



Test Report

| | |
|--------------|-------------------------------|
| Product Name | Wireless Serial Device Server |
| Model No | NPort W2250, NPort W2150 |
| FCC ID. | SLEW2250 |

| | |
|-----------|------------------------------------------------------------------------------------|
| Applicant | Moxa Inc. |
| Address | F1.4, No. 135, Lane 235, Pao-Chiao Rd., Shing Tien City, Taipei, Taiwan, R.O.C. |

| | |
|-----------------|--------------------|
| Date of Receipt | Nov. 01. 2004 |
| Issue Date | Sep. 22. 2008 |
| Report No. | 089290R-RFUSP06V01 |
| Version | V1.0 |

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.
This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Test Report Certification

Issue Date: Sep. 22. 2008

Report No.: 089290R-RFUSP06V01



Accredited by NIST (NVLAP)
NVLAP Lab Code: 200533-0

| | |
|---------------------|---------------------------------------------------------------------------------|
| Product Name | Wireless Serial Device Server |
| Applicant Moxa | Inc. |
| Address | Fl.4, No. 135, Lane 235, Pao-Chiao Rd., Shing Tien City, Taipei, Taiwan, R.O.C. |
| Manufacturer Moxa | Inc. |
| Model No. | NPort W2250, NPort W2150 |
| FCC ID. | SLEW2250 |
| Rated Voltage | AC 120V/60Hz |
| Working Voltage | AC 120V/60Hz |
| Trade Name | MOXA |
| Applicable Standard | FCC CFR Title 47 Part 15 Subpart C: 2007 ANSI C63.4: 2003 |
| Test Result | Complied |



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Documented By :

(Engineering Adm. Specialist /

Rita Huang)



Tested By :

(Engineer / Tim Sung)

Approved By :

(Manager / Vincent Lin)



Testing Laboratory

0914

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

| | |
|-------------------------|------------------------------------------------------------------------------------------|
| Product Name | Wireless Serial Device Server |
| Trade Name | MOXA |
| Model No. | NPort W2250, NPort W2150 |
| FCC ID. | SLEW2250 |
| Frequency Range | 802.11b: 2412-2462MHz |
| Number of Channels | 802.11b: 11 |
| Data Rate | IEEE 802.11b – 1, 2, 5.5, 11Mbps |
| Type of Modulation | 802.11b:DSSS DBPSK, DQPSK, CCK |
| Antenna Type | Dipole |
| Antenna Gain | Refer to the table “Antenna List” |
| Channel Control | AUTO |
| Power Adapter(optional) | MFR: MOXA M/N: JOD-35U-95 Cable Out: Non-Shielded, 1.8m with one ferrite core bonded. |

Antenna List

| No. | Manufacturer | Part No. | Peak Gain |
|-----|--------------------------------|--------------|--------------------|
| 1 | FULL RISE ELECTRONIC CO., LTD. | E421C-2000A1 | 2.14dBi in 2.4 GHz |

Frequency of Each Channel (802.11b):

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|------------|-----------|------------|-----------|-------------|-----------|
| Channel 1: | 2412 MHz | Channel 5: | 2432 MHz | Channel 9: | 2452 MHz |
| Channel 2: | 2417 MHz | Channel 6: | 2437 MHz | Channel 10: | 2457 MHz |
| Channel 3: | 2422 MHz | Channel 7: | 2442 MHz | Channel 11: | 2462 MHz |
| Channel 4: | 2427 MHz | Channel 8: | 2447 MHz | | |

Note:

1. The EUT is a Wireless Serial Device Server with a built-in 2.4GHz WLAN transceiver.
2. The EUT is including two models for different marketing requirement.

| Model Number | Description |
|--------------|-----------------------------------|
| Nport W2250 | Include 2 port for RS-232/422/485 |
| Nport W2150 | Include 1 port for RS-232/422/485 |

3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11b is 11Mbps.)
5. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247 for direct sequence spread spectrum devices.

1.2. Operational Description

The EUT is a Wireless Serial Device Server with 11 channels. This device provides four kinds of transmitting speed 1, 2, 5.5 and 11Mbps. The modulation of device is BPSK, QPSK and CCK (IEEE 802.11b).

The device adapts direct sequence spread spectrum modulation. The antenna provides diversity function to improve the receiving function.

This Wireless Serial Device Server, compliant with IEEE 802.11b, 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 Direct Sequence Spread Spectrum (DSSS) radio transmission, the Wireless Serial Device Server Wired Equivalent Protection (WEP) algorithm is used. In addition, its standard compliance ensures that it can communicate with any IEEE 802.11b network.

| | |
|------------|-----------------------------|
| Test Mode: | Mode 1: Transmitter 802.11b |
|------------|-----------------------------|

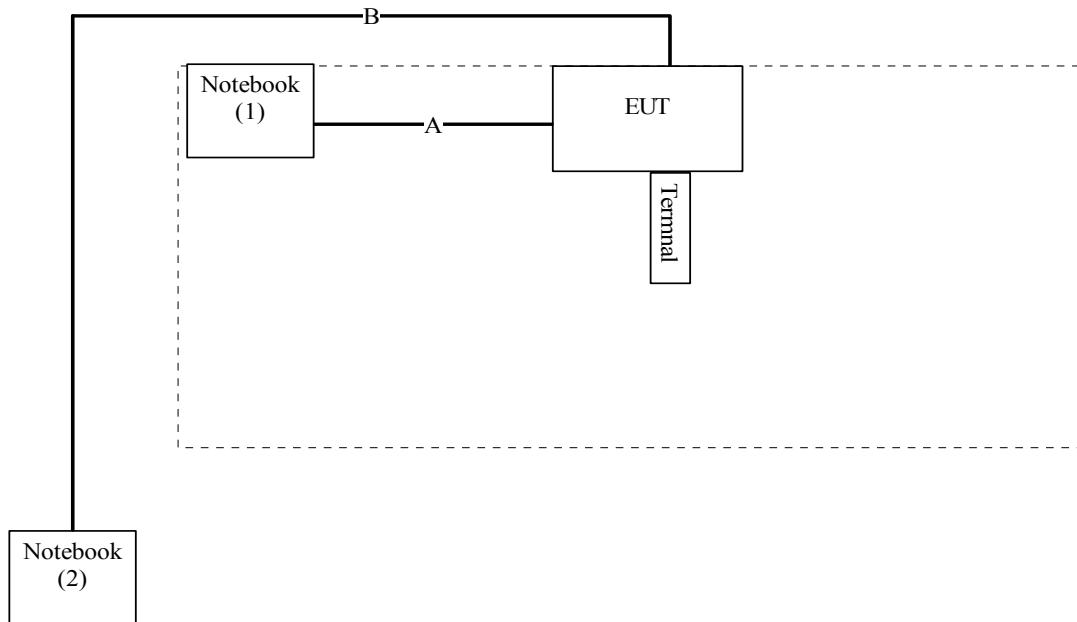
1.3. Tested System Details

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

| Product | Manufacturer | Model No. | Serial No. | Power Cord |
|----------------|--------------|-----------|------------|--------------------|
| 1. Notebook PC | DELL | PP01L | 96FFC A00 | Non-Shielded, 1.8m |
| 2. Notebook PC | ASUS S13 | 00 2 | 6NP018680 | Non-Shielded, 1.8m |

| Signal Cable Type | Signal cable Description |
|-------------------|--------------------------|
| A RS 232 Cable | Shielded, 1.2m |
| B LAN Cable | Non-Shielded, 7m |

1.4. Configuration of Tested System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.3
- (2) Execute <http://192.168.10.2> Web site on the EUT.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Press “OK” to start the continuous receiver.
- (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 : <http://tw.quietek.com/modules/myalbum/>

The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : <http://www.quietek.com/>

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 : service@quietek.com

FCC Accreditation Number: TW1014



2. Conducted Emission

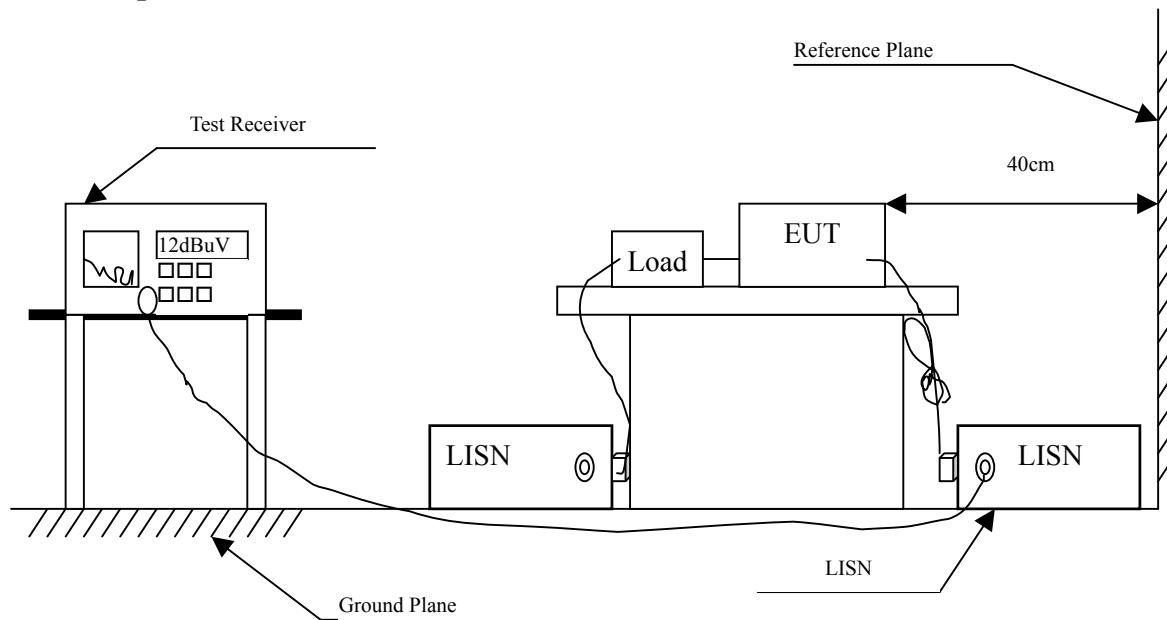
2.1. Test Equipment

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, 2008 | |
| 2 | L.I.S.N. | R & S | ESH3-Z5/825016/6 | May, 2008 | EUT |
| 3 | L.I.S.N. | Kyoritsu | KNW-407/8-1420-3 | May, 2008 | Peripherals |
| 4 | Pulse Limiter | R & S | ESH3-Z2 | May, 2008 | |
| 5 | No.1 Shielded Room | | | N/A | |

Note: All instruments are calibrated every one year.

2.2. Test Setup



2.3. Limits

| FCC Part 15 Subpart B Paragraph 15.107 (dBuV) Limit | | |
|------------------------------------------------------------|--------|-------|
| Frequency MHz | Limits | |
| | QP A | VG |
| 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 : Wireless Serial Device Server
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmitter 802.11b (2441MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|-------------------|----------------|---------------|-------------------|---------|--------|
| MHz | | dB dBuV | dBuV dB | | dBuV |
| LINE 1 | | | | | |
| Quasi-Peak | | | | | |
| 0.158 | 0.700 | 36.470 | 37.170 | -28.400 | 65.570 |
| 0.232 | 0.700 | 33.110 | 33.810 | -28.570 | 62.380 |
| 0.308 | 0.700 | 32.700 | 33.400 | -26.620 | 60.020 |
| 0.345 | 0.700 | 31.960 | 32.660 | -26.420 | 59.080 |
| 0.520 | 0.700 | 25.560 | 26.260 | -29.740 | 56.000 |
| 0.940 | 0.700 | 17.700 | 18.400 | -37.600 | 56.000 |
| Average | | | | | |
| 0.158 | 0.700 | 12.000 | 12.700 | -42.870 | 55.570 |
| 0.232 | 0.700 | 12.300 | 13.000 | -39.380 | 52.380 |
| 0.308 | 0.700 | 19.900 | 20.600 | -29.420 | 50.020 |
| 0.345 | 0.700 | 12.100 | 12.800 | -36.280 | 49.080 |
| 0.520 | 0.700 | 19.000 | 19.700 | -26.300 | 46.000 |
| 0.940 | 0.700 | 13.700 | 14.400 | -31.600 | 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 : Wireless Serial Device Server
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmitter 802.11b (2441MHz)

| Frequency Correct | | Reading | Measurement | Margin | Limit |
|-------------------|---------|---------|-------------|---------|--------|
| Factor | Level | Level | | | |
| MHz | dB dBuV | | dBuV dB | | dBuV |
| LINE 2 | | | | | |
| Quasi-Peak | | | | | |
| 0.170 | 0.700 | 38.230 | 38.930 | -26.030 | 64.960 |
| 0.244 | 0.700 | 37.210 | 37.910 | -24.050 | 61.960 |
| 0.314 | 0.700 | 36.080 | 36.780 | -23.080 | 59.860 |
| 0.522 | 0.700 | 36.000 | 36.700 | -19.300 | 56.000 |
| 0.630 | 0.700 | 33.740 | 34.440 | -21.560 | 56.000 |
| 0.741 | 0.700 | 30.070 | 30.770 | -25.230 | 56.000 |
| Average | | | | | |
| 0.170 | 0.700 | 12.900 | 13.600 | -41.360 | 54.960 |
| 0.244 | 0.700 | 12.500 | 13.200 | -38.760 | 51.960 |
| 0.314 | 0.700 | 22.800 | 23.500 | -26.360 | 49.860 |
| 0.522 | 0.700 | 19.200 | 19.900 | -26.100 | 46.000 |
| 0.630 | 0.700 | 19.300 | 20.000 | -26.000 | 46.000 |
| 0.741 | 0.700 | 19.900 | 20.600 | -25.400 | 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

3. Peak Power Output

3.1. Test Equipment

The following test equipments are used during the radiated emission tests:

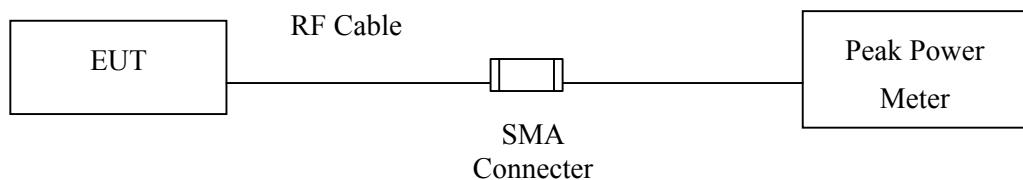
| Equipment Manufacturer | Model No./Serial No. | Last Cal. |
|------------------------|----------------------------|-----------|
| X Power Meter | Anritsu ML2495A/6K00003357 | May, 2008 |
| X Power Sensor | Anritsu MA2491A/034457 | May, 2008 |

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.

3.2. Test Setup

Conducted Measurement



3.3. Test procedures

The EUT was tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

3.4. Limits

The maximum peak power shall be less 1 Watt.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

Product : Wireless Serial Device Server
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b

| Cable loss=0.5dB | | Peak Power Output Value (dBm) | | | | |
|------------------|-----------------|-------------------------------|-------|---------|--------|----------------|
| Channel No. | Frequency (MHz) | Data Rate | | | | Required Limit |
| | | 1 Mbps | 2Mbps | 5.5Mbps | 11Mbps | |
| 1 | 2412.00 | -- | -- | -- | 16.76 | 1Watt= 30 dBm |
| 6 | 2437.00 | 16.85 | 16.92 | 17.13 | 17.22 | 1Watt= 30 dBm |
| 11 | 2462.00 | -- | -- | -- | 17.43 | 1Watt= 30 dBm |

Note: Peak Power Output Value =Reading value on peak power meter + cable loss

4. Radiated Emission

4.1. Test Equipment

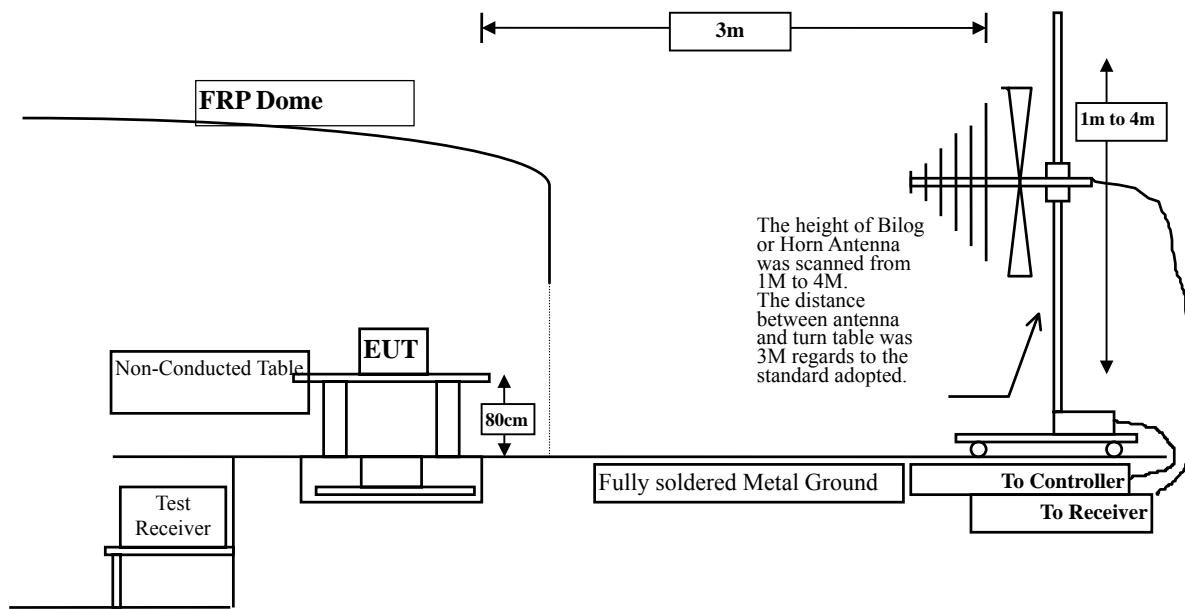
The following test equipment are used during the radiated emission test:

| Test Site | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|----------------------------------------------|---------------------|--------------|------------------------|------------|
| <input type="checkbox"/> Site # 1 | Test Receiver | R & S | ESVS 10 / 834468/003 | May, 2008 |
| | Spectrum Analyzer | Advantest | R3162/ 00803480 | May, 2008 |
| | Pre-Amplifier | Advantest | BB525C/ 3307A01812 | May, 2008 |
| | Bilog Antenna | SCHAFFNER | CBL6112B / 2697 | Sep., 2008 |
| <input type="checkbox"/> Site # 2 | Test Receiver | R & S | ESCS 30 / 836858 / 022 | May, 2008 |
| | Spectrum Analyzer | Advantest | R3162 / 100803466 | May, 2008 |
| | Pre-Amplifier | Advantest | BB525C/3307A01814 | May, 2008 |
| | Bilog Antenna | SCHAFFNER | CBL6112B / 2705 | May, 2008 |
| | Horn Antenna | ETS | 3115 / 0005-6160 | Sep., 2008 |
| | Pre-Amplifier | QTK | QTK-AMP-01 / 0001 | May, 2008 |
| <input checked="" type="checkbox"/> Site # 3 | X Test Receiver | R & S | ESI 26 / 838786/004 | May, 2008 |
| | X Spectrum Analyzer | Agilent | E4407B / US39440758 | May, 2008 |
| | X BiLog Antenna | SCHAFFNER | CBL6112B / 2697 | May, 2008 |
| | X Horn Antenna | Schwarzbeck | BBHA9120D / 305, 306 | July, 2008 |
| | X Horn Antenna | Schwarzbeck | BBHA9170 / 208, 209 | July, 2008 |
| | X Pre-Amplifier | QTK | QTK-AMP-01 / 0001 | July, 2008 |
| | X Pre-Amplifier | QTK | QTK-AMP-03 / 0003 | May, 2008 |
| | X Pre-Amplifier | HP | 8449B / 3008A01123 | July, 2008 |

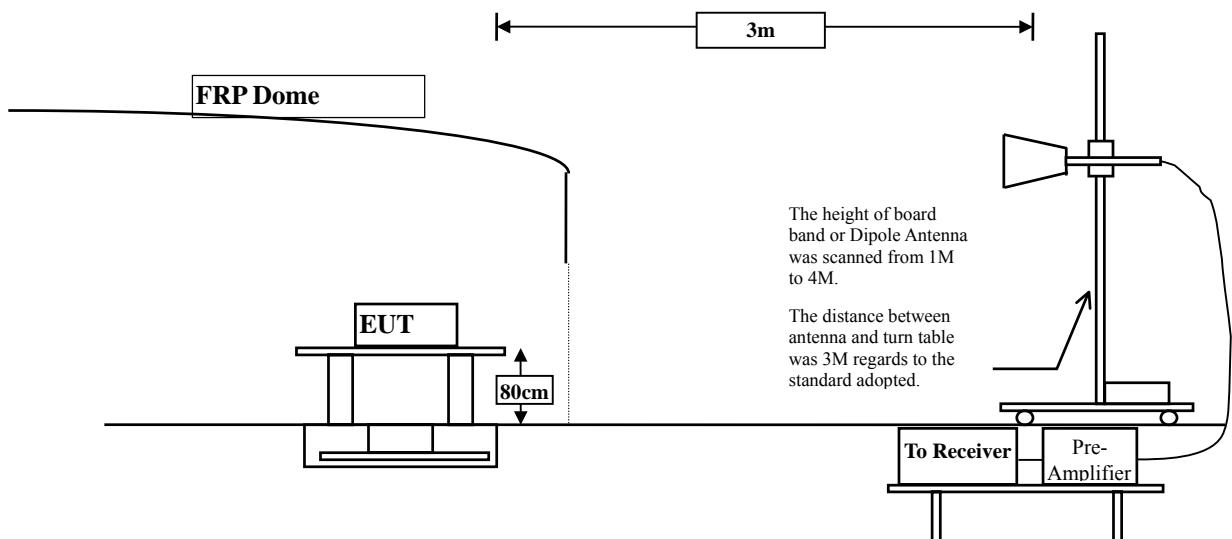
Note: 1. All equipments are calibrated every one year.
2. Test equipments marked by "X" are used to measure the final test results.

4.2. Test Setup

Below 1GHz



Above 1GHz



4.3. Limits

| FCC Part 15 Subpart B Paragraph 15.109 Limits | | |
|------------------------------------------------------|----------|-----------|
| Frequency 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 : 1. RF Voltage (dBuV) = $20 \log \text{RF Voltage (uV)}$
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 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 can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be 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 beamwidth of the antenna.

The worst radiated emission is measured 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 : Wireless Serial Device Server
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2412MHz)

| Frequency | Correct | Reading | Measurement | Margin | Limit |
|-----------------------|---------|---------|-------------|---------|--------|
| Factor | | Level | Level | | |
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| Horizontal | | | | | |
| Peak Detector: | | | | | |
| 4824.000 | 0.760 | 43.820 | 44.580 | -29.420 | 74.000 |
| 7236.000 | 6.510 | 44.980 | 51.490 | -22.510 | 74.000 |
| 9648.000 | 9.740 | 44.060 | 53.800 | -20.200 | 74.000 |
| Average | | | | | |
| Detector: | | | | | |
| -- | | | | | |
| Vertical | | | | | |
| Peak Detector: | | | | | |
| 4824.000 | 0.760 | 43.140 | 43.900 | -30.100 | 74.000 |
| 7236.000 | 6.510 | 44.420 | 50.930 | -23.070 | 74.000 |
| 9648.000 | 9.740 | 43.760 | 53.500 | -20.500 | 74.000 |
| Average | | | | | |
| Detector: | | | | | |
| -- | | | | | |

Note:

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. “*”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Serial Device Server
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2437 MHz)

| Frequency Correct | Reading | Measurement | Margin | Limit |
|-------------------|---------|-------------|--------|--------|
| Factor | Level | Level | | |
| MHz dB | dBuV | dBuV/m dB | | dBuV/m |

Horizontal

Peak Detector:

| | | | | | |
|----------|-------|--------|--------|---------|--------|
| 4874.000 | 0.940 | 43.950 | 44.890 | -29.110 | 74.000 |
| 7311.000 | 6.660 | 43.320 | 49.980 | -24.020 | 74.000 |
| 9748.000 | 9.860 | 44.090 | 53.950 | -20.050 | 74.000 |

Average

Detector:

--

Vertical

Peak Detector:

| | | | | | |
|----------|-------|--------|--------|---------|--------|
| 4874.000 | 0.940 | 43.600 | 44.540 | -29.460 | 74.000 |
| 7311.000 | 6.660 | 42.890 | 49.550 | -24.450 | 74.000 |
| 9748.000 | 9.860 | 44.030 | 53.890 | -20.110 | 74.000 |

Average

Detector:

--

Note:

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. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Serial Device Server
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2462 MHz)

| Frequency | Correct | Reading | Measurement | Margin | Limit |
|-----------|---------|---------|-------------|--------|--------|
| Factor | | Level | Level | | |
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |

Horizontal

Peak Detector:

| | | | | | |
|----------|--------|--------|--------|---------|--------|
| 4924.000 | 1.050 | 42.570 | 43.620 | -30.380 | 74.000 |
| 7386.000 | 6.820 | 43.850 | 50.670 | -23.330 | 74.000 |
| 9848.000 | 10.060 | 43.920 | 53.980 | -20.020 | 74.000 |

Average

Detector:

--

Vertical

Peak Detector:

| | | | | | |
|----------|--------|--------|--------|---------|--------|
| 4924.000 | 1.050 | 42.630 | 43.680 | -30.320 | 74.000 |
| 7386.000 | 6.820 | 43.940 | 50.760 | -23.240 | 74.000 |
| 9848.000 | 10.060 | 43.880 | 53.940 | -20.060 | 74.000 |

Average

Detector:

--

Note:

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. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Serial Device Server
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2437 MHz)

| Frequency | Correct | Reading | Measurement | Margin | Limit |
|-------------------|---------|---------|-------------|---------|--------|
| Factor | | Level | Level | | |
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| Horizontal | | | | | |
| 199.750 | 10.140 | 19.750 | 29.890 | -13.610 | 43.500 |
| 435.460 | 18.610 | 14.850 | 33.460 | -12.540 | 46.000 |
| 460.680 | 19.690 | 13.960 | 33.650 | -12.350 | 46.000 |
| 499.480 | 19.630 | 14.430 | 34.060 | -11.940 | 46.000 |
| 699.300 | 22.700 | 7.750 | 30.450 | -15.550 | 46.000 |
| 799.210 | 24.220 | 3.240 | 27.460 | -18.540 | 46.000 |
| Vertical | | | | | |
| 53.280 | 7.230 | 25.660 | 32.890 | -6.110 | 39.000 |
| 146.400 | 11.090 | 18.390 | 29.480 | -14.020 | 43.500 |
| 435.460 | 20.050 | 5.260 | 25.310 | -20.690 | 46.000 |
| 609.090 | 23.270 | 2.060 | 25.330 | -20.670 | 46.000 |
| 699.300 | 22.510 | 1.300 | 23.810 | -22.190 | 46.000 |
| 900.090 | 26.250 | 2.580 | 28.830 | -17.170 | 46.000 |

Note:

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. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

5. RF antenna conducted test

5.1. Test Equipment

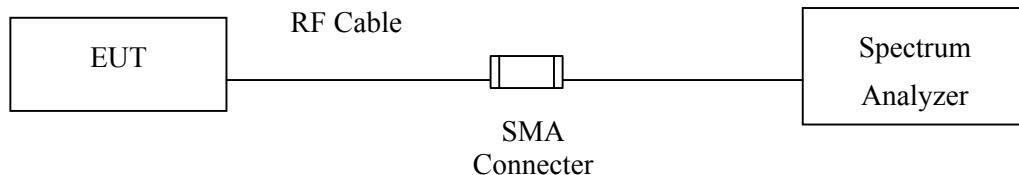
The following test equipments are used during the radiated emission tests:

| Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|-------------------|--------------|-----------------------|-------------|
| Spectrum Analyzer | Agilent | E4407B / US39440758 | May, 2008 |
| X Test Receiver | R & S | ESI 26 / 838786 / 004 | May, 2008 |
| Spectrum Analyzer | Agilent | N9010A / MY48030495 | April, 2008 |

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.

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 Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

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

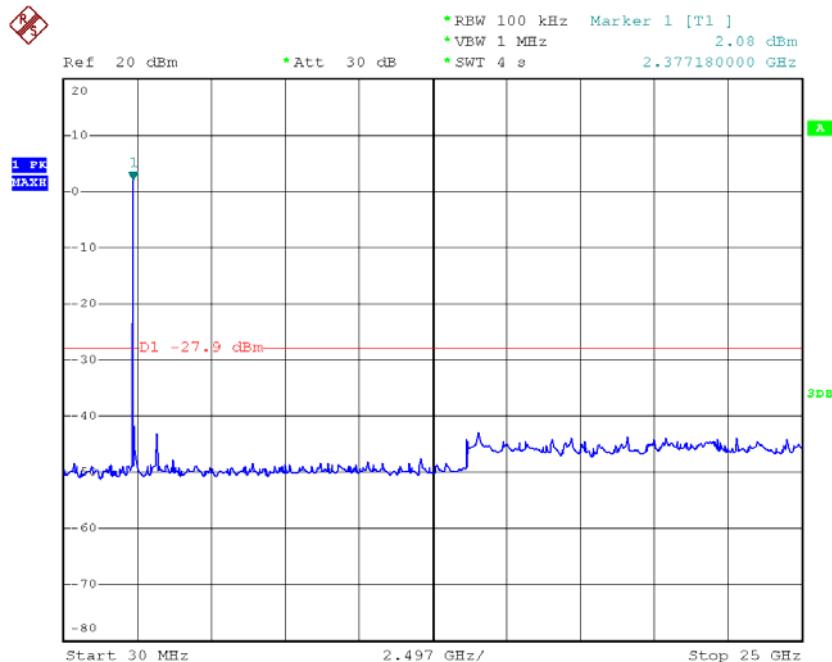
5.5. Uncertainty

The measurement uncertainty
 Conducted is defined as ± 1.27 dB

5.6. Test Result of RF antenna conducted test

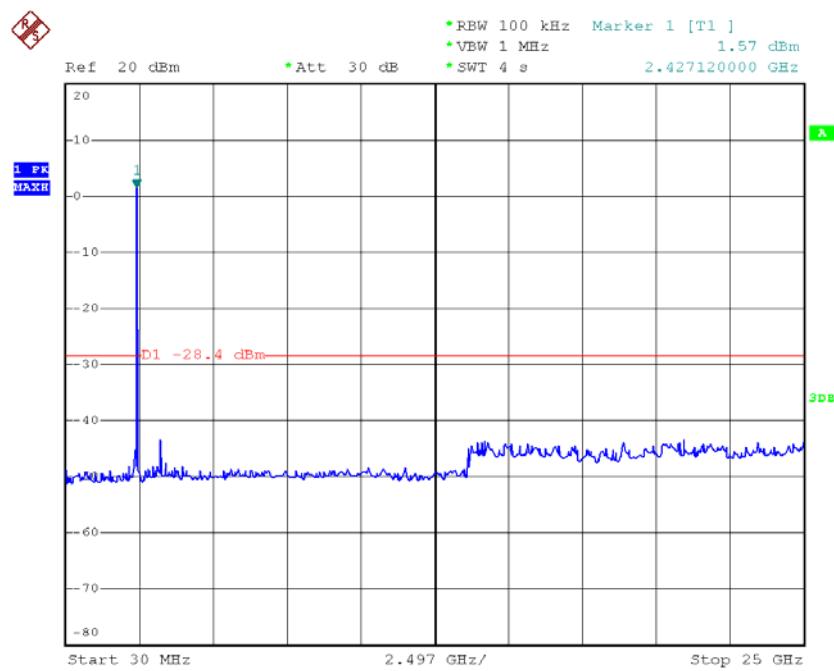
Product : Wireless Serial Device Server
Test Item : RF antenna conducted test
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b

Channel 01 (2412MHz)



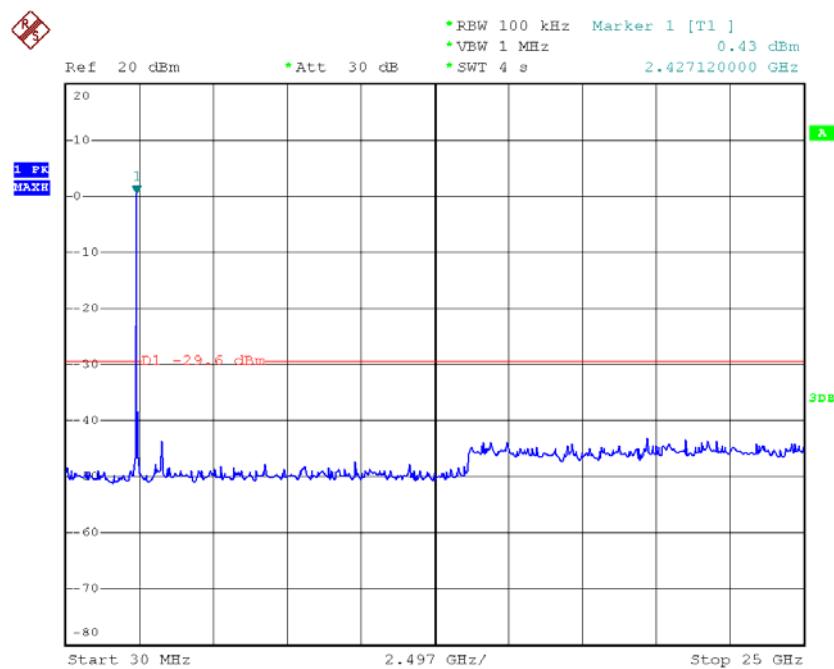
Date: 9.JUL.2008 11:05:35

Channel 06 (2437MHz)



Date: 9.JUL.2008 11:06:23

Channel 11 (2462MHz)



Date: 9.JUL.2008 11:07:01

6. Radiated Emission Band Edge

6.1. Test Equipment

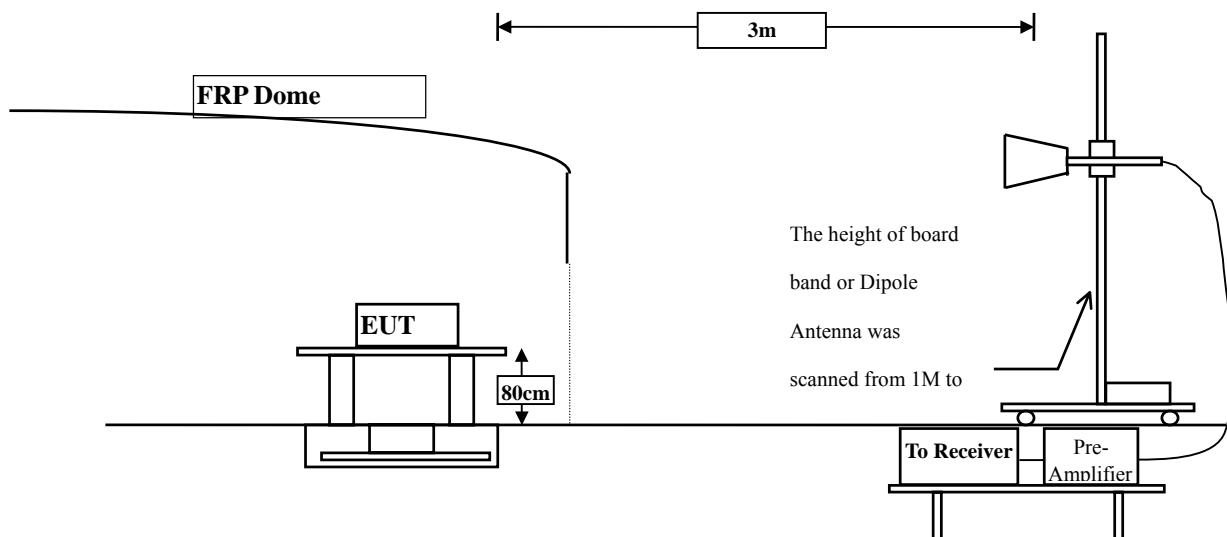
The following test equipments are used during the band edge tests:

| Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---------------------|--------------|-----------------------|------------|
| X Test Receiver | R & S | ESI 26 / 838786 / 004 | May, 2008 |
| X Spectrum Analyzer | Agilent | E4407B / US39440758 | May, 2008 |
| X Bilog Antenna | SCHAFFNER | CBL6112B / 2697 | May, 2008 |
| X Horn Antenna | Schwarzbeck | BBHA9120D / 305, 306 | July, 2008 |
| X Horn Antenna | Schwarzbeck | BBHA9170 / 208, 209 | July, 2008 |
| X Pre-Amplifier | QTK | QTK-AMP-01 / 0001 | July, 2008 |
| X Pre-Amplifier | QTK | QTK-AMP-03 / 0003 | May, 2008 |
| X Pre-Amplifier | HP | 8449B / 3008A01123 | July, 2008 |

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.

6.2. Test Setup

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 Oct 2002 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

± 3.9 dB above 1GHz

6.6. Test Result of Band Edge

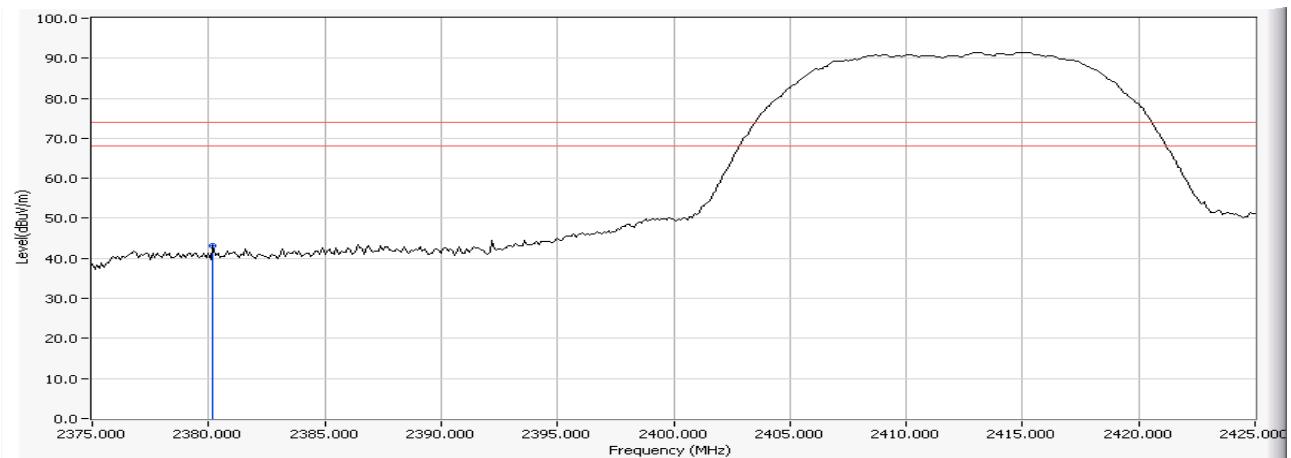
Product : Wireless Serial Device Server
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

RF Radiated Measurement (Horizontal):

| Channel | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|-------------|-----------------|---------------------|----------------------|-------------------------|---------------------|------------------------|--------|
| 1 (Peak) | 2380.200 | -6.799 | 50.026 | 43.227 | 74.00 | 54.00 | Pass |
| 1 (Average) | -- | -- | -- | -- | 74.00 | 54.00 | Pass |

Figure Channel 1:

Horizontal (Peak)



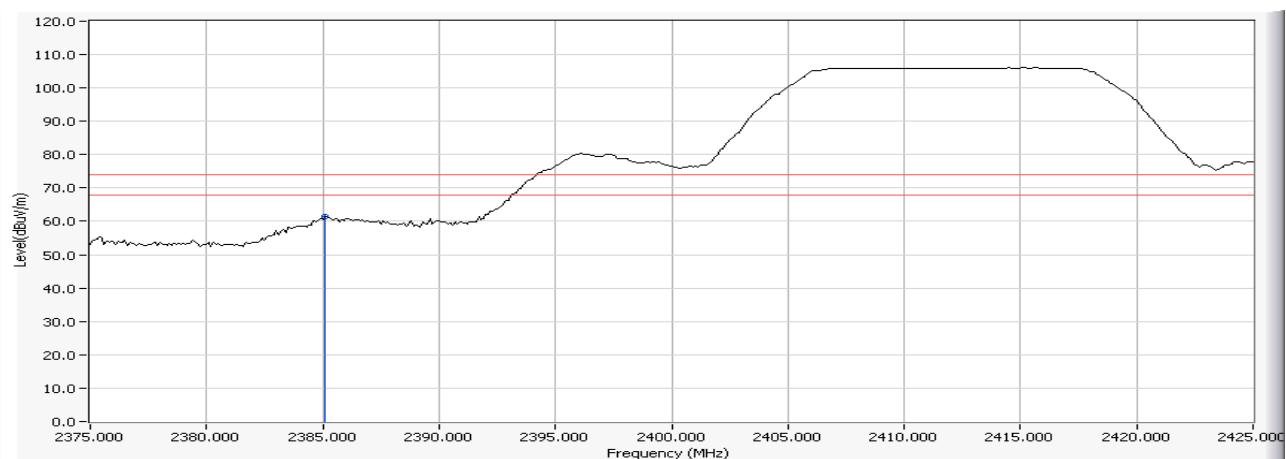
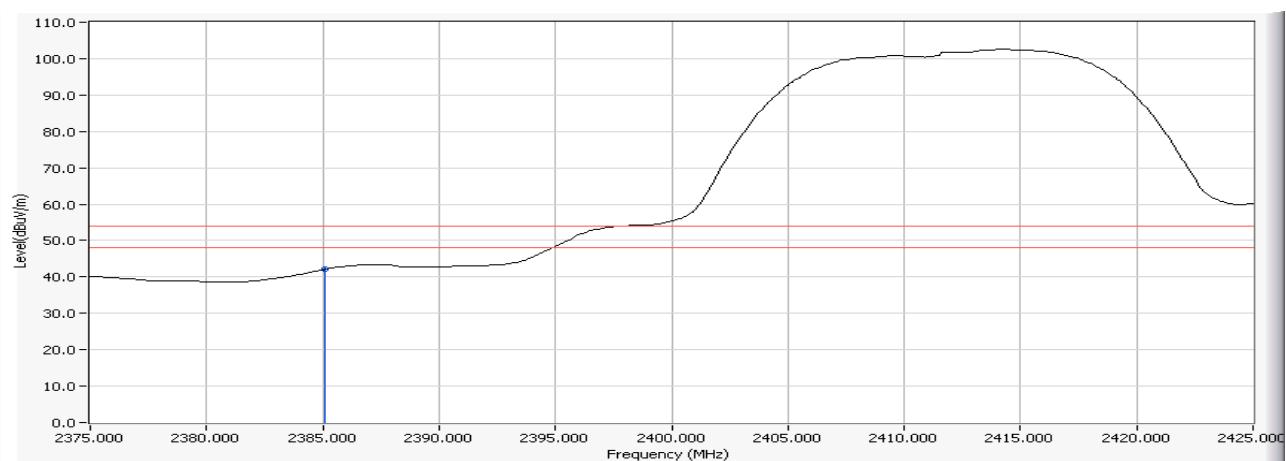
Note:

1. All readings 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. “*”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Serial Device Server
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

RF Radiated Measurement (Vertical):

| Channel | Frequency (MHz) | Correct Fcator (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|-------------|-----------------|---------------------|----------------------|-------------------------|---------------------|------------------------|--------|
| 1 (Peak) | 2385.100 | -6.783 | 68.333 | 61.550 | 74.00 | 54.00 | Pass |
| 1 (Average) | 2385.100 | -6.783 | 48.894 | 42.111 | 74.00 | 54.00 | Pass |

Figure Channel 1:
Vertical (Peak)

Figure Channel 1:
Vertical (Average)

Note:

1. All readings 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. “*”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

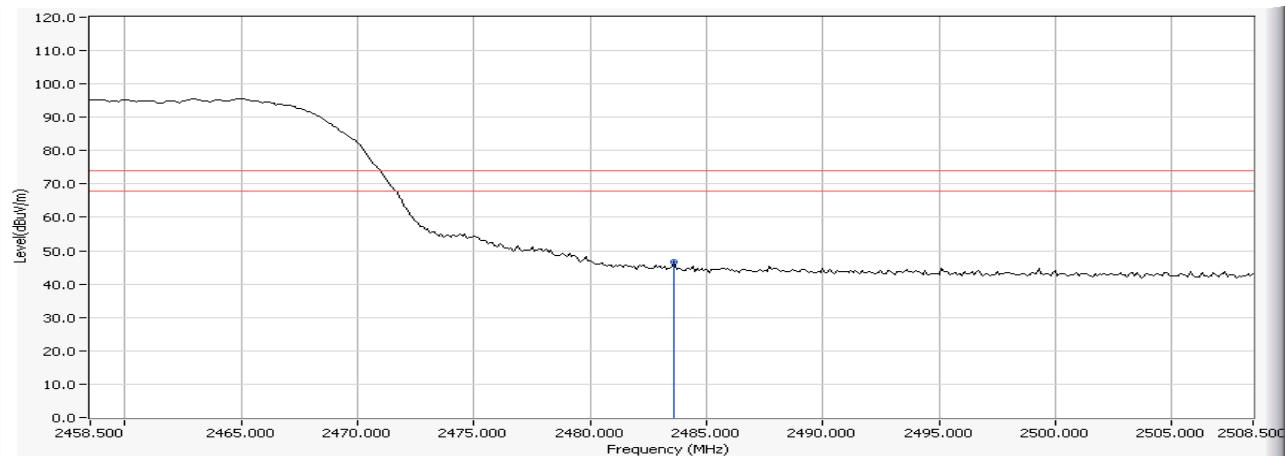
Product : Wireless Serial Device Server
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

RF Radiated Measurement (Horizontal):

| Channel | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|-------------|-----------------|---------------------|----------------------|-------------------------|---------------------|------------------------|--------|
| 11(Peak) | 2483.600 | -6.468 | 53.061 | 46.593 | 74.00 | 54.00 | Pass |
| 11(Average) | -- | --- | | | 74.00 | 54.00 | Pass |

Figure Channel 11:

Horizontal (Peak)



Note:

1. All readings 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. “*”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Serial Device Server
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

RF Radiated Measurement (Vertical):

| Channel | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|-------------|-----------------|---------------------|----------------------|-------------------------|---------------------|------------------------|--------|
| 11(Peak) | 2489.000 | -6.461 | 65.214 | 58.753 | 74.00 | 54.00 | Pass |
| 11(Average) | 2489.000 | -6.461 | 49.809 | 43.348 | 74.00 | 54.00 | Pass |

Figure Channel 11:

Vertical (Peak)

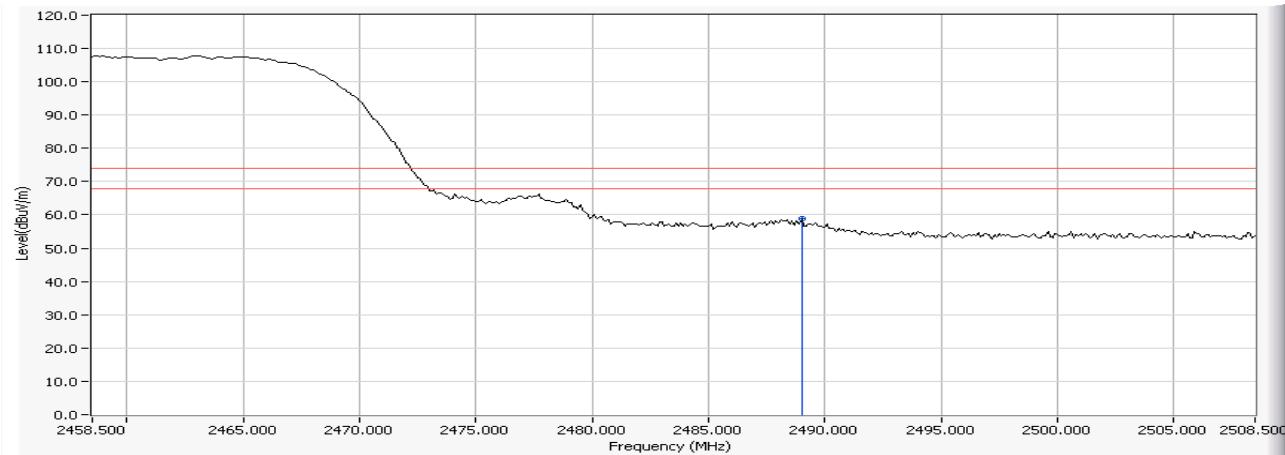
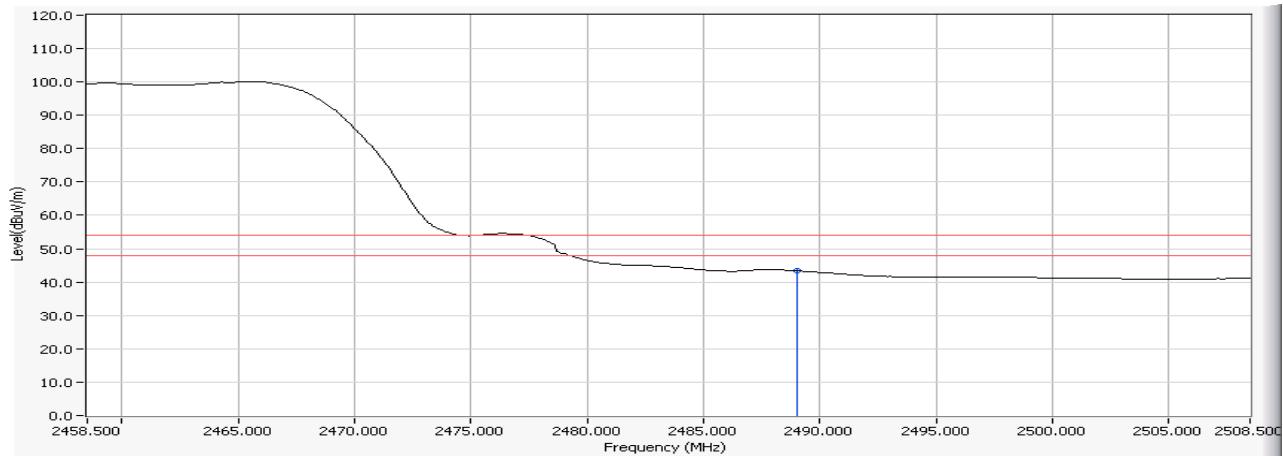


Figure Channel 11:

Vertical (Average)



Note:

1. All readings 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. “*”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

7. Occupied Bandwidth

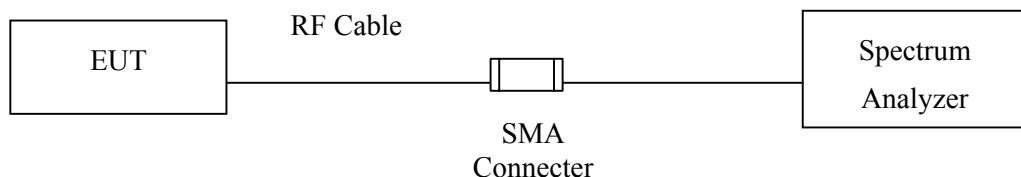
7.1. Test Equipment

The following test equipments are used during the radiated emission tests:

| Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---------------------|--------------|-----------------------|-------------|
| Test Receiver | R & S | ESI 26 / 838786 / 004 | May, 2008 |
| Spectrum Analyzer | Agilent | E4407B / US39440758 | May, 2008 |
| Spectrum Analyzer | Agilent | N9010A / MY48030495 | April, 2008 |
| X Spectrum Analyzer | Advantest | R3162 / 120300652 | June, 2008 |

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.

7.2. Test Setup



7.3. Test Procedures

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Span greater than RBW.

7.4. Limits

The 6 dB bandwidth must be greater than 500 kHz.

7.5. Uncertainty

± 15 0Hz

7.6. Test Result of Occupied Bandwidth

Product : Wireless Serial Device Server
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|-------------|-----------------|-------------------------|----------------------|--------|
| 1 (11Mbps) | 2412.00 | 8950 | >500 | Pass |
| 6 (11Mbps) | 2437.00 | 8850 | >500 | Pass |
| 11 (11Mbps) | 2462.00 | 9350 | >500 | Pass |

Figure Channel 1:

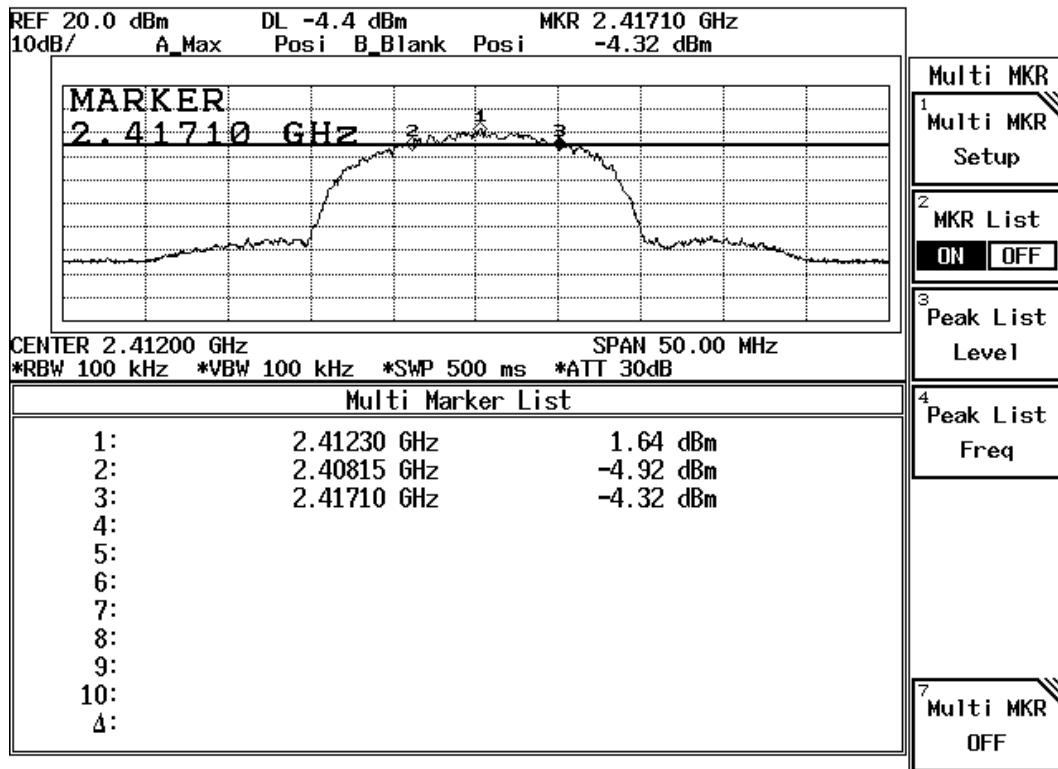


Figure Channel 6:

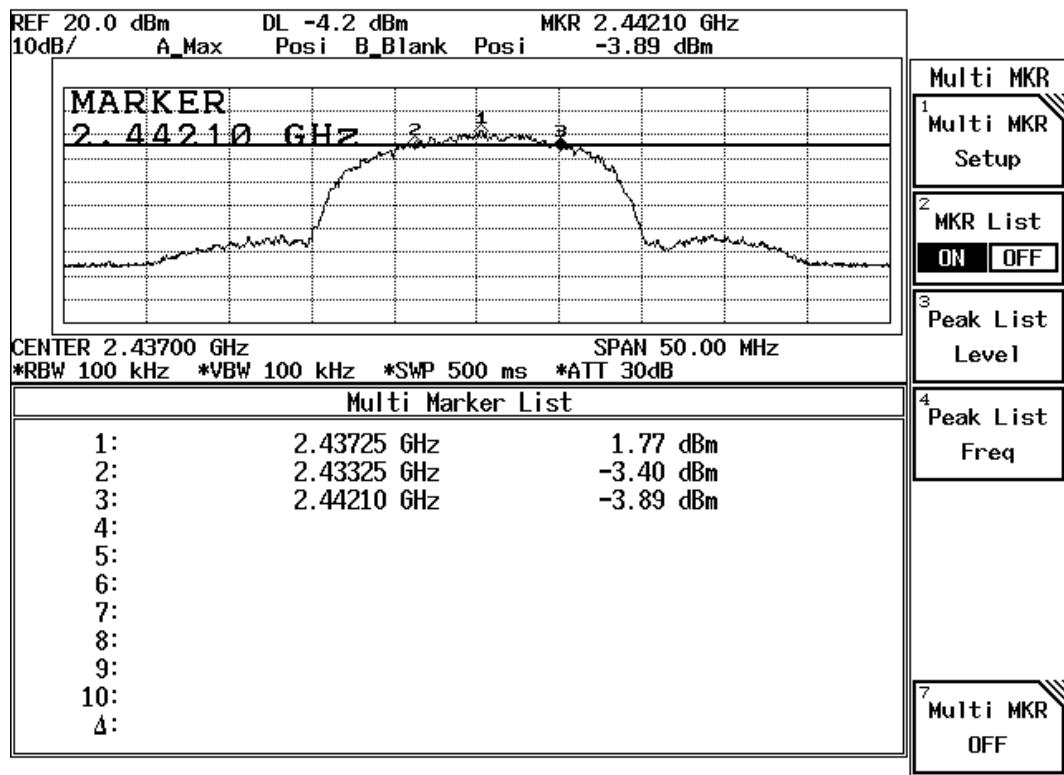
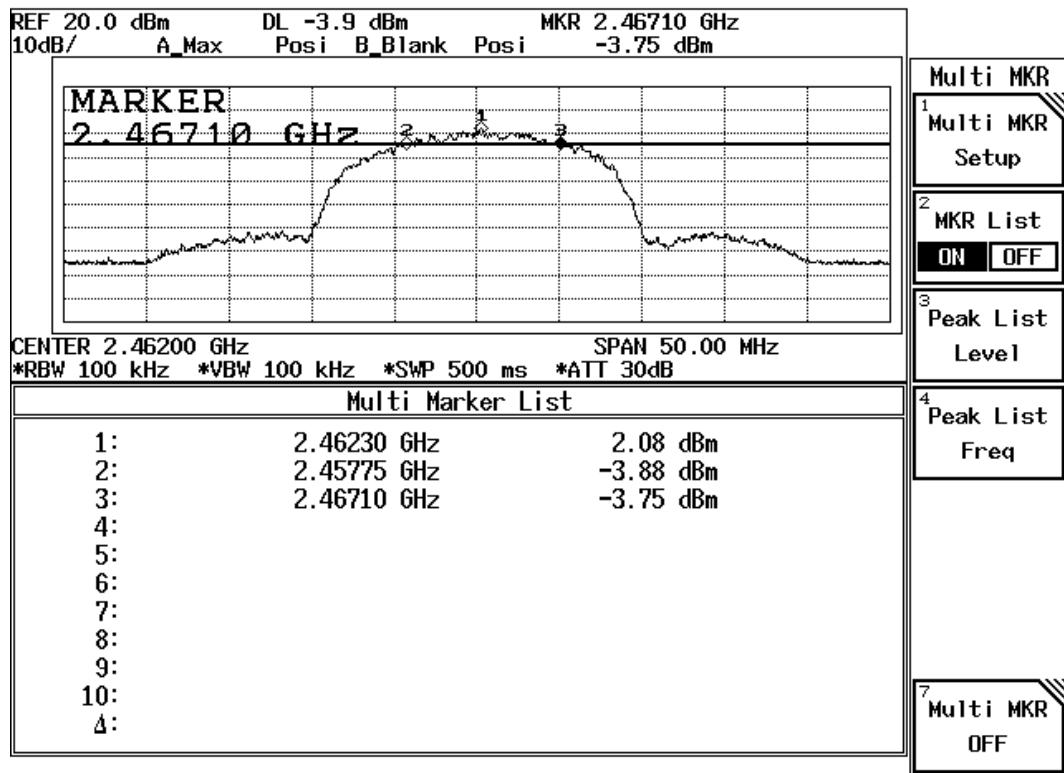


Figure Channel 11:



8. Power Density

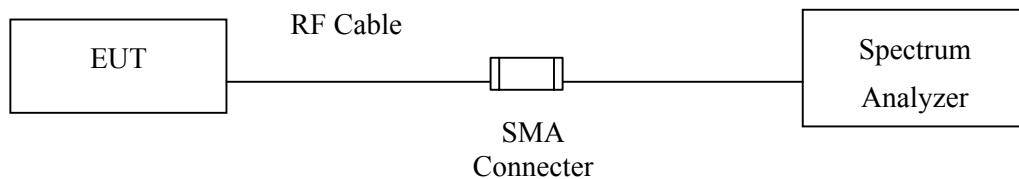
8.1. Test Equipment

The following test equipments are used during the radiated emission tests:

| Equipment | Manufacturer | Model No./Serial No. | Last Cal. | |
|-------------------|-------------------|-----------------------|-------------------|------------|
| Test Receiver | R & S | ESI 26 / 838786 / 004 | May, 2008 | |
| Spectrum Analyzer | Agilent | E4407B / US39440758 | May, 2008 | |
| Spectrum Analyzer | Agilent | N9010A / MY48030495 | April, 2008 | |
| X | Spectrum Analyzer | Advantest | R3162 / 120300652 | June, 2008 |

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.

8.2. Test Setup



8.3. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.4. Test Procedures

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW= 3 kHz, VBW=10KHz, Sweep time=(SPAN/3KHz), detector=Peak detector

8.5. Uncertainty

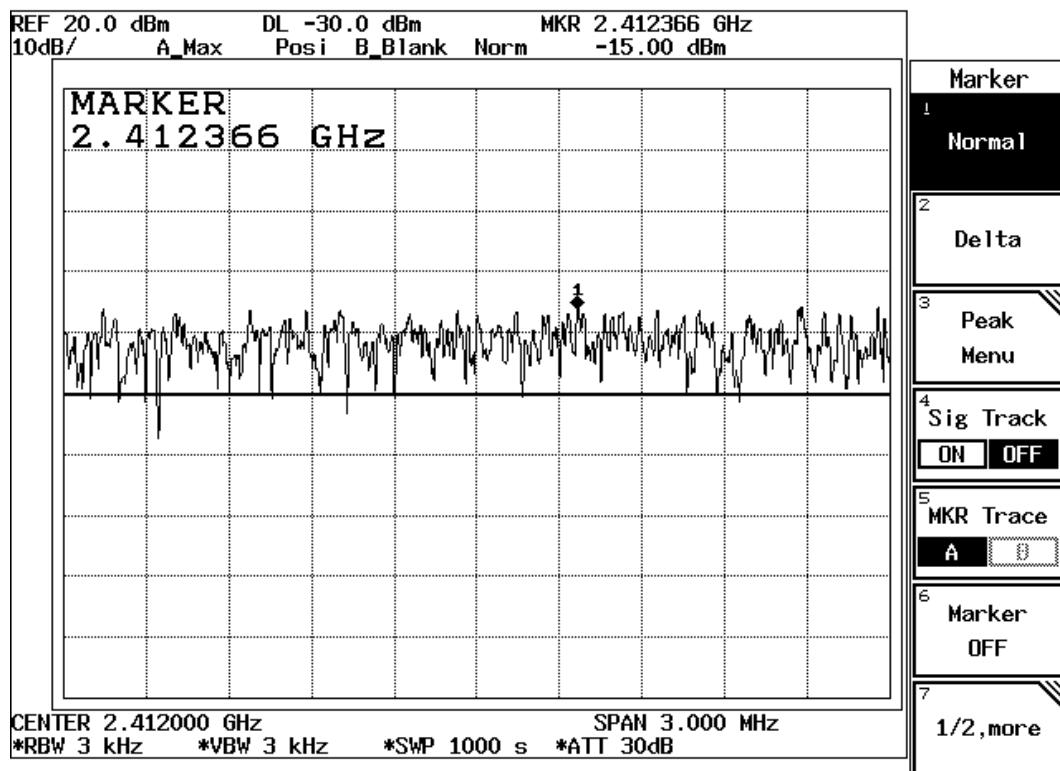
± 1.27 dB

8.6. Test Result of Power Density

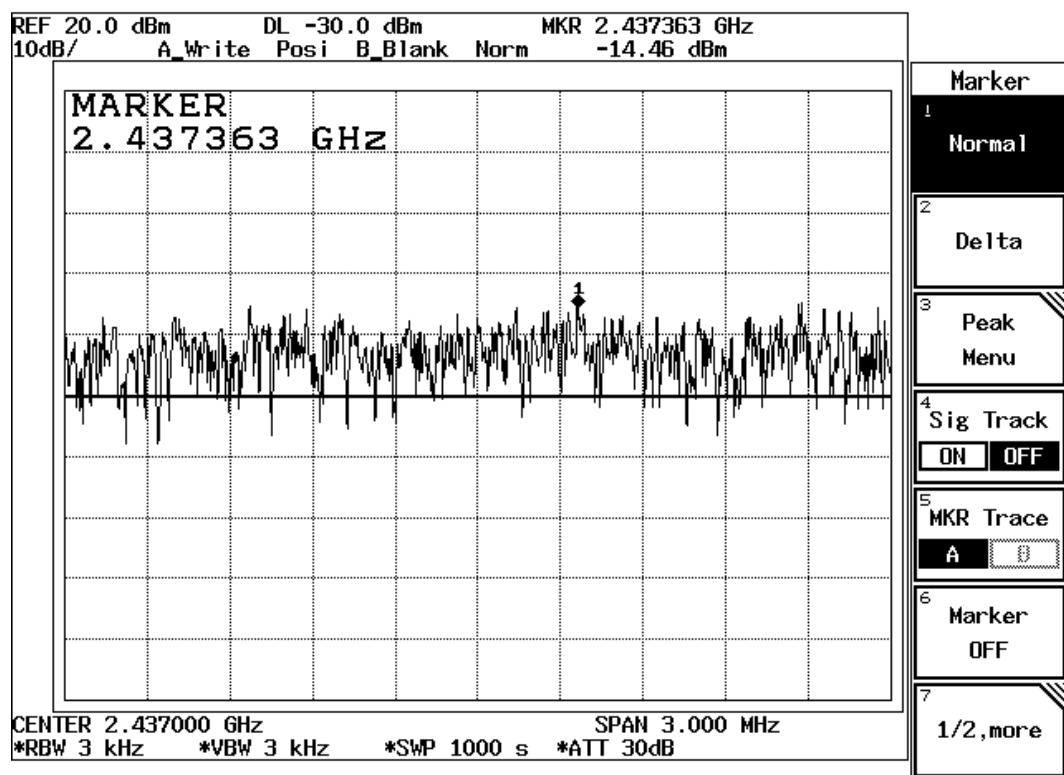
Product : Wireless Serial Device Server
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

| Channel No. | Frequency (MHz) | Measurement Level (dBm) | Required Limit (dBm) | Result |
|-------------|-----------------|-------------------------|----------------------|--------|
| 1 (11Mbps) | 2412.00 | -15.00 | < 10dBm | Pass |
| 6 (11Mbps) | 2437.00 | -14.46 | < 10dBm | Pass |
| 11 (11Mbps) | 2462.00 | -14.08 | < 10dBm | Pass |

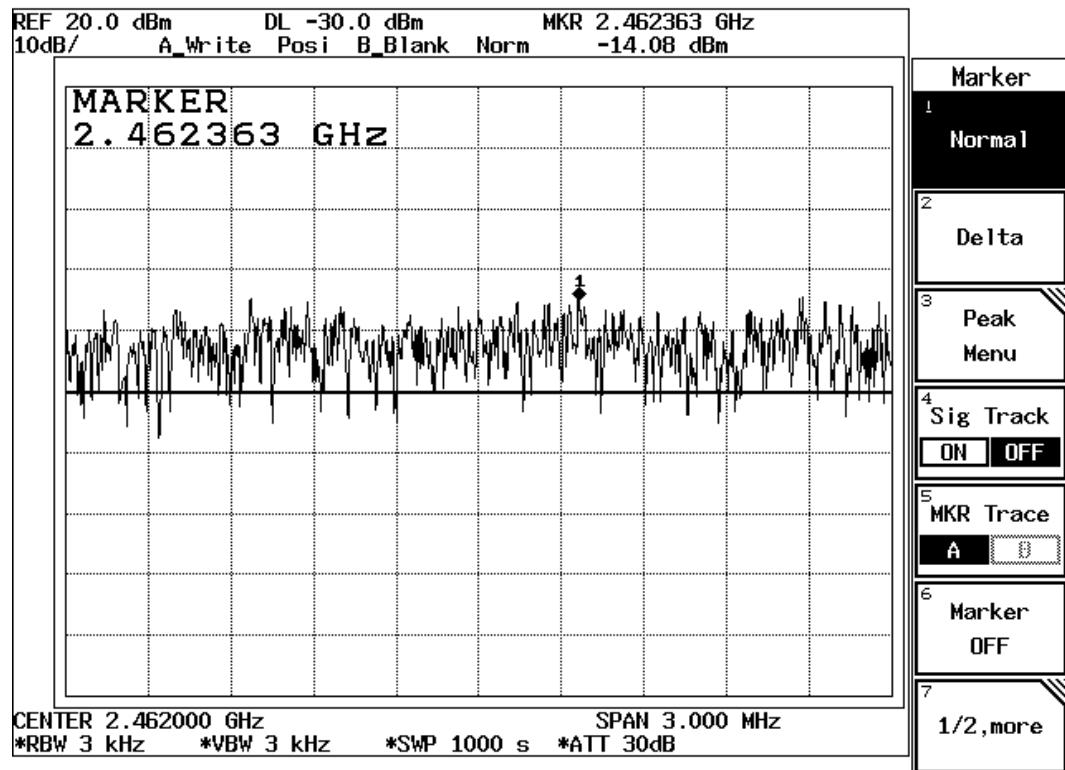
Channel 1:



Channel 6:



Channel 11:



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.