



Test Report

Product Name : Wireless 11b Internal USB Adapter
Model No. : MS-6823A(UB11BM)
FCC ID : I4L-MS6823A

Applicant : MICRO-STAR INT'L Co., LTD

Address : No 69, Li-De st., Jung-He City, Taipei Hsien, Taiwan, R.O.C

Date of Receipt : Jan. 13. 2004

Date of Test : Jan. 14. 2004

Report No. : 041L076FI

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

Test Date : Jan. 14. 2004

Report No. : 041L076FI



Accredited by NIST (NVLAP)

NVLAP Lab Code: 200533-0

Product Name : Wireless 11b Internal USB Adapter

Applicant : MICRO-STAR INT'L Co., LTD

Address : No 69, Li-De st., Jung-He City, Taipei Hsien, Taiwan, R.O.C

Manufacturer : MICRO-STAR INT'L Co., LTD

Model No. : MS-6823A(UB11BM)

Rated Voltage : DC 5V (Power by PC)

Trade Name : MICRO-STAR

Measurement Standard : FCC Part 15 Subpart C Paragraph 15.247

Measurement Procedure : ANSI C63.4: 1992

Test Result : Complied



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Documented By : Grace Lth
(Grace Lin)

Tested By : Tom Hsieh
(Tom Hsieh)

Approved By : Gene Chang
(Gene Chang)

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name : Wireless 11b Internal USB Adapter
 Trade Name : MICRO-STAR
 Model No. : MS-6823A(UB11BM)
 FCC ID : I4L-MS6823A
 Frequency Range : 2412MHz to 2462MHz
 Channel Number : 11
 Data Speed (IEEE 802.11b) : 1Mbps, 2Mbps, 5.5Mbps, 11Mbps
 Type of Modulation : Direct Sequence Spread Spectrum
 Antenna Type : Connector
 Antenna Gain : -0.61dBi
 Channel Control : Auto
 Working Voltage : DC 5V (Power by PC)

Frequency of Each Channel:

| 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. This device is a 2.4GHz Wireless 11b Internal USB Adapter included 812.11b a 2.4GHz receiving function, a 2.4GHz transmitting function.
2. Regards to the frequency band operation; the highest rate that was included the lowest 、 middle and highest frequency of channel were selected to perform the test, then shown on this report.
3. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.

1.2. Operational Description

EUT is a Wireless 11b Internal USB Adapter with 11 channels. This device provided four kinds of transmitting speed 1, 2, 5.5 and 11Mbps. The device of RF carrier is DQPSK, DBPSK and CCK (IEEE 802.11b)

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

This Wireless 11b Internal USB Adapter, 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 Direst Sequence Spread Spectrum (DSSS) radio transmission, the Wireless 11b Internal USB Adapter 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: TX 11MHz (Channel 1)
 Mode 1: TX 11MHz (Channel 6)
 Mode 1: TX 11MHz (Channel 11)

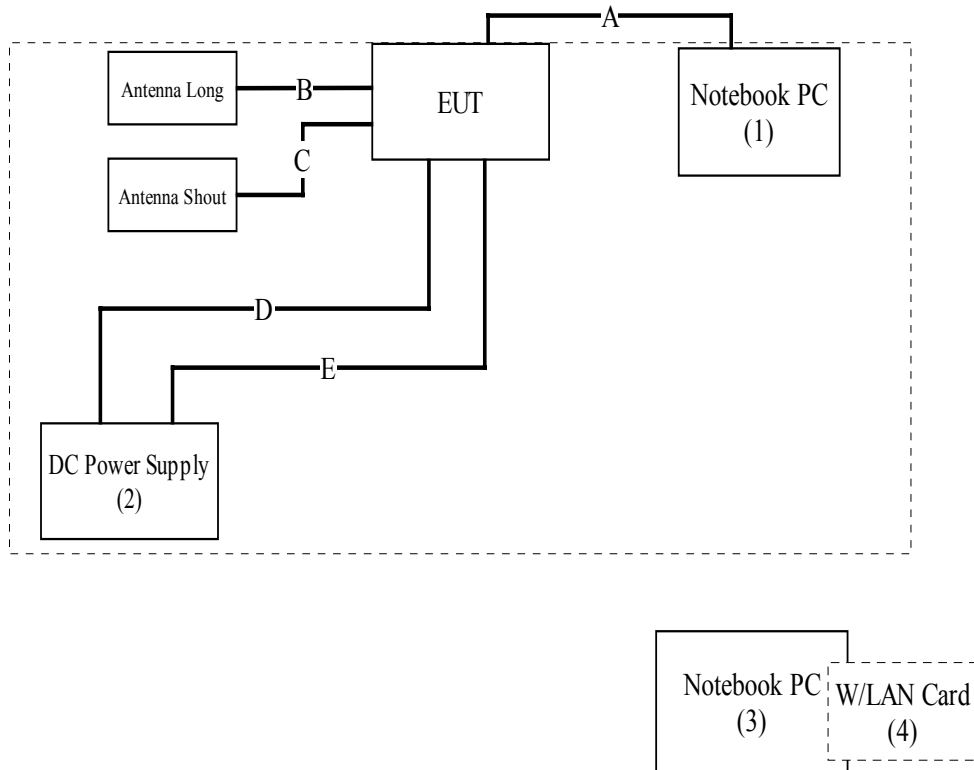
1.3. Tested System Details

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. | FCC ID | Power Cord |
|-----|-----------------|--------------|-----------|-------------|-----------|--------------------|
| (1) | Notebook PC | ASUS | S1300 | 24NP035390 | DoC | Non-Shielded, 1.8m |
| (2) | DC Power Supply | Topward | 6303D | 670302 | N/A | Non-shielded, 1.8m |
| (3) | Notebook PC | ASUS | S1300 | 26NP018680 | DoC | Non-Shielded, 1.8m |
| (4) | W/LAN Card | LEMEL | LM-WLC030 | 1231Q048877 | H8NWLC030 | N/A |

| | Signal Cable Type | Signal cable Description |
|----|---------------------|---------------------------------------------------|
| A. | USB Cable | Non-Shielded, 1.8m, with one ferrite core bonded. |
| B. | Antenna Long Cable | Shielded, 0.41m |
| C. | Antenna Short Cable | Shielded, 0.25m |
| D. | DC Power Cable | Non-Shielded, 1.5m |
| E. | DC Power Cable | Non-Shielded, 1.5m |

1.4. Configuration of tested System



1.5. EUT Exercise Software

- (1) Setup the EUT and simulators as shown on 1.4
- (2) Turn on the power of all equipment.
- (3) Notebook PC reads data from disk.
- (4) Data will be transmitting and receiving through EUT.
- (5) The transmitted and receive status will be shown on the monitor.
- (6) Repeat the above procedure (3) to (5)

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 |

Site Description: June 22, 2001 File on
 Federal Communications Commission
 FCC Engineering Laboratory
 7435 Oakland Mills Road
 Columbia, MD 21046
 Reference 31040/SIT1300F2



0914
ILAC MRA

July 03, 2001 Accreditation on NVLAP
 NVLAP Lab Code: 200533-0



Site Name: Quietek Corporation

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2. Conducted Emission

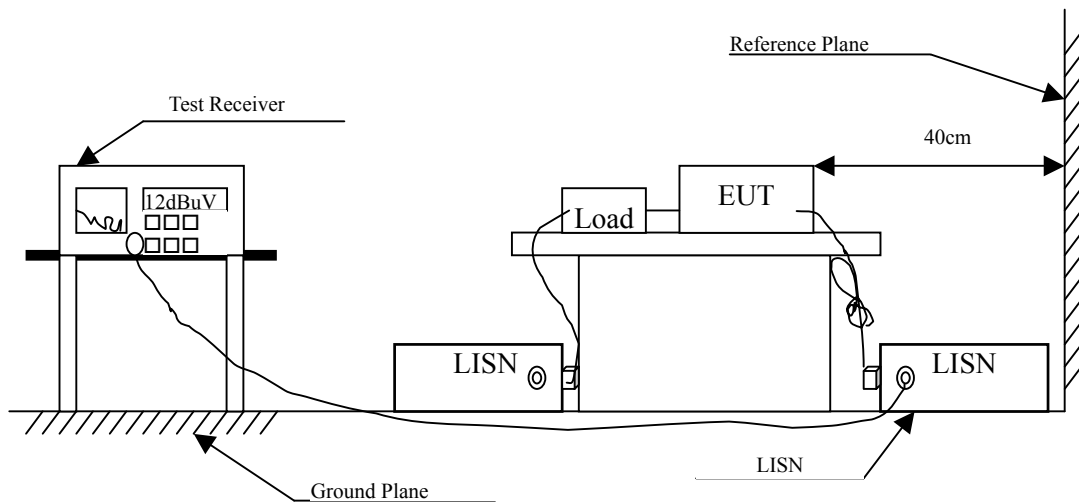
2.1. Test Equipment

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, 2003 | |
| 2 | L.I.S.N. | R & S | ESH3-Z5/825016/6 | May, 2003 | EUT |
| 3 | L.I.S.N. | Kyoritsu | KNW-407/8-1420-3 | May, 2003 | Peripherals |
| 4 | Pulse Limiter | R & S | ESH3-Z2 | May, 2003 | |
| 5 | No.4 Shielded Room | | | N/A | |

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

2.2. Test Setup



2.3. Limits

| FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit | | |
|------------------------------------------------------------|----------------------|----------------------|
| Frequency MHz | Limits | |
| | uV | dBuV |
| 0.15 - 0.50 | 66-56 ^(註) | 56-46 ^(註) |
| 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 C63.4:1992 on conducted measurement.

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

2.5. Test Result of Conducted Emission

Product : Wireless 11b Internal USB Adapter
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: TX 11MHz (Channel 1)

| Frequency MHz | Cable Loss dB | LISN Factor dB | Reading Level dBuV | Emission Level dBuV | Limits dBuV |
|------------------|---------------------|----------------------|--------------------------|---------------------------|----------------|
| ===== | | | | | |
| Quasi-Peak | | | | | |
| * 0.200 | 0.60 | 0.10 | 44.10 | 44.80 | 63.61 |
| 0.403 | 0.60 | 0.10 | 29.70 | 30.40 | 57.79 |
| 1.747 | 0.60 | 0.12 | 29.70 | 30.42 | 56.00 |
| 5.310 | 0.60 | 0.17 | 24.60 | 25.37 | 60.00 |
| 8.265 | 0.60 | 0.19 | 18.60 | 19.39 | 60.00 |
| 26.342 | 0.85 | 0.55 | 17.60 | 19.00 | 60.00 |
| Average | | | | | |
| 0.200 | 0.60 | 0.10 | 33.80 | 34.50 | 53.61 |
| 0.403 | 0.60 | 0.10 | 24.20 | 24.90 | 47.79 |
| * 1.747 | 0.60 | 0.12 | 28.00 | 28.72 | 46.00 |
| 5.310 | 0.60 | 0.17 | 19.60 | 20.37 | 50.00 |
| 8.265 | 0.60 | 0.19 | 13.10 | 13.89 | 50.00 |
| 26.342 | 0.85 | 0.55 | 11.60 | 13.00 | 50.00 |

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Wireless 11b Internal USB Adapter
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: TX 11MHz (Channel 1)

| Frequency | Cable | LISN | Reading | Emission | Limits |
|------------|-------|--------|---------|----------|--------|
| MHz | Loss | Factor | Level | Level | dBuV |
| | dB | dB | dBuV | dBuV | |
| ===== | | | | | |
| Quasi-Peak | | | | | |
| * 0.202 | 0.60 | 0.10 | 45.60 | 46.30 | 63.53 |
| 0.673 | 0.60 | 0.10 | 25.70 | 26.40 | 56.00 |
| 2.219 | 0.60 | 0.13 | 26.50 | 27.23 | 56.00 |
| 7.730 | 0.60 | 0.19 | 19.30 | 20.09 | 60.00 |
| 12.972 | 0.79 | 0.29 | 21.00 | 22.09 | 60.00 |
| 24.410 | 0.88 | 0.52 | 13.60 | 15.00 | 60.00 |
| Average | | | | | |
| * 0.202 | 0.60 | 0.10 | 37.20 | 37.90 | 53.53 |
| 0.673 | 0.60 | 0.10 | 21.80 | 22.50 | 46.00 |
| 2.219 | 0.60 | 0.13 | 24.80 | 25.53 | 46.00 |
| 7.730 | 0.60 | 0.19 | 14.20 | 14.99 | 50.00 |
| 12.972 | 0.79 | 0.29 | 15.80 | 16.89 | 50.00 |
| 24.410 | 0.88 | 0.52 | 8.20 | 9.60 | 50.00 |

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Wireless 11b Internal USB Adapter
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: TX 11MHz (Channel 6)

| Frequency MHz | Cable Loss dB | LISN Factor dB | Reading Level dBuV | Emission Level dBuV | Limits dBuV |
|------------------|---------------------|----------------------|--------------------------|---------------------------|----------------|
| ===== | | | | | |
| Quasi-Peak | | | | | |
| * 0.200 | 0.60 | 0.10 | 42.50 | 43.20 | 63.61 |
| 0.470 | 0.60 | 0.10 | 28.20 | 28.90 | 56.51 |
| 2.282 | 0.60 | 0.14 | 29.60 | 30.34 | 56.00 |
| 5.107 | 0.60 | 0.17 | 24.60 | 25.37 | 60.00 |
| 7.595 | 0.60 | 0.19 | 22.30 | 23.09 | 60.00 |
| 15.927 | 0.86 | 0.37 | 17.10 | 18.33 | 60.00 |
| Average | | | | | |
| 0.200 | 0.60 | 0.10 | 32.10 | 32.80 | 53.61 |
| 0.470 | 0.60 | 0.10 | 26.90 | 27.60 | 46.51 |
| * 2.282 | 0.60 | 0.14 | 28.00 | 28.74 | 46.00 |
| 5.107 | 0.60 | 0.17 | 22.00 | 22.77 | 50.00 |
| 7.595 | 0.60 | 0.19 | 18.40 | 19.19 | 50.00 |
| 15.927 | 0.86 | 0.37 | 9.50 | 10.73 | 50.00 |

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Wireless 11b Internal USB Adapter
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: TX 11MHz (Channel 6)

| Frequency | Cable | LISN | Reading | Emission | Limits |
|------------|-------|--------|---------|----------|--------|
| MHz | Loss | Factor | Level | Level | dBuV |
| | dB | dB | dBuV | dBuV | |
| ===== | | | | | |
| Quasi-Peak | | | | | |
| * 0.202 | 0.60 | 0.10 | 42.30 | 43.00 | 63.53 |
| 0.470 | 0.60 | 0.10 | 28.30 | 29.00 | 56.51 |
| 2.220 | 0.60 | 0.13 | 26.60 | 27.33 | 56.00 |
| 4.435 | 0.60 | 0.16 | 19.30 | 20.06 | 56.00 |
| 12.569 | 0.77 | 0.28 | 23.90 | 24.95 | 60.00 |
| 26.550 | 0.83 | 0.55 | 17.00 | 18.39 | 60.00 |
| Average | | | | | |
| * 0.202 | 0.60 | 0.10 | 33.40 | 34.10 | 53.53 |
| 0.470 | 0.60 | 0.10 | 24.70 | 25.40 | 46.51 |
| 2.220 | 0.60 | 0.13 | 24.80 | 25.53 | 46.00 |
| 4.435 | 0.60 | 0.16 | 12.60 | 13.36 | 46.00 |
| 12.569 | 0.77 | 0.28 | 20.70 | 21.75 | 50.00 |
| 26.550 | 0.83 | 0.55 | 11.60 | 12.99 | 50.00 |

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Wireless 11b Internal USB Adapter
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: TX 11MHz (Channel 11)

| Frequency | Cable | LISN | Reading | Emission | Limits |
|------------|-------|--------|---------|----------|--------|
| MHz | Loss | Factor | Level | Level | dBuV |
| | dB | dB | dBuV | dBuV | |
| ===== | | | | | |
| Quasi-Peak | | | | | |
| * 0.201 | 0.60 | 0.10 | 42.00 | 42.70 | 63.57 |
| 0.607 | 0.60 | 0.10 | 28.30 | 29.00 | 56.00 |
| 2.217 | 0.60 | 0.13 | 30.20 | 30.93 | 56.00 |
| 4.907 | 0.60 | 0.17 | 25.10 | 25.87 | 56.00 |
| 8.468 | 0.60 | 0.19 | 15.30 | 16.09 | 60.00 |
| 12.163 | 0.75 | 0.27 | 18.40 | 19.42 | 60.00 |
| Average | | | | | |
| 0.201 | 0.60 | 0.10 | 31.90 | 32.60 | 53.57 |
| 0.607 | 0.60 | 0.10 | 28.30 | 29.00 | 46.00 |
| * 2.217 | 0.60 | 0.13 | 29.30 | 30.03 | 46.00 |
| 4.907 | 0.60 | 0.17 | 21.80 | 22.57 | 46.00 |
| 8.468 | 0.60 | 0.19 | 9.10 | 9.89 | 50.00 |
| 12.163 | 0.75 | 0.27 | 12.70 | 13.72 | 50.00 |

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Wireless 11b Internal USB Adapter
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: TX 11MHz (Channel 11)

| Frequency | Cable | LISN | Reading | Emission | Limits |
|------------|-------|--------|---------|----------|--------|
| MHz | Loss | Factor | Level | Level | dBuV |
| | dB | dB | dBuV | dBuV | |
| ===== | | | | | |
| Quasi-Peak | | | | | |
| * 0.200 | 0.60 | 0.10 | 42.20 | 42.90 | 63.61 |
| 0.467 | 0.60 | 0.10 | 27.80 | 28.50 | 56.57 |
| 0.805 | 0.60 | 0.10 | 23.70 | 24.40 | 56.00 |
| 2.015 | 0.60 | 0.13 | 24.30 | 25.03 | 56.00 |
| 12.031 | 0.74 | 0.27 | 18.20 | 19.21 | 60.00 |
| 29.907 | 0.72 | 0.60 | 20.40 | 21.71 | 60.00 |
| Average | | | | | |
| * 0.200 | 0.60 | 0.10 | 32.40 | 33.10 | 53.61 |
| 0.467 | 0.60 | 0.10 | 23.10 | 23.80 | 46.57 |
| 0.805 | 0.60 | 0.10 | 21.00 | 21.70 | 46.00 |
| 2.015 | 0.60 | 0.13 | 21.80 | 22.53 | 46.00 |
| 12.031 | 0.74 | 0.27 | 12.80 | 13.81 | 50.00 |
| 29.907 | 0.72 | 0.60 | 15.10 | 16.41 | 50.00 |

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

3. Peak Power Output

3.1. Test Equipment

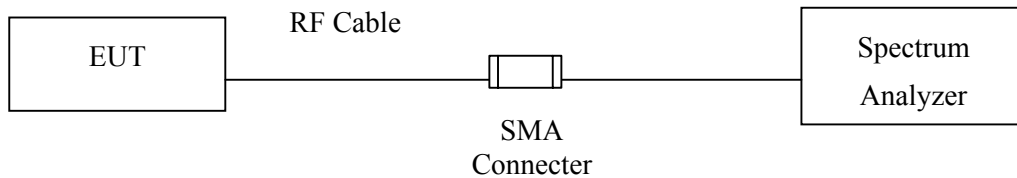
The following test equipments are used during the radiated emission tests:

| | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---|-------------------|--------------|----------------------|-----------|
| X | Spectrum Analyzer | Advantest | R3272 / 72421194 | May, 2003 |

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.
 2. Mark "X" test instruments are used to measure the final test results.

3.2. Test Setup

Conduction Power Measurement



3.3. Limits

The maximum peak power shall be less 1 Watt.

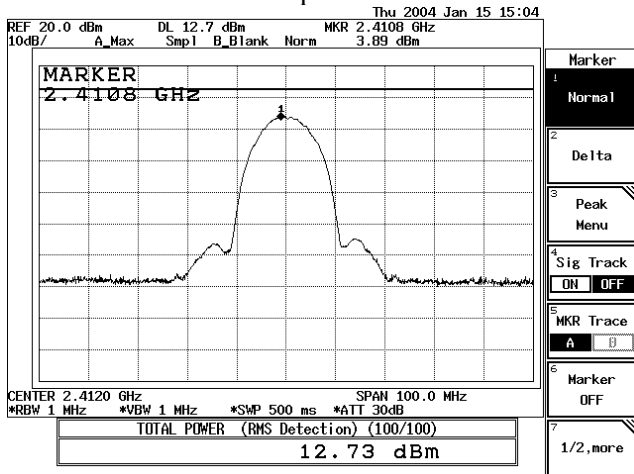
3.4. Test Result of Peak Power Output

Product : Wireless 11b Internal USB Adapter
 Test Item : Peak Power Output Data
 Test Site : No.3OATS
 Test Mode : Mode 1: TX 11MHz

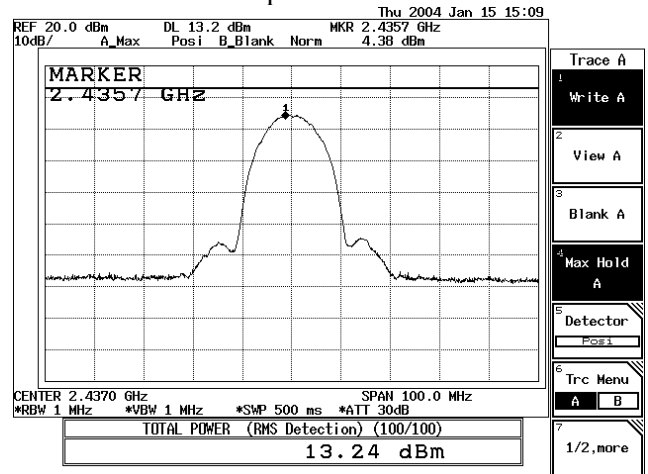
Data Speed: 11Mbps

| Channel No. | Frequency (MHz) | Measurement | Required Limit | Result |
|-------------|-----------------|-------------|----------------|--------|
| 1 | 2410.8 | 12.73 dBm | 1 Watt= 30 dBm | Pass |
| 6 | 2435.7 | 13.24 dBm | 1 Watt= 30 dBm | Pass |
| 11 | 2460.8 | 13.14 dBm | 1 Watt= 30 dBm | Pass |

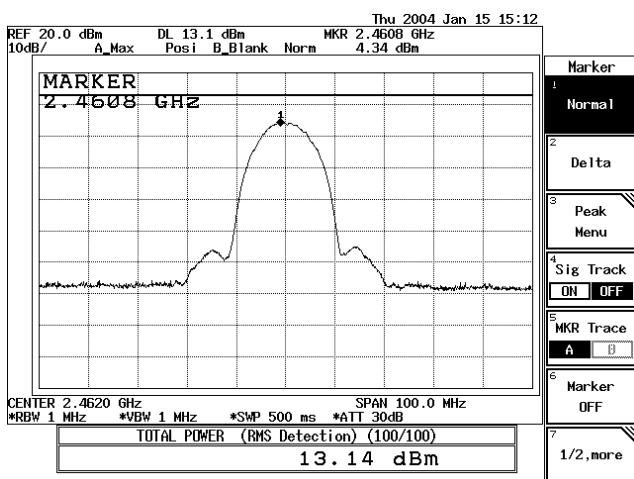
11Mbps-Channel 1



11Mbps-Channel 6



11Mbps-Channel 11



4. Radiated Emission

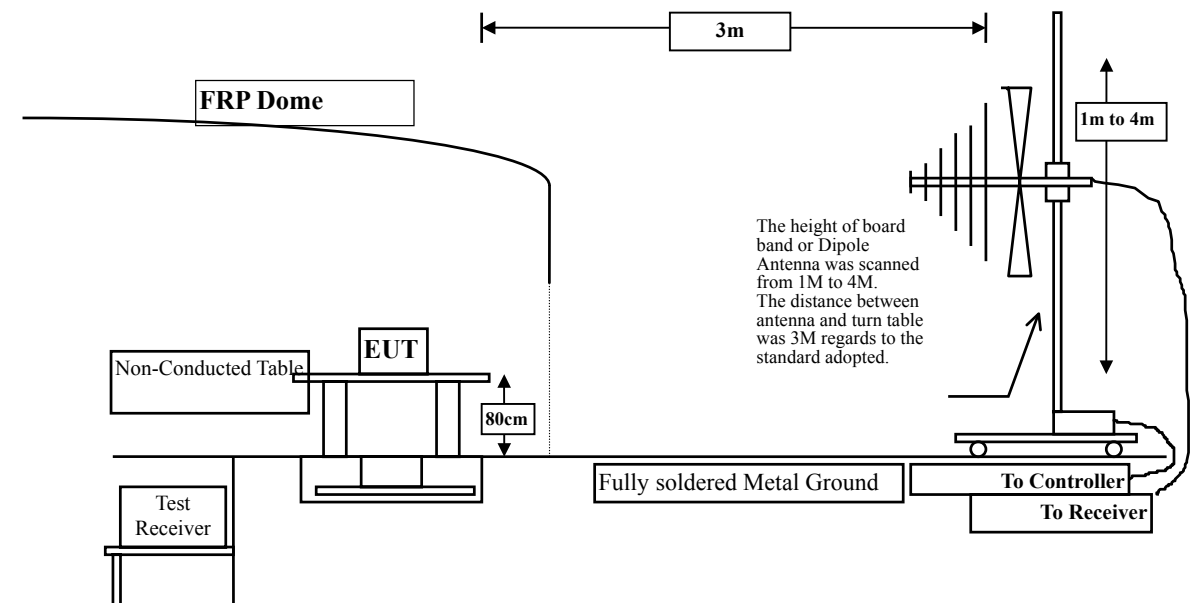
4.1. Test Equipment

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

| Test Site | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|-----------|---------------------|--------------|-----------------------|------------|
| Site # 1 | Test Receiver | R & S | ESCS 30 / 825442/14 | May, 2003 |
| | Spectrum Analyzer | Advantest | R3261C / 71720140 | May, 2003 |
| | Pre-Amplifier | HP | 8447D/3307A01812 | May, 2003 |
| | Bilog Antenna | Chase | CBL6112B / 12452 | Sep., 2003 |
| | Horn Antenna | EM | EM6917 / 103325 | May, 2003 |
| Site # 2 | Test Receiver | R & S | ESCS 30 / 825442/17 | May, 2003 |
| | Spectrum Analyzer | Advantest | R3261C / 71720609 | May, 2003 |
| | Pre-Amplifier | HP | 8447D/3307A01814 | May, 2003 |
| | Bilog Antenna | Chase | CBL6112B / 2455 | Sep., 2003 |
| | Horn Antenna | EM | EM6917 / 103325 | May, 2003 |
| Site # 3 | X Test Receiver | R & S | ESI 26 / 838786 / 004 | May, 2003 |
| | X Spectrum Analyzer | Advantest | R3162 / 100803480 | May, 2003 |
| | X Pre-Amplifier | QTK | QTK-AMP-03 / 0003 | May, 2003 |
| | X Bilog Antenna | SCHAFFNER | CBL6112B / 2697 | May, 2003 |
| | X Horn Antenna | ETS | 3115 / 0005-6160 | Jul., 2003 |
| | X Pre-Amplifier | QTK | QTK-AMP-01 / 0001 | Jul., 2003 |

- Note:
1. All equipments that need to calibrate are with calibration period of 1 year.
 2. Mark "X" test instruments are used to measure the final test results.

4.2. Test Setup



4.3. Limits

➤ **General Radiated Emission 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 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 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 C63.4:1992 on radiated measurement.

The additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of harmonics measurement.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30)is 120 kHz, above 1GHz are 1 MHz.

The frequency range from 30MHz to 10th harmonics is checked.

4.5. Test Result of Radiated Emission

Product : Wireless 11b Internal USB Adapter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3OATS
 Test Mode : Mode 1: TX 11MHz (Channel 1)

| Frequency MHz | Cable Loss dB | Probe Factor dB/m | PreAMP dB | Reading Level dBuV | Emission Level dBuV/m | Margin dB | Limit dBuV/m |
|-------------------------|---------------------|-------------------------|--------------|--------------------------|-----------------------------|--------------|-----------------|
| Horizontal | | | | | | | |
| Peak Detector | | | | | | | |
| 4824.000 | 4.23 | 31.21 | 34.68 | 50.25 | 51.01 | 22.99 | 74.00 |
| 7236.000 | 5.63 | 35.87 | 34.99 | 43.84 | 50.35 | 23.65 | 74.00 |
| 9648.000 | 7.00 | 37.84 | 35.10 | 44.89 | 54.63 | 19.37 | 74.00 |
| 12060.00 | 8.40 | 38.62 | 34.14 | 38.00 | 50.87 | 23.13 | 74.00 |
| Average Detector | | | | | | | |
| 9648.000 | 7.00 | 37.84 | 35.10 | 33.47 | 43.21 | 10.79 | 54.00 |
| Vertical | | | | | | | |
| Peak Detector | | | | | | | |
| 4824.000 | 4.23 | 31.21 | 34.68 | 55.70 | 56.46 | 17.54 | 74.00 |
| 7236.000 | 5.63 | 35.87 | 34.99 | 44.57 | 51.08 | 22.92 | 74.00 |
| 9648.000 | 7.00 | 37.84 | 35.10 | 45.56 | 55.30 | 18.70 | 74.00 |
| 12060.00 | 8.40 | 38.62 | 34.14 | 38.01 | 50.88 | 23.12 | 74.00 |
| Average Detector | | | | | | | |
| 4824.000 | 4.23 | 31.21 | 34.68 | 51.69 | 52.45 | 1.55 | 54.00 |
| 9648.000 | 7.00 | 37.84 | 35.10 | 34.56 | 44.30 | 9.70 | 54.00 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz ◦
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz ◦
4. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Wireless 11b Internal USB Adapter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: TX 11MHz (Channel 6)

| Frequency | Cable Loss | Probe Factor | PreAMP | Reading Level | Emission Level | Margin | Limit |
|-----------|------------|--------------|--------|---------------|----------------|--------|--------|
| MHz | dB | dB/m | dB | dBuV | dBuV/m | dB | dBuV/m |

Horizontal Peak Detector

| | | | | | | | |
|----------------|------|-------|-------|-------|-------|-------|-------|
| 4874.000 | 4.26 | 31.37 | 34.69 | 49.48 | 50.43 | 23.57 | 74.00 |
| 7311.000 | 5.67 | 36.00 | 35.01 | 45.02 | 51.68 | 22.32 | 74.00 |
| 9748.000 | 7.06 | 37.90 | 35.10 | 45.50 | 55.36 | 18.64 | 74.00 |
| 12185.00 | 8.47 | 38.65 | 34.09 | 37.90 | 50.93 | 23.07 | 74.00 |
| Average | | | | | | | |
| 9748.000 | 7.06 | 37.90 | 35.10 | 33.71 | 43.57 | 10.43 | 54.00 |

Vertical Peak Detector

| | | | | | | | |
|----------------|------|-------|-------|-------|-------|-------|-------|
| 4874.000 | 4.26 | 31.37 | 34.69 | 55.79 | 56.74 | 17.26 | 74.00 |
| 7311.000 | 5.67 | 36.00 | 35.01 | 43.63 | 50.29 | 23.71 | 74.00 |
| 9748.000 | 7.06 | 37.90 | 35.10 | 44.22 | 54.08 | 19.92 | 74.00 |
| 12185.00 | 8.47 | 38.65 | 34.09 | 37.90 | 50.93 | 23.07 | 74.00 |
| Average | | | | | | | |
| 4874.000 | 4.26 | 31.37 | 34.69 | 51.41 | 52.36 | 1.64 | 54.00 |
| 9748.000 | 7.06 | 37.90 | 35.10 | 33.87 | 43.73 | 10.27 | 54.00 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz ◦
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz ◦
4. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Wireless 11b Internal USB Adapter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: TX 11MHz (Channel 11)

| Frequency | Cable Loss | Probe Factor | PreAMP | Reading Level | Emission Level | Margin | Limit |
|---------------------------------|------------|--------------|--------|---------------|----------------|--------|--------|
| MHz | dB | dB/m | dB | dBuV | dBuV/m | dB | dBuV/m |
| Horizontal Peak Detector | | | | | | | |
| 4924.000 | 4.31 | 31.43 | 34.69 | 52.55 | 53.60 | 20.40 | 74.00 |
| 7386.000 | 5.72 | 36.12 | 35.02 | 43.17 | 49.99 | 24.01 | 74.00 |
| 9848.000 | 7.13 | 38.00 | 35.07 | 45.88 | 55.94 | 18.06 | 74.00 |
| 12310.00 | 8.53 | 38.68 | 34.03 | 37.34 | 50.52 | 23.48 | 74.00 |
| Average | | | | | | | |
| 9848.000 | 7.13 | 38.00 | 35.07 | 34.35 | 44.41 | 9.59 | 54.00 |
| Vertical Peak Detector | | | | | | | |
| 4924.000 | 4.31 | 31.43 | 34.69 | 48.52 | 49.57 | 24.43 | 74.00 |
| 7386.000 | 5.72 | 36.12 | 35.02 | 42.87 | 49.69 | 24.31 | 74.00 |
| 9848.000 | 7.13 | 38.00 | 35.07 | 44.20 | 54.26 | 19.74 | 74.00 |
| 12310.00 | 8.53 | 38.68 | 34.03 | 37.42 | 50.60 | 23.40 | 74.00 |
| Average | | | | | | | |
| 9848.000 | 7.13 | 38.00 | 35.07 | 33.38 | 43.44 | 10.56 | 54.00 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz ◦
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz ◦
4. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Wireless 11b Internal USB Adapter
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: TX 11MHz (Channel 1)

| Frequency | Cable | Probe | PreAMP | Reading | Emission | Margin | Limit |
|-----------|-------|--------|--------|---------|----------|--------|--------|
| MHz | Loss | Factor | | Level | Level | | |
| | dB | dB/m | dB | dBuV | dBuV/m | dB | dBuV/m |

Horizontal:

| | | | | | | | | |
|---|---------|------|-------|------|-------|-------|-------|-------|
| * | 131.850 | 1.39 | 11.69 | 0.00 | 23.65 | 36.74 | 6.76 | 43.50 |
| | 296.570 | 2.24 | 12.35 | 0.00 | 22.78 | 37.37 | 8.63 | 46.00 |
| | 466.500 | 3.12 | 16.68 | 0.00 | 15.65 | 35.46 | 10.54 | 46.00 |
| | 607.150 | 3.85 | 18.00 | 0.00 | 15.77 | 37.61 | 8.39 | 46.00 |
| | 667.780 | 4.16 | 18.36 | 0.00 | 11.68 | 34.19 | 11.81 | 46.00 |
| | 934.530 | 5.54 | 20.04 | 0.00 | 10.54 | 36.11 | 9.89 | 46.00 |

Vertical:

| | | | | | | | | |
|---|---------|------|-------|------|-------|-------|-------|-------|
| | 168.230 | 1.58 | 8.52 | 0.00 | 26.12 | 36.23 | 7.27 | 43.50 |
| | 265.230 | 2.08 | 12.86 | 0.00 | 22.95 | 37.89 | 8.11 | 46.00 |
| * | 398.600 | 2.77 | 16.13 | 0.00 | 22.71 | 41.61 | 4.39 | 46.00 |
| | 481.050 | 3.19 | 16.40 | 0.00 | 16.35 | 35.94 | 10.06 | 46.00 |
| | 616.850 | 3.89 | 19.34 | 0.00 | 13.78 | 37.01 | 8.99 | 46.00 |
| | 830.000 | 4.99 | 18.82 | 0.00 | 13.07 | 36.89 | 9.11 | 46.00 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss.

Product : Wireless 11b Internal USB Adapter
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: TX 11MHz (Channel 6)

| Frequency | Cable | Probe | PreAMP | Reading | Emission | Margin | Limit |
|--------------------|-------|--------|--------|---------|----------|--------|--------|
| | Loss | Factor | | Level | Level | | |
| MHz | dB | dB/m | dB | dBuV | dBuV/m | dB | dBuV/m |
| Horizontal: | | | | | | | |
| 119.720 | 1.33 | 11.84 | 0.00 | 22.47 | 35.64 | 7.86 | 43.50 |
| * 168.230 | 1.58 | 8.96 | 0.00 | 28.87 | 39.42 | 4.08 | 43.50 |
| 333.120 | 2.43 | 12.56 | 0.00 | 20.96 | 35.96 | 10.04 | 46.00 |
| 500.450 | 3.30 | 16.36 | 0.00 | 19.80 | 39.46 | 6.54 | 46.00 |
| 616.850 | 3.89 | 18.75 | 0.00 | 14.96 | 37.61 | 8.39 | 46.00 |
| 830.250 | 4.99 | 19.29 | 0.00 | 16.41 | 40.69 | 5.31 | 46.00 |
| Vertical: | | | | | | | |
| 204.600 | 1.77 | 8.56 | 0.00 | 26.16 | 36.49 | 7.01 | 43.50 |
| 296.750 | 2.24 | 12.14 | 0.00 | 26.01 | 40.39 | 5.61 | 46.00 |
| 401.200 | 2.78 | 16.47 | 0.00 | 16.36 | 35.61 | 10.39 | 46.00 |
| 498.020 | 3.28 | 16.30 | 0.00 | 15.34 | 34.91 | 11.09 | 46.00 |
| * 662.920 | 4.13 | 17.70 | 0.00 | 19.62 | 41.45 | 4.55 | 46.00 |
| 927.250 | 5.48 | 21.40 | 0.00 | 7.61 | 34.49 | 11.51 | 46.00 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss.

Product : Wireless 11b Internal USB Adapter
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: TX 11MHz (Channel 11)

| Frequency | Cable | Probe | PreAMP | Reading | Emission | Margin | Limit |
|-----------|-------|--------|--------|---------|----------|--------|--------|
| MHz | Loss | Factor | | Level | Level | dB | dBuV/m |
| | dB | dB/m | dB | dBuV | dBuV/m | | |

Horizontal:

| | | | | | | | |
|-----------|------|-------|------|-------|-------|-------|-------|
| * 175.500 | 1.62 | 8.56 | 0.00 | 26.01 | 36.19 | 7.31 | 43.50 |
| 294.330 | 2.23 | 12.21 | 0.00 | 20.43 | 34.87 | 11.13 | 46.00 |
| 432.550 | 2.94 | 15.81 | 0.00 | 19.79 | 38.54 | 7.46 | 46.00 |
| 631.400 | 3.97 | 18.64 | 0.00 | 11.38 | 33.99 | 12.01 | 46.00 |
| 733.250 | 4.50 | 18.70 | 0.00 | 15.40 | 38.60 | 7.40 | 46.00 |
| 900.580 | 5.35 | 19.59 | 0.00 | 9.21 | 34.16 | 11.84 | 46.00 |

Vertical:

| | | | | | | | |
|-----------|------|-------|------|-------|-------|-------|-------|
| 260.380 | 2.05 | 13.10 | 0.00 | 19.63 | 34.78 | 11.22 | 46.00 |
| 364.650 | 2.59 | 14.64 | 0.00 | 20.17 | 37.41 | 8.59 | 46.00 |
| * 529.550 | 3.45 | 16.95 | 0.00 | 19.17 | 39.57 | 6.43 | 46.00 |
| 733.250 | 4.50 | 20.62 | 0.00 | 11.83 | 36.95 | 9.05 | 46.00 |
| 839.950 | 5.04 | 18.86 | 0.00 | 8.11 | 32.00 | 14.00 | 46.00 |
| 927.250 | 5.48 | 21.40 | 0.00 | 9.02 | 35.90 | 10.10 | 46.00 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss.

5. Band Edge

5.1. Test Equipment

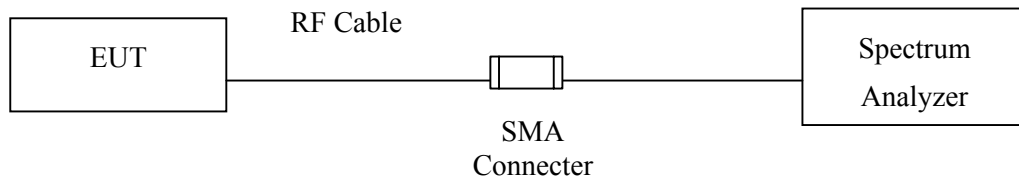
The following test equipments are used during the band edge tests:

| Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---------------------|--------------|----------------------|------------|
| X Spectrum Analyzer | Advantest | R3272 / 72421194 | May, 2003 |
| X Test Receiver | R & S | ESCS 30 / 825442/14 | May, 2003 |
| X Spectrum Analyzer | Advantest | R3261C / 71720140 | May, 2003 |
| X Pre-Amplifier | HP | 8447D/3307A01812 | May, 2003 |
| X Bilog Antenna | Chase | CBL6112B / 12452 | Sep., 2003 |
| X Horn Antenna | EM | EM6917 / 103325 | May, 2003 |

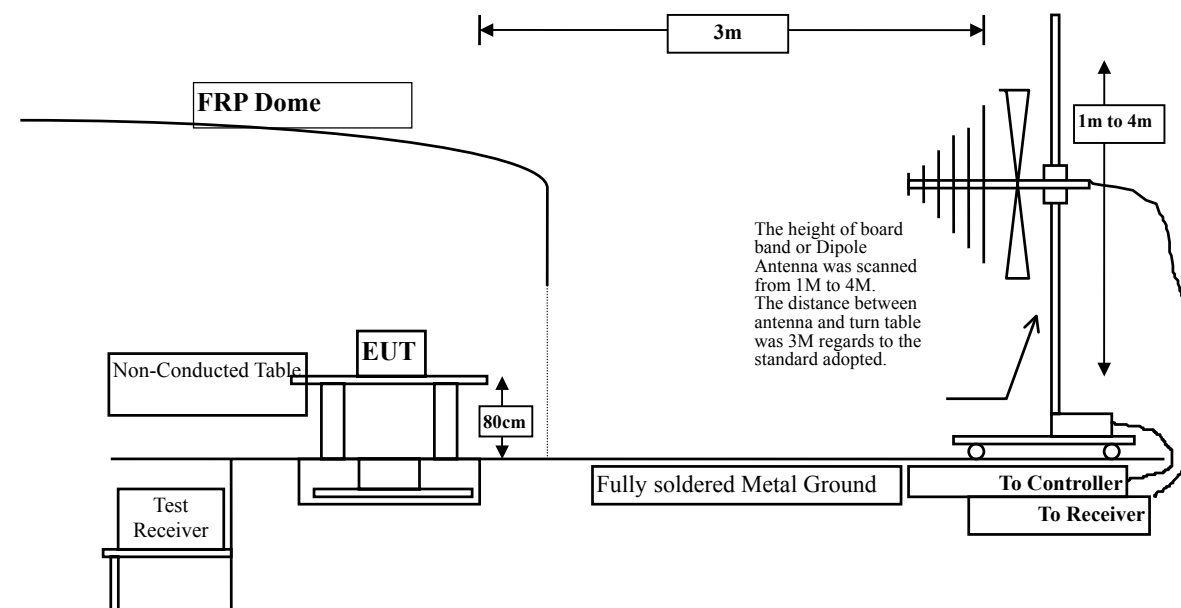
Note: 1. All equipments that need to calibrate are with calibration period of 1 year.
 2. Mark "X" test instruments are used to measure the final test results.

5.2. Test Setup

RF Measurement:



RF Radiated 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 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 C63.4:1992 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30)is 120 kHz, above 1GHz are 1 MHz.

5.5. Test Result of Band Edge

Product : Wireless 11b Internal USB Adapter
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: TX 11MHz (Channel 1)

RF Radiated Measurement:

| Channel No. | Frequency (MHz) | Required Limit (dBc) | Result |
|----------------|-----------------|----------------------|--------|
| 1 (Horizontal) | <2400 | >20 | Pass |
| 1 (Vertical) | <2400 | >20 | Pass |

Figure Channel 1: (Horizontal)

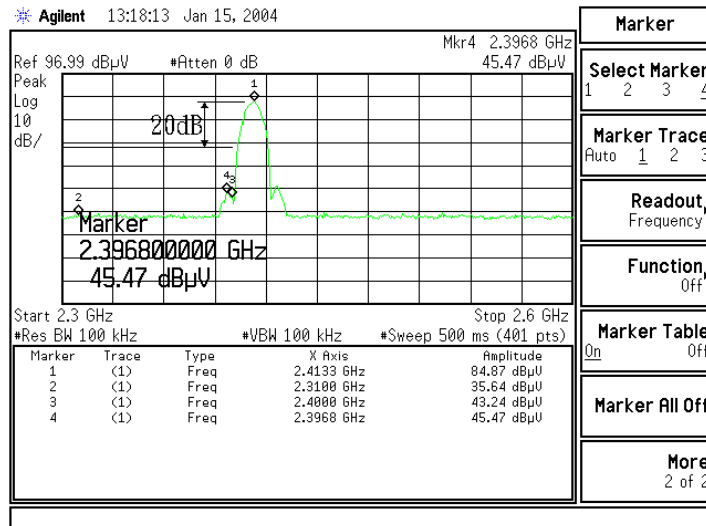
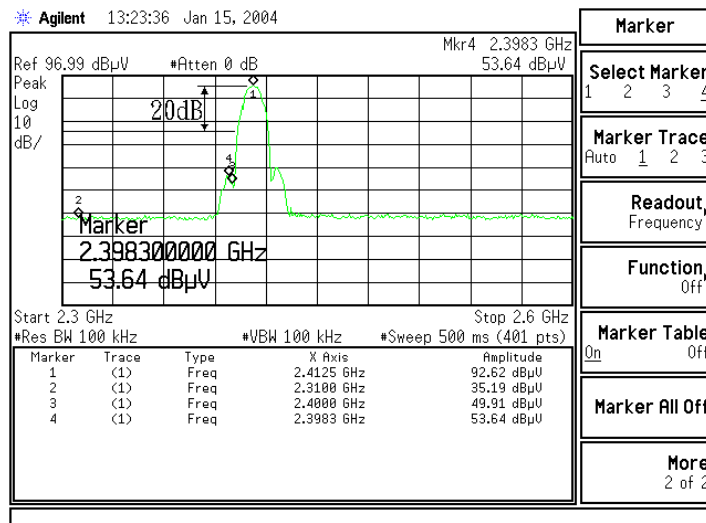


Figure Channel 1: (Vertical)



Product : Wireless 11b Internal USB Adapter
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: TX 11MHz (Channel 11)

RF Radiated Measurement (Peak):

| Channel No. | Frequency (MHz) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|----------------|-----------------|----------------------|-------------------------|---------------------|------------------------|--------|
| 11(Horizontal) | 2491.300 | 47.32 | 42.77 | 74.00 | 54.00 | Pass |
| 11(Vertical) | 2489.000 | 62.68 | 58.13 | 74.00 | 54.00 | Pass |

RF Radiated Measurement (Average):

| Channel No. | Frequency (MHz) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|----------------|-----------------|----------------------|-------------------------|---------------------|------------------------|--------|
| 11(Horizontal) | -- | -- | -- | 74.00 | 54.00 | Pass |
| 11(Vertical) | 2489.000 | 35.75 | 31.20 | 74.00 | 54.00 | Pass |

Figure Channel 11: (Horizontal)

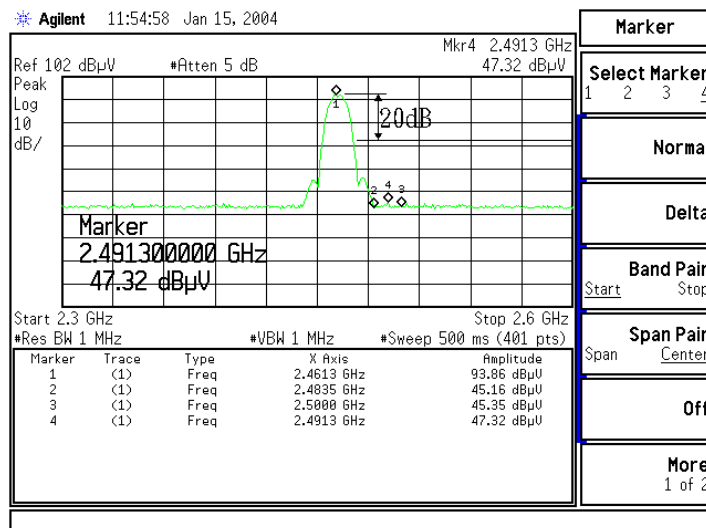
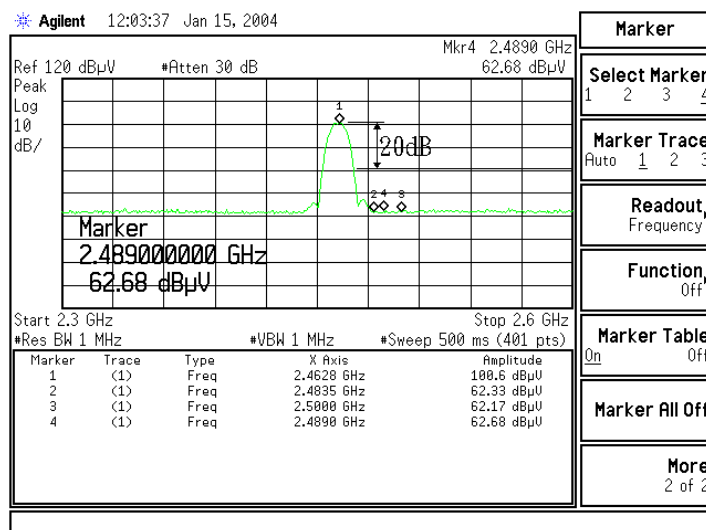


Figure Channel 11: (Vertical)



6. Occupied Bandwidth

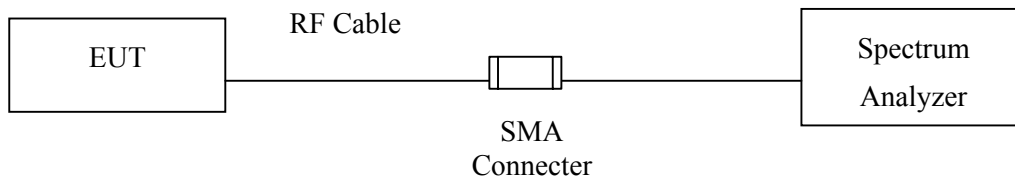
6.1. Test Equipment

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

| | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---|-------------------|--------------|----------------------|-----------|
| X | Spectrum Analyzer | Advantest | R3272 / 72421194 | May, 2003 |

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.
 2. Mark "X" test instruments are used to measure the final test results.

6.2. Test Setup



6.3. Limits

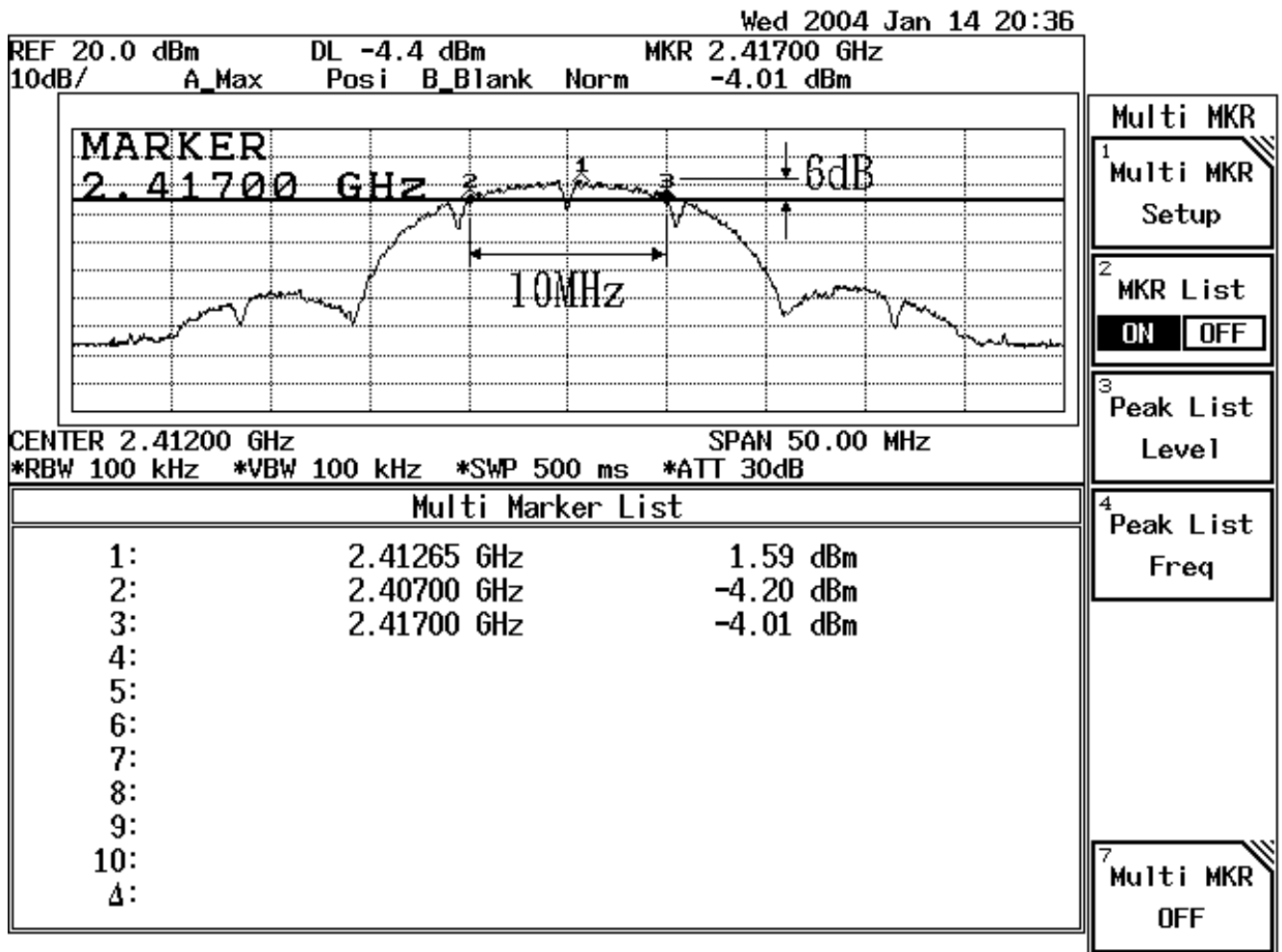
The minimum bandwidth shall be at least 500kHz.

6.4. Test Result of Occupied Bandwidth

Product : Wireless 11b Internal USB Adapter
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: TX 11MHz (Channel 1)

| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|-------------|-----------------|-------------------------|----------------------|--------|
| 1 (11Mbps) | 2417.00 | 10000 | >500 | Pass |

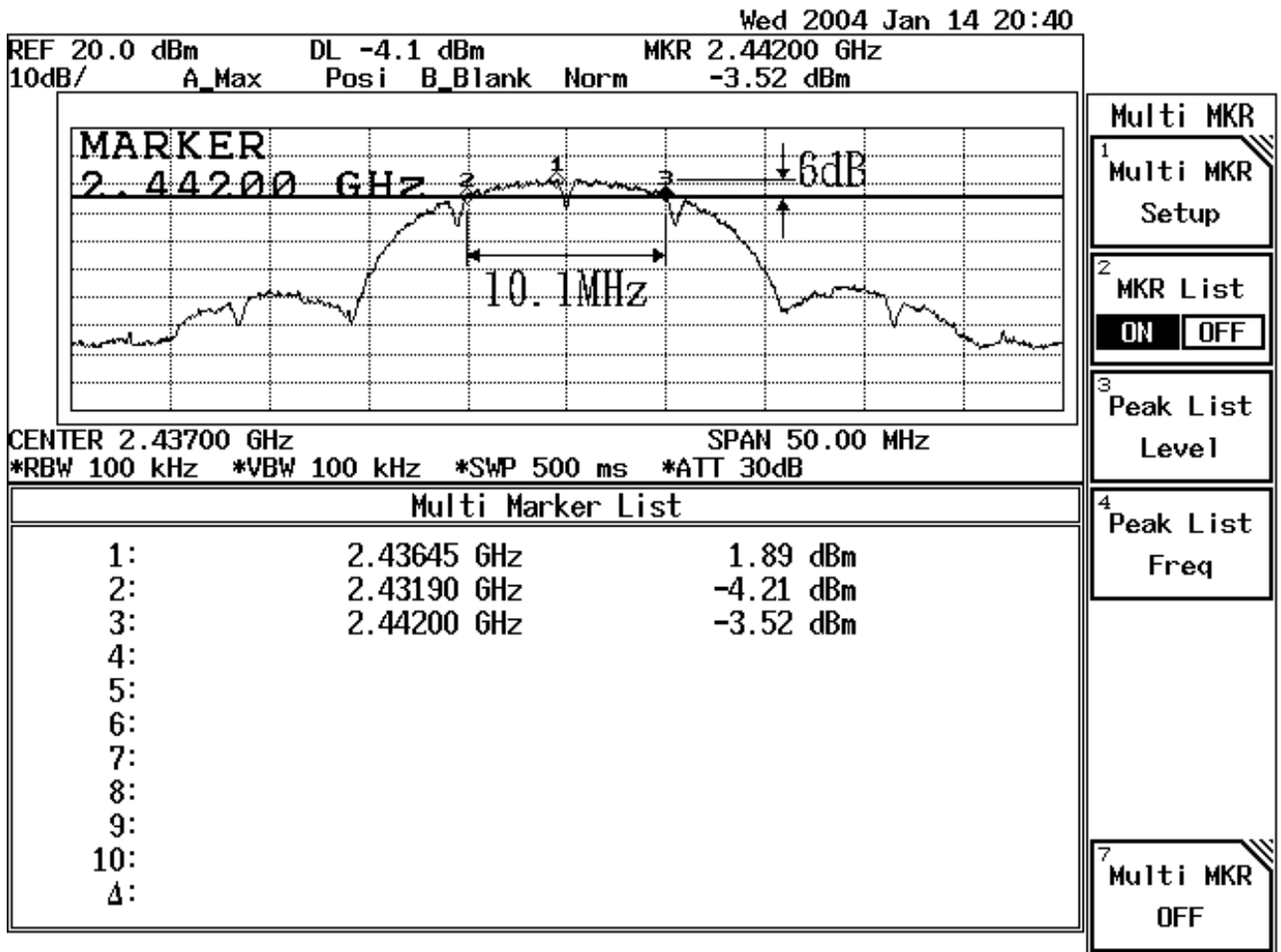
Figure Channel 1: 11Mbps



Product : Wireless 11b Internal USB Adapter
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: TX 11MHz (Channel 6)

| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|-------------|-----------------|-------------------------|----------------------|--------|
| 6 (11Mbps) | 2442.00 | 10100 | >500 | Pass |

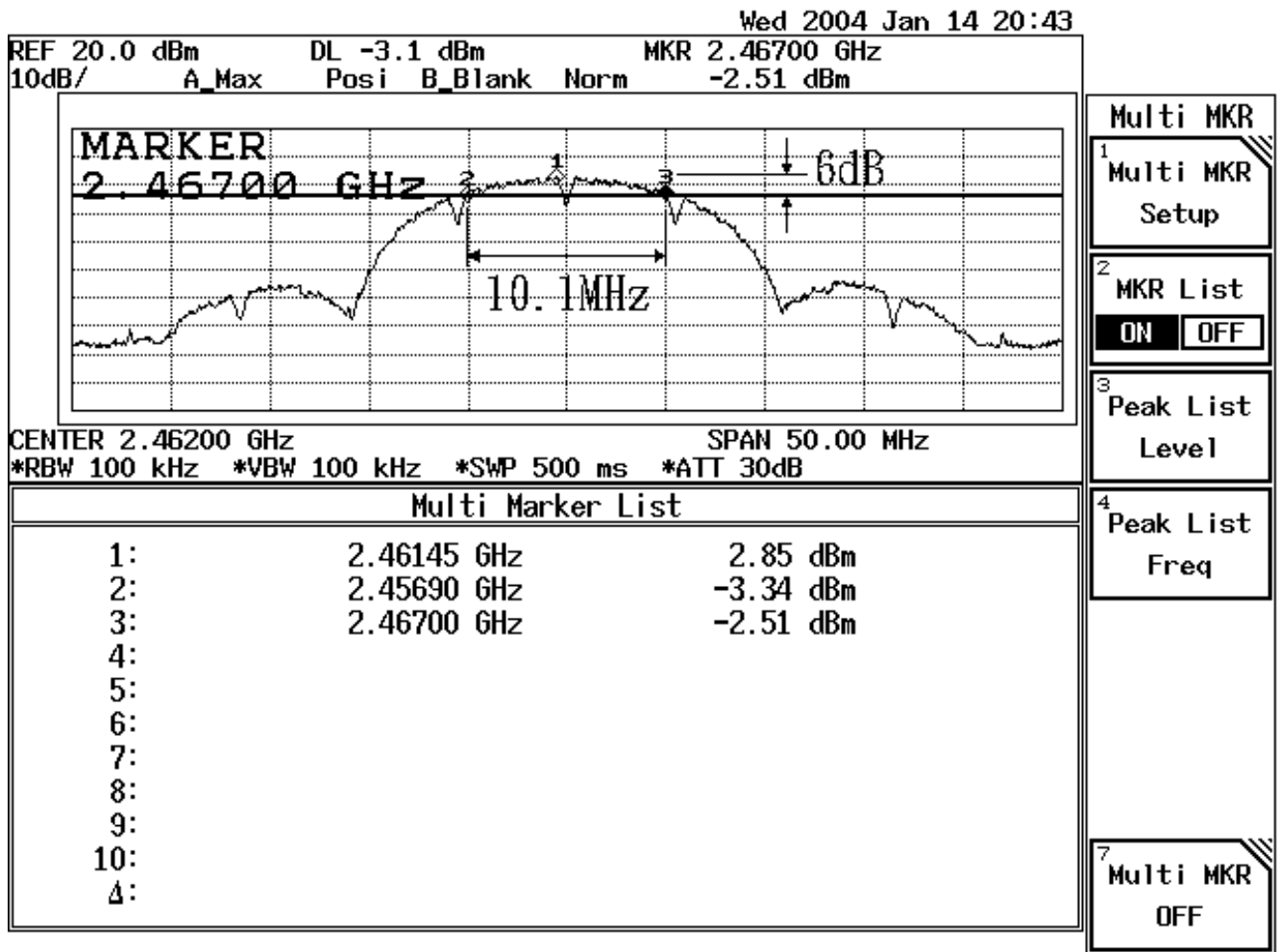
Figure Channel 6: 11Mbps



Product : Wireless 11b Internal USB Adapter
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: TX 11MHz (Channel 11)

| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|-------------|-----------------|-------------------------|----------------------|--------|
| 11 (11Mbps) | 2467.00 | 10100 | >500 | Pass |

Figure Channel 11: 11Mbps



7. Power Density

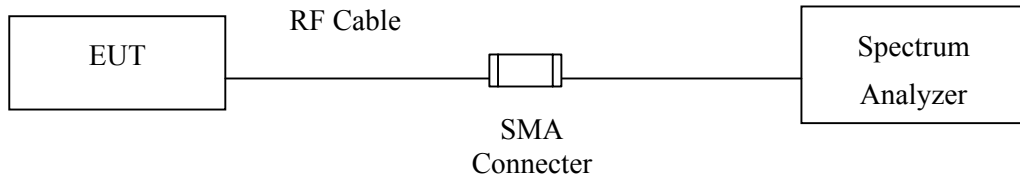
7.1. Test Equipment

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

| | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---|-------------------|--------------|----------------------|-----------|
| X | Spectrum Analyzer | Advantest | R3272 / 72421194 | May, 2003 |

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.
 2. Mark "X" test instruments are used to measure the final test results.

7.2. Test Setup



7.3. Limits

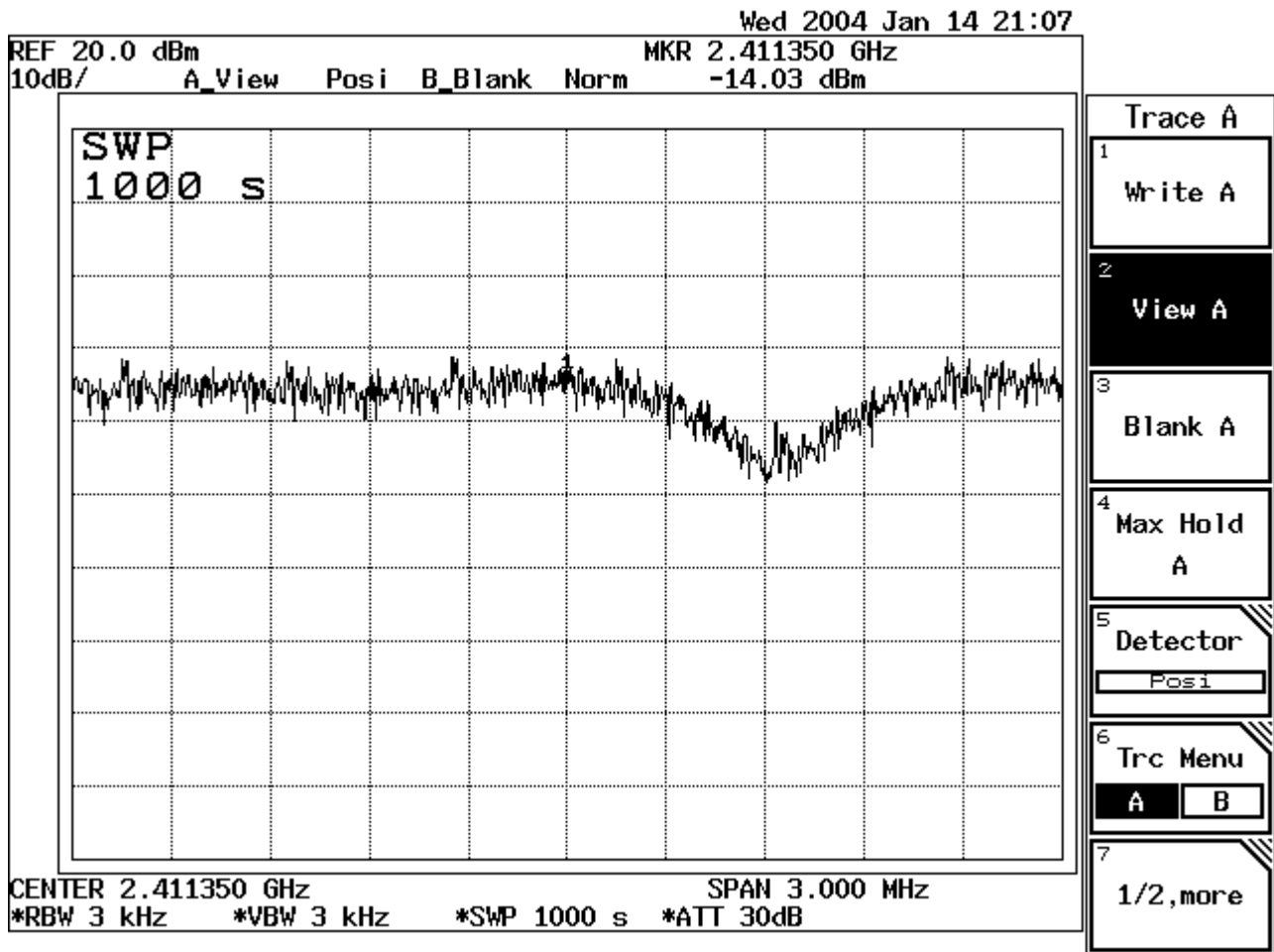
The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

7.4. Test Result of Power Density

Product : Wireless 11b Internal USB Adapter
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: TX 11MHz (Channel 1)

| Channel No. | Frequency (MHz) | Measure Level (dBm) | Limit (dBm) | Result |
|-------------|-----------------|---------------------|-------------|--------|
| 1 (11Mbps) | 2411.350 | -14.03 | < 8dBm | Pass |

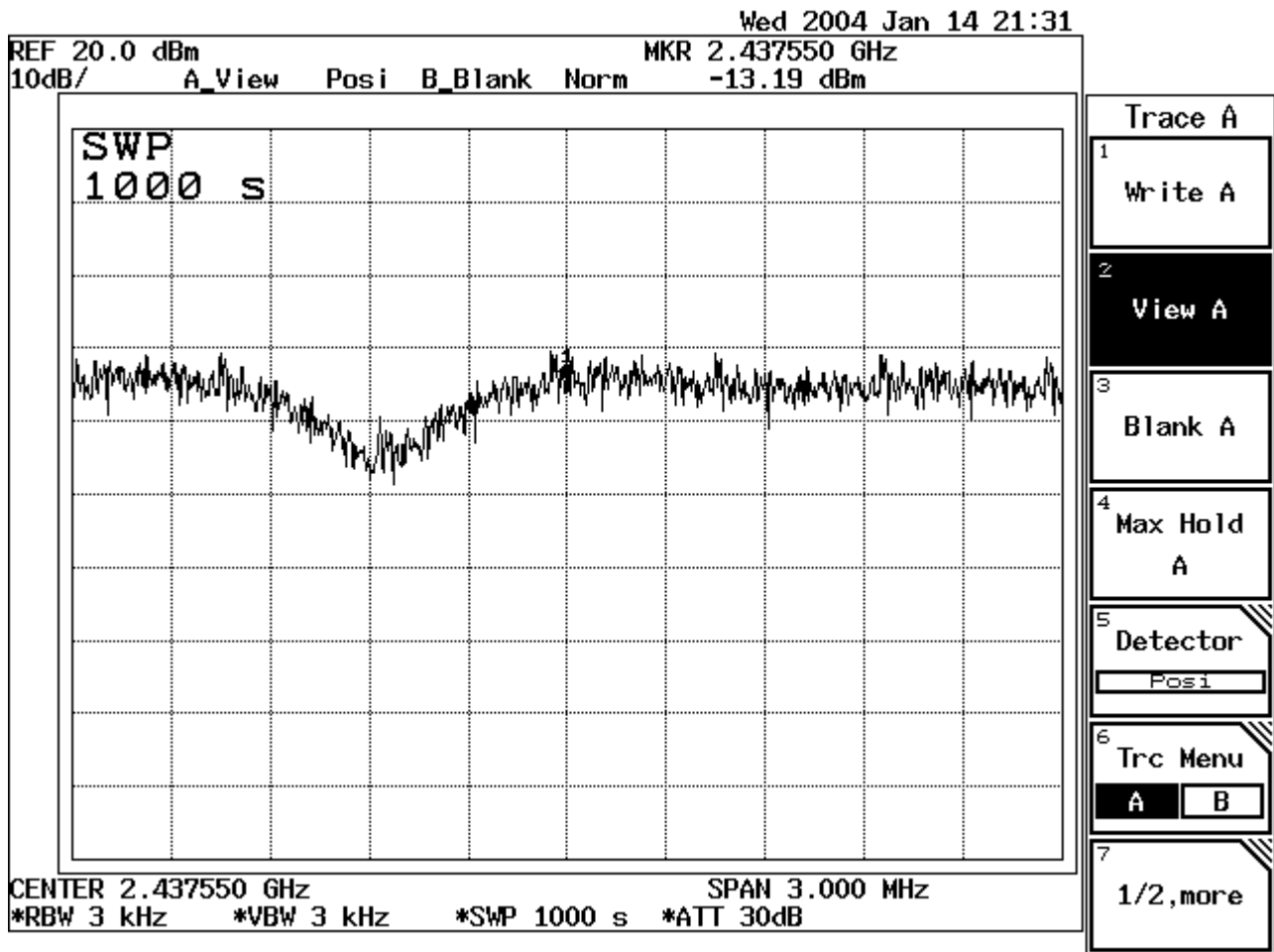
Figure Channel 1: 11Mbps



Product : Wireless 11b Internal USB Adapter
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Mode : Mode 1: TX 11MHz (Channel 6)

| Channel No. | Frequency (MHz) | Measurement Level (dBm) | Required Limit (dBm) | Result |
|-------------|-----------------|-------------------------|----------------------|--------|
| 6 (11Mbps) | 2437.550 | -13.19 | < 8dBm | Pass |

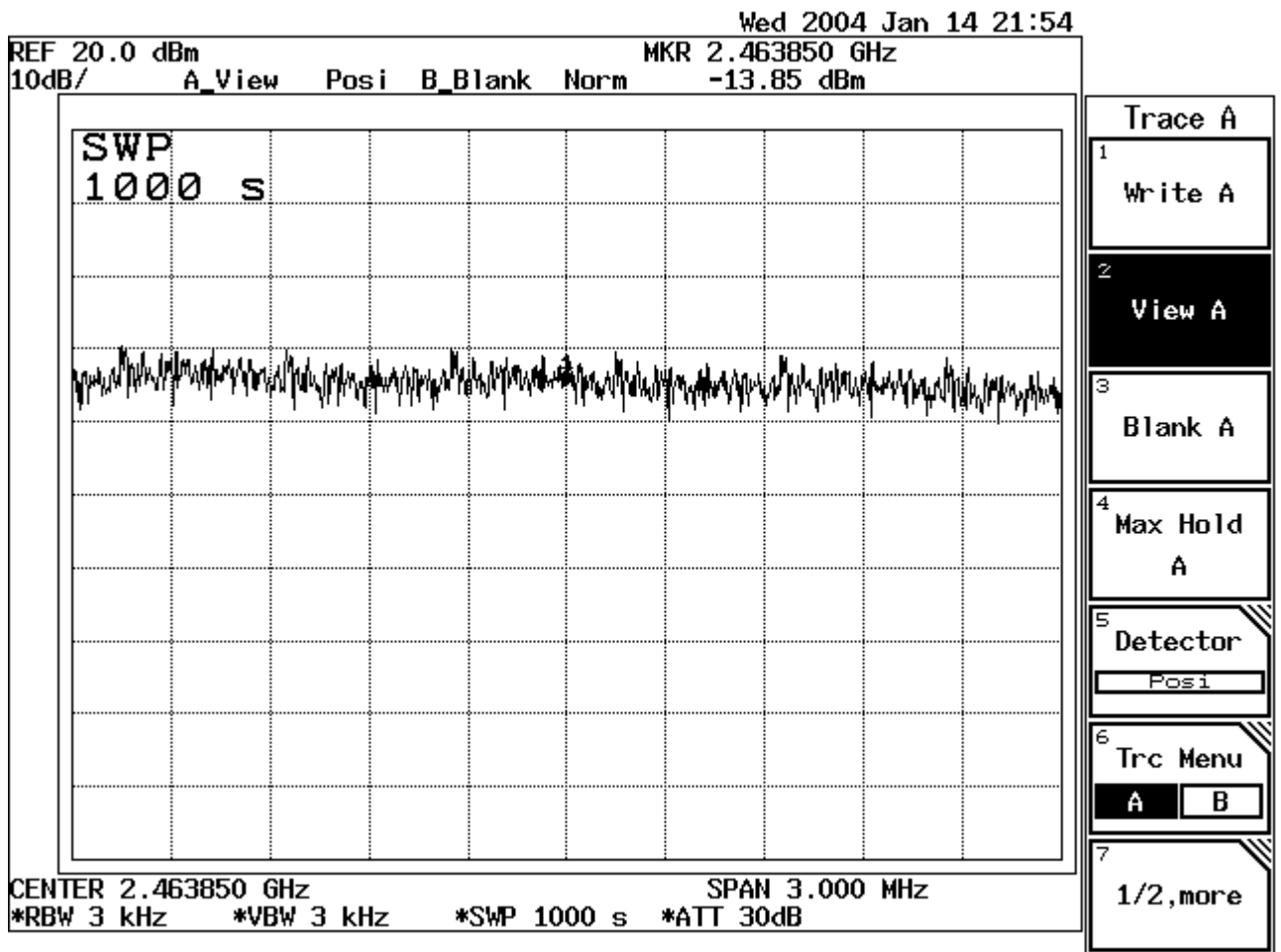
Figure Channel 6: 11Mbps



Product : Wireless 11b Internal USB Adapter
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: TX 11MHz (Channel 11)

| Channel No. | Frequency (MHz) | Measurement Level (dBm) | Required Limit (dBm) | Result |
|-------------|-----------------|-------------------------|----------------------|--------|
| 11 (11Mbps) | 2463.850 | -13.85 | < 8dBm | Pass |

Figure Channel 11: 11Mbps



8. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 1: EUT Test Setup Photographs

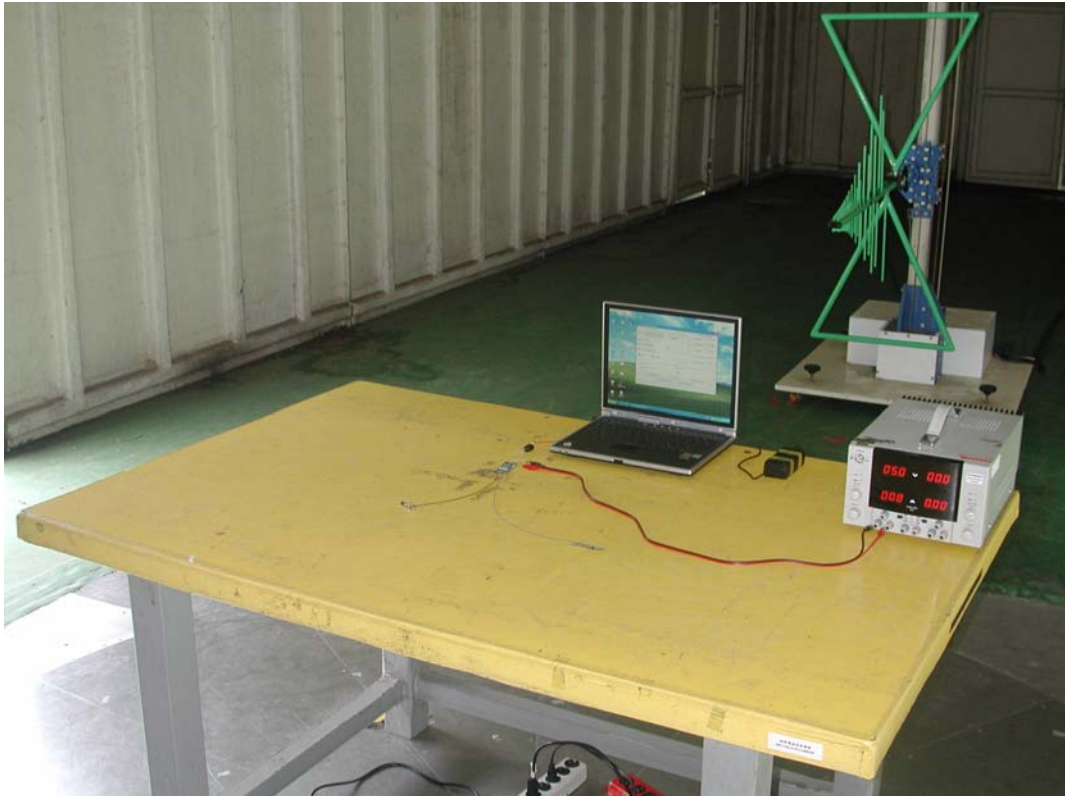
Front View of Conducted Test



Back View of Conducted Test



Front View of Radiated Test



Back View of Radiated Test



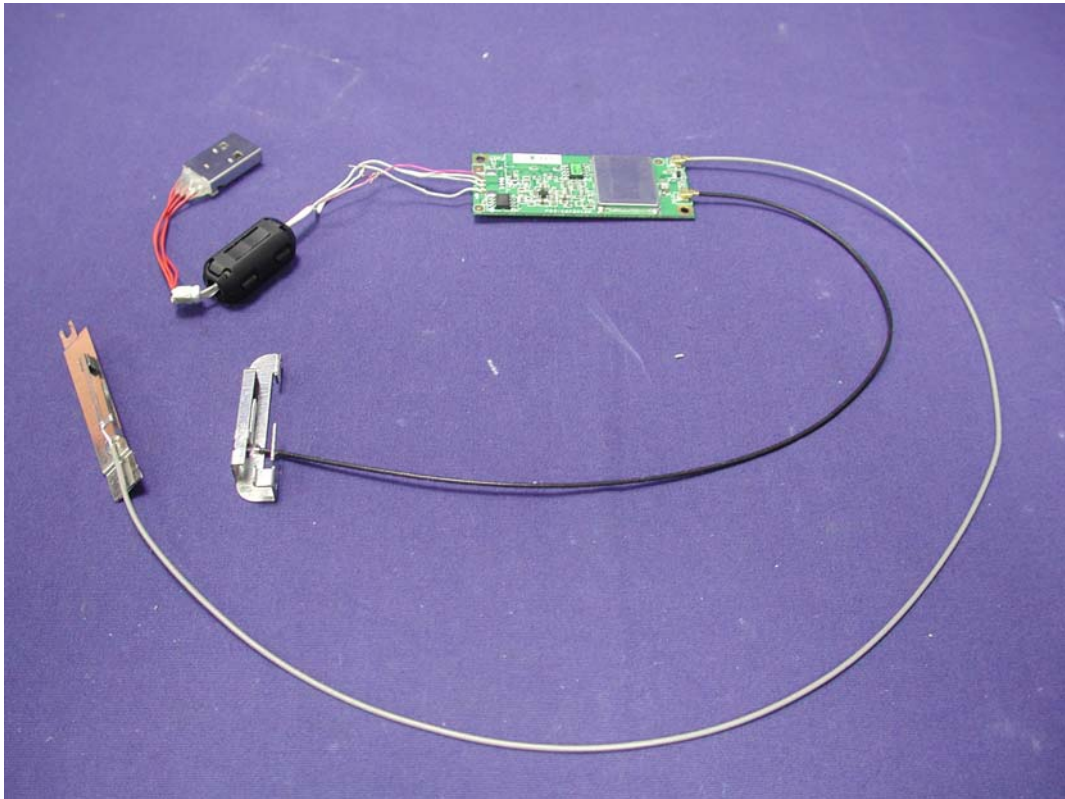
Front View of High Frequency Radiated Test



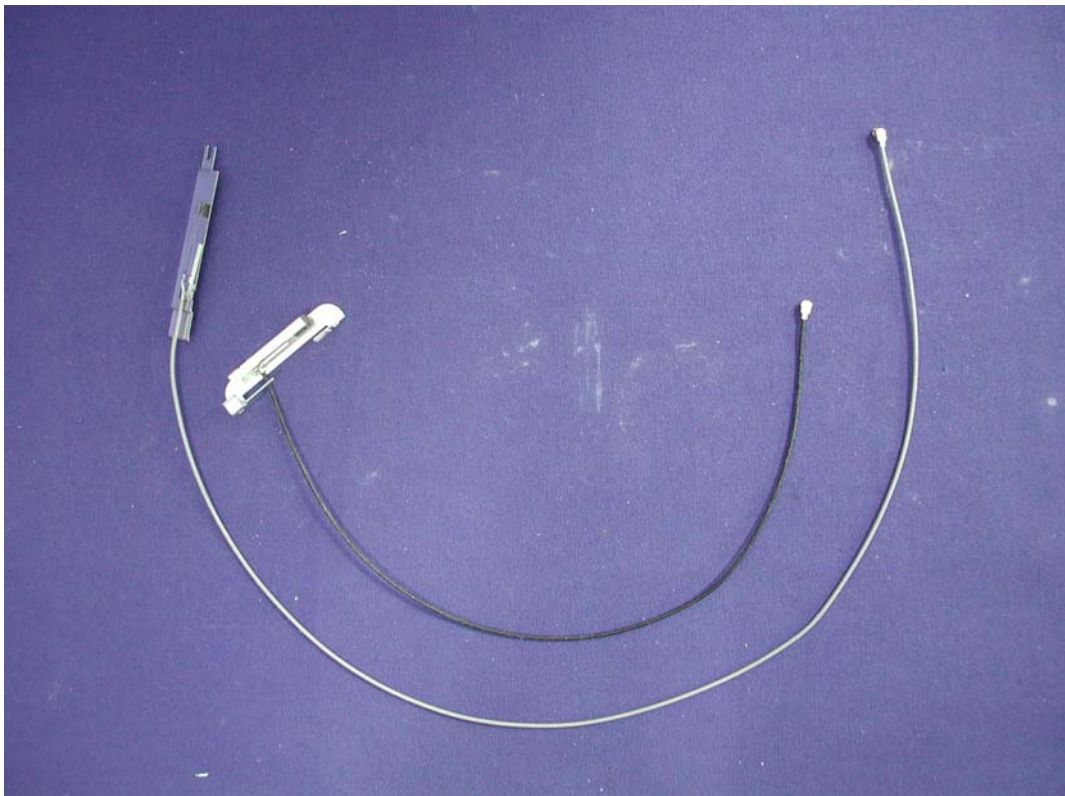
Attachment 2: EUT Detailed Photographs

Attachment 2 : EUT Detailed Photographs

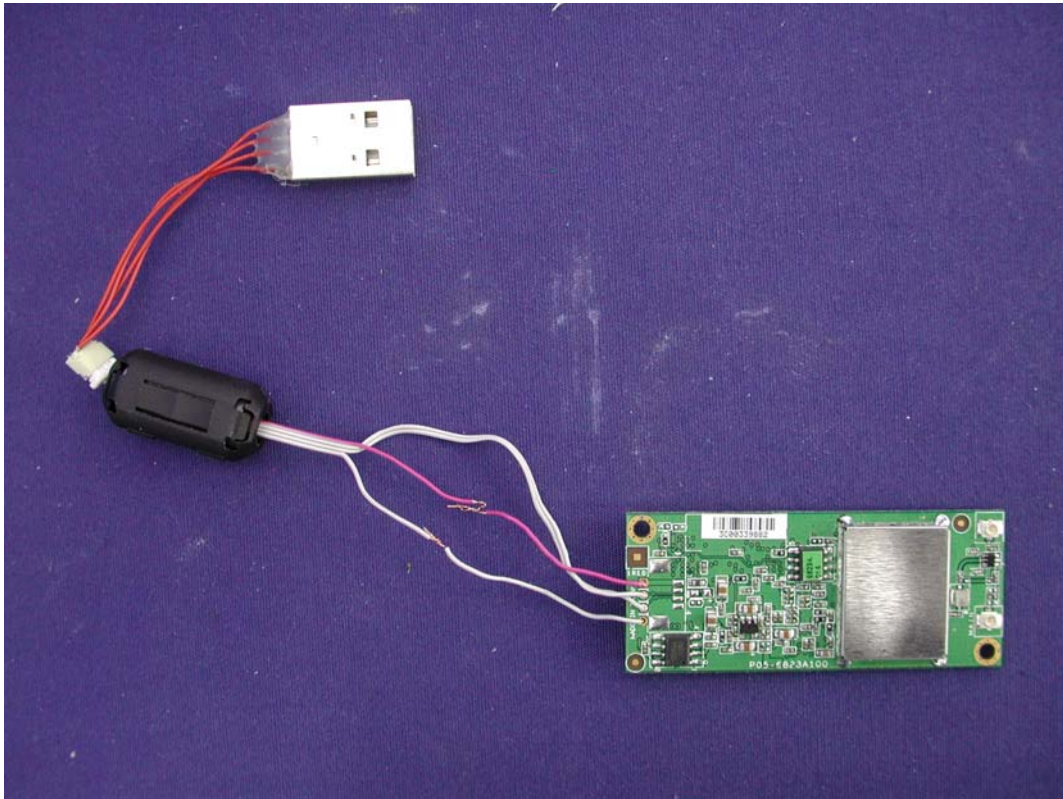
(1) EUT Photo



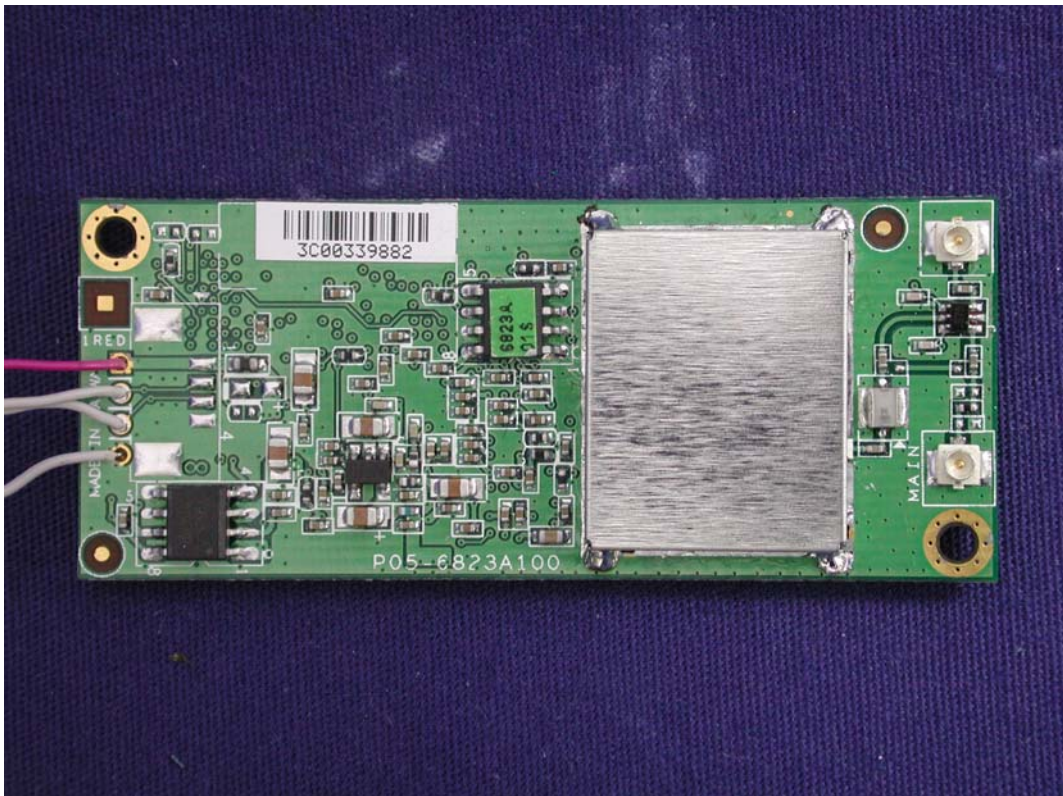
(2) EUT Photo



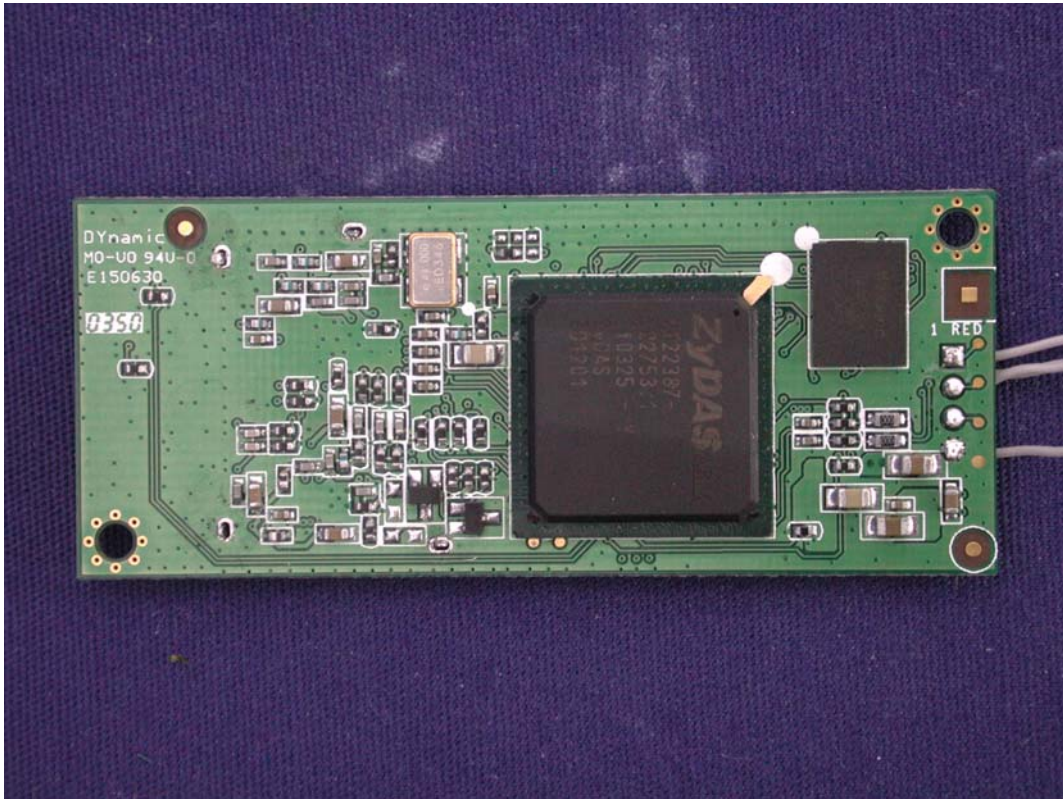
(3) EUT Photo



(4) EUT Photo



(5) EUT Photo



(6) EUT Photo

