



## Test Report

Product Name : Access Point

Model No. : WN1200

FCC ID.: PX91200

Applicant : WINMATE Communication INC.

Address : 9F., No. 175, Ta-Tung Road, Sec. 1, Hsi-Chih, Taipei Hsien, Taiwan, R.O.C.

Date of Receipt : Mar. 1, 2002

Date of Test : Apr. 8, 2002

Report No. : 023L104FI

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 : Apr. 8, 2002

Report No. : 023L104FI



Accredited by NIST (NVLAP)

NVLAP Lab Code: 200347-0

Product Name : Access Point

Applicant : WINMATE Communication INC.

Address : 9F., No. 175, Ta-Tung Road, Sec. 1, Hsi-Chih, Taipei  
Hsien, Taiwan, R.O.C.

Manufacturer : WINMATE Communication INC.

Model No. : WN1200

FCC ID. : PX91200

Rated Voltage : AC 120V/60Hz

Trade Name : WINMATE

Measurement Standard : FCC Part 15 Subpart C Paragraph 15.247

Measurement Procedure : ANSI C63.4:1992

Test Result : Complied



The test results relate only to the samples tested.

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Documented By :

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Tested By :

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Approved By :

( Kevin Wang )

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## 1. GENERAL INFORMATION

### 1.1. EUT Description

|                                              |                                   |
|----------------------------------------------|-----------------------------------|
| Product Name                                 | : Access Point                    |
| Trade Name                                   | : WINMATE                         |
| FCC ID.                                      | : PX91200                         |
| Model No.                                    | : WN1200                          |
| Frequency Range                              | : 2412MHz to 2462MHz              |
| Channel Number                               | : 11                              |
| Chip Rate                                    | : 1Mbps, 2Mbps, 5.5Mbps, 11Mbps   |
| Type of Modulation                           | : Direct Sequence Spread Spectrum |
| Antenna type                                 | : Soldered on PCB                 |
| Operator Selection of<br>Operating Frequency | : By software                     |
| Power Adapter                                | : WN10A-050                       |
|                                              | : Cable Out: Non-shielded, 1.8m   |

Frequency of Each Channel:

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

Note:

1. This device is a 2.4GHz Access Point included a 2.4GHz receiving function, a 2.4GHz transmitting function for the desktop/ laptop computers. Direct Sequence device with 11 channels.
2. Regards to the frequency band operation; two rate that were 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.
4. This device is a composite device in accordance with Part 15 regulations. The function receiving was measured and made a test report that the report number is 023L104F under Declaration of Conformity.

### 1.2. Operational Description

EUT is an USB interface 2.4GHz wireless LAN with 11 channels. This device provided four kind of transmitting speed 1,2,5.5 and 11Mbps. The device of RF carrier is DQPSK, DB PSK and CCK.

The device adapts direct sequence spread spectrum modulation. The soldered on PCB antenna printed on PCB provides diversity function to improve the receiving function. Data can be transmitted by the radio signal connect to the Internet or Local network.

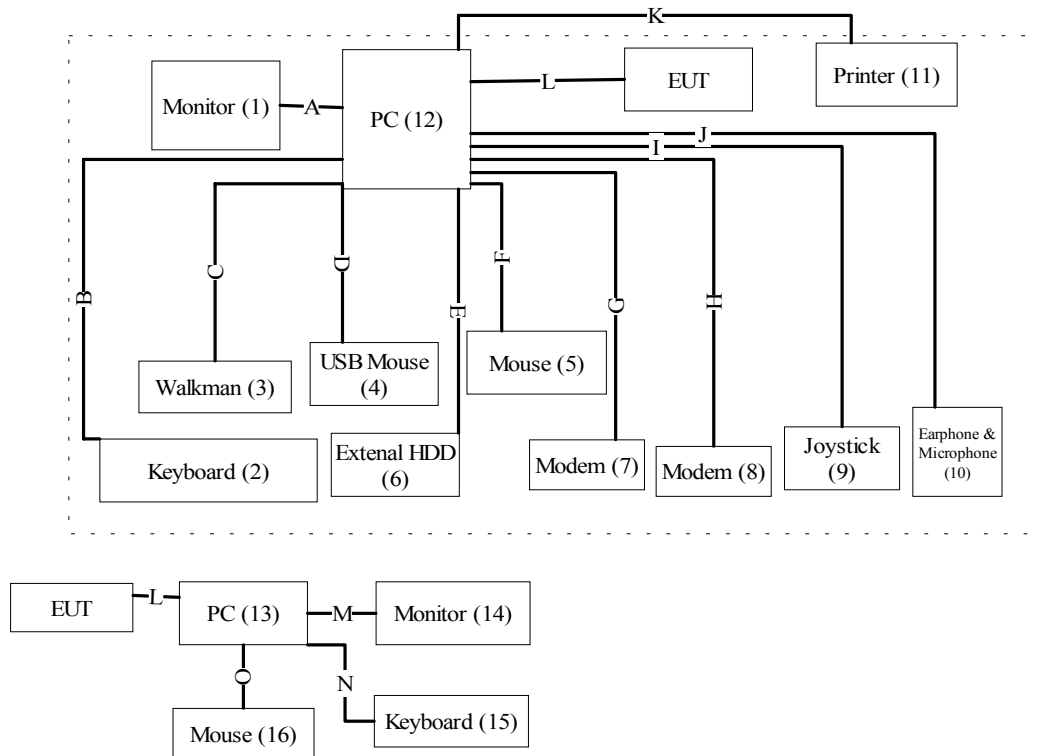
### 1.3. Tested System Details

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         | FCC ID     |
|-------------------------------|--------------|------------------------|------------------|--------------------|------------|
| (1) Monitor                   | ADI          | CM703                  | 038054T10203881A | Non-Shielded, 1.8m | DoC        |
| (2) Keyboard                  | HP           | SK-2506                | C00083358        | --                 | DoC        |
| (3) Walkman                   | AIWA         | HS-TA164               | N/A              | --                 | DoC        |
| (4) Mouse                     | IBM          | M-SAU-IBM6             | 23-029359        | --                 | DoC        |
| (5) Mouse                     | HITACHI      | PC-KM1300              | N/A              | --                 | JNZ201213  |
| (6) External HDD              | FUJITSU      | MMA2200UB              | R129Y19003KY     | --                 | DoC        |
| (7) Modem                     | ACEEX        | DM-1414                | 0102027559       | --                 | IFAXDM1414 |
| (8) Modem                     | ACEEX        | DM-1414                | 0102027558       | --                 | IFAXDM1414 |
| (9) Joystick                  | GENIUS       | MAXFIRE<br>FORCE G-09D | CJ0100200517     | --                 | FSUGG09    |
| (10) Microphone &<br>Earphone | TOKTO        | SX-MI                  | N/A              | --                 | DoC        |
| (11) Printer                  | EPSON        | Color 680              | 023895           | Non-Shielded 1.9m  | DoC        |
| (12) PC                       | ASUS         | CUV4X-ME               | --               | Non-Shielded 1.9m  | DoC        |
| (13) PC                       | IBM          | 2187-16W               | BNL6771          | Non-Shielded 1.8m  | DoC        |
| (14) Monitor                  | ADI          | CM703                  | 038054T10203881A | Non-Shielded 1.8m  | DoC        |
| (15) Keyboard                 | HP           | SK-2506                | C00083358        | --                 | DoC        |
| (16) Mouse                    | HITACHI      | PC-KM1300              | N/A              | --                 | JNZ201213  |

| Signal Cable Type   | Signal Cable Description              |
|---------------------|---------------------------------------|
| A. Monitor Cable    | Shielded, 1.8m, a ferrite core bonded |
| B. Keyboard Cable   | Shielded, 1.8m                        |
| C. Walkman Cable    | Shielded, 1.5m                        |
| D. USB Mouse Cable  | Shielded, 1.2m                        |
| E. USB Cable        | Shielded, 1.2m                        |
| F. USB Mouse Cable  | Shielded, 1.5m                        |
| G. Modem Cable      | Shielded, 1.5m                        |
| H. Modem Cable      | Shielded, 1.5m                        |
| I. Joystick Cable   | Shielded, 2.0m                        |
| J. Microphone Cable | Non-shielded, 1.5m                    |
| K. Printer Cable    | Shielded, 1.2m                        |
| L. LAN Cable        | Non-shielded, 6.0m, 2pcs              |
| M. Monitor Cable    | Shielded, 1.8m, a ferrite core bonded |
| N. Keyboard Cable   | Shielded, 1.5m                        |
| O. Mouse Cable      | Shielded, 1.5m                        |

## 1.4. Configuration of tested System



## 1.5. EUT Exercise Software

- 1.5.1 Setup the EUT and simulators as shown on 1.4.
- 1.5.2 Turn on the power of all equipment.
- 1.5.3 PC reads data from disk.
- 1.5.4 Data will be transmitting through EUT.
- 1.5.5 The transmitted status will be shown on the monitor.
- 1.5.6 Repeat the above procedure 1.5.4 to 1.5.5

## 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: November 3, 1998 File on  
Federal Communications Commission  
FCC Engineering Laboratory  
7435 Oakland Mills Road  
Columbia, MD 21046  
Reference 31040/SIT1300F2  
  
August 30, 2001 Accreditation on NVLAP  
NVLAP Lab Code: 200347-0



Site Name: Quietek Corporation

Site Address: No.75-1, Wang-Yeh Valley, Yung-Hsing,  
Chiung-Lin, Hsin-Chu County,  
Taiwan, R.O.C.  
TEL : 886-3-592-8858 / FAX : 886-3-592-8859  
E-Mail: [service@quietek.com](mailto:service@quietek.com)

## 2. Conducted Emission

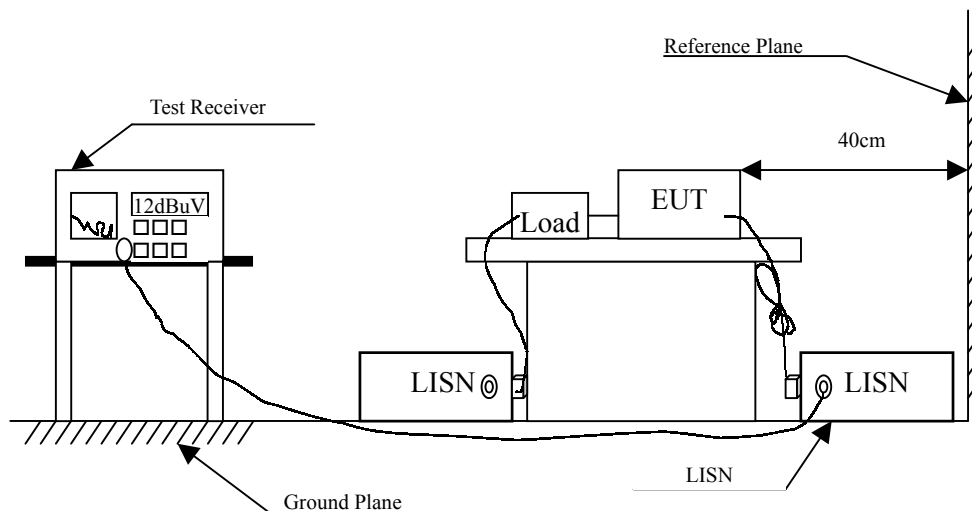
### 2.1. Test Equipment List

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, 2001 |             |
| 2    | L.I.S.N.           | R & S        | ESH3-Z5/825016/6   | May, 2001 | EUT         |
| 3    | L.I.S.N.           | Kyoritsu     | KNW-407/8-1420-3   | May, 2001 | Peripherals |
| 4    | Pulse Limiter      | R & S        | ESH3-Z2            | N/A       |             |
| 5    | No.2 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 Paragraph 15.207 (dBuV) |        |      |
|-------------------------------------|--------|------|
| Frequency<br>MHz                    | Limits |      |
|                                     | uV     | dBuV |
| 0.45 - 30                           | 250    | 48.0 |

## 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 0.45MHz to 30MHz using a receiver bandwidth of 9kHz.

## 2.5. Test Result of Conducted Emission

Product : Access Point  
 Test Item : Conducted Emission Test  
 Test Site : No2. Shielded Room  
 Test Mode : Normal Operation

| Frequency          | Cable | LISN   | Reading Level | Emission Level | Limits |
|--------------------|-------|--------|---------------|----------------|--------|
|                    | Loss  | Factor |               |                |        |
| MHz                | dB    | dB     | dBuV          | dBuV           | dBuV   |
| =====              |       |        |               |                |        |
| <b>Line 1</b>      |       |        |               |                |        |
| <b>Quasi-Peak:</b> |       |        |               |                |        |
| 0.540              | 0.21  | 0.10   | 39.28         | 39.59          | 48.00  |
| *0.750             | 0.16  | 0.10   | 44.18         | 44.44          | 48.00  |
| 0.970              | 0.16  | 0.10   | 38.38         | 38.64          | 48.00  |
| 1.080              | 0.16  | 0.10   | 38.04         | 38.31          | 48.00  |
| 1.525              | 0.16  | 0.12   | 37.32         | 37.60          | 48.00  |
| 1.608              | 0.16  | 0.12   | 33.46         | 33.74          | 48.00  |

### Line 2

#### Quasi-Peak:

|        |      |      |       |       |       |
|--------|------|------|-------|-------|-------|
| 0.536  | 0.21 | 0.10 | 39.26 | 39.57 | 48.00 |
| *0.750 | 0.16 | 0.10 | 43.32 | 43.58 | 48.00 |
| 0.864  | 0.16 | 0.10 | 39.60 | 39.86 | 48.00 |
| 1.076  | 0.16 | 0.10 | 41.72 | 41.99 | 48.00 |
| 1.281  | 0.16 | 0.11 | 39.56 | 39.83 | 48.00 |
| 1.526  | 0.16 | 0.12 | 36.10 | 36.38 | 48.00 |

#### Remarks :

1. All Readings below 1GHz are Quasi-Peak value.
2. “ \* ” means that this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable loss

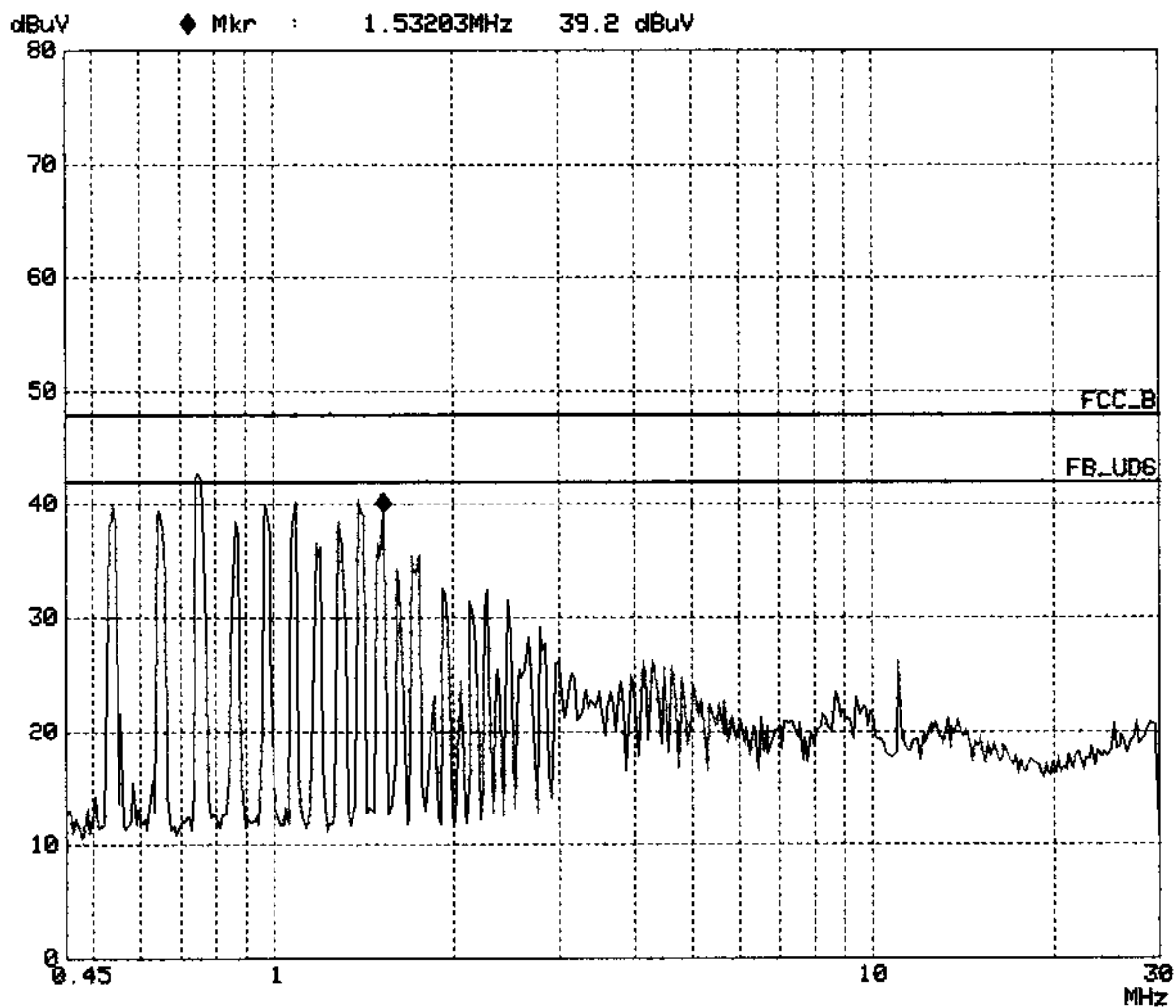
QUIETEK CORPORATION  
EMI TEST RECEIVER

EUT: Access Point  
Manuf: WINMATE  
Operator: SKY  
Test Spec: AC 120/60Hz  
Comment: LINE 1  
CH1 TX  
File name: FCC15B.SPC  
Date: 28. Mar 02 09:57

Overview Scan Settings (1 Range)

| Frequencies |      |      | Receiver Settings |          |        |              |
|-------------|------|------|-------------------|----------|--------|--------------|
| Start       | Stop | Step | IF BW             | Detector | M-Time | Atten Preamp |
| 450k        | 30M  | 3.9k | 9k                | PK       | 0.10ms | 0dBLN OFF    |

Final Measurement: x QP  
Meas Time: 1 s  
Subranges: 8  
Acc Margin: 6dB



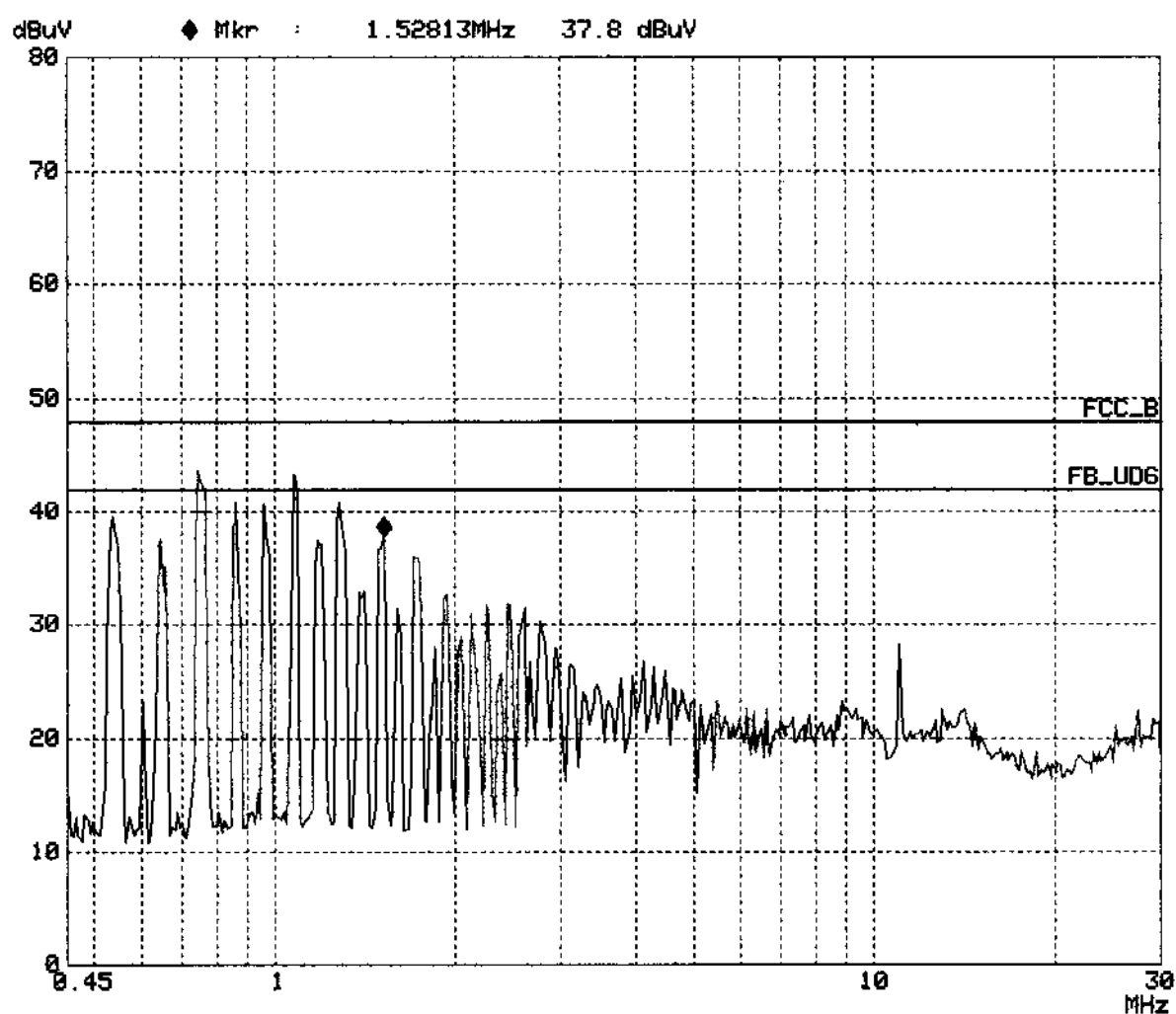
# QUIETEK CORPORATION EMI TEST RECEIVER

EUT: Access Point  
Manuf: WINMATE  
Operator: SKY  
Test Spec: AC 120/60Hz  
Comment: LINE 2  
CH1 TX  
File name: FCC15B.SPC  
Date: 28. Mar 02 10:03

## Overview Scan Settings (1 Range)

| Frequencies |      |      | Receiver Settings |          |        |              |
|-------------|------|------|-------------------|----------|--------|--------------|
| Start       | Stop | Step | IF BW             | Detector | M-Time | Atten Preamp |
| 450k        | 30M  | 3.9k | 9k                | PK       | 0.10ms | 0dB LN OFF   |

Final Measurement: x QP  
Meas Time: 1 s  
Subranges: 8  
Acc Margin: 6dB



### 3. Peak Power Output

#### 3.1. Test Equipment

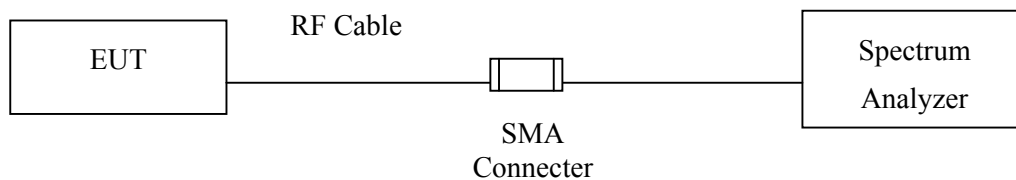
The following test equipments are used during the radiated emission tests:

|   | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---|-----------|--------------|----------------------|-----------|
| X | Spectrum  | Advantest    | R3272 / 72421194     | May, 2001 |

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. Test Condition

Standard Temperature and Humidity, Standard Test Voltage

#### 3.4. Limit

The maximum peak power shall be less 1 Watt.

### 3.5. Test Result of Peak Power Output

Product : Access Point  
 Test Item : Peak Power Output Data  
 Test Site : No.1 OATS  
 Test Mode : Normal Operation

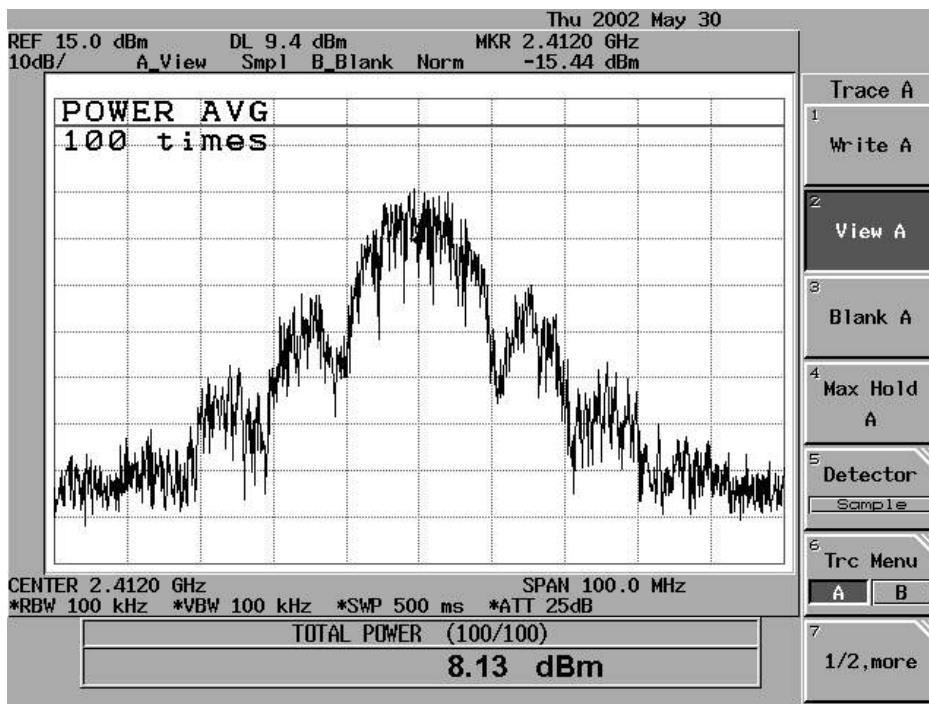
#### Data Speed: 1Mbps

| Channel No. | Frequency(MHz) | Measurement (dBm) | Required Limit | Result |
|-------------|----------------|-------------------|----------------|--------|
| 1           | 2412           | 8.13              | 1 Watt= 30 dBm | Pass   |
| 6           | 2437           | 6.37              | 1 Watt= 30 dBm | Pass   |
| 11          | 2462           | 5.50              | 1 Watt= 30 dBm | Pass   |

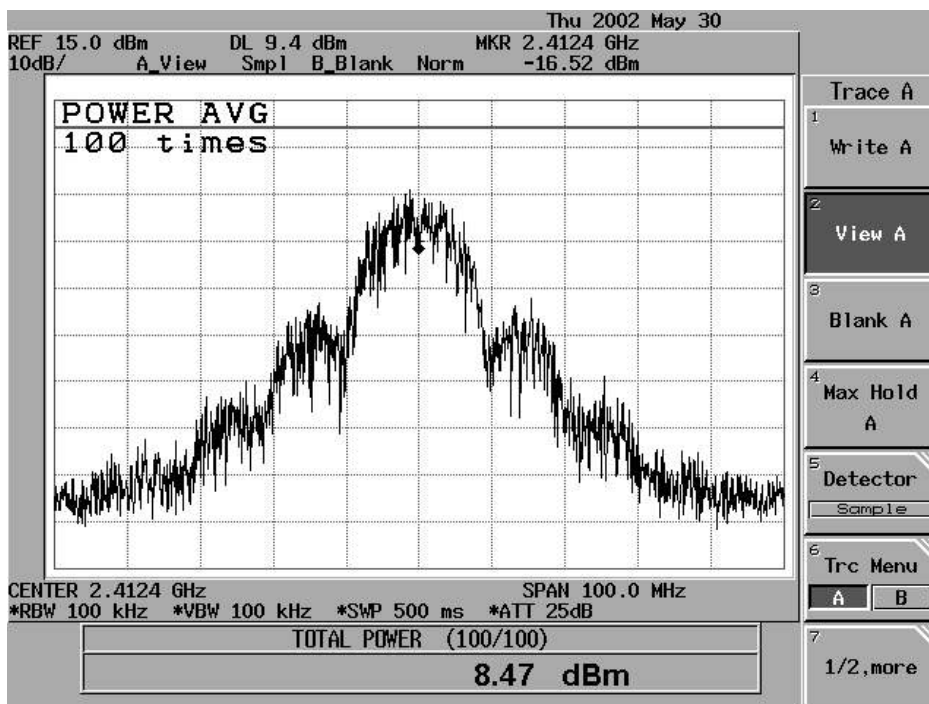
#### Data Speed: 11Mbps

| Channel No. | Frequency(MHz) | Measurement (dBm) | Required Limit | Result |
|-------------|----------------|-------------------|----------------|--------|
| 1           | 2412           | 8.47              | 1 Watt= 30 dBm | Pass   |
| 6           | 2437           | 6.71              | 1 Watt= 30 dBm | Pass   |
| 11          | 2462           | 5.75              | 1 Watt= 30 dBm | Pass   |

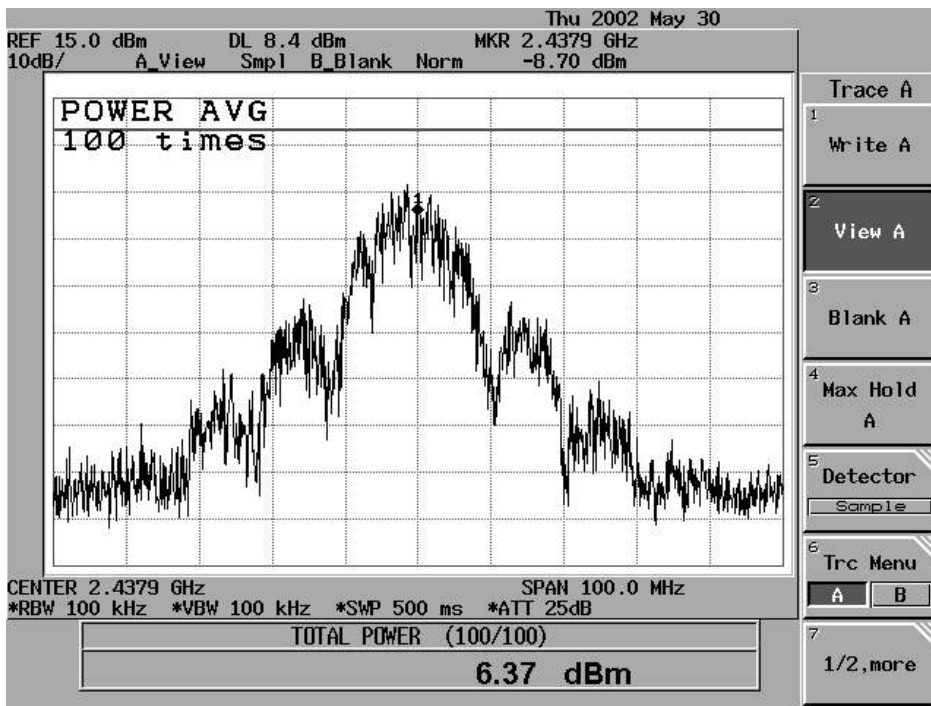
Channel 1\_1 MHz



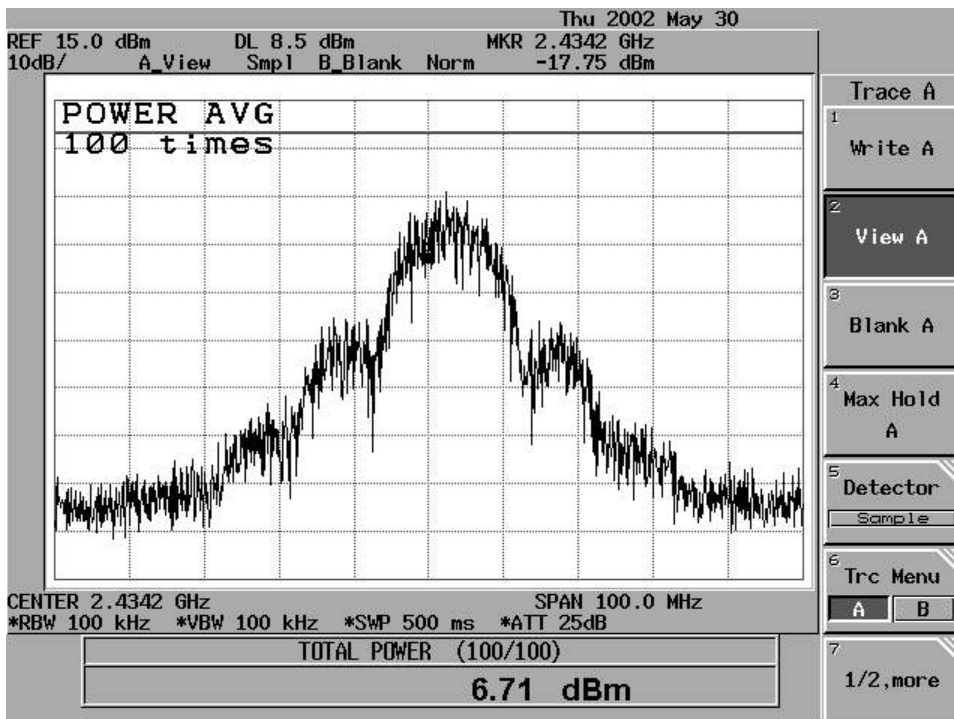
Channel 1\_11 MHz



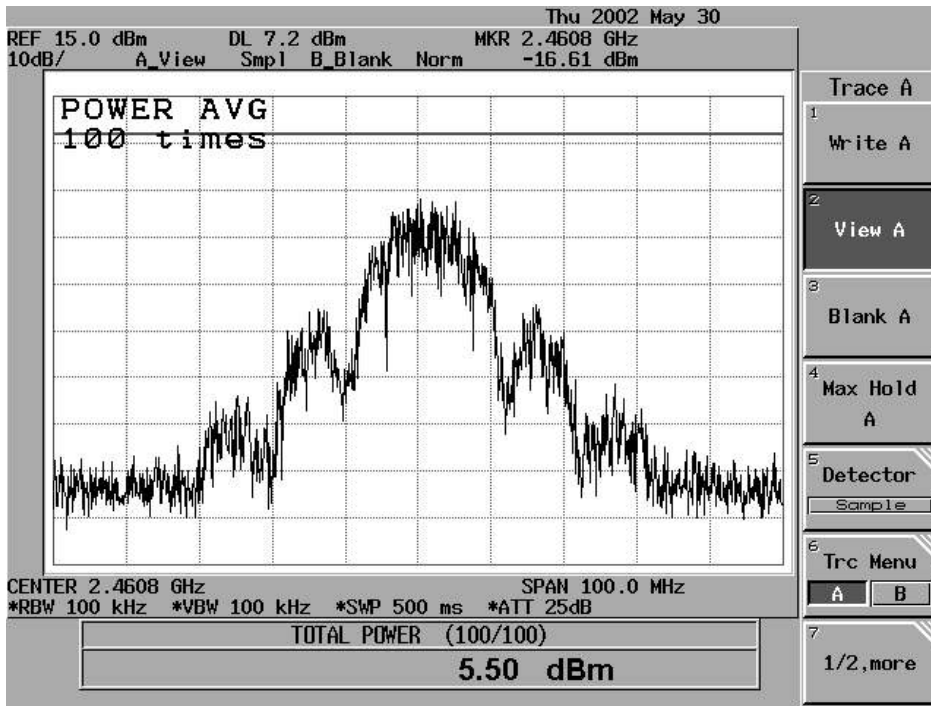
Channel 6\_1 MHz



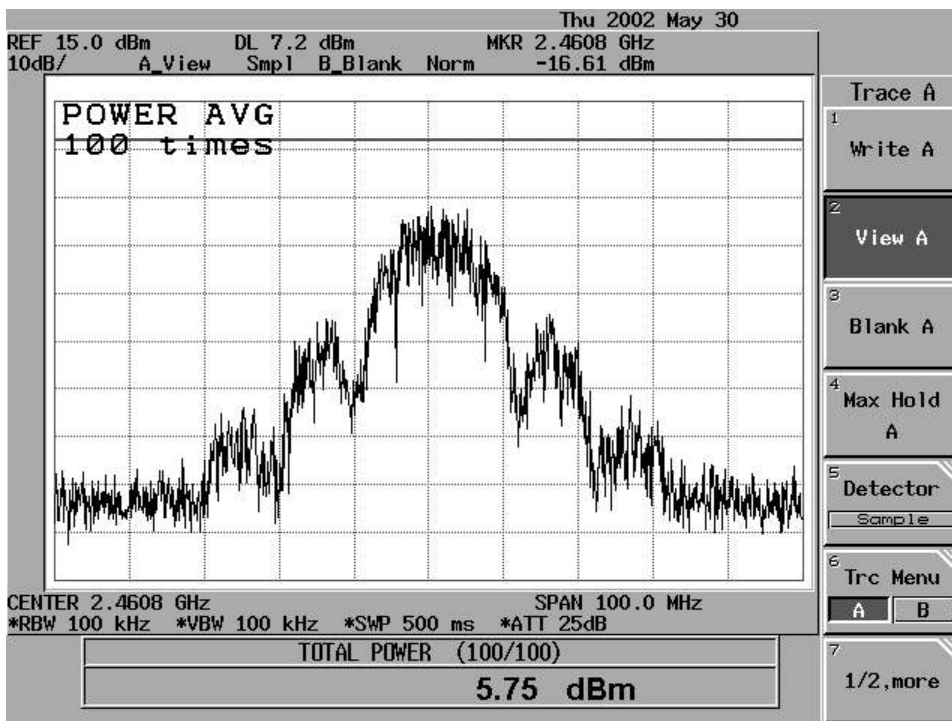
Channel 6\_11 MHz



Channel 11\_1 MHz



Channel 11\_11 MHz



#### 4. RF Exposure Evaluation

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

##### LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| Frequency Range (MHz)                                     | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm <sup>2</sup> ) | Average Time (Minutes) |
|-----------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|------------------------|
| (A) Limits for Occupational/ Control Exposures            |                               |                               |                                     |                        |
| 300-1500                                                  | --                            | --                            | F/300                               | 6                      |
| 1500-100,000                                              | --                            | --                            | 5                                   | 6                      |
| (B) Limits for General Population/ Uncontrolled Exposures |                               |                               |                                     |                        |
| 300-1500                                                  | --                            | --                            | F/1500                              | 6                      |
| 1500-100,000                                              | --                            | --                            | 1                                   | 30                     |

F= Frequency in MHz

##### 4.1. Friis Formula

Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

G = gain of antenna in linear scale

$\pi$  = 3.1416

R = distance between observation point and center of the radiator in cm

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

##### 4.2. EUT Operation condition

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

### 4.3. Test Result of RF Exposure Evaluation

Product : Access Point  
 Test Item : RF Exposure Evaluation Data  
 Test Site : No.1 OATS  
 Test Mode : Normal Operation

#### 4.3.1 Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 0dBi linear scale.

#### 4.3.2 Output Power Into Antenna & RF Exposure Evaluation Distance

| Channel     | Channel Frequency (MHz) | Output Power to Antenna (dBm) | Minimum Allowable Distance ® From Skin(cm) |
|-------------|-------------------------|-------------------------------|--------------------------------------------|
| 1 (1Mbps)   | 2412                    | 8.13                          | 0.72                                       |
| 1 (11Mbps)  | 2412                    | 8.47                          | 0.75                                       |
| 6 (1Mbps)   | 2437                    | 6.37                          | 0.59                                       |
| 6 (11Mbps)  | 2437                    | 6.71                          | 0.61                                       |
| 11 (1Mbps)  | 2462                    | 5.50                          | 0.53                                       |
| 11 (11Mbps) | 2462                    | 5.75                          | 0.55                                       |

The distance r (4<sup>th</sup> column) calculated from the Friis transmission formula is far shorter than 20 cm separation requirement. So, RF exposure limit warning or SAR test are not required.

## 5. Radiated Emission

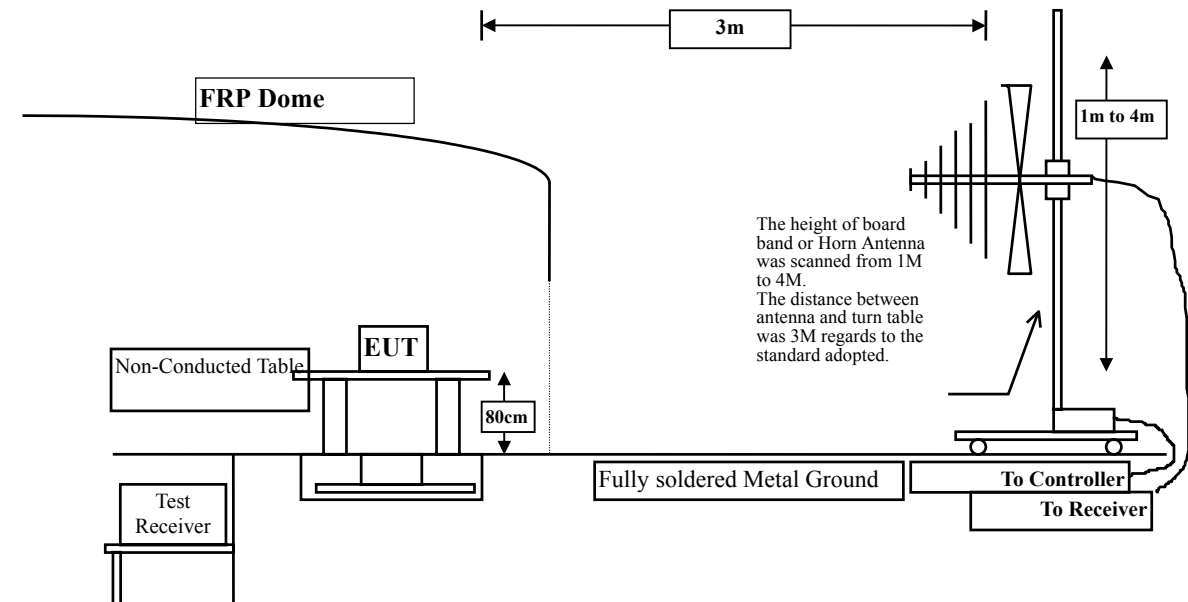
### 5.1. Test Equipment

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

| Test Site |   | Equipment         | Manufacturer | Model No./Serial No. | Last Cal.  |
|-----------|---|-------------------|--------------|----------------------|------------|
| Site # 1  | X | Test Receiver     | R & S        | ESCS 30 / 825442/14  | May, 2001  |
|           | X | Spectrum Analyzer | Advantest    | R3261C / 71720140    | May, 2001  |
|           | X | Pre-Amplifier     | HP           | 8447D/3307A01812     | May, 2001  |
|           | X | Bilog Antenna     | Chase        | CBL6112B / 12452     | Sep., 2001 |
|           | X | Horn Antenna      | EM           | EM6917 / 103325      | May, 2001  |
| Site # 2  |   | Test Receiver     | R & S        | ESCS 30 / 825442/17  | May, 2001  |
|           |   | Spectrum Analyzer | Advantest    | R3261C / 71720609    | May, 2001  |
|           |   | Pre-Amplifier     | HP           | 8447D/3307A01814     | May, 2001  |
|           |   | Bilog Antenna     | Chase        | CBL6112B / 2455      | Sep., 2001 |
|           |   | Horn Antenna      | EM           | EM6917 / 103325      | May, 2001  |

- 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



### 5.3. 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<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 :
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.

### 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 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.

## 5.5. Test Result of Radiated Emission

Product : Access Point  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.1 OATS  
 Test Mode : Channel 1(1Mbps)

| Frequency                    | Cable Loss | Probe Factor | PreAMP | Reading Level | Emission Level | Margin | Limit  |
|------------------------------|------------|--------------|--------|---------------|----------------|--------|--------|
| MHz                          | dB         | dB/m         | dB     | dBuV          | dBuV/m         | dB     | dBuV/m |
| <b>Horizontal: (Peak)</b>    |            |              |        |               |                |        |        |
| 4824.040                     | 6.19       | 33.70        | 19.50  | 37.23         | 57.62          | 16.38  | 74.00  |
| 7236.000                     | 7.34       | 36.69        | 18.33  | 38.00         | 63.70          | 10.30  | 74.00  |
| <b>Horizontal: (Average)</b> |            |              |        |               |                |        |        |
| 4824.040                     | 6.19       | 33.70        | 19.50  | 25.41         | 45.80          | 8.20   | 54.00  |
| 7236.000                     | 7.34       | 36.69        | 18.33  | 21.13         | 46.83          | 7.17   | 54.00  |
| <b>Vertical: (Peak)</b>      |            |              |        |               |                |        |        |
| 4824.000                     | 6.19       | 33.70        | 19.50  | 36.45         | 56.84          | 17.16  | 74.00  |
| 7236.000                     | 7.34       | 36.69        | 18.33  | 38.62         | 64.32          | 9.68   | 74.00  |
| <b>Vertical: (Average)</b>   |            |              |        |               |                |        |        |
| 4824.040                     | 6.19       | 33.70        | 19.50  | 32.32         | 52.71          | 1.29   | 54.00  |
| 7236.000                     | 7.34       | 36.69        | 18.33  | 21.13         | 46.83          | 7.17   | 54.00  |

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable loss-PreAMP

Product : Access Point  
Test Item : Harmonic Radiated Emission Data  
Test Site : No.1 OATS  
Test Mode : Channel 6(1Mbps)

| 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)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4874.000 | 6.21 | 33.85 | 19.49 | 36.85 | 57.42 | 16.58 | 74.00 |
| 7310.000 | 7.39 | 36.91 | 18.26 | 37.00 | 63.04 | 10.96 | 74.00 |

#### Horizontal: (Average)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4874.000 | 6.21 | 33.85 | 19.49 | 23.41 | 43.98 | 10.02 | 54.00 |
| 7310.000 | 7.39 | 36.91 | 18.26 | 21.13 | 47.17 | 6.83  | 54.00 |

#### Vertical: (Peak)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4874.000 | 6.21 | 33.85 | 19.49 | 36.12 | 56.69 | 17.31 | 74.00 |
| 7310.000 | 7.39 | 36.91 | 18.26 | 38.00 | 64.04 | 9.96  | 74.00 |

#### Vertical: (Average)

|          |      |       |       |       |       |      |       |
|----------|------|-------|-------|-------|-------|------|-------|
| 4874.000 | 6.21 | 33.85 | 19.49 | 26.87 | 47.44 | 6.56 | 54.00 |
| 7310.000 | 7.39 | 36.91 | 18.26 | 21.20 | 47.24 | 6.76 | 54.00 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable loss-PreAMP

Product : Access Point  
Test Item : Harmonic Radiated Emission Data  
Test Site : No.1 OATS  
Test Mode : Channel 11(1Mbps)

| 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)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4923.925 | 6.25 | 33.99 | 19.49 | 35.00 | 55.75 | 18.25 | 74.00 |
| 7386.115 | 7.43 | 37.06 | 18.22 | 32.00 | 58.27 | 15.73 | 74.00 |

#### Horizontal: (Average)

|          |      |       |       |       |       |      |       |
|----------|------|-------|-------|-------|-------|------|-------|
| 4923.925 | 6.25 | 33.99 | 19.49 | 23.91 | 44.66 | 9.34 | 54.00 |
| 7386.115 | 7.43 | 37.06 | 18.22 | 21.46 | 47.73 | 6.27 | 54.00 |

#### Vertical: (Peak)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4924.060 | 6.25 | 33.99 | 19.49 | 35.26 | 56.01 | 17.99 | 74.00 |
| 7386.190 | 7.43 | 37.06 | 18.22 | 37.00 | 63.27 | 10.73 | 74.00 |

#### Vertical: (Average)

|          |      |       |       |       |       |      |       |
|----------|------|-------|-------|-------|-------|------|-------|
| 4924.060 | 6.25 | 33.99 | 19.49 | 25.75 | 46.50 | 7.50 | 54.00 |
| 7386.190 | 7.43 | 37.06 | 18.22 | 21.45 | 47.72 | 6.28 | 54.00 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable loss-PreAMP

Product : Access Point  
Test Item : Harmonic Radiated Emission Data  
Test Site : No.1 OATS  
Test Mode : Channel 1(11Mbps)

| 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)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4824.040 | 6.19 | 33.70 | 19.50 | 37.23 | 57.62 | 16.38 | 74.00 |
| 7236.000 | 7.34 | 36.69 | 18.33 | 37.82 | 63.52 | 10.48 | 74.00 |

#### Horizontal: (Average)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4824.040 | 6.19 | 33.70 | 19.50 | 20.11 | 40.50 | 13.50 | 54.00 |
| 7236.000 | 7.34 | 36.69 | 18.33 | 21.12 | 46.82 | 7.18  | 54.00 |

#### Vertical: (Peak)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4824.000 | 6.19 | 33.70 | 19.50 | 37.21 | 57.60 | 16.40 | 74.00 |
| 7236.000 | 7.34 | 36.69 | 18.33 | 38.00 | 63.70 | 10.30 | 74.00 |

#### Vertical: (Average)

|          |      |       |       |       |       |      |       |
|----------|------|-------|-------|-------|-------|------|-------|
| 4824.000 | 6.19 | 33.70 | 19.50 | 27.32 | 47.71 | 6.29 | 54.00 |
| 7236.000 | 7.34 | 36.69 | 18.33 | 19.53 | 45.23 | 8.77 | 54.00 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable loss-PreAMP

Product : Access Point  
Test Item : Harmonic Radiated Emission Data  
Test Site : No.1 OATS  
Test Mode : Channel 6(11Mbps)

| 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)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4874.000 | 6.21 | 33.85 | 19.49 | 36.12 | 56.69 | 17.31 | 74.00 |
| 7310.000 | 7.39 | 36.91 | 18.26 | 38.00 | 64.04 | 9.96  | 74.00 |

#### Horizontal: (Average)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4874.000 | 6.21 | 33.85 | 19.49 | 18.41 | 38.98 | 15.02 | 54.00 |
| 7310.000 | 7.39 | 36.91 | 18.26 | 20.08 | 46.12 | 7.88  | 54.00 |

#### Vertical: (Peak)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4874.000 | 6.21 | 33.85 | 19.49 | 35.26 | 55.83 | 18.17 | 74.00 |
| 7310.000 | 7.39 | 36.91 | 18.26 | 36.00 | 62.04 | 11.96 | 74.00 |

#### Vertical: (Average)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4874.000 | 6.21 | 33.85 | 19.49 | 21.87 | 42.44 | 11.56 | 54.00 |
| 7310.000 | 7.39 | 36.91 | 18.26 | 19.19 | 45.23 | 8.77  | 54.00 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable loss-PreAMP

Product : Access Point  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.1 OATS  
 Test Mode : Channel 11(11Mbps)

| 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)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4923.000 | 6.24 | 33.94 | 19.49 | 33.44 | 54.13 | 19.87 | 74.00 |
| 7386.115 | 7.43 | 37.06 | 18.22 | 32.00 | 58.27 | 15.73 | 74.00 |

#### Horizontal: (Average)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4923.925 | 6.25 | 33.99 | 19.49 | 20.48 | 41.23 | 12.77 | 54.00 |
| 7386.115 | 7.43 | 37.06 | 18.22 | 18.96 | 45.23 | 8.77  | 54.00 |

#### Vertical: (Peak)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4924.000 | 6.25 | 33.99 | 19.49 | 35.00 | 55.75 | 18.25 | 74.00 |
| 7386.190 | 7.43 | 37.06 | 18.22 | 36.00 | 62.27 | 11.73 | 74.00 |

#### Vertical: (Average)

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 4924.000 | 6.25 | 33.99 | 19.49 | 20.75 | 41.50 | 12.50 | 54.00 |
| 7386.190 | 7.43 | 37.06 | 18.22 | 19.35 | 45.62 | 8.38  | 54.00 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable loss-PreAMP

Product : Access Point  
Test Item : General Radiated Emission Data  
Test Site : No.1 OATS  
Test Mode : Normal Operation

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

#### Horizontal:

|          |      |       |       |       |       |      |       |
|----------|------|-------|-------|-------|-------|------|-------|
| 516.940  | 1.20 | 21.66 | 20.70 | 37.68 | 39.84 | 6.16 | 46.00 |
| 538.280  | 1.20 | 21.82 | 20.70 | 36.03 | 38.35 | 7.65 | 46.00 |
| 648.860  | 1.40 | 23.01 | 20.70 | 36.16 | 39.86 | 6.14 | 46.00 |
| 671.170  | 1.40 | 22.54 | 20.70 | 37.86 | 41.10 | 4.90 | 46.00 |
| *692.510 | 1.20 | 20.79 | 20.70 | 40.03 | 41.32 | 4.68 | 46.00 |
| 736.160  | 1.40 | 23.52 | 20.70 | 33.73 | 37.95 | 8.05 | 46.00 |

#### Vertical:

|          |      |       |       |       |       |       |       |
|----------|------|-------|-------|-------|-------|-------|-------|
| 516.940  | 1.20 | 19.23 | 20.70 | 38.01 | 37.74 | 8.26  | 46.00 |
| 538.280  | 1.20 | 19.21 | 20.70 | 34.42 | 34.13 | 11.87 | 46.00 |
| 648.860  | 1.40 | 20.69 | 20.70 | 34.86 | 36.25 | 9.75  | 46.00 |
| *692.510 | 1.20 | 21.66 | 20.70 | 36.59 | 38.75 | 7.25  | 46.00 |
| 714.820  | 1.40 | 21.85 | 20.70 | 34.67 | 37.22 | 8.78  | 46.00 |
| 869.050  | 1.60 | 25.43 | 20.70 | 31.73 | 38.06 | 7.94  | 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- Pre Amp.

## 6. Band Edge

### 6.1. Test Equipment

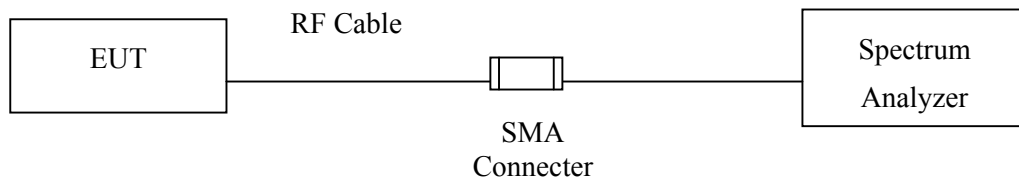
The following test equipments are used during the band edge tests:

| Equipment           | Manufacturer | Model No./Serial No. | Last Cal.  |
|---------------------|--------------|----------------------|------------|
| X Spectrum Analyzer | Advantest    | R3272 / 72421194     | May, 2001  |
| X Test Receiver     | R & S        | ESCS 30 / 825442/14  | May, 2001  |
| X Spectrum Analyzer | Advantest    | R3261C / 71720140    | May, 2001  |
| X Pre-Amplifier     | HP           | 8447D/3307A01812     | May, 2001  |
| X Bilog Antenna     | Chase        | CBL6112B / 12452     | Sep., 2001 |
| X Horn Antenna      | EM           | EM6917 / 103325      | May, 2001  |

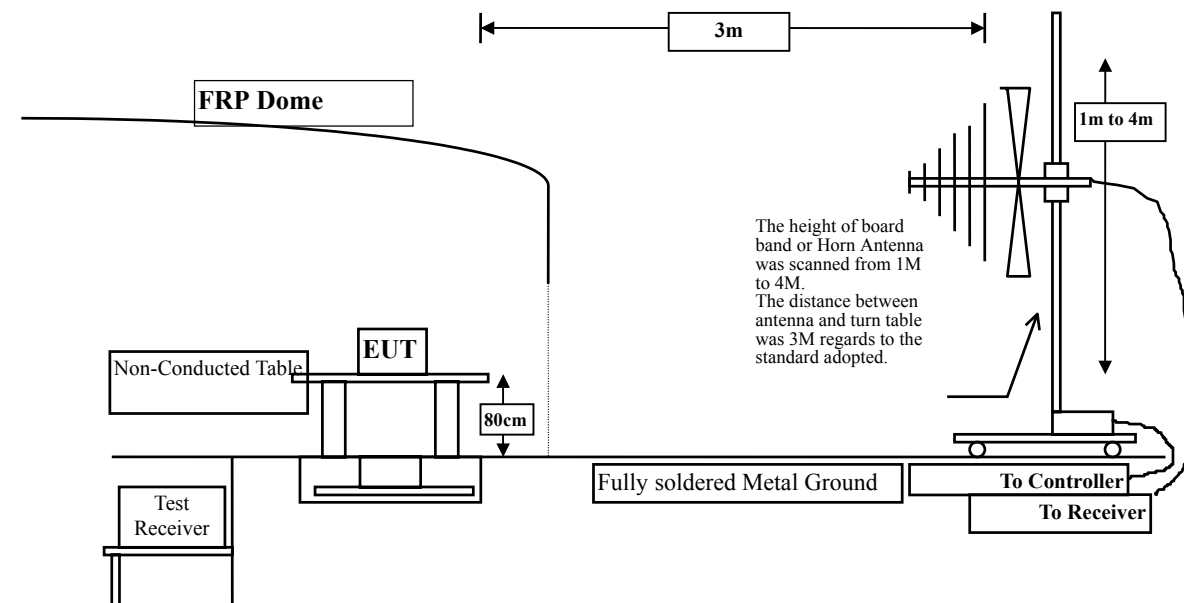
- Note:
1. All equipments that need to calibrate are with calibration period of 1 year.
  2. Mark "X" test instruments are used to measure the final test results.

### 6.2. Test Setup

#### RF Conducted Measurement:



#### RF Radiated Measurement:



### **6.3. Test Condition**

Standard Temperature and Humidity, Standard Test Voltage

### **6.4. Limit**

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)).

### **6.5. 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 is 120 kHz, above 1GHz are 1 MHz.

## 6.6. Test Result of Band Edge

Product : Access Point  
 Test Item : Band Edge Data  
 Test Site : No.1 OATS  
 Test Mode : Channel 1 (1Mbps)

### 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)

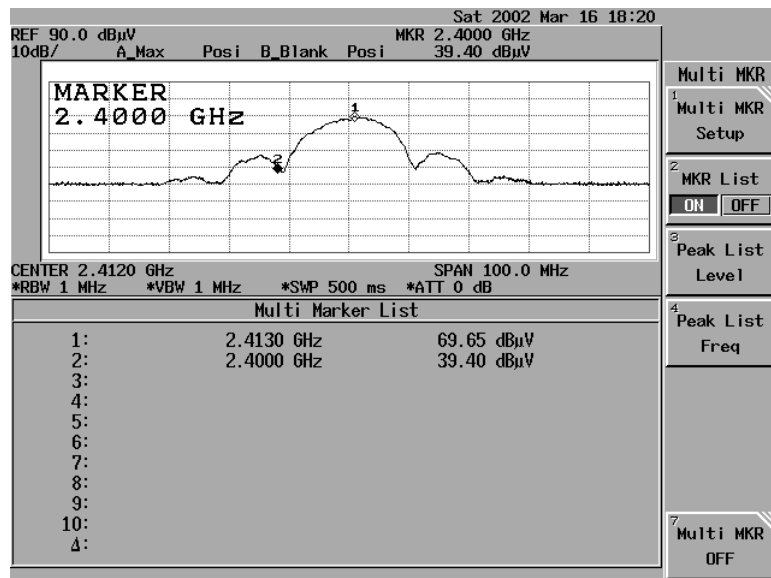
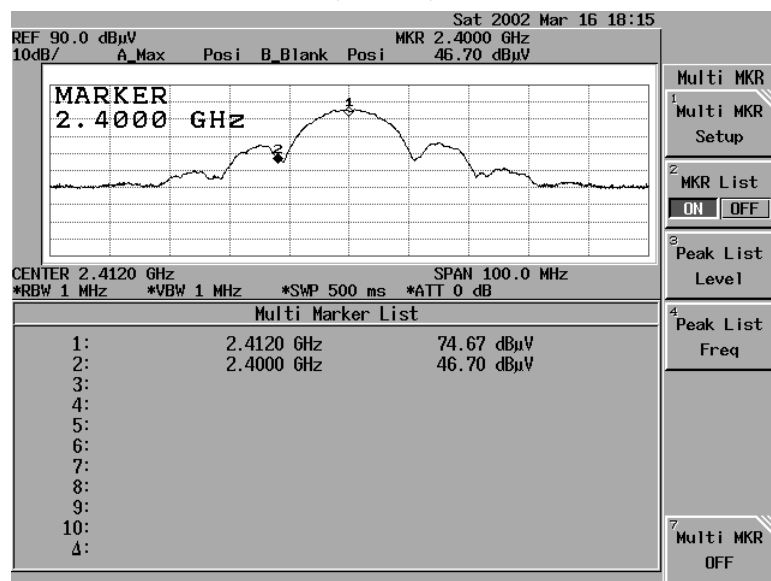


Figure Channel 1: (Vertical)



Product : Access Point  
 Test Item : Band Edge Data  
 Test Site : No.1 OATS  
 Test Mode : Channel 1 (11Mbps)

**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)

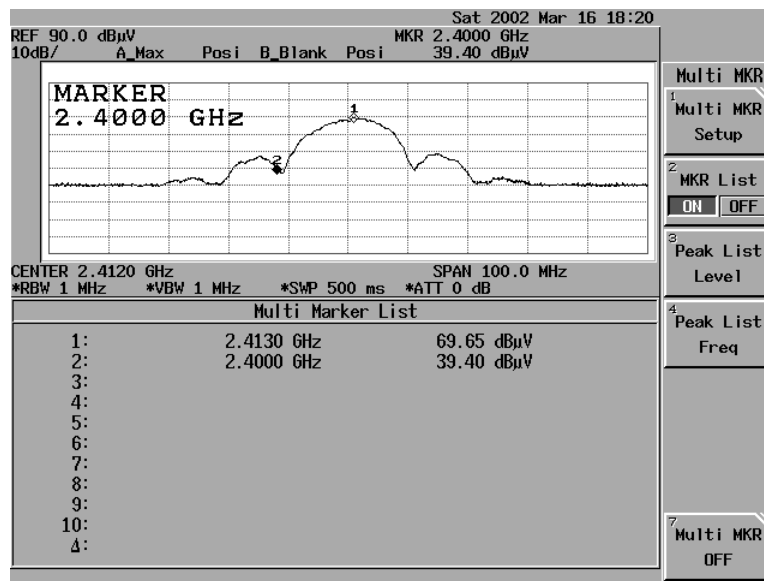
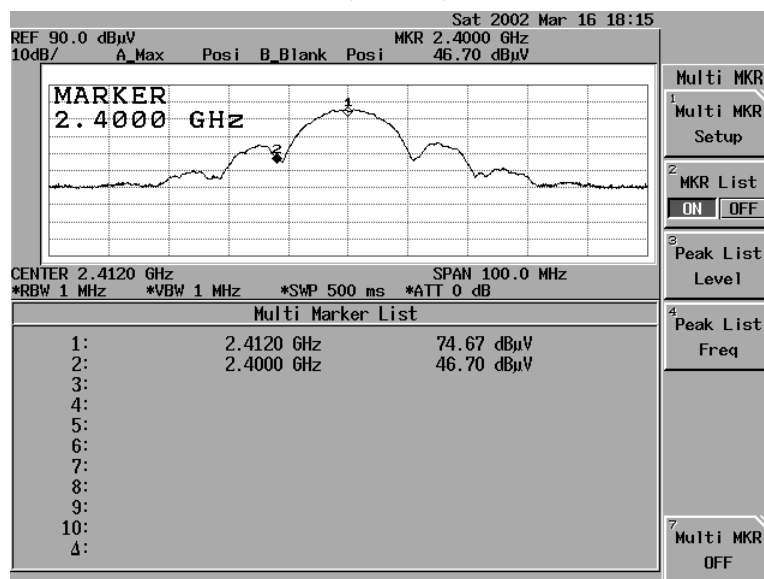


**Figure Channel 1:** (Vertical)



Product : Access Point  
 Test Item : Band Edge Data  
 Test Site : No.1 OATS  
 Test Mode : Channel 11 (1Mbps)

**RF Radiated Measurement:**

| Channel No.    | Frequency (MHz) | Reading Level (dBuV) | Emission Level (dBuV/m) | Limit (dBuV/m) | Result |
|----------------|-----------------|----------------------|-------------------------|----------------|--------|
| 11(Horizontal) | 2487.8          | 33.80                | 32.21                   | 54             | Pass   |
| 11 (Vertical)  | 2487.9          | 35.38                | 32.73                   | 54             | Pass   |

**Figure Channel 11:**

(Horizontal)

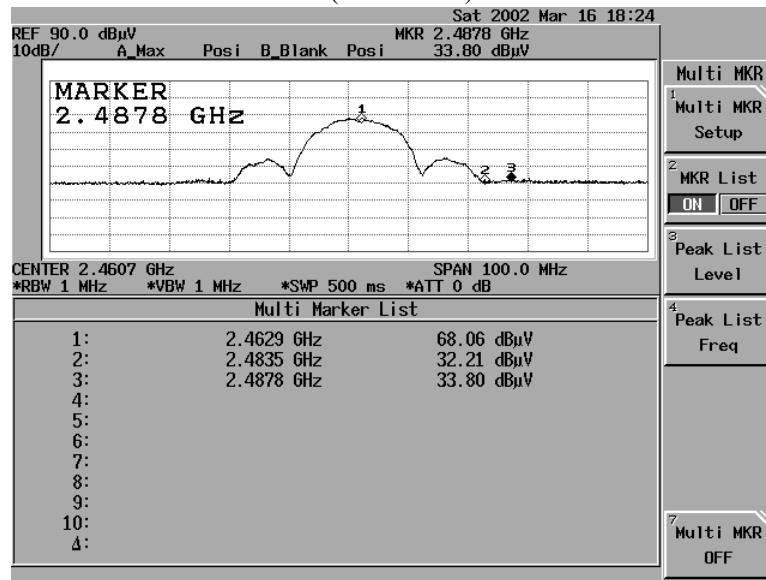
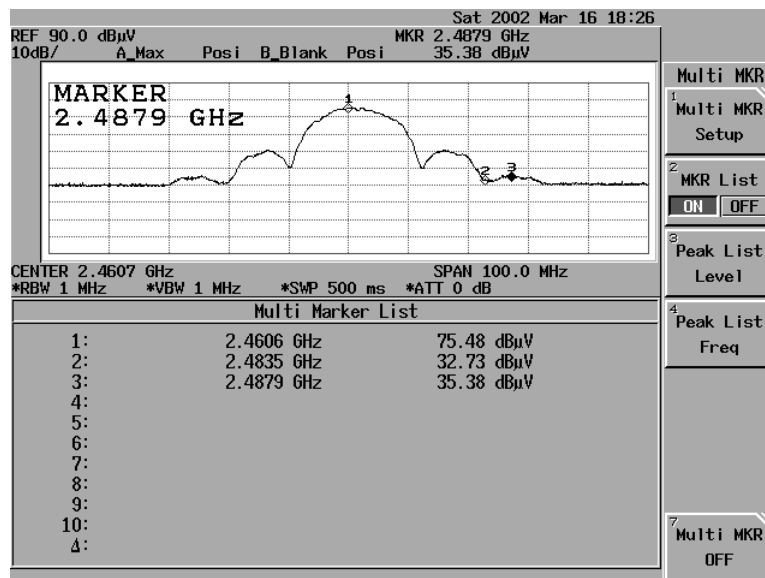


**Figure Channel 11:**

(Vertical)



Product : Access Point  
 Test Item : Band Edge Data  
 Test Site : No.1 OATS  
 Test Mode : Channel 11 (11Mbps)

**RF Radiated Measurement:**

| Channel No.    | Frequency (MHz) | Reading Level (dBuV) | Emission Level (dBuV/m) | Limit (dBuV/m) | Result |
|----------------|-----------------|----------------------|-------------------------|----------------|--------|
| 11(Horizontal) | 2487.8          | 33.80                | 32.21                   | 54             | Pass   |
| 11(Vertical)   | 2487.9          | 35.38                | 32.73                   | 54             | Pass   |

**Figure Channel 11:**

(Horizontal)

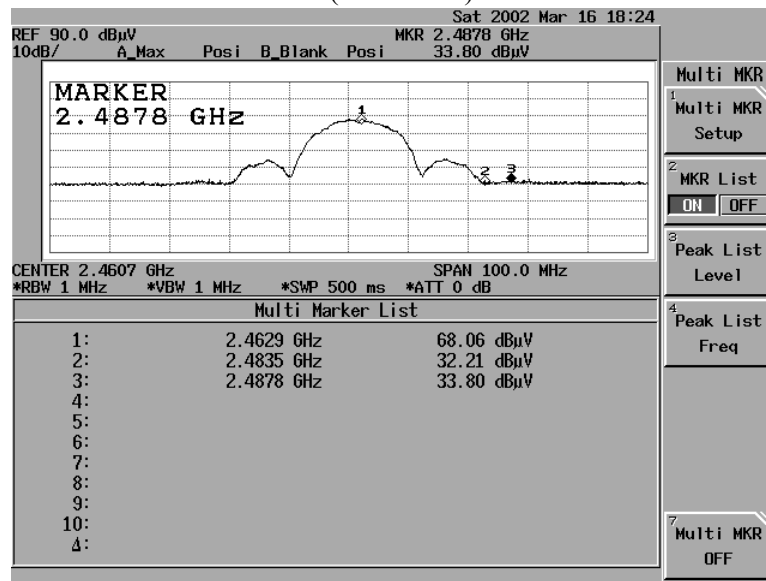
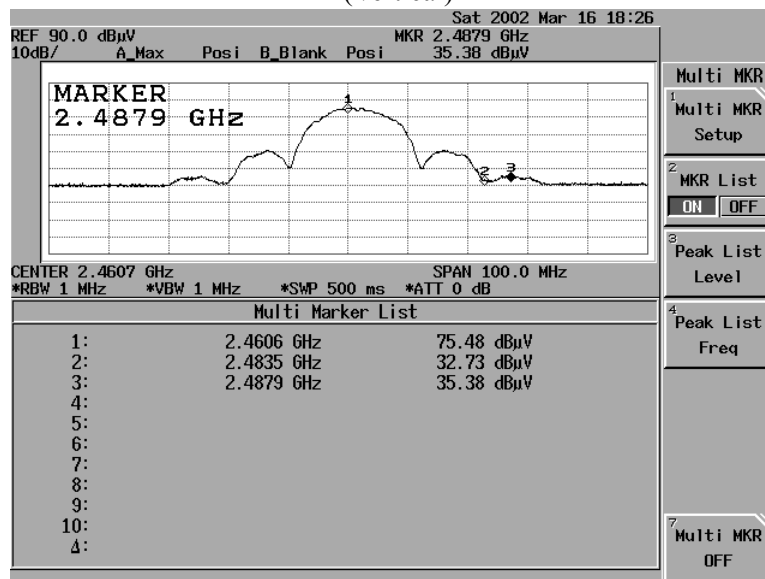


**Figure Channel 11:**

(Vertical)



## 7. Occupied Bandwidth

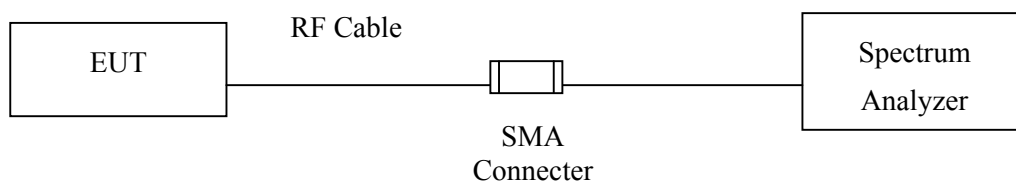
### 7.1. Test Equipment

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

|   | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---|-----------|--------------|----------------------|-----------|
| X | Spectrum  | Advantest    | R3272 / 72421194     | May, 2001 |

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. Test Condition

Standard Temperature and Humidity, Standard Test Voltage

### 7.4. Limit

The minimum bandwidth shall be at least 500kHz.

## 7.5. Test Result of Occupied Bandwidth

Product : Access Point  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.1 OATS  
 Test Mode : Channel 1

| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|-------------|-----------------|-------------------------|----------------------|--------|
| 1 (1Mbps)   | 2410.4          | 9900                    | >500                 | Pass   |
| 1 (11Mbps)  | 2412.0          | 10100                   | >500                 | Pass   |

Figure Channel 1: 1Mbps

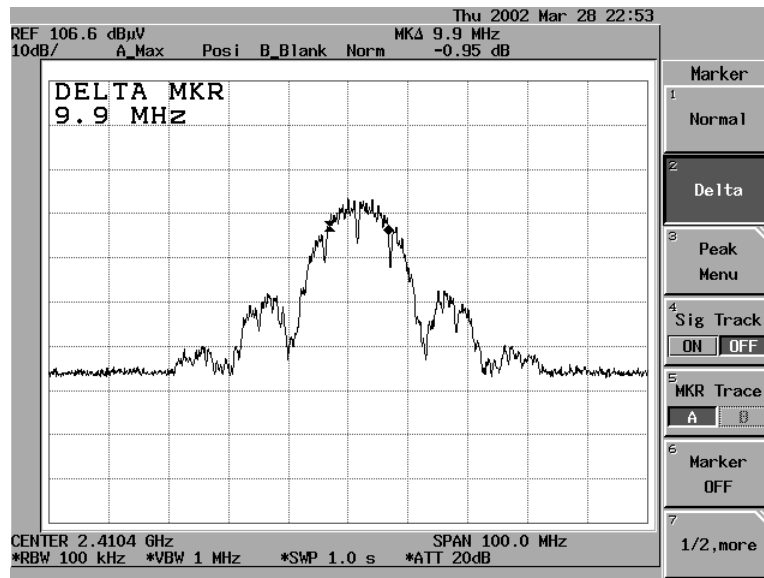
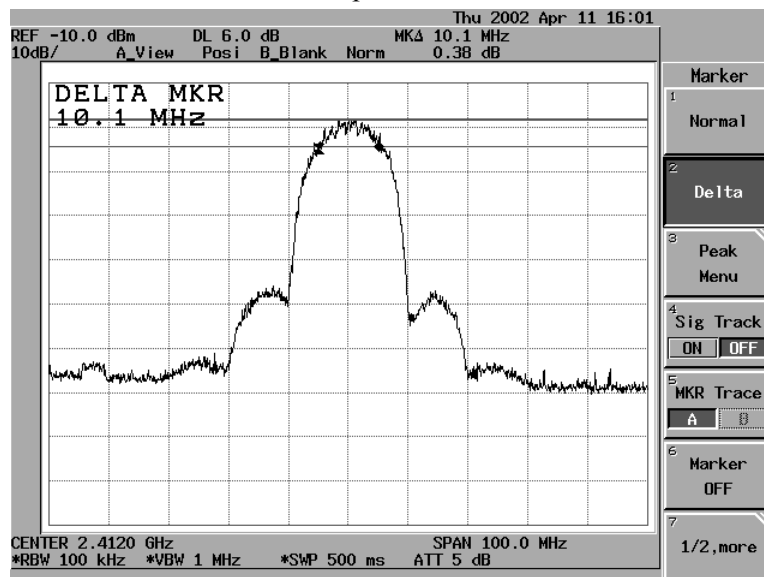


Figure Channel 1: 11Mbps



Product : Access Point  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.1 OATS  
 Test Mode : Channel 6

| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|-------------|-----------------|-------------------------|----------------------|--------|
| 6 (1Mbps)   | 2435.4          | 10100                   | >500                 | Pass   |
| 6 (11Mbps)  | 2437.1          | 10500                   | >500                 | Pass   |

Figure Channel 6: 1Mbps

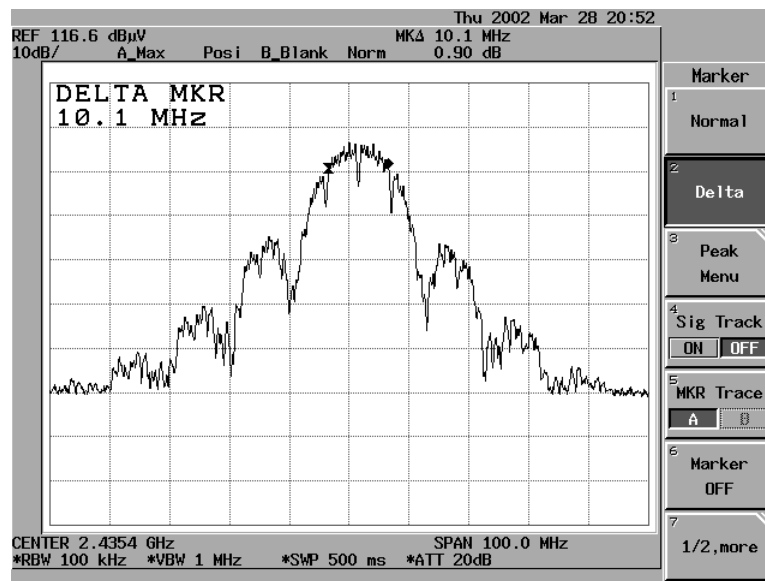
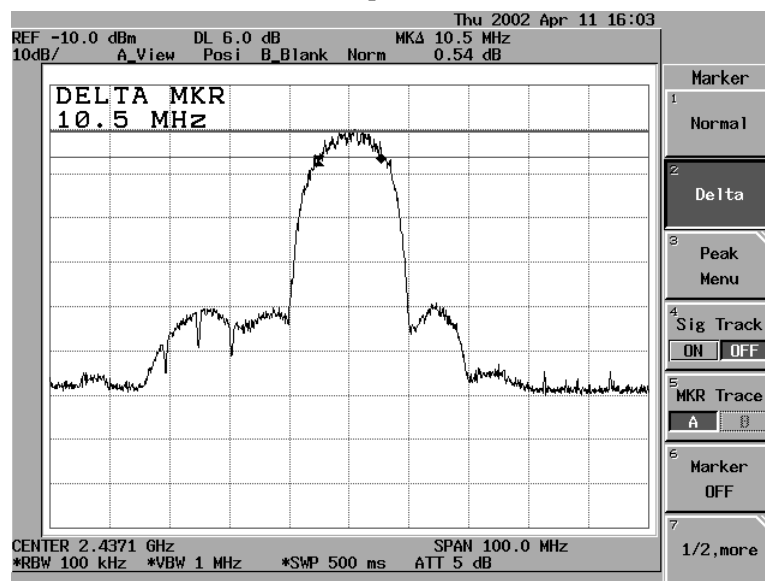


Figure Channel 6: 11Mbps



Product : Access Point  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.1 OATS  
 Test Mode : Channel 11

| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|-------------|-----------------|-------------------------|----------------------|--------|
| 11 (1Mbps)  | 2460.5          | 10000                   | >500                 | Pass   |
| 11 (11Mbps) | 2462.1          | 9600                    | >500                 | Pass   |

Figure Channel 11:

1Mbps

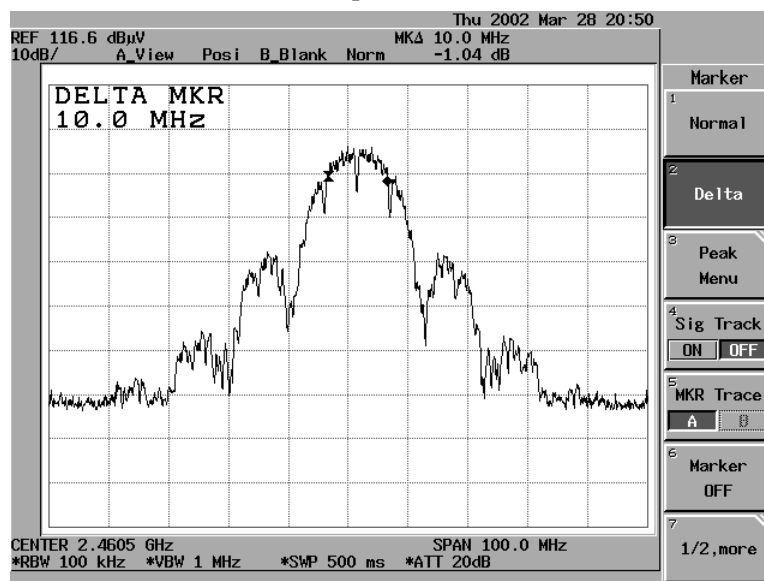
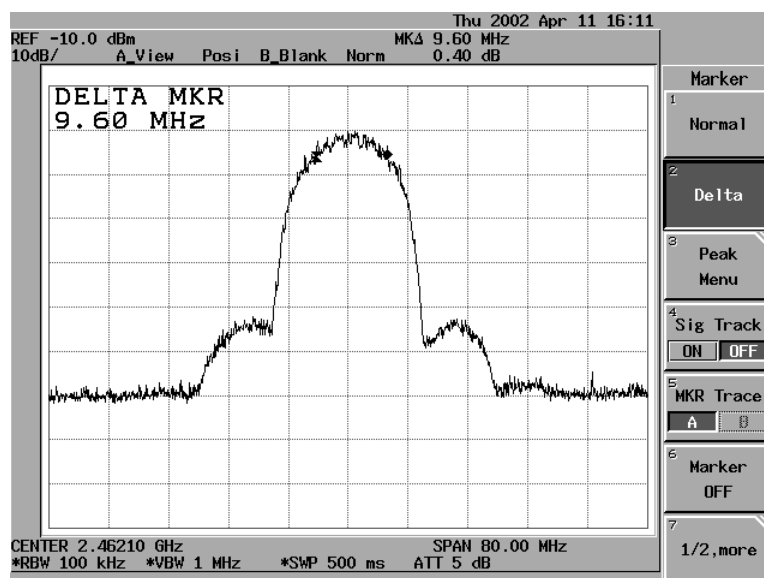


Figure Channel 11:

11Mbps



## 8. Transmitter Power Density

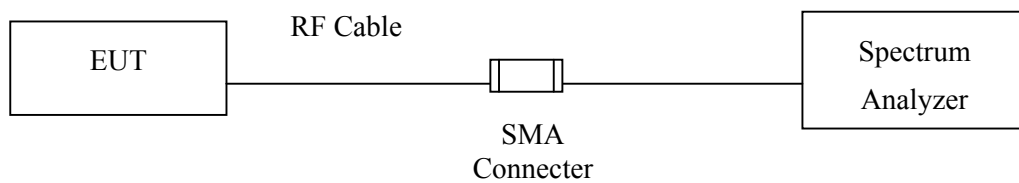
### 8.1. Test Equipment

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

|   | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---|-----------|--------------|----------------------|-----------|
| X | Spectrum  | Advantest    | R3272 / 72421194     | May, 2001 |

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.

### 8.2. Test Setup



### 8.3. Test Condition

Standard Temperature and Humidity, Standard Test Voltage

### 8.4. Limit

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

## 8.5. Test Result of Transmitter Power Density

Product : Access Point  
 Test Item : Transmitter Power Density Data  
 Test Site : No.1 OATS  
 Test Mode : Channel 1

| Channel No. | Frequency (MHz) | Measurement Level (dBm) | Required Limit (dBm) | Result |
|-------------|-----------------|-------------------------|----------------------|--------|
| 1 (1Mbps)   | 2412.795        | -46.31                  | < 8dBm               | Pass   |
| 1 (11Mbps)  | 2411.139        | -32.61                  | < 8dBm               | Pass   |

Figure Channel 1:

1Mbps

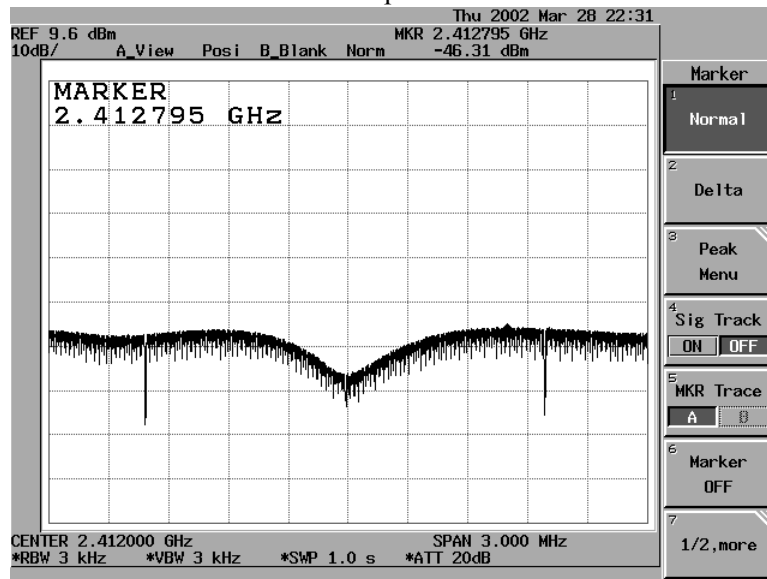
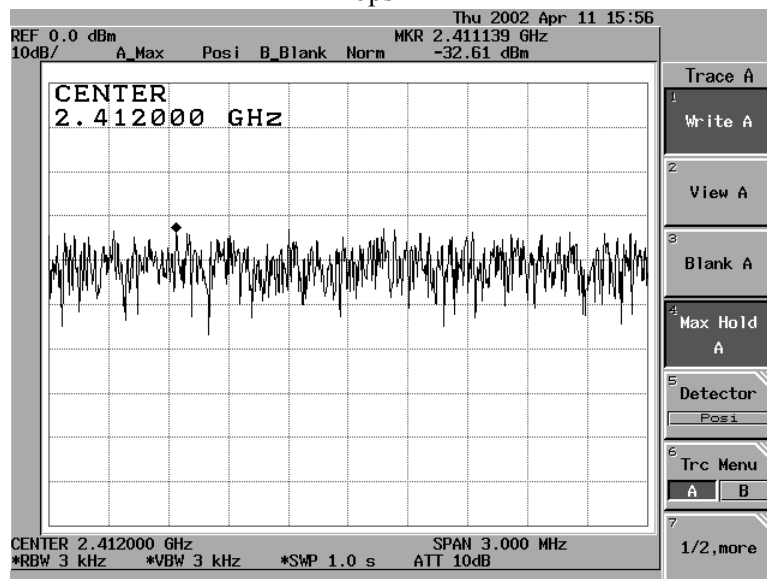


Figure Channel 1:

11Mbps



Product : Access Point  
 Test Item : Transmitter Power Density Data  
 Test Site : No.1 OATS  
 Test Mode : Channel 6

| Channel No. | Frequency (MHz) | Measurement Level (dBm) | Required Limit (dBm) | Result |
|-------------|-----------------|-------------------------|----------------------|--------|
| 6 (1Mbps)   | 2437.790        | -45.65                  | < 8dBm               | Pass   |
| 6 (11Mbps)  | 2436.139        | -33.29                  | < 8dBm               | Pass   |

Figure Channel 6: 1Mbps

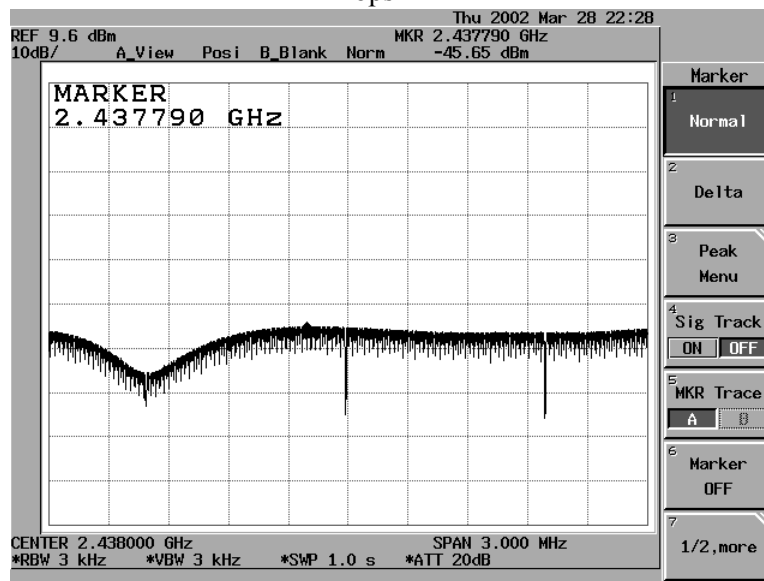
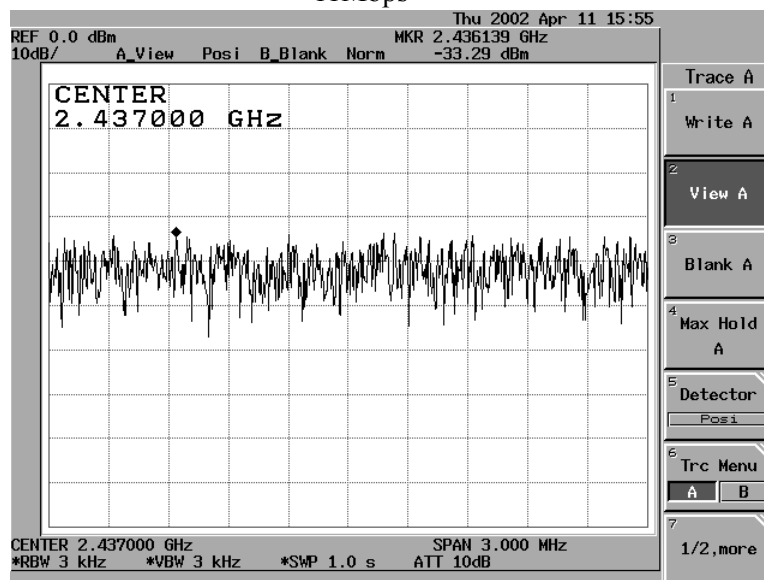


Figure Channel 6: 11Mbps



Product : Access Point  
 Test Item : Transmitter Power Density Data  
 Test Site : No.1 OATS  
 Test Mode : Channel 11

| Channel No. | Frequency (MHz) | Measurement Level (dBm) | Required Limit (dBm) | Result |
|-------------|-----------------|-------------------------|----------------------|--------|
| 11 (1Mbps)  | 2460.411        | -46.26                  | < 8dBm               | Pass   |
| 11 (11Mbps) | 2461.139        | -34.10                  | < 8dBm               | Pass   |

Figure Channel 11:

1Mbps

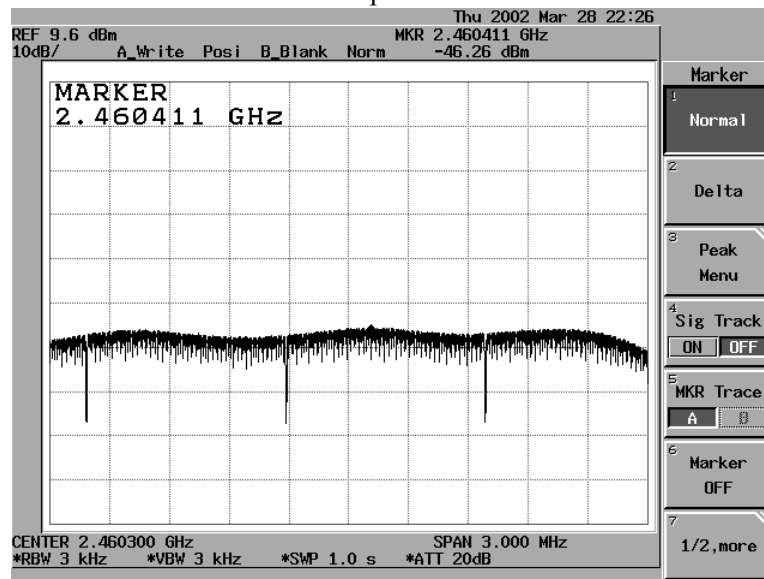
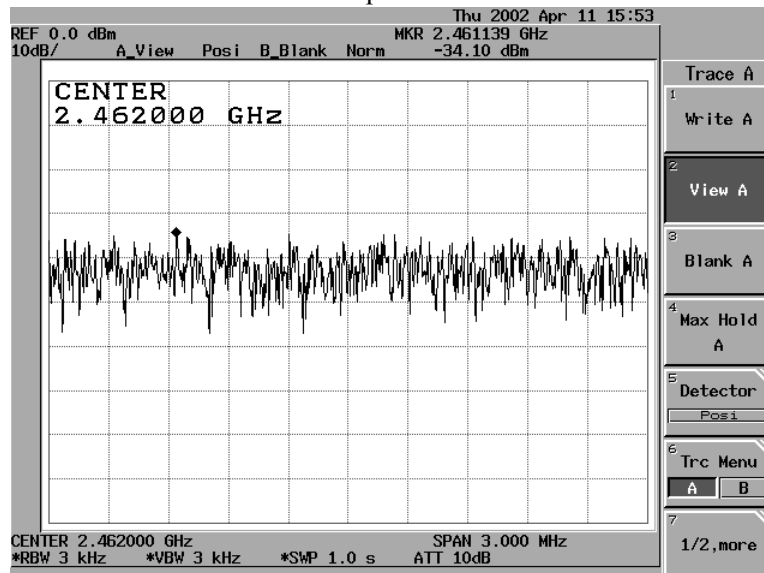


Figure Channel 11:

11Mbps



## **9. Processing Gain**

### **9.1. Test Condition**

Standard Temperature and Humidity, Standard Test Voltage

### **9.2. Limit**

According to FCC Part 15 Subpart C Paragraph 15.247(e), The processing gain shall be at least 10 dB.

### **9.3. Test Result of Processing Gain**

As EUT power is less than 20dBm, processing gain is omitted.

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**10. EMI Reduction Method During Compliance Testing**

No modification was made during testing.

## Attachment 1 : EUT Test Photographs

## Attachment 2 : EUT Detailed Photographs