



Test Report

Product Name: Wireless Modem

Model No.: SST-2450

FCC ID.: Q6MIT450000

Applicant : ICP DAS CO., LTD

Address : NO.111,Kuangfu N.Rd., Hukou Shiang , Hsinchu, Taiwan, R.O.C.

Date of Receipt : Oct. 18, 2002

Date of Test : Apr 22, 2003

Report No. : 02AH054FI

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 22, 2003

Report No. : 02AH054FI



Accredited by NIST (NVLAP)

NVLAP Lab Code: 200347-0

Product Name : Wireless Modem

Applicant : ICP DAS CO., LTD

Address : NO.111,Kuangfu N.Rd., Hukou Shiang , Hsinchu, Taiwan, R.O.C.

Manufacturer : ICP DAS CO., LTD

Model No. : SST-2450

FCC ID. : Q6MIT450000

Rated Voltage : DC 10~30V

Trade Name : ICP CON

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 : 
(Ellie Cheng)

Tested By : 
(Kenny Jwo)


Approved By : 
(Kevin Wang)

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION	5
1.1. EUT Description.....	5
1.2. Operational Description	6
1.3. Tested System Details.....	7
1.4. Configuration of tested System	8
1.5. EUT Exercise Software	8
1.6. Test Facility	9
2. Conducted Emission.....	10
2.1. Test Equipment.....	10
2.2. Test Setup	10
2.3. Limits	10
2.4. Test Procedure	11
2.5. Test Result of Conducted Emission.....	12
3. Peak Power Output	13
3.1. Test Equipment.....	13
3.2. Test Setup	13
3.3. Limits	13
3.4. Test Result of Peak Power Output.....	14
4. RF Exposure Evaluation	15
4.1. Limits	15
4.2. Test Procedure	15
4.3. Test Result of RF Exposure Evaluation.....	16
5. Radiated Emission.....	17
5.1. Test Equipment.....	17
5.2. Test Setup	17
5.3. Limits	18
5.4. Test Procedure	19
5.5. Test Result of Radiated Emission.....	20
6. Band Edge	26
6.1. Test Equipment.....	26
6.2. Test Setup	26
6.3. Limits	27
6.4. Test Procedure	27
6.5. Test Result of Band Edge	28
7. Occupied Bandwidth.....	31
7.1. Test Equipment.....	31
7.2. Test Setup	31
7.3. Limits	31
7.4. Test Result of Occupied Bandwidth	32
8. Power Density	33

8.1.	Test Equipment.....	33
8.2.	Test Setup	33
8.3.	Limits	33
8.4.	Test Result of Power Density	34
9.	EMI Reduction Method During Compliance Testing	35
Attachment 1: EUT Test Photographs		
Attachment 2: EUT Detailed Photographs		

1. GENERAL INFORMATION

1.1. EUT Description

Product Name : Wireless Modem
Trade Name : ICP CON
FCC ID. : Q6MIT450000
Model No. : SST-2450
Frequency Range : 2410.496 MHz to 2471.936MHz
Channel Number : 16
Type of Modulation : Direct Sequence Spread Spectrum
Antenna type : Connector (Reverse SMA)
Antenna Gain : 2.15dBi
Channel Control : Manual
RS-232 Cable : Non-shielded, 1.5m

Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 0:	2410.496 MHz	Channel 1:	2414.592 MHz	Channel 2:	2418.688 MHz	Channel 3:	2422.784 MHz
Channel 4:	2426.880 MHz	Channel 5:	2430.976 MHz	Channel 6:	2435.072 MHz	Channel 7:	2439.168 MHz
Channel 8:	2443.264 MHz	Channel 9:	2447.360 MHz	Channel A:	2451.456 MHz	Channel B:	2455.552 MHz
Channel C:	2459.648 MHz	Channel D:	2463.744 MHz	Channel E:	2467.840 MHz	Channel F:	2471.936 MHz

Note:

1. This device is a 2.4GHz Wireless Modem included a 2.4GHz receiving function, a 2.4GHz transmitting function.
2. Regards to the frequency band operation; 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 02AH054F under Declaration of Conformity.

1.2. Operational Description

EUT is a Wireless Modem with 16 channels.

The device adapts Direct Sequence spread spectrum modulation. The connector antenna was provides diversity function to improve the receiving function.

This Wireless Modem is an IEEE 802.11b Wireless LAN adapter. It allows your computer to connect to a wireless network and to share resources, such as files or printers without being bound to the network wires. Operation in 2.4GHz Direct Sequence Spectrum radio transmission, the Wireless Modem transfers data at speeds up to 64/128-bit Wired Equivalent Protection (WEP) algorithm is used. In addition, its standard compliance ensures that it can communicate with any 802.11b network.

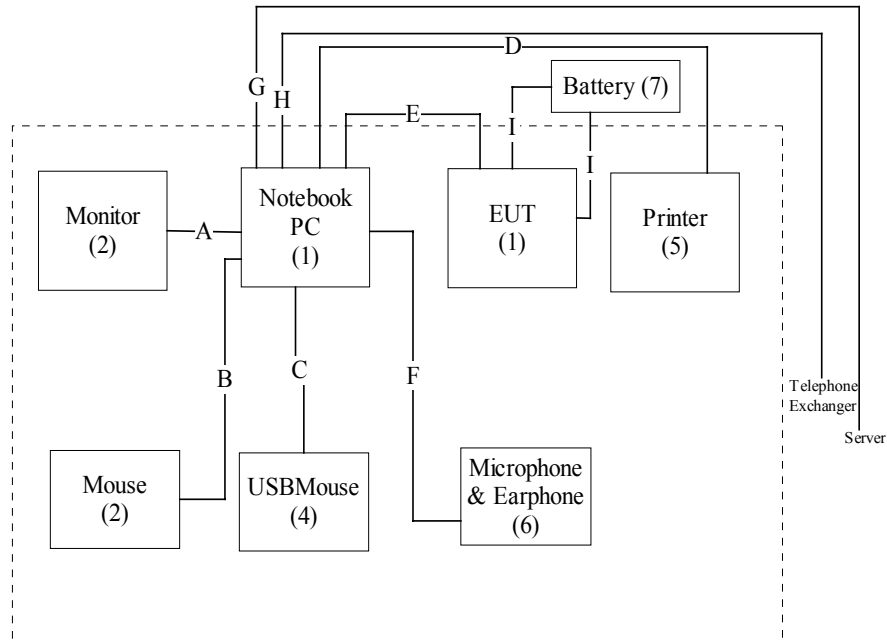
1.3. Tested System Details

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
(1)	Notebook PC	DELL	Latitude 610	N/A	Non-shielded, 1.7m, a ferrite core bonded
(2)	Monitor	LEMEL	VA-570	OS243014320	Non-shielded, 1.8m
(3)	Mouse	Logitech	M-S35	LZA81451691	--
(4)	USB Mouse	Logitech	M-UE55	LTC93800397	--
(5)	Printer	HP	C2642A	MY75J1D1D0	Non-shielded, 0.7m
(6)	Microphone & Earphone	TOKTO	SX-MI	N/A	--
(7)	Battery	YUASA	36B20R	N/A	--

Signal Cable Type	Signal cable Description
A. VGA Cable	Shielded, 1.6m
B. Mouse Cable	Shielded, 1.8m
C. USB Mouse Cable	Shielded, 1.0m
D. Printer Cable	Shielded, 1.2m
E. RS232 Cable	Non-shielded, 1.5m
F. Microphone & Earphone Cable	Non-shielded, 1.8m
G. LAN Cable	Non-shielded, 2.5m
H. Telecom Cable	Non-shielded, 2.5m
I. Power Line	Non-shielded, 2.0m, 2Pcs

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 through EUT.
- (5) The transmitted status will be shown on the monitor.
- (6) Repeat the above procedure 1.5.3 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



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2. Conducted Emission

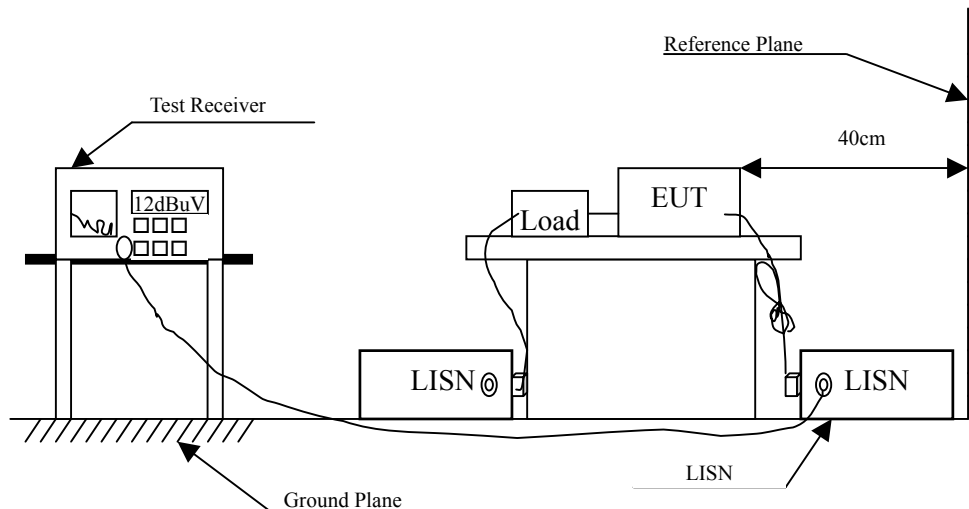
2.1. Test Equipment

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, 2002	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2002	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2002	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 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks : In the above table, the tighter limit applies at the band edges.

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 refer 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 investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Test Result of Conducted Emission

Owing to the DC operation of EUT, this test item is not performed.

3. Peak Power Output

3.1. Test Equipment

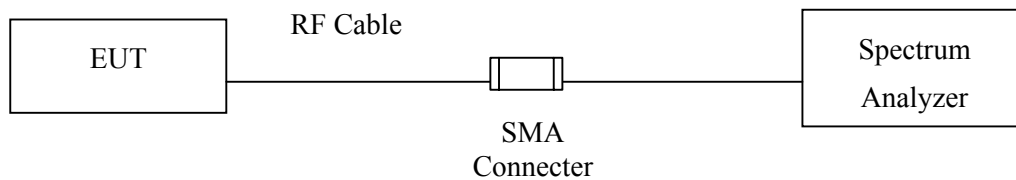
The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Advantest	R3272 / 72421194	May, 2002

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 Modem
 Test Item : Peak Power Output
 Test Site : No.1 OATS
 Test Mode : Normal Operation

Channel No.	Frequency(MHz)	Measurement	Required Limit	Result
0	2410.94	18.85dBm	1 Watt= 30 dBm	Pass
9	2447.46	19.58dBm	1 Watt= 30 dBm	Pass
F	2472.06	21.09dBm	1 Watt= 30 dBm	Pass

Note:

1. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °

4. RF Exposure Evaluation

4.1. Limits

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 ²)	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

Friis Formula

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

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d is the limit of MPE, 1 mW/cm². 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. Test Procedure

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

The temperature and related humidity: 18°C and 78% RH.

4.3. Test Result of RF Exposure Evaluation

Product : Wireless Modem
 Test Item : RF Exposure Evaluation
 Test Site : No.1 OATS
 Test Mode : Normal Operation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.15dBi or 1.64 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
1	2410.94	76.7361	0.0250
6	2447.46	90.7821	0.0296
11	2472.06	128.5287	0.0419

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm².

5. Radiated Emission

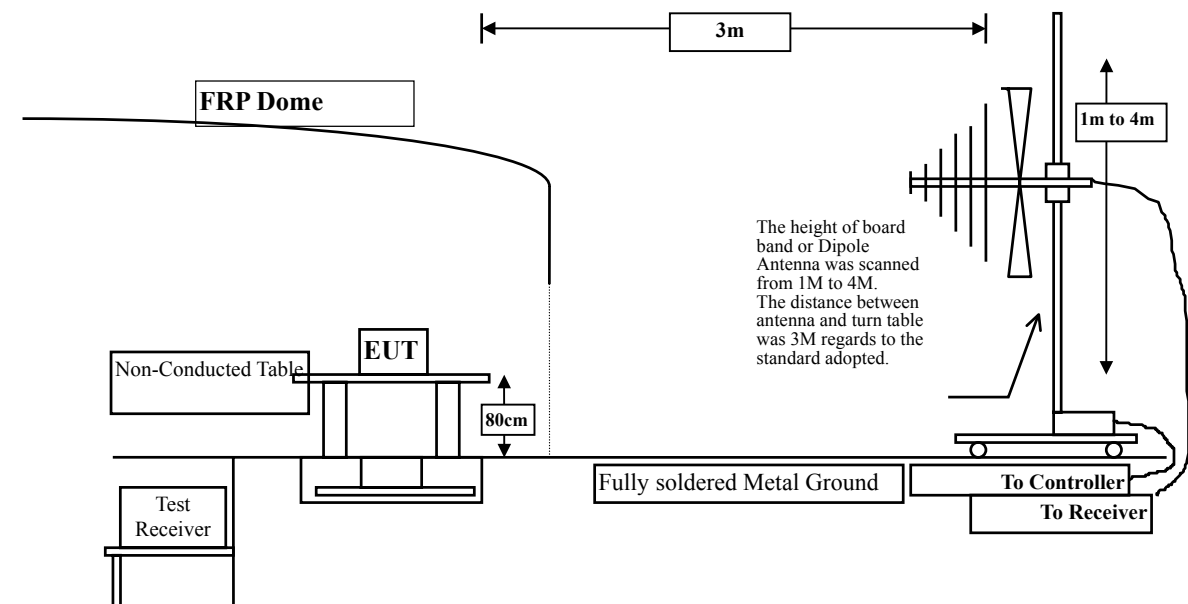
5.1. Test Equipment

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, 2002
	X	Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2002
	X	Pre-Amplifier	HP	8447D/3307A01812	May, 2002
	X	Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2002
	X	Horn Antenna	EM	EM6917 / 103325	May, 2002
Site # 2		Test Receiver	R & S	ESCS 30 / 825442/17	May, 2002
		Spectrum Analyzer	Advantest	R3261C / 71720609	May, 2002
		Pre-Amplifier	HP	8447D/3307A01814	May, 2002
		Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2002
		Horn Antenna	EM	EM6917 / 103325	May, 2002

- 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 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.

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 : Wireless Modem
Test Item : Harmonic Radiated Emission
Test Site : No.1 OATS
Test Mode : Channel 0

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

Horizontal

Peak Detector:

4822.560	4.24	31.28	34.38	47.43	48.58	25.42	74.00
7234.120	5.63	36.54	34.94	56.36	63.59	10.41	74.00
9645.560	7.01	37.98	34.43	43.80	< 54.36	19.64	74.00
12051.04	8.39	38.60	33.23	38.80	< 52.56	21.44	74.00

Average Detector:

4820.930	4.24	31.28	34.38	37.08	38.23	15.77	54.00
7231.360	5.62	36.54	34.93	42.94	50.17	3.83	54.00
9642.040	7.00	37.98	34.45	30.77	< 41.30	12.70	54.00
12052.04	8.39	38.60	33.23	26.45	< 40.21	13.79	54.00

Vertical

Peak Detector:

4822.600	4.24	31.28	34.38	56.00	57.15	16.85	74.00
7228.500	5.62	36.54	34.93	59.79	67.02	6.98	74.00
9640.000	7.00	37.98	34.45	46.60	< 57.13	16.87	74.00
12051.16	8.39	38.60	33.23	38.82	< 52.58	21.42	74.00

Average Detector:

4820.960	4.24	31.28	34.38	46.61	47.76	6.24	54.00
7231.560	5.62	36.54	34.93	45.20	52.43	1.57	54.00
9641.920	7.00	37.98	34.45	32.84	< 43.37	10.63	54.00
12051.60	8.39	38.60	33.23	26.60	< 40.36	13.64	54.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
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.

Product : Wireless Modem
Test Item : Harmonic Radiated Emission
Test Site : No.1 OATS
Test Mode : Channel 9

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

Horizontal

Peak Detector:

4896.560	4.28	31.40	34.37	52.32	53.63	20.37	74.00
7342.080	5.69	36.57	34.99	55.58	62.85	11.15	74.00
9793.400	7.09	38.19	34.27	47.75	< 58.76	15.24	74.00
12238.14	8.49	38.48	33.35	38.57	< 52.20	21.80	74.00

Average Detector:

4894.720	4.28	31.40	34.37	43.91	45.22	8.78	54.00
7342.160	5.69	36.57	34.99	43.40	50.67	3.33	54.00
9789.160	7.09	38.17	34.27	34.77	< 45.76	8.24	54.00
12237.06	8.49	38.48	33.35	26.76	< 40.39	13.61	54.00

Vertical

Peak Detector:

4896.760	4.28	31.41	34.37	56.25	57.58	16.42	74.00
7339.500	5.69	36.57	34.99	59.25	66.52	7.48	74.00
9789.160	7.09	38.17	34.27	47.24	< 58.23	15.77	74.00
12237.80	8.49	38.48	33.35	38.46	< 52.09	21.91	74.00

Average Detector:

4894.720	4.28	31.40	34.37	48.05	49.36	4.64	54.00
7342.040	5.69	36.57	34.99	43.55	50.82	3.18	54.00
9789.120	7.09	38.17	34.27	34.09	< 45.08	8.92	54.00
12237.48	8.49	38.48	33.35	26.16	< 39.79	14.21	54.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
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.

Product : Wireless Modem
Test Item : Harmonic Radiated Emission
Test Site : No.1 OATS
Test Mode : Channel F

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

Horizontal

Peak Detector:

4942.240	4.31	31.45	34.36	56.17	57.58	16.42	74.00
7417.400	5.73	36.57	35.02	49.47	56.75	17.25	74.00
9884.080	7.15	38.16	34.14	48.23	< 59.40	14.60	74.00
12360.28	8.56	38.39	33.42	38.55	< 52.08	21.92	74.00

Average Detector:

4943.960	4.31	31.47	34.36	48.55	49.98	4.02	54.00
7415.850	5.73	36.57	35.02	37.79	45.07	8.93	54.00
9887.600	7.15	38.16	34.14	35.24	< 46.41	7.59	54.00
12360.28	8.56	38.39	33.42	26.26	< 39.79	14.21	54.00

Vertical

Peak Detector:

4945.840	4.31	31.47	34.36	57.33	58.76	15.24	74.00
7413.080	5.73	36.57	35.02	50.96	58.24	15.76	74.00
9885.360	7.15	38.16	34.14	50.30	< 61.47	12.53	74.00
12359.76	8.56	38.39	33.42	38.97	< 52.50	21.50	74.00

Average Detector:

4943.840	4.31	31.47	34.36	49.40	50.83	3.17	54.00
7415.600	5.73	36.57	35.02	39.11	46.39	7.61	54.00
9887.760	7.15	38.16	34.14	37.14	< 48.31	5.69	54.00
12360.00	8.56	38.39	33.42	26.57	< 40.10	13.90	54.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
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.

Product : Wireless Modem
Test Item : General Radiated Emission
Test Site : No.1 OATS
Test Mode : Channel 0

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

Horizontal

*50.370	0.36	14.17	26.70	41.20	29.03	10.97	40.00
132.820	0.69	17.10	26.21	39.80	31.38	12.12	43.50
266.680	1.01	17.70	25.28	37.80	31.23	14.77	46.00
458.740	1.46	21.73	26.31	37.00	33.89	12.11	46.00
534.400	1.74	22.98	26.58	33.60	31.74	14.26	46.00
587.750	1.83	23.59	26.50	34.20	33.12	12.88	46.00

Vertical

73.650	0.51	14.65	26.42	44.20	32.94	7.06	40.00
*132.820	0.69	17.11	26.21	45.00	36.59	6.91	43.50
212.360	0.93	14.89	25.54	46.00	36.27	7.23	43.50
328.760	1.14	19.37	25.29	32.80	28.02	17.98	46.00
456.800	1.42	22.02	26.29	36.60	33.75	12.25	46.00
553.800	1.57	24.10	26.58	31.20	30.29	15.71	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss-PreAMP.

Product : Wireless Modem
Test Item : General Radiated Emission
Test Site : No.1 OATS
Test Mode : Channel 9

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

Horizontal

*43.580	0.34	18.16	26.72	42.60	34.38	5.62	40.00
222.060	0.99	14.59	25.47	43.40	33.50	12.50	46.00
397.630	1.17	21.01	25.82	43.60	39.95	6.05	46.00
455.830	1.40	21.70	26.28	40.20	37.02	8.98	46.00
533.430	1.76	22.78	26.58	37.40	35.36	10.64	46.00
720.640	1.78	24.80	26.30	30.00	30.29	15.71	46.00

Vertical

72.680	0.50	13.78	26.42	44.20	32.05	7.95	40.00
130.880	0.69	16.69	26.21	40.40	31.57	11.93	43.50
*213.330	0.93	14.89	25.54	46.00	36.29	7.21	43.50
244.370	1.05	18.18	25.38	38.20	32.06	13.94	46.00
325.850	1.14	19.40	25.27	37.60	32.87	13.13	46.00
481.050	1.66	22.59	26.47	32.20	29.98	16.02	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss-PreAMP.

Product : Wireless Modem
Test Item : General Radiated Emission
Test Site : No.1 OATS
Test Mode : Channel F

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

Horizontal

124.090	0.66	17.08	26.25	35.40	26.89	16.61	43.50
356.890	1.24	19.98	25.54	36.20	31.87	14.13	46.00
453.890	1.36	21.68	26.26	38.20	34.98	11.02	46.00
531.490	1.79	22.75	26.58	37.40	35.36	10.64	46.00
*667.290	2.02	23.88	26.39	36.40	35.90	10.10	46.00
814.730	2.03	25.48	26.06	32.60	34.05	11.95	46.00

Vertical

69.770	0.47	13.89	26.44	42.60	30.52	9.48	40.00
*223.030	0.99	16.23	25.47	46.80	38.55	7.45	46.00
288.990	1.13	18.79	25.28	37.80	32.43	13.57	46.00
452.920	1.35	21.86	26.26	34.00	30.95	15.05	46.00
530.520	1.81	23.33	26.58	32.80	31.36	14.64	46.00
929.190	2.25	27.17	25.61	33.80	37.61	8.39	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss-PreAMP.

6. Band Edge

6.1. Test Equipment

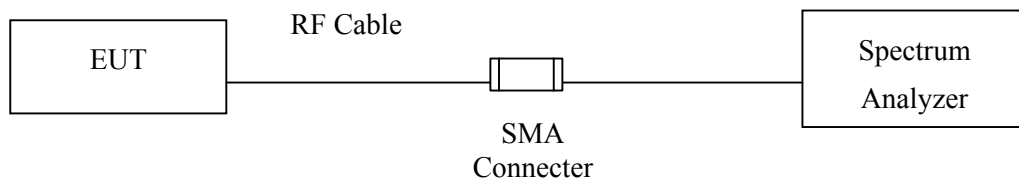
The following test equipments are used during the band edge tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Spectrum Analyzer	Advantest	R3272 / 72421194	May, 2002
X Test Receiver	R & S	ESCS 30 / 825442/14	May, 2002
X Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2002
X Pre-Amplifier	HP	8447D/3307A01812	May, 2002
X Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2002
X Horn Antenna	EM	EM6917 / 103325	May, 2002

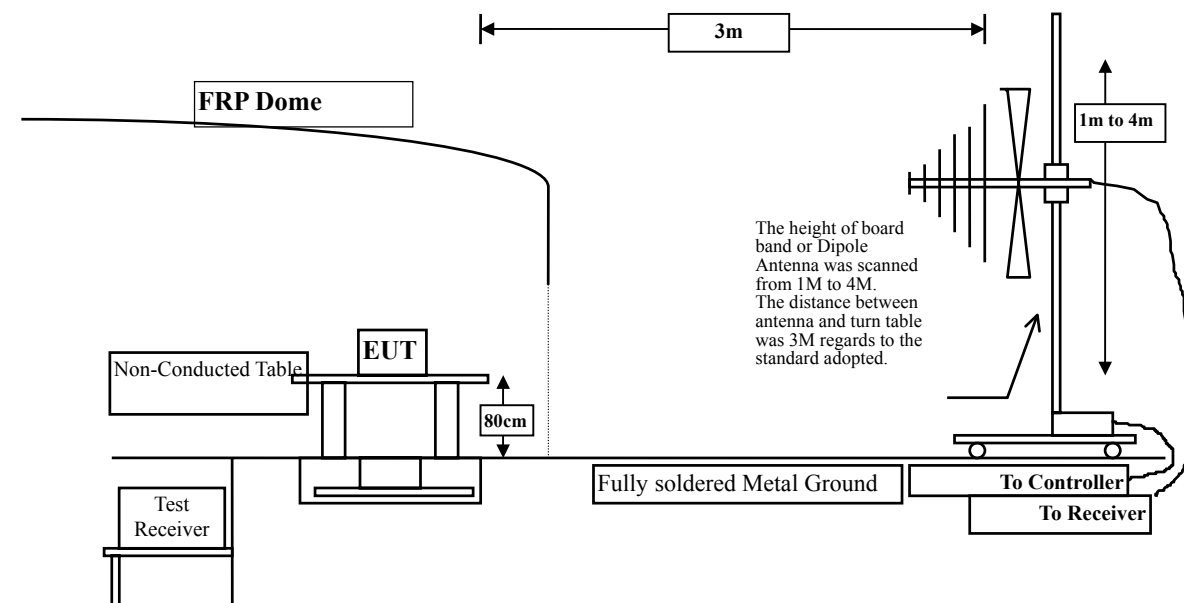
- Note:
1. All equipments that need to calibrate are with calibration period of 1 year.
 2. Mark "X" test instruments are used to measure the final test results.

6.2. Test Setup

RF Conducted Measurement:



RF Radiated Measurement:



6.3. 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)).

6.4. 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.

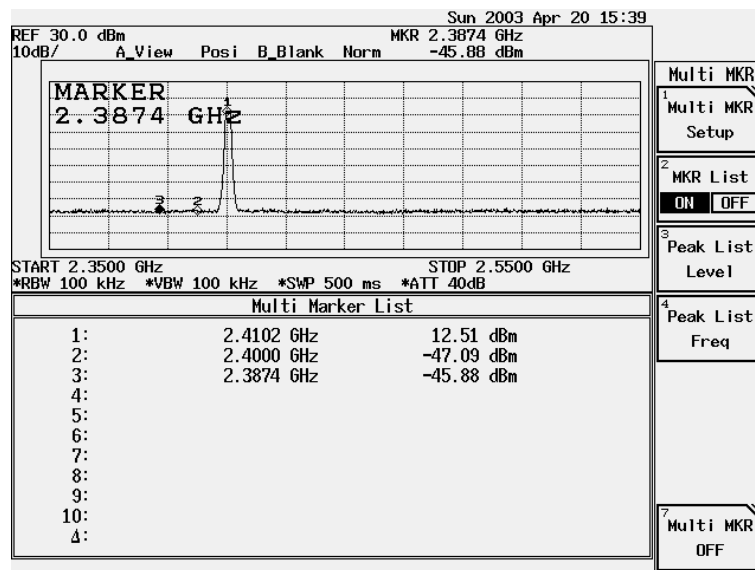
6.5. Test Result of Band Edge

Product : Wireless Modem
 Test Item : Band Edge
 Test Site : No.1 OATS
 Test Mode : Channel 0

RF Conducted Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
0	<2400	>20	Pass

Figure Channel 0:



Product : Wireless Modem
 Test Item : Band Edge
 Test Site : No.1 OATS
 Test Mode : Channel F

RF Radiated Measurement: (Peak Detector)

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	PreAMP (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Result
F (Horizontal)	2487.200	25.34	29.60	2.50	0.00	57.45	74	Pass
F (Vertical)	2493.200	25.66	29.62	2.50	0.00	57.79	74	Pass

Figure Channel F:

(Horizontal)

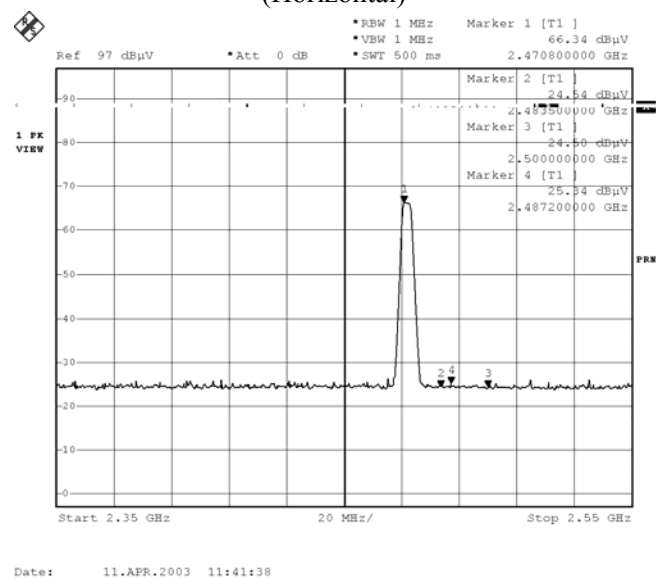
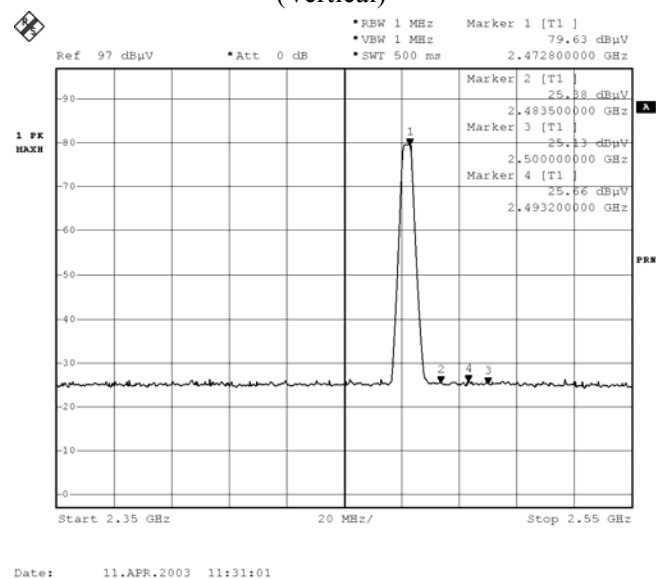


Figure Channel F:

(Vertical)



Note: 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 Modem
 Test Item : Band Edge
 Test Site : No.1 OATS
 Test Mode : Channel F

RF Radiated Measurement: (Average Detector)

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	PreAMP (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Result
F (Horizontal)	2487.200	13.11	29.60	2.50	0.00	45.22	54	Pass
F (Vertical)	2493.200	13.45	29.62	2.50	0.00	45.58	54	Pass

Figure Channel F: (Horizontal)

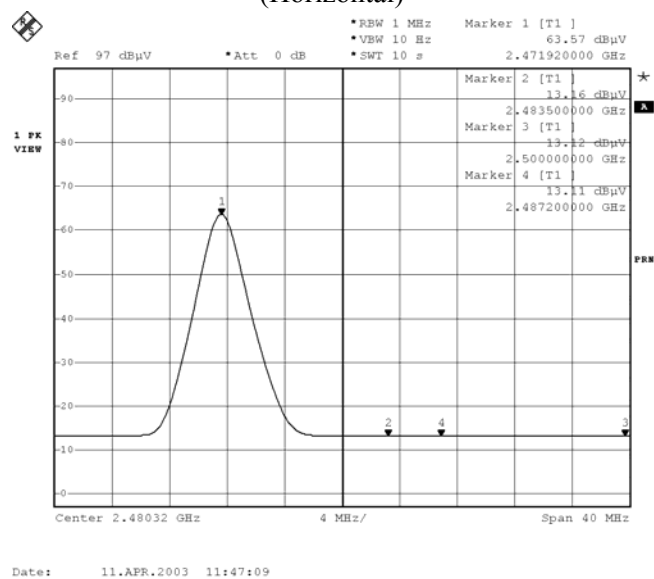
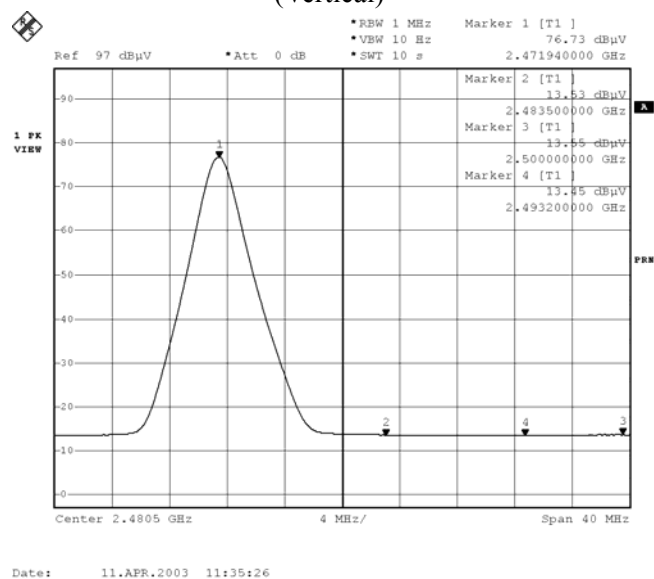


Figure Channel F: (Vertical)



Note: 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.

7. Occupied Bandwidth

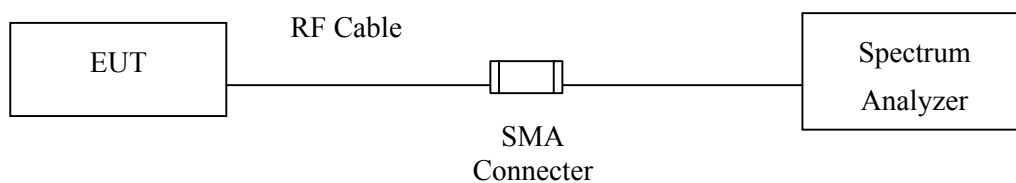
7.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Advantest	R3272 / 72421194	May, 2002

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

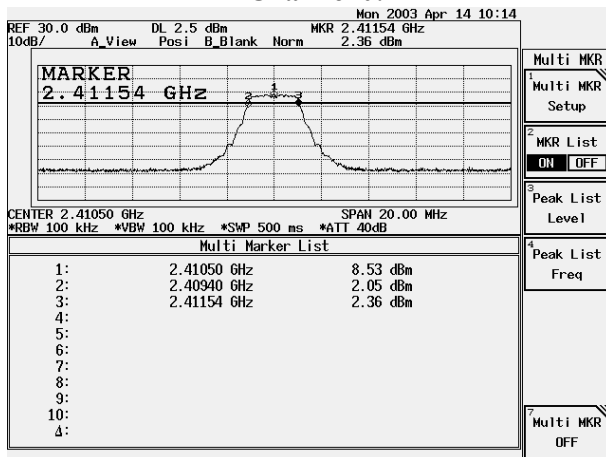
The minimum 6dB bandwidth shall be at least 500kHz.

7.4. Test Result of Occupied Bandwidth

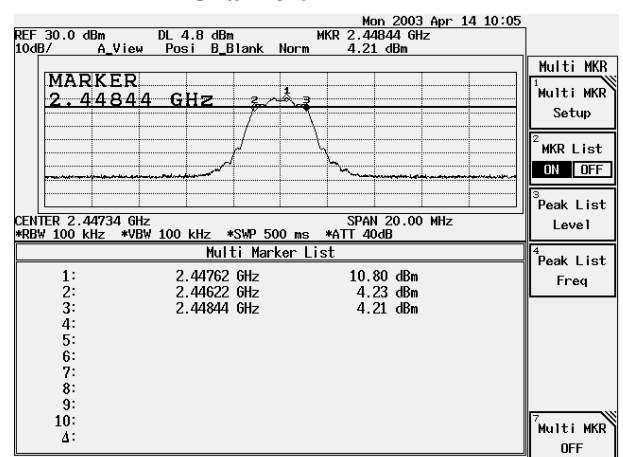
Product : Wireless Modem
 Test Item : Occupied Bandwidth
 Test Site : No.1 OATS
 Test Mode : Normal Operation

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
0	2410.50	2140	>500	Pass
9	2447.34	2220	>500	Pass
F	2472.00	2240	>500	Pass

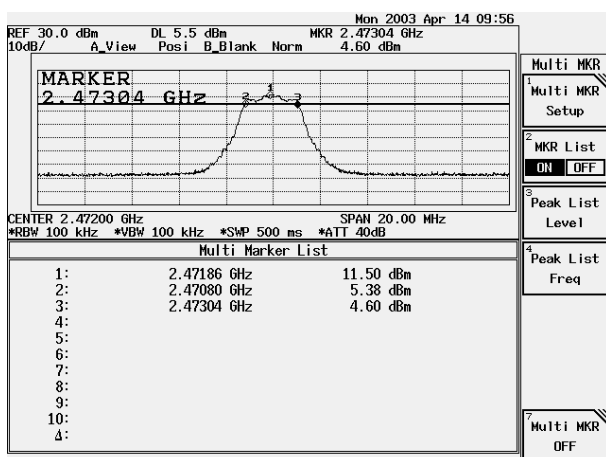
Channel 0:



Channel 9



Channel F:



8. Power Density

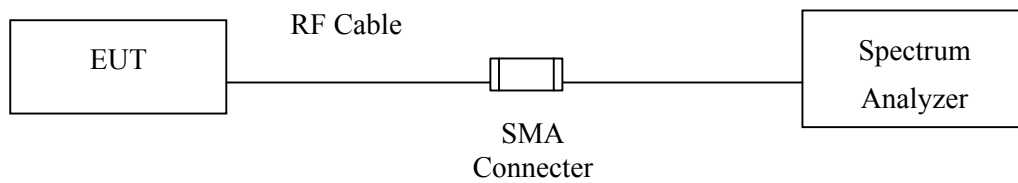
8.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Advantest	R3272 / 72421194	May, 2002

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. Limits

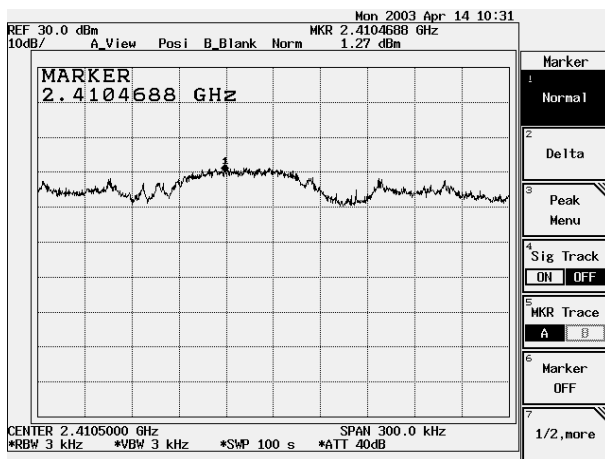
The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.4. Test Result of Power Density

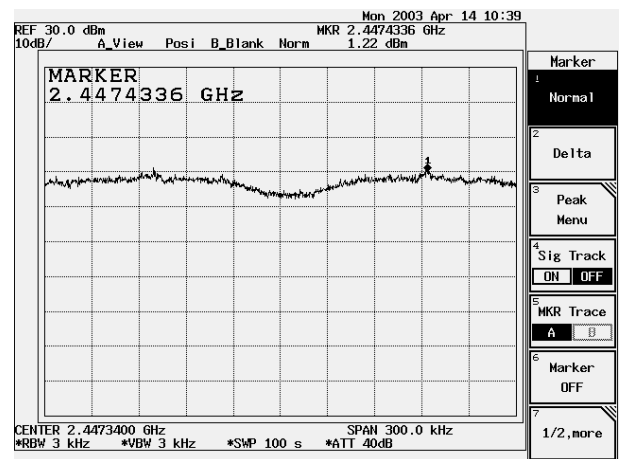
Product : Wireless Modem
 Test Item : Power Density
 Test Site : No.1 OATS
 Test Mode : Normal Operation

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
0	2410.4688	1.27	< 8dBm	Pass
9	2447.4336	1.22	< 8dBm	Pass
F	2471.8941	2.91	< 8dBm	Pass

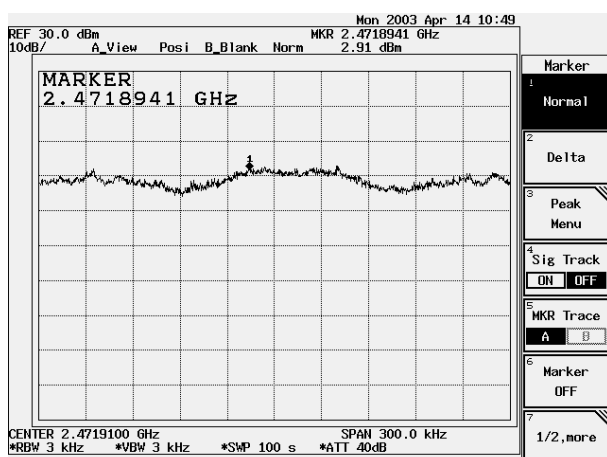
Channel 0:



Channel 9



Channel F:



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs