Test Report

Product Name	Mini RISC-based Ready-to-Run Wireless Embedded Computer
Model No.	ThinkCore W311, ThinkCore W311-LX
FCC ID	SLEW311

Applicant	Moxa Technologies Co., Ltd
Address	Fl.4, No. 135, Lane 235, Pao-Chiao Rd., Shing Tien City, Taipei, Taiwan, R.O.C.

Date of Receipt	Aug. 06, 2007
Issued Date	Oct. 25, 2007
Report No.	078123R-RFUSP05V01

Test Report Certification

Issued Date: Oct. 25, 2007
Report No.: 078123R-RFUSP05V01

Product Name	Mini RISC-based Ready-to-Run Wireless Embedded Computer
Applicant	Moxa Technologies Co., Ltd
Address	Fl.4, No. 135, Lane 235, Pao-Chiao Rd., Shing Tien City, Taipei, Taiwan, R.O.C.
Manufacturer	Moxa Technologies Co., Ltd
Model No.	ThinkCore W311, ThinkCore W311-LX
Rated Voltage	AC 120V/60Hz
Working Voltage	DC 12V
Trade Name	Moxa
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2006 ANSI C63.4: 2003 NVLAP Lab Code: 200533-0
Test Result	Complied

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

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(Engineering Adm. Specialist / Rita Huang)

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(Engineer / M o l i n H u a n g)

Approved By :
(Deputy Manager / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Mini RISC-based Ready-to-Run Wireless Embedded Computer
Trade Name	Moxa
Model No.	ThinkCore W311, ThinkCore W311-LX
FCC ID	SLEW311
Frequency Range	2412MHz - 2462MHz, 5180-5240MHz, 5745-5805MHz
Channel Number	11 in 2.4GHz band, 8 in 5GHz band
Data Speed	802.11b – 1, 2, 5.5, 11Mbps 802.11a/g – 6, 9, 12, 18, 24, 36, 48, 54Mbps
Type of Modulation	DSSS/OFDM
Antenna Type	Connector (Reverse SMA)
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto
Channel Separation	5MHz in 2.4GHz band, 20MHz in 5GHz band
Power Adapter	MFR: ENG, M/N: 3A-161DA12 Cable in: Shielded, 1.5m Cable out: Non-Shielded, 1.6m with one ferrite core bonded.

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	SmartAnt	SAA05-220420	2.0 dBi for 2.4 GHz 2.0 dBi for 5.0 GHz

2.4GHz Band 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		

5GHz Band Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 1	5180 MHz	Channel 2	5200 MHz	Channel 3	5220 MHz	Channel 4	5240 MHz
Channel 5	5745 MHz	Channel 6	5765 MHz	Channel 7	5785 MHz	Channel 8	5805 MHz

Note:

1. The EUT is a Mini RISC-based Ready-to-Run Wireless Embedded Computer with a built-in 2.4GHz and 5GHz transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11b is 1Mbps and 802.11a/g is 6Mbps)
4. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
5. Part 15 Subpart B compliance for spread spectrum devices is shown on the report no. 078L123-RFUSP01V02.
6. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

1.2. Operational Description

EUT is a Mini RISC-based Ready-to-Run Wireless Embedded Computer with a built-in 2.4GHz and 5GHz transceiver.

There are 11 channels in 2412 – 2462MHz, 4 channels in 5180 – 5240MHz and 4 channels in 5745-5805MHz.

The channels are separated by 5MHz. This device supports the data rates of 1, 2, 5.5, 11Mbps in 802.11b mode and 6, 9, 12, 18, 24, 36, 48, 54Mbps in 802.11g mode. The signals are modulated by DSSS in 802.11b mode and OFDM in 802.11g mode. The antennas are Connector and use diversity to improve the receiving sensitivity.

This Mini RISC-based Ready-to-Run Wireless Embedded Computer, complied with IEEE 802.11b and IEEE 802.11g, 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 network wires. Wired Equivalent Protection (WEP) algorithm is used. In addition, its standard compliance ensures that it can communicate with any IEEE 802.11b+g and IEEE 802.11a network.

Test Mode	Mode 1: Transmitter 802.11b
	Mode 2: Transmitter 802.11g

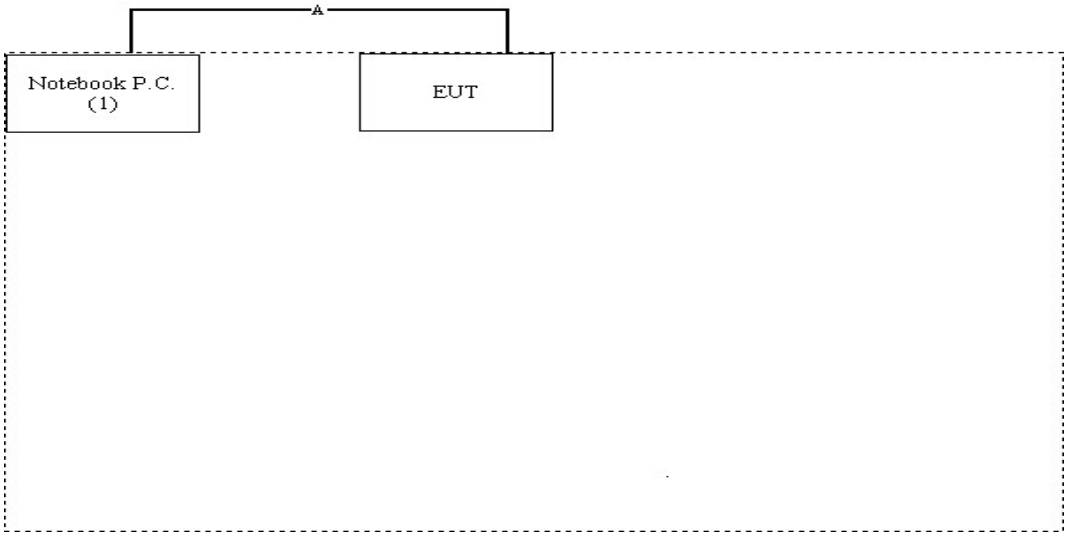
1.3. Tested System Datails

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	PP18L	42649348672	Non-Shielded, 0.8m

Signal Cable Type		Signal cable Description
A	RS-232 Cable	Non-Shielded, 1.0m

1.4. Configuration of Test System



1.5. EUT Exercise Software

(1) Setup the EUT as shown in Section 1.4

(2) Execute Telnet IP 192.168.126.254 on the notebook.

(3) Configure the test mode, the test channel, and the data rate.

(4) Press “OK” to start the continuous transmission.

(5) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

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

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

Accreditation on NVLAP
NVLAP Lab Code: 200533-0

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

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FCC Accreditation Number: TW1014

2. Conducted Emission

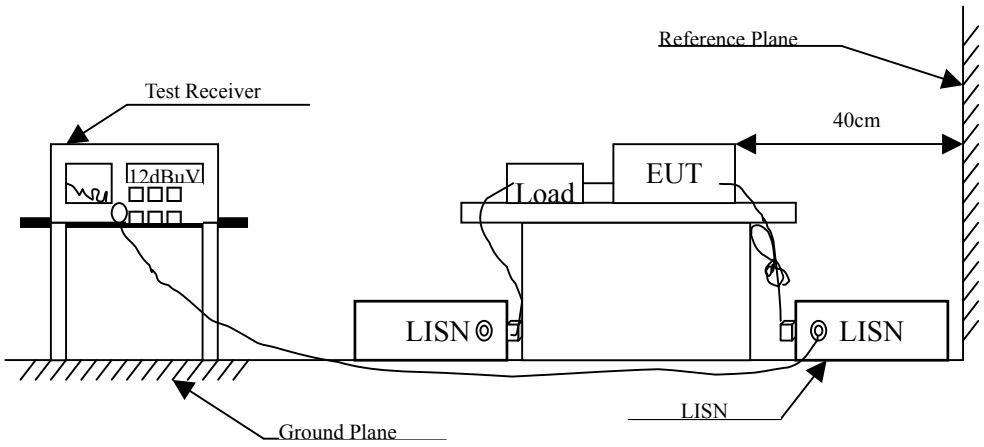
2.1. Test Equipment

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

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 2007	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2007	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2007	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2007	
5	No.1 Shielded Room			N/A	

Note: All instruments are calibrated every one year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
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: 2003 on conducted measurement.
Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.373	0.300	48.570	48.870	-10.759	59.629
0.978	0.310	41.710	42.020	-13.980	56.000
1.423	0.330	39.730	40.060	-15.940	56.000
2.134	0.350	41.390	41.740	-14.260	56.000
3.384	0.380	37.900	38.280	-17.720	56.000
10.310	0.610	36.440	37.050	-22.950	60.000
Average					
0.373	0.300	46.320	46.620	-3.009	49.629
0.978	0.310	36.630	36.940	-9.060	46.000
1.423	0.330	34.660	34.990	-11.010	46.000
2.134	0.350	36.480	36.830	-9.170	46.000
3.384	0.380	33.080	33.460	-12.540	46.000
10.310	0.610	31.430	32.040	-17.960	50.000

Note:

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

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 2					
Quasi-Peak					
0.377	0.310	49.030	49.340	-10.174	59.514
0.857	0.320	42.110	42.430	-13.570	56.000
1.490	0.330	38.550	38.880	-17.120	56.000
2.119	0.350	41.430	41.780	-14.220	56.000
3.427	0.380	37.910	38.290	-17.710	56.000
11.752	0.625	36.380	37.005	-22.995	60.000
Average					
0.377	0.310	46.070	46.380	-3.134	49.514
0.857	0.320	33.460	33.780	-12.220	46.000
1.490	0.330	34.430	34.760	-11.240	46.000
2.119	0.350	37.010	37.360	-8.640	46.000
3.427	0.380	33.550	33.930	-12.070	46.000
11.752	0.625	31.030	31.655	-18.345	50.000

Note:

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

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.388	0.300	46.860	47.160	-12.040	59.200
0.873	0.310	42.460	42.770	-13.230	56.000
1.408	0.330	39.670	40.000	-16.000	56.000
2.154	0.350	41.440	41.790	-14.210	56.000
3.818	0.390	32.800	33.190	-22.810	56.000
10.107	0.600	38.260	38.860	-21.140	60.000
Average					
0.388	0.300	42.030	42.330	-6.870	49.200
0.873	0.310	37.520	37.830	-8.170	46.000
1.408	0.330	34.380	34.710	-11.290	46.000
2.154	0.350	36.580	36.930	-9.070	46.000
3.818	0.390	26.030	26.420	-19.580	46.000
10.107	0.600	33.170	33.770	-16.230	50.000

Note:

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

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 2					
Quasi-Peak					
0.392	0.310	48.200	48.510	-10.576	59.086
0.966	0.320	43.430	43.750	-12.250	56.000
1.443	0.330	39.540	39.870	-16.130	56.000
2.177	0.350	41.790	42.140	-13.860	56.000
3.490	0.390	38.830	39.220	-16.780	56.000
10.236	0.510	37.590	38.100	-21.900	60.000
Average					
0.392	0.310	46.250	46.560	-2.526	49.086
0.966	0.320	38.600	38.920	-7.080	46.000
1.443	0.330	34.160	34.490	-11.510	46.000
2.177	0.350	36.830	37.180	-8.820	46.000
3.490	0.390	34.020	34.410	-11.590	46.000
10.236	0.510	32.380	32.890	-17.110	50.000

Note:

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

3. Peak Power Output

3.1. Test Equipment

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

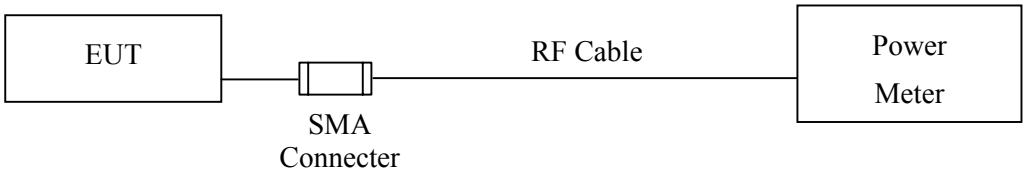
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2007
X	Power Sensor	Anritsu	MA2491A/034457	May, 2007

Note: 1. All instruments are calibrated every one year.

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

3.2. Test Setup

Conducted Measurement



3.3. Limits

The maximum peak power shall be less 1 Watt.

3.4. Uncertainty

± 1.27 dB

3.5. Test Result of Peak Power Output

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b

Data Speed: 1Mbps

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
1	2412.00	15.39dBm	1Watt= 30 dBm	Pass
6	2437.00	15.49dBm	1Watt= 30 dBm	Pass
11	2462.00	15.56dBm	1Watt= 30 dBm	Pass

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter 802.11g

Data Speed: 6Mbps

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
1	2412.00	18.25dBm	1Watt= 30 dBm	Pass
6	2437.00	17.96dBm	1Watt= 30 dBm	Pass
11	2462.00	18.06dBm	1Watt= 30 dBm	Pass

4. Radiated Emission

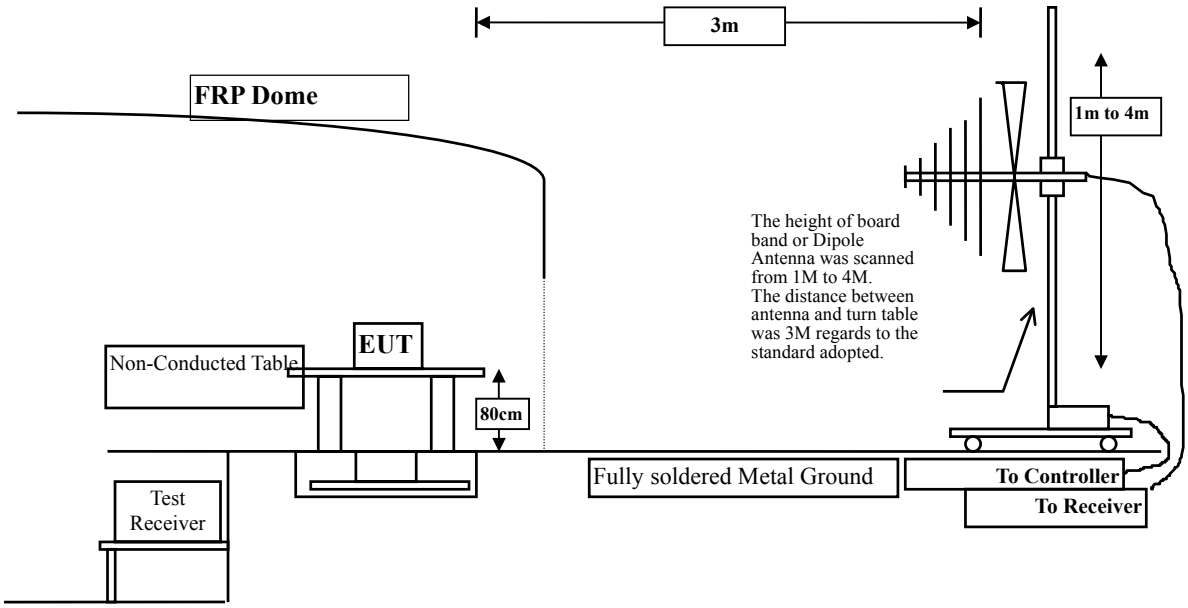
4.1. Test Equipment

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

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☐Site # 1		Test Receiver	R & S	ESVS 10 / 834468/003	May, 2007
		Spectrum Analyzer	Advantest	R3162/ 00803480	May, 2007
		Pre-Amplifier	Advantest	BB525C/ 3307A01812	May, 2007
		Bilog Antenna	SCHAFFNER	CBL6112B / 2697	Sep., 2007
☐Site # 2		Test Receiver	R & S	ESCS 30 / 836858 / 022	May, 2007
		Spectrum Analyzer	Advantest	R3162 / 100803466	May, 2007
		Pre-Amplifier	Advantest	BB525C/3307A01814	May, 2007
		Bilog Antenna	SCHAFFNER	CBL6112B / 2705	May, 2007
		Horn Antenna	ETS	3115 / 0005-6160	Sep., 2007
		Pre-Amplifier	QTK	QTK-AMP-01/ 0001	May, 2007
☒Site # 3	X	Test Receiver	R & S	ESI 26 / 838786/004	May, 2007
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007
	X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
	X	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2007
	X	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2007
	X	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2007
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2007
	X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2007

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

4.2. Test Setup



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: 2003 on radiated measurement.
The additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field dtrength of harmonics measurement.
The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz.
The frequency range from 30MHz to 10th harminics is checked.

4.5. Uncertainty

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

4.6. Test Result of Radiated Emission

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b (2412MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4824.000	3.623	42.331	45.954	-28.046	74.000
7236.000	9.189	43.530	52.719	-21.281	74.000
9648.000	11.689	41.552	53.241	-20.759	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	3.623	42.752	46.375	-27.625	74.000
7236.000	9.189	43.908	53.096	-20.904	74.000
9648.000	11.689	41.974	53.663	-20.337	74.000
Average Detector:					
--					

Note:

1. The reading levels below 1GHz and above 1GHz are quasi-peak values and peak/average values, respectively.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz。
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:10Hz; Span:20MHz。
4. Emission Level = Reading Level + Correct Factor.
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 : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4874.000	3.803	41.788	45.590	-28.410	74.000
7311.000	9.384	43.593	52.977	-21.023	74.000
9748.000	11.672	41.457	53.129	-20.871	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	3.803	41.953	45.755	-28.245	74.000
7311.000	9.384	43.300	52.684	-21.316	74.000
9748.000	11.672	41.655	53.327	-20.673	74.000
Average Detector:					
--					

Note:

1. The reading levels below 1GHz and above 1GHz are quasi-peak values and peak/average values, respectively.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz。
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:10Hz; Span:20MHz。
4. Emission Level = Reading Level + Correct Factor.
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 : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b (2462 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4924.000	3.985	41.912	45.896	-28.104	74.000
7386.000	9.572	43.604	53.176	-20.824	74.000
9848.000	11.696	41.497	53.193	-20.807	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4924.000	3.985	42.067	46.051	-27.949	74.000
7386.000	9.572	43.120	52.692	-21.308	74.000
9848.000	11.696	41.633	53.329	-20.671	74.000
Average Detector:					
--					

Note:

1. The reading levels below 1GHz and above 1GHz are quasi-peak values and peak/average values, respectively.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz。
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:10Hz; Span:20MHz。
4. Emission Level = Reading Level + Correct Factor.
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 : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Harmonic Radiated Emission Data
Test Site : No.3OATS
Test Mode : Mode 2: Transmitter 802.11g (2412 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4824.000	3.623	42.141	45.764	-28.236	74.000
7236.000	9.189	44.074	53.262	-20.738	74.000
9648.000	11.689	41.631	53.320	-20.680	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	3.623	41.843	45.466	-28.534	74.000
7236.000	9.189	43.693	52.881	-21.119	74.000
9648.000	11.689	41.423	53.112	-20.888	74.000
Average Detector:					
--					

Note:

1. The reading levels below 1GHz and above 1GHz are quasi-peak values and peak/average values, respectively.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz。
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:10Hz; Span:20MHz。
4. Emission Level = Reading Level + Correct Factor.
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 : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter 802.11g (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4874.000	3.803	42.410	46.212	-27.788	74.000
7311.000	9.384	43.608	52.992	-21.008	74.000
9748.000	11.672	41.497	53.169	-20.831	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4874.000	3.803	41.868	45.670	-28.330	74.000
7311.000	9.384	43.167	52.551	-21.449	74.000
9748.000	11.672	41.018	52.690	-21.310	74.000
Average					
Detector:					
--					

Note:

1. The reading levels below 1GHz and above 1GHz are quasi-peak values and peak/average values, respectively.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz。
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:10Hz; Span:20MHz。
4. Emission Level = Reading Level + Correct Factor.
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 : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter 802.11g (2462 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4924.000	3.985	41.626	45.610	-28.390	74.000
7386.000	9.572	43.297	52.869	-21.131	74.000
9848.000	11.696	41.851	53.547	-20.453	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4924.000	3.985	41.143	45.127	-28.873	74.000
7386.000	9.572	43.399	52.971	-21.029	74.000
9848.000	11.696	41.590	53.286	-20.714	74.000
Average Detector:					
--					

Note:

1. The reading levels below 1GHz and above 1GHz are quasi-peak values and peak/average values, respectively.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz。
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:10Hz; Span:20MHz。
4. Emission Level = Reading Level + Correct Factor.
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 : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
202.175	9.862	20.935	30.797	-12.703	43.500
250.675	13.342	21.794	35.136	-10.864	46.000
367.075	15.892	17.409	33.301	-12.699	46.000
575.625	19.517	13.156	32.673	-13.327	46.000
721.125	20.929	13.897	34.826	-11.174	46.000
961.200	22.909	13.326	36.235	-17.765	54.000
Vertical					
240.975	12.463	20.172	32.635	-13.365	46.000
347.685	14.949	21.306	36.255	-9.745	46.000
563.500	21.137	13.675	34.812	-11.188	46.000
648.375	20.198	12.397	32.595	-13.405	46.000
750.620	23.190	12.354	35.544	-10.456	46.000
864.200	21.968	12.332	34.300	-11.700	46.000

Note:

1. The reading levels below 1GHz are quasi-peak values.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The radiated emissions below 1GHz of the lowest, middle, highest frequency are pretested. Only the worst case is shown on the report.

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter 802.11g (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
153.675	11.363	14.272	25.635	-17.865	43.500
364.650	15.770	13.884	29.654	-16.346	46.000
442.250	17.690	11.955	29.645	-16.355	46.000
575.625	19.517	15.360	34.877	-11.123	46.000
648.375	20.951	9.054	30.005	-15.995	46.000
767.200	22.117	10.807	32.924	-13.076	46.000
Vertical					
250.675	13.346	17.648	30.994	-15.006	46.000
384.050	16.822	9.127	25.949	-20.051	46.000
500.450	18.354	11.029	29.383	-16.617	46.000
575.625	21.418	8.236	29.654	-16.346	46.000
696.875	20.633	7.935	28.568	-17.432	46.000
864.200	21.968	12.085	34.053	-11.947	46.000

Note:

1. The reading levels below 1GHz are quasi-peak values.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The radiated emissions below 1GHz of the lowest, middle, highest frequency are pretested. Only the worst case is shown on the report.

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	Test Receiver	R & S	ESI 26 / 838786/004	May, 2007
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007
X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
X	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2007
X	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2007
X	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2007
X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2007
X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2007

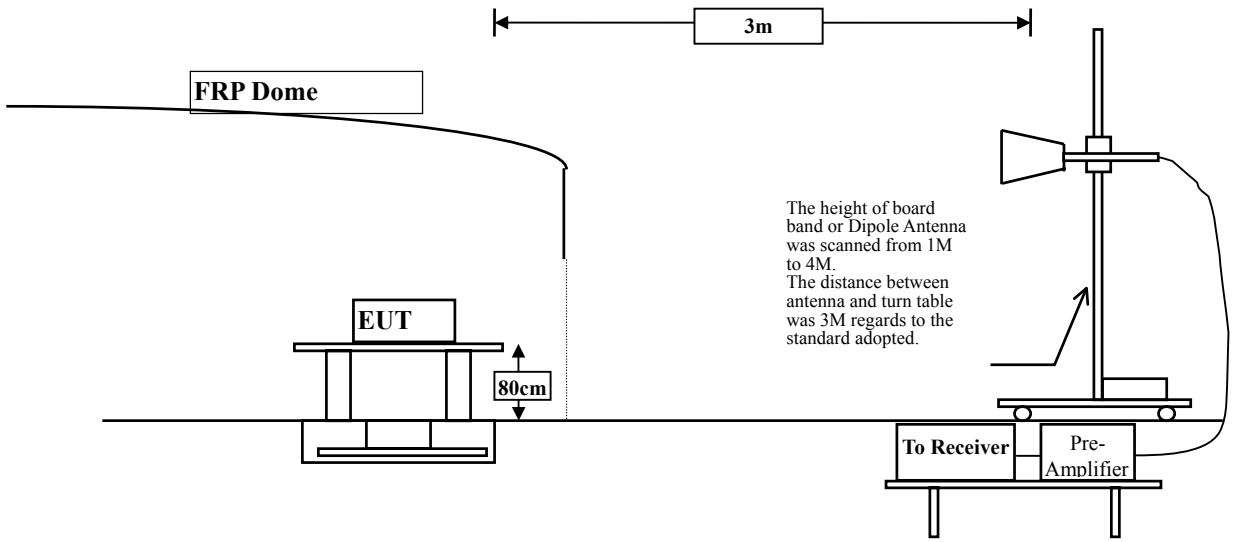
Test Site: Site3

Note: 1. All equipments are calibrated every one year.

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

5.2. Test Setup

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: 2003 on radiated measurement.
The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

5.5. Uncertainty

Conducted is ± 1.27 dB
Radiated is ± 3.9 dB

5.6. Test Result of Band Edge

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b

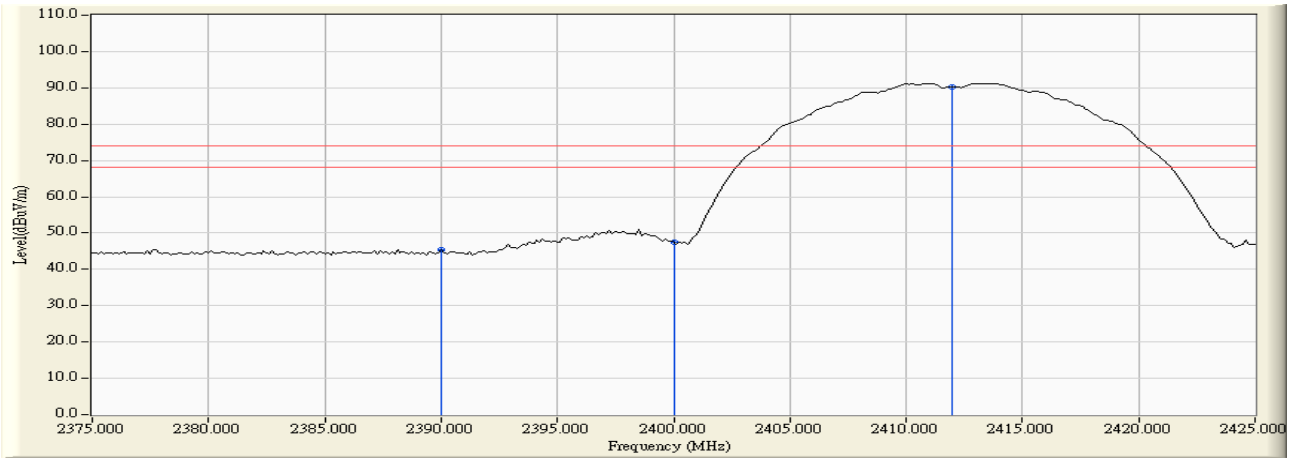
RF Radiated Measurement:

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

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
1 (Peak)	2390.000	-2.378	47.921	45.544	74.00	54.00	Pass
1 (Peak)	2400.000	-2.328	49.770	47.442	74.00	54.00	Pass
1 (Peak)	2412.000	-2.268	92.558	90.290	74.00	54.00	Pass

Figure Channel 1: Horizontal (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b

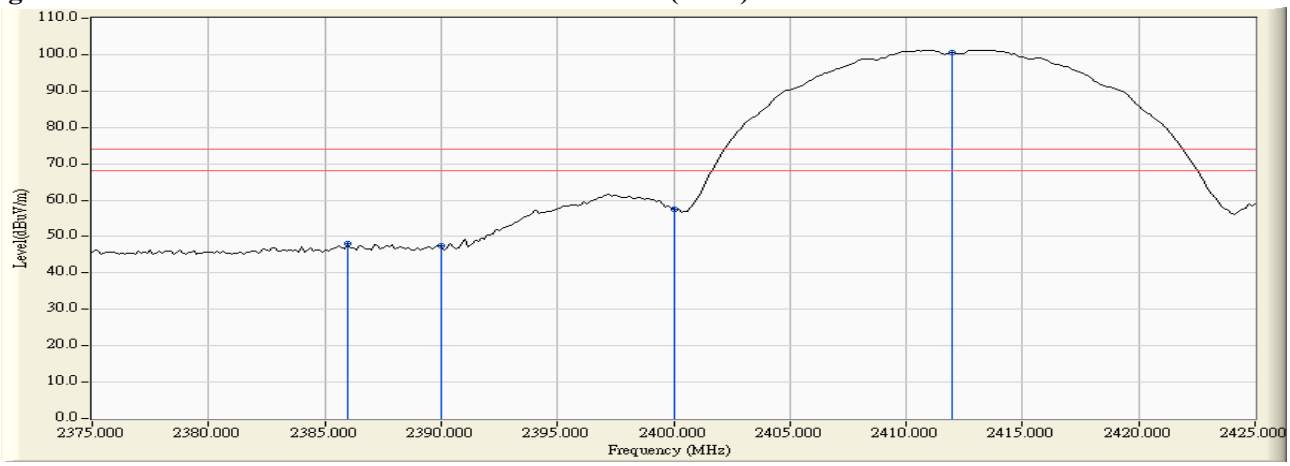
RF Radiated Measurement:

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

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
1 (Peak)	2386.000	-2.397	50.554	48.157	74.00	54.00	Pass
1 (Peak)	2390.000	-2.378	49.725	47.348	74.00	54.00	Pass
1 (Peak)	2400.000	-2.328	59.868	57.540	74.00	54.00	Pass
1 (Peak)	2412.000	-2.268	102.729	100.461	74.00	54.00	Pass

Figure Channel 1: Vertical (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b

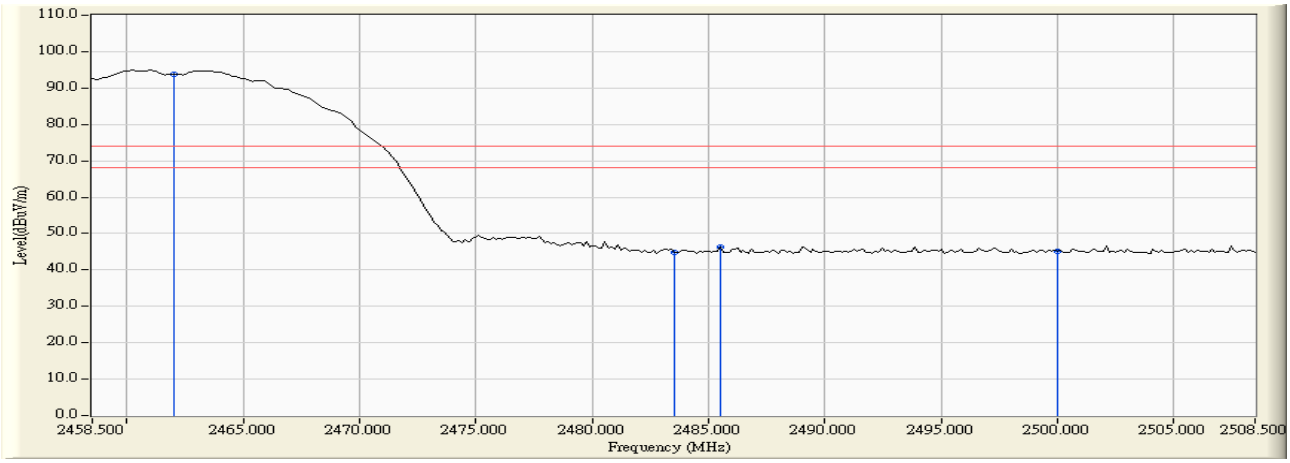
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
11 (Horizontal)	>2483.5	>20	Pass

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
11(Peak)	2462.000	-2.034	95.864	93.831	74.00	54.00	Pass
11(Peak)	2483.500	-1.937	46.757	44.820	74.00	54.00	Pass
11(Peak)	2485.500	-1.930	48.090	46.159	74.00	54.00	Pass
11(Peak)	2500.000	-1.886	47.004	45.118	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b

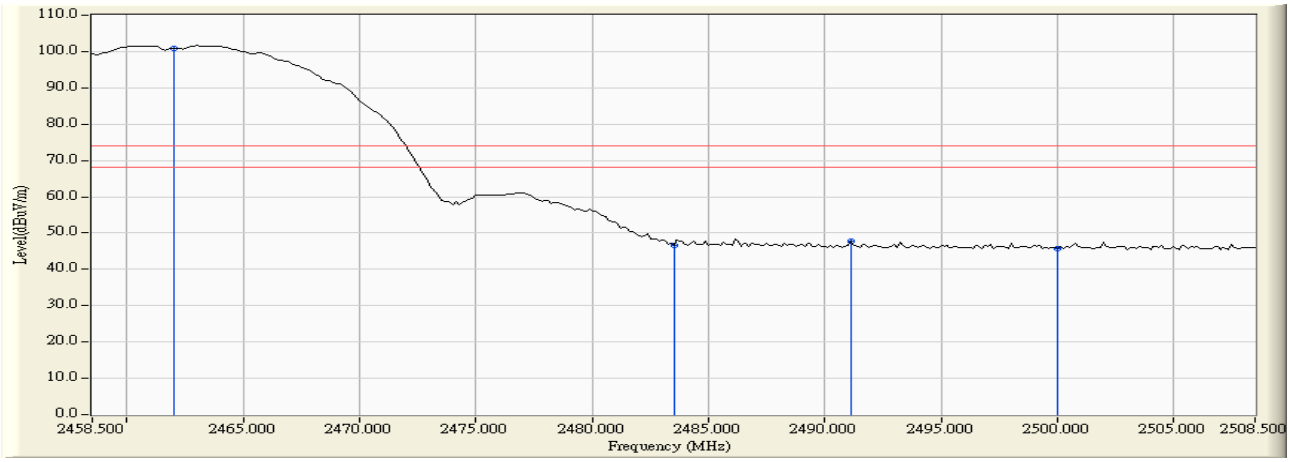
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
11 (Vertical)	>2483.5	>20	Pass

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
11(Peak)	2462.000	-2.034	102.797	100.764	74.00	54.00	Pass
11(Peak)	2483.500	-1.937	48.657	46.720	74.00	54.00	Pass
11(Peak)	2491.125	-1.913	49.818	47.905	74.00	54.00	Pass
11(Peak)	2500.000	-1.886	47.655	45.769	74.00	54.00	Pass

Figure Channel 11: Vertical (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter 802.11g

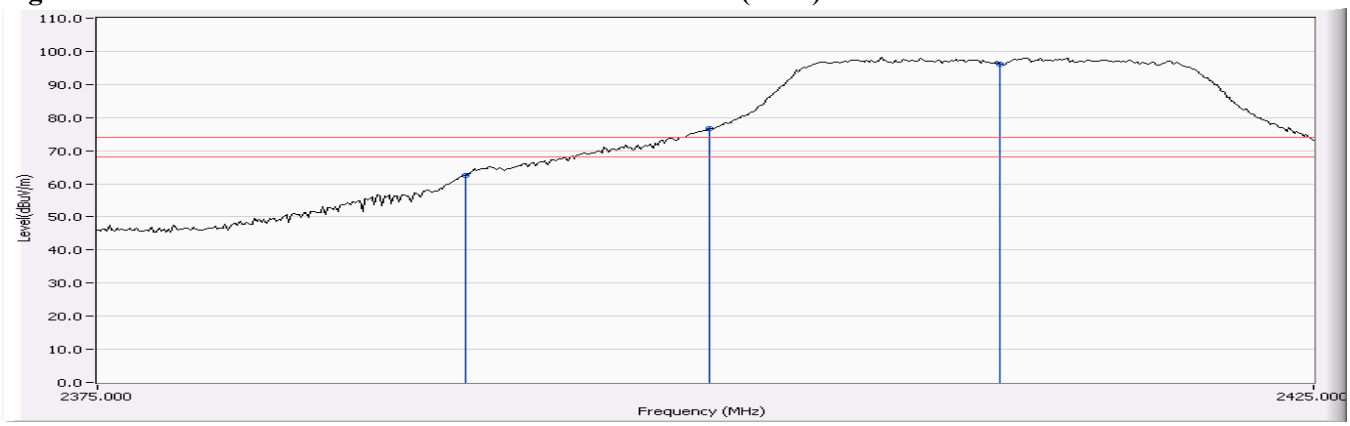
RF Radiated Measurement:

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

RF Radiated Measurement (Horizontal):

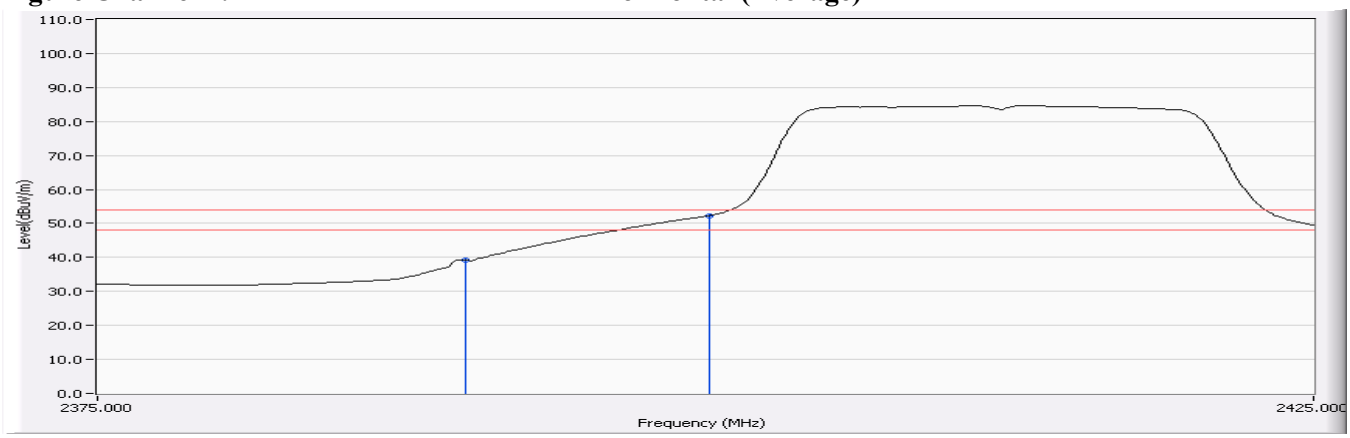
Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
1 (Peak)	2390.000	-1.407	63.910	62.503	74.00	54.00	Pass
1 (Average)	2390.000	-1.407	40.537	39.130	74.00	54.00	Pass
1 (Peak)	2400.000	-1.363	78.122	76.759	74.00	54.00	Pass
1 (Average)	2400.000	-1.363	53.610	52.247	74.00	54.00	Pass
1 (Peak)	2412.000	-1.314	97.366	96.052	74.00	54.00	Pass

Figure Channel 1: Horizontal (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Figure Channel 1: Horizontal (Average)



Note: RBW=1MHz, VBW=300Hz, Sweep=500ms

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter 802.11g

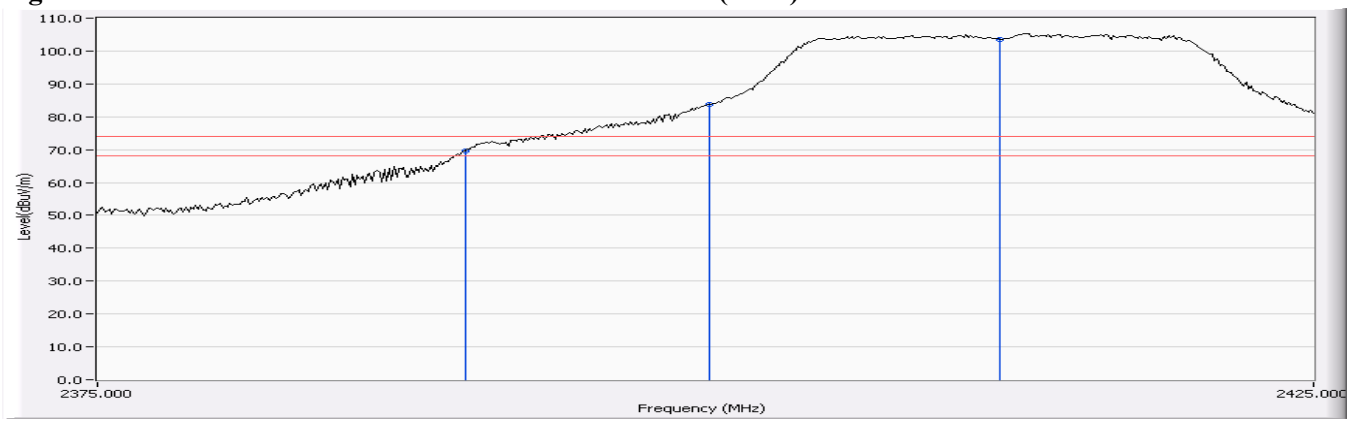
RF Radiated Measurement:

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

RF Radiated Measurement (Vertical):

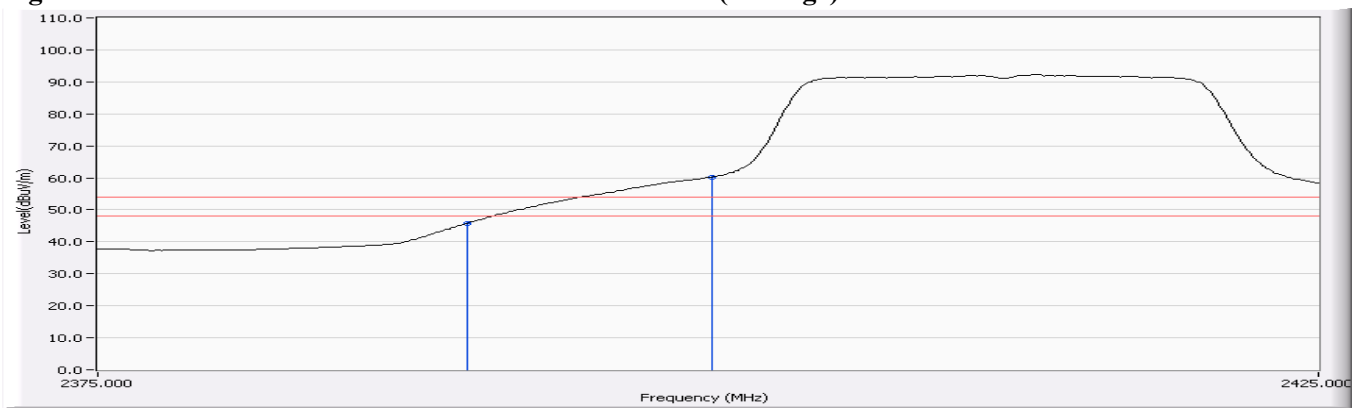
Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
1 (Peak)	2390.000	-1.407	71.019	69.612	74.00	54.00	Pass
1 (Average)	2390.000	-1.407	47.078	45.671	74.00	54.00	Pass
1 (Peak)	2400.000	-1.363	83.977	82.614	74.00	54.00	Pass
1 (Average)	2400.000	-1.363	60.605	59.242	74.00	54.00	Pass
1 (Peak)	2412.000	-1.314	104.860	103.546	74.00	54.00	Pass

Figure Channel 1: Vertical (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Figure Channel 1: Vertical (Average)



Note: RBW=1MHz, VBW=300Hz, Sweep=500ms

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter 802.11g

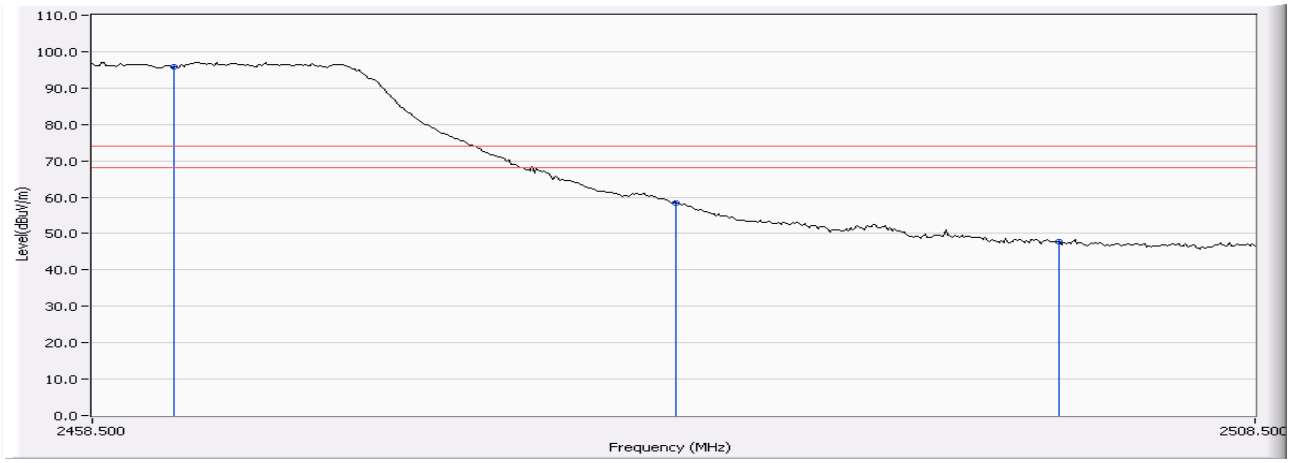
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
11 (Horizontal)	>2483.5	>20	Pass

RF Radiated Measurement (Horizontal):

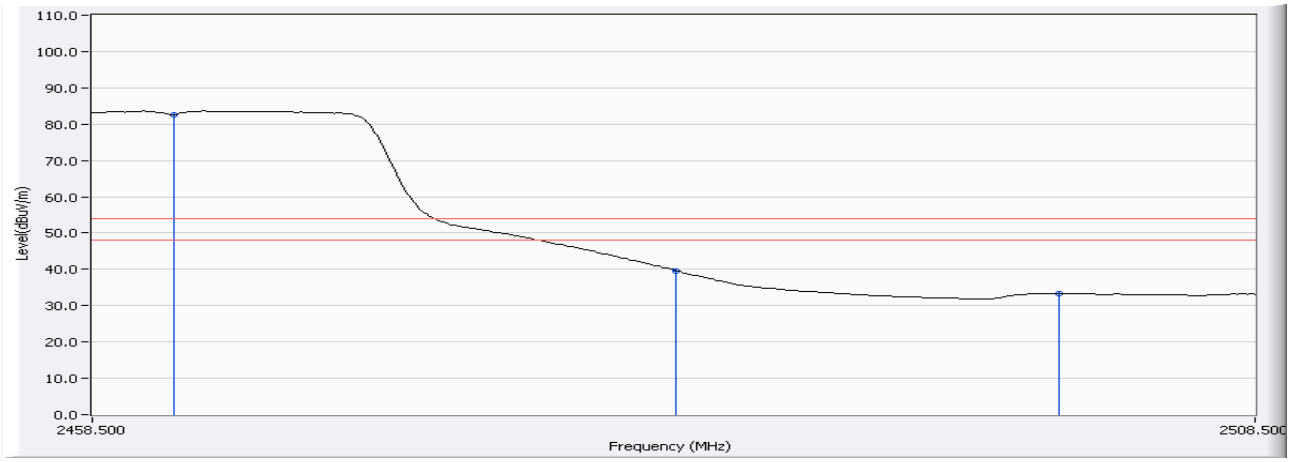
Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
11 (Peak)	2462.000	-1.118	96.893	95.775	74.00	54.00	Pass
11 (Average)	2462.000	-1.118	83.613	82.495	74.00	54.00	Pass
11 (Peak)	2483.500	-1.037	59.432	58.395	74.00	54.00	Pass
11 (Average)	2483.500	-1.037	40.691	39.654	74.00	54.00	Pass
11 (Peak)	2500.000	-0.988	48.721	47.733	74.00	54.00	Pass
11 (Average)	2500.000	-0.988	34.206	33.218	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Figure Channel 11: Horizontal (Average)



Note: RBW=1MHz, VBW=300Hz, Sweep=500ms

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter 802.11g

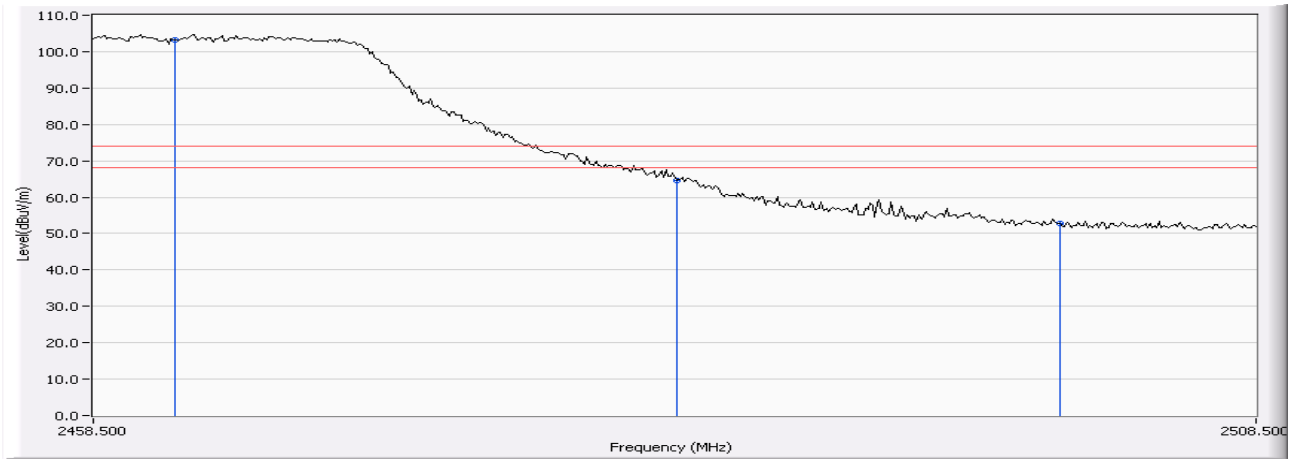
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
11 (Vertical)	>2483.5	>20	Pass

RF Radiated Measurement (Vertical):

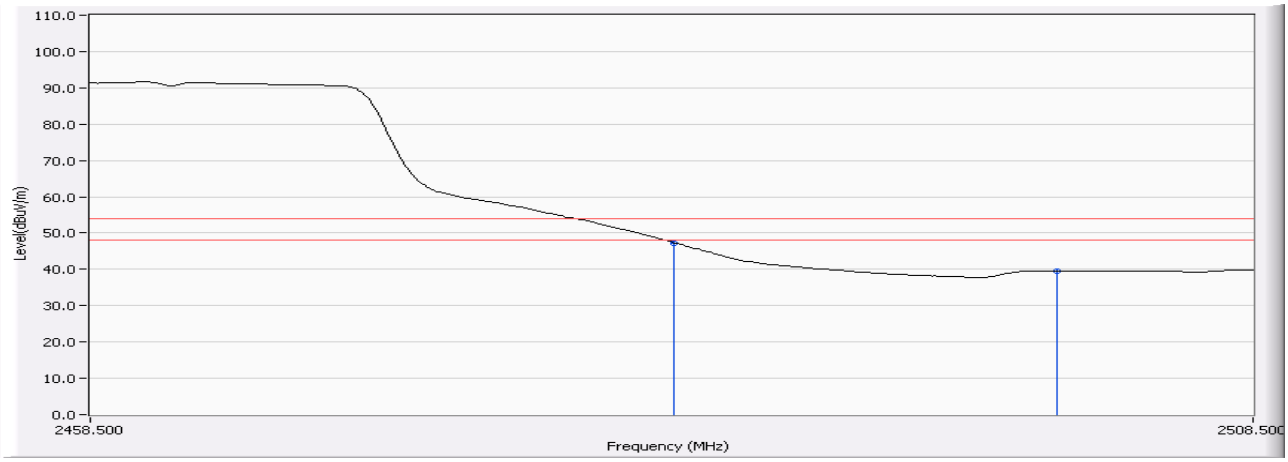
Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
11 (Peak)	2462.000	-1.118	104.249	103.131	74.00	54.00	Pass
11 (Peak)	2483.500	-1.037	65.631	64.594	74.00	54.00	Pass
11 (Average)	2483.500	-1.037	48.312	47.275	74.00	54.00	Pass
11 (Peak)	2500.000	-0.988	53.688	52.700	74.00	54.00	Pass
11 (Average)	2500.000	-0.988	40.568	39.580	74.00	54.00	Pass

Figure Channel 11: Vertical (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Figure Channel 11: Vertical (Average)



Note: RBW=1MHz, VBW=300Hz, Sweep=500ms

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.

6. Occupied Bandwidth

6.1. Test Equipment

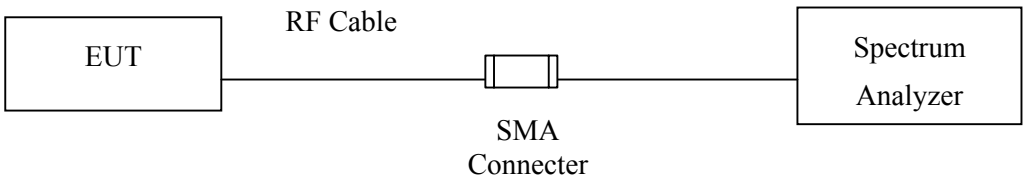
The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R&S	FSP40 / 100170	Nov, 2007

Note: 1. All instruments are calibrated every one year.

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

6.2. Test Setup



6.3. Limits

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

6.4. Uncertainty

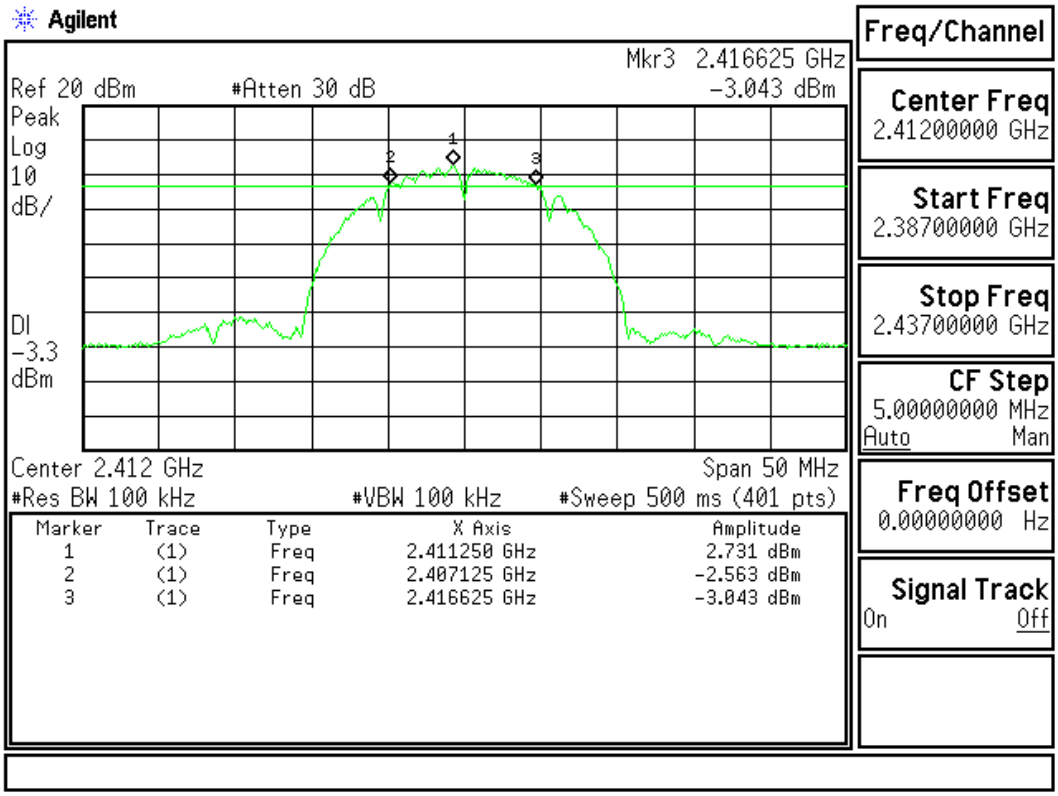
± 150Hz

6.5. Test Result of Occupied Bandwidth

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b (2412MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1 (1Mbps)	2412.00	9500	>500	Pass

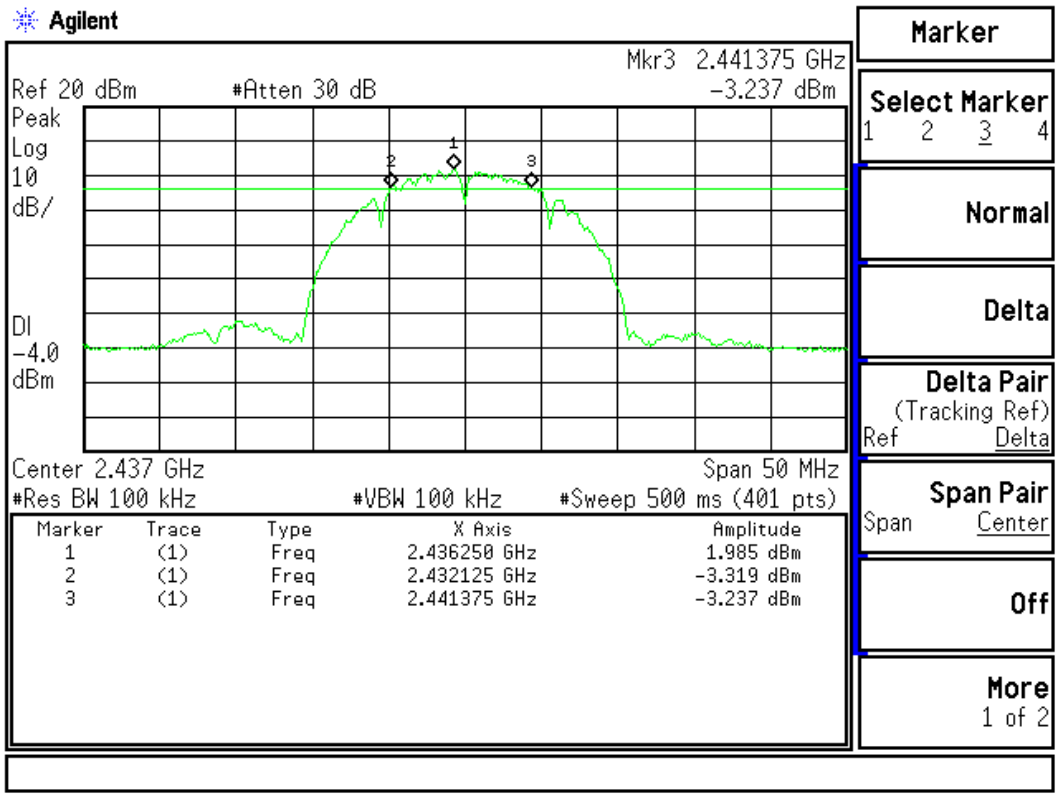
Figure Channel 1:



Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6 (1Mbps)	2437.00	9250	>500	Pass

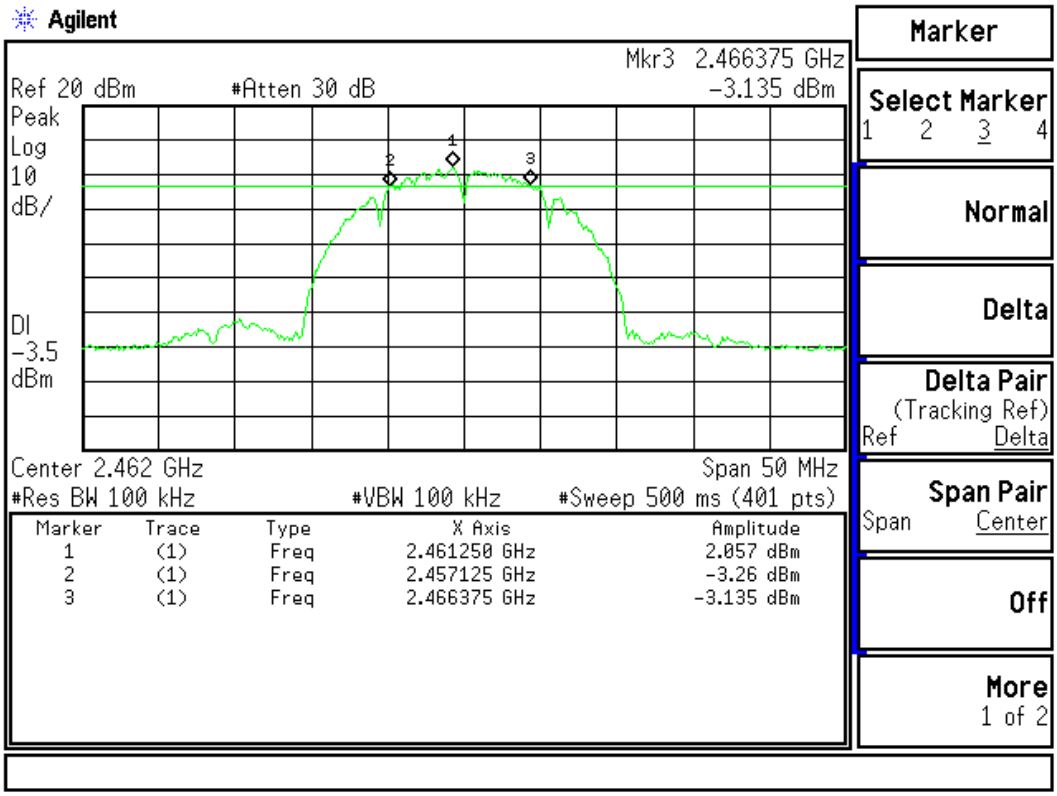
Figure Channel 6:



Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
11 (1Mbps)	2462.00	9250	>500	Pass

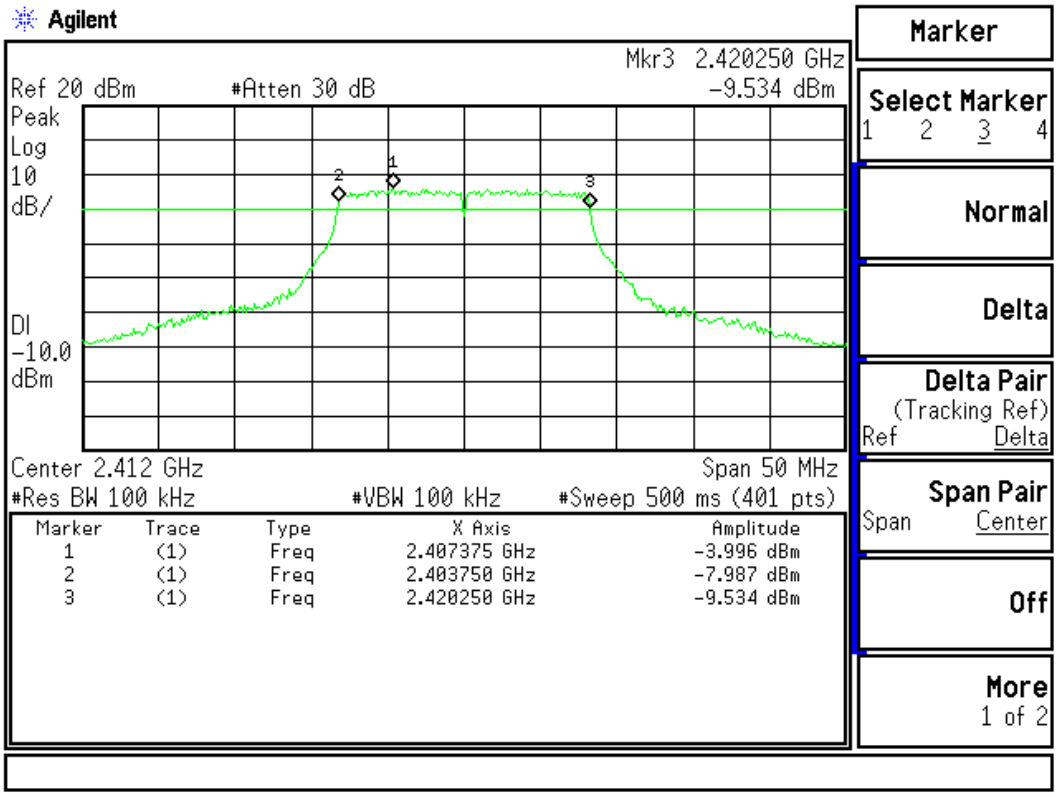
Figure Channel 11:



Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter 802.11g (2412MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1 (6Mbps)	2412.00	16500	>500	Pass

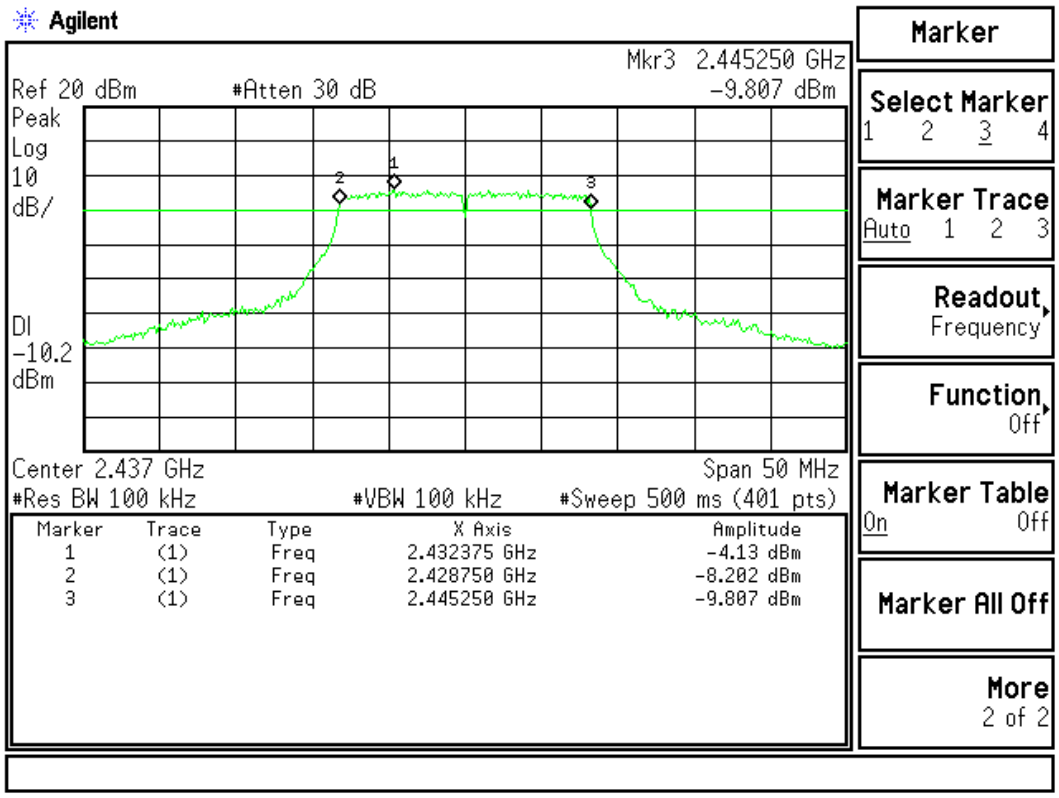
Figure Channel 1:



Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6 (6Mbps)	2437.00	16500	>500	Pass

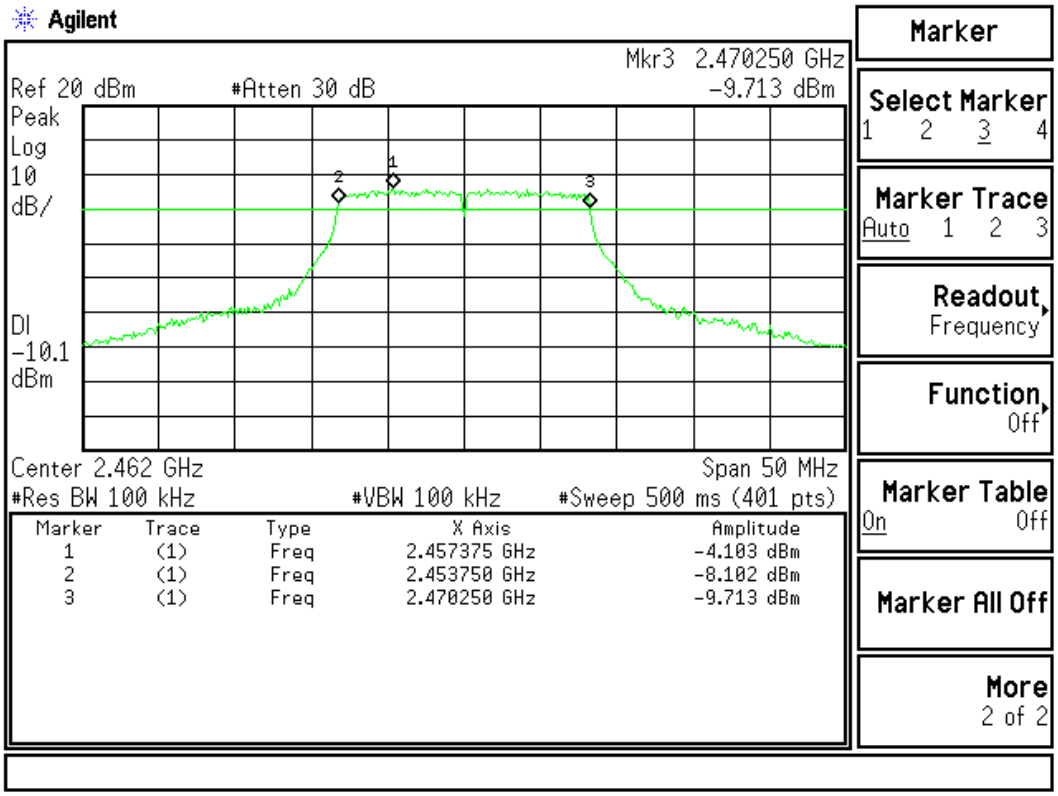
Figure Channel 6:



Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter 802.11g (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
11 (6Mbps)	2462.00	16500	>500	Pass

Figure Channel 11:



7. Power Density

7.1. Test Equipment

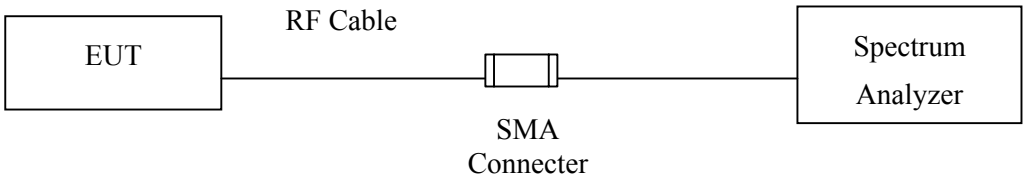
The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R&S	FSP40 / 100170	Nov, 2007

Note: 1. All equipments are calibrated every one year.

2. The test instruments marked by "X" 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. Uncertainty

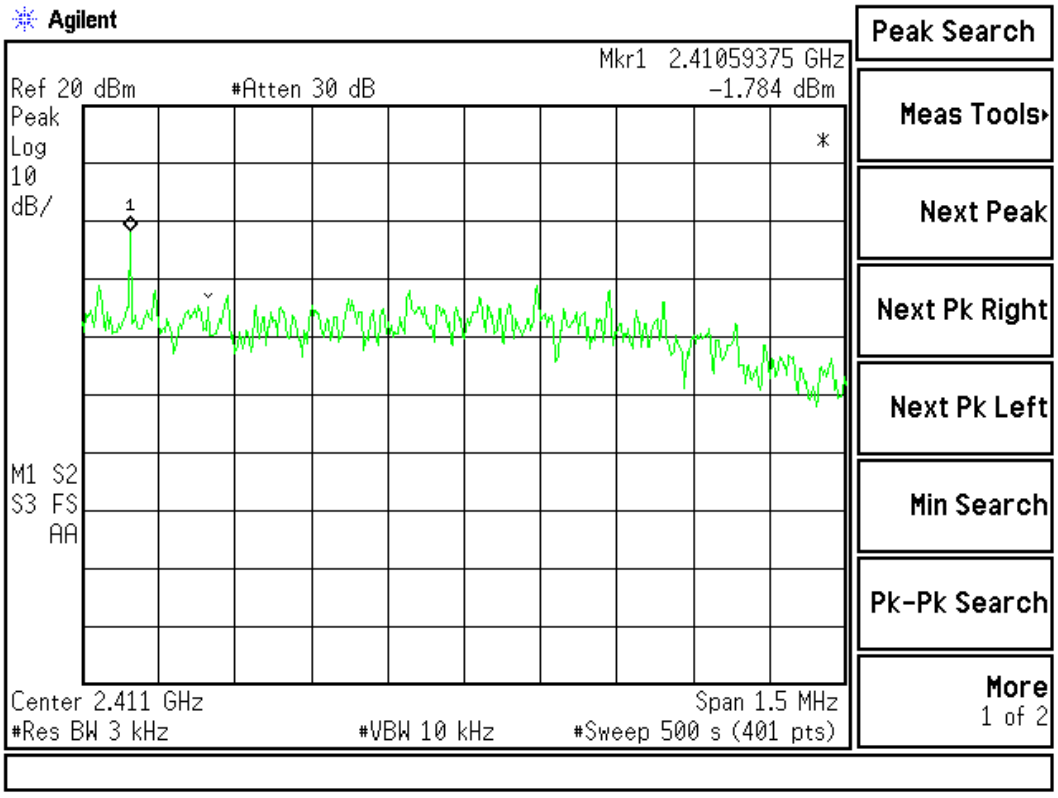
± 1.27 dB

7.5. Test Result of Power Density

Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Power Density Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b (2412MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1 (1Mbps)	2412.00	-1.784	< 8dBm	Pass

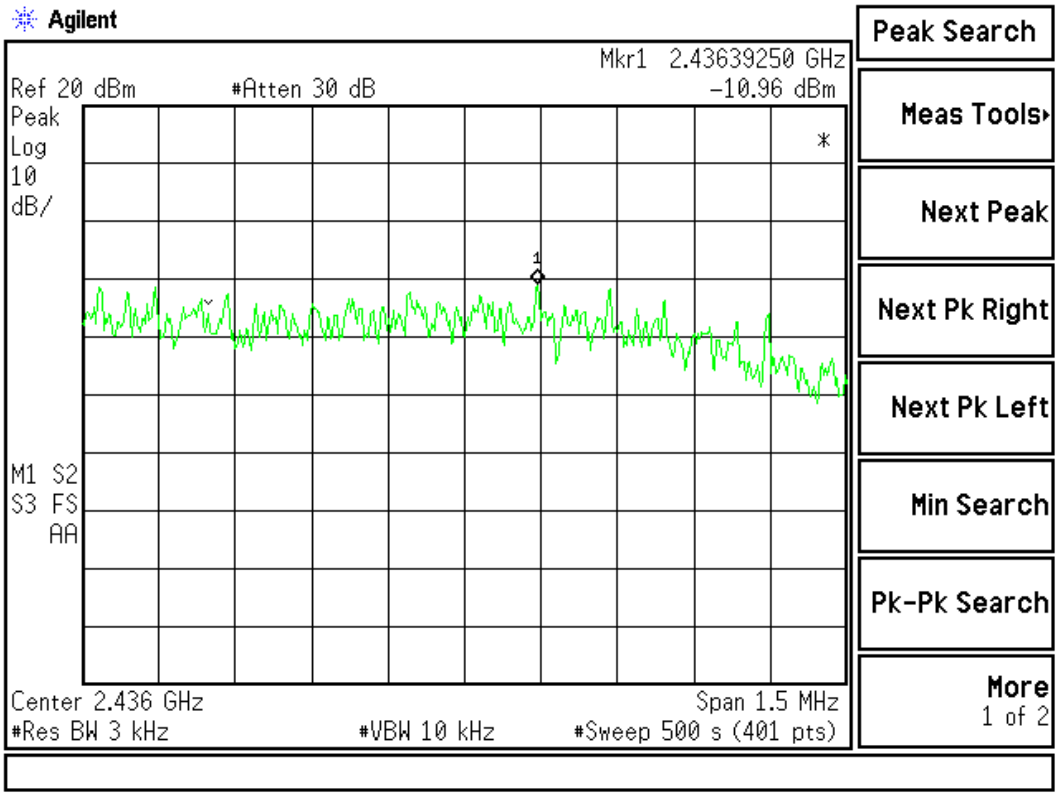
Figure Channel 1:



Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Power Density Data
Test Site : No.3OATS
Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
6 (1Mbps)	2437.000	-10.96	< 8dBm	Pass

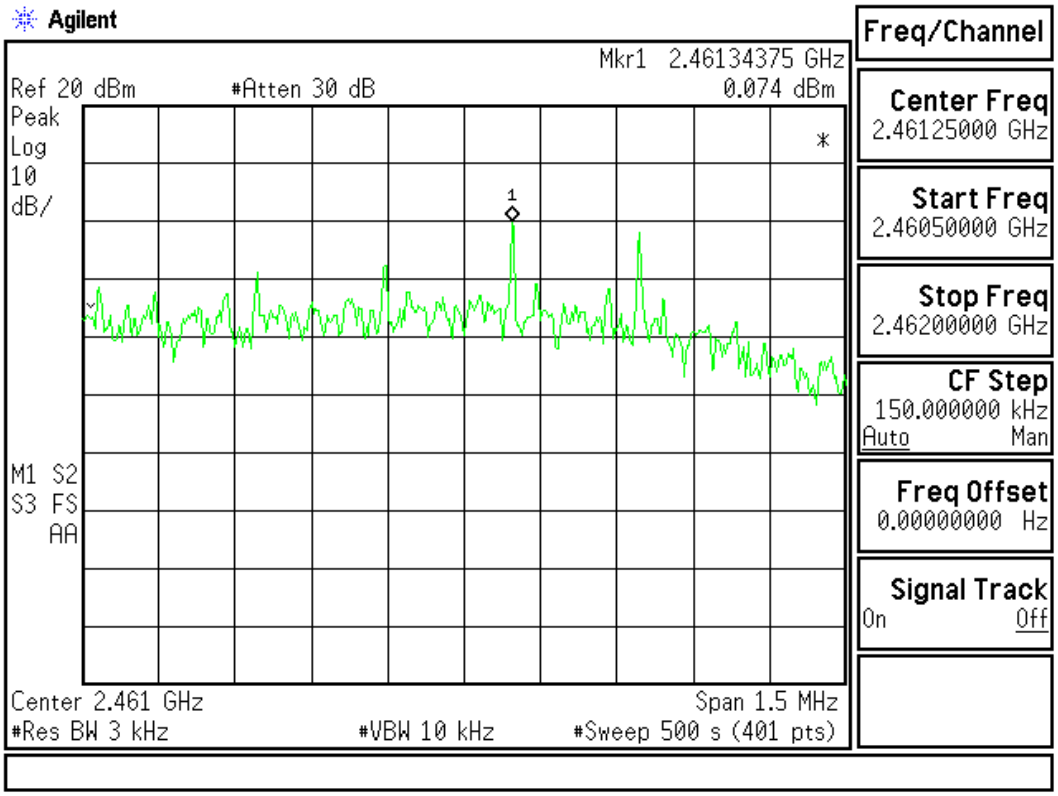
Figure Channel 6:



Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Power Density Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
11 (1Mbps)	2462.00	0.074	< 8dBm	Pass

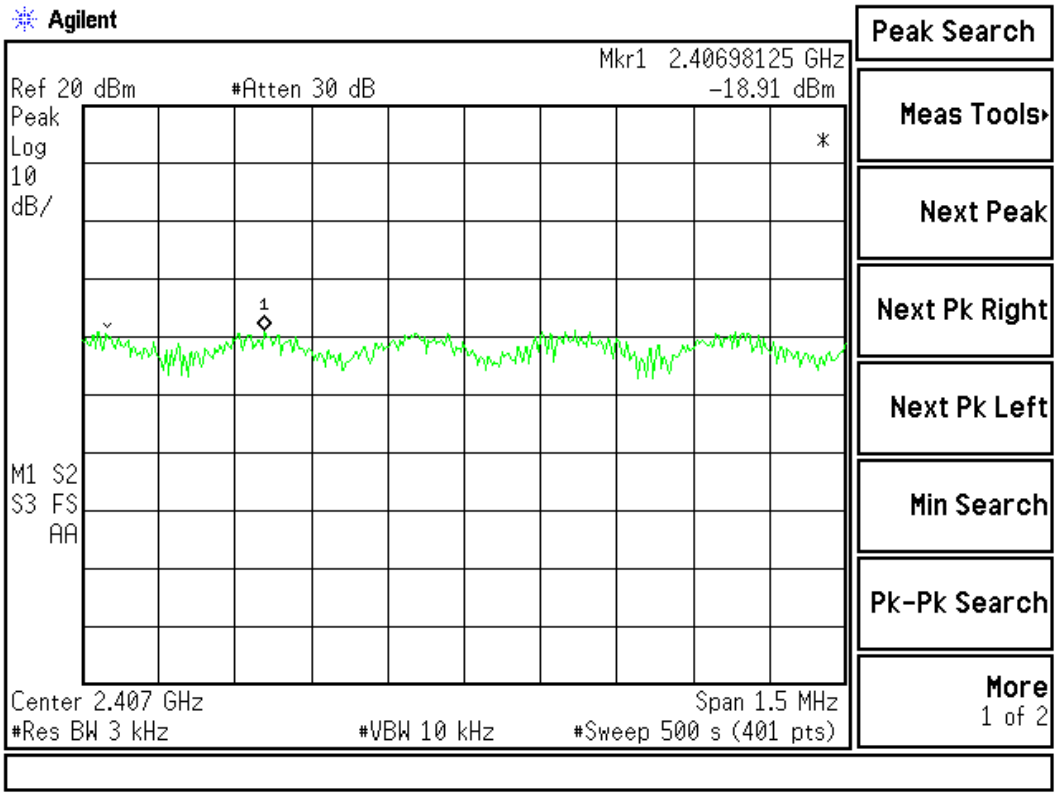
Figure Channel 11:



Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Power Density Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter 802.11g (2412MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1 (6Mbps)	2412.00	-18.91	< 8dBm	Pass

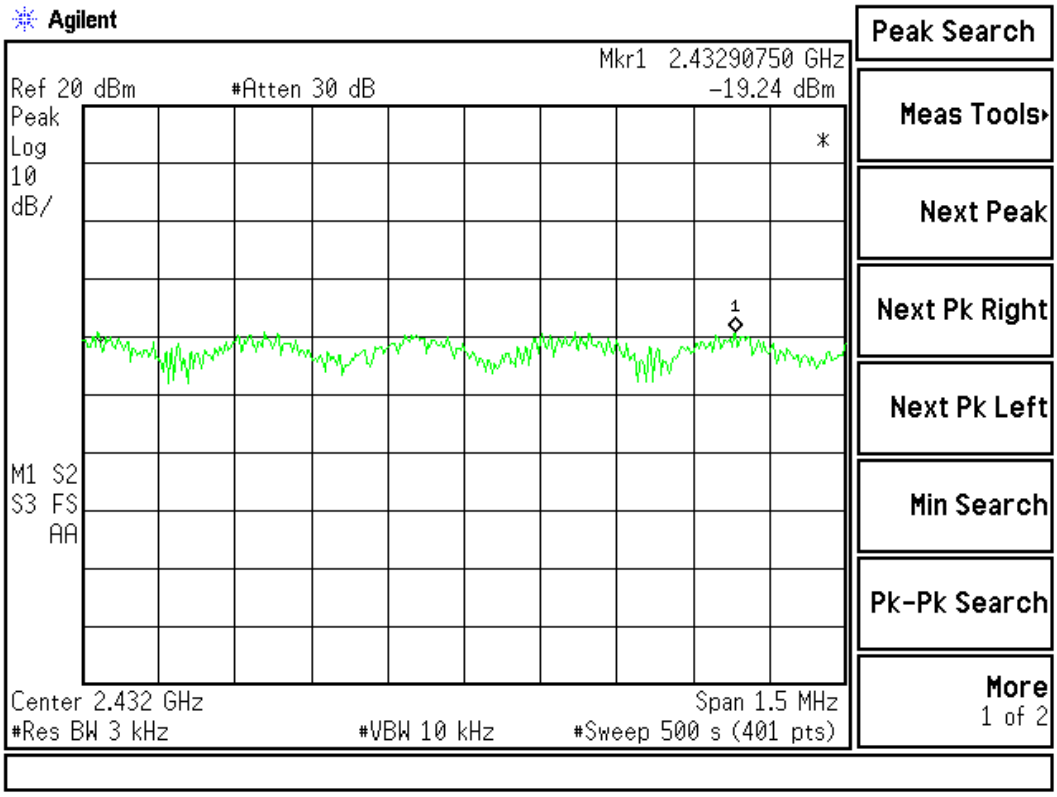
Figure Channel 1:



Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Power Density Data
Test Site : No.3OATS
Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
6 (6Mbps)	2437.000	-19.24	< 8dBm	Pass

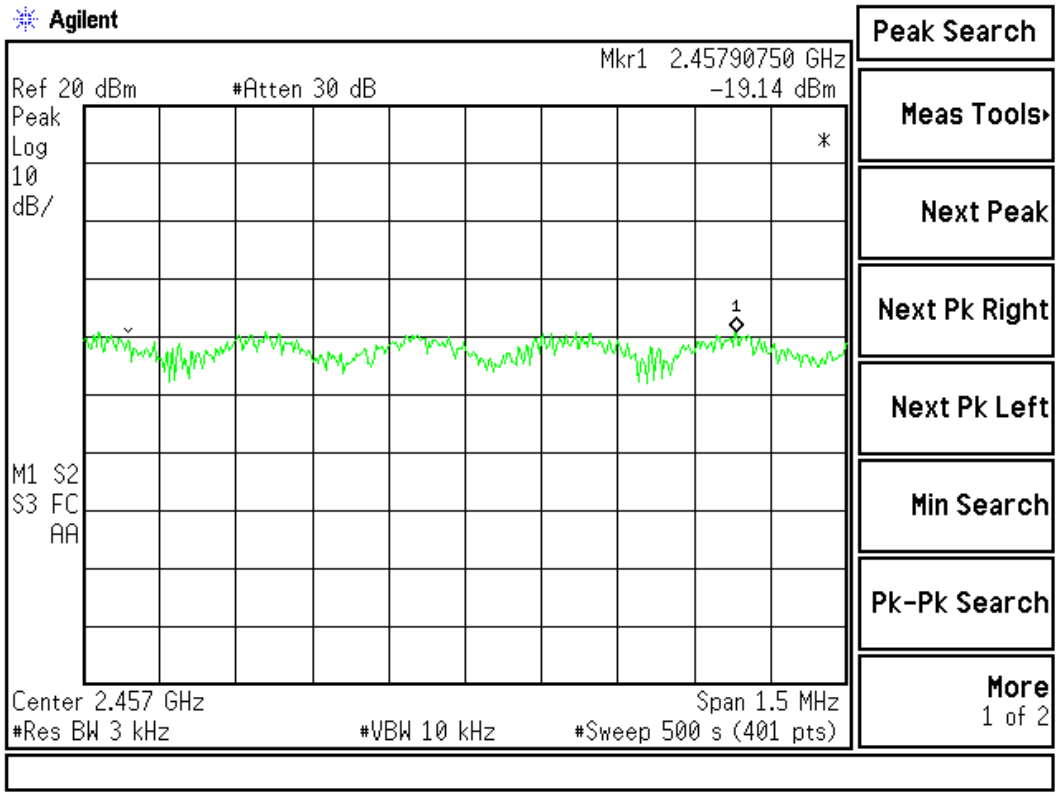
Figure Channel 6:



Product : Mini RISC-based Ready-to-Run Wireless Embedded Computer
Test Item : Power Density Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter 802.11g (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
11 (6Mbps)	2462.00	-19.14	< 8dBm	Pass

Figure Channel 11:



8. EMI Reduction Method During Compliance Testing

No modification was made during testing.