



Test Report

Product Name	Wireless Thin Client
Model No.	TX-3000
FCC ID	BJM-TX3000

Applicant	TATUNG CO.
Address	22, Chungshan N. Rd., 3rd Sec. Taipei, Taiwan, 104, R.O.C.

Date of Receipt	Sep. 26, 2007
Issued Date	Oct. 19, 2007
Report No.	07A003R-RFUSP05V01

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

Issued Date: Oct. 19, 2007

Report No.: 07A003R-RFUSP05V01



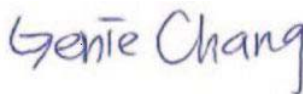
Product Name	Wireless Thin Client
Applicant	TATUNG CO.
Address	22, Chungshan N. Rd., 3rd Sec. Taipei, Taiwan, 104, R.O.C.
Manufacturer	TATUNG CO.
Model No.	TX-3000
Rated Voltage	AC 120V/60Hz
Working Voltage	DC 3.3V
Trade Name	TATUNG, Control 4
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2006 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

Documented By :


(Engineering Adm. Specialist /
Genie Chang)



Tested By :


(Vice Supervisor / Tom Hsieh)



0914

Approved By :


(Deputy Manager / Vincent Lin)

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION	4
1.1. EUT Description.....	4
1.2. Operational Description	5
1.3. Tested System Details.....	6
1.4. Configuration of Test System.....	6
1.5. EUT Exercise Software	6
1.6. Test Facility	7
2. Peak Power Output	8
2.1. Test Equipment.....	8
2.2. Test Setup	8
2.3. Limits	8
2.4. Uncertainty	8
2.5. Test Result of Peak Power Output.....	9
3. Radiated Emission.....	13
3.1. Test Equipment.....	13
3.2. Test Setup	14
3.3. Limits	14
3.4. Test Procedure	15
3.5. Uncertainty	15
3.6. Test Result of Radiated Emission.....	16
4. Band Edge	24
4.1. Test Equipment.....	24
4.2. Test Setup	24
4.3. Limits	25
4.4. Test Procedure	25
4.5. Uncertainty	25
4.6. Test Result of Band Edge	26
5. Occupied Bandwidth.....	36
5.1. Test Equipment.....	36
5.2. Test Setup	36
5.3. Limits	36
5.4. Uncertainty	36
5.5. Test Result of Occupied Bandwidth	37
6. Power Density	43
6.1. Test Equipment.....	43
6.2. Test Setup	43
6.3. Limits	43
6.4. Uncertainty	43
6.5. Test Result of Power Density	44
7. EMI Reduction Method During Compliance Testing	50
Attachment 1: EUT Test Photographs	
Attachment 2: EUT Detailed Photographs	

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Wireless Thin Client
Trade Name	TATUNG, Control 4
Model No.	TX-3000
FCC ID	BJM-TX3000
Frequency Range	2412MHz - 2462MHz
Channel Number	11 in 2.4GHz band
Data Speed	802.11b – 1, 2, 5.5, 11Mbps 802.11g – 6, 9, 12, 18, 24, 36, 48, 54Mbps
Type of Modulation	DSSS/OFDM
Antenna Type	Chip Antenna
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto
Channel Separation	5MHz in 2.4GHz band
Power Adapter	MFR: UMEC, M/N: UP0501Q-16P Input: AC 100-240 V / 47-63Hz, 2.0A Output: 16V-3.13A Cable Out: Non-Shielded, 1.8m, with one ferrite core bonded Power Cord: Shielded, 1.75m.

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	JOHANSON	2450AT45A100	3.0dBi

Frequency of Each Channel:

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

Note:

1. The EUT is a Wireless Thin Client with a built-in 2.4GHz 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 11Mbps and 802.11a/g is 54Mbps)
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. 07A003R-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 Wireless Thin Client with a built-in 2.4GHz transceiver. There are 11 channels in 2412 – 2462MHz. 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 Wireless Thin Client, 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 and IEEE 802.11g network.

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

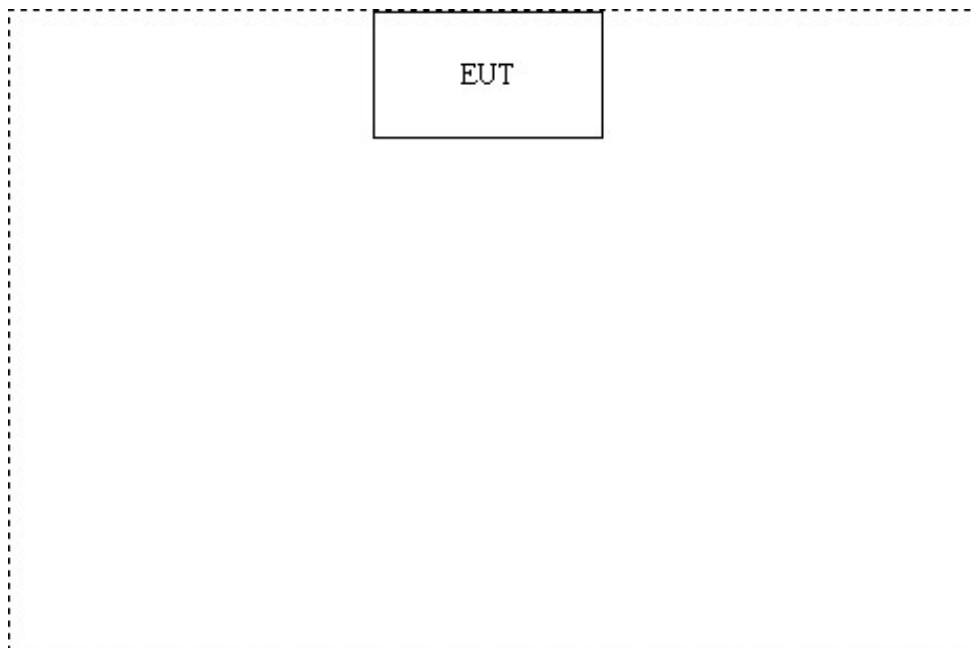
1.3. Tested System Details

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	N/A	N/A	N/A	N/A

Signal Cable Type	Signal cable Description
A	N/A

1.4. Configuration of Test System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Run “ART TOOL” test software 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



FCC Accreditation Number: TW1014

2. Peak Power Output

2.1. Test Equipment

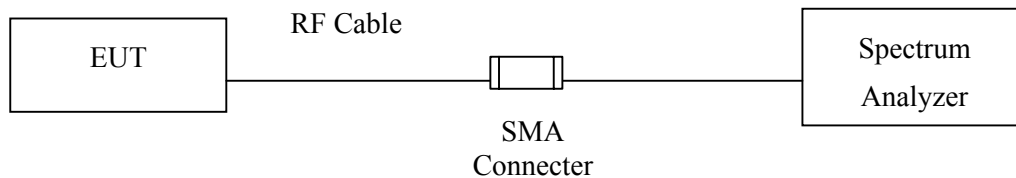
The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Spectrum Analyzer	Agilent	E4407B / US39440758	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.

2.2. Test Setup

Conducted Measurement



2.3. Limits

The maximum peak power shall be less 1 Watt.

2.4. Test Procedure

- (1) The transmitter output was connected the spectrum analyzer.
- (2) Select the middle channel of the operation band, and measure the peak output power value of each data rate.
- (3) Find out the worst-case data rate of previous procedure, and dependence on which data rate to measure the high and the low channel.

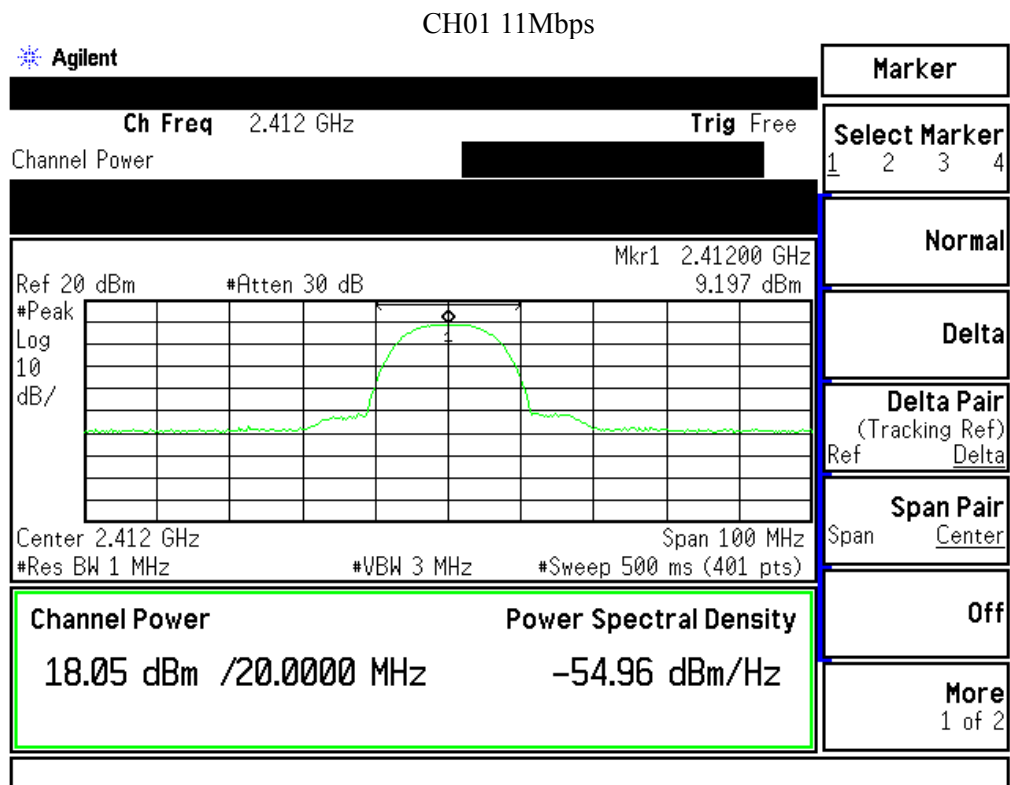
2.5. Uncertainty

± 1.27 dB

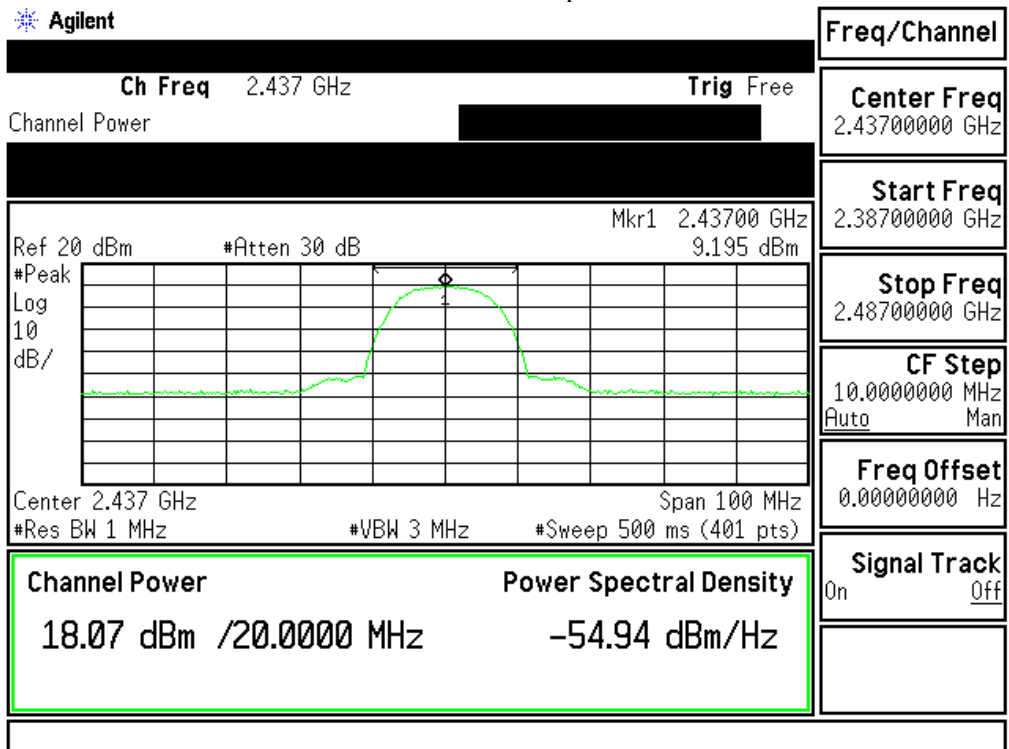
2.6. Test Result of Peak Power Output

Product : Wireless Thin Client
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

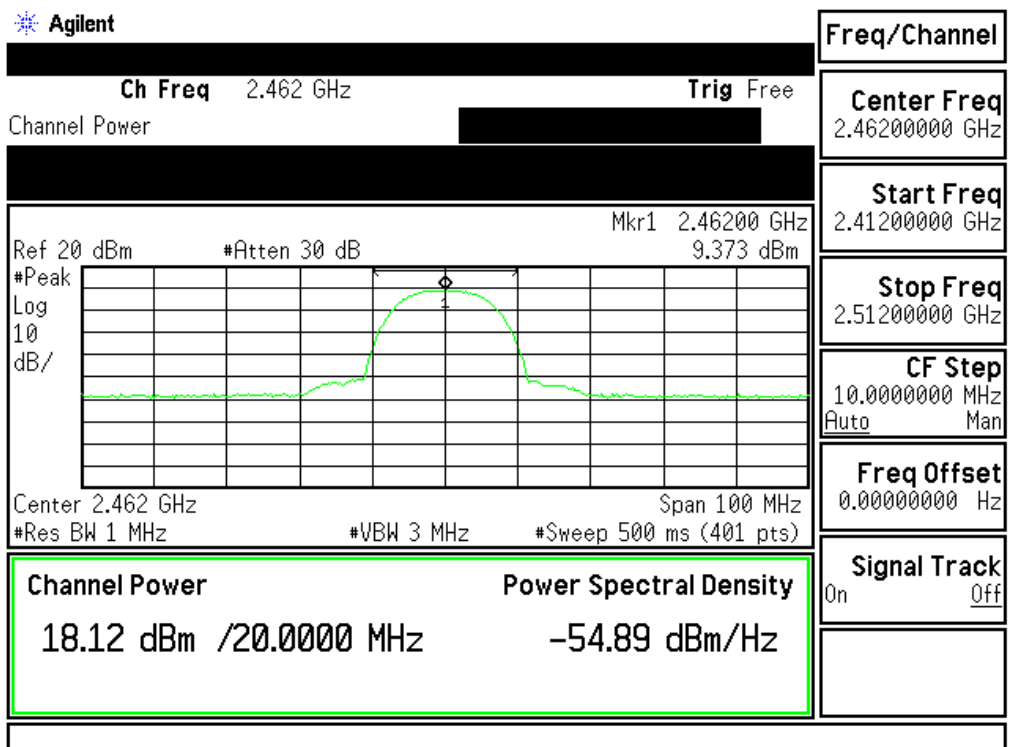
Peak Power Output						
Channel No.	Frequency (MHz)	Data Rate				Required Limit
		1	2	5.5	11	
1	2412.00	--	--	--	18.05	1 Watt= 30 dBm
6	2437.00	17.85	17.92	17.93	18.07	1 Watt= 30 dBm
11	2462.00	--	--	--	18.12	1 Watt= 30 dBm



CH06 11Mbps

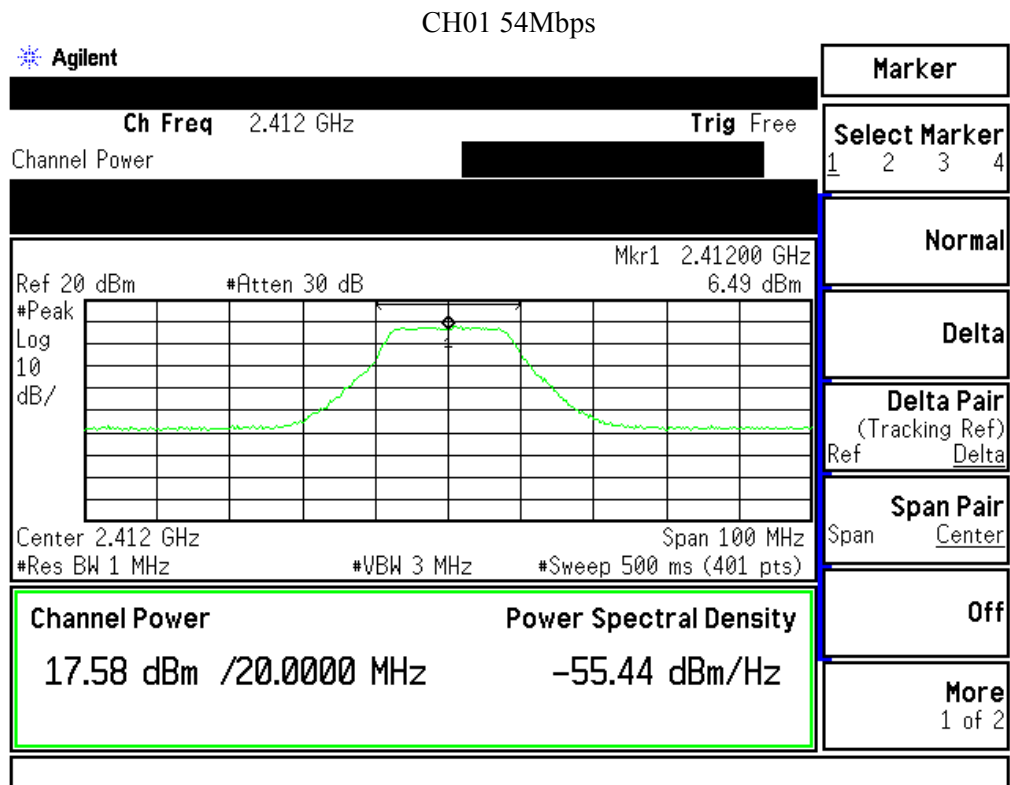


CH11 11Mbps

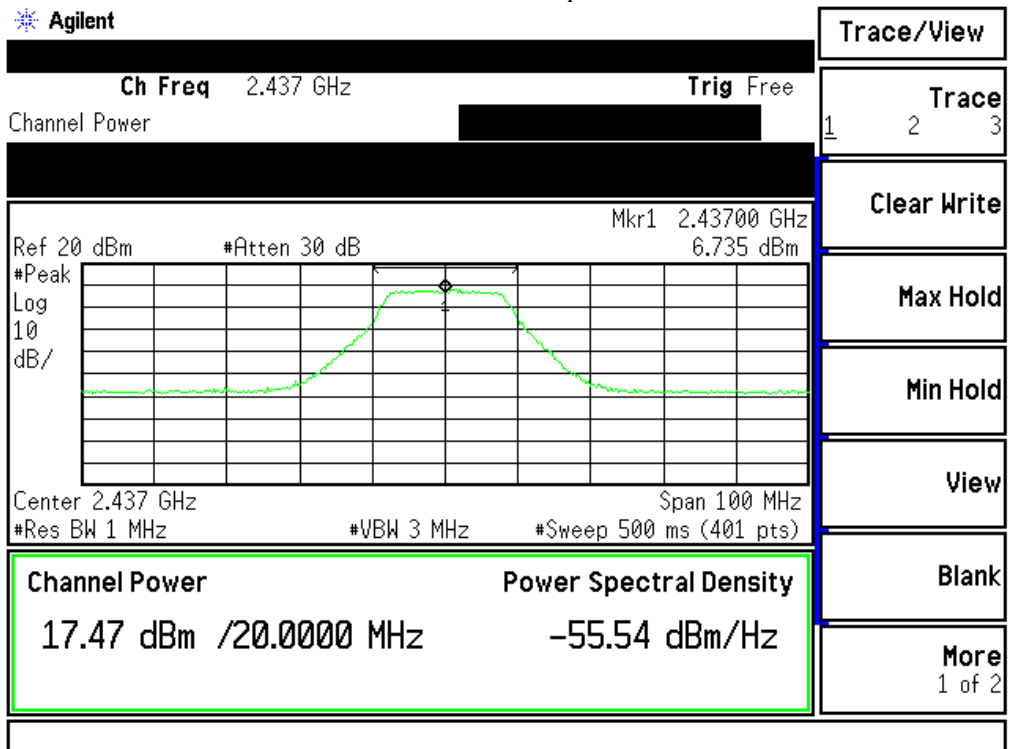


Product : Wireless Thin Client
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

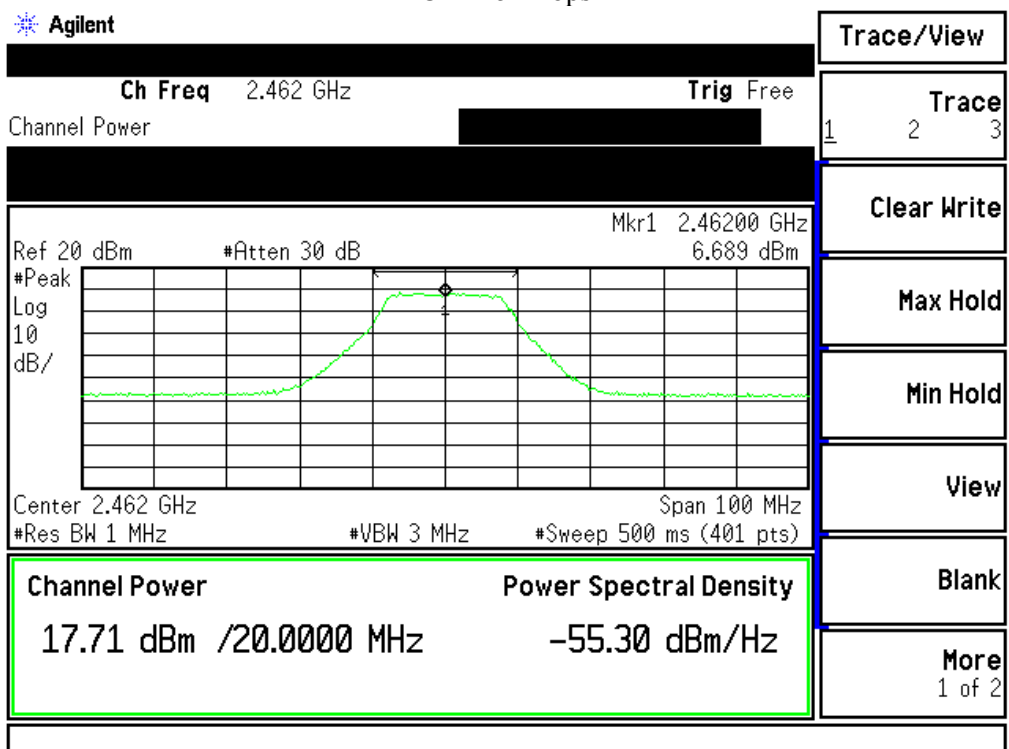
Peak Power Output										
Channel No.	Frequency (MHz)	Data Rate								Required Limit
		6	9	12	18	24	36	48	54	
1	2412.00	--	--	--	--	--	--	--	17.58	1 Watt= 30 dBm
6	2437.00	17.01	17.15	17..08	17.1	17.23	17.22	17.25	17.47	1 Watt= 30 dBm
11	2462.00	--	--	--	--	--	--	--	17.71	1 Watt= 30 dBm



CH06 54Mbps



CH11 54Mbps



3. Radiated Emission

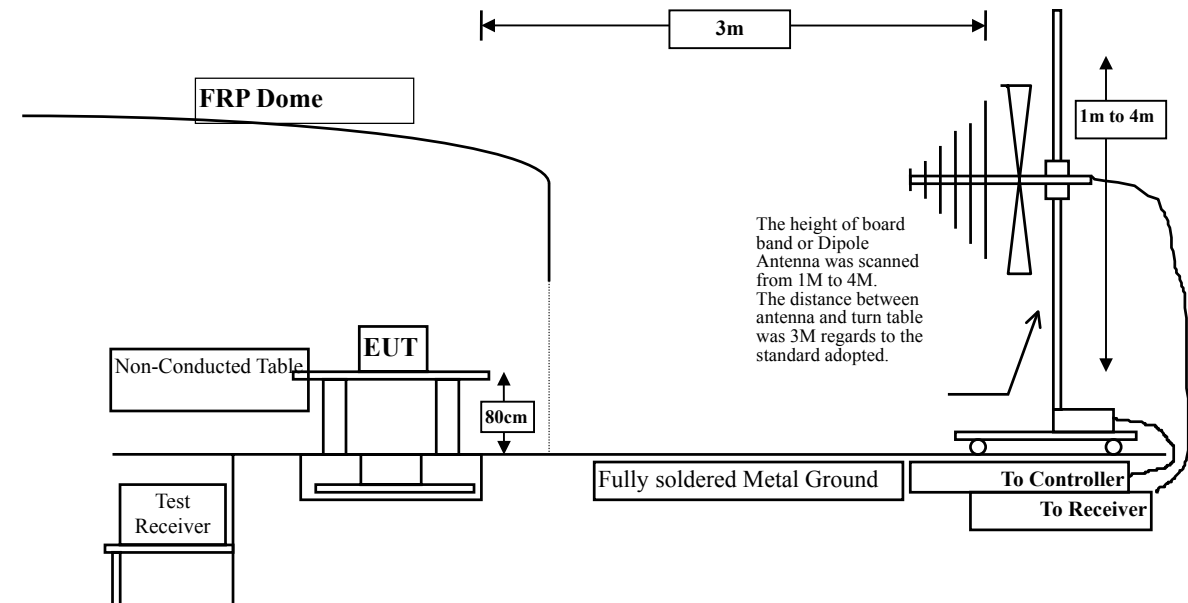
3.1. Test Equipment

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.

3.2. Test Setup



3.3. 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.

3.4. 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 strength 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 harmonics is checked.

3.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

3.6. Test Result of Radiated Emission

Product : Wireless Thin Client
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2412MHz)

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

Horizontal

Peak Detector:

4824.000	2.927	38.040	40.967	-33.033	74.000
7236.000	9.472	37.550	47.022	-26.978	74.000
9648.000	10.512	38.200	48.712	-25.288	74.000

Average

Detector:

--

Vertical

Peak Detector:

4824.000	2.927	39.100	42.027	-31.973	74.000
7236.000	9.472	37.340	46.812	-27.188	74.000
9648.000	10.512	37.940	48.452	-25.548	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:30Hz; 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 : Wireless Thin Client
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

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

Horizontal

Peak Detector:

4874.000	3.037	38.880	41.917	-32.083	74.000
7311.000	9.557	36.680	46.238	-27.762	74.000
9748.000	10.600	37.480	48.080	-25.920	74.000

Average

Detector:

--

Vertical

Peak Detector:

4874.000	3.037	38.660	41.697	-32.303	74.000
7311.000	9.557	37.170	46.728	-27.272	74.000
9748.000	10.600	38.310	48.910	-25.090	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:30Hz; 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 : Wireless Thin Client
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b (2462 MHz)

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

Horizontal

Peak Detector:

4924.000	3.154	38.140	41.294	-32.706	74.000
7386.000	9.627	36.300	45.927	-28.073	74.000
9848.000	10.686	37.040	47.726	-26.274	74.000

Average

Detector:

--

Vertical

Peak Detector:

4924.000	3.154	37.940	41.094	-32.906	74.000
7386.000	9.627	36.180	45.807	-28.193	74.000
9848.000	10.686	36.230	46.916	-27.084	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:30Hz; 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 : Wireless Thin Client
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3OATS
 Test Mode : Mode 2: Transmitter 802.11g (2412 MHz)

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

Horizontal

Peak Detector:

4824.000	2.927	39.250	42.177	-31.823	74.000
7236.000	9.472	37.290	46.762	-27.238	74.000
9648.000	10.512	37.830	48.342	-25.658	74.000

Average

Detector:

--

Vertical

Peak Detector:

4824.000	2.927	38.000	40.927	-33.073	74.000
7236.000	9.472	37.370	46.842	-27.158	74.000
9648.000	10.512	38.080	48.592	-25.408	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:30Hz; 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 : Wireless Thin Client
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3OATS
 Test Mode : Mode 2: Transmitter 802.11g (2437 MHz)

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

Horizontal

Peak Detector:

4874.000	3.037	38.730	41.767	-32.233	74.000
7311.000	9.557	36.410	45.968	-28.032	74.000
9748.000	10.600	37.290	47.890	-26.110	74.000

Average

Detector:

--

Vertical

Peak Detector:

4874.000	3.037	38.960	41.997	-32.003	74.000
7311.000	9.557	36.210	45.768	-28.232	74.000
9748.000	10.600	38.040	48.640	-25.360	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:30Hz; 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 : Wireless Thin Client
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2462 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4924.000	3.154	37.840	40.994	-33.006	74.000
7386.000	9.627	35.900	45.527	-28.473	74.000
9848.000	10.686	36.550	47.236	-26.764	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4924.000	3.154	38.140	41.294	-32.706	74.000
7386.000	9.627	35.770	45.397	-28.603	74.000
9848.000	10.686	36.710	47.396	-26.604	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:30Hz; 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 : Wireless Thin Client
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2437 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
332.640	13.136	22.302	35.438	-10.562	46.000
390.840	14.786	22.894	37.680	-8.320	46.000
456.800	17.203	20.588	37.791	-8.209	46.000
586.780	18.745	21.831	40.576	-5.424	46.000
798.240	20.363	19.081	39.444	-6.556	46.000
980.600	21.629	18.075	39.704	-14.296	54.000
Vertical					
198.780	8.693	28.425	37.118	-6.382	43.500
332.640	13.186	20.689	33.875	-12.125	46.000
390.840	16.125	20.308	36.433	-9.567	46.000
522.760	17.461	23.065	40.526	-5.474	46.000
588.720	20.436	19.192	39.628	-6.372	46.000
798.240	20.313	18.214	38.527	-7.473	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 : Wireless Thin Client
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2437 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
390.840	14.786	23.720	38.506	-7.494	46.000
588.720	18.660	21.583	40.243	-5.757	46.000
652.740	19.442	20.005	39.447	-6.553	46.000
718.700	19.135	21.093	40.228	-5.772	46.000
796.300	20.444	19.240	39.684	-6.316	46.000
980.600	21.629	17.670	39.299	-14.701	54.000
Vertical					
332.640	13.186	21.107	34.293	-11.707	46.000
390.840	16.125	20.630	36.755	-9.245	46.000
522.760	17.461	23.147	40.608	-5.392	46.000
588.720	20.436	18.530	38.966	-7.034	46.000
796.300	20.294	17.956	38.250	-7.750	46.000
980.600	21.029	15.137	36.166	-17.834	54.000

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.

4. Band Edge

4.1. Test Equipment

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

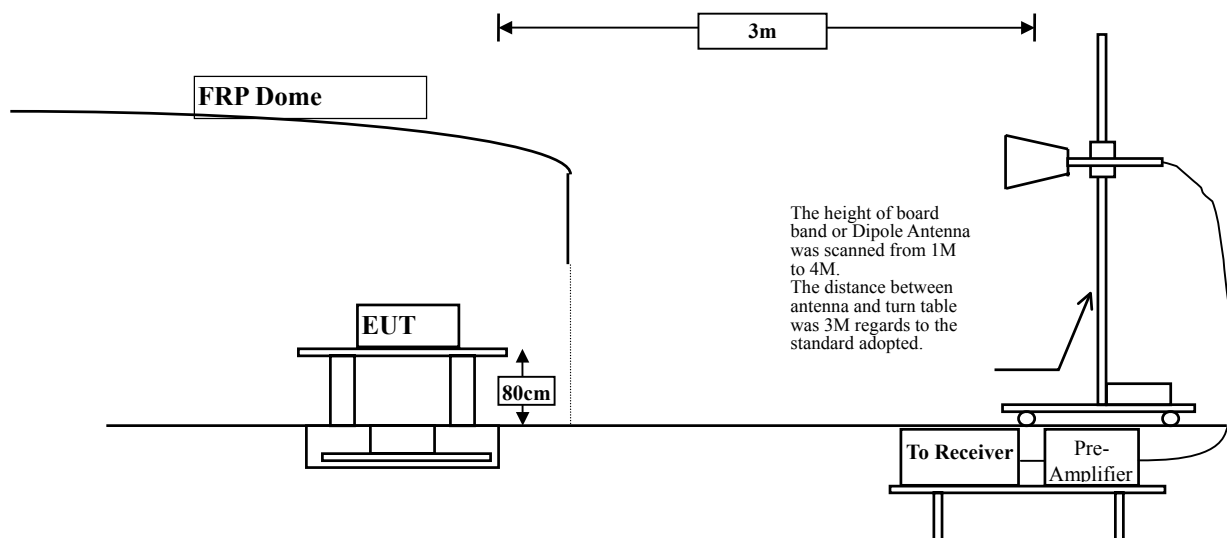
Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Test Receiver	R & S	ESI 26 / 838786/004	May, 2007
X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007
X Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
X Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2007
X Horn Antenna	Schwarzbeck	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.

4.2. Test Setup

RF Radiated Measurement:



4.3. 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)).

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 bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

4.5. Uncertainty

Conducted is ± 1.27 dB

Radiated is ± 3.9 dB

4.6. Test Result of Band Edge

Product : Wireless Thin Client
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

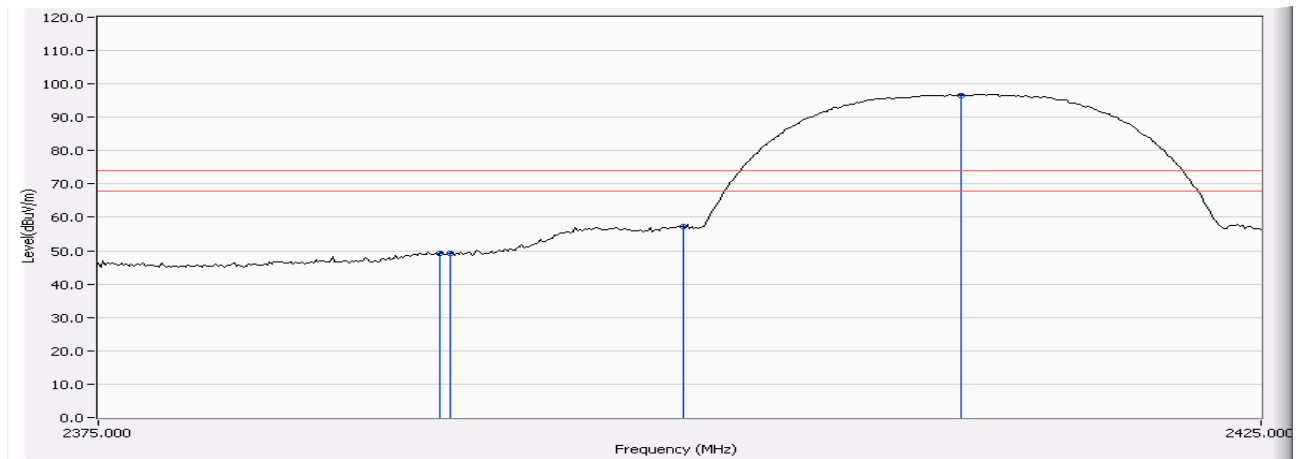
RF Radiated Measurement:

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)	Average Limit (dBuV/m)	Result
1 (Peak)	2389.600	-1.408	50.739	49.331	74.00	54.00	Pass
1 (Peak)	2390.000	-1.407	50.549	49.142	74.00	54.00	Pass
1 (Peak)	2400.000	-1.363	58.760	57.397	74.00	54.00	Pass
1 (Peak)	2412.000	-1.314	97.930	96.616	74.00	54.00	Pass

Figure Channel 1: Horizontal (Peak)



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

Product : Wireless Thin Client
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

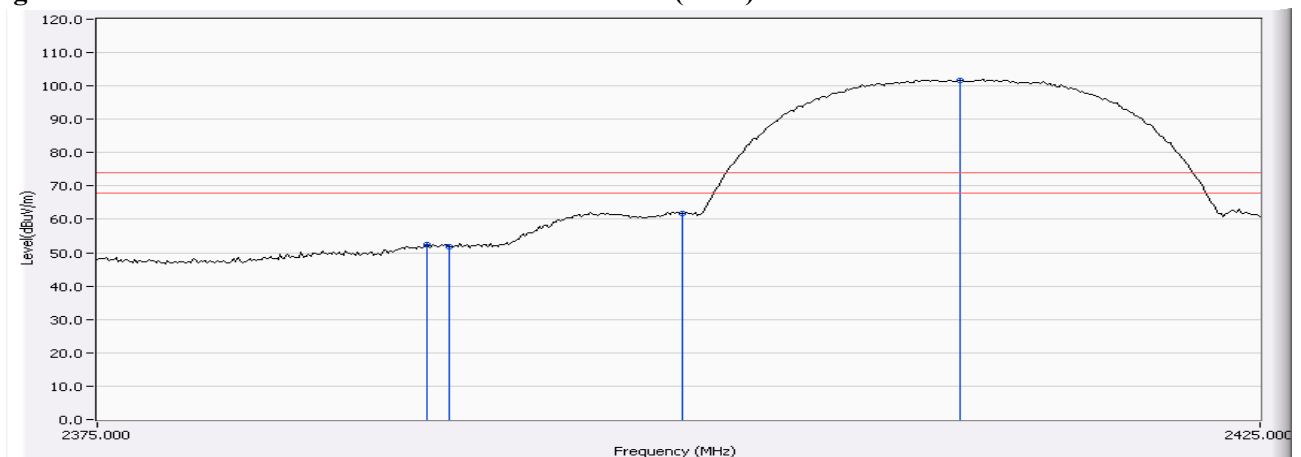
RF Radiated Measurement:

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)	Average Limit (dBuV/m)	Result
1 (Peak)	2389.100	-1.410	53.821	52.411	74.00	54.00	Pass
1 (Peak)	2390.000	-1.407	53.157	51.750	74.00	54.00	Pass
1 (Peak)	2400.000	-1.363	63.053	61.690	74.00	54.00	Pass
1 (Peak)	2412.000	-1.314	102.959	101.645	74.00	54.00	Pass

Figure Channel 1: Vertical (Peak)



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

Product : Wireless Thin Client
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

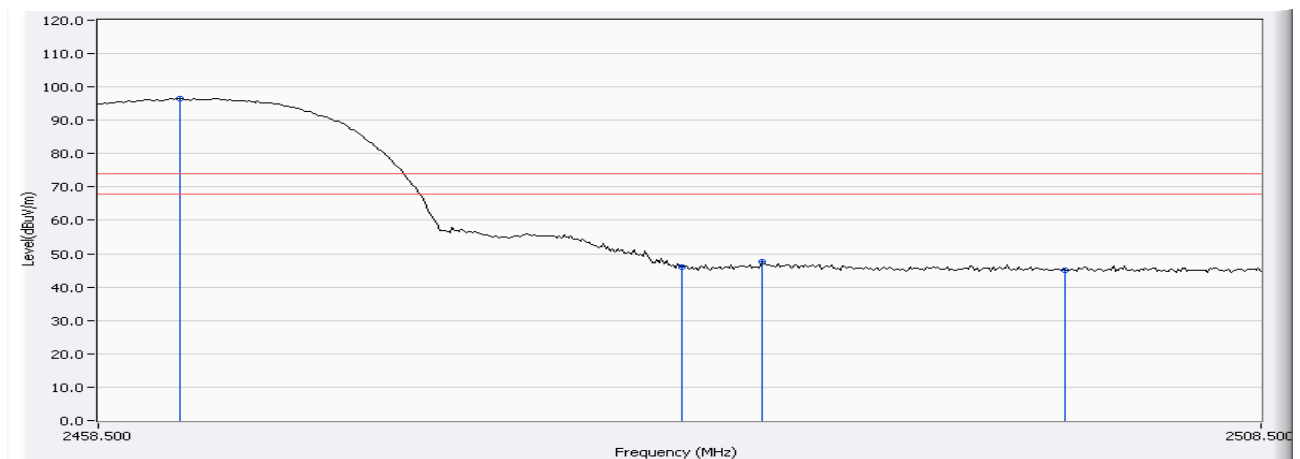
RF Radiated Measurement:

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)	Average Limit (dBuV/m)	Result
11(Peak)	2462.000	-1.118	97.683	96.565	74.00	54.00	Pass
11(Peak)	2483.500	-1.037	47.094	46.057	74.00	54.00	Pass
11(Peak)	2486.900	-1.029	48.512	47.483	74.00	54.00	Pass
11(Peak)	2500.000	-0.988	46.076	45.088	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)



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

Product : Wireless Thin Client
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

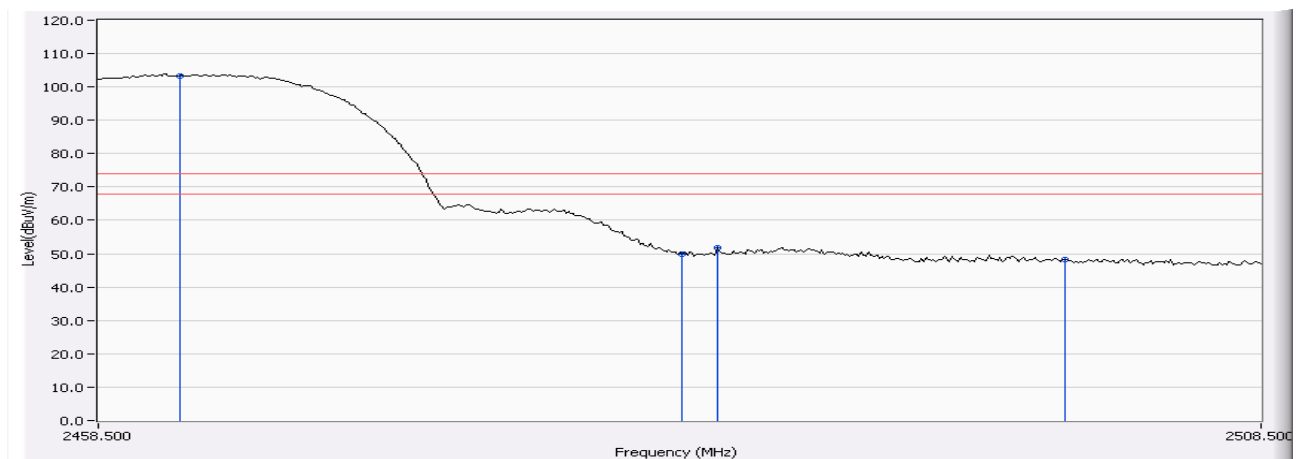
RF Radiated Measurement:

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)	Average Limit (dBuV/m)	Result
11(Peak)	2462.000	-1.118	104.251	103.133	74.00	54.00	Pass
11(Peak)	2483.500	-1.037	50.767	49.730	74.00	54.00	Pass
11(Peak)	2485.000	-1.033	52.828	51.795	74.00	54.00	Pass
11(Peak)	2500.000	-0.988	49.248	48.260	74.00	54.00	Pass

Figure Channel 11: Vertical (Peak)



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

Product : Wireless Thin Client
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

RF Radiated Measurement:

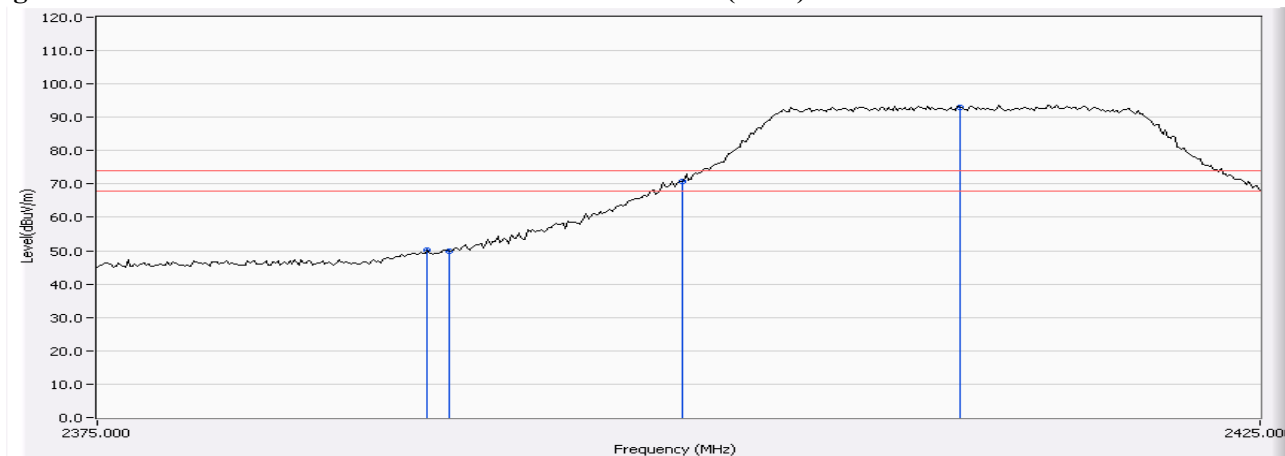
Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
1 (Horizontal)	<2400	>20	Pass

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
1 (Peak)	2389.100	-1.410	51.699	50.289	74.00	54.00	Pass
1 (Peak)	2390.000	-1.407	51.322	49.915	74.00	54.00	Pass
1 (Peak)	2400.000	-1.363	71.990	70.627	74.00	54.00	Pass
1 (Peak)	2412.000	-1.314	94.423	93.109	74.00	54.00	Pass

Figure Channel 1:

Horizontal (Peak)



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

Product : Wireless Thin Client
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

RF Radiated Measurement:

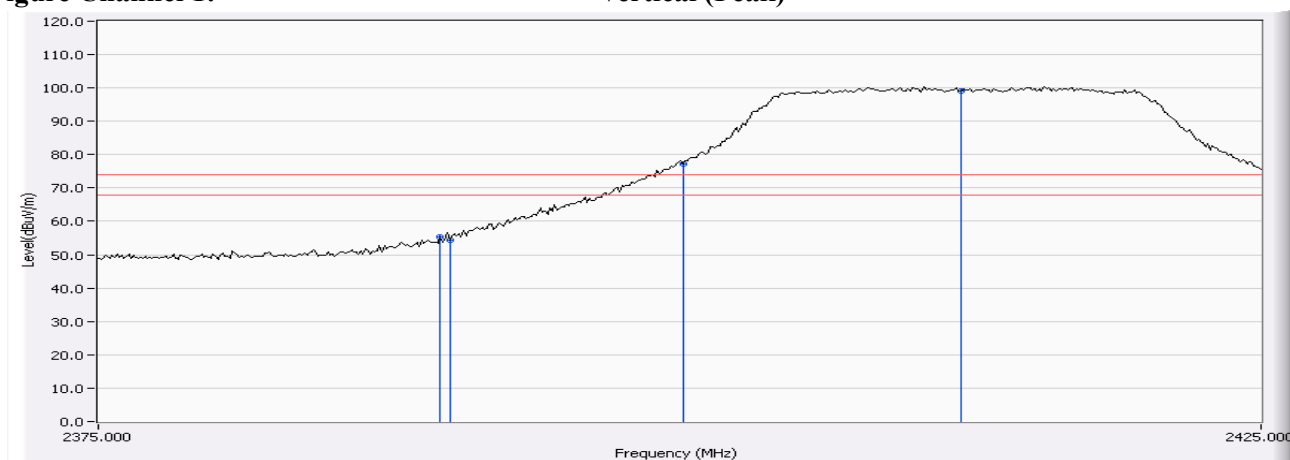
Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
1 (Vertical)	<2400	>20	Pass

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
1 (Peak)	2389.600	-1.408	56.646	55.238	74.00	54.00	Pass
1 (Peak)	2390.000	-1.407	55.834	54.427	74.00	54.00	Pass
1 (Peak)	2400.000	-1.363	78.530	77.167	74.00	54.00	Pass
1 (Peak)	2412.000	-1.314	100.364	99.050	74.00	54.00	Pass
1 (Average)	2389.600	-1.408	41.980	40.572	74.00	54.00	Pass

Figure Channel 1:

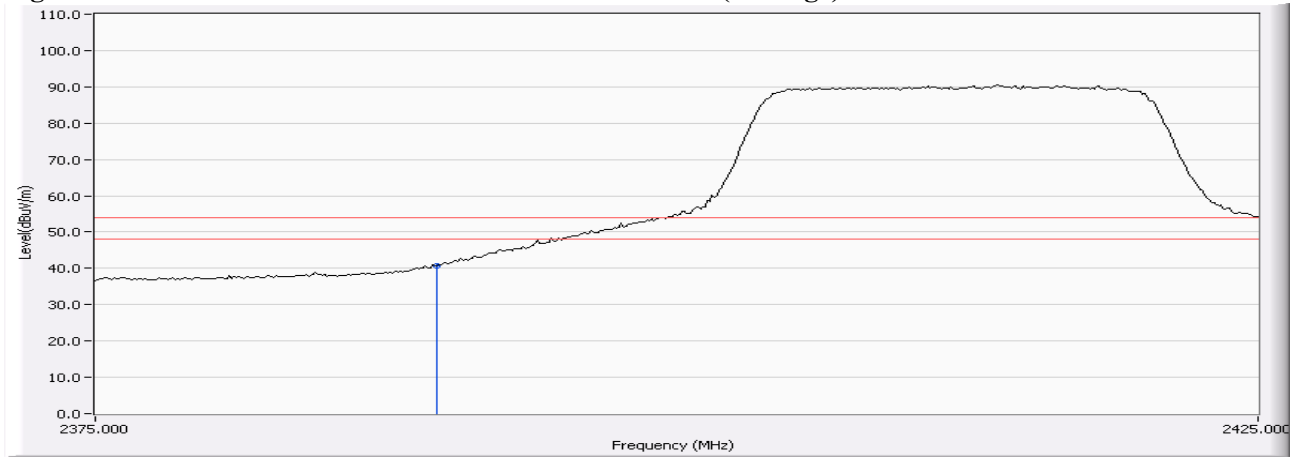
Vertical (Peak)



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

Figure Channel 1:

Vertical (Average)



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

Product : Wireless Thin Client
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

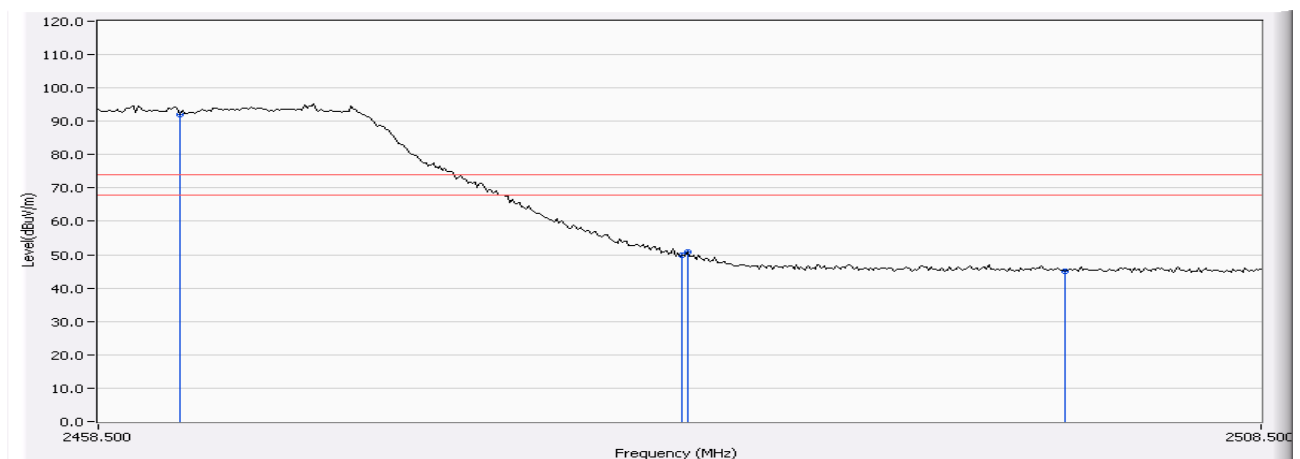
RF Radiated Measurement:

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)	Average Limit (dBuV/m)	Result
11 (Peak)	2462.000	-1.118	93.275	92.157	74.00	54.00	Pass
11 (Peak)	2483.500	-1.037	50.995	49.958	74.00	54.00	Pass
11 (Peak)	2483.700	-1.036	51.939	50.903	74.00	54.00	Pass
11 (Peak)	2500.000	-0.988	46.085	45.097	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)



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

Product : Wireless Thin Client
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

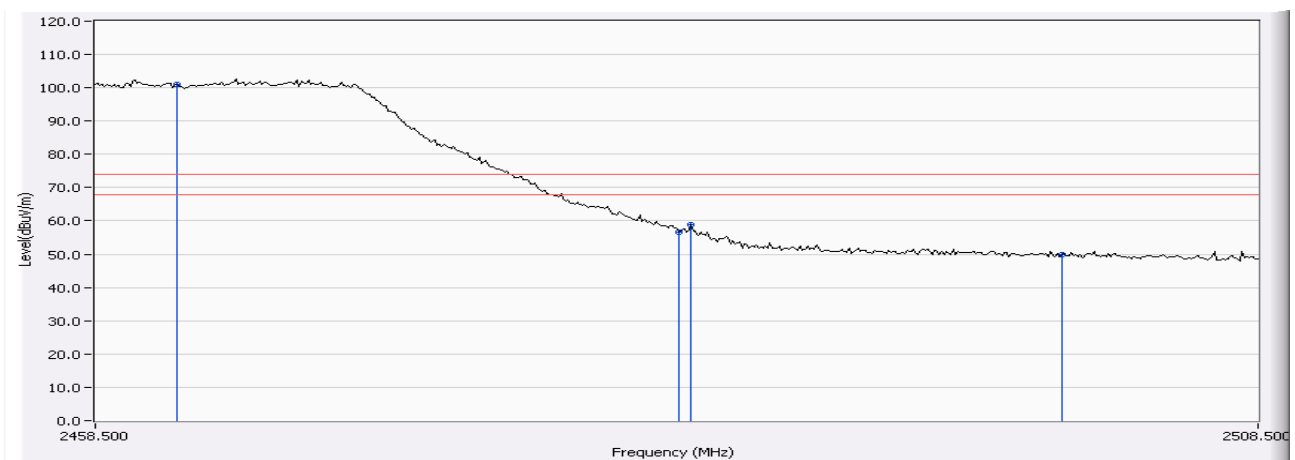
RF Radiated Measurement:

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)	Average Limit (dBuV/m)	Result
11 (Peak)	2462.000	-1.118	102.094	100.976	74.00	54.00	Pass
11 (Peak)	2483.500	-1.037	57.701	56.664	74.00	54.00	Pass
11 (Peak)	2484.000	-1.035	59.972	58.937	74.00	54.00	Pass
11 (Peak)	2500.000	-0.988	50.714	49.726	74.00	54.00	Pass
11(Average)	2484.000	-1.035	43.435	42.400	74.00	54.00	Pass

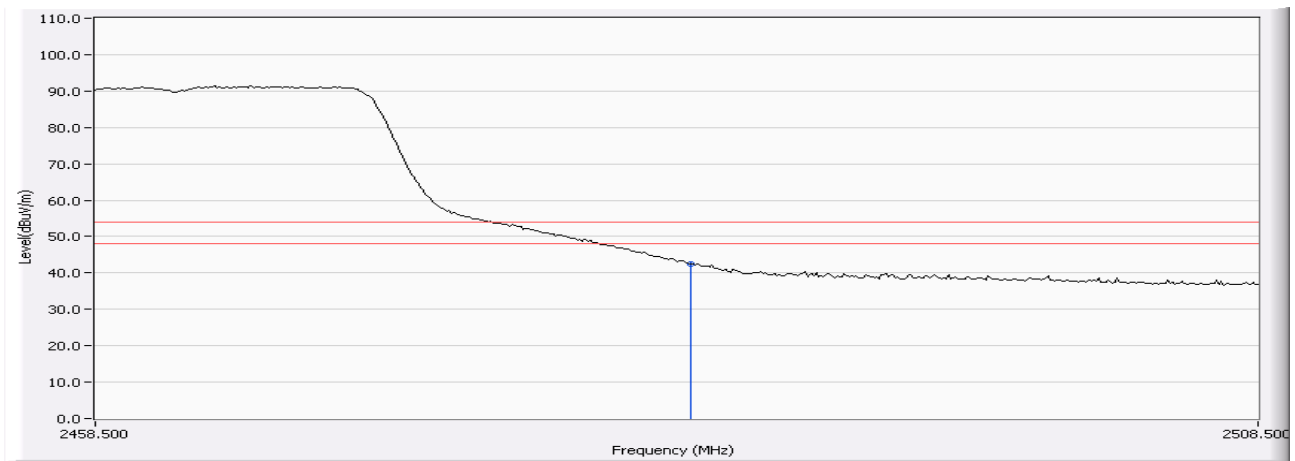
Figure Channel 11: Vertical (Peak)



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.

5. Occupied Bandwidth

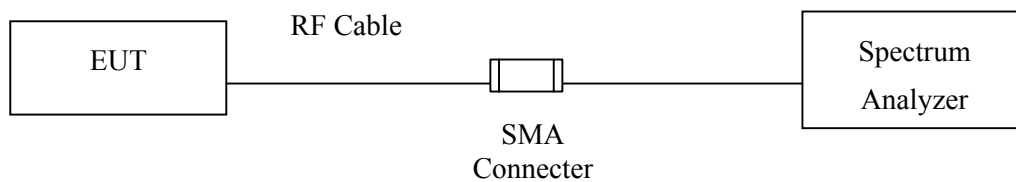
5.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	E4407B / US39440758	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.

5.2. Test Setup



5.3. Limits

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

5.4. Uncertainty

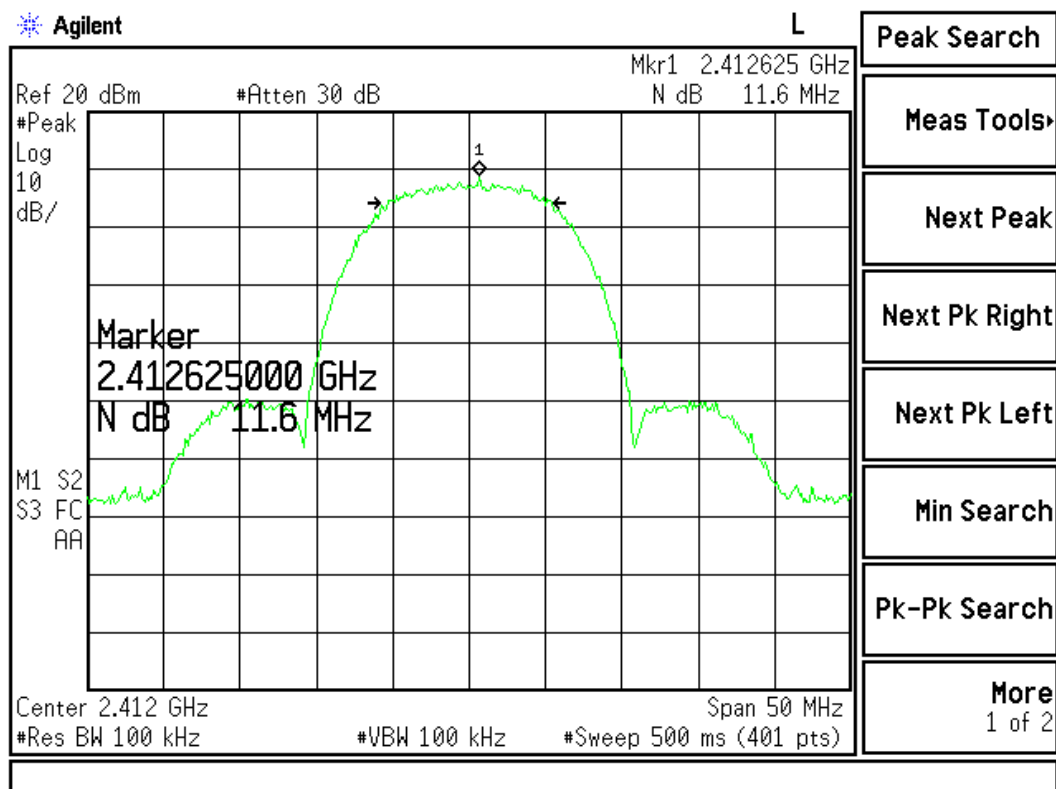
$\pm 150\text{Hz}$

5.5. Test Result of Occupied Bandwidth

Product : Wireless Thin Client
 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 (11Mbps)	2412.00	11600	>500	Pass

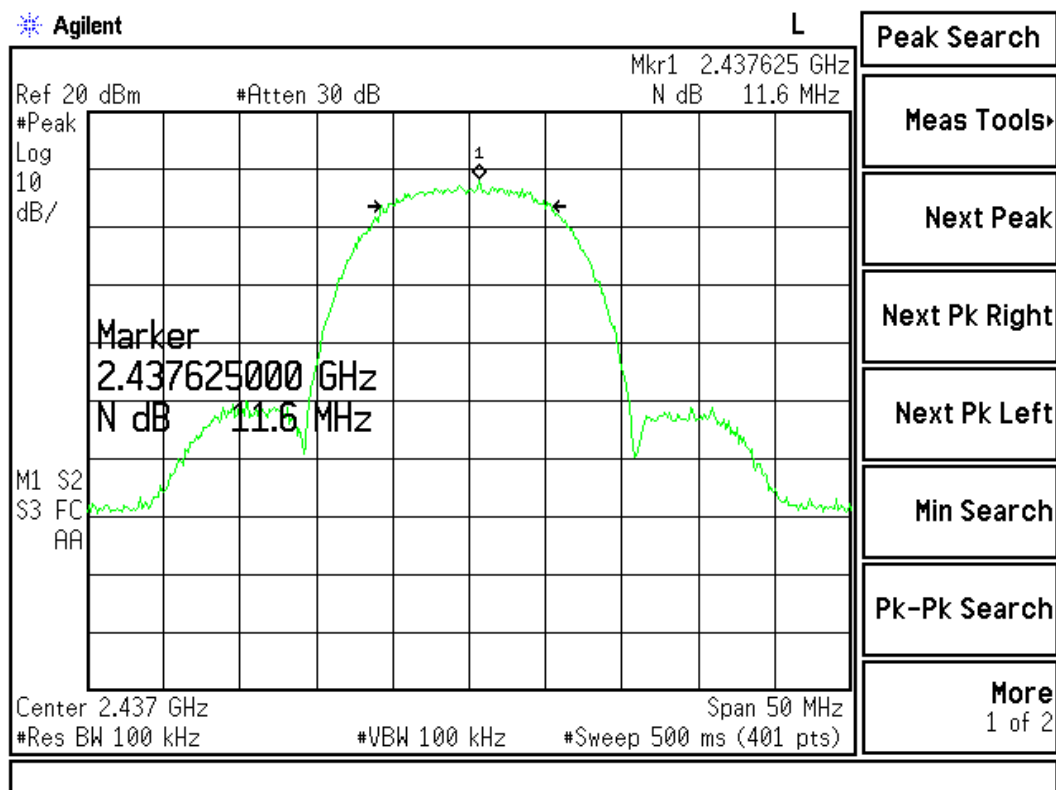
Figure Channel 1:



Product : Wireless Thin Client
 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 (11Mbps)	2437.00	11600	>500	Pass

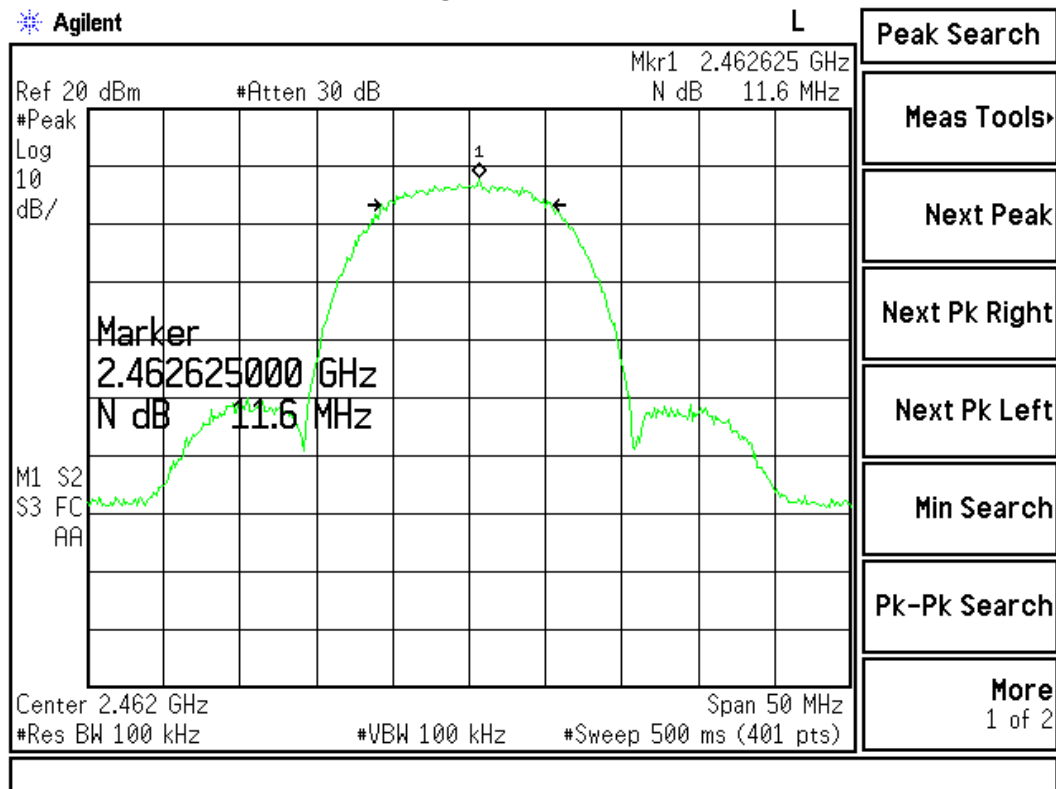
Figure Channel 6:



Product : Wireless Thin Client
 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 (11Mbps)	2462.00	11600	>500	Pass

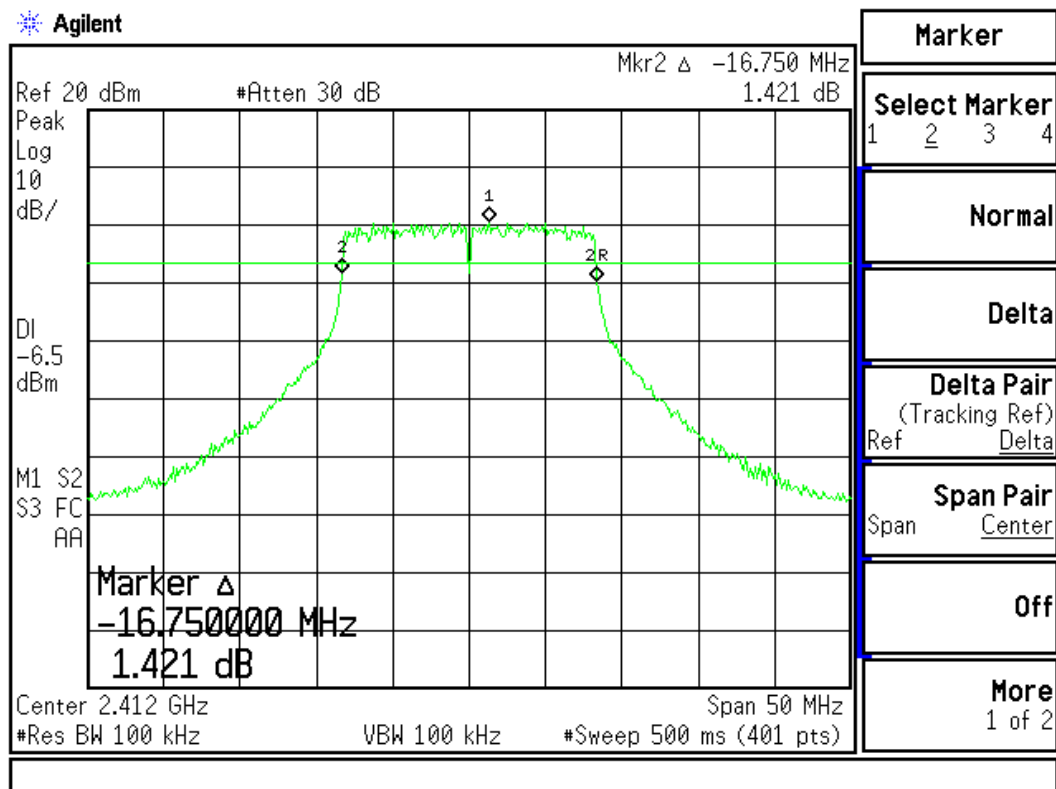
Figure Channel 11:



Product : Wireless Thin Client
 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 (54Mbps)	2412.00	16750	>500	Pass

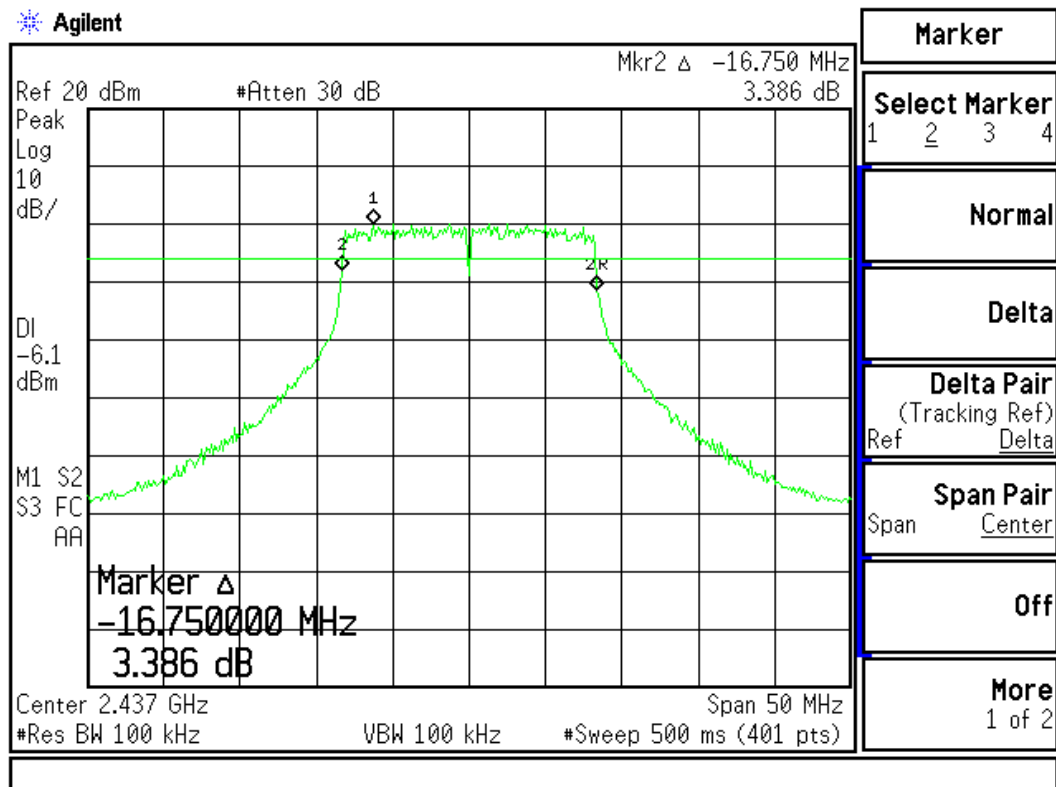
Figure Channel 1:



Product : Wireless Thin Client
 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 (54Mbps)	2437.00	16750	>500	Pass

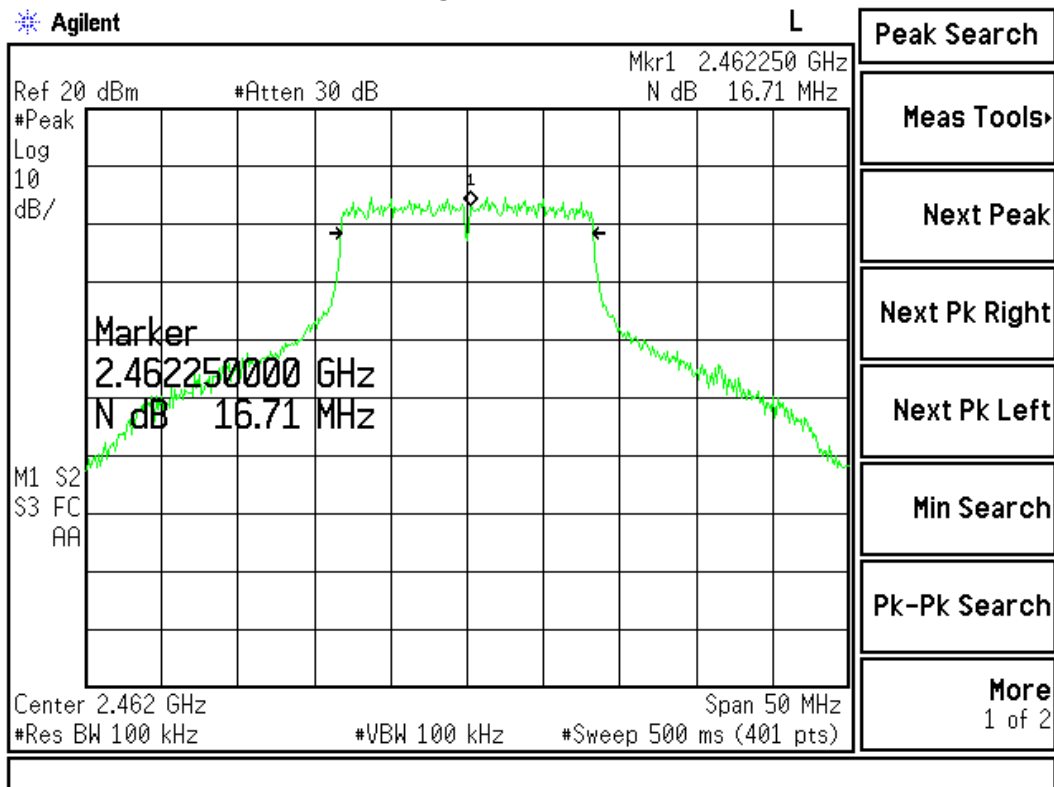
Figure Channel 6:



Product : Wireless Thin Client
 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 (54Mbps)	2462.00	16710	>500	Pass

Figure Channel 11:



6. Power Density

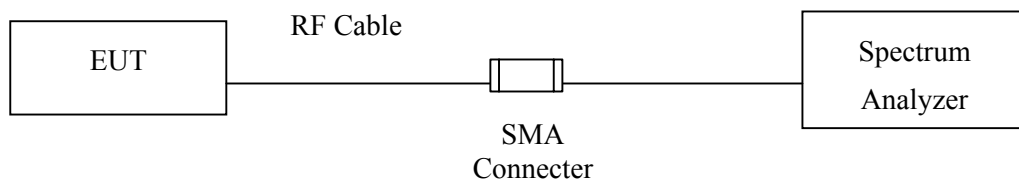
6.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 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.

6.2. Test Setup



6.3. Limits

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

6.4. Uncertainty

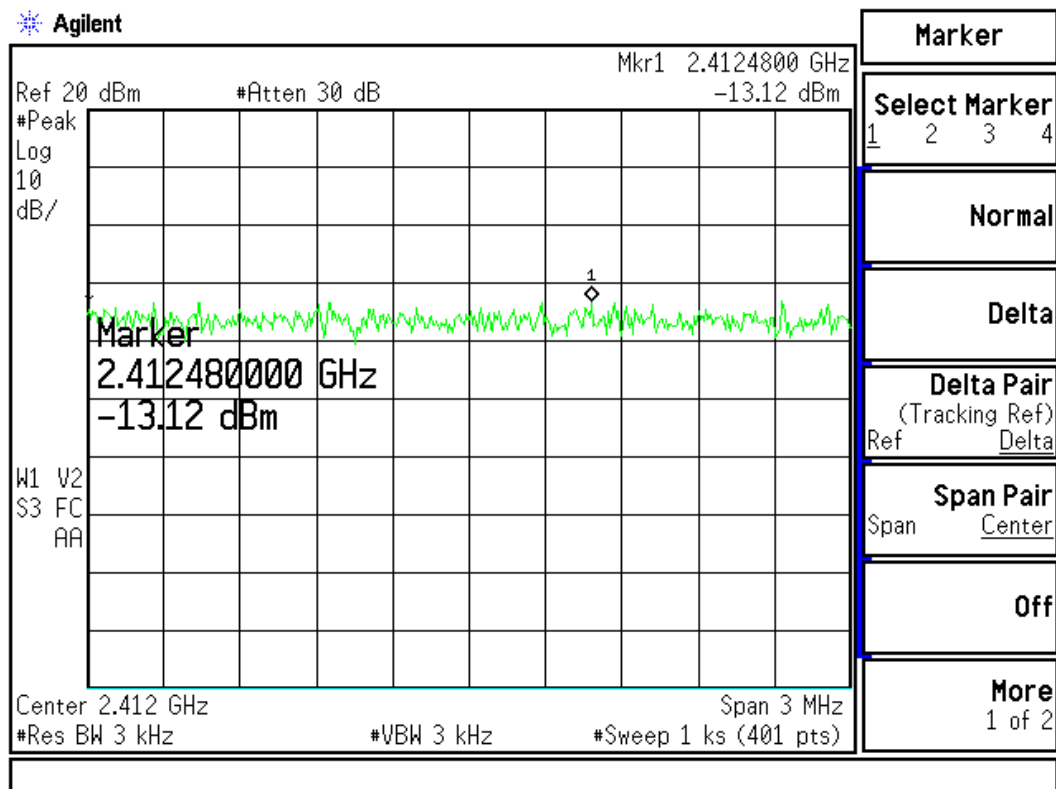
± 1.27 dB

6.5. Test Result of Power Density

Product : Wireless Thin Client
 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 (11Mbps)	2412.00	-13.12	< 8dBm	Pass

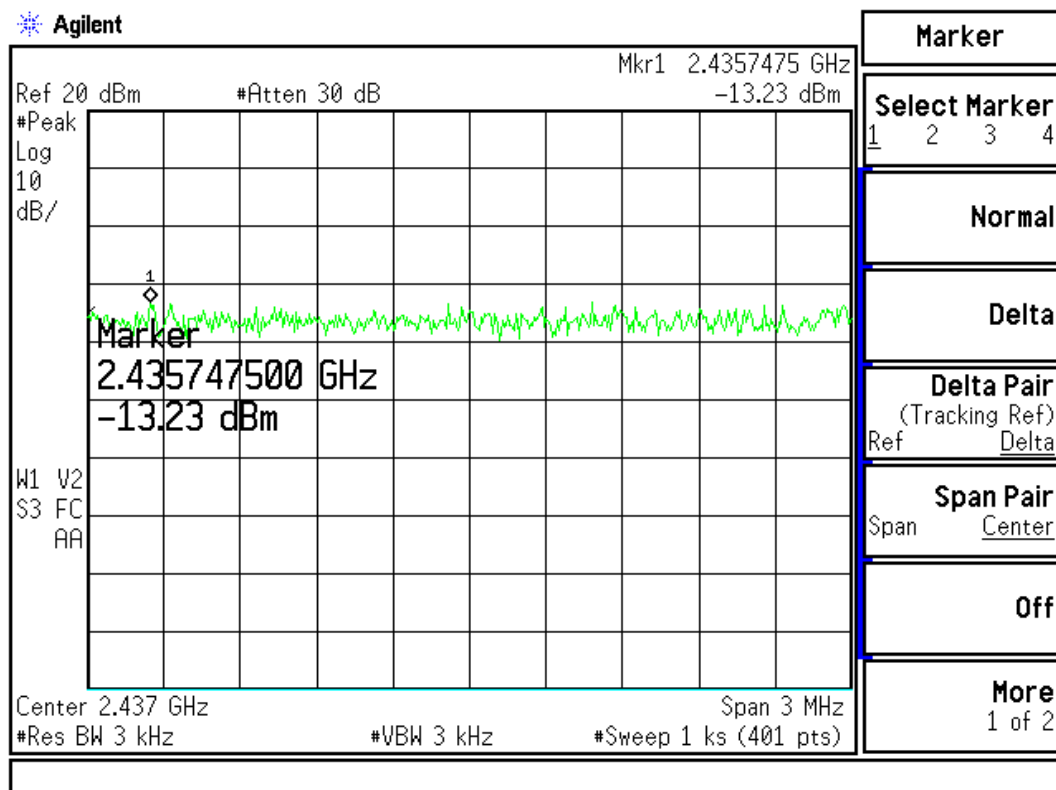
Figure Channel 1:



Product : Wireless Thin Client
 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 (11Mbps)	2437.000	-13.23	< 8dBm	Pass

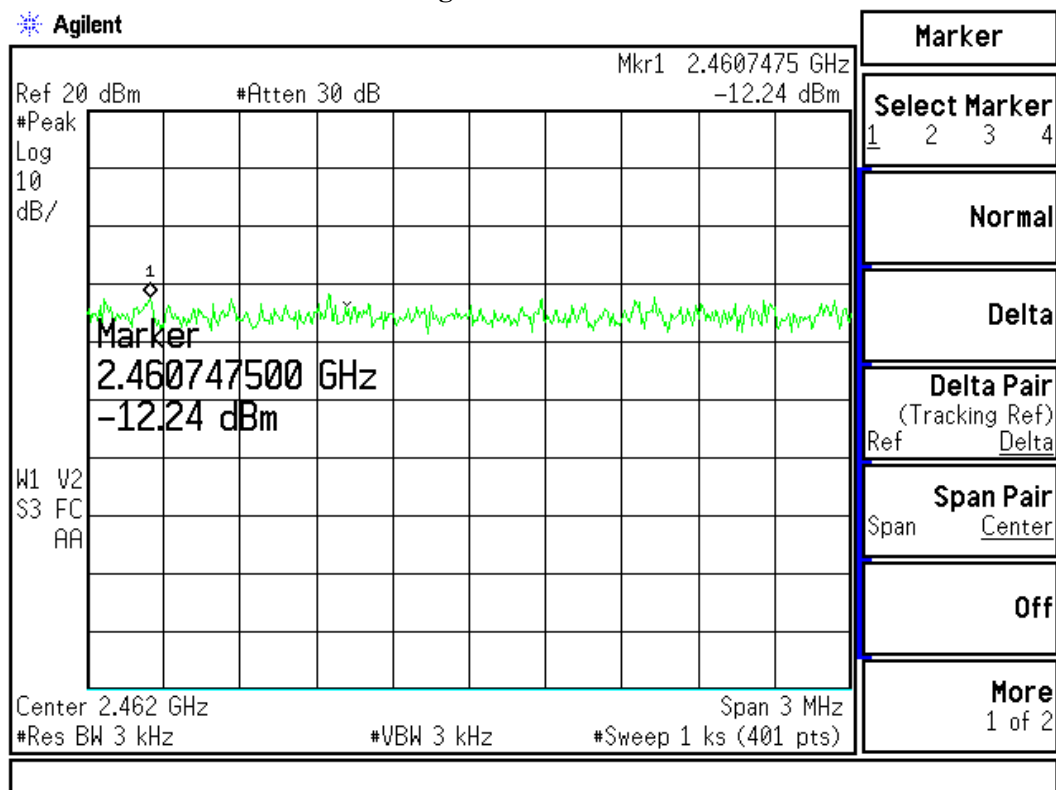
Figure Channel 6:



Product : Wireless Thin Client
 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 (11Mbps)	2462.00	-12.24	< 8dBm	Pass

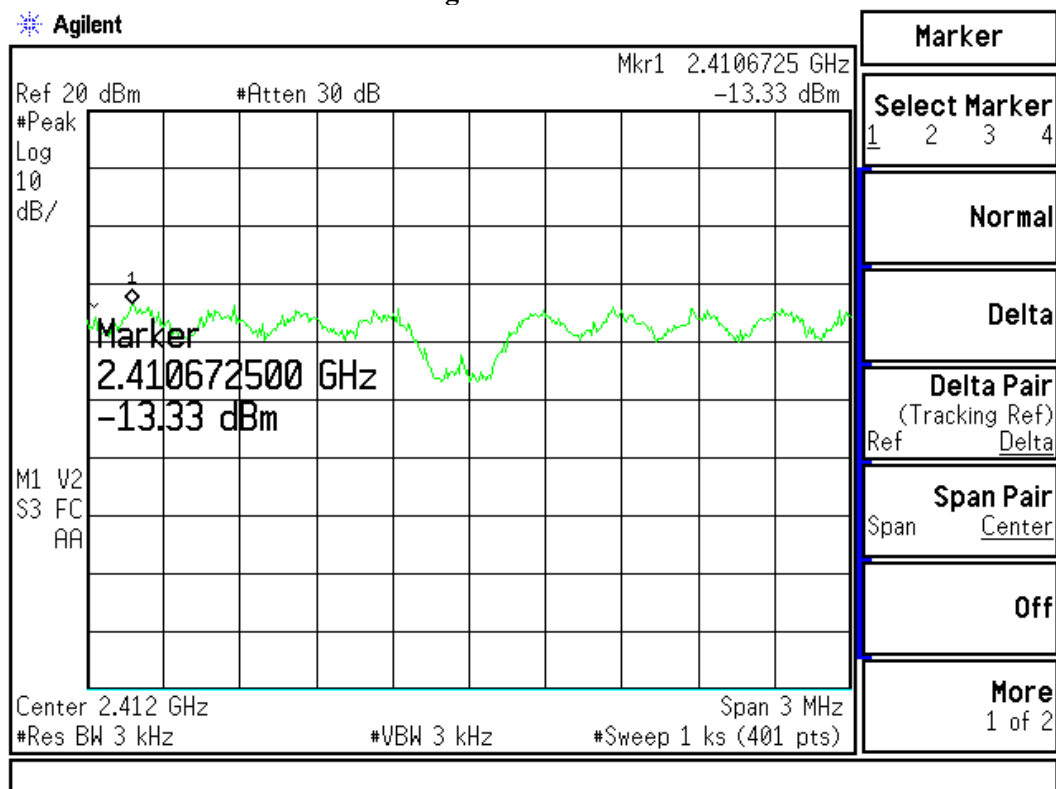
Figure Channel 11:



Product : Wireless Thin Client
 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 (54Mbps)	2412.00	-13.13	< 8dBm	Pass

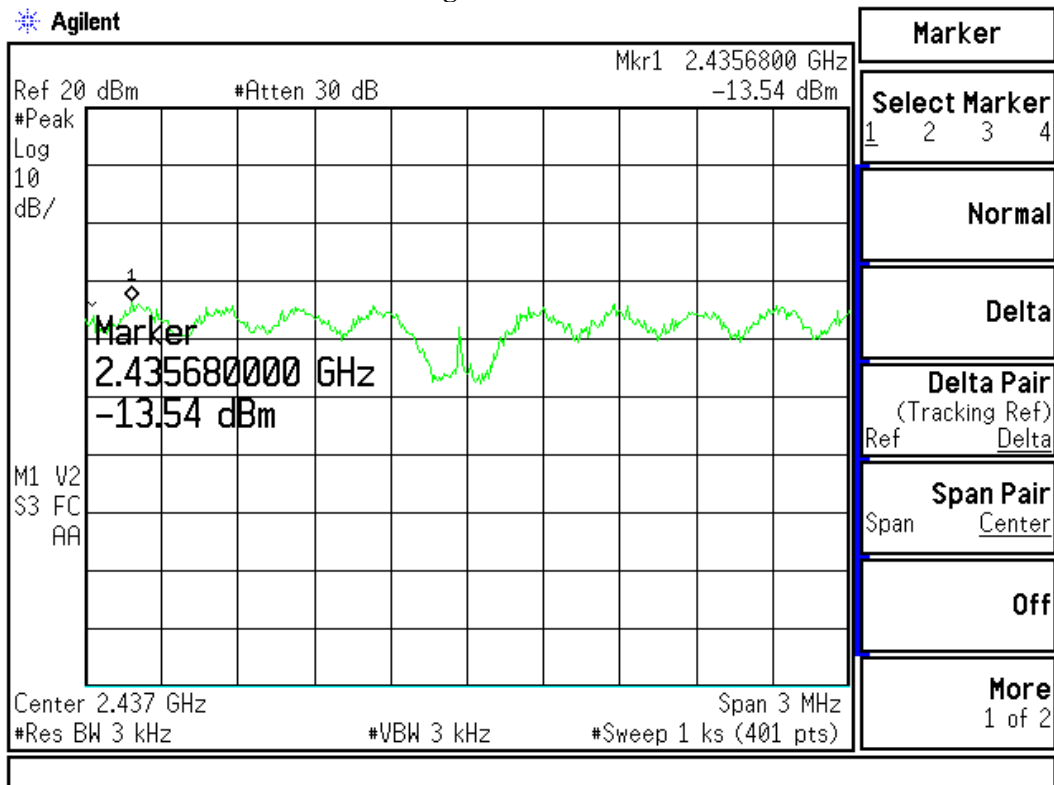
Figure Channel 1:



Product : Wireless Thin Client
 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 (54Mbps)	2437.000	-13.54	< 8dBm	Pass

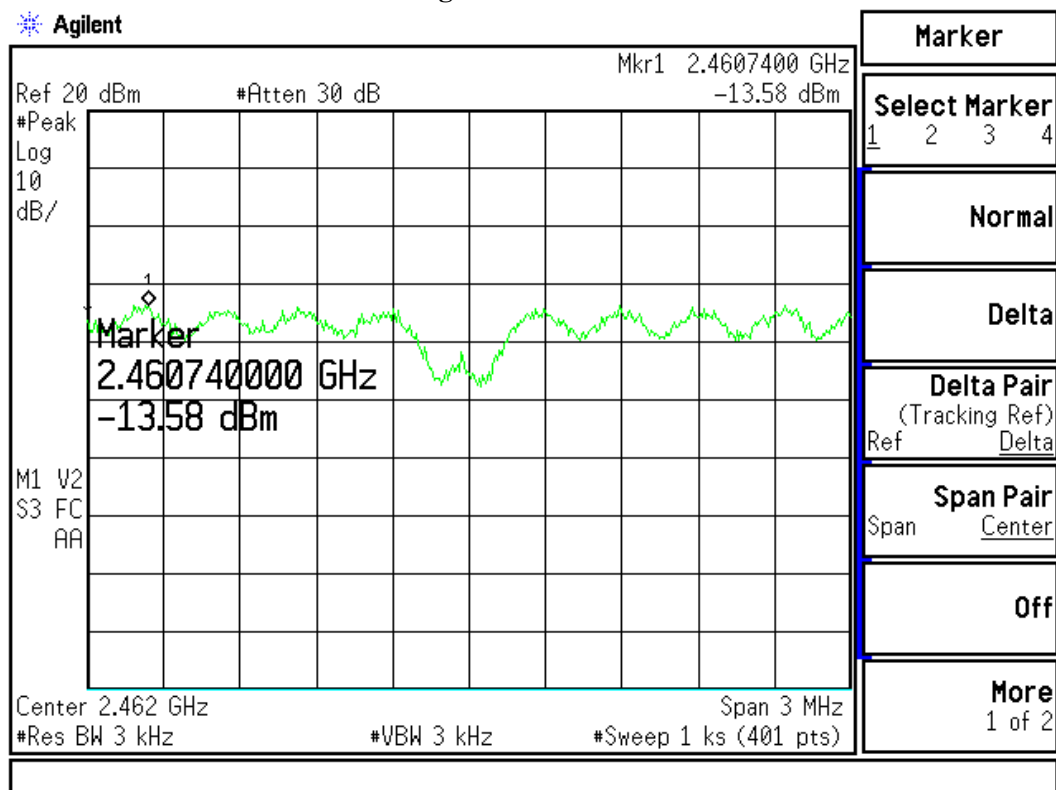
Figure Channel 6:



Product : Wireless Thin Client
 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 (54Mbps)	2462.00	-13.58	< 8dBm	Pass

Figure Channel 11:



7. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs