



Test Report

Product Name	Wireless Serial Device Server
Model No	NPort W2250, NPort W2150
FCC ID.	SLEW2250

Applicant	Moxa Inc.
Address	F1.4, No. 135, Lane 235, Pao-Chiao Rd., Shing Tien City, Taipei, Taiwan, R.O.C.

Date of Receipt	Nov. 01. 2004
Issue Date	Sep. 22. 2008
Report No.	089290R-RFUSP06V01
Version	V1.0

The test results relate only to the samples tested.

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Test Report Certification

Issue Date: Sep. 22. 2008

Report No.: 089290R-RFUSP06V01



Accredited by NIST (NVLAP)
NVLAP Lab Code: 200533-0

Product Name	Wireless Serial Device Server
Applicant Moxa	Inc.
Address	Fl.4, No. 135, Lane 235, Pao-Chiao Rd., Shing Tien City, Taipei, Taiwan, R.O.C.
Manufacturer Moxa	Inc.
Model No.	NPort W2250, NPort W2150
FCC ID.	SLEW2250
Rated Voltage	AC 120V/60Hz
Working Voltage	AC 120V/60Hz
Trade Name	MOXA
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2007 ANSI C63.4: 2003
Test Result	Complied



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(Manager / Vincent Lin)



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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Wireless Serial Device Server
Trade Name	MOXA
Model No.	NPort W2250, NPort W2150
FCC ID.	SLEW2250
Frequency Range	802.11b: 2412-2462MHz
Number of Channels	802.11b: 11
Data Rate	IEEE 802.11b – 1, 2, 5.5, 11Mbps
Type of Modulation	802.11b:DSSS DBPSK, DQPSK, CCK
Antenna Type	Dipole
Antenna Gain	Refer to the table “Antenna List”
Channel Control	AUTO
Power Adapter(optional)	MFR: MOXA M/N: JOD-35U-95 Cable Out: Non-Shielded, 1.8m with one ferrite core bonded.

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	FULL RISE ELECTRONIC CO., LTD.	E421C-2000A1	2.14dBi in 2.4 GHz

Frequency of Each Channel (802.11b):

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 Serial Device Server with a built-in 2.4GHz WLAN transceiver.
2. The EUT is including two models for different marketing requirement.

Model Number	Description
Nport W2250	Include 2 port for RS-232/422/485
Nport W2150	Include 1 port for RS-232/422/485

3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11b is 11Mbps.)
5. These tests are conducted on a sample of the equipments for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247 for direct sequence spread spectrum devices.

1.2. Operational Description

The EUT is a Wireless Serial Device Server with 11 channels. This device provides four kinds of transmitting speed 1, 2, 5.5 and 11Mbps. The modulation of device is BPSK, QPSK and CCK (IEEE 802.11b).

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

This Wireless Serial Device Server, compliant with IEEE 802.11b, is a high-efficiency Wireless LAN adapter. It allows your computer to connect to a wireless network and to share resources, such as files or printers without being bound to the network wires. Operation in 2.4GHz Direct Sequence Spread Spectrum (DSSS) radio transmission, the Wireless Serial Device Server Wired Equivalent Protection (WEP) algorithm is used. In addition, its standard compliance ensures that it can communicate with any IEEE 802.11b network.

Test Mode:	Mode 1: Transmitter 802.11b
------------	-----------------------------

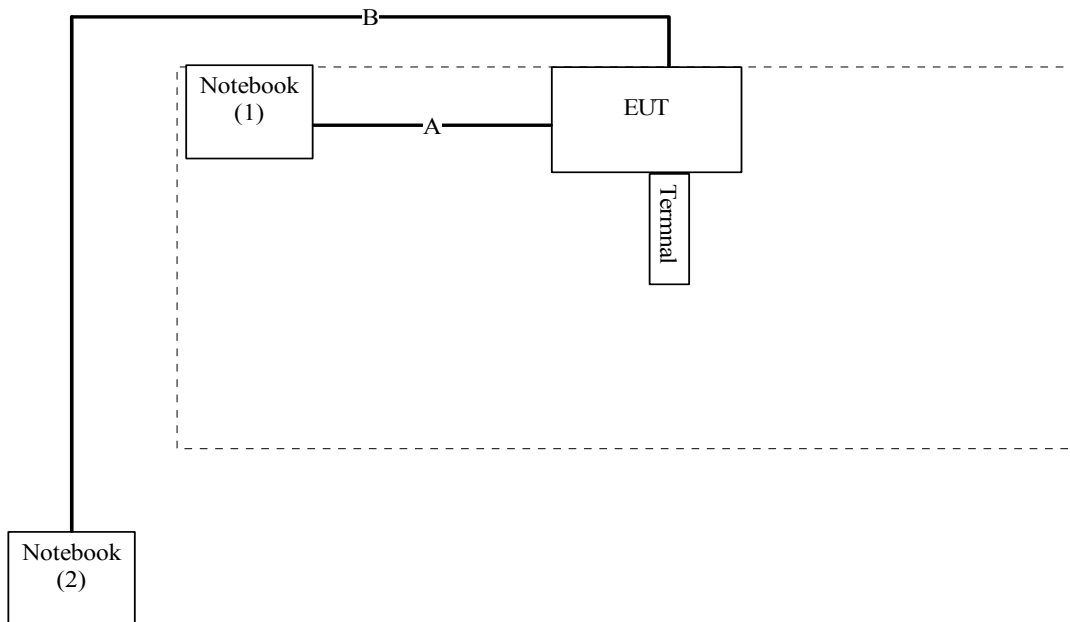
1.3. Tested System Details

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	PP01L	96FFC A00	Non-Shielded, 1.8m
2.	Notebook PC	ASUS S13	00 2	6NP018680	Non-Shielded, 1.8m

	Signal Cable Type	Signal cable Description
A	RS 232 Cable	Shielded, 1.2m
B	LAN Cable	Non-Shielded, 7m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.3
- (2) Execute <http://192.168.10.2> Web site on the EUT.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Press “OK” to start the continuous receiver.
- (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

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site : <http://tw.quietek.com/modules/myalbum/>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site : <http://www.quietek.com/>

Site Description: File on
 Federal Communications Commission
 FCC Engineering Laboratory
 7435 Oakland Mills Road
 Columbia, MD 21046
 Registration Number: 92195



Accreditation on NVLAP
 NVLAP Lab Code: 200533-0



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FCC Accreditation Number: TW1014



2. Conducted Emission

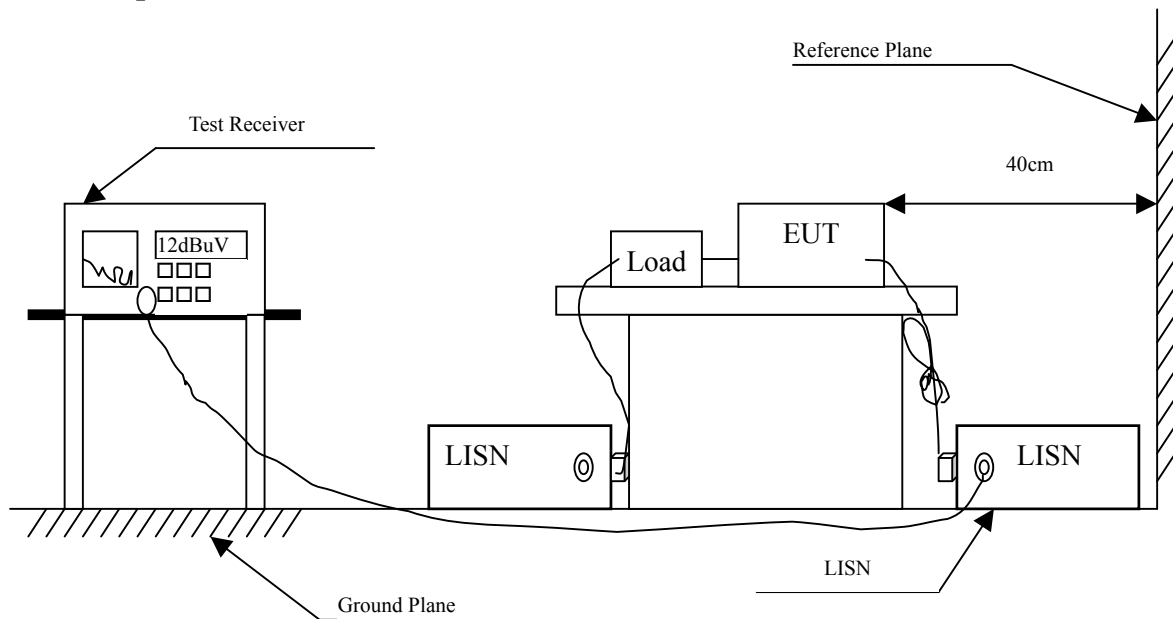
2.1. Test Equipment

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, 2008	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2008	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2008	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2008	
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 B Paragraph 15.107 (dBuV) Limit		
Frequency MHz	Limits	
	QP A	VG
0.15 - 0.50	66-56	56-46
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 : Wireless Serial Device Server
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmitter 802.11b (2441MHz)

Frequency Correct Factor		Reading Level	Measurement Level	Margin	Limit
MHz	dB dBuV		dBuV dB		dBuV
LINE 1					
Quasi-Peak					
0.158	0.700	36.470	37.170	-28.400	65.570
0.232	0.700	33.110	33.810	-28.570	62.380
0.308	0.700	32.700	33.400	-26.620	60.020
0.345	0.700	31.960	32.660	-26.420	59.080
0.520	0.700	25.560	26.260	-29.740	56.000
0.940	0.700	17.700	18.400	-37.600	56.000
Average					
0.158	0.700	12.000	12.700	-42.870	55.570
0.232	0.700	12.300	13.000	-39.380	52.380
0.308	0.700	19.900	20.600	-29.420	50.020
0.345	0.700	12.100	12.800	-36.280	49.080
0.520	0.700	19.000	19.700	-26.300	46.000
0.940	0.700	13.700	14.400	-31.600	46.000

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 : Wireless Serial Device Server
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmitter 802.11b (2441MHz)

Frequency Correct Factor		Reading Level	Measurement Level	Margin	Limit
MHz	dB dBuV		dBuV dB		dBuV
LINE 2					
Quasi-Peak					
0.170	0.700	38.230	38.930	-26.030	64.960
0.244	0.700	37.210	37.910	-24.050	61.960
0.314	0.700	36.080	36.780	-23.080	59.860
0.522	0.700	36.000	36.700	-19.300	56.000
0.630	0.700	33.740	34.440	-21.560	56.000
0.741	0.700	30.070	30.770	-25.230	56.000
Average					
0.170	0.700	12.900	13.600	-41.360	54.960
0.244	0.700	12.500	13.200	-38.760	51.960
0.314	0.700	22.800	23.500	-26.360	49.860
0.522	0.700	19.200	19.900	-26.100	46.000
0.630	0.700	19.300	20.000	-26.000	46.000
0.741	0.700	19.900	20.600	-25.400	46.000

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

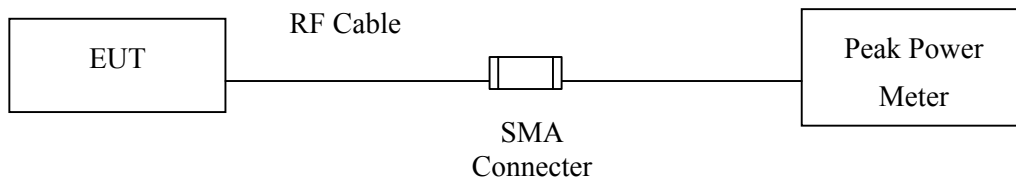
The following test equipments are used during the radiated emission tests:

	Equipment Manufacturer		Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2008
X	Power Sensor	Anritsu	MA2491A/034457	May, 2008

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with “X” are used to measure the final test results.

3.2. Test Setup

Conducted Measurement



3.3. Test procedures

The EUT was tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

3.4. Limits

The maximum peak power shall be less 1 Watt.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

Product : Wireless Serial Device Server
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

Cable loss=0.5dB		Peak Power Output Value (dBm)				
Channel No.	Frequency (MHz)	Data Rate				Required Limit
		1 Mbps	2Mbps	5.5Mbps	11Mbps	
1	2412.00	--	--	--	16.76	1Watt= 30 dBm
6	2437.00	16.85	16.92	17.13	17.22	1Watt= 30 dBm
11	2462.00	--	--	--	17.43	1Watt= 30 dBm

Note: Peak Power Output Value =Reading value on peak power meter + cable loss

4. Radiated Emission

4.1. Test Equipment

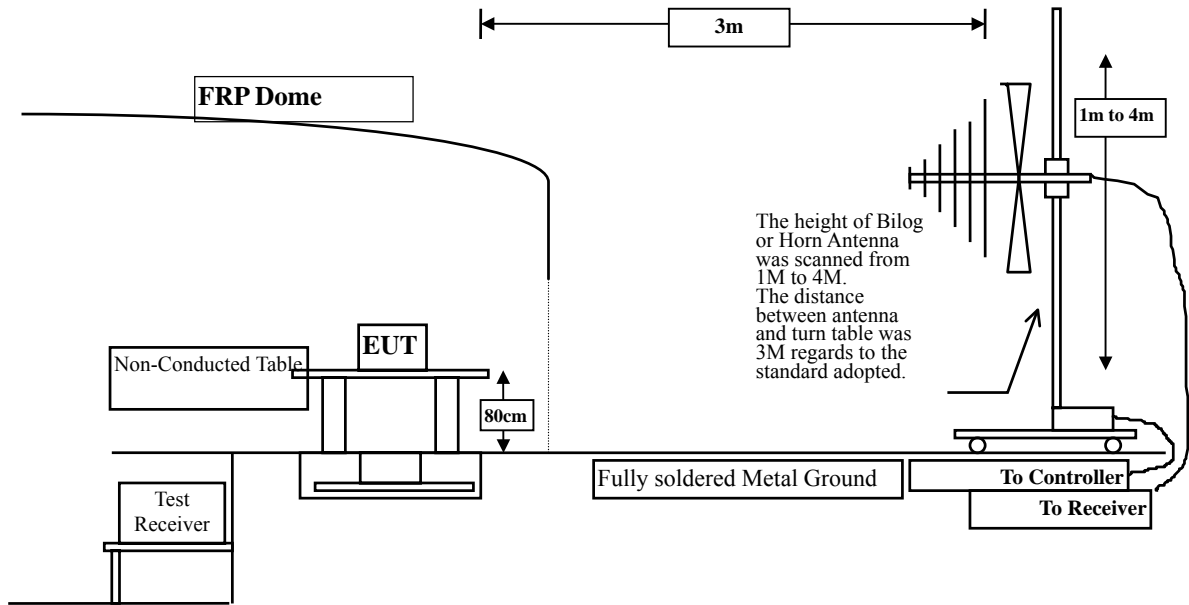
The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
<input type="checkbox"/> Site # 1		Test Receiver	R & S	ESVS 10 / 834468/003	May, 2008
		Spectrum Analyzer	Advantest	R3162/ 00803480	May, 2008
		Pre-Amplifier	Advantest	BB525C/ 3307A01812	May, 2008
		Bilog Antenna	SCHAFFNER	CBL6112B / 2697	Sep., 2008
<input type="checkbox"/> Site # 2		Test Receiver	R & S	ESCS 30 / 836858 / 022	May, 2008
		Spectrum Analyzer	Advantest	R3162 / 100803466	May, 2008
		Pre-Amplifier	Advantest	BB525C/3307A01814	May, 2008
		Bilog Antenna	SCHAFFNER	CBL6112B / 2705	May, 2008
		Horn Antenna	ETS	3115 / 0005-6160	Sep., 2008
	Pre-Amplifier	QTK	QTK-AMP-01/ 0001	May, 2008	
<input checked="" type="checkbox"/> Site # 3	X	Test Receiver	R & S	ESI 26 / 838786/004	May, 2008
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2008
	X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2008
	X	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2008
	X	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2008
	X	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2008
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2008
	X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2008

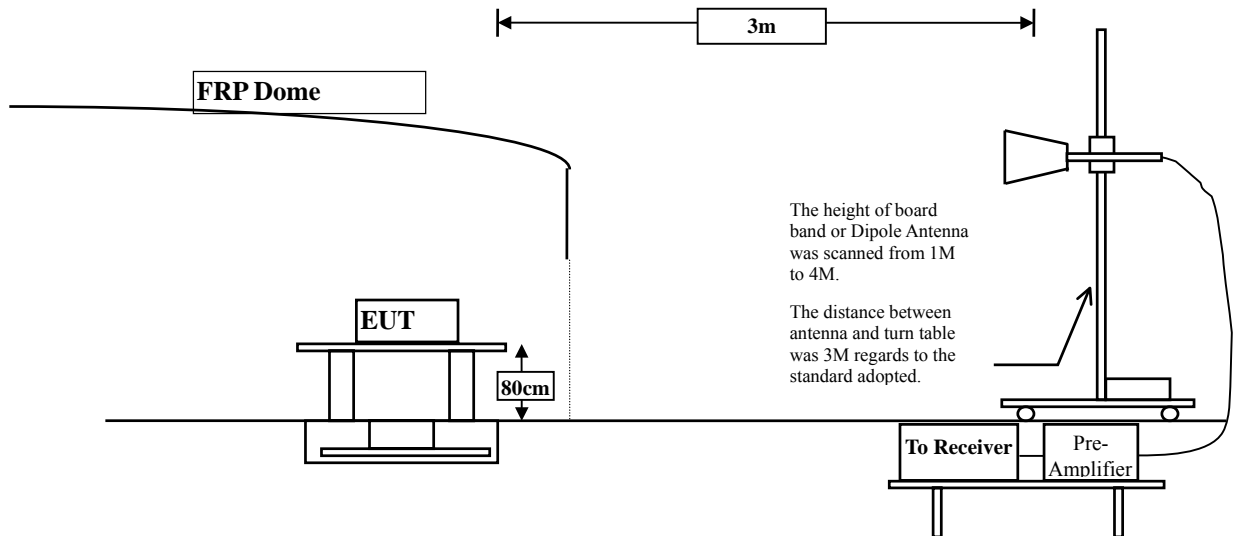
- Note:
1. All equipments are calibrated every one year.
 2. Test equipments marked by "X" are used to measure the final test results.

4.2. Test Setup

Below 1GHz



Above 1GHz



4.3. Limits

FCC Part 15 Subpart B Paragraph 15.109 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 resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB beamwidth of the antenna.

The worst radiated emission is measured on the Final Measurement.

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

4.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

4.6. Test Result of Radiated Emission

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

Frequency Correct Factor MHz dB	Reading Level dBuV	Measurement Level dBuV/m dB	Margin	Limit dBuV/m	
Horizontal					
Peak Detector:					
4824.000	0.760	43.820	44.580	-29.420	74.000
7236.000	6.510	44.980	51.490	-22.510	74.000
9648.000	9.740	44.060	53.800	-20.200	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	0.760	43.140	43.900	-30.100	74.000
7236.000	6.510	44.420	50.930	-23.070	74.000
9648.000	9.740	43.760	53.500	-20.500	74.000
Average Detector:					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Serial Device Server
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2437 MHz)

Frequency Correct Factor MHz dB	Reading Level dBuV	Measurement Level dBuV/m dB	Margin	Limit dBuV/m	
Horizontal					
Peak Detector:					
4874.000	0.940	43.950	44.890	-29.110	74.000
7311.000	6.660	43.320	49.980	-24.020	74.000
9748.000	9.860	44.090	53.950	-20.050	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	0.940	43.600	44.540	-29.460	74.000
7311.000	6.660	42.890	49.550	-24.450	74.000
9748.000	9.860	44.030	53.890	-20.110	74.000
Average Detector:					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Serial Device Server
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2462 MHz)

Frequency Correct Factor MHz dB	Reading Level dBuV	Measurement Level dBuV/m dB	Margin	Limit dBuV/m	
Horizontal					
Peak Detector:					
4924.000	1.050	42.570	43.620	-30.380	74.000
7386.000	6.820	43.850	50.670	-23.330	74.000
9848.000	10.060	43.920	53.980	-20.020	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4924.000	1.050	42.630	43.680	-30.320	74.000
7386.000	6.820	43.940	50.760	-23.240	74.000
9848.000	10.060	43.880	53.940	-20.060	74.000
Average Detector:					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Serial Device Server
 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					
199.750	10.140	19.750	29.890	-13.610	43.500
435.460	18.610	14.850	33.460	-12.540	46.000
460.680	19.690	13.960	33.650	-12.350	46.000
499.480	19.630	14.430	34.060	-11.940	46.000
699.300	22.700	7.750	30.450	-15.550	46.000
799.210	24.220	3.240	27.460	-18.540	46.000
Vertical					
53.280	7.230	25.660	32.890	-6.110	39.000
146.400	11.090	18.390	29.480	-14.020	43.500
435.460	20.050	5.260	25.310	-20.690	46.000
609.090	23.270	2.060	25.330	-20.670	46.000
699.300	22.510	1.300	23.810	-22.190	46.000
900.090	26.250	2.580	28.830	-17.170	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

5. RF antenna conducted test

5.1. Test Equipment

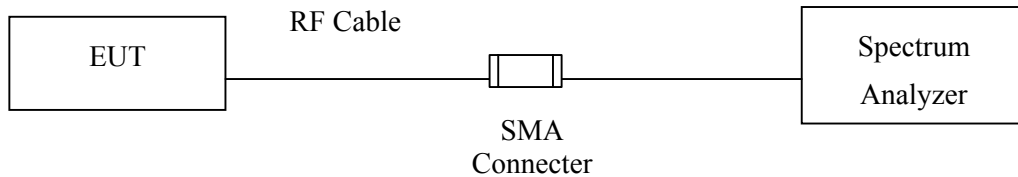
The following test equipments are used during the radiated emission tests:

	Equipment Manufacturer		Model No./Serial No.	Last Cal.
	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2008
X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2008
	Spectrum Analyzer	Agilent	N9010A / MY48030495	April, 2008

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with “X” are used to measure the final test results.

5.2. Test Setup

RF antenna Conducted 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 was tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

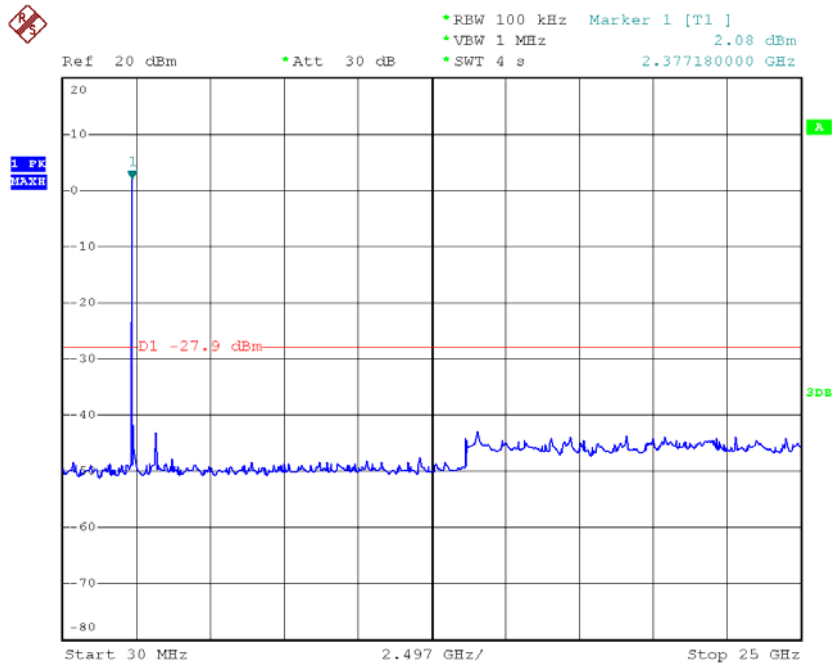
5.5. Uncertainty

The measurement uncertainty Conducted is defined as ± 1.27 dB

5.6. Test Result of RF antenna conducted test

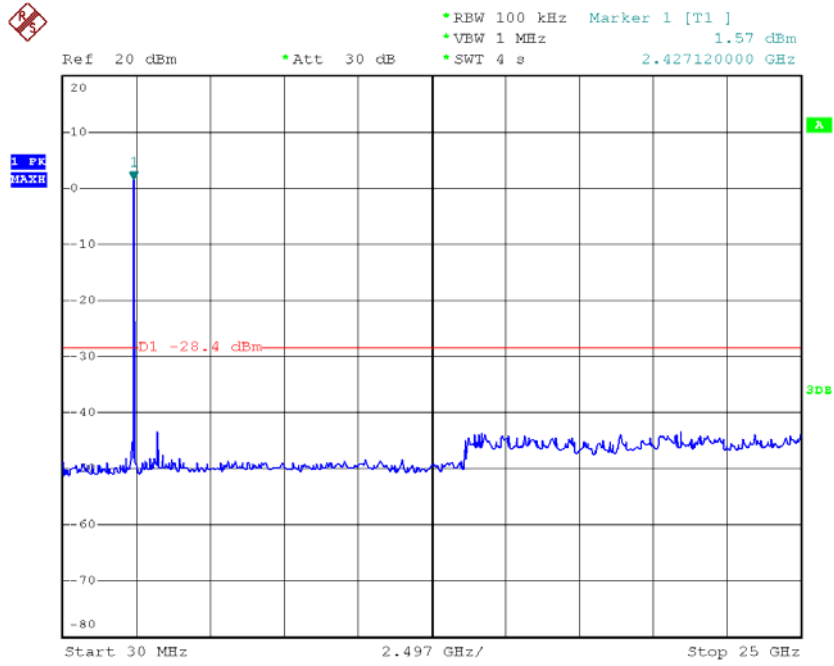
Product : Wireless Serial Device Server
Test Item : RF antenna conducted test
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b

Channel 01 (2412MHz)



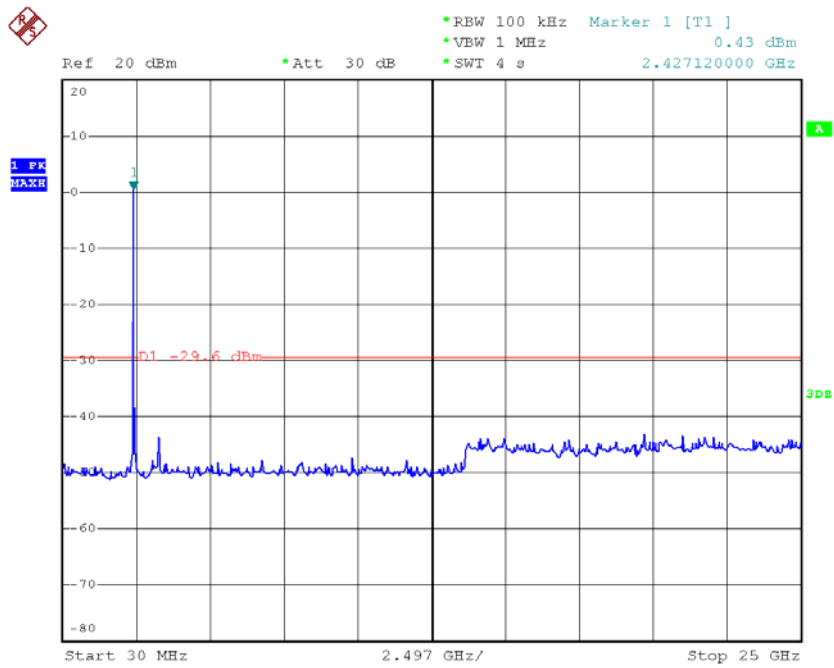
Date: 9.JUL.2008 11:05:35

Channel 06 (2437MHz)



Date: 9.JUL.2008 11:06:23

Channel 11 (2462MHz)



Date: 9.JUL.2008 11:07:01

6. Radiated Emission Band Edge

6.1. Test Equipment

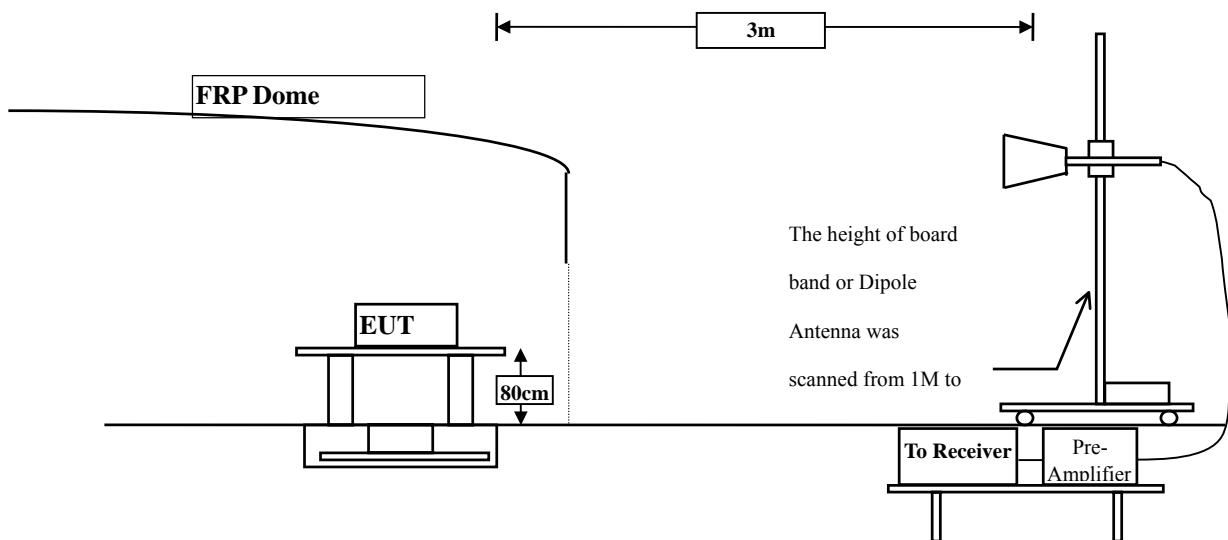
The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2008
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2008
X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2008
X	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2008
X	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2008
X	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2008
X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2008
X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2008

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with "X" are used to measure the final test results.

6.2. Test Setup

RF Radiated Measurement:



6.3. 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.

6.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 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 is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.

6.5. Uncertainty

± 3.9 dB above 1GHz

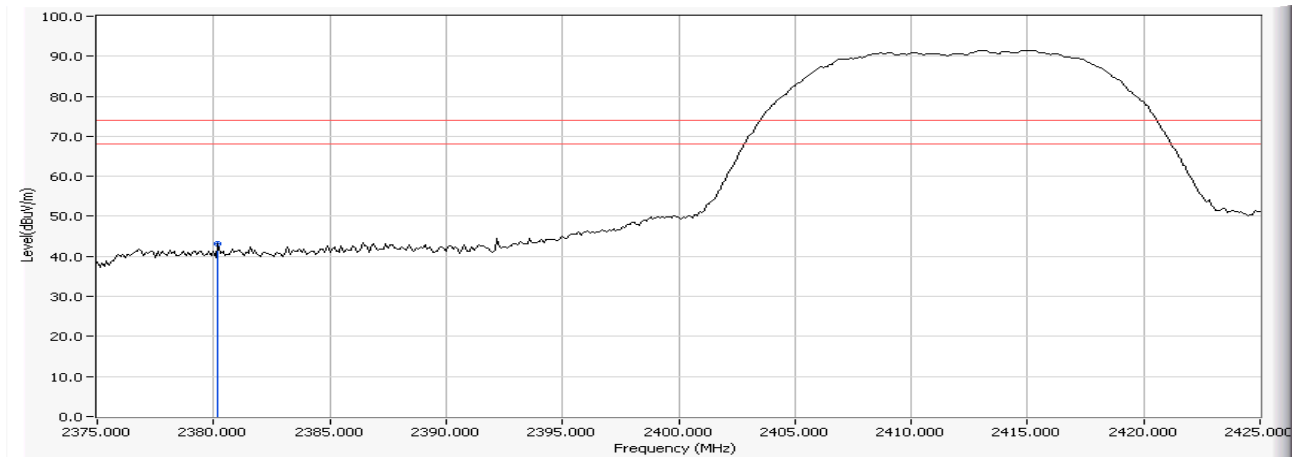
6.6. Test Result of Band Edge

Product : Wireless Serial Device Server
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

RF Radiated Measurement (Horizontal):

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
1 (Peak)	2380.200	-6.799	50.026	43.227	74.00	54.00	Pass
1 (Average)	--	--	--	--	74.00	54.00	Pass

Figure Channel 1: Horizontal (Peak)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Serial Device Server
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

RF Radiated Measurement (Vertical):

Channel	Frequency (MHz)	Correct Fcator (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
1 (Peak)	2385.100	-6.783	68.333	61.550	74.00	54.00	Pass
1 (Average)	2385.100	-6.783	48.894	42.111	74.00	54.00	Pass

Figure Channel 1: Vertical (Peak)

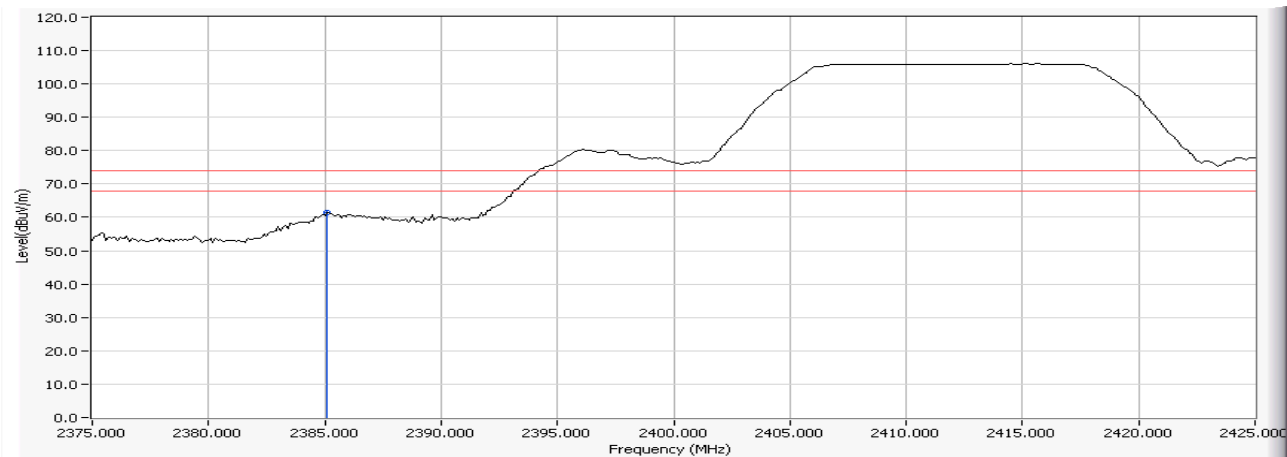
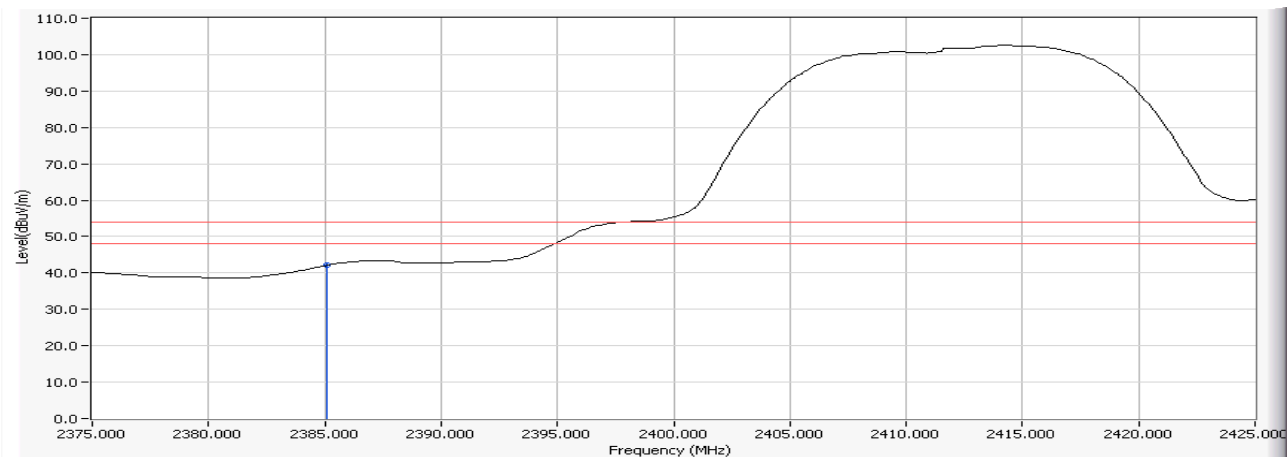


Figure Channel 1: Vertical (Average)



Note:

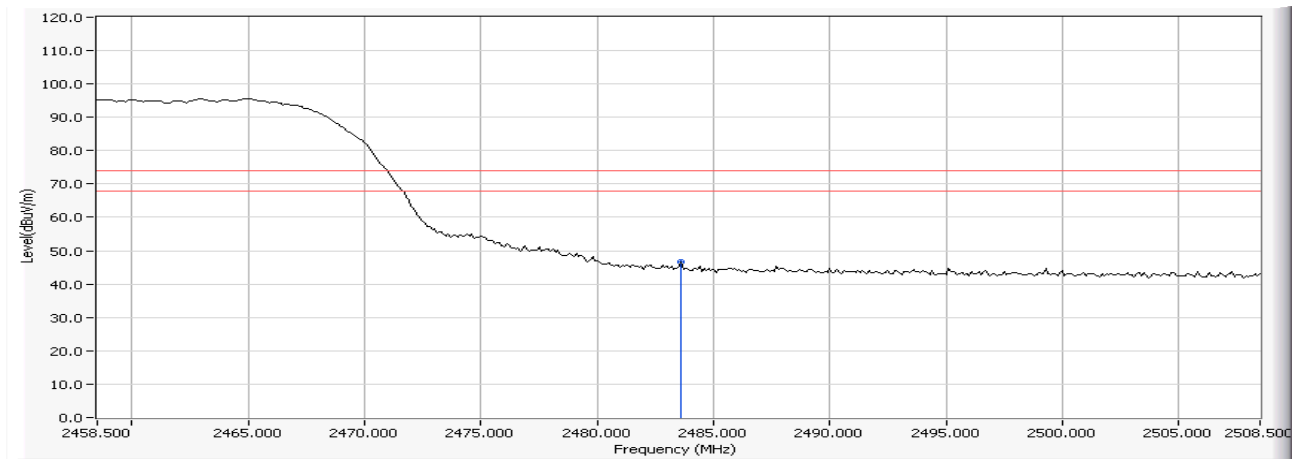
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Serial Device Server
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

RF Radiated Measurement (Horizontal):

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11(Peak)	2483.600	-6.468	53.061	46.593	74.00	54.00	Pass
11(Average)	--	-- -- --			74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Serial Device Server
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

RF Radiated Measurement (Vertical):

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11(Peak)	2489.000	-6.461	65.214	58.753	74.00	54.00	Pass
11(Average)	2489.000	-6.461	49.809	43.348	74.00	54.00	Pass

Figure Channel 11: Vertical (Peak)

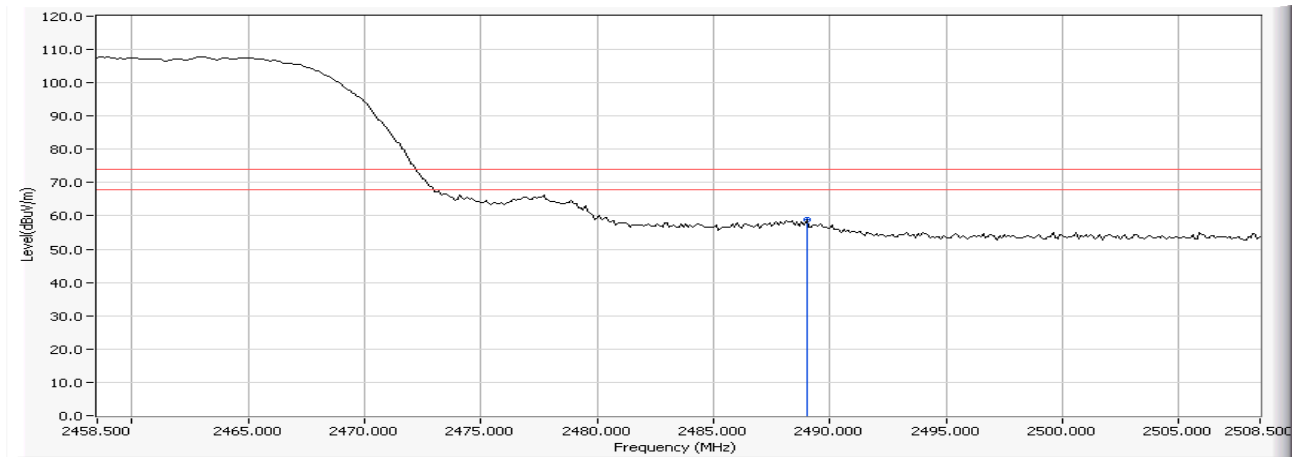
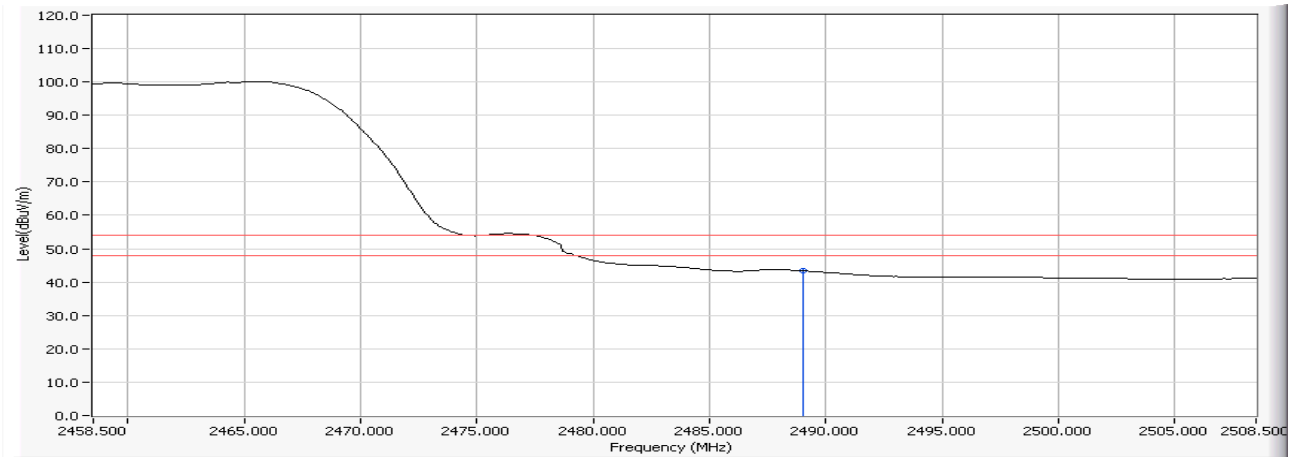


Figure Channel 11: Vertical (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

7. Occupied Bandwidth

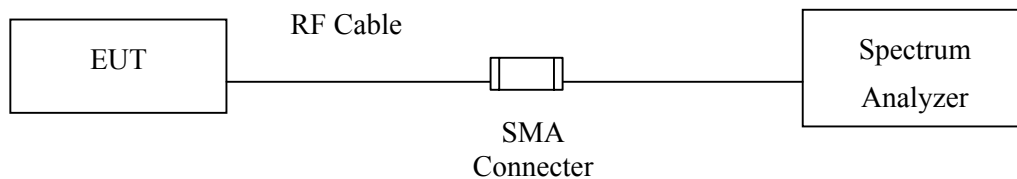
7.1. Test Equipment

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

Equipment Manufacturer	Model No./Serial No.	Last Cal.	
Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2008
Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2008
Spectrum Analyzer	Agilent	N9010A / MY48030495	April, 2008
X Spectrum Analyzer	Advantest	R3162 / 120300652	June, 2008

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with “X” are used to measure the final test results.

7.2. Test Setup



7.3. Test Procedures

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Span greater than RBW.

7.4. Limits

The 6 dB bandwidth must be greater than 500 kHz.

7.5. Uncertainty

± 15 0Hz

7.6. Test Result of Occupied Bandwidth

Product : Wireless Serial Device Server
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1 (11Mbps)	2412.00	8950	>500	Pass
6 (11Mbps)	2437.00	8850	>500	Pass
11 (11Mbps)	2462.00	9350	>500	Pass

Figure Channel 1:

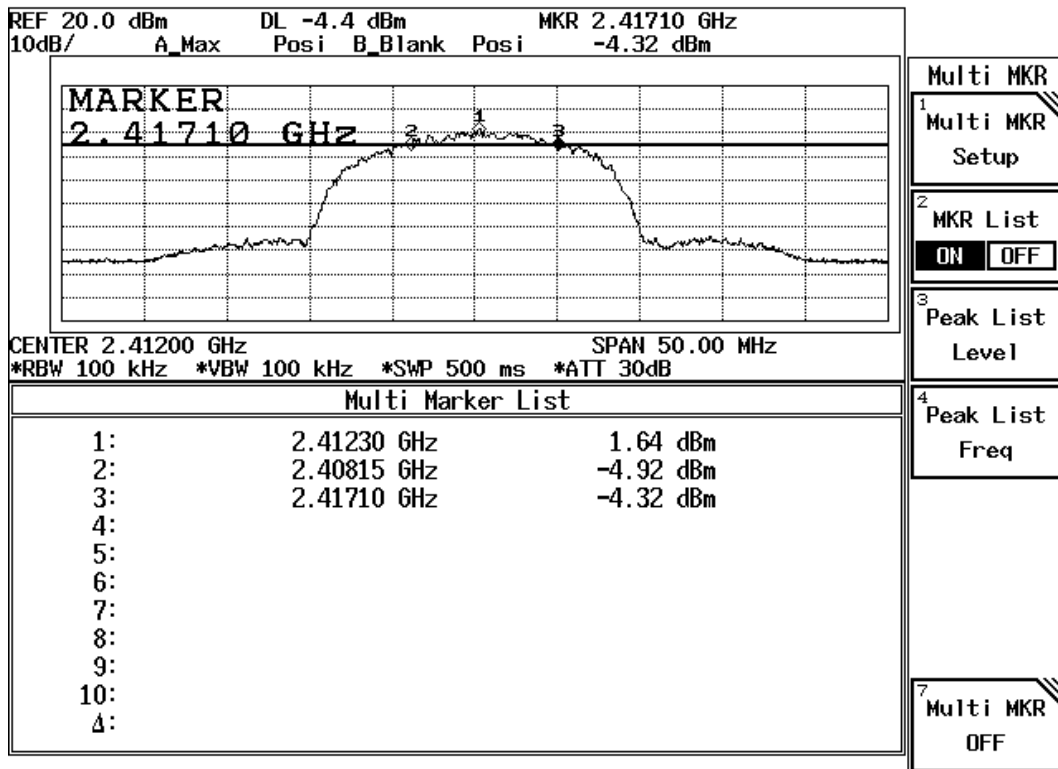


Figure Channel 6:

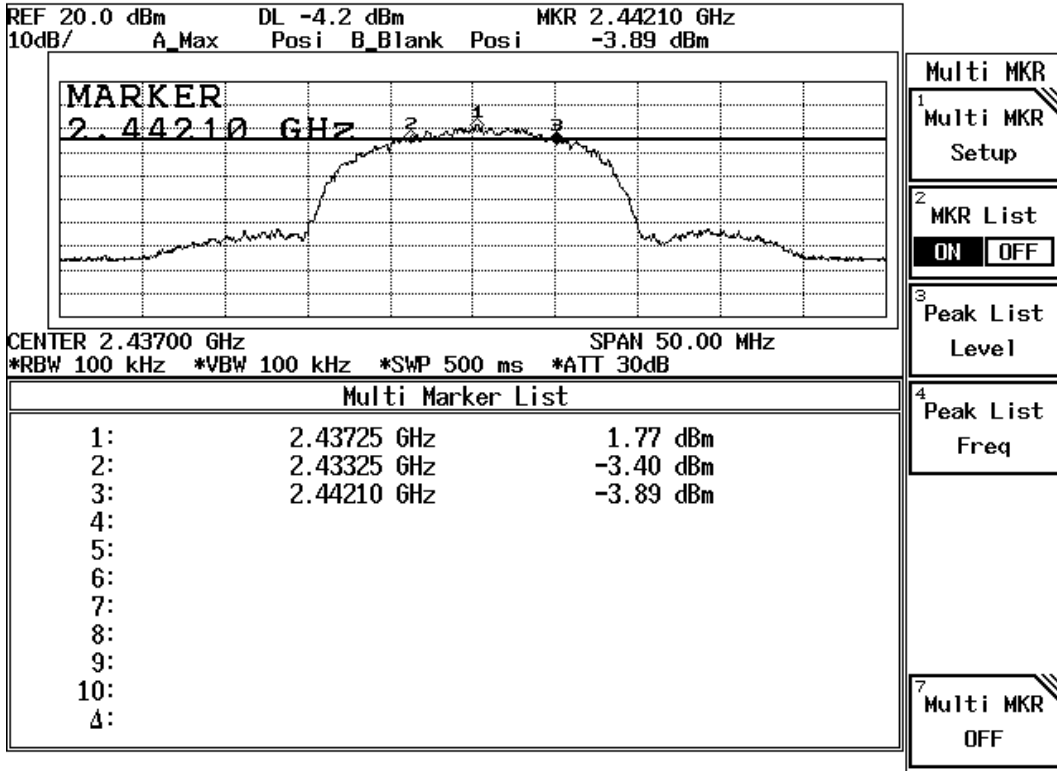
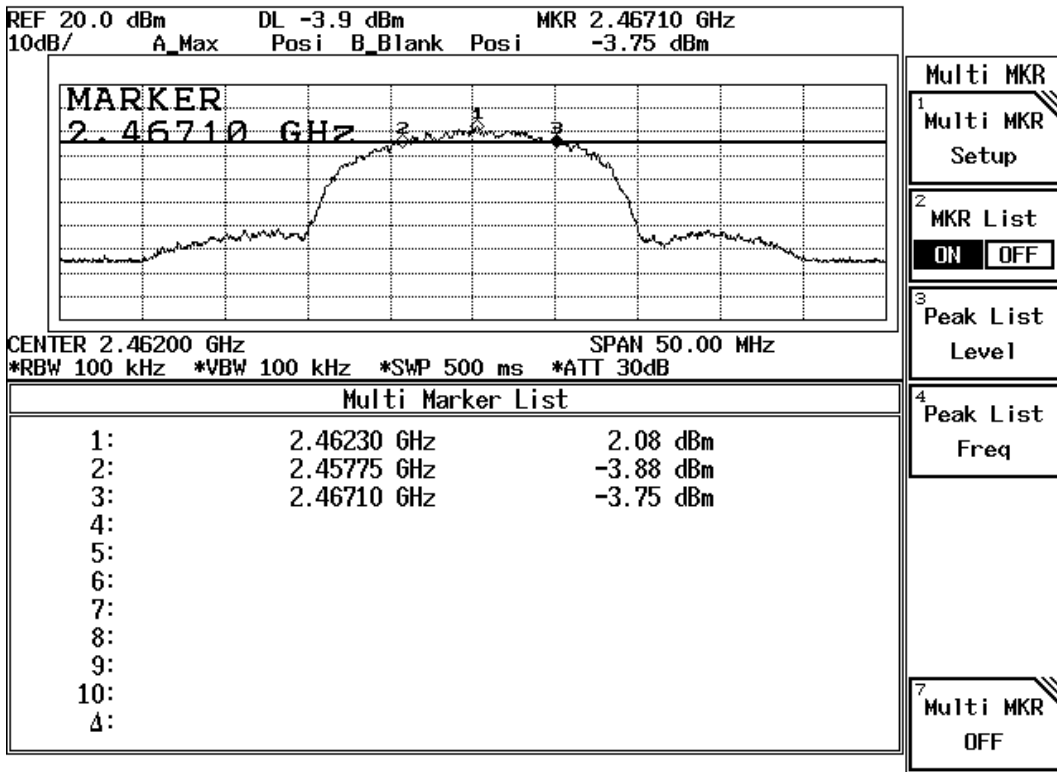


Figure Channel 11:



8. Power Density

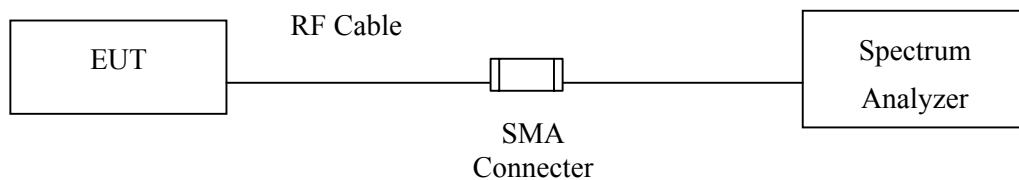
8.1. Test Equipment

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

	Equipment Manufacturer	Model No./Serial No.	Last Cal.
	Test Receiver	R & S ESI 26 / 838786 / 004	May, 2008
	Spectrum Analyzer	Agilent E4407B / US39440758	May, 2008
	Spectrum Analyzer	Agilent N9010A / MY48030495	April, 2008
X	Spectrum Analyzer	Advantest R3162 / 120300652	June, 2008

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with “X” 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 Procedures

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW= 3 kHz, VBW=10KHz, Sweep time=(SPAN/3KHz), detector=Peak detector

8.5. Uncertainty

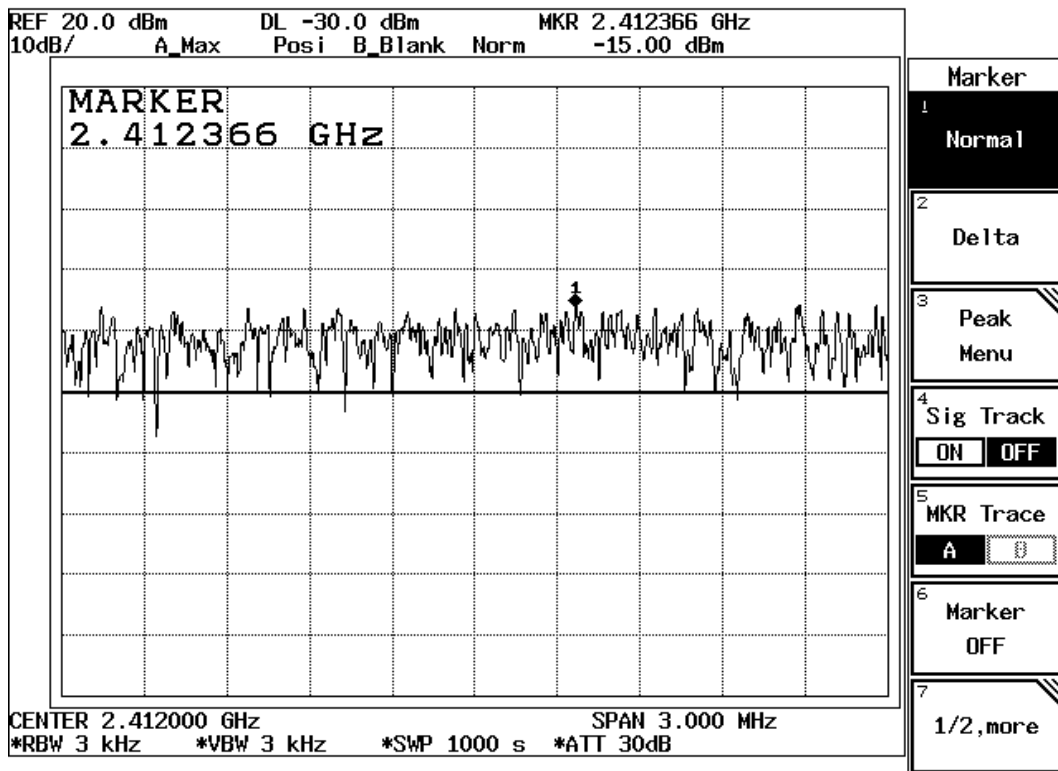
± 1.27 dB

8.6. Test Result of Power Density

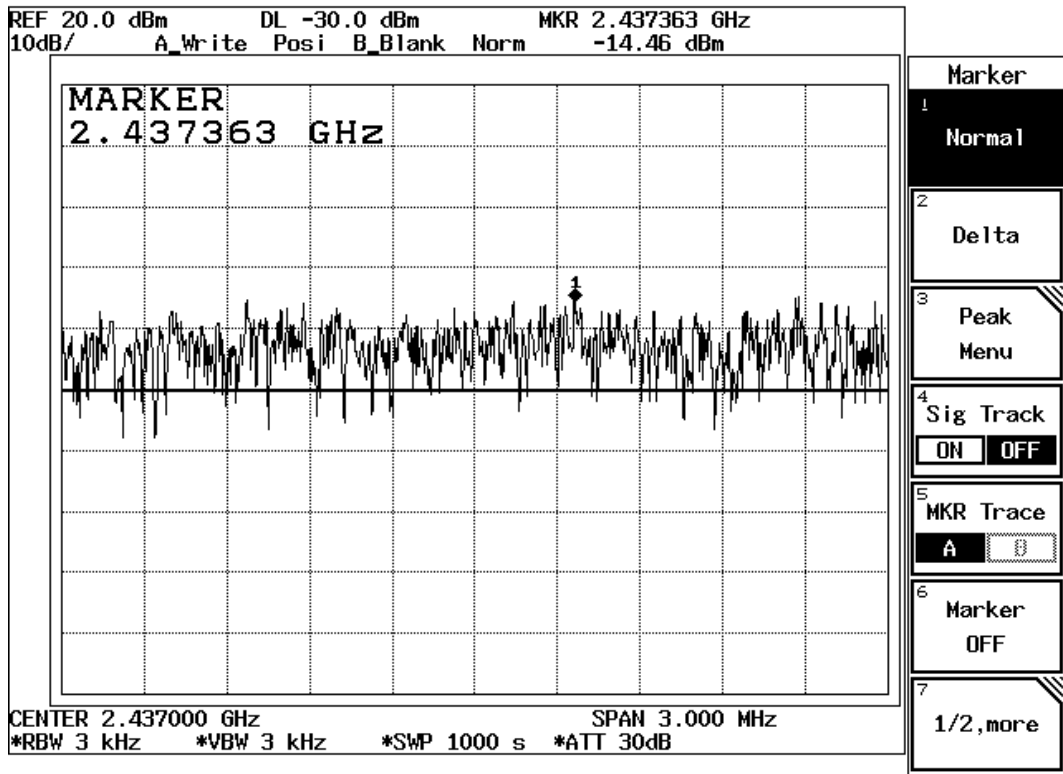
Product : Wireless Serial Device Server
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
1 (11Mbps)	2412.00	-15.00	< 10dBm	Pass
6 (11Mbps)	2437.00	-14.46	< 10dBm	Pass
11 (11Mbps)	2462.00	-14.08	< 10dBm	Pass

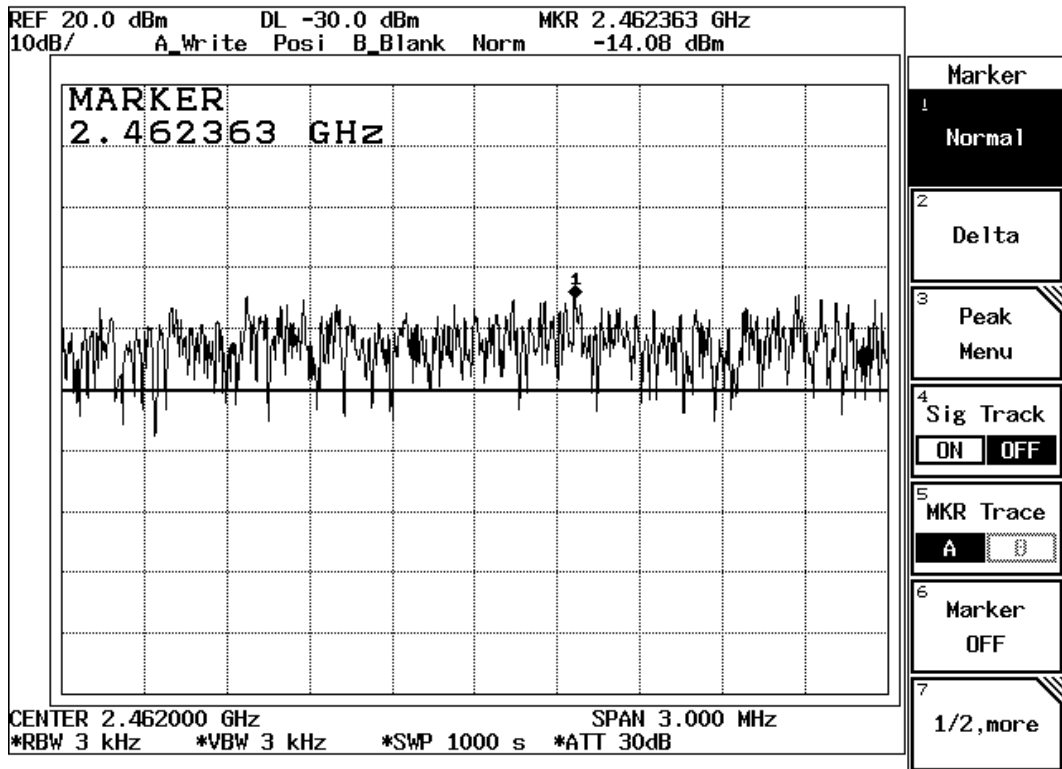
Channel 1:



Channel 6:



Channel 11:



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.