Test Report

Product Name : Wireless to Serial Device Server

Model No : WE-2100T

FCC ID : SLEWE2100T

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 : May 21, 2007

Issued Date : June 13, 2007

Report No. : 075L129-RFUSP09V01

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: June 13, 2007
Rport No.: 075L129-RFUSP09V01

Product Name	:	Wireless to Serial Device Server
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.	:	WE-2100T
FCC ID.	:	SLEWE2100T
Rated Voltage	:	AC 120V/60Hz
Working Voltage	:	DC 3.3V
Trade Name	:	Moxa
Applicable Standard	:	FCC CFR Title 47 Part 15 Subpart E: 2005 ANSI C63.4: 2003
Test Result	:	Complied

NVLAP Lab Code: 200533-0

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This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Documented By : Genie chang
(Engineering Adm. Specialist / Genie Chang)

Tested By : Tim Sung
(Senior Engineer /Tim Sung)

Approved By : Gene Chang
(President / Gene Chang)

0914

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	:	Wireless to Serial Device Server
Trade Name	:	Moxa
FCC ID.	:	SLEWE2100T
Model No.	:	WE-2100T
Frequency Range	:	2412MHz - 2462MHz, 5150-5250MHz, 5725-5825MHz
Number of Channels	:	11 in 2.4GHz band, 8 in 5GHz band
Channel Separation	:	5MHz in 2.4GHz band, 20MHz in 5GHz band
Channel Control	:	Auto
Data Rate	:	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”

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

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. This device is a Wireless to Serial Device Server 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. 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)
3. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.

1.2. Operational Description

EUT is a Wireless to Serial Device Server with a built-in 2.4GHz and 5GHz transceiver. The channels are separated by 20MHz of 802.11a and 5MHz of 802.11b/g. 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 802.11a/g mode. The signals are modulated by DSSS in 802.11b mode and OFDM in 802.11a/g mode. The antennas are Connector and use diversity to improve the receiving sensitivity.

This Wireless to Serial Device Server, complied with IEEE 802.11b, IEEE 802.11g, and IEEE 802.11a, 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 802.11a

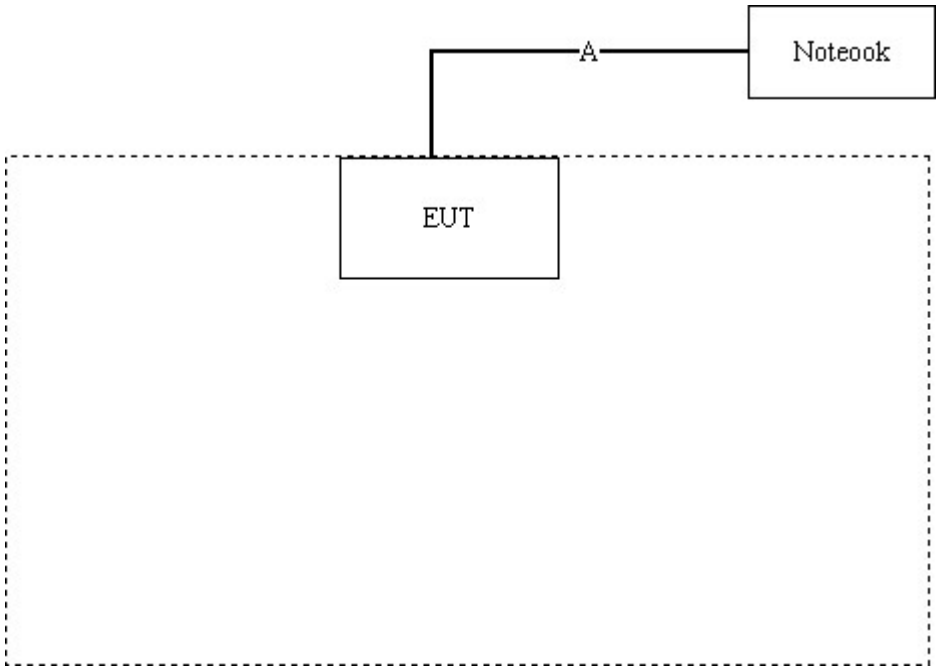
1.3. Tested System Datails

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	PP04X	C8YYM1S	Non-Shielded, 0.8m

Signal Cable Type		Signal cable Description
A	LAN Cable	Non-Shielded, 7.0m

1.4. Configuration of tested 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

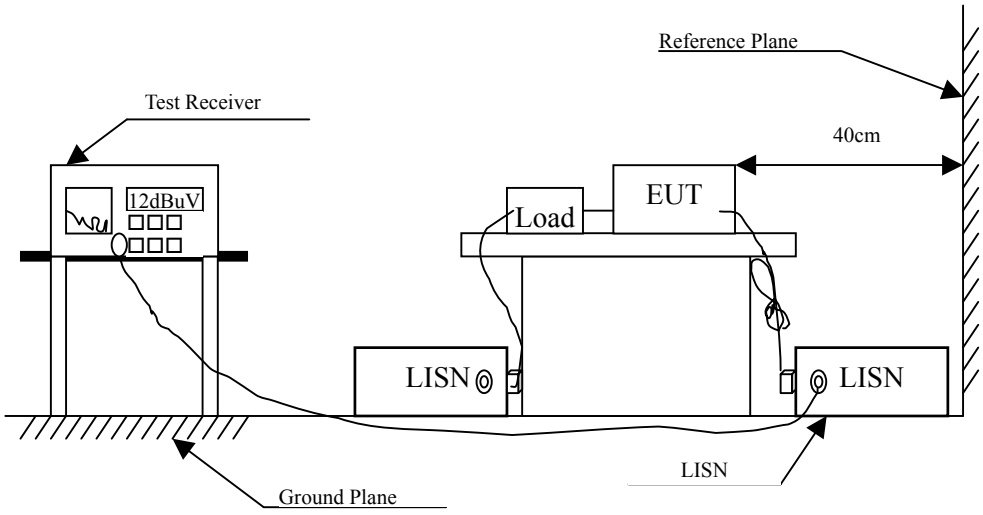
2.1. Test Equipment

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 equipments 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	56-46
0.50-5.0	56	46
5.0 - 30	60	50

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

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please 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 to Serial Device Server
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 1: Transmitter 802.11a (5220MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.197	0.670	44.690	45.360	-19.297	64.657
0.257	0.329	29.910	30.239	-32.704	62.943
0.327	0.300	36.280	36.580	-24.363	60.943
0.457	0.300	34.370	34.670	-22.559	57.229
0.527	0.300	38.760	39.060	-16.940	56.000
9.173	0.570	40.300	40.870	-19.130	60.000
Average					
0.197	0.670	43.000	43.670	-10.987	54.657
0.257	0.329	28.230	28.559	-24.384	52.943
0.327	0.300	34.410	34.710	-16.233	50.943
0.457	0.300	32.520	32.820	-14.409	47.229
0.527	0.300	36.130	36.430	-9.570	46.000
9.173	0.570	35.320	35.890	-14.110	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

Product : Wireless to Serial Device Server
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 1: Transmitter 802.11a (5220MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 2					
Quasi-Peak					
0.197	0.300	44.690	44.990	-19.667	64.657
0.267	0.300	31.380	31.680	-30.977	62.657
0.327	0.300	36.280	36.580	-24.363	60.943
0.397	0.310	33.220	33.530	-25.413	58.943
0.527	0.310	38.680	38.990	-17.010	56.000
9.408	0.490	40.710	41.200	-18.800	60.000
Average					
0.197	0.300	43.000	43.300	-11.357	54.657
0.267	0.300	29.690	29.990	-22.667	52.657
0.327	0.300	34.410	34.710	-16.233	50.943
0.397	0.310	29.390	29.700	-19.243	48.943
0.527	0.310	36.130	36.440	-9.560	46.000
9.408	0.490	35.620	36.110	-13.890	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 : Wireless to Serial Device Server
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 1: Transmitter 802.11a (5785MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.197	0.670	44.670	45.340	-19.317	64.657
0.257	0.329	30.150	30.479	-32.464	62.943
0.327	0.300	36.340	36.640	-24.303	60.943
0.457	0.300	34.570	34.870	-22.359	57.229
0.527	0.300	38.600	38.900	-17.100	56.000
9.541	0.580	38.930	39.510	-20.490	60.000
Average					
0.197	0.670	42.940	43.610	-11.047	54.657
0.257	0.329	28.410	28.739	-24.204	52.943
0.327	0.300	34.490	34.790	-16.153	50.943
0.457	0.300	32.680	32.980	-14.249	47.229
0.527	0.300	36.060	36.360	-9.640	46.000
9.541	0.580	34.120	34.700	-15.300	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 : Wireless to Serial Device Server
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 1: Transmitter 802.11a (5785MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 2					
Quasi-Peak					
0.197	0.300	44.670	44.970	-19.687	64.657
0.267	0.300	31.260	31.560	-31.097	62.657
0.327	0.300	36.300	36.600	-24.343	60.943
0.397	0.310	33.180	33.490	-25.453	58.943
0.527	0.310	38.560	38.870	-17.130	56.000
9.197	0.490	39.750	40.240	-19.760	60.000
Average					
0.197	0.300	43.000	43.300	-11.357	54.657
0.267	0.300	29.620	29.920	-22.737	52.657
0.327	0.300	34.490	34.790	-16.153	50.943
0.397	0.310	29.390	29.700	-19.243	48.943
0.527	0.310	36.060	36.370	-9.630	46.000
9.197	0.490	34.220	34.710	-15.290	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 Transmit Power

3.1. Test Equipment

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

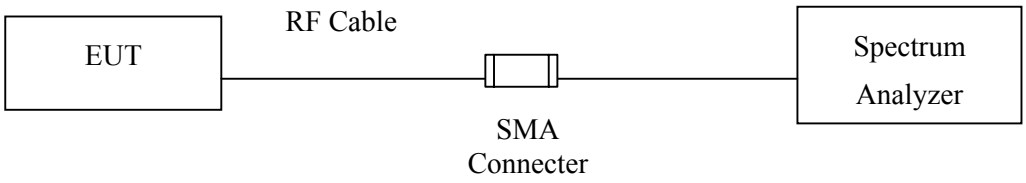
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R&S	FSP40 / 100170	Nov, 2007

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

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

3.2. Test Setup

Conduction Power Measurement



3.3. Limits

(1) For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antenna of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

(2) For the band 5.25-5.35 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antenna of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.825 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 1W or 17 dBm + 10log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antenna of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

3.4. Uncertainty

± 1.27 dB

3.5. Test Result of Peak Transmit Power

Product : Wireless to Serial Device Server
Test Item : Peak Transmit Power
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5180MHz)

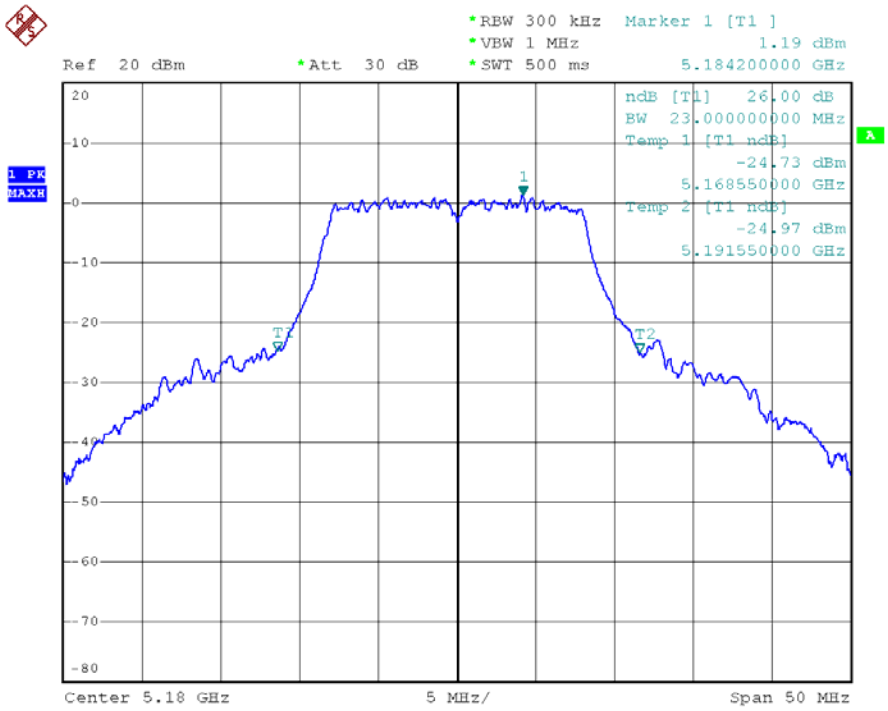
Peak Transmit Power Measurement:

Channel No.	Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	Measurement Level (dBm)
1	5180	23	14.82

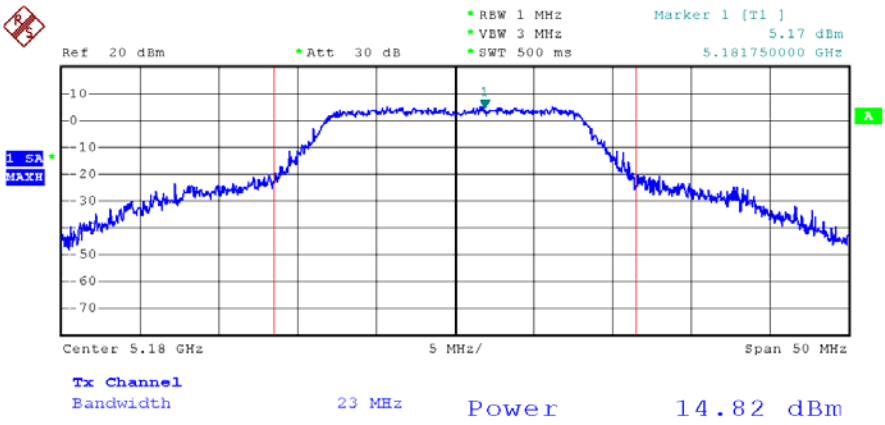
Limits (dBm)	Result
50mW (17dBm) or 4dBm+10 log (B= 23MHz)=17.62dBm	Pass

26dBc Occupied Bandwidth:

Channel 1



Peak Transmit Power:
Channel 1



PN1

Date: 30.MAY.2007 05:01:06

Product : Wireless to Serial Device Server
Test Item : Peak Transmit Power
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5220MHz)

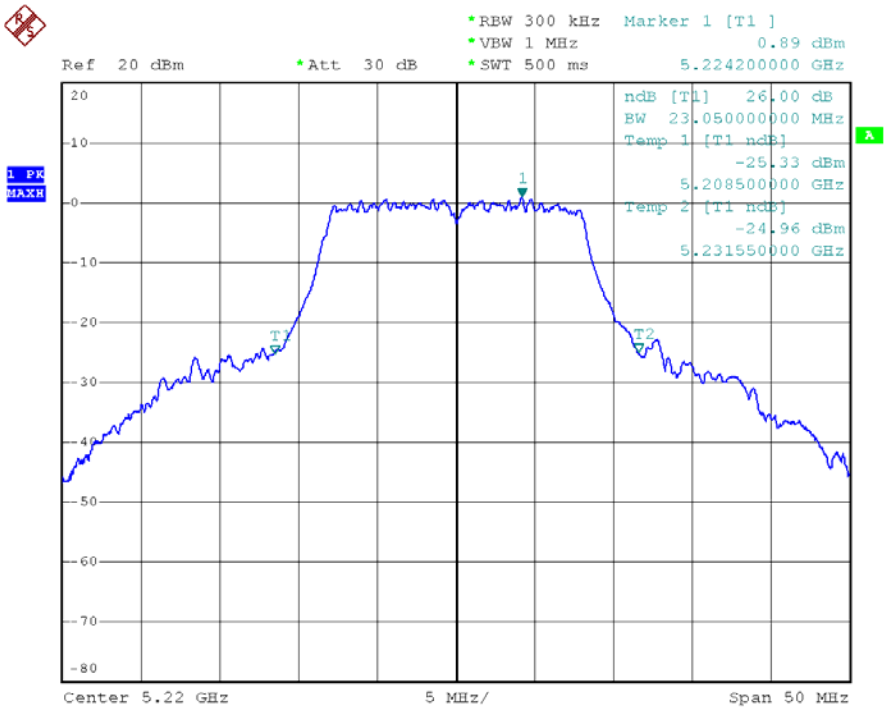
Peak Transmit Power Measurement:

Channel No.	Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	Measurement Level (dBm)
3	5220	23.05	14.63

Limits (dBm)	Result
50mW (17dBm) or 4dBm+10 log (B= 23.05MHz)=17.62dBm	Pass

26dBc Occupied Bandwidth:

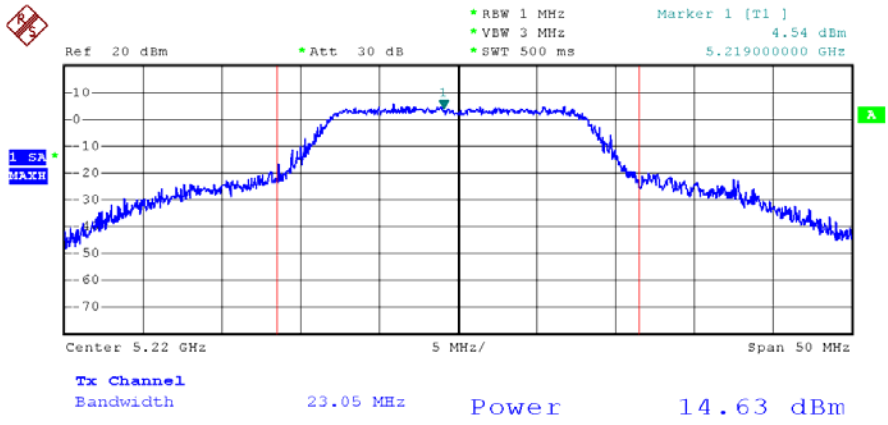
Channel 3



PN1
Date: 30.MAY.2007 04:44:23

Peak Transmit Power:

Channel 3



PN1

Date: 30.MAY.2007 05:02:39

Product : Wireless to Serial Device Server
Test Item : Peak Transmit Power
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5240MHz)

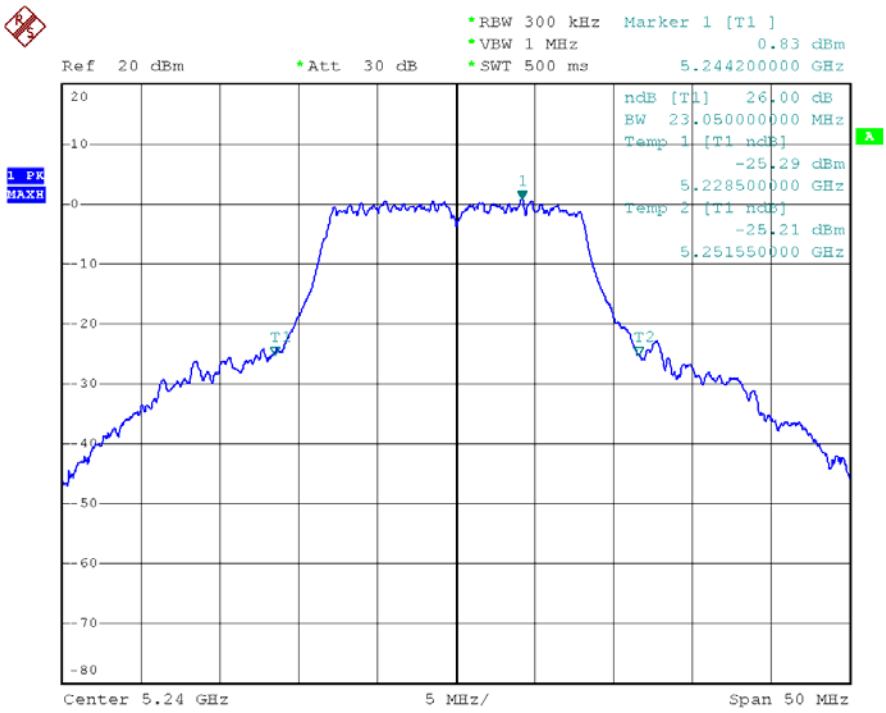
Peak Transmit Power Measurement:

Channel No.	Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	Measurement Level (dBm)
4	5240	23.05	14.76

Limits (dBm)	Result
50mW (17dBm) or 4dBm+10 log (B=23.05MHz)=17.62dBm	Pass

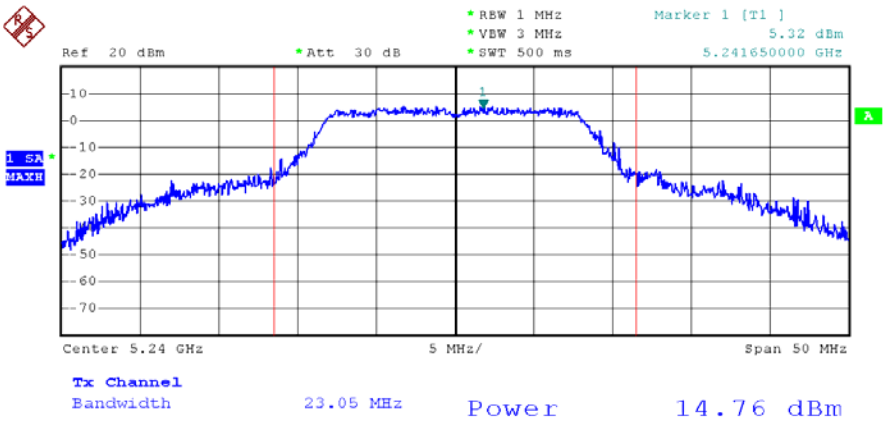
26dBc Occupied Bandwidth:

Channel 4



PN1
Date: 30.MAY.2007 04:44:52

Peak Transmit Power:
Channel 4



PN1

Date: 30.MAY.2007 05:03:45

Product : Wireless to Serial Device Server
Test Item : Peak Transmit Power
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5745MHz)

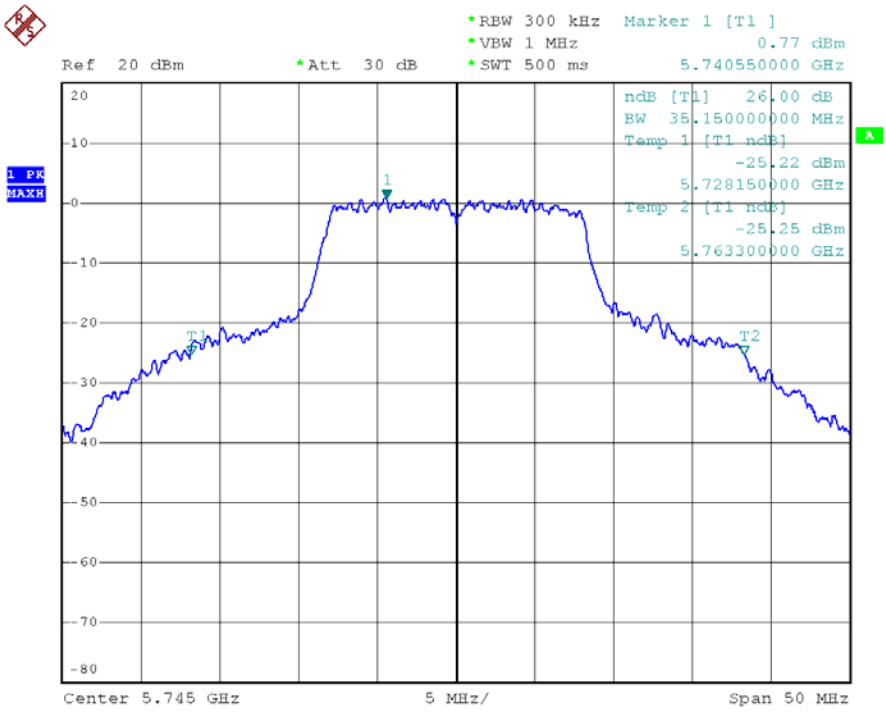
Peak Transmit Power Measurement:

Channel No.	Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	Measurement Level (dBm)
5	5745	32.45	14.82

Limits (dBm)	Result
1W (30dBm) or 17dBm+10 log (B= 35.15MHz)=32.45 dBm	Pass

26dBc Occupied Bandwidth:

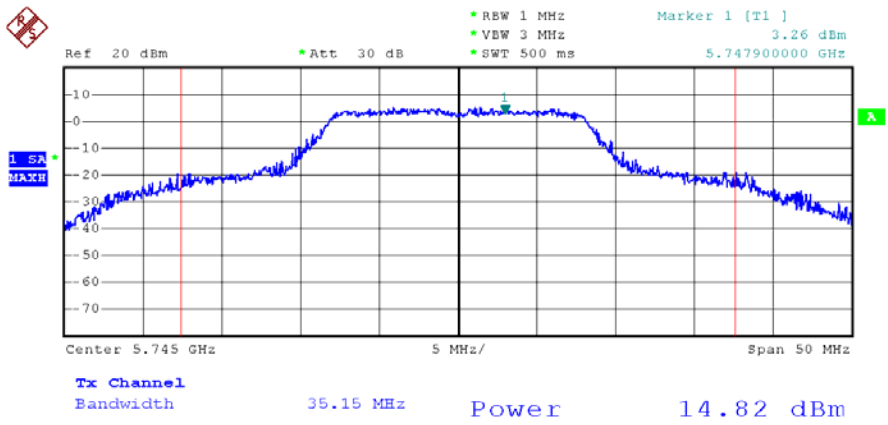
Channel 5



PN1
Date: 30.MAY.2007 04:47:32

Peak Transmit Power:

Channel 5



PN1

Date: 30.MAY.2007 05:08:20

Product : Wireless to Serial Device Server
Test Item : Peak Transmit Power
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5785MHz)

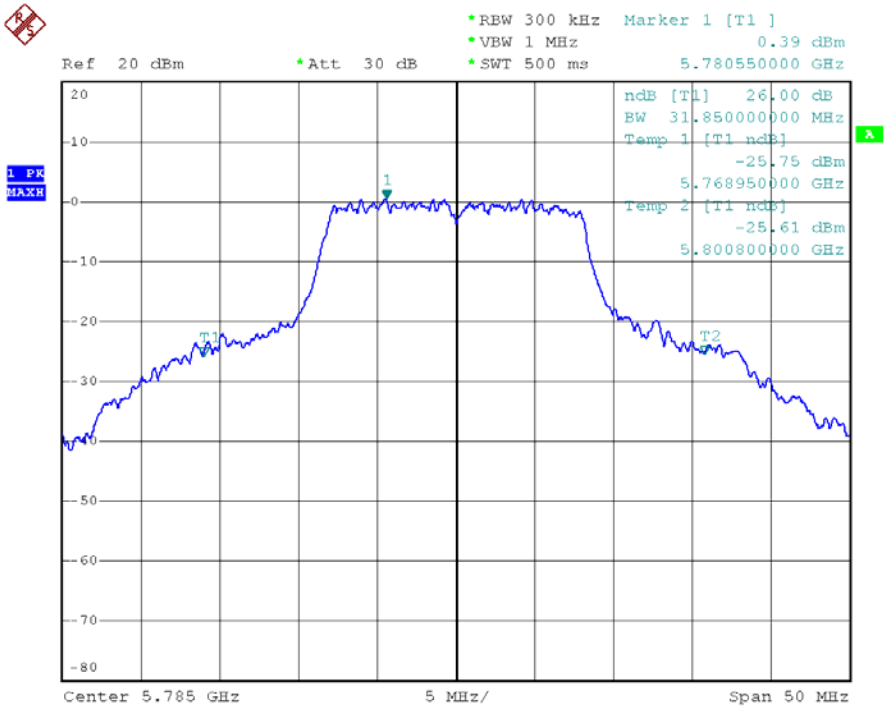
Peak Transmit Power Measurement:

Channel No.	Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	Measurement Level (dBm)
7	5785	32.031	14.44

Limits (dBm)	Result
1W (30dBm) or 17dBm+10 log (B=31.85MHz)=32.031dBm	Pass

26dBc Occupied Bandwidth:

Channel 7



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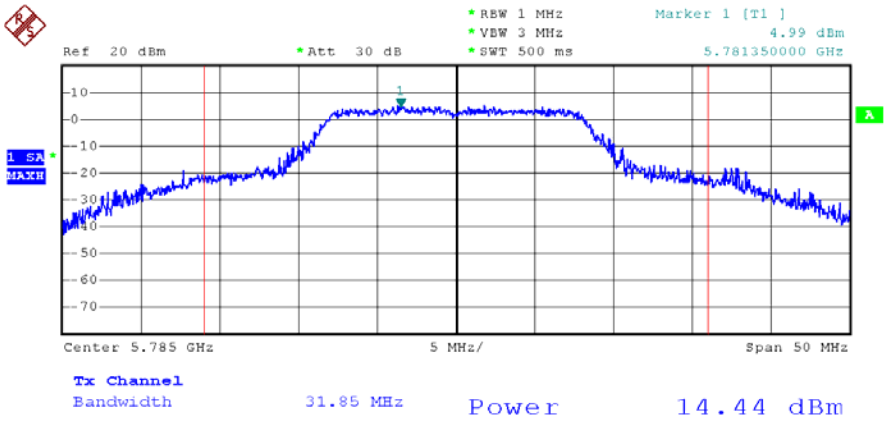
Peak Transmit Power:
Channel 7



PN1

Date: 30.MAY.2007 05:09:58

Product : Wireless to Serial Device Server
Test Item : Peak Transmit Power
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5805MHz)

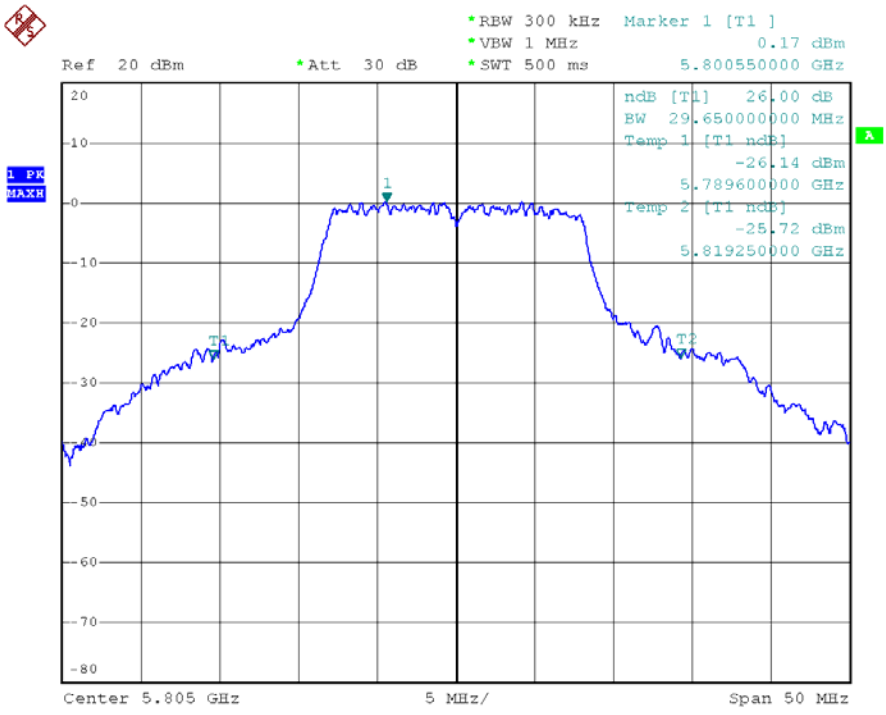
Peak Transmit Power Measurement:

Channel No.	Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	Measurement Level (dBm)
8	5805	29.65	14.42

Limits (dBm)	Result
1W (30dBm) or 17dBm+10 log (B=29.65MHz)=31.72dBm	Pass

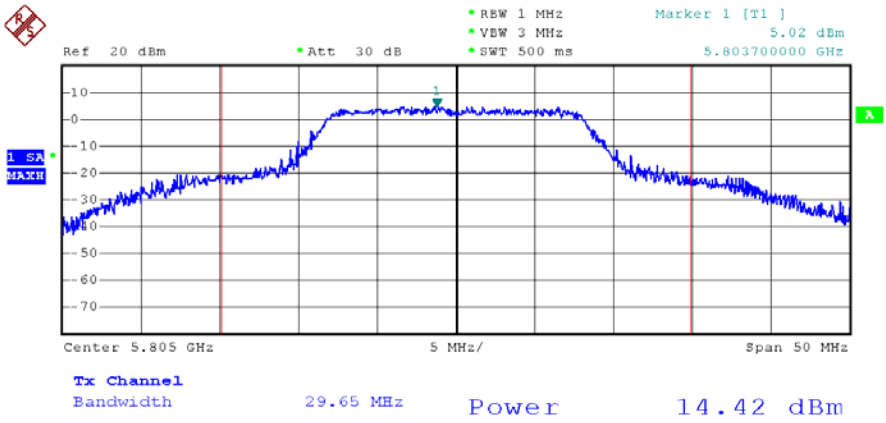
26dBc Occupied Bandwidth:

Channel 8



PN1
Date: 30.MAY.2007 04:49:03

Peak Transmit Power:
Channel 8



PN1

Date: 30.MAY.2007 05:11:20

4. Peak Power Spectral Density

4.1. Test Equipment

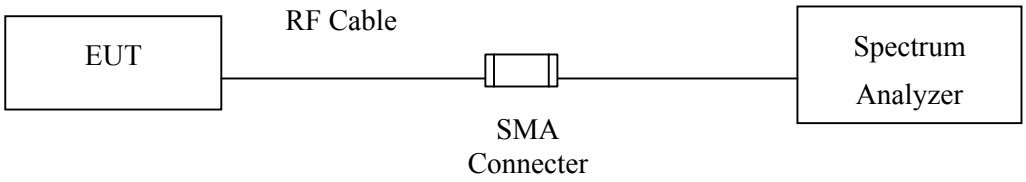
The following test equipments are used during the radiated emission tests:

	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.

4.2. Test Setup



4.3. Limits

(4) For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

(5) For the band 5.25-5.35 GHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

(6) For the band 5.725-5.825 GHz, the peak power spectral density shall not exceed 17 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

4.4. Uncertainty

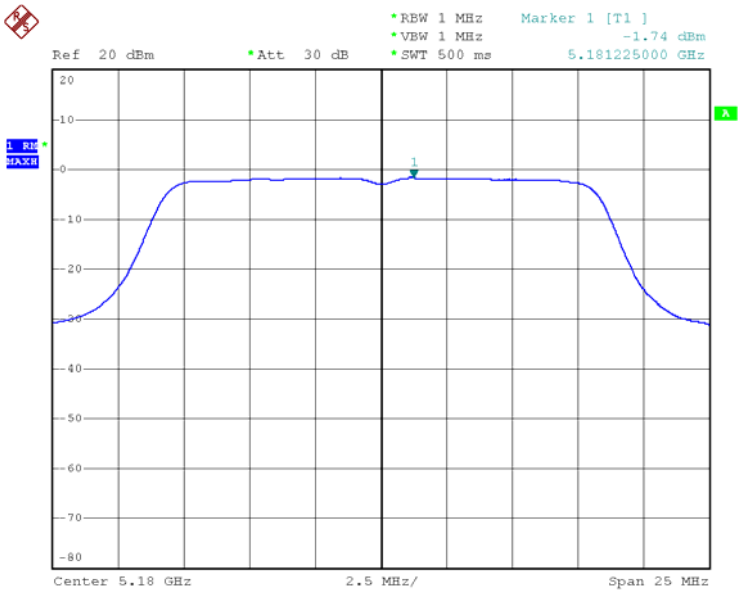
± 1.27 dB

4.5. Test Result of Peak Power Spectral Density

Product : Wireless to Serial Device Server
Test Item : Peak Power Spectral Density
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
1	5180.00	-1.74	< 4	Pass
3	5220.00	-1.91	< 4	Pass
4	5240.00	-1.93	< 4	Pass
5	5745.00	-2.24	< 17	Pass
7	5785.00	-2.67	< 17	Pass
8	5805.00	-2.85	< 17	Pass

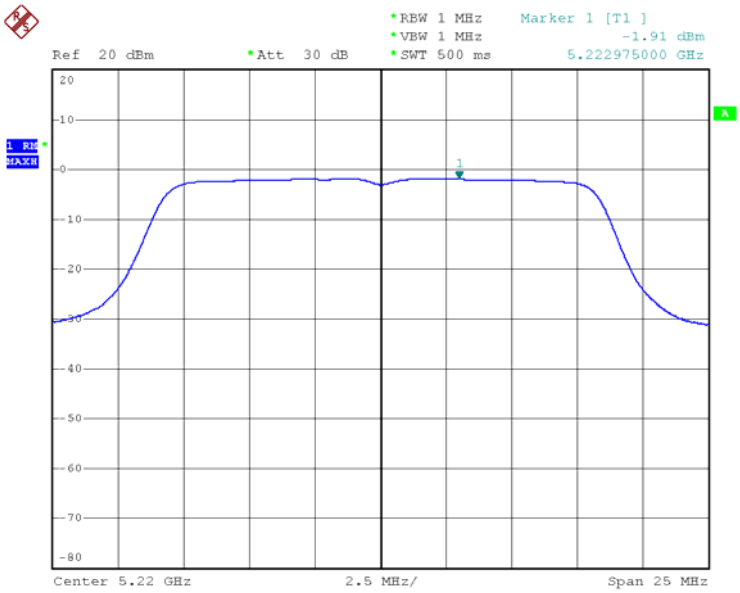
Channel 1:



PN1

Date: 30.MAY.2007 07:26:50

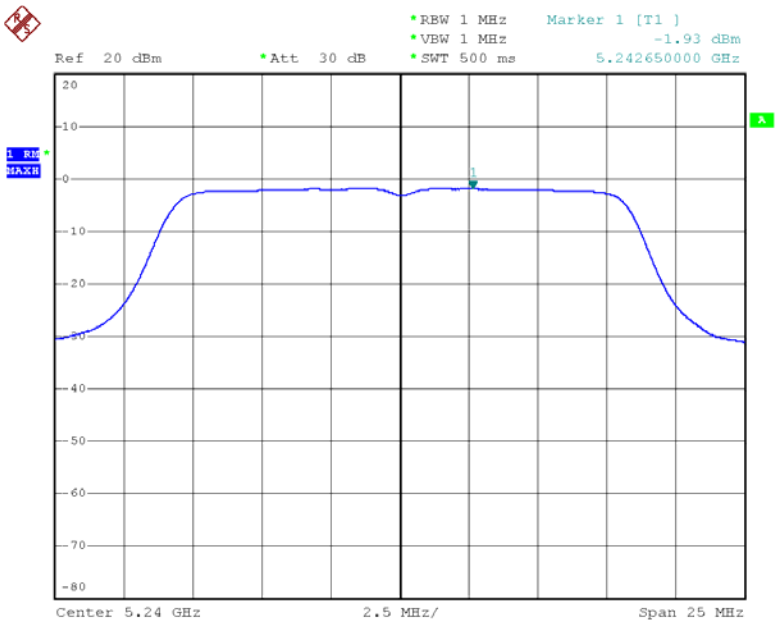
Channel 3:



PN1

Date: 30.MAY.2007 07:28:07

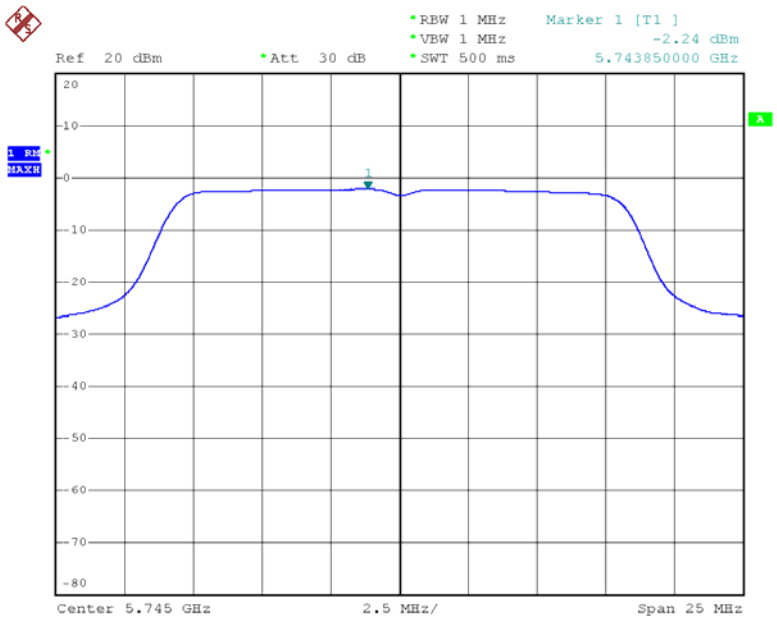
Channel 4:



PN1

Date: 30.MAY.2007 07:28:23

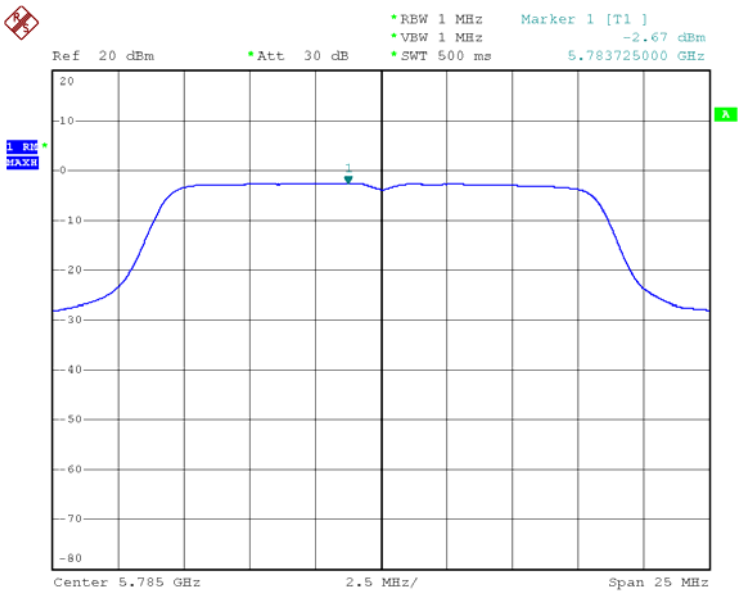
Channel 5:



PN1

Date: 30.MAY.2007 07:28:44

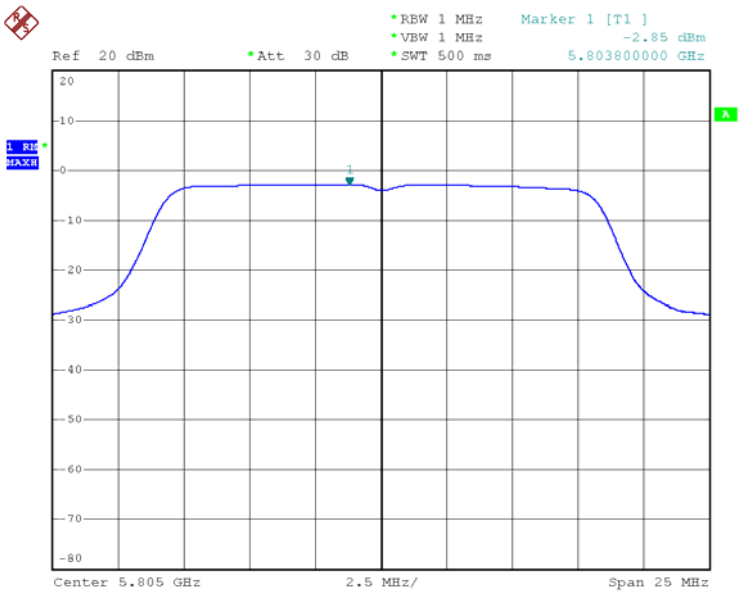
Channel7:



PN1

Date: 30.MAY.2007 07:29:02

Channel 8:



PN1

Date: 30.MAY.2007 07:29:16

5. Peak Excursion

5.1. Test Equipment

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

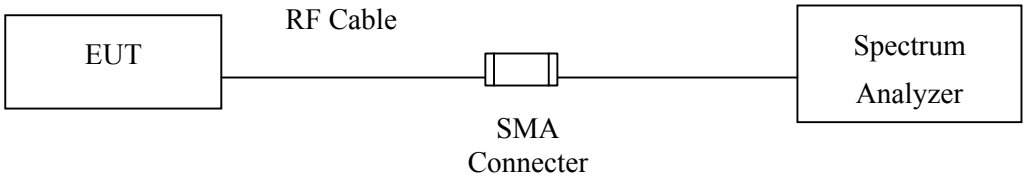
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R&S	FSP40 / 100170	Nov, 2007

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

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

5.2. Test Setup

Conduction Power Measurement



5.3. Limits

The ratio of the peak excursion of the modulation envelope (measured suing a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

5.4. Uncertainty

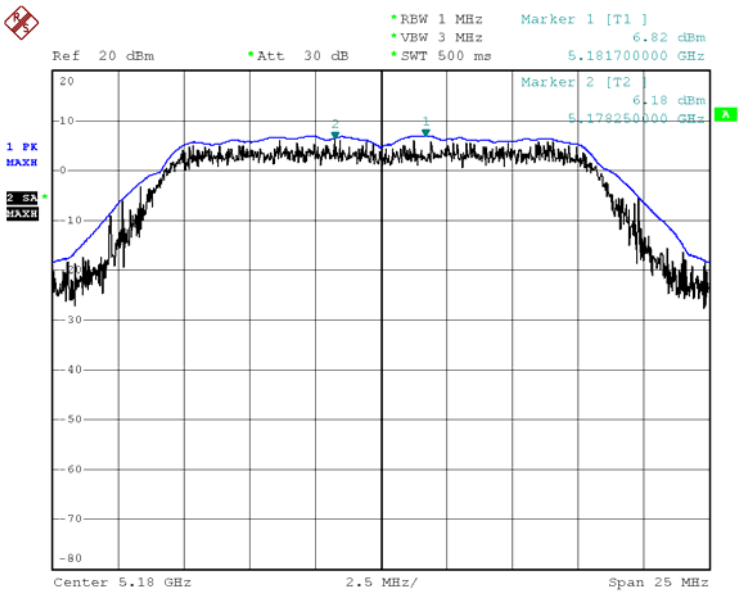
± 1.27 dB

5.5. Test Result of Peak Excursion

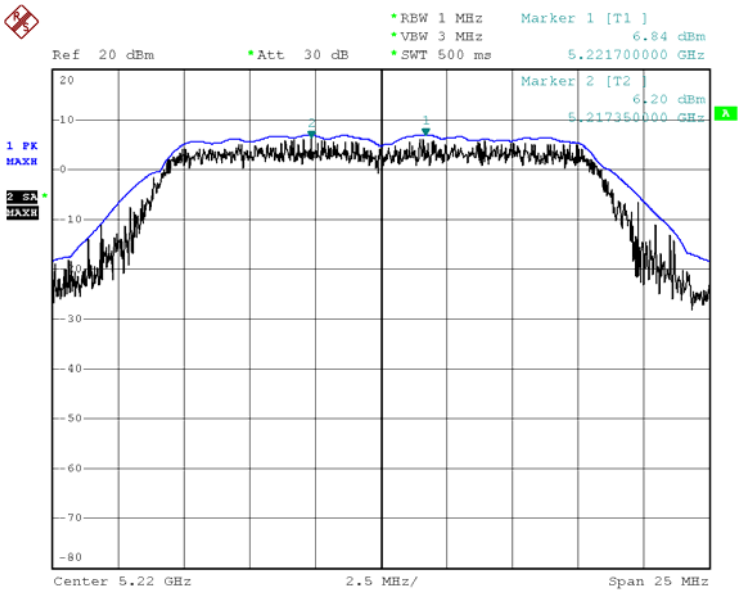
Product : Wireless to Serial Device Server
Test Item : Peak Excursion
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a

Channel No.	Frequency (MHz)	Measurement Level (dB)	Required Limit (dB)	Result
1	5180.00	0.64	≦ 13	Pass
3	5220.00	0.64	≦ 13	Pass
4	5240.00	0.16	≦ 13	Pass
5	5745.00	0.56	≦ 13	Pass
7	5785.00	0.81	≦ 13	Pass
8	5805.00	0.4	≦ 13	Pass

Channel 1:



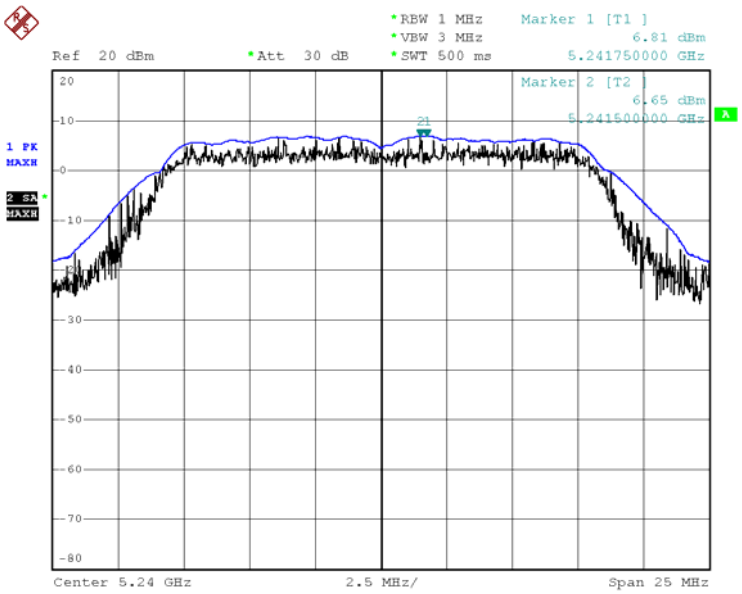
Channel 3:



PN1

Date: 30.MAY.2007 07:33:40

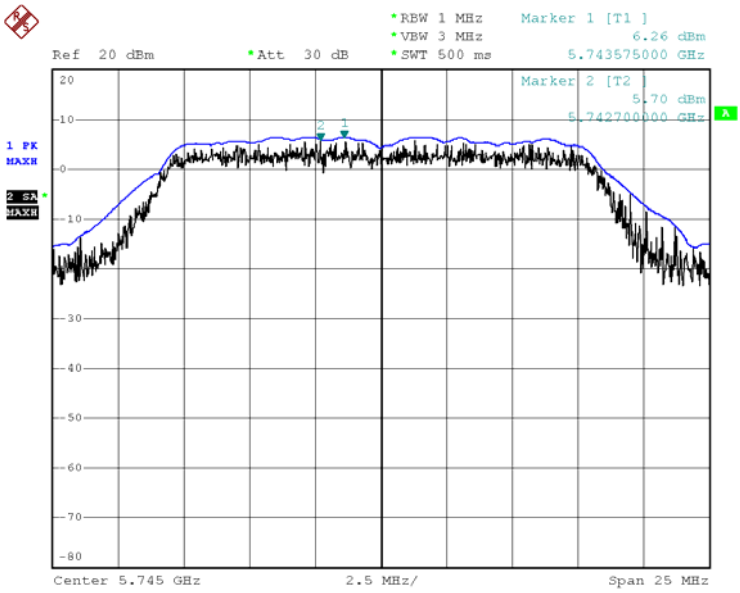
Channel 4:



PN1

Date: 30.MAY.2007 07:34:15

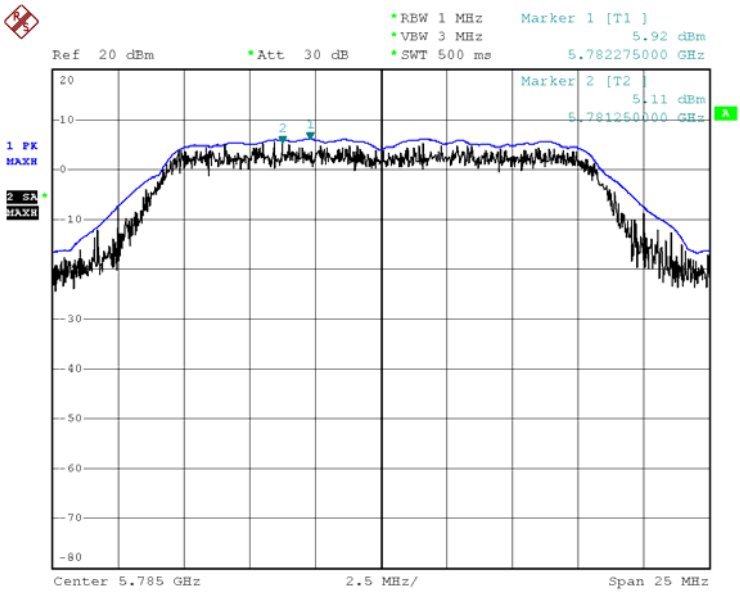
Channel 5:



PN1

Date: 30.MAY.2007 07:35:05

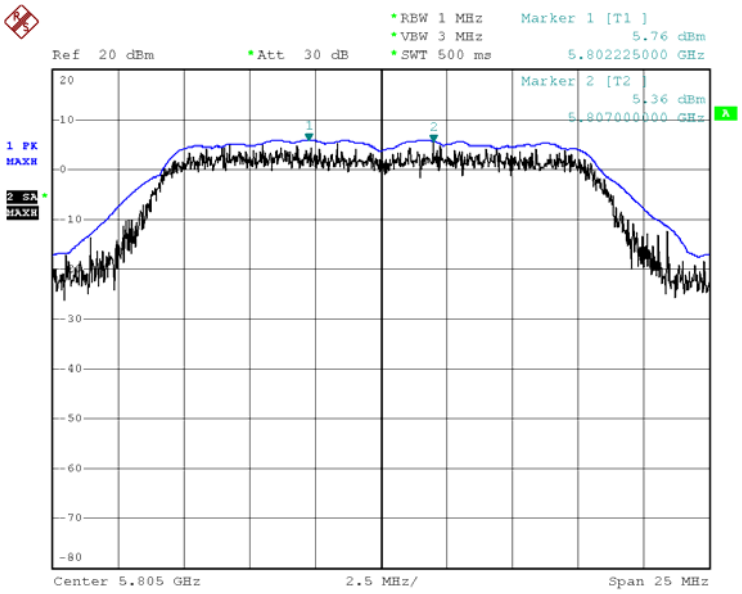
Channel 7:



PN1

Date: 30.MAY.2007 07:35:33

Channel 8:



PN1

Date: 30.MAY.2007 07:35:58

6. Undesirable Emission

6.1. Test Equipment

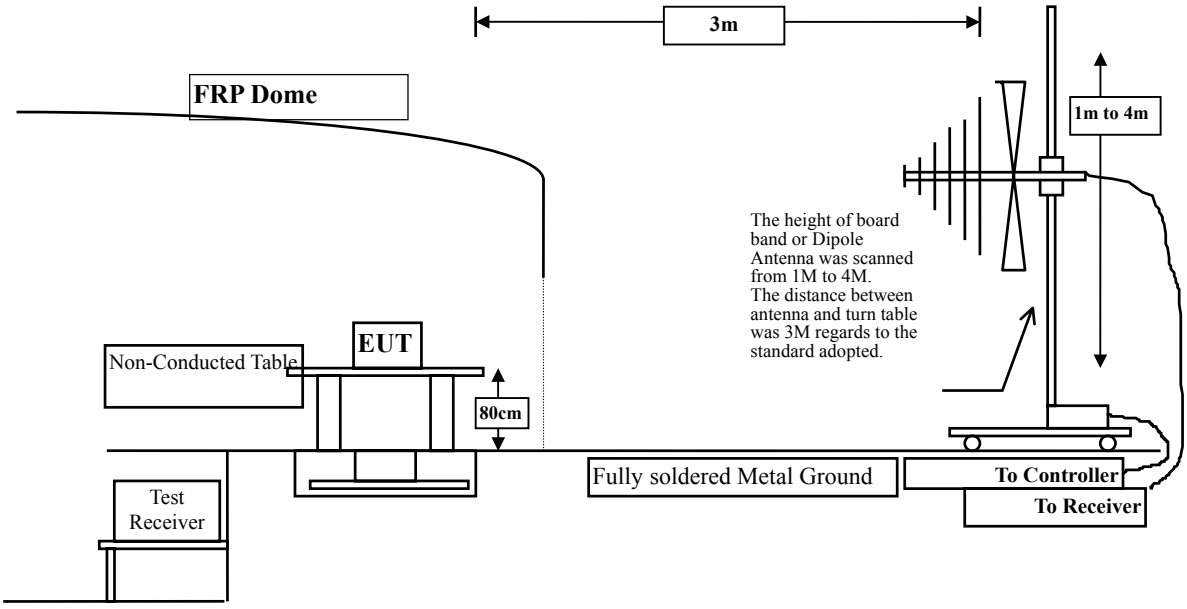
The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 3	X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2007
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2007
	X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
	X	Horn Antenna	ETS	3115 / 0005-6160	July, 2006
	X	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2006

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

(1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of –27 dBm/MHz in the 5.15-5.25 GHz band.

(3) For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of –17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of –27 dBm/MHz.

(4) The field strength of emissions appearing within restricted bands of operation shall not exceed the limits in the Section 15.209.

(5) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209:

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks : 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)

2. In the Above Table, the tighter limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

6.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:2003 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.

6.5. Uncertainty

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

6.6. Test Result of Undesirable Emission

Product : Wireless to Serial Device Server
Test Item : Undesirable Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5180MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector					
10360.000	12.977	33.213	46.189	-27.811	74.000
15540.000	15.276	32.384	47.659	-26.341	74.000
Average Detector					
--					
Vertical					
Peak Detector					
10360.000	12.977	32.873	45.849	-28.151	74.000
15540.000	15.276	33.019	48.294	-25.706	74.000
Average Detector					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz.
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz.
4. Measurement 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 to Serial Device Server
Test Item : Undesirable Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5220MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector					
10440.000	13.218	32.156	45.373	-28.627	74.000
15660.000	14.994	33.314	48.308	-25.692	74.000
Average Detector					
--					
Vertical					
Peak Detector					
10440.000	13.218	33.369	46.586	-27.414	74.000
15660.000	14.994	32.575	47.569	-26.431	74.000
Average Detector					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz.
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz.
4. Measurement 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 to Serial Device Server
Test Item : Undesirable Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5240MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector					
10480.000	13.343	32.812	46.154	-27.846	74.000
15720.000	14.730	32.632	47.361	-26.639	74.000
Average Detector					
--					
Vertical					
Peak Detector					
10480.000	13.343	33.100	46.442	-27.558	74.000
15720.000	14.730	32.703	47.432	-26.568	74.000
Average Detector					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz。
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz。
4. Measurement 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 to Serial Device Server
Test Item : Undesirable Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5745Hz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector					
11490.000	15.526	32.206	47.731	-26.269	74.000
17235.000	14.291	32.333	46.624	-27.376	74.000
Average Detector					
--					
Vertical					
Peak Detector					
11490.000	15.526	33.438	48.963	-25.037	74.000
17235.000	14.291	32.561	46.852	-27.148	74.000
Average Detector					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz。
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz。
4. Measurement 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 to Serial Device Server
Test Item : Undesirable Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5785MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector					
11570.000	14.910	32.687	47.596	-26.404	74.000
17355.000	14.144	32.174	46.319	-27.681	74.000
Average Detector					
--					
Vertical					
Peak Detector					
11570.000	14.910	32.166	47.075	-26.925	74.000
17355.000	14.144	31.962	46.107	-27.893	74.000
Average Detector					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz。
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz。
4. Measurement 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 to Serial Device Server
Test Item : Undesirable Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5805MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector					
11610.000	14.674	33.180	47.854	-26.146	74.000
17415.000	14.047	33.063	47.110	-26.890	74.000
Average Detector					
--					
Vertical					
Peak Detector					
11610.000	14.674	32.309	46.983	-27.017	74.000
17415.000	14.047	32.898	46.945	-27.055	74.000
Average Detector					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz。
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz。
4. Measurement 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 to Serial Device Server
Test Item : Undesirable Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5220MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector					
287.050	13.473	19.892	33.365	-12.635	46.000
381.625	15.715	27.544	43.259	-2.741	46.000
481.050	18.786	24.479	43.265	-2.735	46.000
575.625	19.517	20.128	39.645	-6.355	46.000
750.225	21.085	19.195	40.280	-5.720	46.000
767.200	22.117	18.730	40.847	-5.153	46.000
Vertical					
Peak Detector					
226.425	10.799	16.886	27.685	-18.315	46.000
287.050	13.637	13.732	27.369	-18.631	46.000
384.050	16.822	25.976	42.798	-3.202	46.000
481.050	18.586	15.305	33.891	-12.109	46.000
750.225	23.184	11.144	34.328	-11.672	46.000
767.200	22.767	8.509	31.276	-14.724	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
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 to Serial Device Server
Test Item : Undesirable Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5785MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector					
381.625	15.715	27.844	43.559	-2.441	46.000
401.025	16.644	23.611	40.255	-5.745	46.000
481.050	18.786	23.730	42.516	-3.484	46.000
575.625	19.517	20.871	40.388	-5.612	46.000
750.225	21.085	18.058	39.143	-6.857	46.000
767.200	22.117	17.740	39.857	-6.143	46.000
Vertical					
Peak Detector					
148.825	10.521	21.328	31.849	-11.651	43.500
287.050	13.637	16.001	29.638	-16.362	46.000
384.050	16.822	25.604	42.426	-3.574	46.000
481.050	18.586	16.382	34.968	-11.032	46.000
750.225	23.184	11.698	34.882	-11.118	46.000
961.200	23.009	12.790	35.799	-18.201	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
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.

7. Band Edge

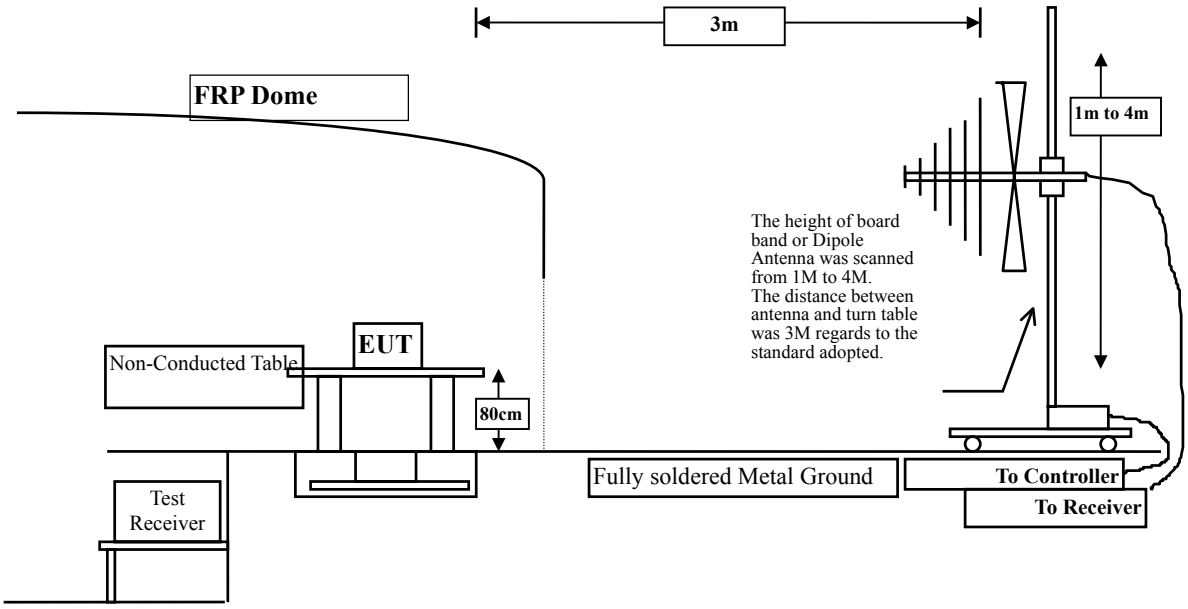
7.1. Test Equipment

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

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 3	X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2007
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2007
	X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
	X	Horn Antenna	ETS	3115 / 0005-6160	July, 2006
	X	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2006

7.2. Test Setup

RF Radiated Measurement:



7.3. Limits

The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

Radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209:

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks : 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)

2. In the Above Table, the tighter limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

7.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.
The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:1992 on radiated measurement.
The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz.

7.5. Uncertainty

± 3.8 dB below 1GHz

± 3.9 dB above 1GHz

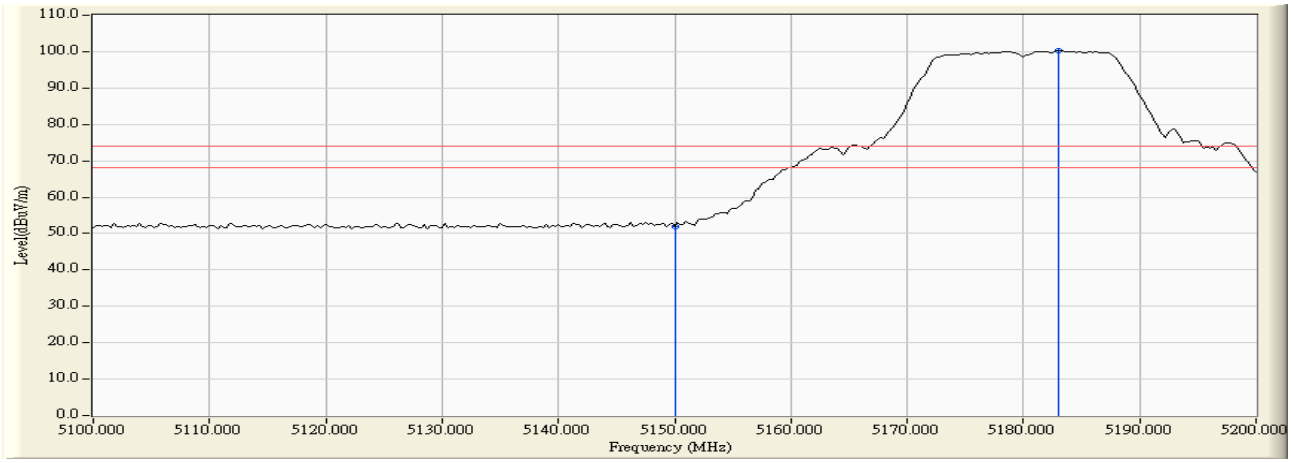
7.6. Test Result of Band Edge

Product : Wireless to Serial Device Server
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5180MHz)

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)	5150.000	4.305	47.629	51.934	74.00	54.00	Pass
1 (Average)	--	--	--	--	74.00	54.00	Pass

Figure Channel 1: **Horizontal** (Peak)



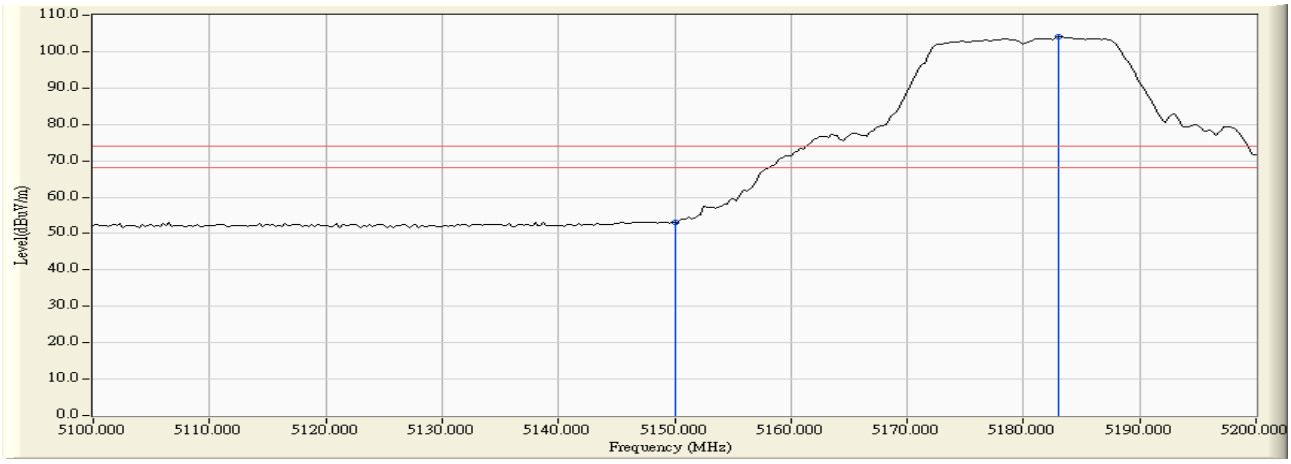
Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : Wireless to Serial Device Server
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5180MHz)

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)	5150.000	4.305	48.663	52.968	74.00	54.00	Pass
1 (Average)	--	--	--	--	74.00	54.00	Pass

Figure Channel 1: **Vertical** (Peak)



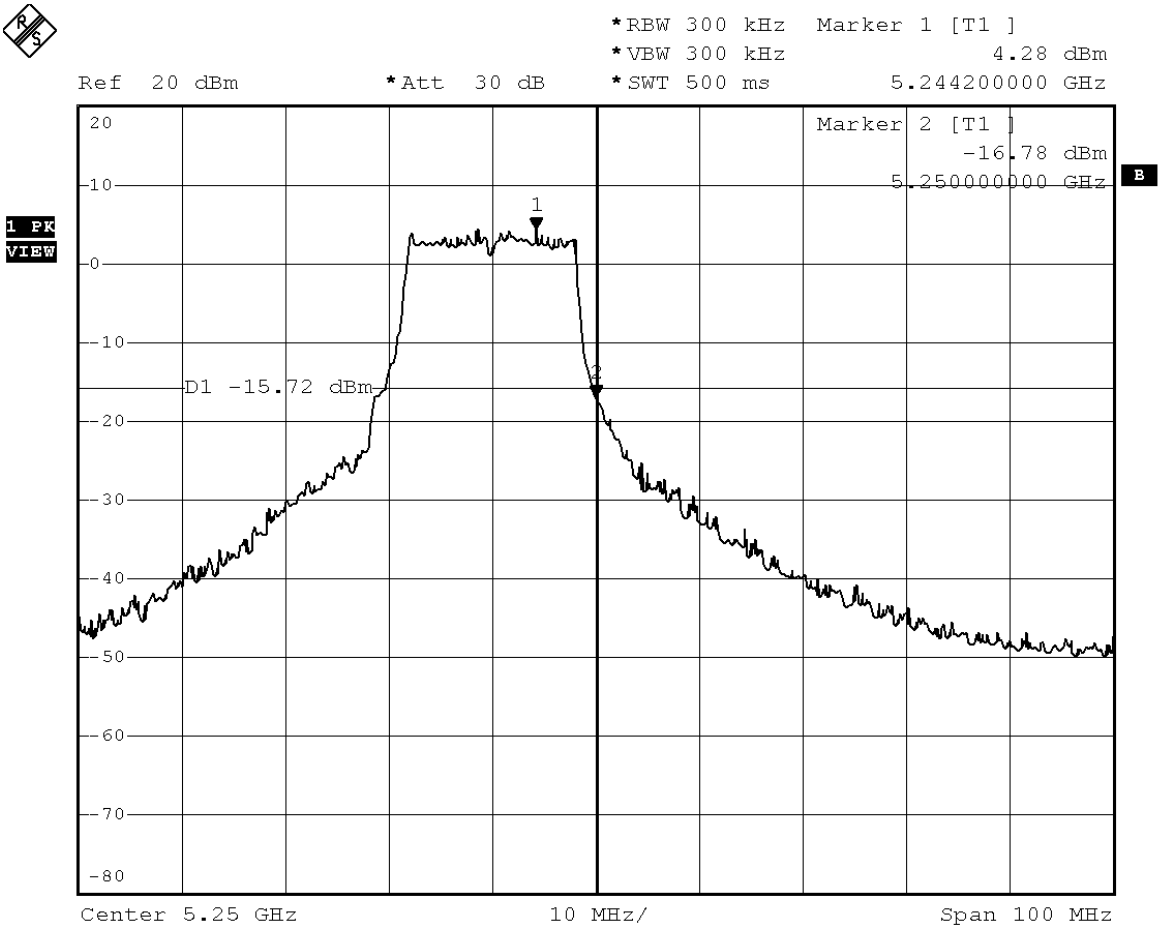
Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : Wireless to Serial Device Server
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5240MHz)

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
4	>5250	>20	Pass

RF Conduction Measurement:

Figure Channel 4:



PN1

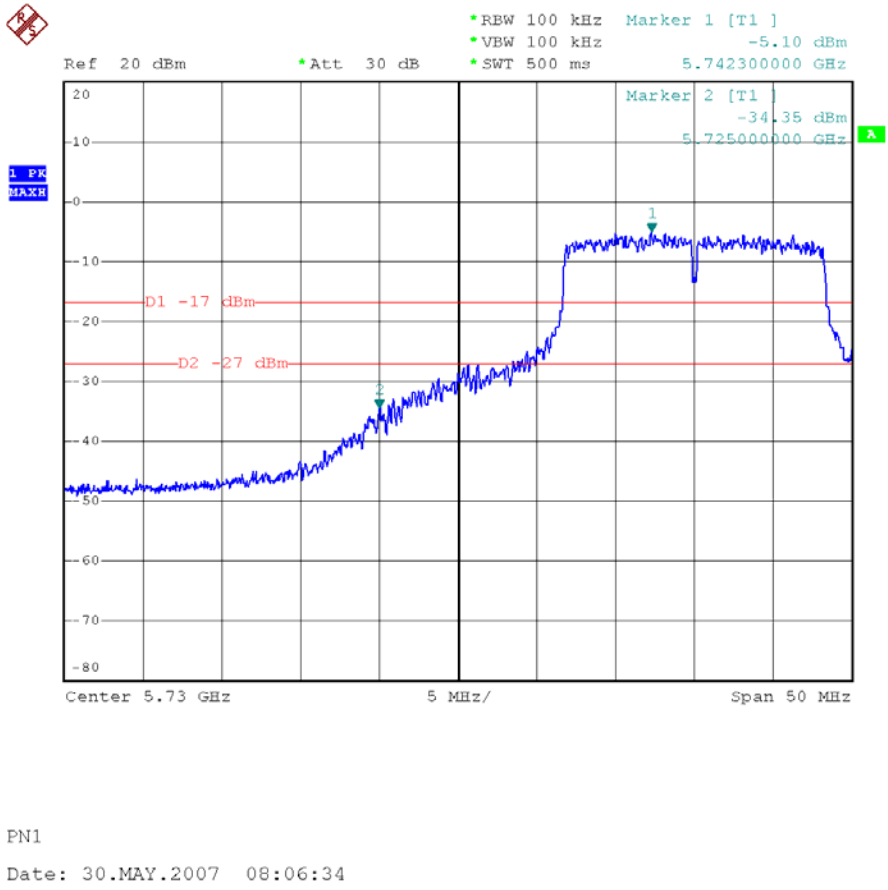
Date: 21.JUN.2007 17:28:14

Note: RBW=300kHz, VBW=300kHz, Sweep=500ms

Product : Wireless to Serial Device Server
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5745MHz)

RF Conduction Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
5	<5725	>20	Pass

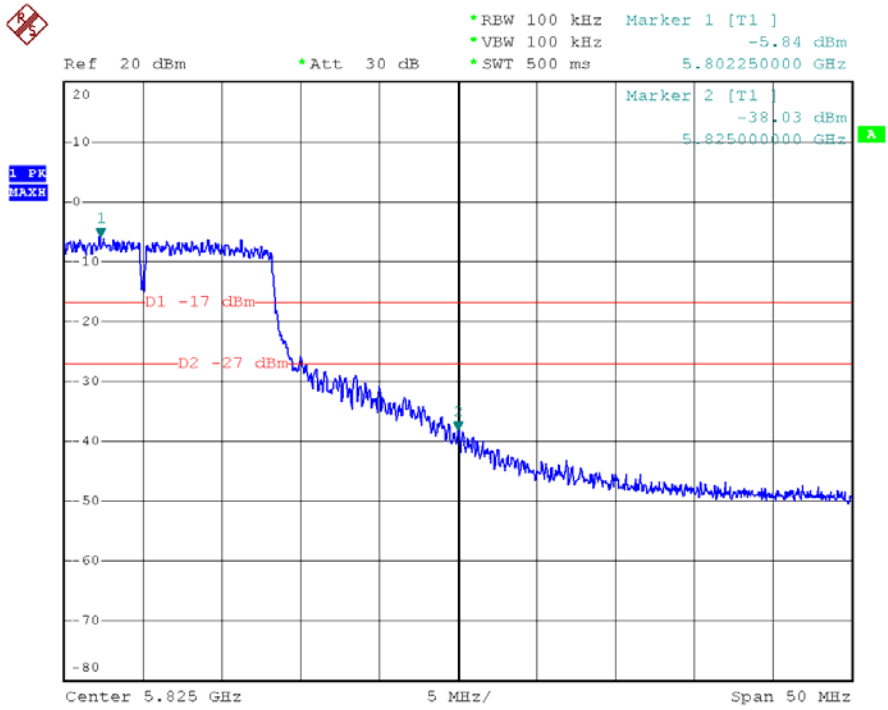


Note: RBW=100kHz, VBW=100kHz, Sweep=500ms

Product : Wireless to Serial Device Server
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5805MHz)

RF Conduction Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
8	>5825	>20	Pass



Note: RBW=100kHz, VBW=100kHz, Sweep=500ms

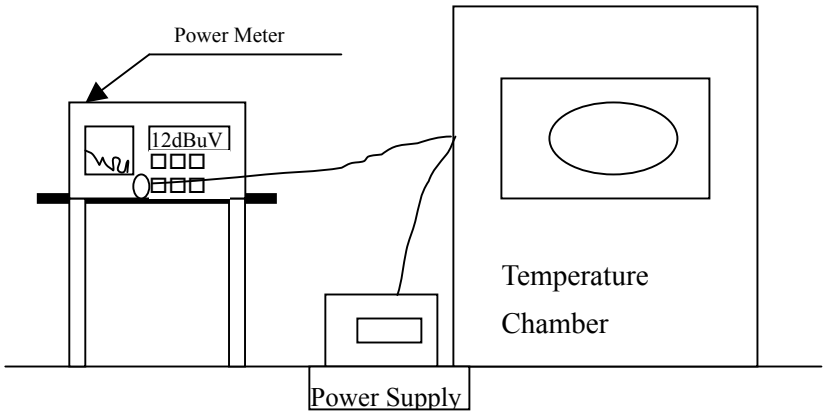
8. Frequency Stability

8.1. Test Equipment

Equipment	Manufacturer	Model No./Serial No.	Last Cal.	Remark
Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007	
Temperature Chamber	WIT GROUP	TH-1S-B / WIT-02121901	June, 2006	

Note: All equipments are calibrated every one year.

8.2. Test Setup



8.3. Limits

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified

8.4. Uncertainty

± 150 Hz

8.5. Test Result of Frequency Stability

Product : Wireless to Serial Device Server
Test Item : Frequency Stability
Test Site : Temperature Chamber
Test Mode : Mode 1: Transmitter 802.11a

Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	△F (MHz)
Tnom (20) °C	Vnom (110)V	1	5180.00	5180.00	0.00
		3	5220.00	5220.00	0.00
		4	5240.00	5240.00	0.00
		5	5745.00	5745.00	0.00
		7	5785.00	5785.00	0.00
		8	5805.00	5805.00	0.00
Tmax (50) °C	Vmax (126.5)V	1	5180.00	5180.00	0.00
		3	5220.00	5220.00	0.00
		4	5240.00	5240.00	0.00
		5	5745.00	5745.00	0.00
		7	5785.00	5785.00	0.00
		8	5805.00	5805.00	0.00
Tmax (50) °C	Vnim (93.5)V	1	5180.00	5180.00	0.00
		3	5220.00	5220.00	0.00
		4	5240.00	5240.00	0.00
		5	5745.00	5745.00	0.00
		7	5785.00	5785.00	0.00
		8	5805.00	5805.00	0.00
Tnim (0) °C	Vmax (126.5)V	1	5180.00	5180.00	0.00
		3	5220.00	5220.00	0.00
		4	5240.00	5240.00	0.00
		5	5745.00	5745.00	0.00
		7	5785.00	5785.00	0.00
		8	5805.00	5805.00	0.00
Tnim (0) °C	Vnim (93.5)V	1	5180.00	5180.00	0.00
		3	5220.00	5220.00	0.00
		4	5240.00	5240.00	0.00
		5	5745.00	5745.00	0.00
		7	5785.00	5785.00	0.00
		8	5805.00	5805.00	0.00

9. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs