Test Report

Product Name : 2G Wireless NPort

Model No : NPort W2150 Plus, NPort W2250 Plus

FCC ID : SLEW2250Plus

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 : March 13, 2007

Issued Date : April 07, 2007

Report No. : 073L065-RFUSP08V01

Test Report Certification

Issued Date: April 07, 2007
Rport No.: 073L065-RFUSP08V01

Product Name	:	2G Wireless NPort
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.	:	NPort W2150 Plus, NPort W2250 Plus
FCC ID.	:	SLEW2250Plus
Rated Voltage	:	AC 120V/60Hz
Working Voltage	:	DC 12V
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

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

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

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

Approved By : Gene Chang
(President /Gene Chang)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	:	2G Wireless NPort
Trade Name	:	Moxa
FCC ID.	:	SLEW2250Plus
Model No.	:	NPort W2150 Plus, NPort W2250 Plus
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”
Power Adapter	:	MFR: BLANCE, M/N: GPSA-1200120 Input: AC 100-240V, 50-60Hz, 0.5A Output: DC 12V-1.2A Cable out: Non-Shielded, 1.9m with one ferrite core bonded.

Antenna List

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

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 2G Wireless NPort 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 2G Wireless NPort 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 2G Wireless NPort, 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, IEEE 802.11g, and IEEE 802.11a network.

Test Mode	Mode 1: Transmitter 802.11a

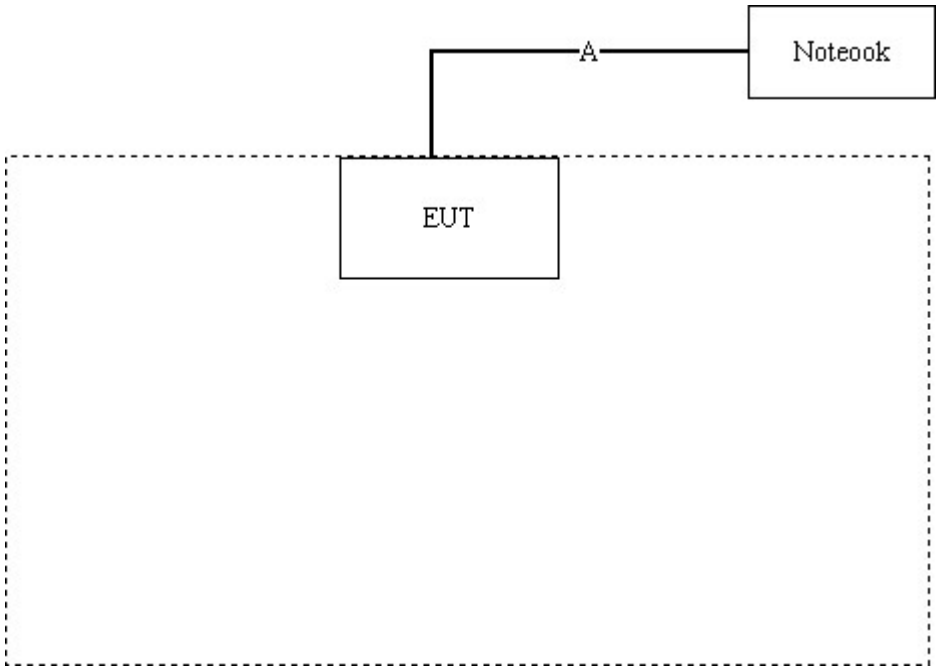
1.3. Tested System Datails

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 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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2. Conducted Emission

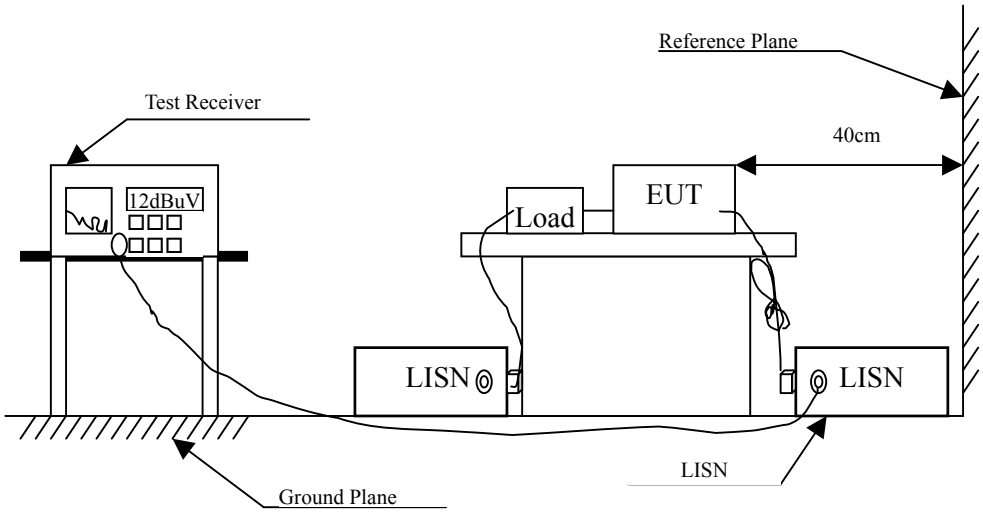
2.1. Test Equipment

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 : 2G Wireless NPort
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	40.390	41.060	-23.597	64.657
0.267	0.306	31.740	32.046	-30.611	62.657
0.327	0.300	29.810	30.110	-30.833	60.943
0.397	0.300	31.050	31.350	-27.593	58.943
0.457	0.300	19.680	19.980	-37.249	57.229
0.527	0.300	37.520	37.820	-18.180	56.000
Average					
0.197	0.670	39.780	40.450	-14.207	54.657
0.267	0.306	29.950	30.256	-22.401	52.657
0.327	0.300	27.700	28.000	-22.943	50.943
0.397	0.300	30.310	30.610	-18.333	48.943
0.457	0.300	18.790	19.090	-28.139	47.229
0.527	0.300	34.380	34.680	-11.320	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 : 2G Wireless NPort
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					
0.201	0.300	38.580	38.880	-25.663	64.543
0.261	0.300	30.680	30.980	-31.849	62.829
0.331	0.301	32.490	32.791	-28.038	60.829
0.391	0.310	23.710	24.020	-35.094	59.114
0.461	0.310	27.430	27.740	-29.374	57.114
0.531	0.310	35.680	35.990	-20.010	56.000
Average					
0.201	0.300	37.850	38.150	-16.393	54.543
0.261	0.300	28.850	29.150	-23.679	52.829
0.331	0.301	30.450	30.751	-20.078	50.829
0.391	0.310	22.970	23.280	-25.834	49.114
0.461	0.310	26.630	26.940	-20.174	47.114
0.531	0.310	32.480	32.790	-13.210	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 : 2G Wireless NPort
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	40.610	41.280	-23.377	64.657
0.267	0.306	31.470	31.776	-30.881	62.657
0.327	0.300	30.560	30.860	-30.083	60.943
0.397	0.300	31.020	31.320	-27.623	58.943
0.457	0.300	20.690	20.990	-36.239	57.229
0.527	0.300	37.820	38.120	-17.880	56.000
Average					
0.197	0.670	39.970	40.640	-14.017	54.657
0.267	0.306	29.730	30.036	-22.621	52.657
0.327	0.300	28.520	28.820	-22.123	50.943
0.397	0.300	30.240	30.540	-18.403	48.943
0.457	0.300	19.610	19.910	-27.319	47.229
0.527	0.300	34.540	34.840	-11.160	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 : 2G Wireless NPort
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	40.630	40.930	-23.727	64.657
0.267	0.300	31.490	31.790	-30.867	62.657
0.327	0.300	30.820	31.120	-29.823	60.943
0.397	0.310	30.960	31.270	-27.673	58.943
0.457	0.310	21.400	21.710	-35.519	57.229
0.527	0.310	37.820	38.130	-17.870	56.000
Average					
0.197	0.300	40.010	40.310	-14.347	54.657
0.267	0.300	29.800	30.100	-22.557	52.657
0.327	0.300	28.850	29.150	-21.793	50.943
0.397	0.310	30.240	30.550	-18.393	48.943
0.457	0.310	20.370	20.680	-26.549	47.229
0.527	0.310	34.790	35.100	-10.900	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 Transmit Power

3.1. Test Equipment

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

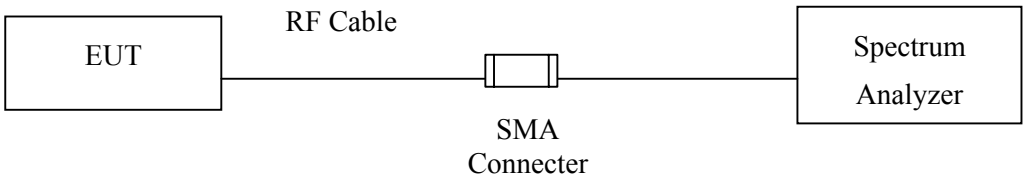
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007

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

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

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 : 2G Wireless NPort
Test Item : Peak Transmit Power
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5180MHz)

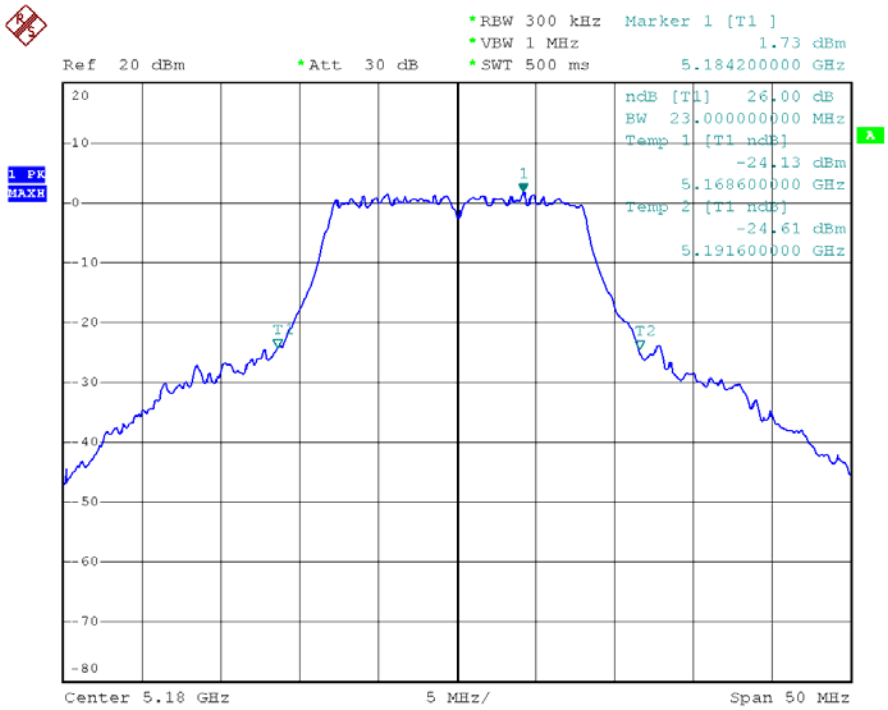
Peak Transmit Power Measurement:

Channel No.	Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	Measurement Level (dBm)
1	5180	23	16.49

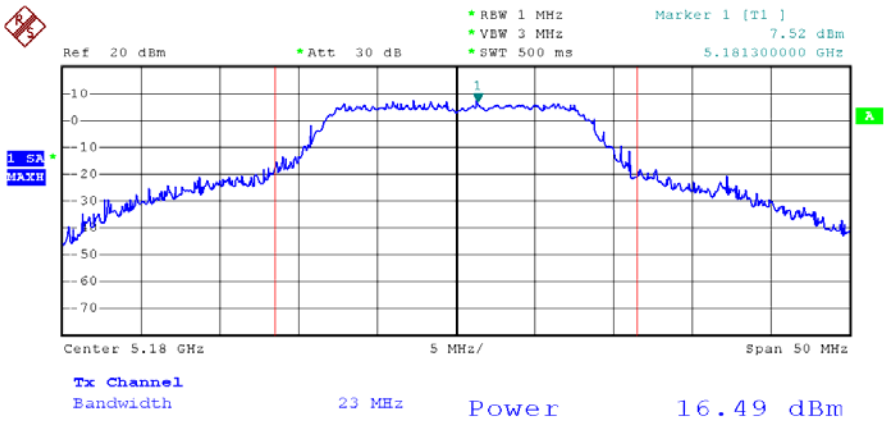
Limits (dBm)	Result
50mW (17dBm) or 4dBm+10 log (B= 23MHz)=17.62dBm	Pass

26dBc Occupied Bandwidth:

Channel 1



Peak Transmit Power:
Channel 1



PN1

Date: 10.MAY.2007 07:11:41

Product : 2G Wireless NPort
Test Item : Peak Transmit Power
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5220MHz)

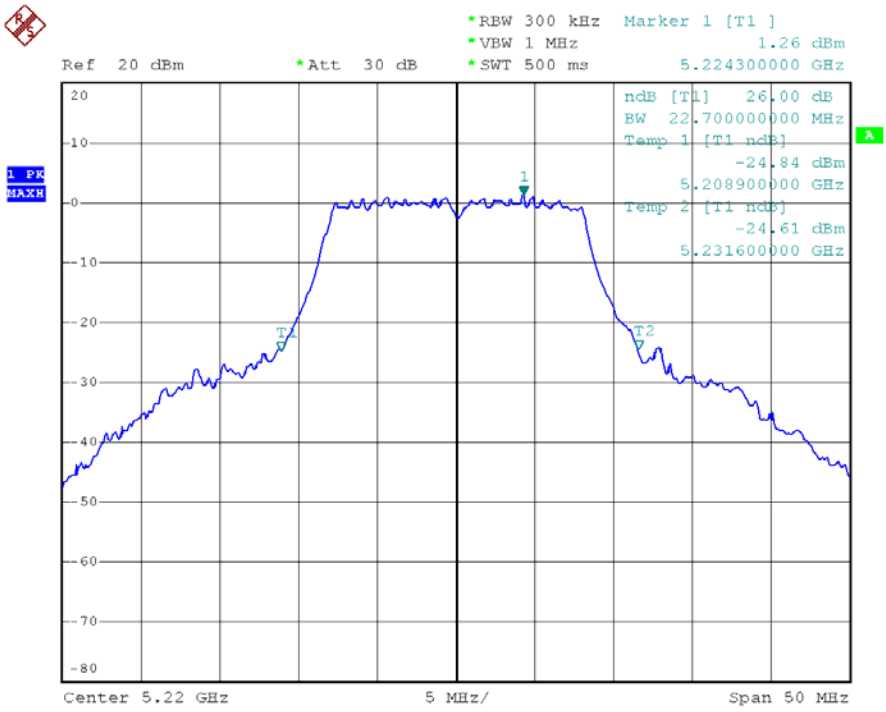
Peak Transmit Power Measurement:

Channel No.	Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	Measurement Level (dBm)
3	5220	22.7	16.45

Limits (dBm)	Result
50mW (17dBm) or 4dBm+10 log (B= 22.7MHz)=17.56dBm	Pass

26dBc Occupied Bandwidth:

Channel 3



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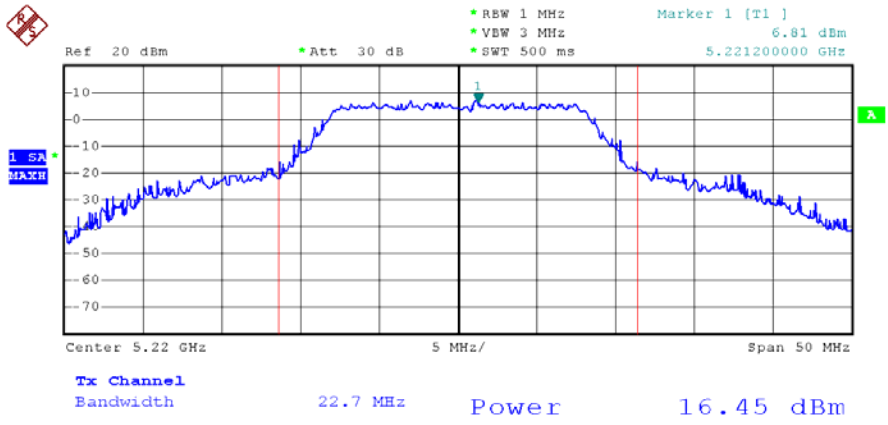
Peak Transmit Power:

Channel 3



PN1

Date: 10.MAY.2007 07:13:23

Product : 2G Wireless NPort
Test Item : Peak Transmit Power
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5240MHz)

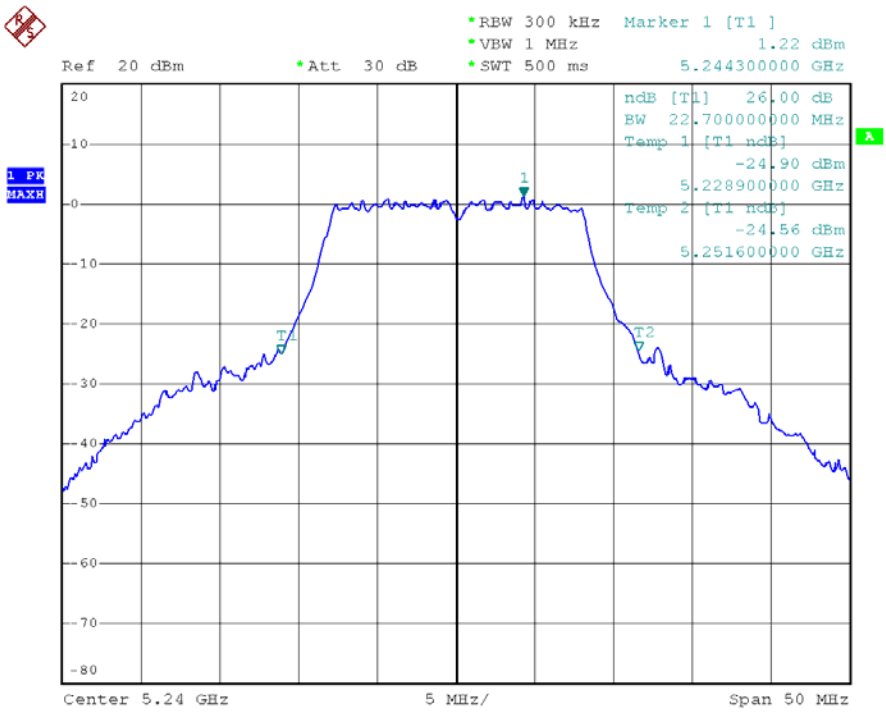
Peak Transmit Power Measurement:

Channel No.	Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	Measurement Level (dBm)
4	5240	22.7	16.44

Limits (dBm)	Result
50mW (17dBm) or 4dBm+10 log (B=22.7MHz)=17.56dBm	Pass

26dBc Occupied Bandwidth:

Channel 4



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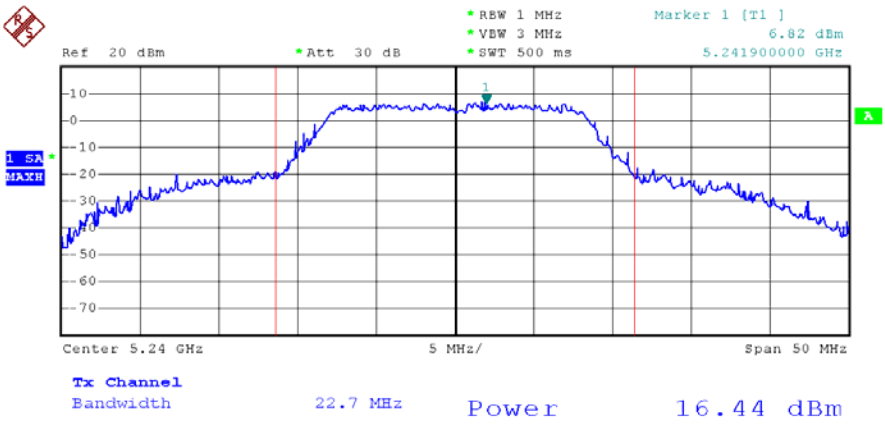
Peak Transmit Power:
Channel 4



PN1

Date: 10.MAY.2007 07:14:52

Product : 2G Wireless NPort
Test Item : Peak Transmit Power
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5745MHz)

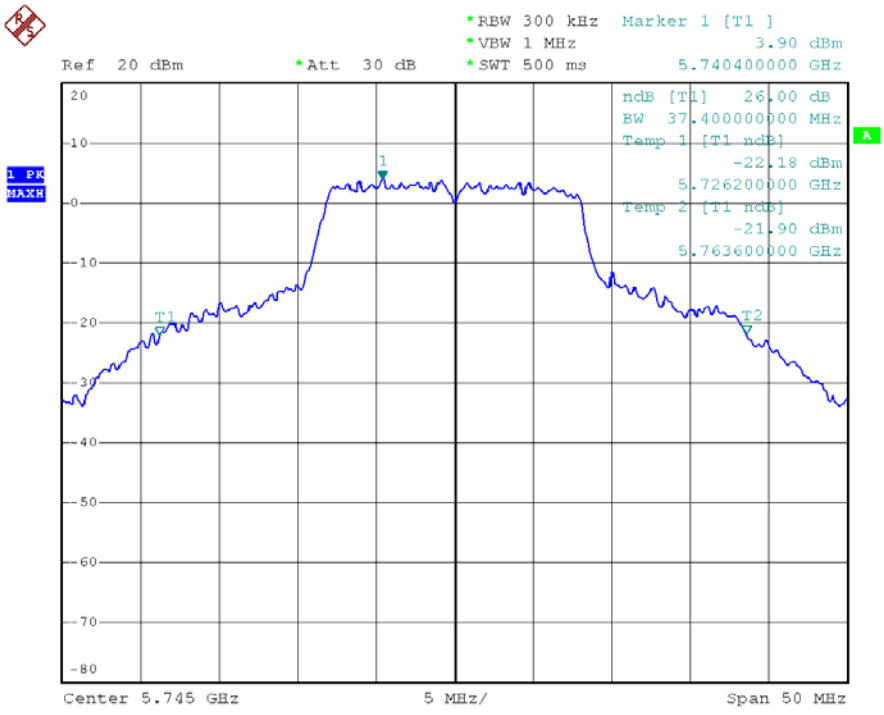
Peak Transmit Power Measurement:

Channel No.	Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	Measurement Level (dBm)
5	5745	37.40	18.66

Limits (dBm)	Result
1W (30dBm) or 17dBm+10 log (B= 37.40MHz)=32.73dBm	Pass

26dBc Occupied Bandwidth:

Channel 9



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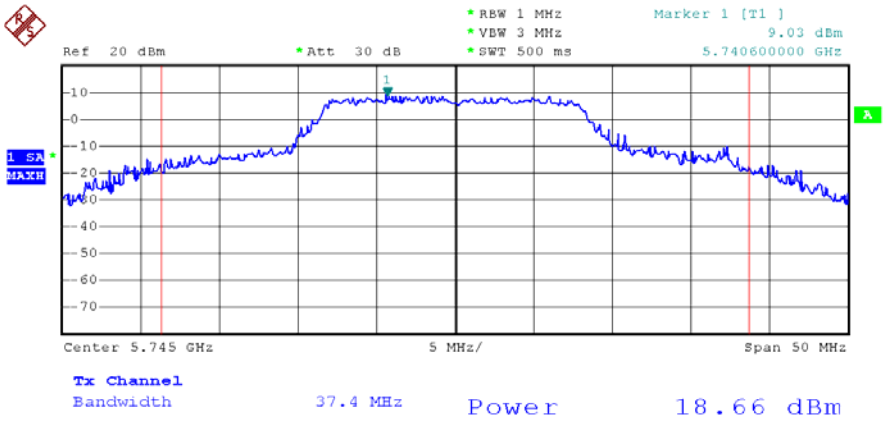
Date: 11.APR.2007 08:04:38

Peak Transmit Power:

Channel 9



PN1

Date: 11.APR.2007 10:52:46

Product : 2G Wireless NPort
Test Item : Peak Transmit Power
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5785MHz)

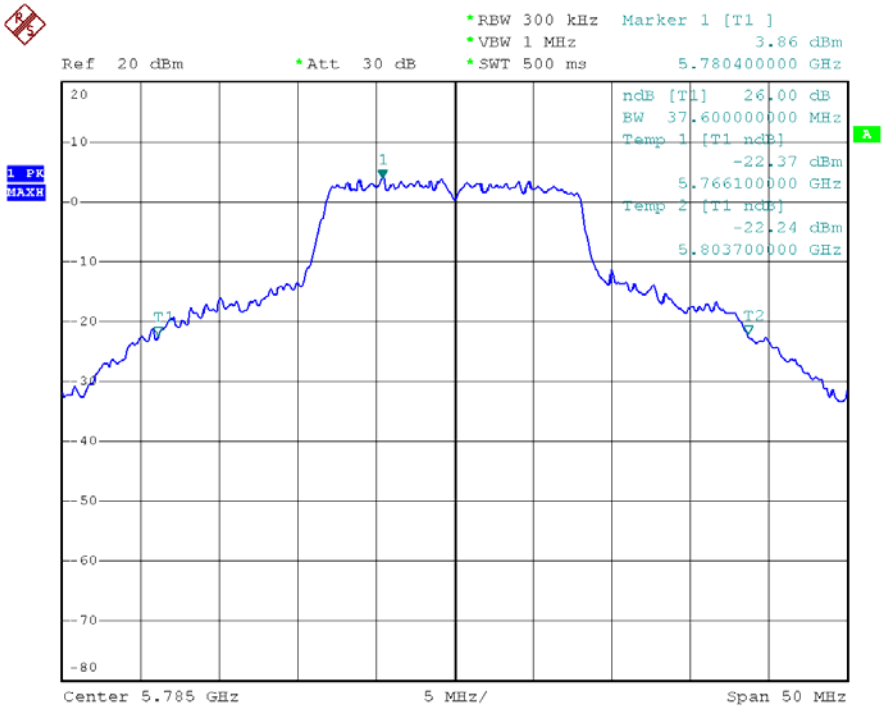
Peak Transmit Power Measurement:

Channel No.	Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	Measurement Level (dBm)
7	5785	37.60	18.48

Limits (dBm)	Result
1W (30dBm) or 17dBm+10 log (B=37.60MHz)=32.75dBm	Pass

26dBc Occupied Bandwidth:

Channel 11



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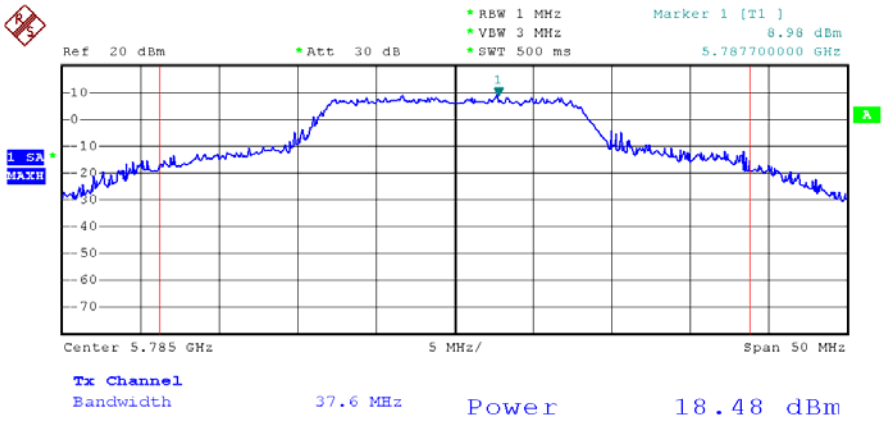
Peak Transmit Power:
Channel 11



PN1

Date: 11.APR.2007 10:55:16

Product : 2G Wireless NPort
Test Item : Peak Transmit Power
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5805MHz)

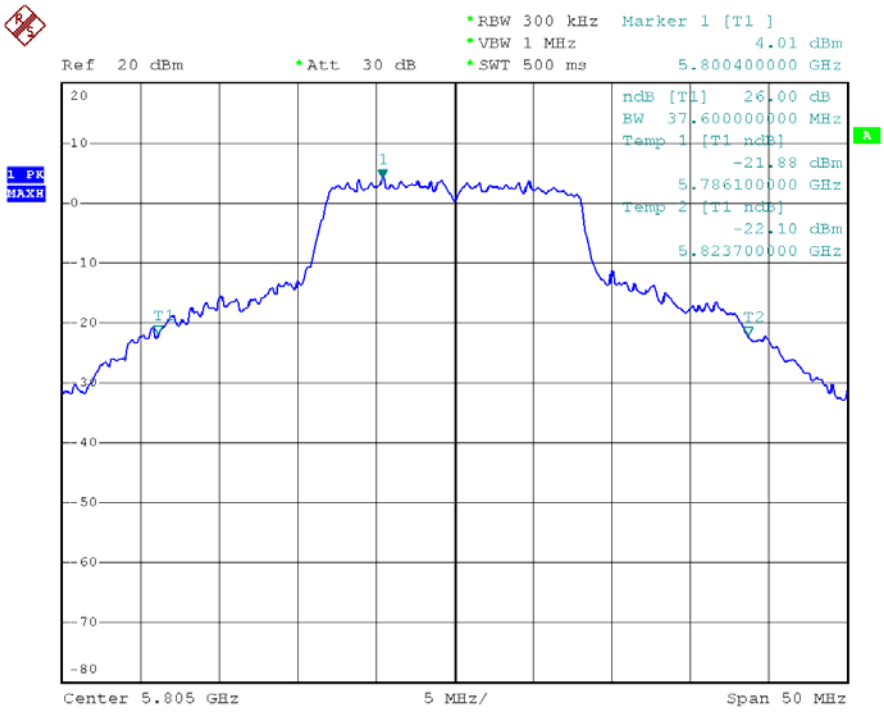
Peak Transmit Power Measurement:

Channel No.	Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	Measurement Level (dBm)
8	5805	37.60	18.63

Limits (dBm)	Result
1W (30dBm) or 17dBm+10 log (B=37.60MHz)=32.75dBm	Pass

26dBc Occupied Bandwidth:

Channel 12



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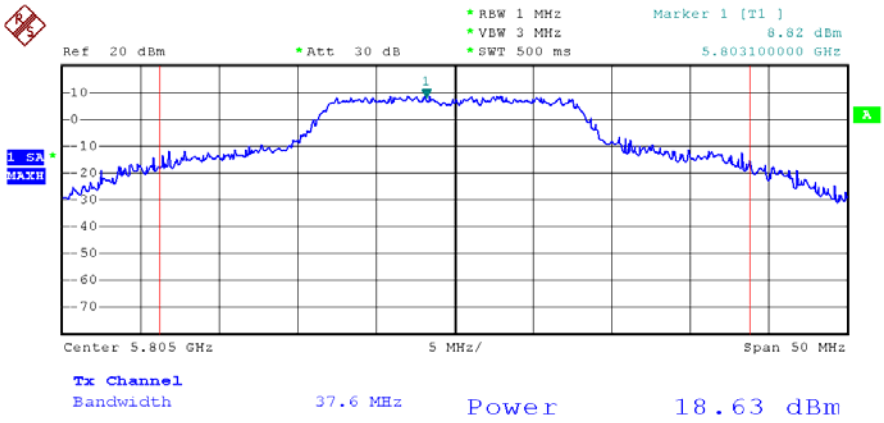
Peak Transmit Power:
Channel 12



PN1

Date: 11.APR.2007 10:56:45

4. Peak Power Spectral Density

4.1. Test Equipment

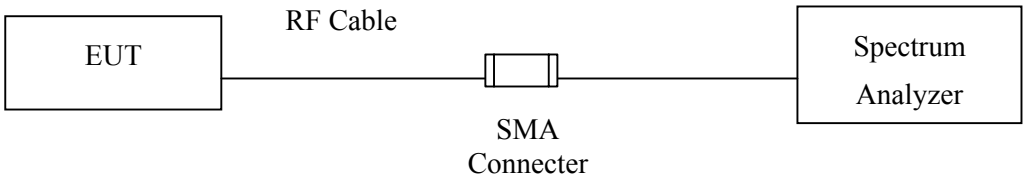
The following test equipments are used during the radiated emission tests:

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

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

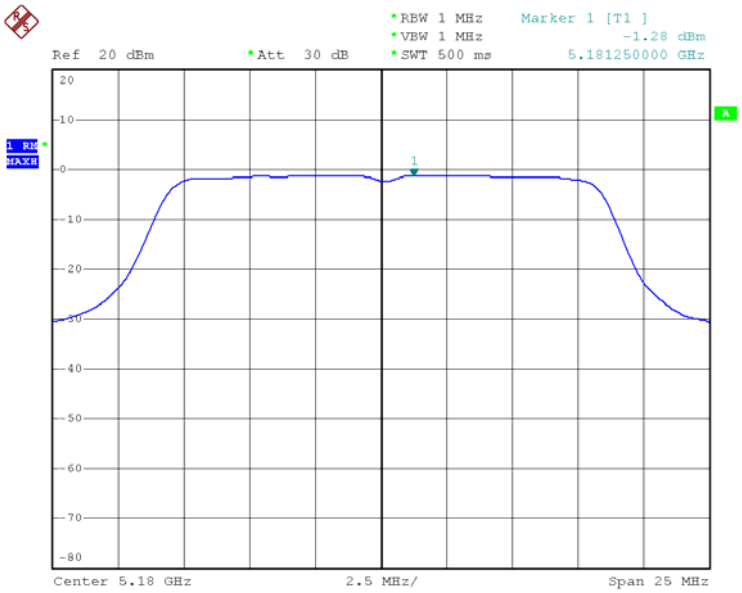
± 1.27 dB

4.5. Test Result of Peak Power Spectral Density

Product : 2G Wireless NPort
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	-1.28	< 4	Pass
3	5220.00	-1.45	< 4	Pass
4	5240.00	-1.47	< 4	Pass
5	5745.00	0.76	< 17	Pass
7	5785.00	0.72	< 17	Pass
8	5805.00	0.80	< 17	Pass

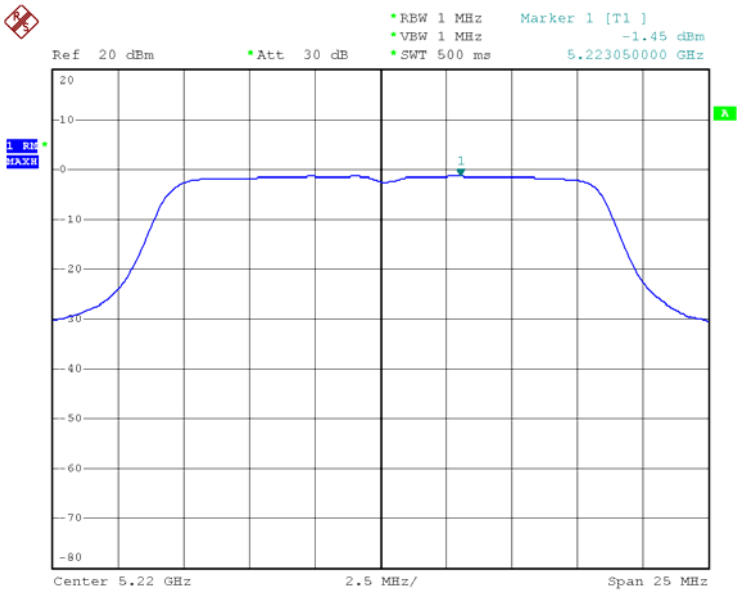
Channel 1:



PN1

Date: 10.MAY.2007 07:16:19

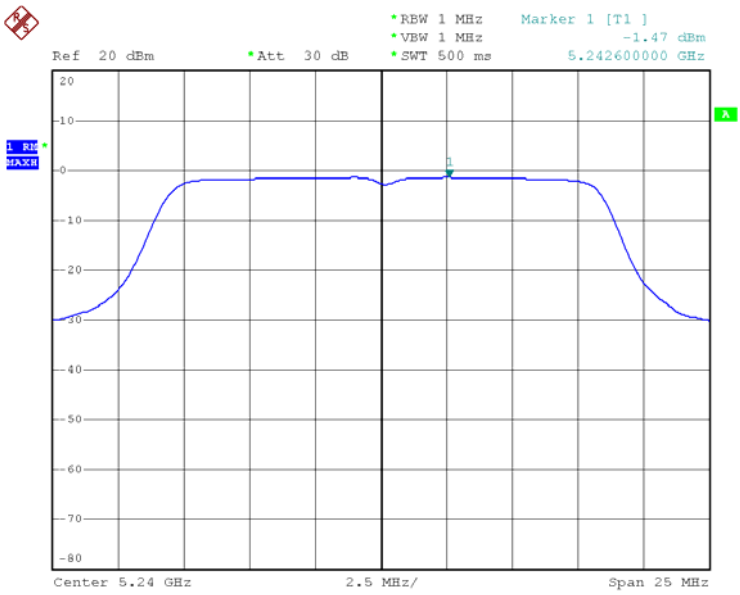
Channel 3:



PN1

Date: 10.MAY.2007 07:16:38

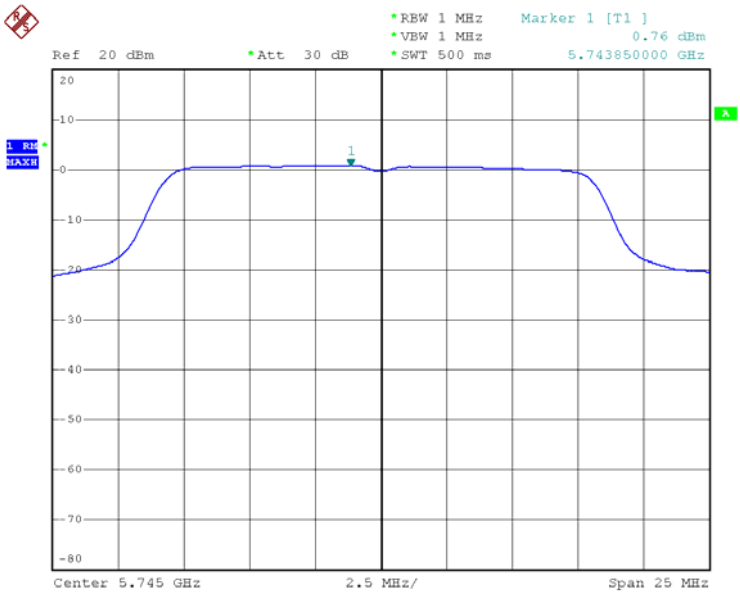
Channel 5:



PN1

Date: 10.MAY.2007 07:17:04

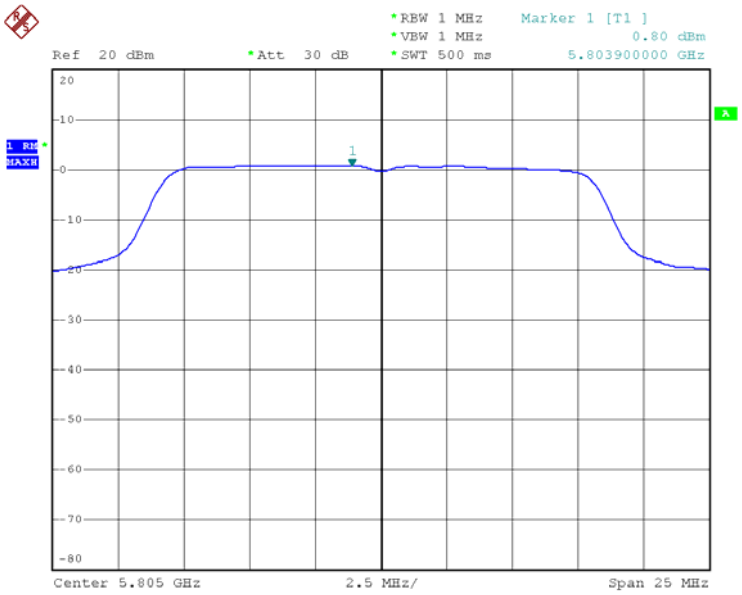
Channel 7:



PN1

Date: 11.APR.2007 11:02:21

Channel 8:



PN1

Date: 11.APR.2007 11:03:20

5. Peak Excursion

5.1. Test Equipment

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

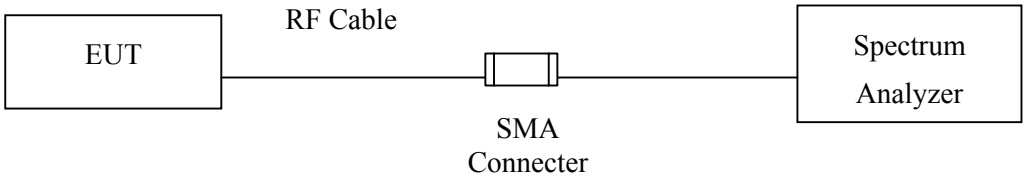
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007

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

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

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

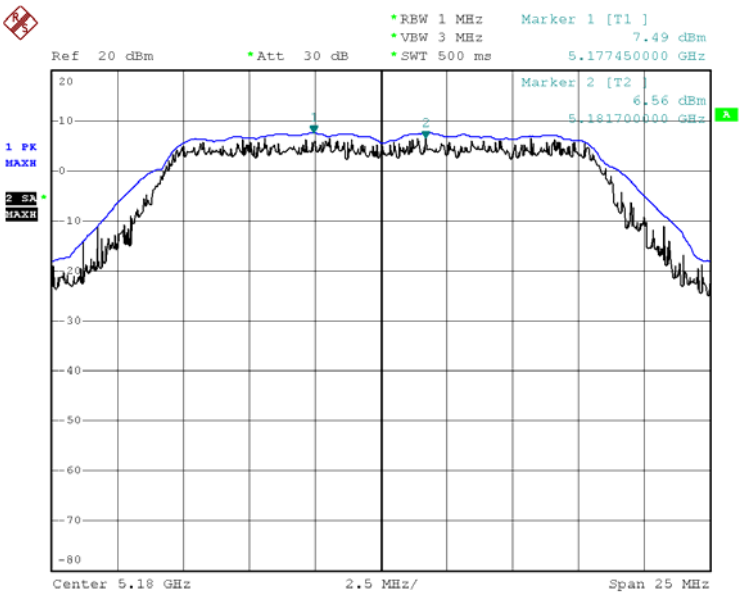
± 1.27 dB

5.5. Test Result of Peak Excursion

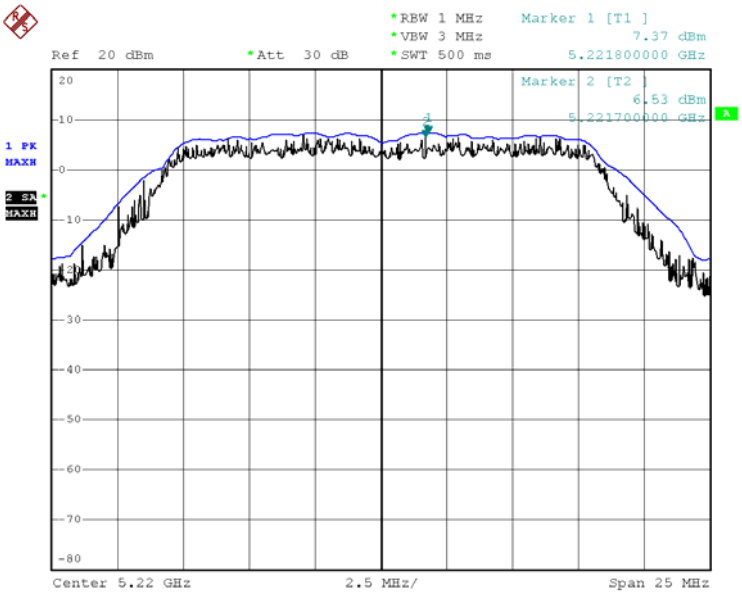
Product : 2G Wireless NPort
Test Item : Peak Excursion
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a

Channel No.	Frequency (MHz)	Measurement Level (dB)	Required Limit (dB)	Result
1	5180.00	0.93	≦ 13	Pass
3	5220.00	0.84	≦ 13	Pass
4	5240.00	0.73	≦ 13	Pass
5	5745.00	0.33	≦ 13	Pass
7	5785.00	0.79	≦ 13	Pass
8	5805.00	0.63	≦ 13	Pass

Channel 1:



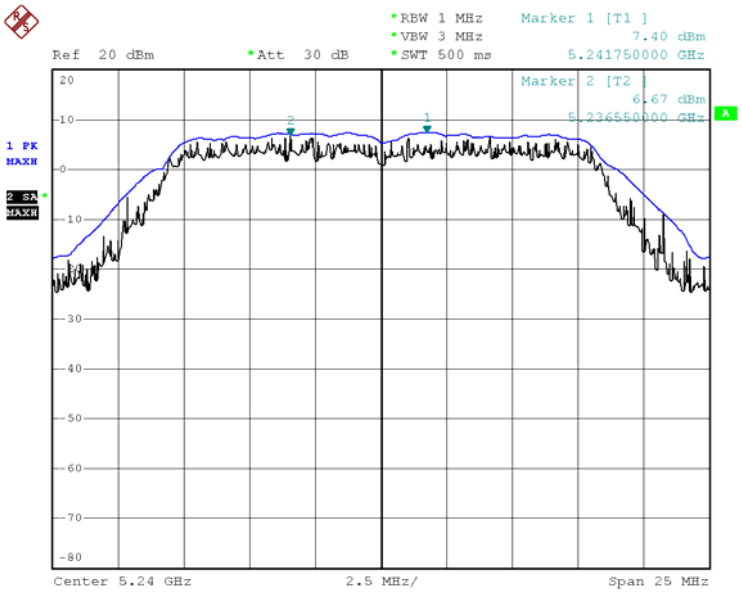
Channel 3:



PN1

Date: 10.MAY.2007 07:35:50

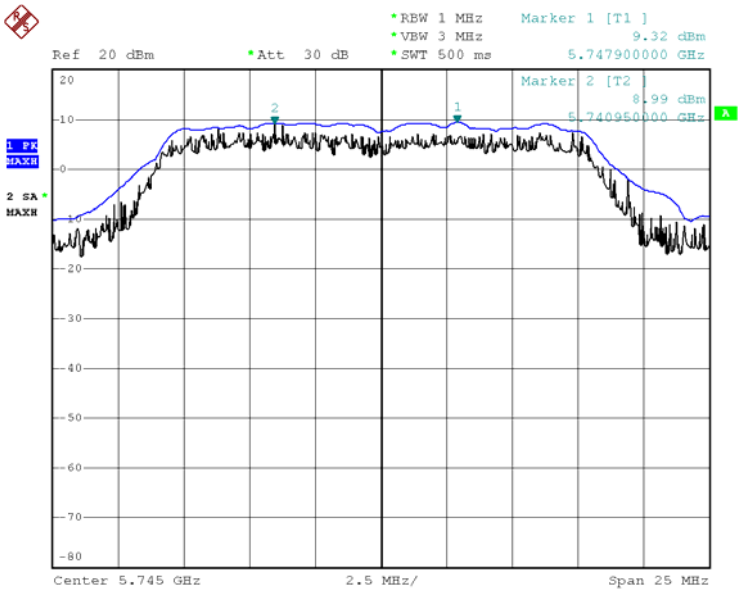
Channel 4:



PN1

Date: 10.MAY.2007 07:37:15

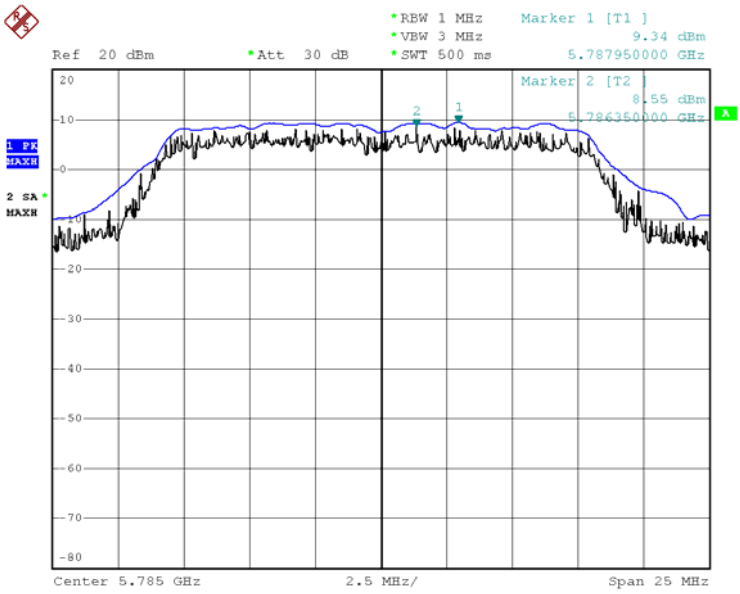
Channel 5:



PN1

Date: 11.APR.2007 11:14:15

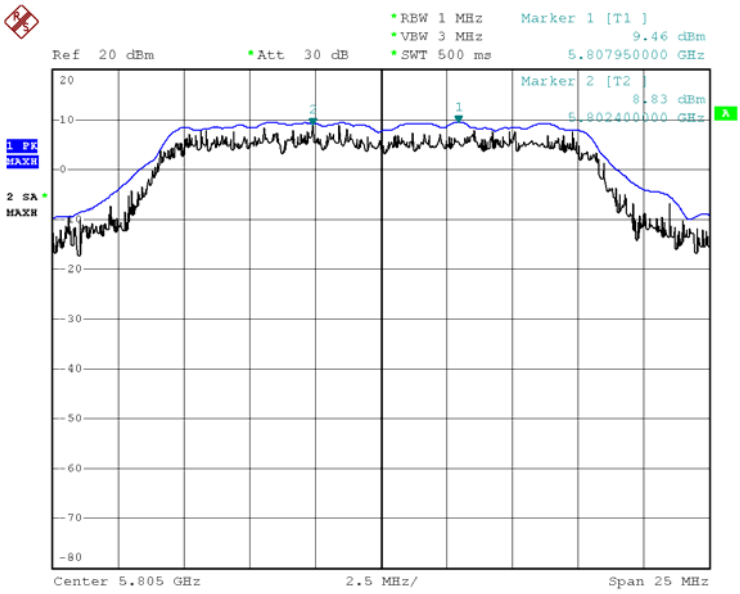
Channel 7:



PN1

Date: 11.APR.2007 11:14:44

Channel 8:



PN1

Date: 11.APR.2007 11:15:08

6. Undesirable Emission

6.1. Test Equipment

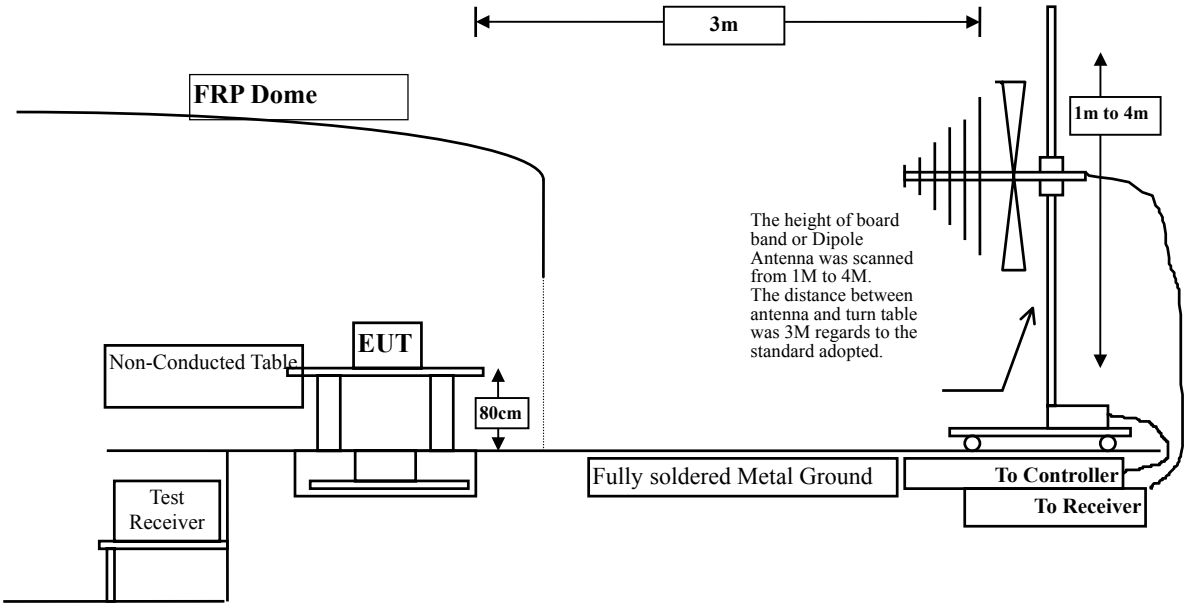
The following test equipment are used during the radiated emission test:

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 : 2G Wireless NPort
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	10.363	42.728	53.091	-20.909	74.000
15540.000	16.803	34.667	51.469	-22.531	74.000
Average Detector					
--					
Vertical					
Peak Detector					
10360.000	10.363	43.084	53.447	-20.553	74.000
15540.000	16.803	34.434	51.236	-22.764	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 : 2G Wireless NPort
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	10.388	42.502	52.890	-21.110	74.000
15660.000	10.804	40.466	51.270	-22.730	74.000
Average Detector					
--					
Vertical					
Peak Detector					
10440.000	41.293	43.377	53.765	-20.235	74.000
15660.000	40.036	40.479	51.283	-22.717	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 : 2G Wireless NPort
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	10.503	42.238	52.741	-21.259	74.000
15720.000	10.636	40.598	51.233	-22.767	74.000
Average Detector					
--					
Vertical					
Peak Detector					
10480.000	10.503	43.448	53.951	-20.049	74.000
15720.000	10.636	40.221	50.856	-23.144	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 : 2G Wireless NPort
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	11.785	41.153	52.938	-21.062	74.000
17235.000	9.933	41.514	51.447	-22.553	74.000
Average Detector					
--					
Vertical					
Peak Detector					
11490.000	11.785	41.969	53.754	-20.246	74.000
17235.000	9.933	41.919	51.852	-22.148	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 : 2G Wireless NPort
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	11.751	41.395	53.146	-20.854	74.000
17355.000	9.662	42.034	51.697	-22.303	74.000
Average Detector					
--					
Vertical					
Peak Detector					
11570.000	11.751	41.902	53.653	-20.347	74.000
17355.000	9.662	41.564	51.227	-22.773	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 : 2G Wireless NPort
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	11.730	41.015	52.745	-21.255	74.000
17415.000	9.527	41.706	51.233	-22.767	74.000
Average Detector					
--					
Vertical					
Peak Detector					
11610.000	11.730	41.554	53.284	-20.716	74.000
17415.000	9.527	40.758	50.285	-23.715	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 : 2G Wireless NPort
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	29.222	42.695	-3.305	46.000
384.050	15.761	25.570	41.331	-4.669	46.000
481.050	18.786	17.055	35.841	-10.159	46.000
672.625	20.659	21.683	42.342	-3.658	46.000
767.200	22.117	15.366	37.483	-8.517	46.000
864.200	22.212	19.448	41.660	-4.340	46.000
Vertical					
Peak Detector					
107.600	11.442	19.359	30.801	-12.699	43.500
287.050	13.637	27.624	41.261	-4.739	46.000
384.050	16.822	15.753	32.575	-13.425	46.000
599.875	21.898	7.984	29.882	-16.118	46.000
672.625	19.955	22.496	42.451	-3.549	46.000
864.200	21.968	8.134	30.102	-15.898	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 : 2G Wireless NPort
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					
287.050	13.473	29.065	42.538	-3.462	46.000
384.050	15.761	25.668	41.429	-4.571	46.000
481.050	18.786	16.593	35.379	-10.621	46.000
672.625	20.659	22.339	42.998	-3.002	46.000
767.200	22.117	15.699	37.816	-8.184	46.000
864.200	22.212	19.556	41.768	-4.232	46.000
Vertical					
Peak Detector					
107.600	11.442	18.586	30.028	-13.472	43.500
287.050	13.637	27.529	41.166	-4.834	46.000
384.050	16.822	15.542	32.364	-13.636	46.000
612.000	21.748	8.761	30.509	-15.491	46.000
672.625	19.955	22.346	42.301	-3.699	46.000
864.200	21.968	8.337	30.305	-15.695	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.

7. Band Edge

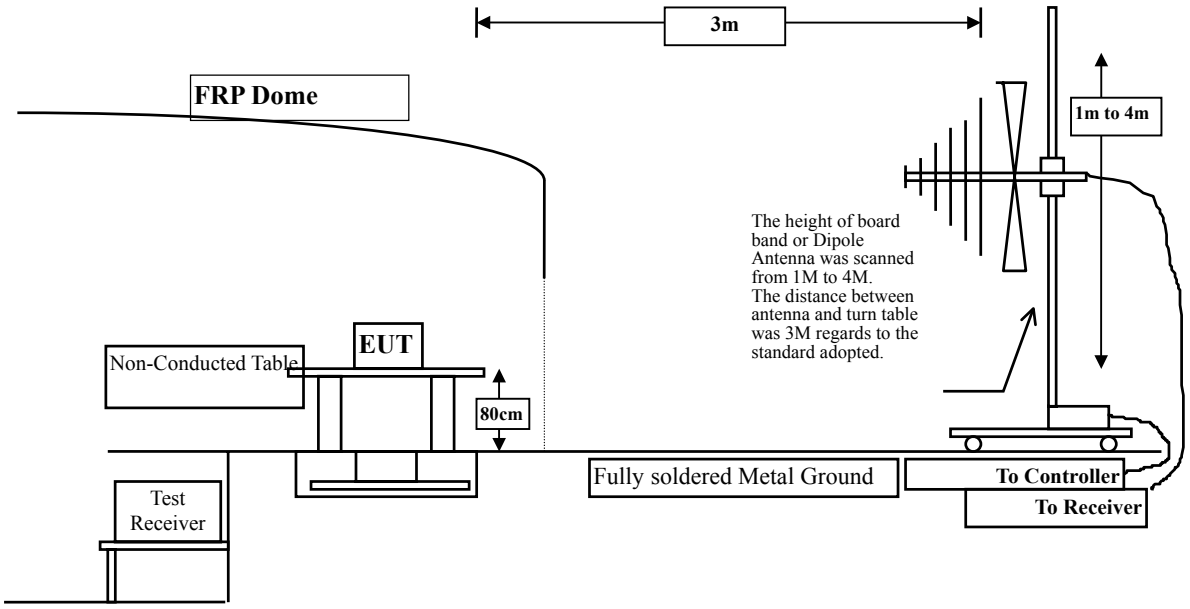
7.1. Test Equipment

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

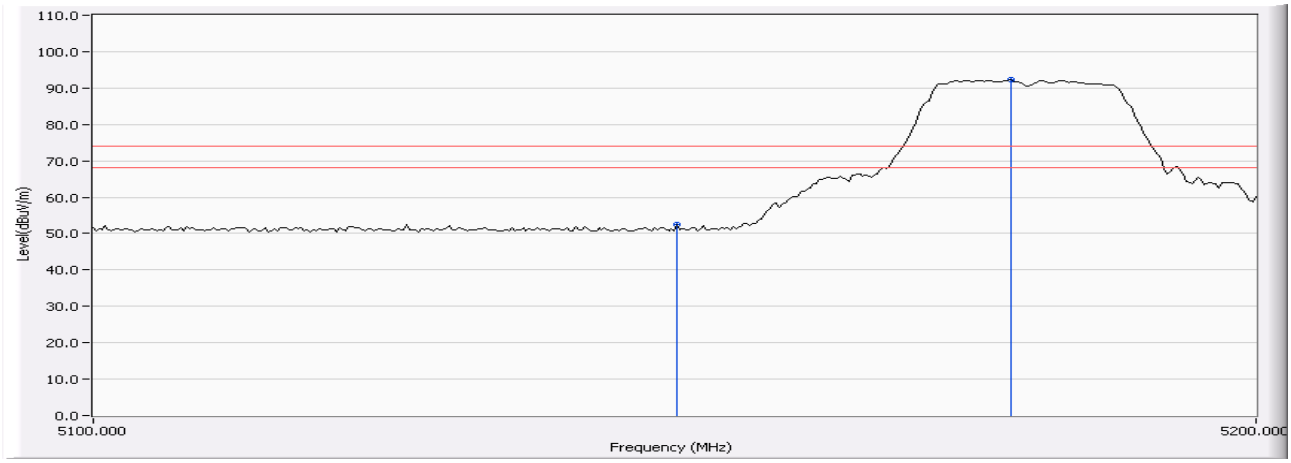
7.6. Test Result of Band Edge

Product : 2G Wireless NPort
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	4.000	48.483	52.484	74.00	54.00	Pass
1 (Average)	--	--	--	--	74.00	54.00	Pass

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



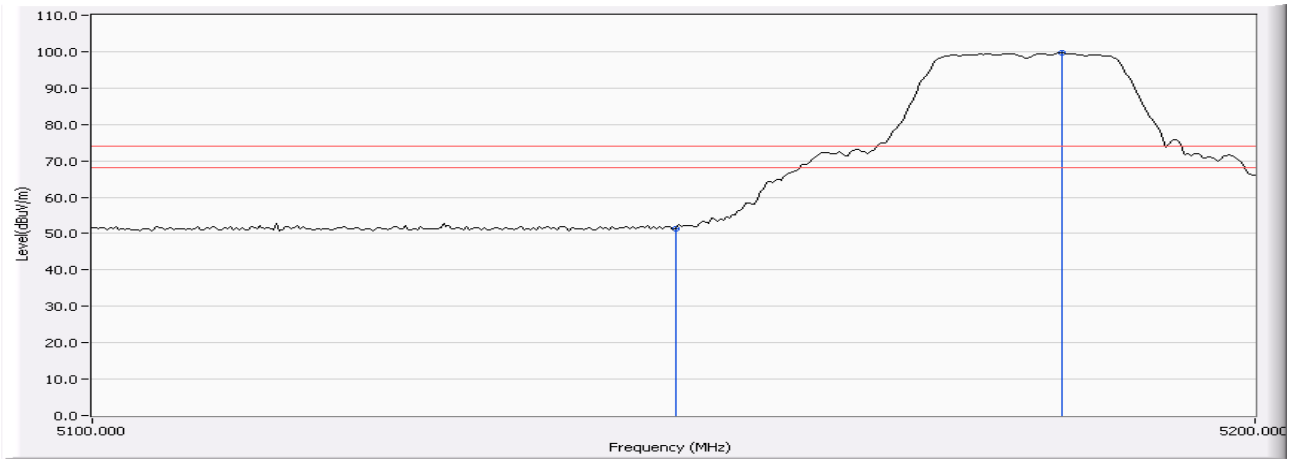
Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : 2G Wireless NPort
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	4.000	47.269	51.270	74.00	54.00	Pass
1 (Average)	--	--	--	--	74.00	54.00	Pass

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



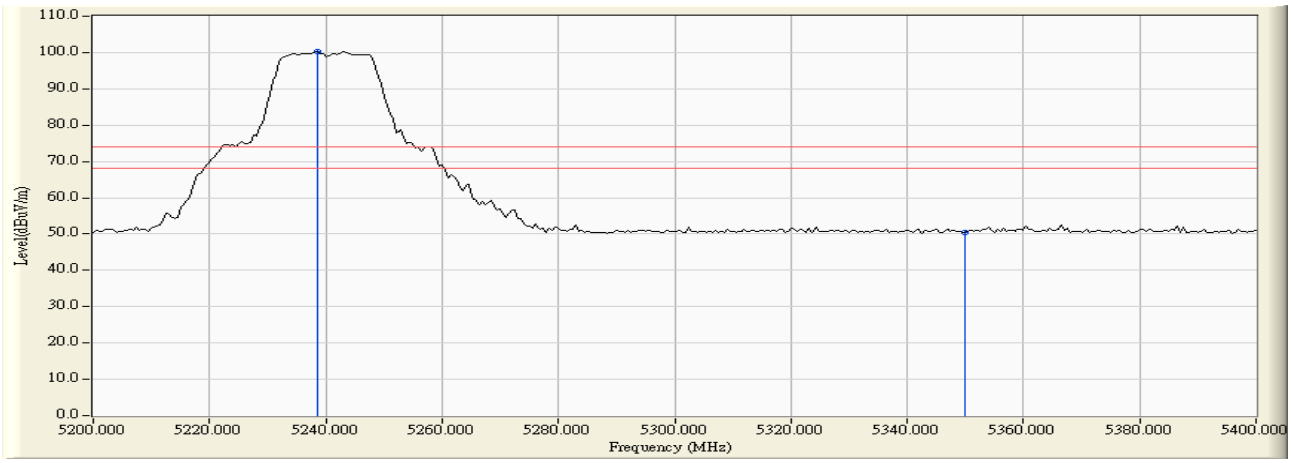
Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : 2G Wireless NPort
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5240MHz)

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
4 (Peak)	5350.000	3.242	47.309	50.551	74.00	54.00	Pass
4 (Average)	5350.000	--	--	--	74.00	54.00	Pass

Figure Channel 8: **Horizonal** (Peak)



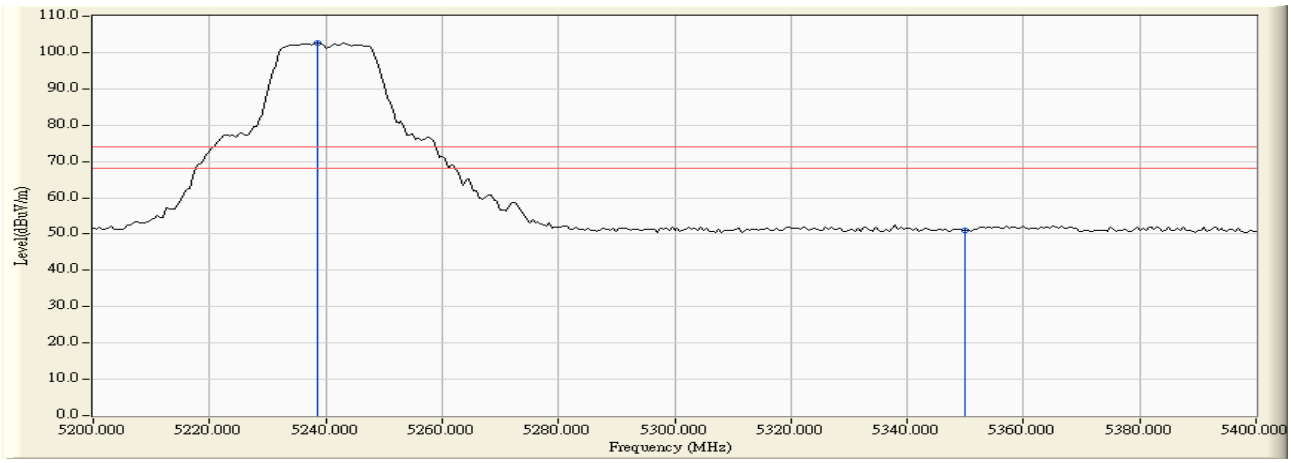
Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : 2G Wireless NPort
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5240MHz)

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
4 (Peak)	5350.000	3.242	47.818	51.060	74.00	54.00	Pass
4 (Average)	5350.000	--	--	--	74.00	54.00	Pass

Figure Channel 8: **Vertical** (Peak)



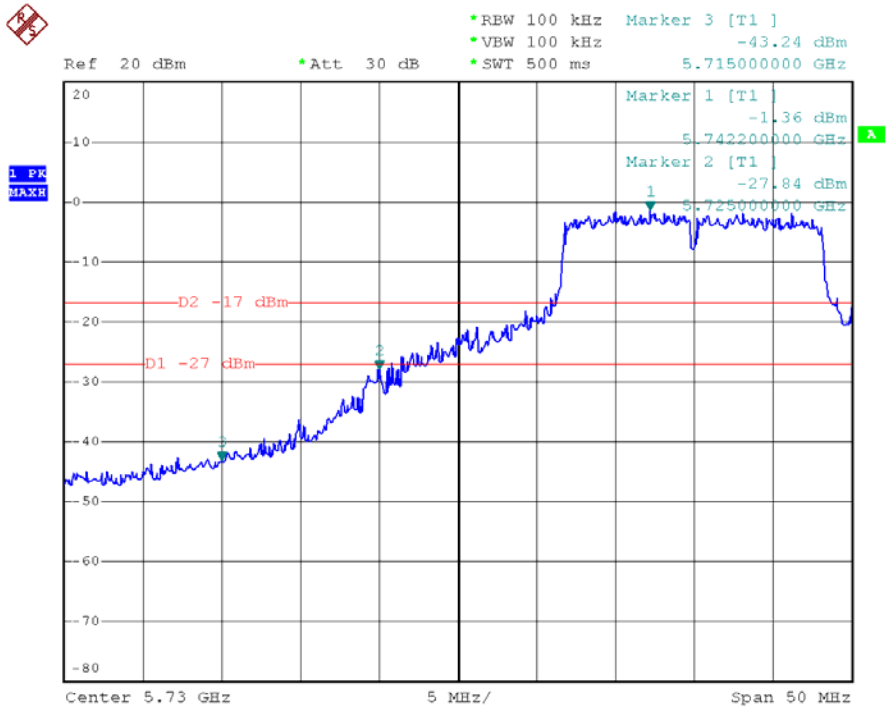
Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

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.

Product : 2G Wireless NPort
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5745MHz)

RF Radiated Measurement:

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

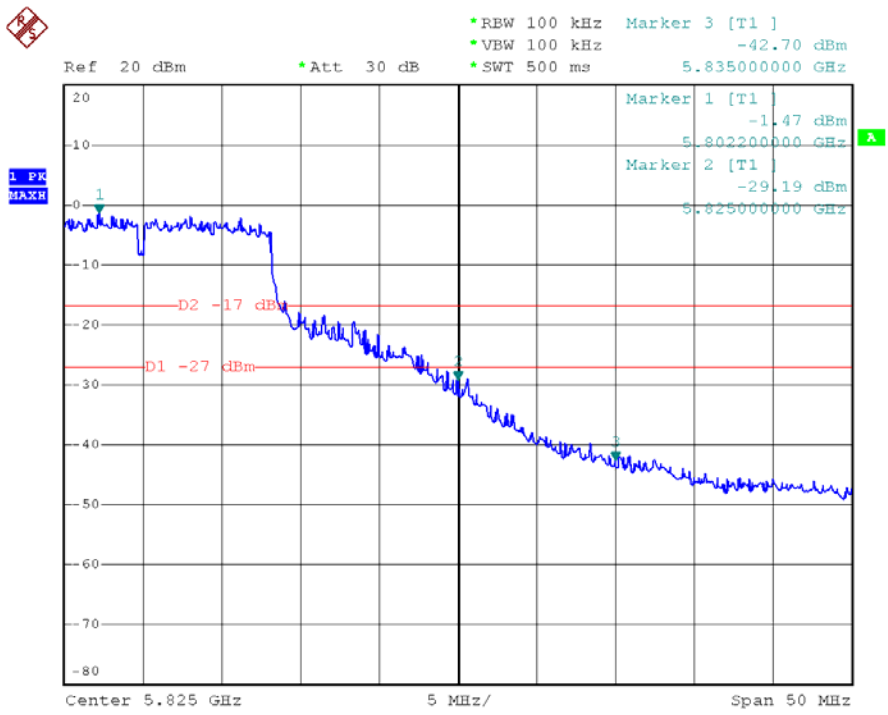


PN1
Date: 27.MAR.2007 12:30:00

Product : 2G Wireless NPort
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11a (5805MHz)

RF Radiated Measurement:

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



PN1
Date: 27.MAR.2007 12:31:28

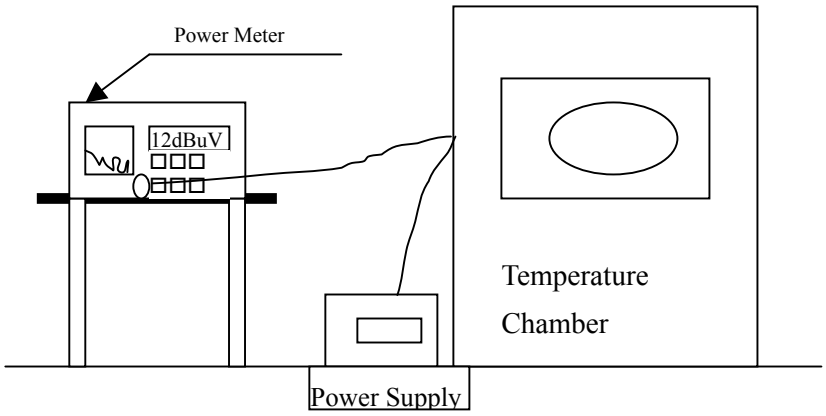
8. Frequency Stability

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 : 2G Wireless NPort
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.

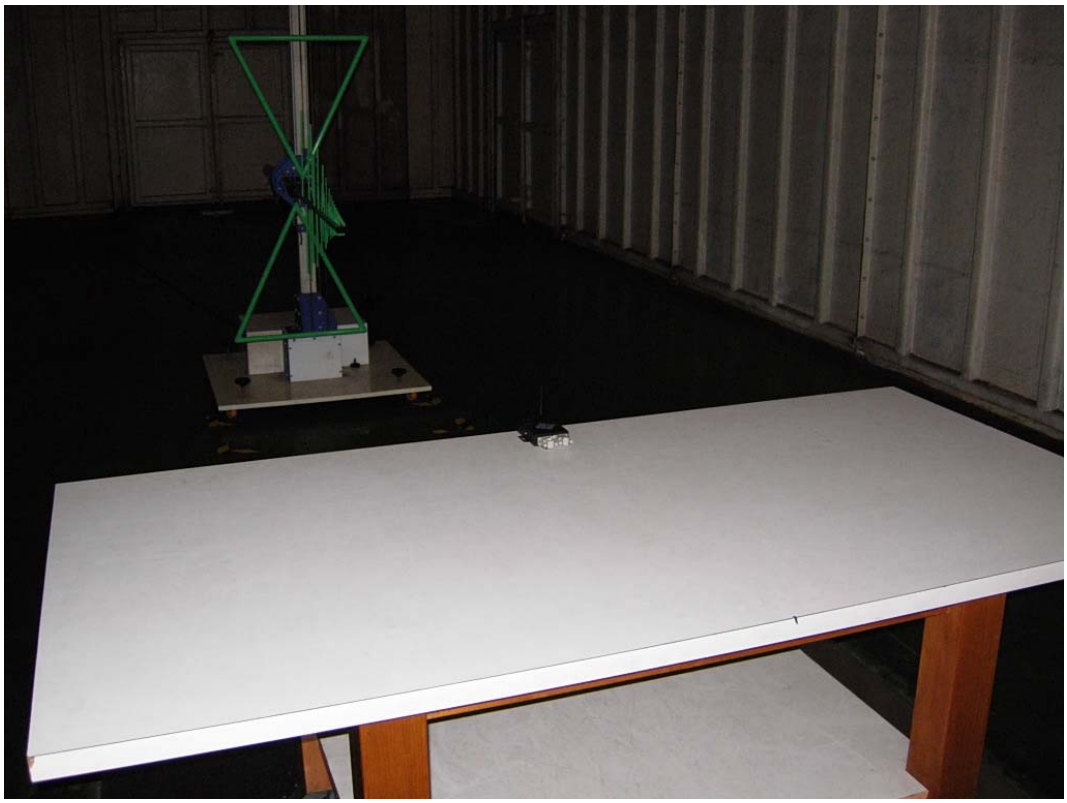
Attachment 1: EUT Test Photographs

Attachment 1: EUT Test Setup Photographs

Front View of Conducted Test

Back View of Conducted Test

Front View of Radiated Test

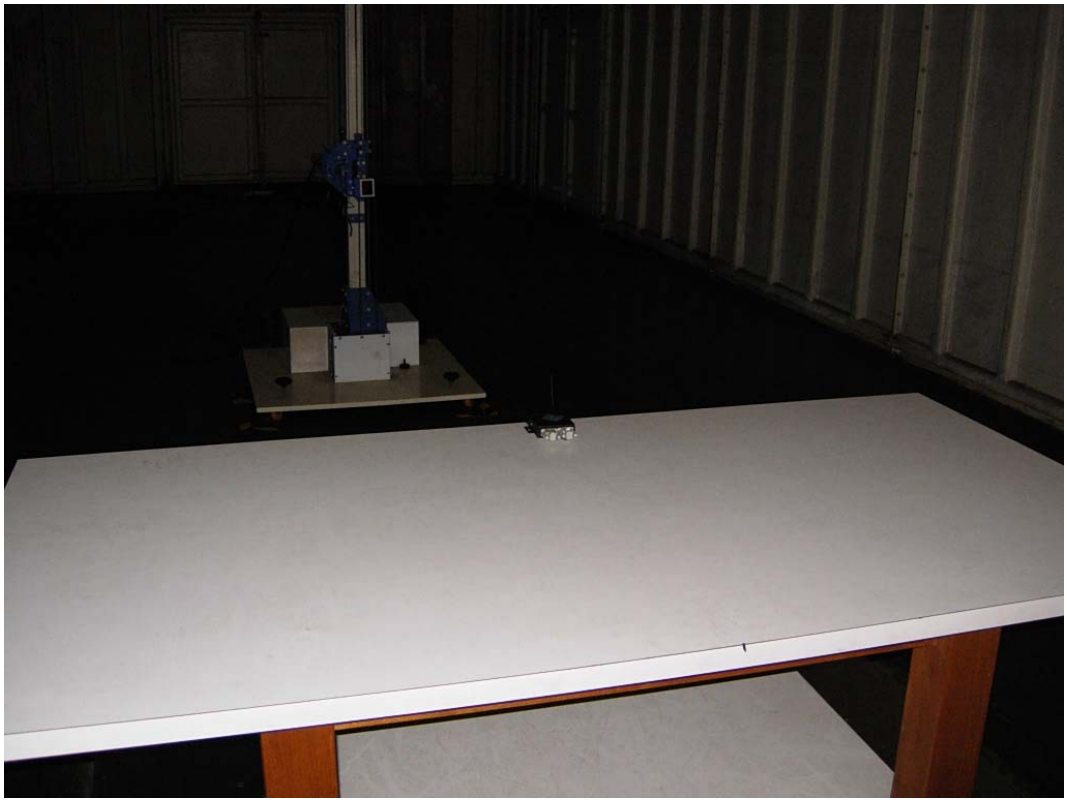


Back View of Radiated Test

Front View of Radiated Test (Horn)

Back View of Radiated Test (Horn)

Front View of Radiated Test (Horn)



Back View of Radiated Test (Horn)

Attachment 2: EUT Detailed Photographs

Attachment 2 : EUT Detailed Photographs

(1) EUT Photo

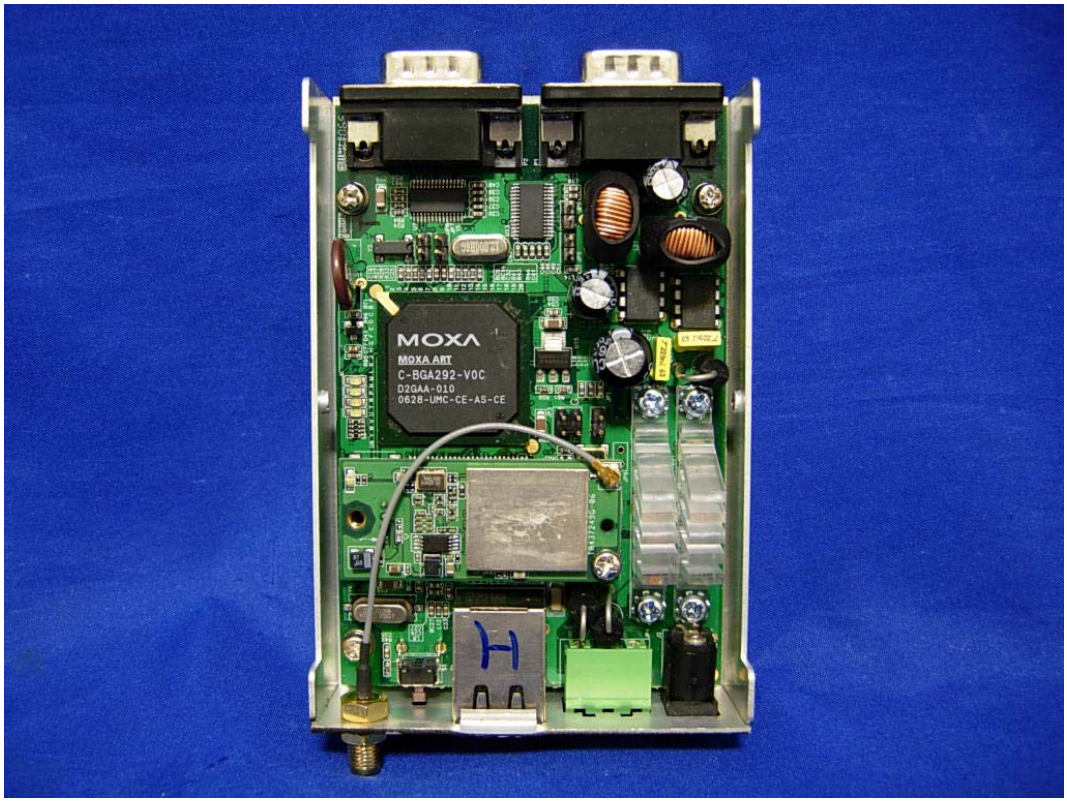
(2) EUT Photo

(3) EUT Photo

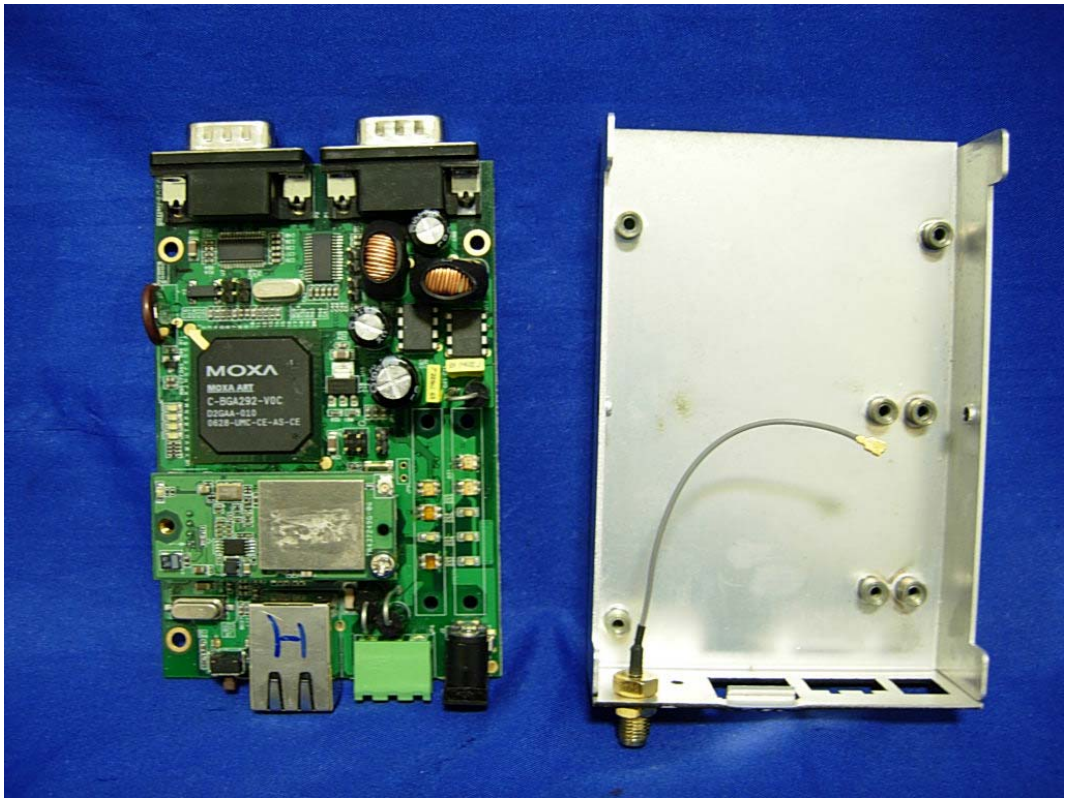
(4) EUT Photo

(5) EUT Photo

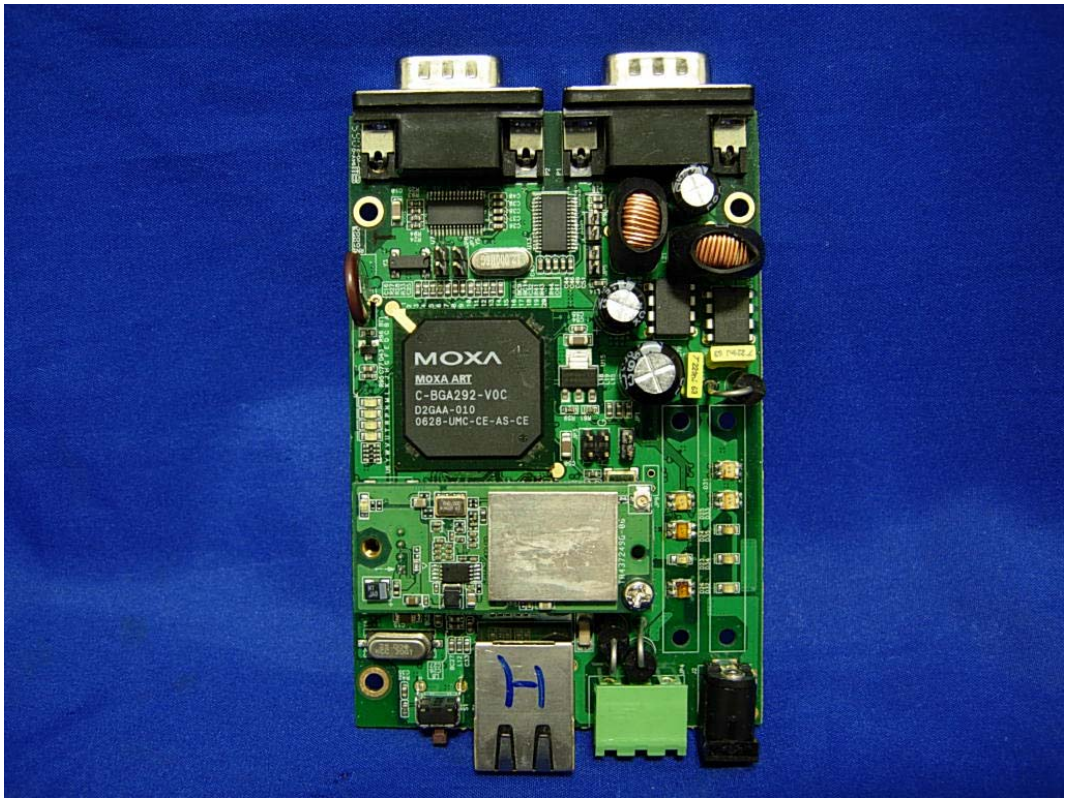
(6) EUT Photo



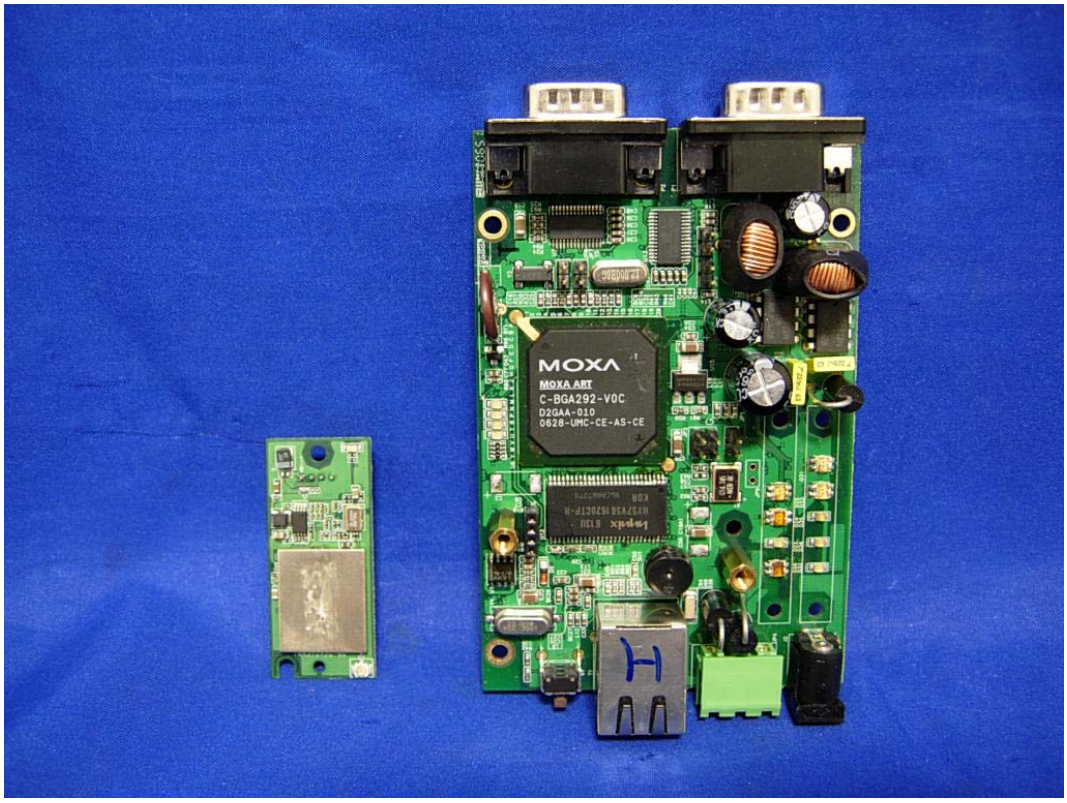
(7) EUT Photo



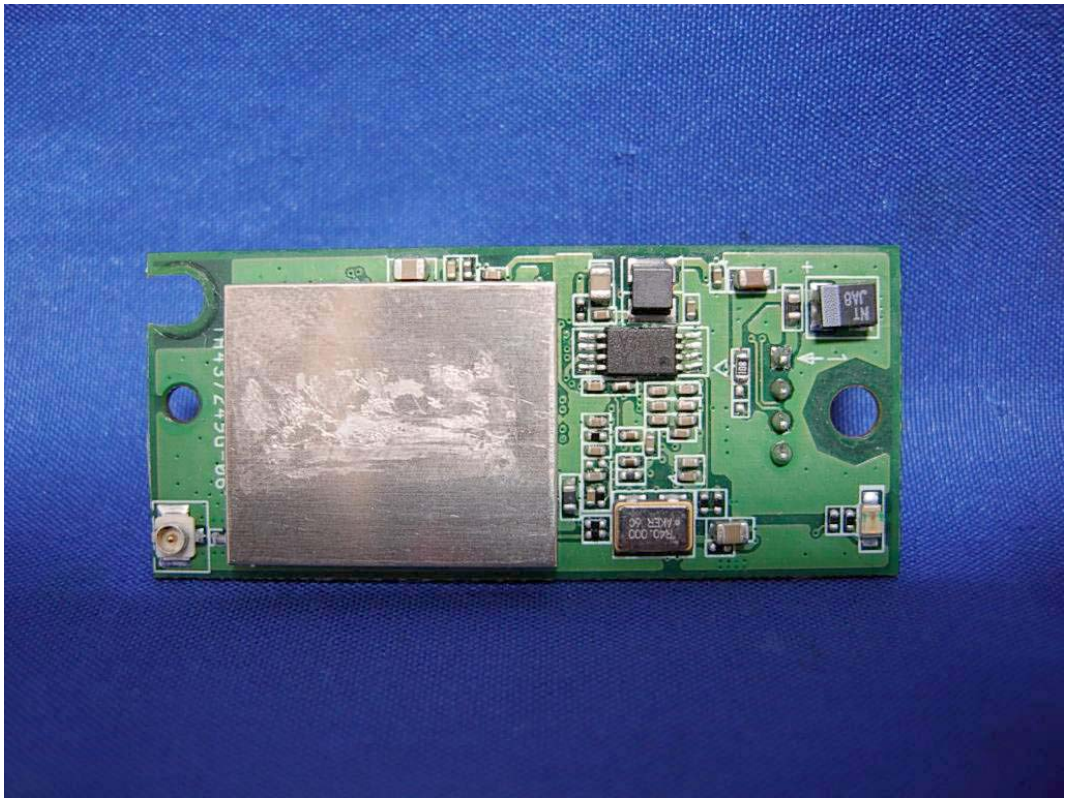
(8) EUT Photo



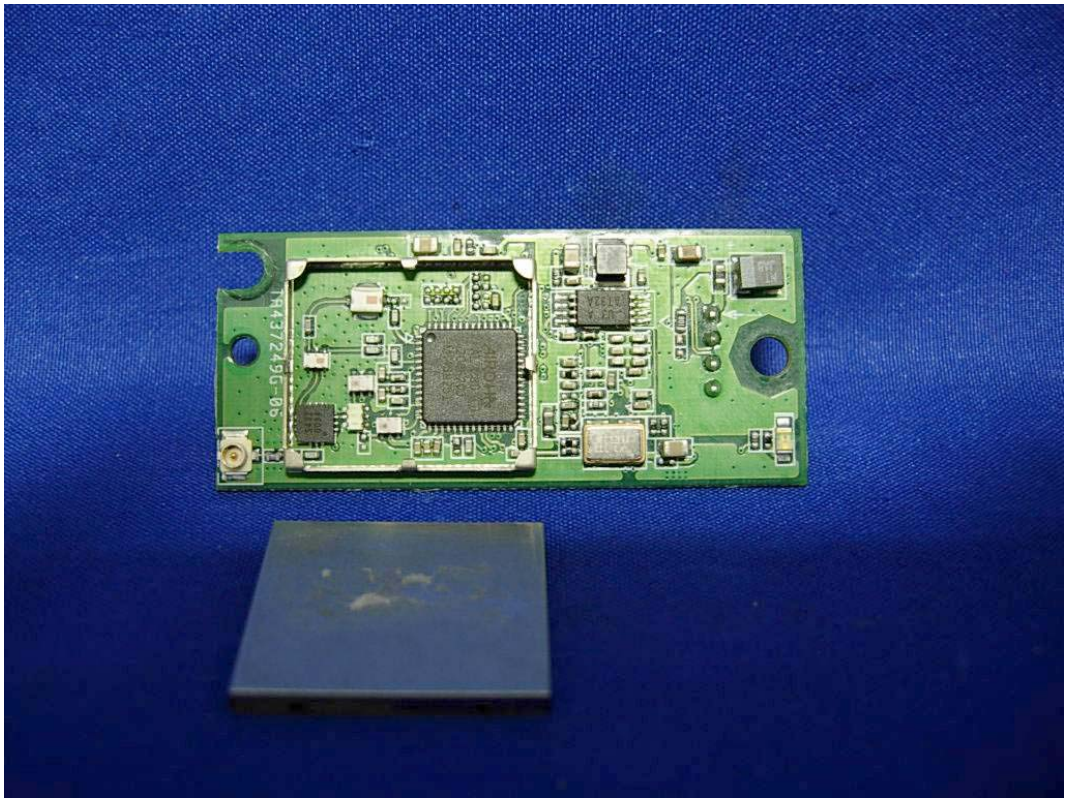
(9) EUT Photo



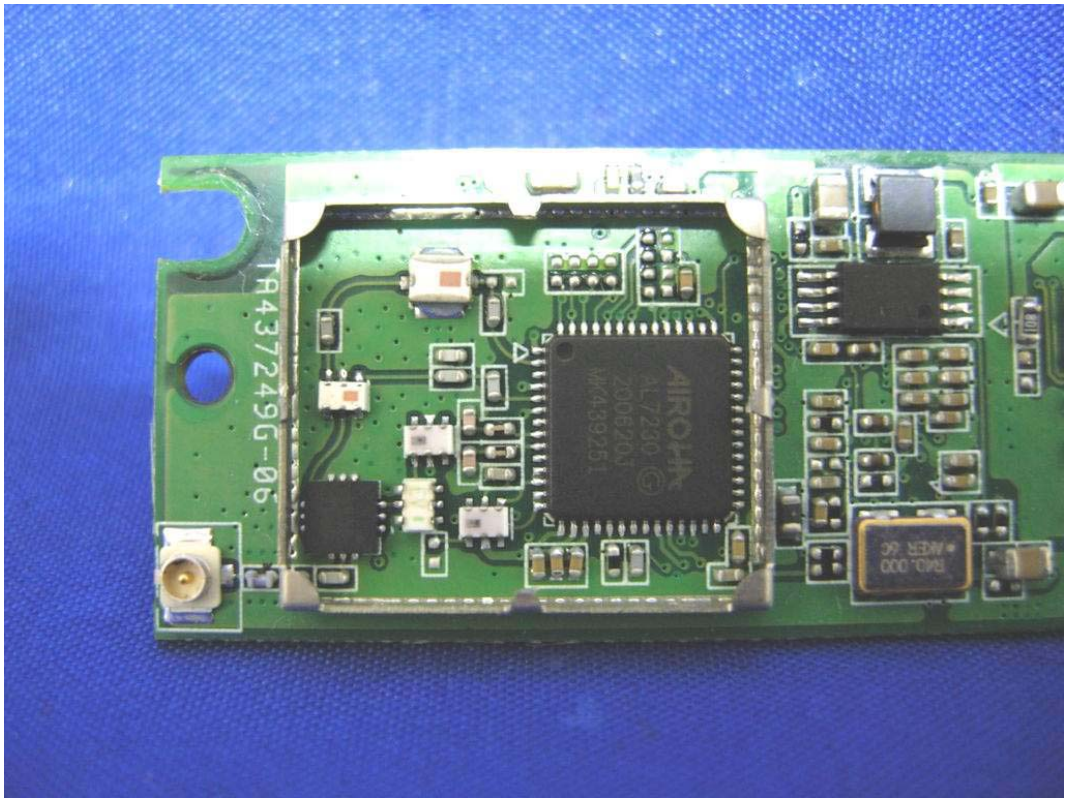
(10) EUT Photo



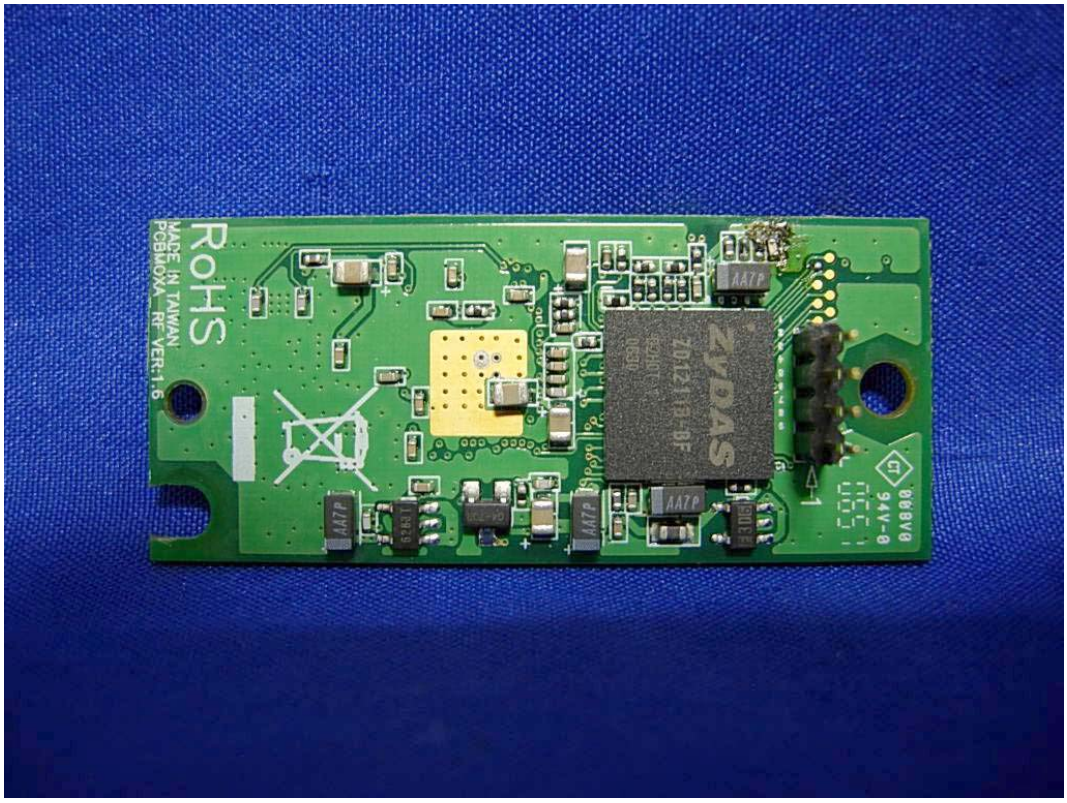
(11) EUT Photo



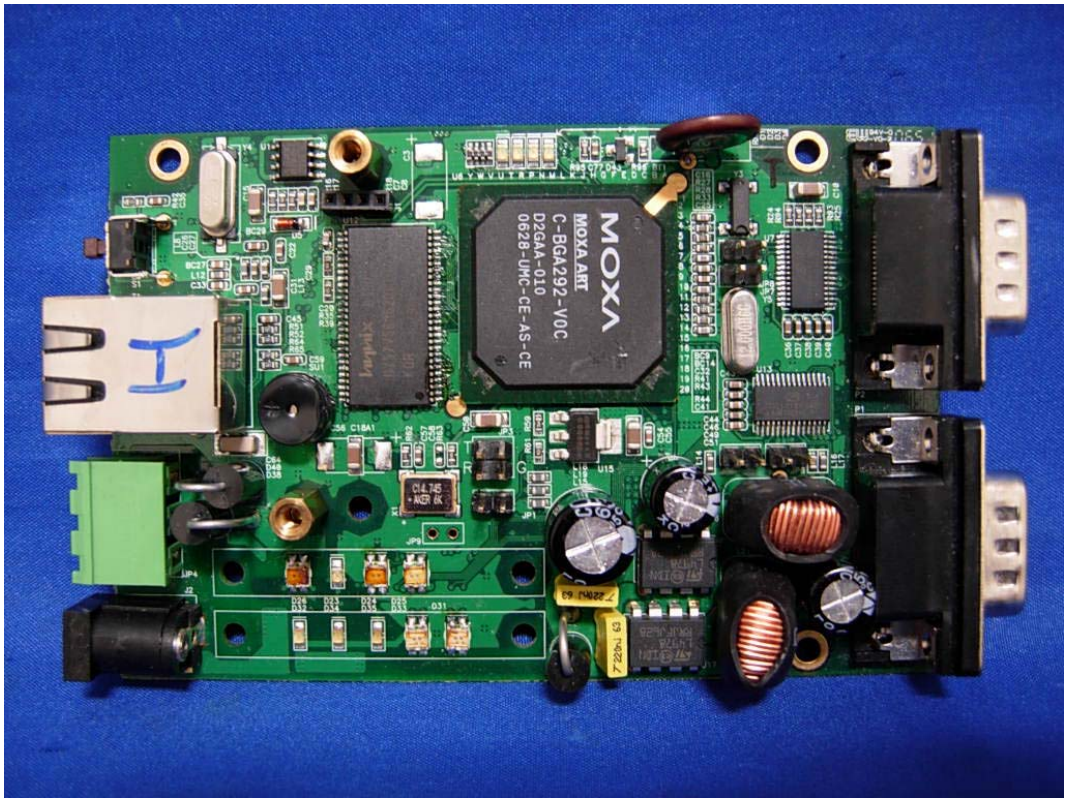
(12) EUT Photo



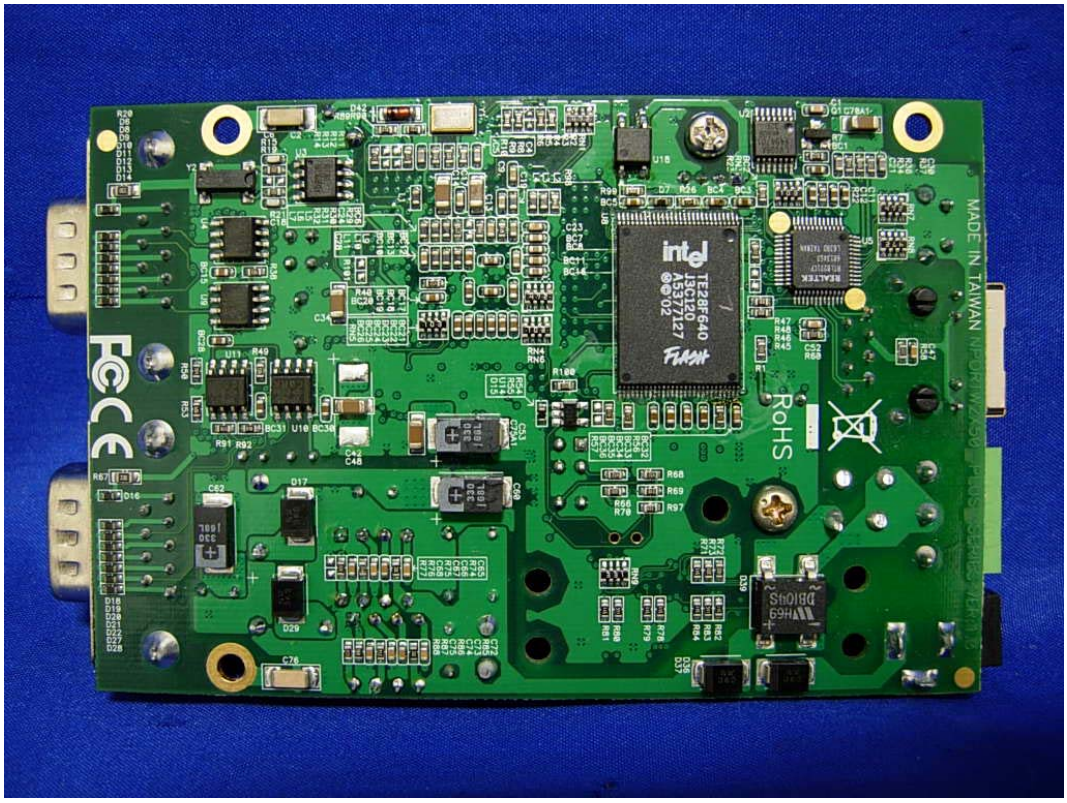
(13) EUT Photo



(14) EUT Photo



(15) EUT Photo



(16) EUT Photo

(17) EUT Photo

(18) EUT Photo