

FCC 47 CFR PART 15 SUBPART C

Product Type : VIP4G

Applicant : Microhard Systems Inc.

Address : 150 Country Hills Landing NW Calgary, Alberta, Canada
T3K 5P3

Trade Name : Microhard

Model Number : VIP4G

Test Specification : FCC 47 CFR PART 15 SUBPART C: Oct., 2012
Canada RSS-210 ISSUE 8: Dec., 2010
Canada RSS-Gen ISSUE 3: Dec., 2010
ANSI C63.4-2009

Receive Date : Nov. 28, 2012

Test Period : Dec. 05, 2012 ~ Jan. 21, 2013

Issue Date : Jan. 23, 2013

Issue by

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Taiwan Accreditation Foundation accreditation number: 1330

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Revision History

Rev.	Issue Date	Revisions	Revised By
00	Jan. 23, 2013	Initial Issue	

Verification of Compliance

Issued Date: 01/23/2013

Product Type : VIP4G
Applicant : Microhard Systems Inc.
Address : 150 Country Hills Landing NW Calgary, Alberta, Canada
T3K 5P3
Trade Name : Microhard
Model Number : VIP4G
FCC ID : NS9VIP4GABGN20
IC : 3143A-VIP4GABGN20
EUT Rated Voltage : DC 12.0V, 1.25A
Test Voltage : 120 Vac / 60 Hz
Applicable Standard : FCC 47 CFR PART 15 SUBPART C: Oct., 2012
Canada RSS-210 ISSUE 8: Dec., 2010
Canada RSS-Gen ISSUE 3: Dec., 2010
ANSI C63.4-2009

Test Result : Complied

Performing Lab. : A Test Lab Techno Corp.
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Taiwan Accreditation Foundation accreditation number: 1330
<http://www.atl-lab.com.tw/e-index.htm>



The above equipment was tested by A Test Lab Techno Corp. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2009 and the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247 .

The test results of this report relate only to the tested sample identified in this report.

Approved By



(Manager)

Reviewed By



(Testing Engineer)

(Fly Lu)

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1 General Information

1.1 Summary of Test Result

Standard		Item	Result	Remark
15.247	RSS-GEN			
15.207	7.2.2	AC Power Conducted Emission	PASS	-----
-----	6	Receiver Radiated Emissions	PASS	-----
Standard		Item	Result	Remark
15.247	RSS-210			
15.247(d)	A8.5	Transmitter Radiated Emissions	PASS	-----
15.247(b)(3)	A8.4	Max. Output Power	PASS	-----
15.247(a)(2)	A8.2 (a)	6dB RF Bandwidth	PASS	-----
15.247(e)	A8.2 (b)	Power Spectral Density	PASS	-----
15.247(c)	A8.5	Out of Band Conducted Spurious Emission	PASS	-----
15.247(d)	A8.5	Band Edge Measurement	PASS	-----
15.247(c)	A8.5	Occupied Bandwidth Measurement	PASS	-----
15.203	-	Antenna Requirement	PASS	-----

The test results of this report relate only to the tested sample(s) identified in this report. Manufacturer or whom it may concern should recognize the pass or fail of the test result.

1.2 Measurement Uncertainty

Conducted Emission

The measurement uncertainty is evaluated as ± 2.24 dB.

Radiated Emission

The measurement uncertainty is evaluated as ± 3.072 dB.

2 EUT Description

Product	VIP4G
Trade Name	Microhard
Model No.	VIP4G
Applicant	Microhard Systems Inc. 150 Country Hills Landing NW Calgary, Alberta, Canada T3K 5P3
Manufacturer	Microhard Systems Inc. 150 Country Hills Landing NW Calgary, Alberta, Canada T3K 5P3
FCC ID	NS9VIP4GABGN20
IC	3143A-VIP4GABGN20
Frequency Range	IEEE 802.11b / 802.11g / 802.11n 2.4GHz 20MHz: 2412 ~ 2462 MHz IEEE 802.11n 2.4GHz 40MHz: 2422 ~ 2452 MHz IEEE 802.11a / IEEE 802.11n 5 GHz U-NII Band IV: 5745 ~ 5850 MHz
Modulation Type	IEEE 802.11b:DSSS IEEE 802.11g:DSSS + OFDM IEEE 802.11n 2.4GHz / IEEE 802.11a / IEEE 802.11n 5 GHz U-NII Band IV: OFDM
Antenna Type	Dipole Antenna
Antenna Gain	2.0 dBi
RF Output Power	IEEE 802.11b: 0.077 W / 18.89 dBm IEEE 802.11g: 0.335 W / 25.25 dBm IEEE 802.11n 2.4GHz 20MHz: 0.398 W / 26.00 dBm IEEE 802.11n 2.4GHz 40MHz: 0.247 W / 23.92 dBm IEEE 802.11a U-NII Band IV: 0.245 W / 23.90 dBm IEEE 802.11n U-NII Band IV 20MHz: 0.291 W / 24.64 dBm IEEE 802.11n U-NII Band IV 40MHz: 0.242 W / 23.83 dBm
Component	
Power Adapter	BI, BI30-120200-Adu Input:100-240Vac, 50/60Hz, 1.2A Output: 12Vdc, 2.0A Cable out: Non-Shielded, 1.5 m Non-Detachable at Power Adaptor with a core

3 Test Methodology

3.1. Mode of Operation

Decision of Test ATL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Normal Operation Mode
Mode 2: IEEE 802.11b Link Mode
Mode 3: IEEE 802.11g Link Mode
Mode 4: IEEE 802.11n 2.4GHz 20MHz Link Mode
Mode 5: IEEE 802.11n 2.4GHz 40MHz Link Mode
Mode 6: IEEE 802.11a U-NII Band IV Link Mode
Mode 7: IEEE 802.11n U-NII Band IV 20MHz Link Mode
Mode 8: IEEE 802.11n U-NII Band IV 40MHz Link Mode
Mode 9: Receiver Mode

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

IEEE 802.11b mode (ANT1):

IEEE 802.11b mode (ANT1):

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 1Mbps data rate were chosen for full testing.

IEEE 802.11g mode (ANT1):

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n 2.4GHz 20MHz mode (ANT1+ANT2):

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 13Mbps data rate were chosen for full testing.

IEEE 802.11n 2.4GHz 40MHz mode (ANT1+ANT2):

Channel Low (2422MHz), Channel Mid (2437MHz) and Channel High (2452MHz) with 27Mbps data rate were chosen for full testing.

IEEE 802.11a mode / 5745 ~ 5825MHz (ANT1):

Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n U-NII Band IV 20MHz mode / 5745 ~ 5825MHz (ANT1+ANT2):

Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with 13Mbps data rate were chosen for full testing.

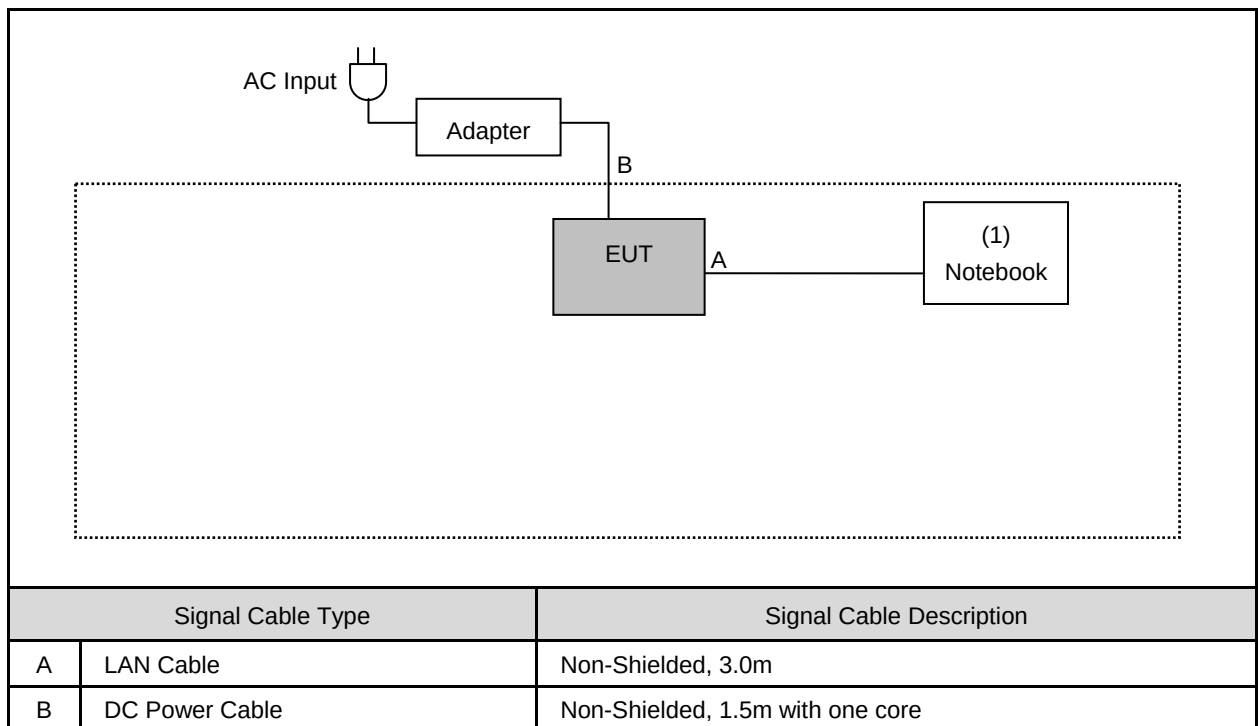
IEEE 802.11n U-NII Band IV 40MHz mode / 5755 ~ 5795MHz (ANT1+ANT2):

Channel Low (5755MHz) and Channel High (5795MHz) with 27Mbps data rate were chosen for full testing.

3.2. EUT Exercise Software

1.	Setup the EUT shown on 3.3.
2.	Turn on the power of all equipment.
3.	The EUT LAN port connects to the Notebook and data will communicate between Notebook through EUT.
4.	The EUT will start to operate function.

3.3. Configuration of Test System Details



Devices Description				
Product	Manufacturer	Model Number	Serial Number	Power Cord
(1) Notebook	DELL	D531	GCDGD-T6HYQ-3MQ8R-JCPD3-3G8G2	Non-Shielded, 2.0m

3.4. Test Site Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	26
Humidity (%RH)	25-75	60
Barometric pressure (mbar)	860-1060	950

4 Conducted Emission Measurement

4.1. Limit

Frequency (MHz)	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

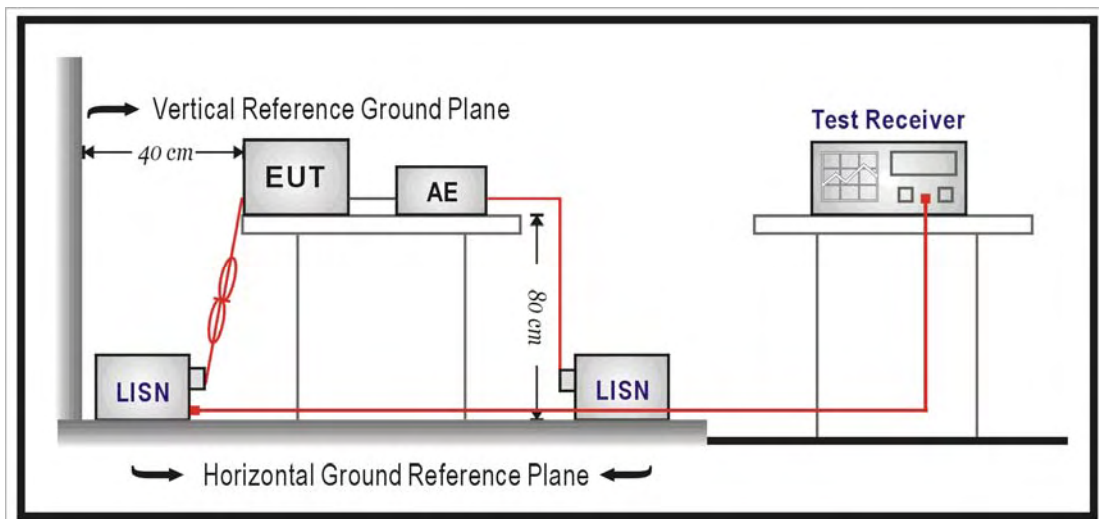
4.2. Test Instruments

Describe	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Test Receiver	R&S	ESCI	100367	06/18/2012	(1)
LISN	R&S	ENV216	101040	03/07/2012	(1)
LISN	R&S	ENV216	101041	03/07/2012	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years. (3) Calibration period 3 years.

Note: N.C.R. = No Calibration Request.

4.3. Test Setup



4.4. Test Procedure

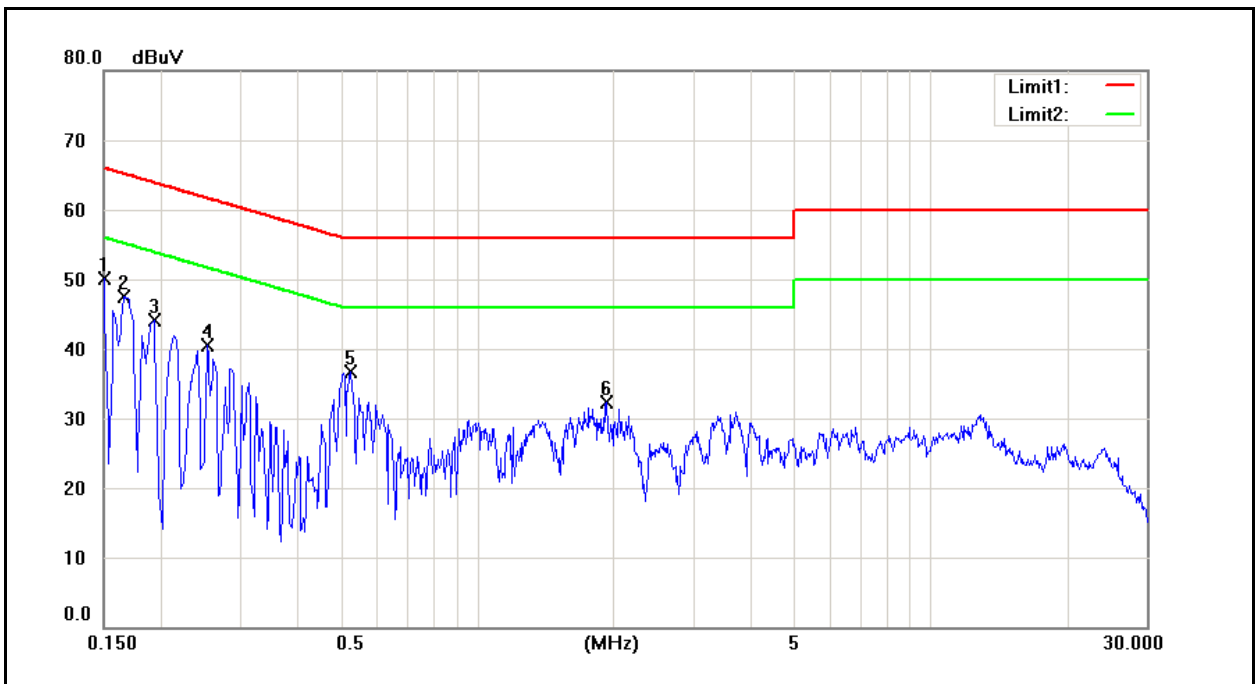
The power line conducted emission measurements were performed in a shielded enclosure. The EUT was assembled on a wooden table which is 80 centimeters high, was placed 40 centimeters from the back wall and at least 1 meter from the sidewall.

Power was fed to the EUT from the public utility power grid through a line filter and EMCO Model 3162/2 SH Line Impedance Stabilization Networks (LISN). The LISN housing, measuring instrumentation case, ground plane, etc., were electrically bonded together at the same RF potential. The Spectrum analyzer was connected to the AC line through an isolation transformer. The 50-ohm output of the LISN was connected to the spectrum analyzer directly. Conducted emission levels were in the CISPR quasi-peak detection mode. The analyzer's 6 dB bandwidth was set to 9 KHz. No post-detector video filter was used.

The spectrum was scanned from 150 KHz to 30 MHz. The physical arrangement of the test system and associated cabling was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude and frequency. All spurious emission frequencies were observed. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in paragraph 4.1.

4.5. Test Result

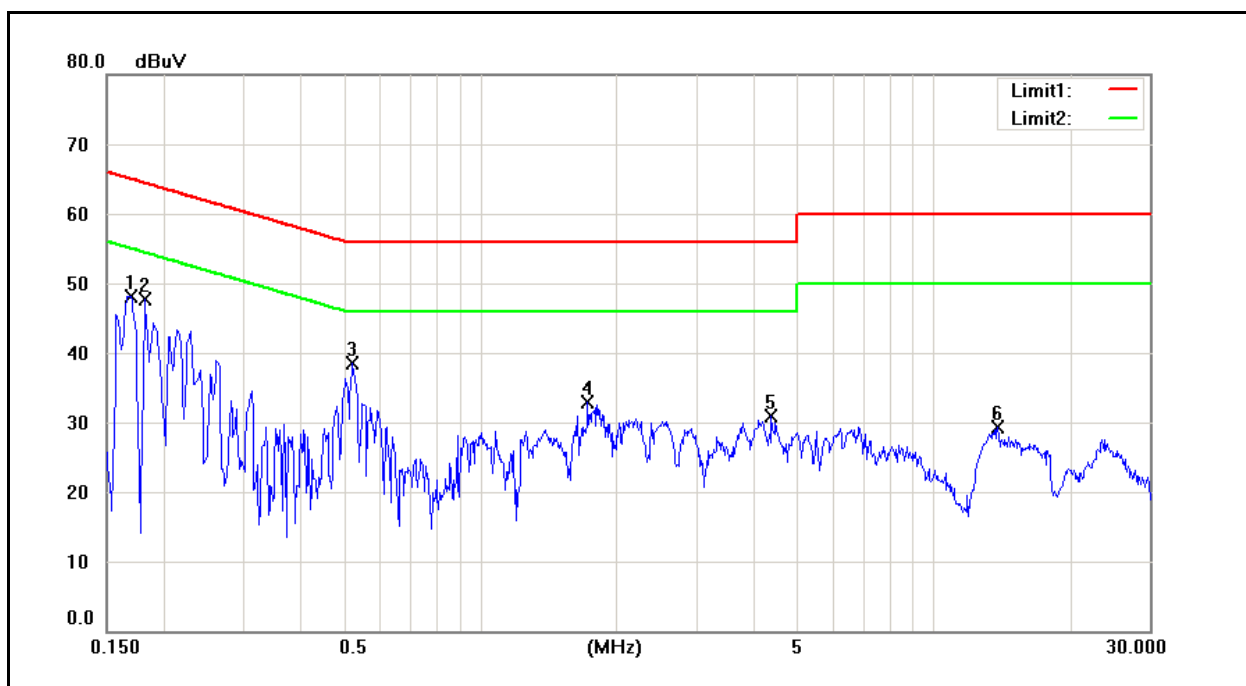
Standard:	FCC Part 15C	Line:	L1
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	1	Date:	01/21/2013
		Test By:	Fly Lu
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1500	35.56	15.72	9.72	45.28	25.44	66.00	56.00	-20.72	-30.56	Pass
2	0.1660	36.67	20.28	9.72	46.39	30.00	65.16	55.16	-18.77	-25.16	Pass
3	0.1940	33.31	17.64	9.72	43.03	27.36	63.86	53.86	-20.83	-26.50	Pass
4	0.2540	23.52	4.91	9.72	33.24	14.63	61.63	51.63	-28.39	-37.00	Pass
5	0.5260	26.20	24.46	9.72	35.92	34.18	56.00	46.00	-20.08	-11.82	Pass
6	1.9380	14.47	6.11	9.80	24.27	15.91	56.00	46.00	-31.73	-30.09	Pass

Standard:	FCC Part 15C	Line:	N
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	1	Date:	01/21/2013
		Test By:	Fly Lu

Description:



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1700	36.36	20.66	9.65	46.01	30.31	64.96	54.96	-18.95	-24.65	Pass
2	0.1820	28.14	5.80	9.64	37.78	15.44	64.39	54.39	-26.61	-38.95	Pass
3	0.5220	27.84	21.45	9.64	37.48	31.09	56.00	46.00	-18.52	-14.91	Pass
4	1.7260	17.76	12.16	9.71	27.47	21.87	56.00	46.00	-28.53	-24.13	Pass
5	4.3980	16.08	8.92	9.71	25.79	18.63	56.00	46.00	-30.21	-27.37	Pass
6	13.8660	13.49	8.02	9.85	23.34	17.87	60.00	50.00	-36.66	-32.13	Pass

5 Radiated Emission Measurement

5.1. Limit

According to §15.209(a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$ at meter)	Measurement Distance (meters)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 - 88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

5.2. Test Instruments

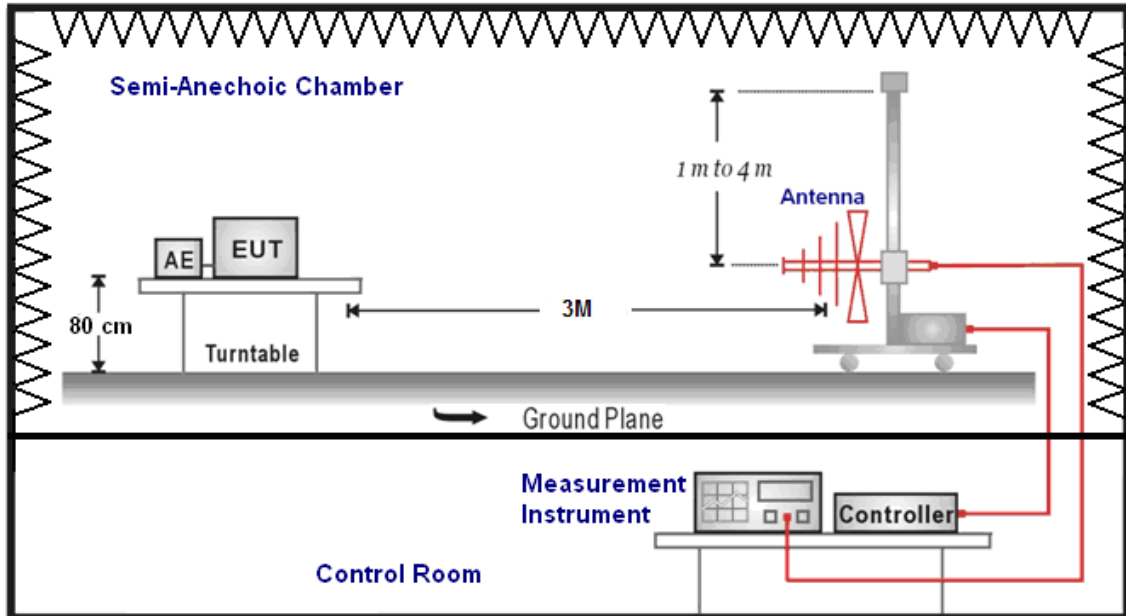
3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
RF Pre-selector	Agilent	N9039A	MY46520256	01/16/2012	(2)
Spectrum Analyzer	Agilent	E4446A	MY46180578	01/16/2012	(1)
Pre Amplifier	Agilent	8449B	3008A02237	02/22/2012	(1)
Pre Amplifier	Agilent	8447D	2944A10961	02/22/2012	(1)
Broadband Antenna (30MHz~1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	9163-270	06/29/2012	(1)
Horn Antenna (1~18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	06/15/2012	(1)
Horn Antenna (18~40GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9170	9170-320	06/21/2012	(1)
Loop Antenna	COM-POWER CORPORATION	AL-130	121014	08/14/2009	(3)
Test Site	ATL	TE01	888001	08/28/2012	(1)

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years. (3) Calibration period 3 years.

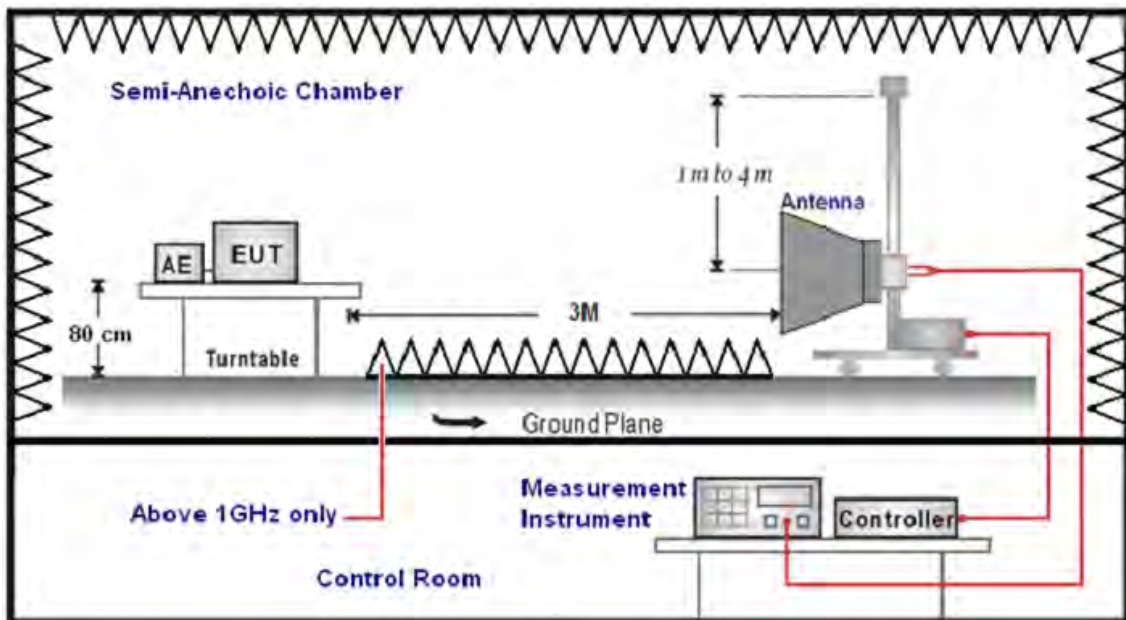
Note: N.C.R. = No Calibration Request.

5.3. Setup

Below 1GHz



Above 1GHz



5.4. Test Procedure

Final radiation measurements were made on a three-meter, Semi Anechoic Chamber. The EUT system was placed on a nonconductive turntable which is 0.8 meters height, top surface 1.0 x 1.5 meter. The spectrum was examined from 250 MHz to 2.5 GHz in order to cover the whole spectrum below 10th harmonic which could generate from the EUT. During the test, EUT was set to transmit continuously & Measurements spectrum range from 9 kHz to 26.5 GHz is investigated.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

A nonconductive material surrounded the EUT to supporting the EUT for standing on three orthogonal planes. At each condition, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

SCHWARZBECK MESS-ELEKTRONIK Biconilog Antenna (mode VULB9163) at 3 Meter and the SCHWARZBECK Double Ridged Guide Antenna (model BBHA9120D&9170) was used in frequencies 1 – 26.5 GHz at a distance of 1 meter. All test results were extrapolated to equivalent signal at 3 meters utilizing an inverse linear distance extrapolation Factor (20dB/decade).

For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. No post – detector video filters were used in the test.

The spectrum analyzer's 6 dB bandwidth was set to 1 MHz, and the analyzer was operated in the peak detection mode, for frequencies both below and up 1 GHz. The average levels were obtained by subtracting the duty cycle correction factor from the peak readings.

The following procedures were used to convert the emission levels measured in decibels referenced to 1 microvolt (dBuV) into field intensity in micro volts per meter (uV/m).

The actual field intensity in decibels referenced to 1 microvolt in to field intensity in micro volts per meter (dBuV/m).

The actual field intensity in referenced to 1 microvolt per meter (dBuV/m) is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) and Subtracting the gain of preamplifier (dB) is auto calculate in spectrum analyzer.

(1) $\text{Amplitude (dBuV/m)} = \text{FI (dBuV)} + \text{AF (dBuV)} + \text{CL (dBuV)} - \text{Gain (dB)}$

FI= Reading of the field intensity.

AF= Antenna factor.

CL= Cable loss.

P.S Amplitude is auto calculate in spectrum analyzer.

(2) $\text{Actual Amplitude (dBuV/m)} = \text{Amplitude (dBuV)} - \text{Dis(dB)}$

The FCC specified emission limits were calculated according the EUT operating frequency and by following linear interpolation equations:

(a) For fundamental frequency : Transmitter Output < +30dBm

(b) For spurious frequency : Spurious emission limits = fundamental emission limit /10

Data of measurement within this frequency range without mark in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5.5. Test Result

Below 1GHz

Standard:		FCC Part 15C		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		VIP4G		Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Mode:		1		Date:		12/13/2012	
				Test By:		Fly Lu	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
125.0000	50.34	-16.66	33.68	43.50	-9.82	QP	H
300.0000	48.09	-10.53	37.56	46.00	-8.44	QP	H
400.0000	42.89	-8.60	34.29	46.00	-11.71	QP	H
510.0000	44.74	-6.74	38.00	46.00	-8.00	QP	H
625.0000	43.16	-4.53	38.63	46.00	-7.37	QP	H
832.0000	37.82	-1.06	36.76	46.00	-9.24	QP	H
170.0000	51.50	-16.44	35.06	43.50	-8.44	QP	V
300.0000	48.98	-10.53	38.45	46.00	-7.55	QP	V
500.0000	44.34	-6.79	37.55	46.00	-8.45	QP	V
680.0000	40.32	-3.86	36.46	46.00	-9.54	QP	V
800.0000	36.95	-1.55	35.40	46.00	-10.60	QP	V
875.0000	38.00	-0.30	37.70	46.00	-8.30	QP	V

Note: No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).

Above 1GHz

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	2			Date:	12/13/2012		
Frequency:	2412MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2820.000	39.25	5.45	44.70	74.00	-29.30	peak	H
4591.000	36.24	11.11	47.35	74.00	-26.65	peak	H
6313.000	34.52	16.84	51.36	74.00	-22.64	peak	H
2960.000	38.34	5.81	44.15	74.00	-29.85	peak	V
4549.000	35.92	11.01	46.93	74.00	-27.07	peak	V
5907.000	34.42	15.60	50.02	74.00	-23.98	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	2			Date:	12/13/2012		
Frequency:	2437MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2981.000	37.12	5.86	42.98	74.00	-31.02	peak	H
4584.000	35.93	11.09	47.02	74.00	-26.98	peak	H
6138.000	33.46	16.30	49.76	74.00	-24.24	peak	H
2981.000	38.70	5.86	44.56	74.00	-29.44	peak	V
4563.000	36.16	11.05	47.21	74.00	-26.79	peak	V
6117.000	34.12	16.23	50.35	74.00	-23.65	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	2			Date:	12/13/2012		
Frequency:	2462MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2981.000	36.93	5.86	42.79	74.00	-31.21	peak	H
4605.000	34.83	11.15	45.98	74.00	-28.02	peak	H
6075.000	32.51	16.11	48.62	74.00	-25.38	peak	H
3072.000	38.79	6.07	44.86	74.00	-29.14	peak	V
4924.000	37.52	11.97	49.49	74.00	-24.51	peak	V
6145.000	33.53	16.32	49.85	74.00	-24.15	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	3			Date:	12/13/2012		
Frequency:	2412MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2981.000	37.80	5.86	43.66	74.00	-30.34	peak	H
4598.000	36.84	11.14	47.98	74.00	-26.02	peak	H
6257.000	33.44	16.66	50.10	74.00	-23.90	peak	H
2946.000	37.52	5.76	43.28	74.00	-30.72	peak	V
4619.000	35.29	11.19	46.48	74.00	-27.52	peak	V
6131.000	34.68	16.29	50.97	74.00	-23.03	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	3			Date:	12/13/2012		
Frequency:	2437MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3037.000	39.03	5.99	45.02	74.00	-28.98	peak	H
4626.000	35.70	11.20	46.90	74.00	-27.10	peak	H
6187.000	33.70	16.45	50.15	74.00	-23.85	peak	H
3009.000	37.79	5.93	43.72	74.00	-30.28	peak	V
4563.000	35.61	11.05	46.66	74.00	-27.34	peak	V
6201.000	31.99	16.49	48.48	74.00	-25.52	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	3			Date:	12/13/2012		
Frequency:	2462MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3037.000	37.05	5.99	43.04	74.00	-30.96	peak	H
4598.000	35.19	11.14	46.33	74.00	-27.67	peak	H
6215.000	33.61	16.54	50.15	74.00	-23.85	peak	H
3030.000	37.24	5.97	43.21	74.00	-30.79	peak	V
4570.000	35.34	11.06	46.40	74.00	-27.60	peak	V
5977.000	33.53	15.81	49.34	74.00	-24.66	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	4			Date:	12/13/2012		
Frequency:	2412MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2925.000	37.31	5.73	43.04	74.00	-30.96	peak	H
4465.000	35.99	10.75	46.74	74.00	-27.26	peak	H
5683.000	34.38	14.91	49.29	74.00	-24.71	peak	H
3051.000	39.06	6.02	45.08	74.00	-28.92	peak	V
4591.000	36.04	11.11	47.15	74.00	-26.85	peak	V
6152.000	34.70	16.35	51.05	74.00	-22.95	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	4			Date:	12/13/2012		
Frequency:	2437MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2974.000	37.87	5.84	43.71	74.00	-30.29	peak	H
4556.000	35.23	11.02	46.25	74.00	-27.75	peak	H
6194.000	34.19	16.47	50.66	74.00	-23.34	peak	H
2981.000	37.62	5.86	43.48	74.00	-30.52	peak	V
4577.000	35.88	11.07	46.95	74.00	-27.05	peak	V
6250.000	34.32	16.64	50.96	74.00	-23.04	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	4			Date:	12/13/2012		
Frequency:	2462MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2981.000	37.62	5.86	43.48	74.00	-30.52	peak	H
4577.000	35.88	11.07	46.95	74.00	-27.05	peak	H
6250.000	34.32	16.64	50.96	74.00	-23.04	peak	H
3107.000	38.55	6.14	44.69	74.00	-29.31	peak	V
4584.000	35.93	11.09	47.02	74.00	-26.98	peak	V
6033.000	34.02	15.98	50.00	74.00	-24.00	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	5			Date:	12/13/2012		
Frequency:	2422MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2960.000	38.66	5.81	44.47	74.00	-29.53	peak	H
4507.000	36.47	10.89	47.36	74.00	-26.64	peak	H
6180.000	34.27	16.43	50.70	74.00	-23.30	peak	H
2981.000	37.72	5.86	43.58	74.00	-30.42	peak	V
4577.000	36.41	11.07	47.48	74.00	-26.52	peak	V
6229.000	35.01	16.58	51.59	74.00	-22.41	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	5			Date:	12/13/2012		
Frequency:	2437MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3093.000	38.04	6.11	44.15	74.00	-29.85	peak	H
4514.000	36.43	10.92	47.35	74.00	-26.65	peak	H
5886.000	35.23	15.53	50.76	74.00	-23.24	peak	H
3016.000	37.84	5.95	43.79	74.00	-30.21	peak	V
4598.000	35.50	11.14	46.64	74.00	-27.36	peak	V
6138.000	34.89	16.30	51.19	74.00	-22.81	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	5			Date:	12/13/2012		
Frequency:	2452MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3058.000	38.58	6.04	44.62	74.00	-29.38	peak	H
4570.000	35.51	11.06	46.57	74.00	-27.43	peak	H
6068.000	34.59	16.09	50.68	74.00	-23.32	peak	H
2939.000	38.59	5.75	44.34	74.00	-29.66	peak	V
4598.000	37.16	11.14	48.30	74.00	-25.70	peak	V
5893.000	35.64	15.55	51.19	74.00	-22.81	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	6			Date:	12/13/2012		
Frequency:	5745MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2687.000	38.94	5.11	44.05	74.00	-29.95	peak	H
4549.000	37.18	11.01	48.19	74.00	-25.81	peak	H
6334.000	34.80	16.90	51.70	74.00	-22.30	peak	H
2274.000	39.82	3.10	42.92	74.00	-31.08	peak	V
3856.000	37.67	8.48	46.15	74.00	-27.85	peak	V
6572.000	32.36	17.77	50.13	74.00	-23.87	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	6			Date:	12/13/2012		
Frequency:	5785MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2337.000	39.52	3.53	43.05	74.00	-30.95	peak	H
4549.000	36.16	11.01	47.17	74.00	-26.83	peak	H
6390.000	33.33	17.08	50.41	74.00	-23.59	peak	H
2715.000	38.37	5.17	43.54	74.00	-30.46	peak	V
4269.000	36.53	10.06	46.59	74.00	-27.41	peak	V
6544.000	32.67	17.63	50.30	74.00	-23.70	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	6			Date:	12/13/2012		
Frequency:	5825MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2554.000	38.59	4.77	43.36	74.00	-30.64	peak	H
4052.000	37.75	9.27	47.02	74.00	-26.98	peak	H
6320.000	33.91	16.86	50.77	74.00	-23.23	peak	H
2540.000	39.17	4.72	43.89	74.00	-30.11	peak	V
4052.000	37.09	9.27	46.36	74.00	-27.64	peak	V
6859.000	30.98	19.19	50.17	74.00	-23.83	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	7			Date:	12/13/2012		
Frequency:	5745MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2470.000	38.05	4.42	42.47	74.00	-31.53	peak	H
4052.000	36.76	9.27	46.03	74.00	-27.97	peak	H
6215.000	34.07	16.54	50.61	74.00	-23.39	peak	H
2470.000	38.52	4.42	42.94	74.00	-31.06	peak	V
4066.000	37.60	9.33	46.93	74.00	-27.07	peak	V
6537.000	33.36	17.60	50.96	74.00	-23.04	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	7			Date:	12/13/2012		
Frequency:	5785MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2596.000	37.74	4.86	42.60	74.00	-31.40	peak	H
4073.000	37.11	9.35	46.46	74.00	-27.54	peak	H
6166.000	34.13	16.39	50.52	74.00	-23.48	peak	H
2183.000	37.99	2.49	40.48	74.00	-33.52	peak	V
3947.000	36.80	8.86	45.66	74.00	-28.34	peak	V
6607.000	33.59	17.95	51.54	74.00	-22.46	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	7			Date:	12/13/2012		
Frequency:	5825MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2323.000	39.07	3.43	42.50	74.00	-31.50	peak	H
4129.000	37.18	9.56	46.74	74.00	-27.26	peak	H
6383.000	34.11	17.06	51.17	74.00	-22.83	peak	H
2442.000	38.44	4.24	42.68	74.00	-31.32	peak	V
4101.000	37.63	9.45	47.08	74.00	-26.92	peak	V
6663.000	33.59	18.21	51.80	74.00	-22.20	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	8			Date:	12/13/2012		
Frequency:	5755MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2729.000	38.34	5.21	43.55	74.00	-30.45	peak	H
4591.000	35.94	11.11	47.05	74.00	-26.95	peak	H
6390.000	33.97	17.08	51.05	74.00	-22.95	peak	H
2225.000	38.90	2.78	41.68	74.00	-32.32	peak	V
3898.000	37.66	8.67	46.33	74.00	-27.67	peak	V
6747.000	33.03	18.63	51.66	74.00	-22.34	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VIP4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	8			Date:	12/13/2012		
Frequency:	5795MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2400.000	39.19	3.95	43.14	74.00	-30.86	peak	H
4493.000	36.17	10.86	47.03	74.00	-26.97	peak	H
6453.000	33.85	17.26	51.11	74.00	-22.89	peak	H
2491.000	37.98	4.55	42.53	74.00	-31.47	peak	V
3975.000	37.22	8.98	46.20	74.00	-27.80	peak	V
6684.000	32.86	18.31	51.17	74.00	-22.83	peak	V

Standard:	RSS-Gen		Test Distance:	3m				
Test item:	Radiated Emission		Power:	AC 120V/60Hz				
Model Number:	VIP4G		Temp.(℃)/Hum.(%RH):	26(℃)/60%RH				
Mode:	9		Date:	12/13/2012				
Modulation:	IEEE 802.11b		Test By:	Fly Lu				
Frequency:	2437MHz							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/	Peak Limit (dBuV/m)	AVG. Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pola H / V
2897.000	36.13	5.64	41.77	74.00	54.00	-32.23	peak	H
4521.000	35.98	10.93	46.91	74.00	54.00	-27.09	peak	H
6089.000	31.56	16.15	47.71	74.00	54.00	-26.29	peak	H
2953.000	36.45	5.79	42.24	74.00	54.00	-31.76	peak	V
4591.000	35.53	11.11	46.64	74.00	54.00	-27.36	peak	V
6187.000	33.51	16.45	49.96	74.00	54.00	-24.04	peak	V

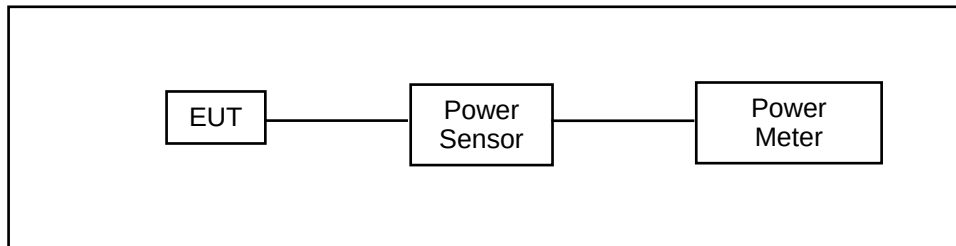
Standard:	RSS-Gen		Test Distance:	3m				
Test item:	Radiated Emission		Power:	AC 120V/60Hz				
Model Number:	VIP4G		Temp.(℃)/Hum.(%RH):	26(℃)/60%RH				
Mode:	9		Date:	12/13/2012				
Modulation:	IEEE 802.11a		Test By:	Fly Lu				
Frequency:	5745MHz							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/	Peak Limit (dBuV/m)	AVG. Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pola H / V
2540.000	38.65	4.72	43.37	74.00	54.00	-30.63	peak	H
4038.000	37.08	9.22	46.30	74.00	54.00	-27.70	peak	H
6145.000	33.80	16.32	50.12	74.00	54.00	-23.88	peak	H
2540.000	37.95	4.72	42.67	74.00	54.00	-31.33	peak	V
4031.000	36.74	9.20	45.94	74.00	54.00	-28.06	peak	V
6887.000	31.17	19.32	50.49	74.00	54.00	-23.51	peak	V

6 Maximum Conducted Output Power Measurement

6.1. Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm.

6.2. Test Setup



6.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Single Channel PK Power Sensor	Agilent	N1911A	MY45101619	12/15/2011	(1)
Wideband Power Meter	Agilent	N1921A	MY45241957	12/15/2011	(1)
Test Site	ATL	TE05	TE05	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years. (3) Calibration period 3 years.

Note: N.C.R. = No Calibration Request.

6.4. Test Procedure

The tests below are run with the EUT's transmitter set at high power in TX mode. The EUT is needed to force selection of output power level and channel number. While testing, EUT was set to transmit continuously. Remove the Subjective device's antenna and connect the RF output port to power sensor. The maximum peak output power shall not exceed 1 watt.

Use a direct connection between the antenna port of transmitter and the power sensor, for prevent the power sensor input attenuation 40-50 dB. Set the RBW Bandwidth of the emission or use a channel power meter mode.

For antennas with gains of 6 dBi or less, maximum allowed transmitter output is 1 watt (+30 dBm). For antennas with gains greater than 6 dBi, transmitter output level must be decreased by an amount equal to (GAIN - 6)/3 dBm.

The antenna port of the EUT was connected to the input of a power sensor. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.

6.5. Test Result

Model Number	VIP4G									
Test Item	Maximum Conducted Output Power									
Test Mode	Mode 2: IEEE 802.11b Link Mode									
Date of Test	12/05/2012							Test Site		TE05
Frequency (MHz)	Data Rate	Average Power				Peak Power				Limit (dBm)
		ANT1		ANT2		ANT1		ANT2		
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	
2412	1 M	15.72	0.037	15.64	0.037	18.60	0.072	18.56	0.072	< 30
2437		15.91	0.039	15.82	0.038	18.89	0.077	18.81	0.076	< 30
2462		15.52	0.036	15.47	0.035	18.42	0.070	18.37	0.069	< 30

Model Number	VIP4G									
Test Item	Maximum Conducted Output Power									
Test Mode	Mode 3: IEEE 802.11g Link Mode									
Date of Test	12/05/2012							Test Site		TE05
Frequency (MHz)	Data Rate	Average Power				Peak Power				Limit (dBm)
		ANT1		ANT2		ANT1		ANT2		
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	
2412	6 M	13.88	0.024	13.83	0.024	24.59	0.288	24.43	0.277	< 30
2437		14.51	0.028	14.41	0.028	25.25	0.335	25.17	0.329	< 30
2462		14.45	0.028	14.32	0.027	25.12	0.325	25.03	0.318	< 30

Model Number	VIP4G													
Test Item	Maximum Conducted Output Power													
Test Mode	Mode 4: IEEE 802.11n 2.4GHz 20MHz Link Mode													
Date of Test	12/05/2012							Test Site		TE05				
Frequency (MHz)	Data Rate	Average Power						Peak Power						Limit (dBm)
		ANT1		ANT2		Total Power		ANT1		ANT2		Total Power		
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	
2412	13 M	11.96	0.016	11.91	0.016	14.95	0.031	22.68	0.185	22.62	0.183	25.66	0.368	< 30
2437		12.14	0.016	12.08	0.016	15.12	0.033	22.91	0.195	22.88	0.194	25.91	0.390	< 30
2462		12.32	0.017	12.27	0.017	15.31	0.034	23.01	0.200	22.96	0.198	26.00	0.398	< 30

Model Number	VIP4G													
Test Item	Maximum Conducted Output Power													
Test Mode	Mode 5: IEEE 802.11n 2.4GHz 40MHz Link Mode													
Date of Test	12/05/2012							Test Site		TE05				
Frequency (MHz)	Data Rate	Average Power						Peak Power						Limit (dBm)
		ANT1		ANT2		Total Power		ANT1		ANT2		Total Power		
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	
2422	27 M	9.88	0.010	9.86	0.010	12.88	0.019	20.61	0.115	20.59	0.115	23.61	0.230	< 30
2437		10.04	0.010	10.01	0.010	13.04	0.020	20.79	0.120	20.66	0.116	23.74	0.236	< 30
2452		10.29	0.011	10.25	0.011	13.28	0.021	20.99	0.126	20.83	0.121	23.92	0.247	< 30

Model Number	VIP4G									
Test Item	Maximum Conducted Output Power									
Test Mode	Mode 6: IEEE 802.11a U-NII Band IV Link Mode									
Date of Test	12/05/2012							Test Site		TE05
Frequency (MHz)	Data Rate	Average Power				Peak Power				Limit (dBm)
		ANT1		ANT2		ANT1		ANT2		
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	
5745	6 M	16.01	0.040	15.93	0.039	23.07	0.203	22.94	0.197	< 30
5785		16.53	0.045	16.44	0.044	23.79	0.239	23.69	0.234	< 30
5825		16.61	0.046	16.52	0.045	23.90	0.245	23.82	0.241	< 30

Model Number	VIP4G													
Test Item	Maximum Conducted Output Power													
Test Mode	Mode 7: IEEE 802.11n U-NII Band IV 20MHz Link Mode													
Date of Test	12/05/2012							Test Site		TE05				
Frequency (MHz)	Data Rate	Average Power						Peak Power						Limit (dBm)
		ANT1		ANT2		Total Power		ANT1		ANT2		Total Power		
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	
5745	13 M	14.75	0.030	14.66	0.029	17.72	0.059	20.73	0.118	20.65	0.116	23.70	0.234	< 30
5785		15.16	0.033	15.06	0.032	18.12	0.065	21.34	0.136	21.23	0.133	24.30	0.269	< 30
5825		15.43	0.035	15.36	0.034	18.41	0.069	21.66	0.147	21.59	0.144	24.64	0.291	< 30

Model Number	VIP4G													
Test Item	Maximum Conducted Output Power													
Test Mode	Mode 8: IEEE 802.11n U-NII Band IV 40MHz Link Mode													
Date of Test	12/05/2012							Test Site		TE05				
Frequency (MHz)	Data Rate	Average Power						Peak Power						Limit (dBm)
		ANT1		ANT2		Total Power		ANT1		ANT2		Total Power		
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	
5755	27 M	13.29	0.021	13.21	0.021	16.26	0.042	20.66	0.116	20.59	0.115	23.64	0.231	< 30
5795		13.63	0.023	13.57	0.023	16.61	0.046	20.89	0.123	20.75	0.119	23.83	0.242	< 30

7 6dB RF Bandwidth & 99 % Occupied Bandwidth Measurement

7.1. Limit

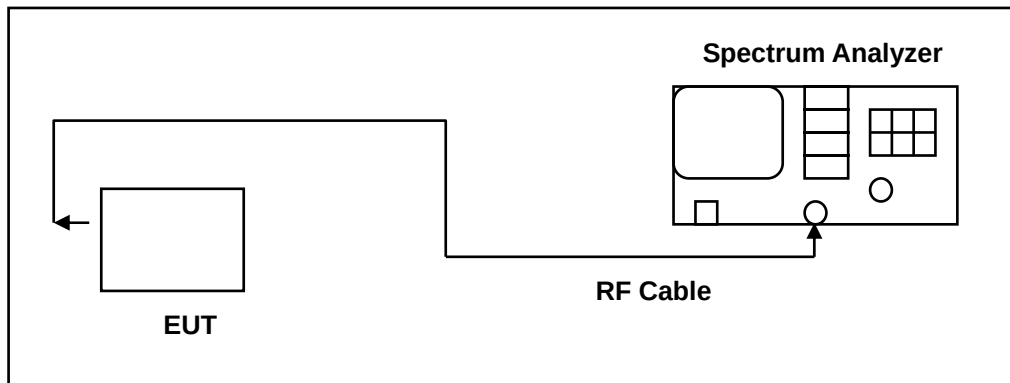
6dB RF Bandwidth

Systems using digital modulation techniques may operate in the 2400–2483.5 MHz bands. The minimum 6 dB band-width shall be at least 500 kHz.

99 % Occupied Bandwidth

N/A

7.2. Test Setup



7.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/21/2011	(2)
Test Site	ATL	TE05	TE05	N.C.R.	-----

dRemark: (1) Calibration period 1 year. (2) Calibration period 2 years. (3) Calibration period 3 years.

Note: N.C.R. = No Calibration Request.

7.4. Test Procedure

6dB RF Bandwidth

The EUT was setup to ANSI C63.4, 2009; tested to DTS test procedure of Oct 2012 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A peak output reading was taken, a DISPLAY line was drawn 6 dB lower than peak level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line.

The test was performed at 3 channels (Channel 1, 6, 11)

99 % Occupied Bandwidth

The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%.

The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

7.5. Test Result

Model Number	VIP4G		
Test Item	6dB RF Bandwidth & 99 % Occupied Bandwidth		
Test Mode	Mode 2: IEEE 802.11b Link Mode		
Date of Test	12/13/2012		Test Site TE05
Frequency (MHz)	6dB Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	Limit (kHz)
2412	12121	15768.5	> 500
2437	11167	15778.6	> 500
2462	12109	15700.8	> 500

Model Number	VIP4G		
Test Item	6dB RF Bandwidth & 99 % Occupied Bandwidth		
Test Mode	Mode 3: IEEE 802.11g Link Mode		
Date of Test	12/13/2012		Test Site TE05
Frequency (MHz)	6dB Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	Limit (kHz)
2412	16454	16488.8	> 500
2437	16442	16474.3	> 500
2462	16409	16474.4	> 500

Model Number	VIP4G					
Test Item	6dB RF Bandwidth & 99 % Occupied Bandwidth					
Test Mode	Mode 4: IEEE 802.11n 2.4GHz 20MHz Link Mode					
Date of Test	12/13/2012				Test Site	TE05
Frequency (MHz)	6dB Bandwidth (kHz)		99% Occupied Bandwidth (kHz)		Limit (kHz)	
	ANT1	ANT2	ANT1	ANT2		
2412	17729	17731	17673.1	17684.8	> 500	
2437	17684	17756	17692.8	17718.4	> 500	
2462	17745	17744	17708.8	17708.6	> 500	

Model Number	VIP4G				
Test Item	6dB RF Bandwidth & 99 % Occupied Bandwidth				
Test Mode	Mode 5: IEEE 802.11n 2.4GHz 40MHz Link Mode				
Date of Test	12/13/2012			Test Site	TE05
Frequency (MHz)	6dB Bandwidth (kHz)		99% Occupied Bandwidth (kHz)		Limit (kHz)
	ANT1	ANT2	ANT1	ANT2	
2422	35647	35677	36067.1	36036.6	> 500
2437	35904	35938	36030.3	36033.6	> 500
2452	35546	35570	36078.9	36078.5	> 500

Model Number	VIP4G				
Test Item	6dB RF Bandwidth & 99 % Occupied Bandwidth				
Test Mode	Mode 6: IEEE 802.11a U-NII Band IV Link Mode				
Date of Test	12/19/2012			Test Site	TE05
Frequency (MHz)	6dB Bandwidth (kHz)		99% Occupied Bandwidth (kHz)		Limit (kHz)
	ANT1	ANT2	ANT1	ANT2	
5745	16367		16515.8		> 500
5785	16400		16518.1		> 500
5825	16377		16524.7		> 500

Model Number	VIP4G				
Test Item	6dB RF Bandwidth & 99 % Occupied Bandwidth				
Test Mode	Mode 7: IEEE 802.11n U-NII Band IV 20MHz Link Mode				
Date of Test	12/19/2012			Test Site	TE05
Frequency (MHz)	6dB Bandwidth (kHz)		99% Occupied Bandwidth (kHz)		Limit (kHz)
	ANT1	ANT2	ANT1	ANT2	
5745	17700	17701	17691.9	17701.4	> 500
5785	17674	17682	17648.9	17692.0	> 500
5825	17681	17709	17671.4	17695.6	> 500

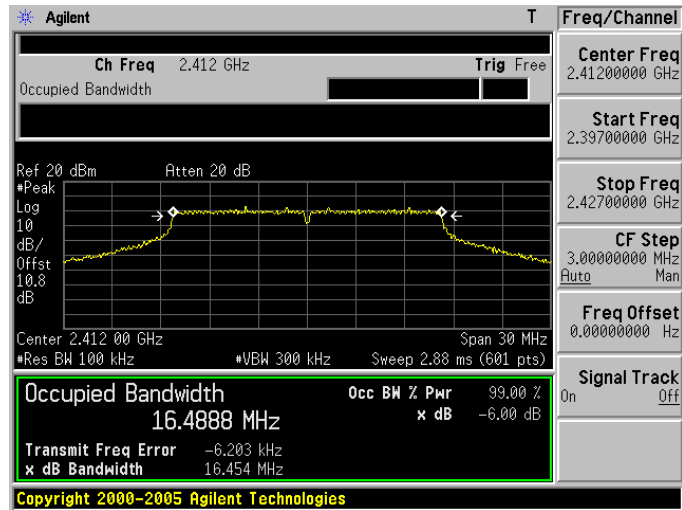
Model Number	VIP4G				
Test Item	6dB RF Bandwidth & 99 % Occupied Bandwidth				
Test Mode	Mode 8: IEEE 802.11n U-NII Band IV 40MHz Link Mode				
Date of Test	12/19/2012			Test Site	TE05
Frequency (MHz)	6dB Bandwidth (kHz)		99% Occupied Bandwidth (kHz)		Limit (kHz)
	ANT1	ANT2	ANT1	ANT2	
5755	35542	35805	36059.8	36043.8	> 500
5795	35806	35998	36030.2	36025.9	> 500

7.6. Test Graphs

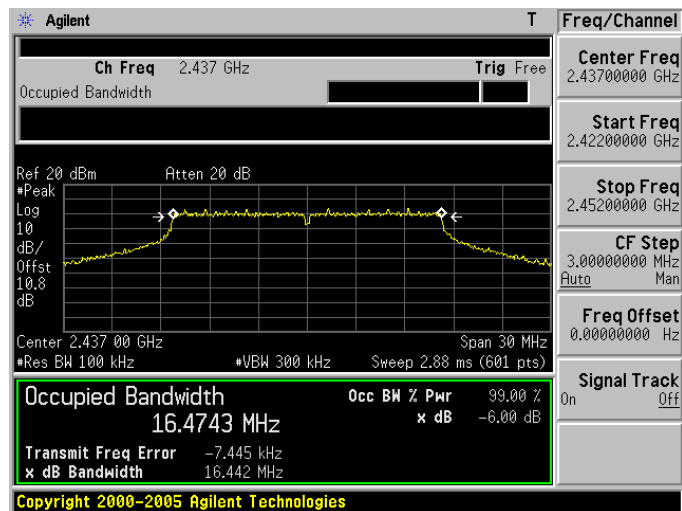
Mode 2: IEEE 802.11b Link Mode	
2412	
2437	
2462	

Mode 3: IEEE 802.11g Link Mode

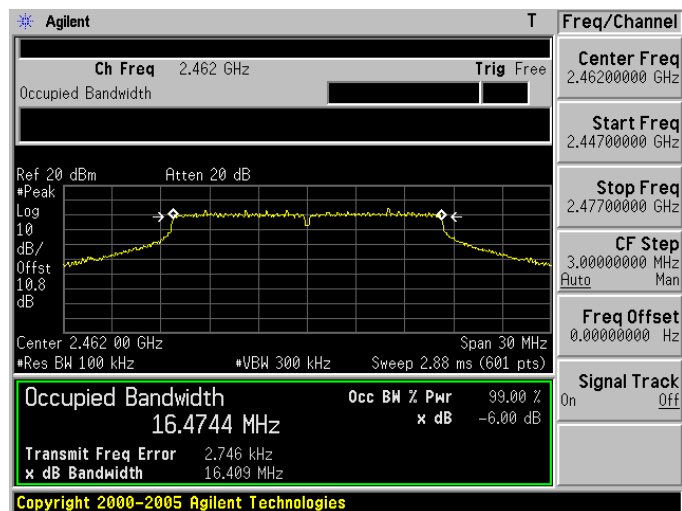
2412



2437

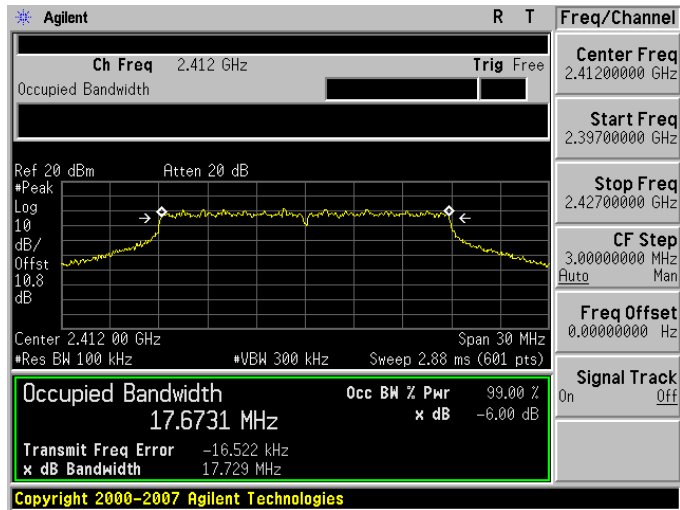


2462

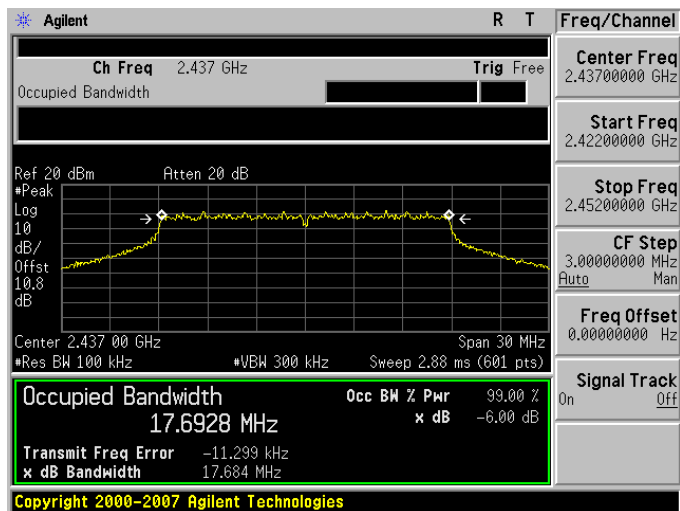


Mode 4: IEEE 802.11n 2.4GHz 20MHz Link Mode _ ANT1

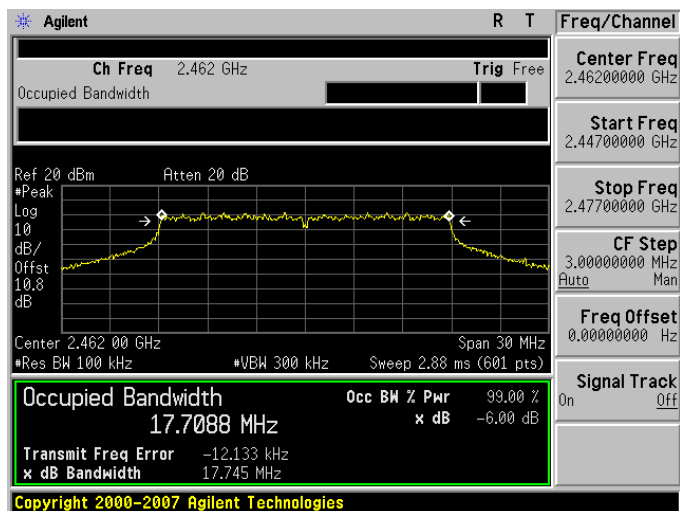
2412



2437

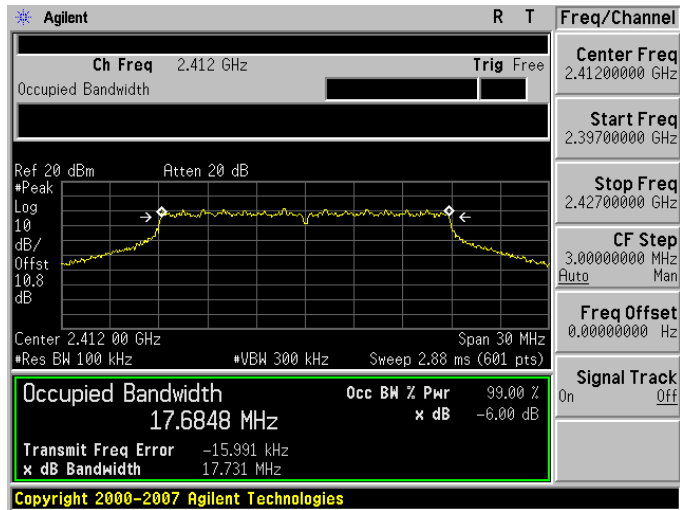


2462

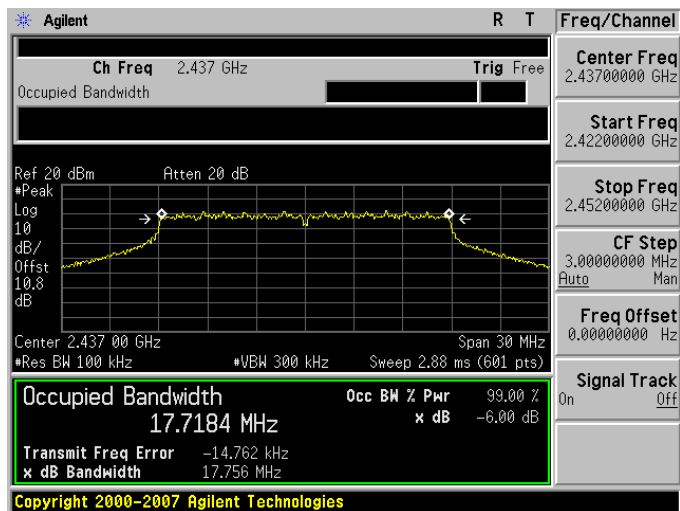


Mode 4: IEEE 802.11n 2.4GHz 20MHz Link Mode _ANT2

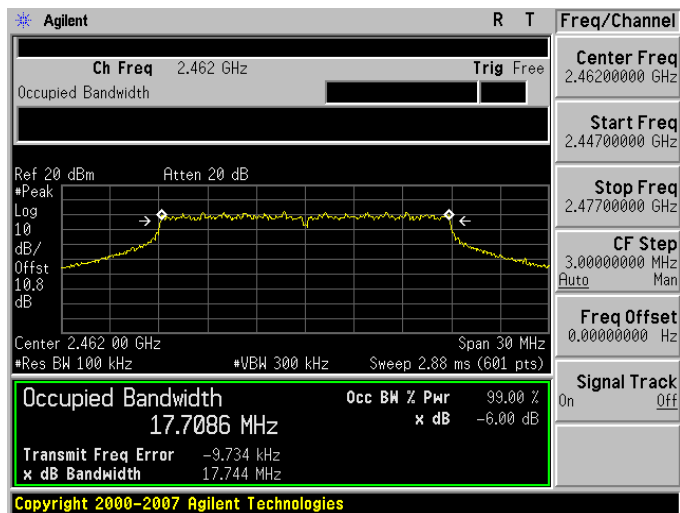
2412



2437

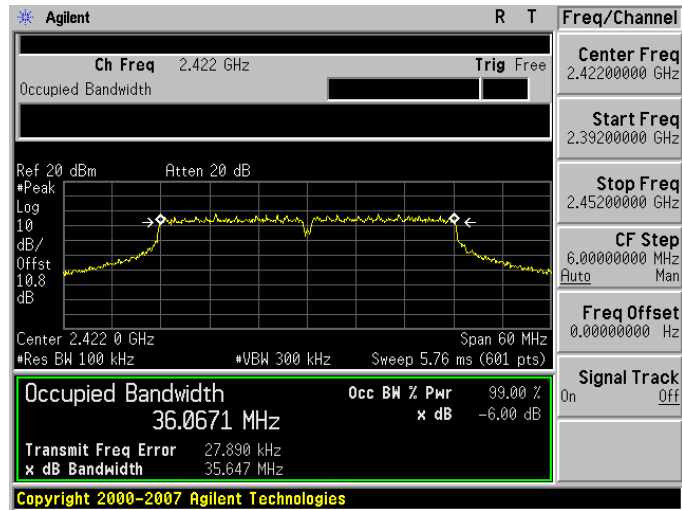


2462

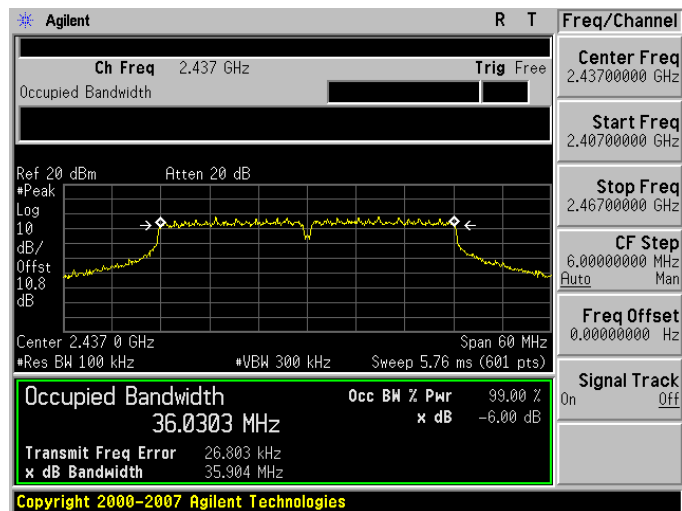


Mode 5: IEEE 802.11n 2.4GHz 40MHz Link Mode _ ANT1

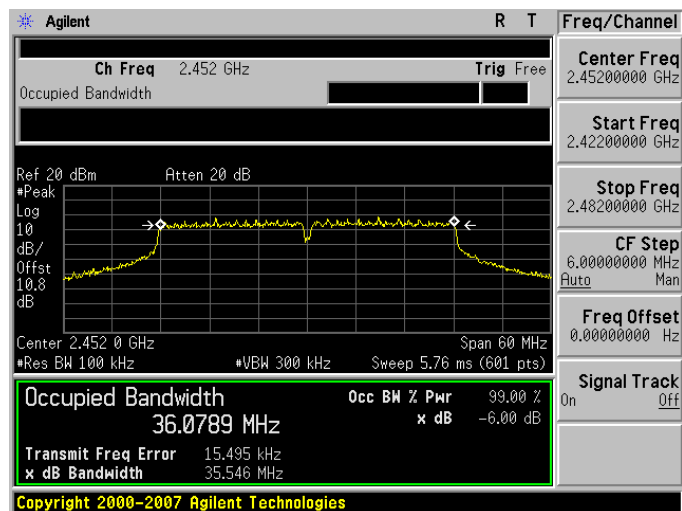
2422



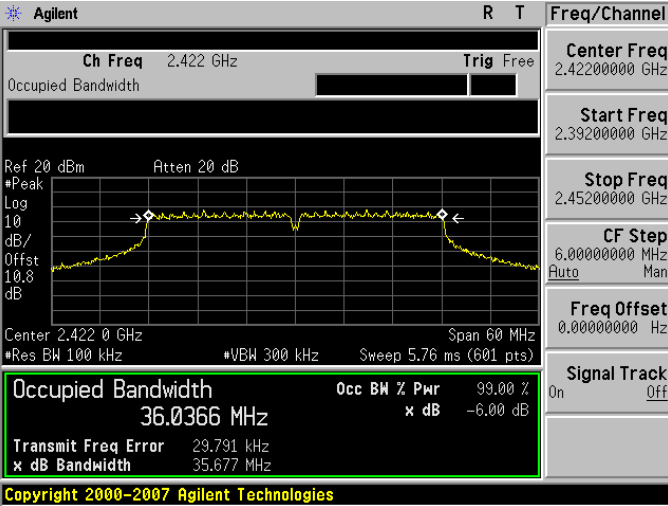
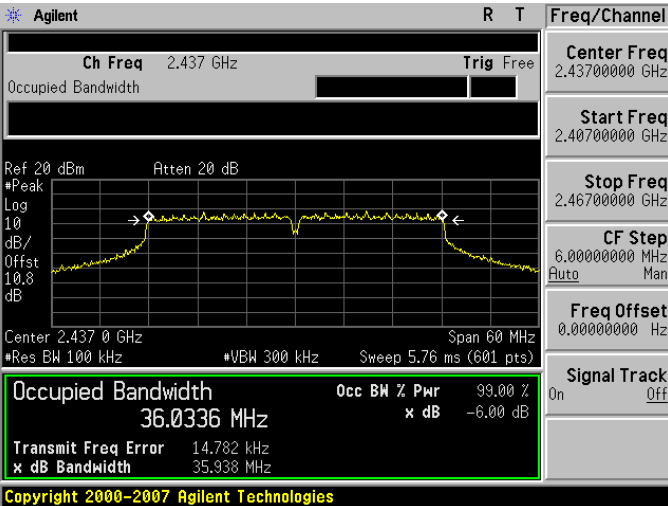
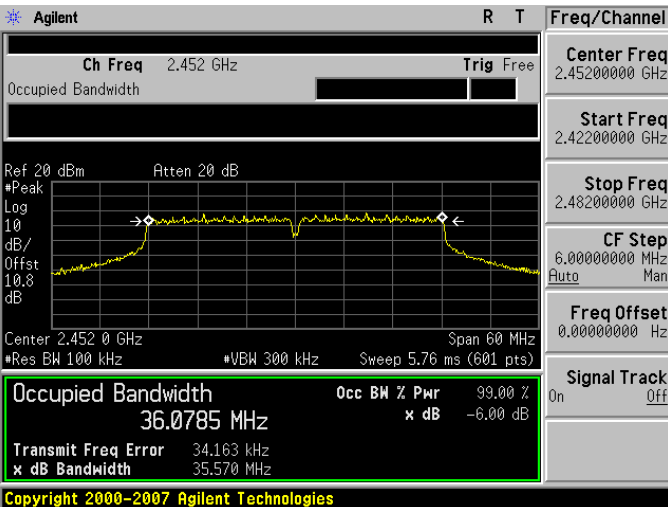
2437



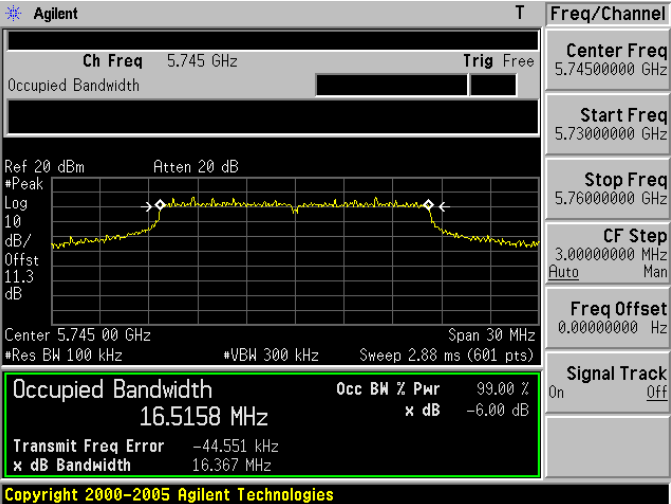
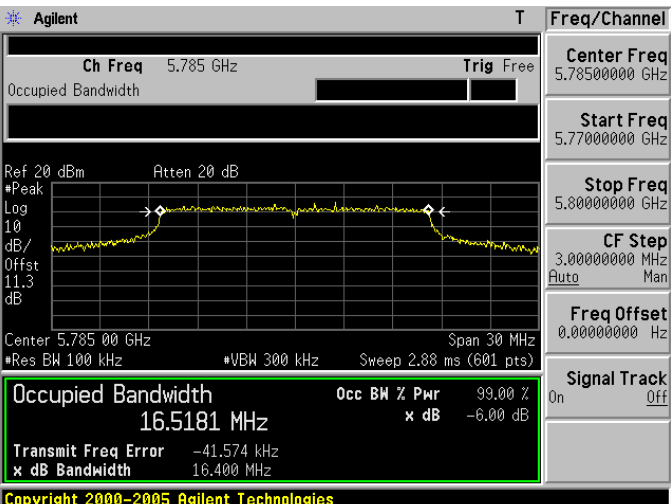
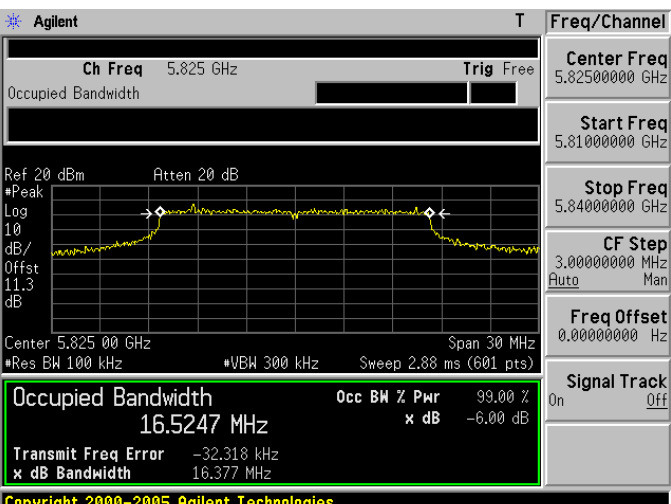
2452



Mode 5: IEEE 802.11n 2.4GHz 40MHz Link Mode _ ANT2

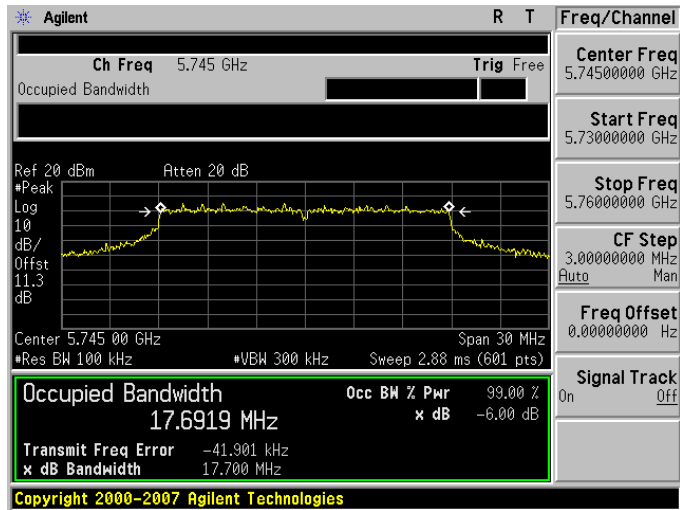
2422	 Agilent R T Freq/Channel Ch Freq 2.422 GHz Trig Free Center Freq 2.42200000 GHz Start Freq 2.39200000 GHz Stop Freq 2.45200000 GHz CF Step 6.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 20 dBm Atten 20 dB Peak Log 10 dB/Offst 10.8 dB Center 2.422 0 GHz Span 60 MHz Res BW 100 kHz VBW 300 kHz Sweep 5.76 ms (601 pts) Occupied Bandwidth 36.0366 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error 29.791 kHz x dB Bandwidth 35.677 MHz Copyright 2000-2007 Agilent Technologies
2437	 Agilent R T Freq/Channel Ch Freq 2.437 GHz Trig Free Center Freq 2.43700000 GHz Start Freq 2.40700000 GHz Stop Freq 2.46700000 GHz CF Step 6.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 20 dBm Atten 20 dB Peak Log 10 dB/Offst 10.8 dB Center 2.437 0 GHz Span 60 MHz Res BW 100 kHz VBW 300 kHz Sweep 5.76 ms (601 pts) Occupied Bandwidth 36.0336 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error 14.782 kHz x dB Bandwidth 35.938 MHz Copyright 2000-2007 Agilent Technologies
2452	 Agilent R T Freq/Channel Ch Freq 2.452 GHz Trig Free Center Freq 2.45200000 GHz Start Freq 2.42200000 GHz Stop Freq 2.48200000 GHz CF Step 6.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 20 dBm Atten 20 dB Peak Log 10 dB/Offst 10.8 dB Center 2.452 0 GHz Span 60 MHz Res BW 100 kHz VBW 300 kHz Sweep 5.76 ms (601 pts) Occupied Bandwidth 36.0785 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error 34.163 kHz x dB Bandwidth 35.570 MHz Copyright 2000-2007 Agilent Technologies

Mode 6: IEEE 802.11a U-NII Band IV Link Mode

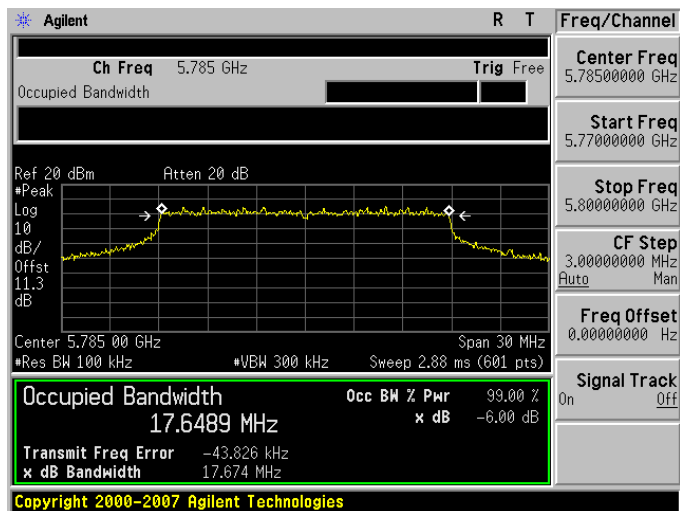
5745	 Agilent T Ch Freq 5.745 GHz Trig Free Occupied Bandwidth Ref 20 dBm Atten 20 dB Peak Log 10 dB/ Offst 11.3 dB Center 5.745 00 GHz Span 30 MHz *Res BW 100 kHz *VBW 300 kHz Sweep 2.88 ms (601 pts) Occupied Bandwidth 16.5158 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -44.551 kHz x dB Bandwidth 16.367 MHz Copyright 2000-2005 Agilent Technologies Freq/Channel Center Freq 5.74500000 GHz Start Freq 5.73000000 GHz Stop Freq 5.76000000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off
5785	 Agilent T Ch Freq 5.785 GHz Trig Free Occupied Bandwidth Ref 20 dBm Atten 20 dB Peak Log 10 dB/ Offst 11.3 dB Center 5.785 00 GHz Span 30 MHz *Res BW 100 kHz *VBW 300 kHz Sweep 2.88 ms (601 pts) Occupied Bandwidth 16.5181 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -41.574 kHz x dB Bandwidth 16.400 MHz Copyright 2000-2005 Agilent Technologies Freq/Channel Center Freq 5.78500000 GHz Start Freq 5.77000000 GHz Stop Freq 5.80000000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off
5825	 Agilent T Ch Freq 5.825 GHz Trig Free Occupied Bandwidth Ref 20 dBm Atten 20 dB Peak Log 10 dB/ Offst 11.3 dB Center 5.825 00 GHz Span 30 MHz *Res BW 100 kHz *VBW 300 kHz Sweep 2.88 ms (601 pts) Occupied Bandwidth 16.5247 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -32.318 kHz x dB Bandwidth 16.377 MHz Copyright 2000-2005 Agilent Technologies Freq/Channel Center Freq 5.82500000 GHz Start Freq 5.81000000 GHz Stop Freq 5.84000000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off

Mode 7: IEEE 802.11n U-NII Band IV 20MHz Link Mode _ ANT1

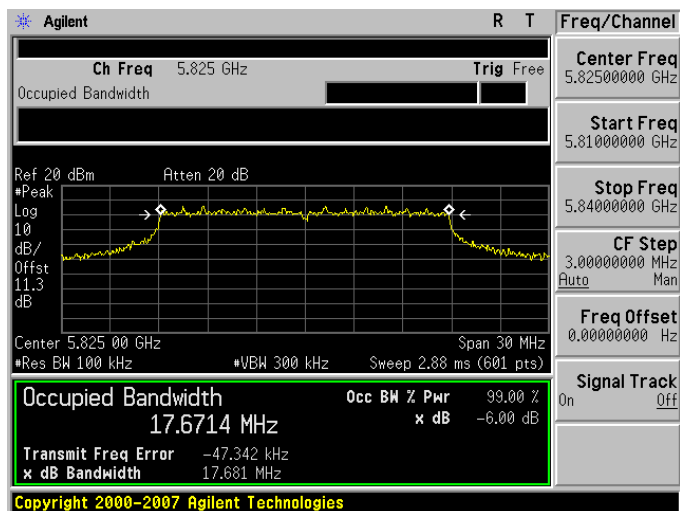
5745



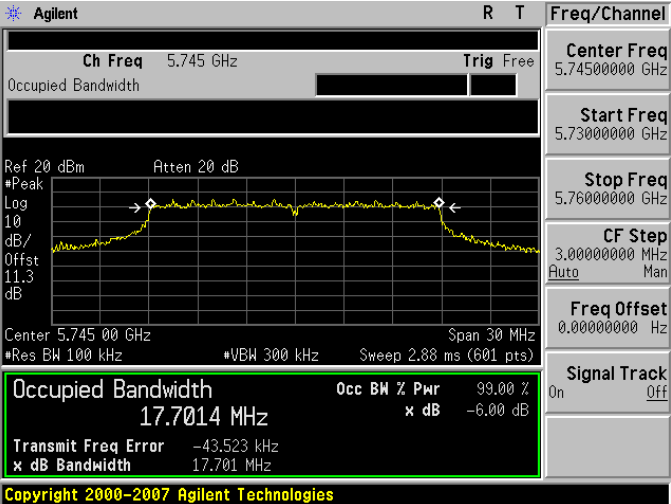
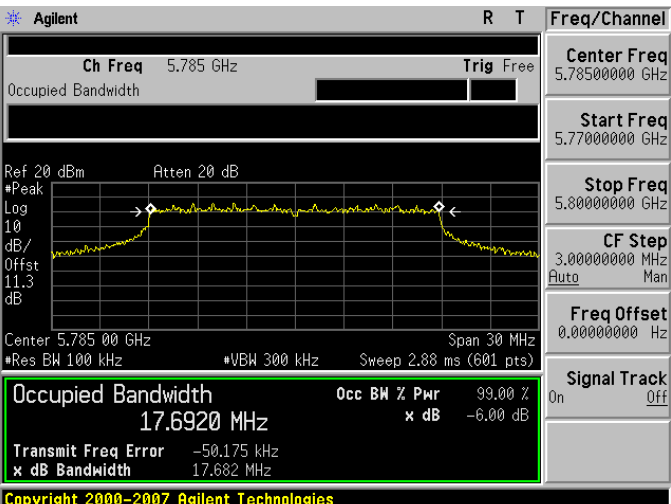
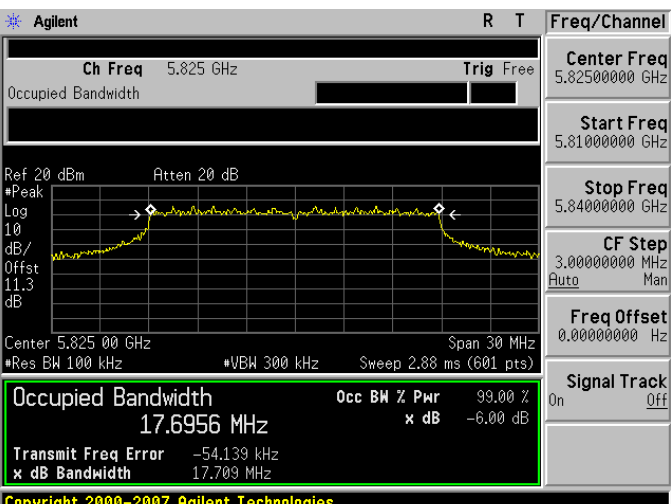
5785



5825

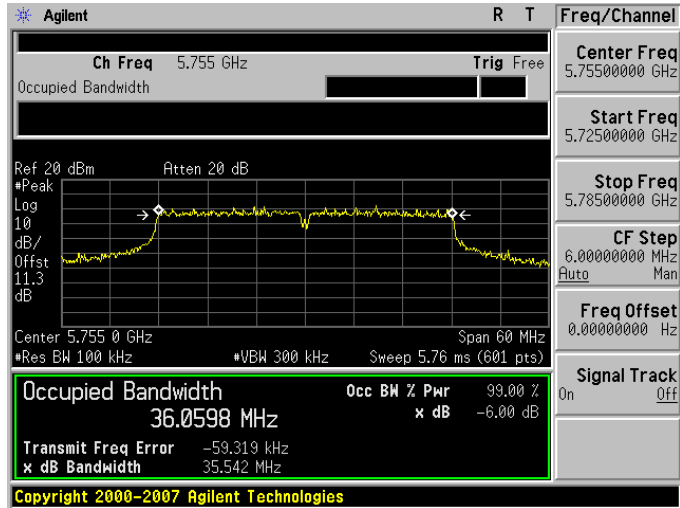


Mode 7: IEEE 802.11n U-NII Band IV 20MHz Link Mode _ ANT2

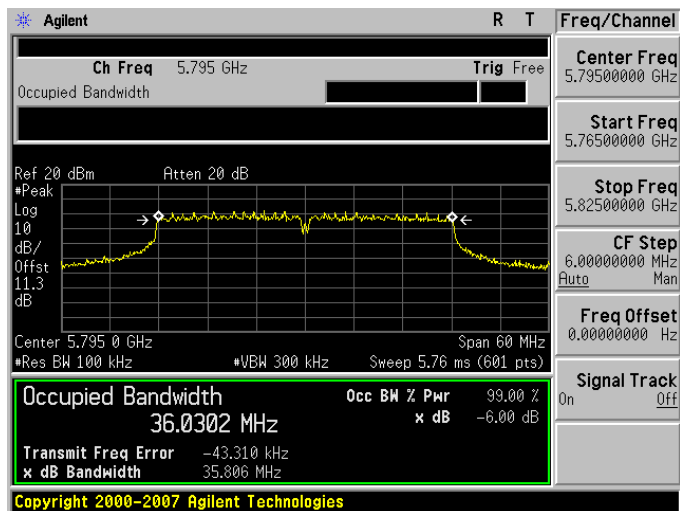
5745	 Agilent R T Ch Freq 5.745 GHz Trig Free Occupied Bandwidth Ref 20 dBm Atten 20 dB Peak Log 10 dB/Offst 11.3 dB Center 5.745 00 GHz Span 30 MHz Res BW 100 kHz VBW 300 kHz Sweep 2.88 ms (601 pts) Occupied Bandwidth 17.7014 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -43.523 kHz x dB Bandwidth 17.701 MHz Copyright 2000-2007 Agilent Technologies Freq/Channel Center Freq 5.74500000 GHz Start Freq 5.73000000 GHz Stop Freq 5.76000000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off
5785	 Agilent R T Ch Freq 5.785 GHz Trig Free Occupied Bandwidth Ref 20 dBm Atten 20 dB Peak Log 10 dB/Offst 11.3 dB Center 5.785 00 GHz Span 30 MHz Res BW 100 kHz VBW 300 kHz Sweep 2.88 ms (601 pts) Occupied Bandwidth 17.6920 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -50.175 kHz x dB Bandwidth 17.682 MHz Copyright 2000-2007 Agilent Technologies Freq/Channel Center Freq 5.78500000 GHz Start Freq 5.77000000 GHz Stop Freq 5.80000000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off
5825	 Agilent R T Ch Freq 5.825 GHz Trig Free Occupied Bandwidth Ref 20 dBm Atten 20 dB Peak Log 10 dB/Offst 11.3 dB Center 5.825 00 GHz Span 30 MHz Res BW 100 kHz VBW 300 kHz Sweep 2.88 ms (601 pts) Occupied Bandwidth 17.6956 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -54.139 kHz x dB Bandwidth 17.709 MHz Copyright 2000-2007 Agilent Technologies Freq/Channel Center Freq 5.82500000 GHz Start Freq 5.81000000 GHz Stop Freq 5.84000000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off

Mode 8: IEEE 802.11n U-NII Band IV 40MHz Link Mode _ ANT1

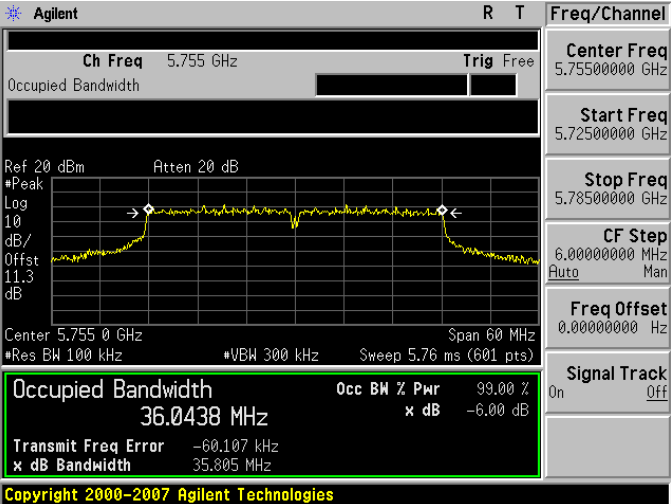
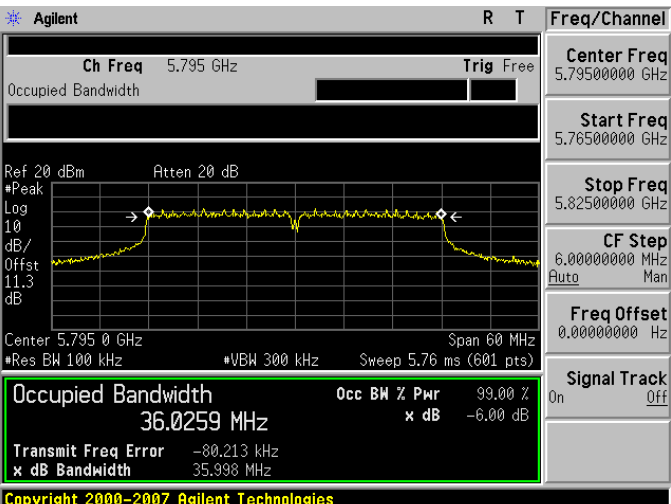
5755



5795



Mode 8: IEEE 802.11n U-NII Band IV 40MHz Link Mode _ANT2

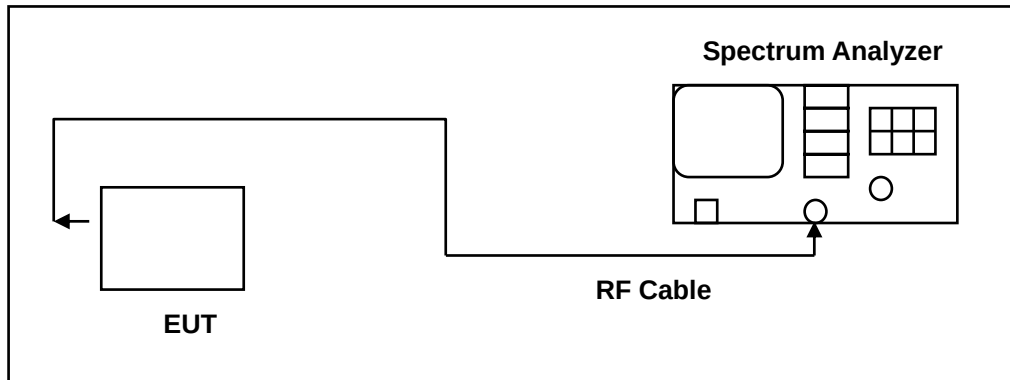
5755	 Agilent R T Freq/Channel Ch Freq 5.755 GHz Trig Free Center Freq 5.75500000 GHz Start Freq 5.72500000 GHz Stop Freq 5.78500000 GHz CF Step 6.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 20 dBm Atten 20 dB Peak Log 10 dB/Offst 11.3 dB Center 5.755 0 GHz Span 60 MHz Res BW 100 kHz VBW 300 kHz Sweep 5.76 ms (601 pts) Occupied Bandwidth 36.0438 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -60.107 kHz x dB Bandwidth 35.805 MHz Copyright 2000-2007 Agilent Technologies
5795	 Agilent R T Freq/Channel Ch Freq 5.795 GHz Trig Free Center Freq 5.79500000 GHz Start Freq 5.76500000 GHz Stop Freq 5.82500000 GHz CF Step 6.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 20 dBm Atten 20 dB Peak Log 10 dB/Offst 11.3 dB Center 5.795 0 GHz Span 60 MHz Res BW 100 kHz VBW 300 kHz Sweep 5.76 ms (601 pts) Occupied Bandwidth 36.0259 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -80.213 kHz x dB Bandwidth 35.998 MHz Copyright 2000-2007 Agilent Technologies

8 Maximum Power Density Measurement

8.1. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

8.2. Test Setup



8.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/21/2011	(2)
Test Site	ATL	TE05	TE05	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years. (3) Calibration period 3 years.

Note: N.C.R. = No Calibration Request.

8.4. Test Procedure

The EUT was setup to ANSI C63.4, 2009; tested to DTS test procedure of Oct 2012 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

- 1) The EUT was directly connectd to the spectrum analyzer and antenna output port as show in the block diagram below,
- 2) Spectrum Setting: RBW=100KHz, VBW=300KHz, Sweep time=Auto. Span to 5-30% greater than EBW
- 3) Scale the observed power level to an equivalent value in 3kHz by adjusting(reducing) the measured power by a bandwidth correction factor(BWCF) where $BWCF = 10\log(3\text{kHz}/100\text{kHz}) = -15.2\text{dB}$.
- 4) Use peak detector+BWCF.
- 5) The resulting peak PSD level must be $\leq 8\text{dBm}$.

8.5. Test Result

Model Number	VIP4G			
Test Item	Maximum Power Density			
Test Mode	Mode 2: IEEE 802.11b Link Mode			
Date of Test	12/13/2012		Test Site	TE05
Frequency (MHz)	Reading (dBm/100KHz)	BWCF (dB)	Results (dBm/3KHz)	Limit (dBm)
2412	6.43	-15.30	-8.87	< 8
2437	6.27	-15.30	-9.03	< 8
2462	5.88	-15.30	-9.42	< 8

Model Number	VIP4G			
Test Item	Maximum Power Density			
Test Mode	Mode 3: IEEE 802.11g Link Mode			
Date of Test	12/13/2012		Test Site	TE05
Frequency (MHz)	Reading (dBm/100KHz)	BWCF (dB)	Results (dBm/3KHz)	Limit (dBm)
2412	3.42	-15.30	-11.88	< 8
2437	3.84	-15.30	-11.46	< 8
2462	3.97	-15.30	-11.33	< 8

Model Number	VIP4G				
Test Item	Maximum Power Density				
Test Mode	Mode 4: IEEE 802.11n 2.4GHz 20MHz Link Mode				
Date of Test	12/13/2012			Test Site	TE05
Frequency (MHz)	Reading (dBm/100KHz)		BWCF (dB)	Results (dBm/3KHz)	Limit (dBm)
	ANT1	ANT2			
2412	1.73	1.93	-15.30	-10.46	< 8
2437	2.00	1.67	-15.30	-10.45	< 8
2462	1.30	1.37	-15.30	-10.95	< 8

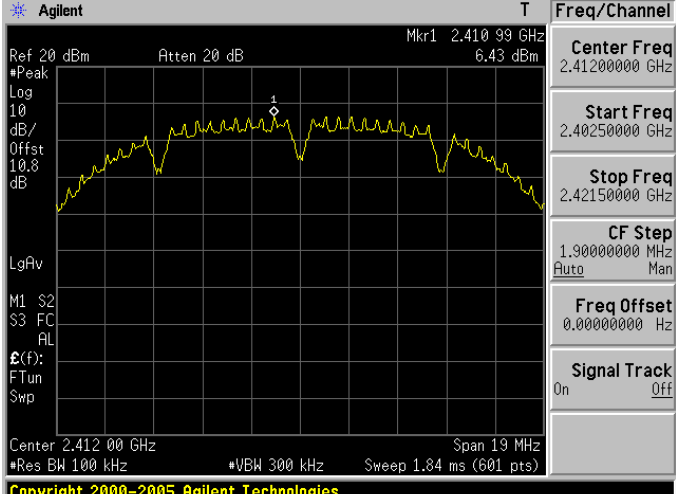
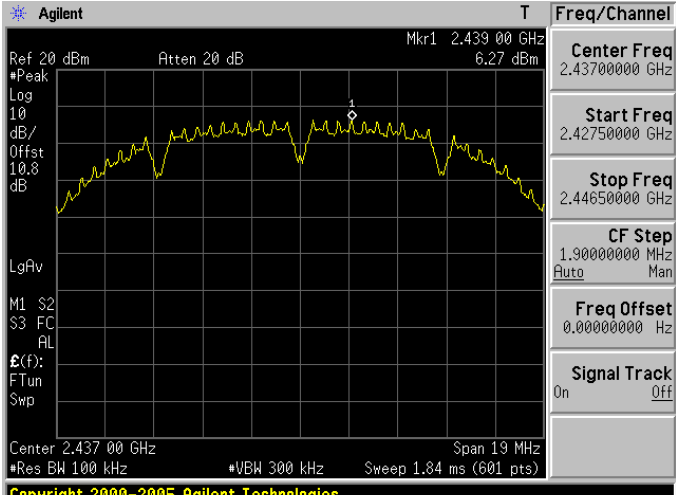
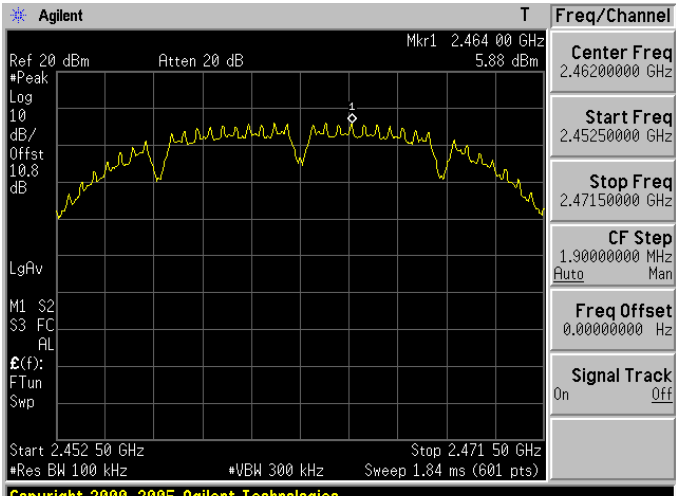
Model Number	VIP4G				
Test Item	Maximum Power Density				
Test Mode	Mode 5: IEEE 802.11n 2.4GHz 40MHz Link Mode				
Date of Test	12/13/2012			Test Site	TE05
Frequency (MHz)	Reading (dBm/100KHz)		BWCF (dB)	Results (dBm/3KHz)	Limit (dBm)
	ANT1	ANT2			
2412	-1.41	-2.27	-15.30	-14.11	< 8
2437	-2.52	-2.28	-15.30	-14.69	< 8
2462	-1.58	-1.75	-15.30	-13.95	< 8

Model Number	VIP4G				
Test Item	Maximum Power Density				
Test Mode	Mode 6: IEEE 802.11a U-NII Band IV Link Mode				
Date of Test	12/19/2012			Test Site	TE05
Frequency (MHz)	Reading (dBm/100KHz)		BWCF (dB)	Results (dBm/3KHz)	Limit (dBm)
	ANT1	ANT2			
5745	6.31		-15.30	-8.99	< 8
5785	6.84		-15.30	-8.46	< 8
5825	6.82		-15.30	-8.48	< 8

Model Number	VIP4G				
Test Item	Maximum Power Density				
Test Mode	Mode 7: IEEE 802.11n U-NII Band IV 20MHz Link Mode				
Date of Test	12/19/2012			Test Site	TE05
Frequency (MHz)	Reading (dBm/100KHz)		BWCF (dB)	Results (dBm/3KHz)	Limit (dBm)
	ANT1	ANT2			
5745	5.23	5.51	-15.30	-6.92	< 8
5785	5.44	5.56	-15.30	-6.79	< 8
5825	5.95	5.80	-15.30	-6.41	< 8

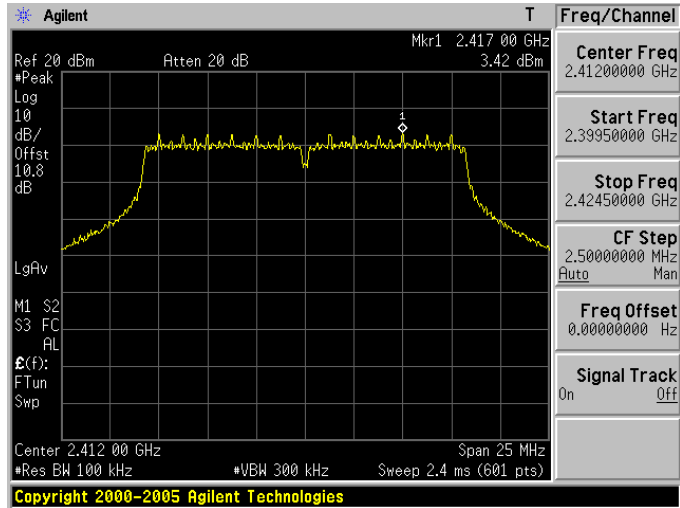
Model Number	VIP4G				
Test Item	Maximum Power Density				
Test Mode	Mode 8: IEEE 802.11n U-NII Band IV 40MHz Link Mode				
Date of Test	12/19/2012			Test Site	TE05
Frequency (MHz)	Reading (dBm/100KHz)		BWCF (dB)	Results (dBm/3KHz)	Limit (dBm)
	ANT1	ANT2			
5755	2.04	2.09	-15.30	-10.22	< 8
5795	1.64	1.98	-15.30	-10.48	< 8

8.6. Test Graphs

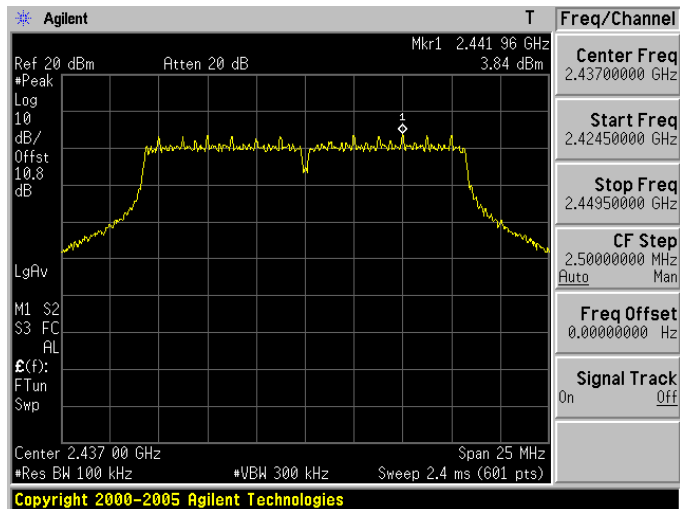
Mode 2: IEEE 802.11b Link Mode	
2412	 Copyright 2000-2005 Agilent Technologies
2437	 Copyright 2000-2005 Agilent Technologies
2462	 Copyright 2000-2005 Agilent Technologies

Mode 3: IEEE 802.11g Link Mode

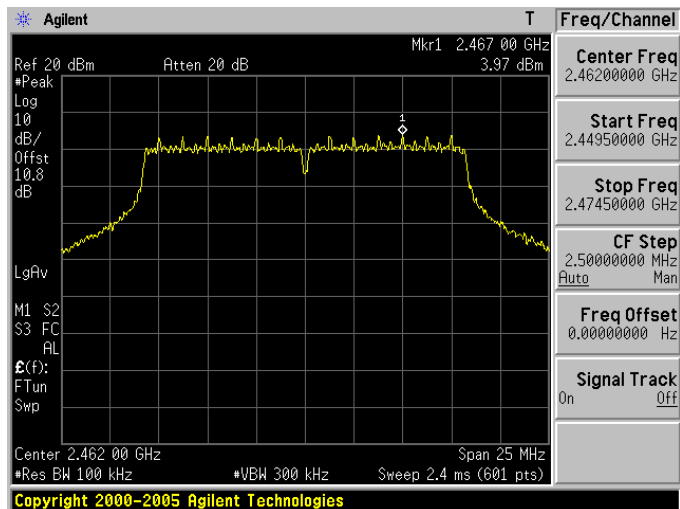
2412



2437

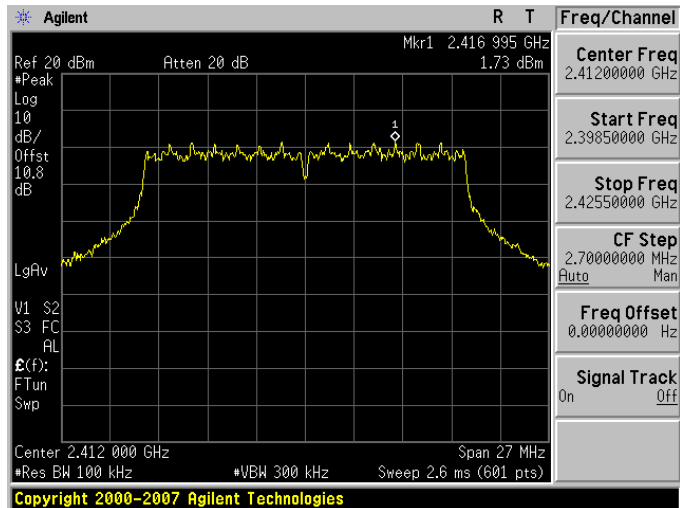


2462

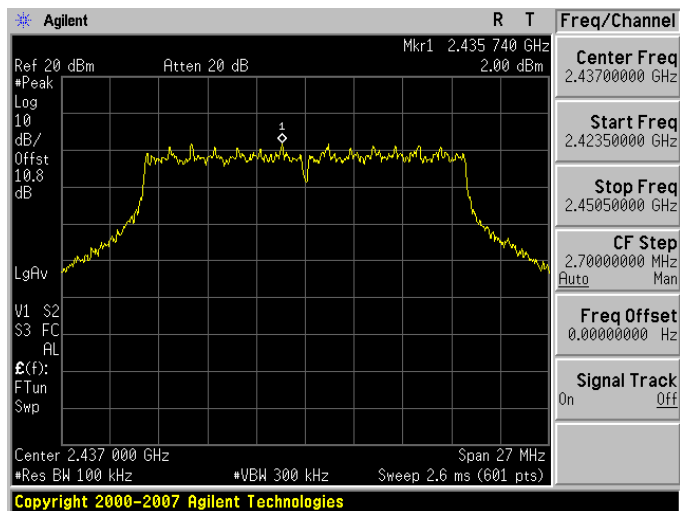


Mode 4: IEEE 802.11n 2.4GHz 20MHz Link Mode _ ANT1

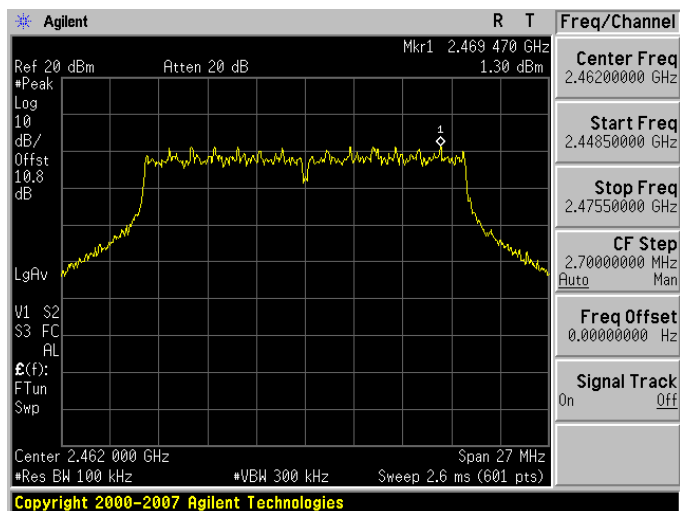
2412



2437

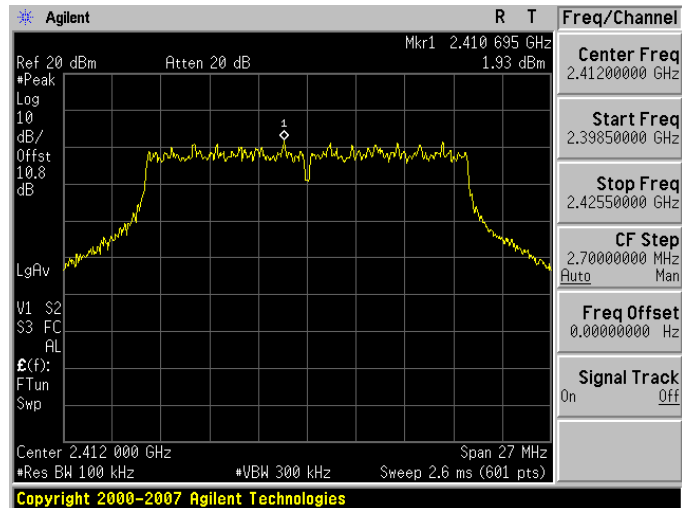


2462

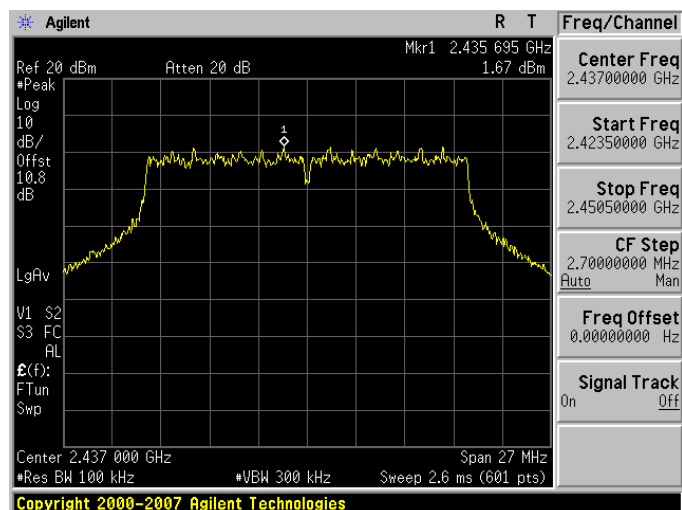


Mode 4: IEEE 802.11n 2.4GHz 20MHz Link Mode _ ANT2

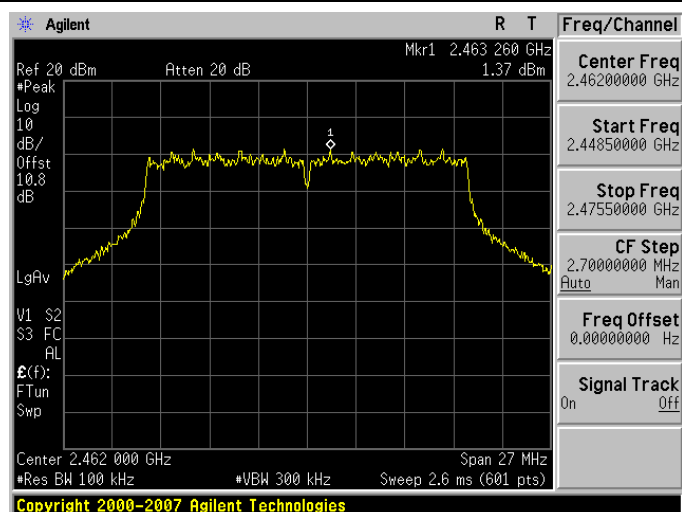
2412



2437

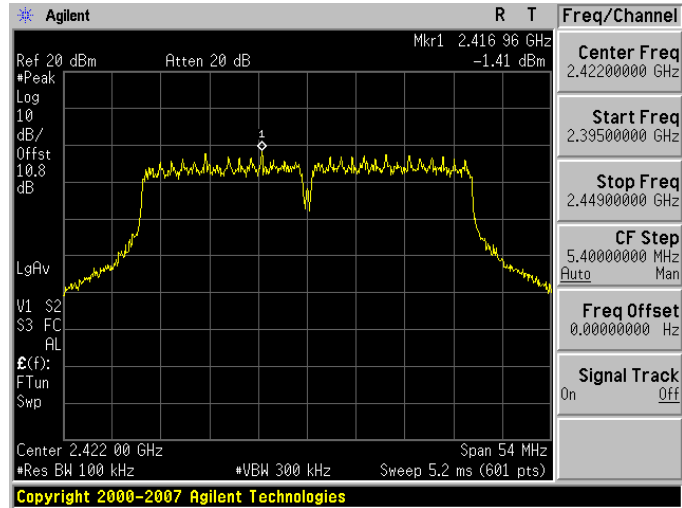


2462

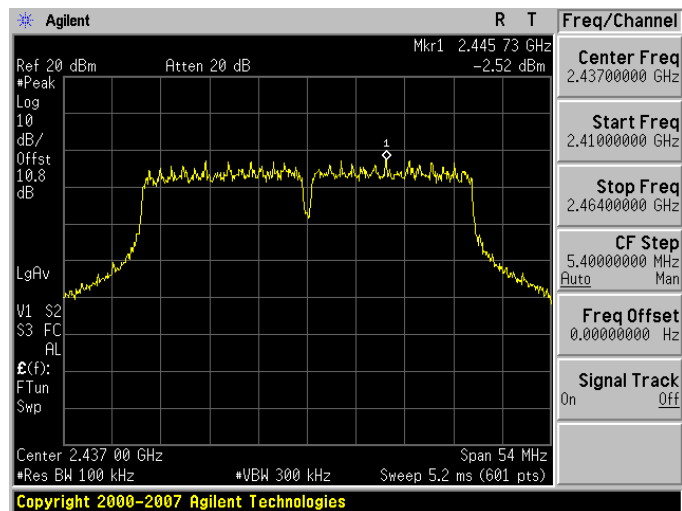


Mode 5: IEEE 802.11n 2.4GHz 40MHz Link Mode _ANT1

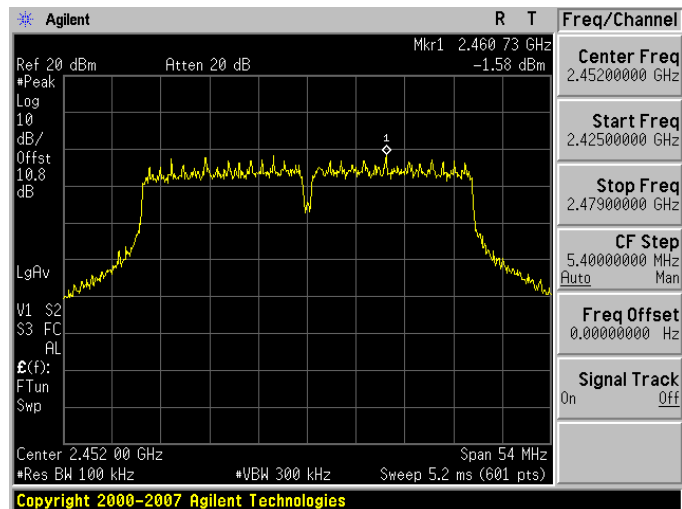
2422



2437

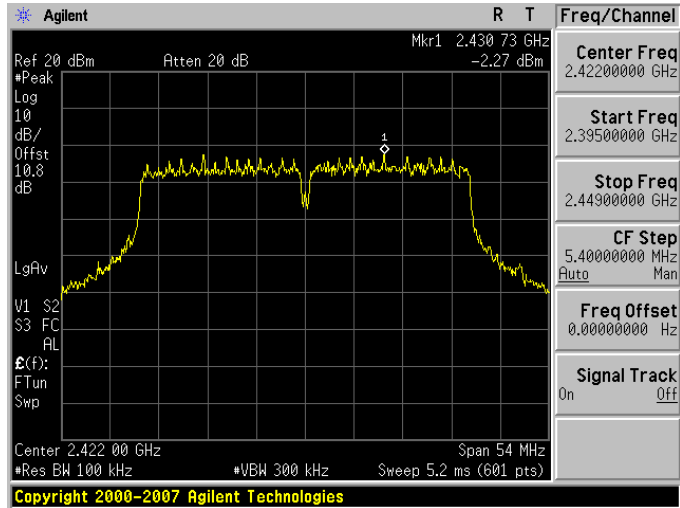


2452

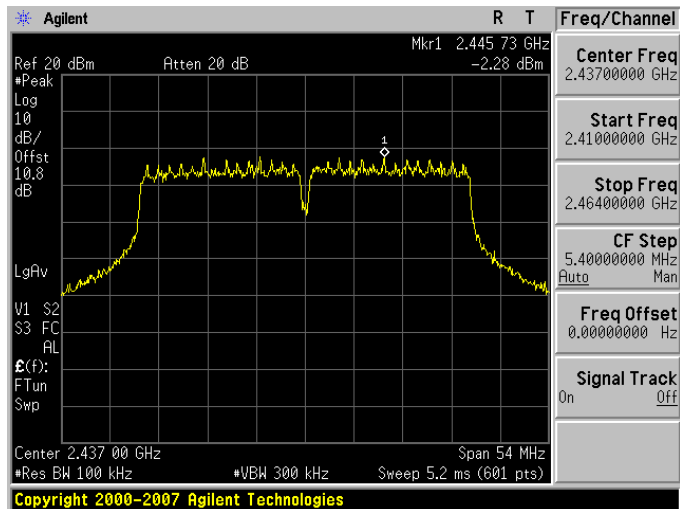


Mode 5: IEEE 802.11n 2.4GHz 40MHz Link Mode _ANT2

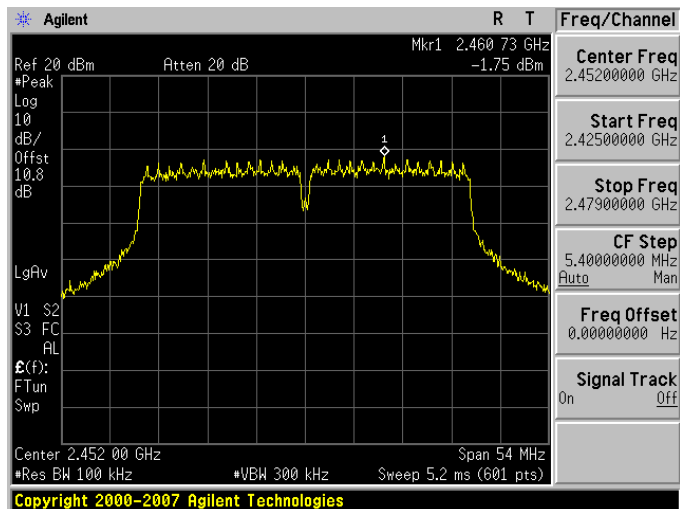
2422



2437

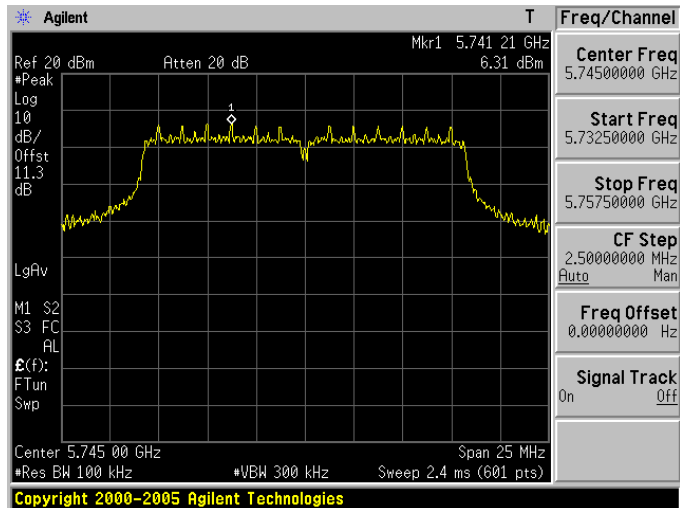


2452

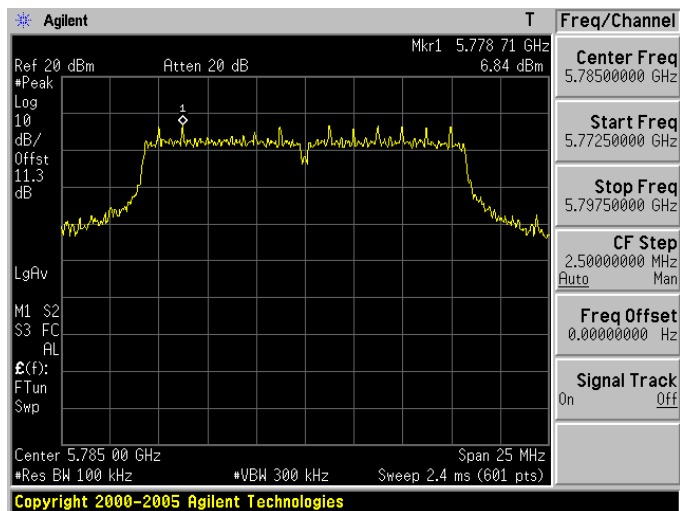


Mode 6: IEEE 802.11a U-NII Band IV Link Mode

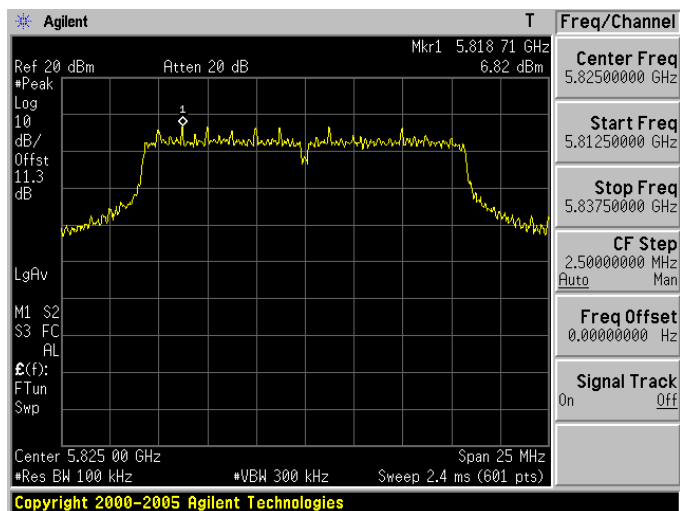
5745



5785

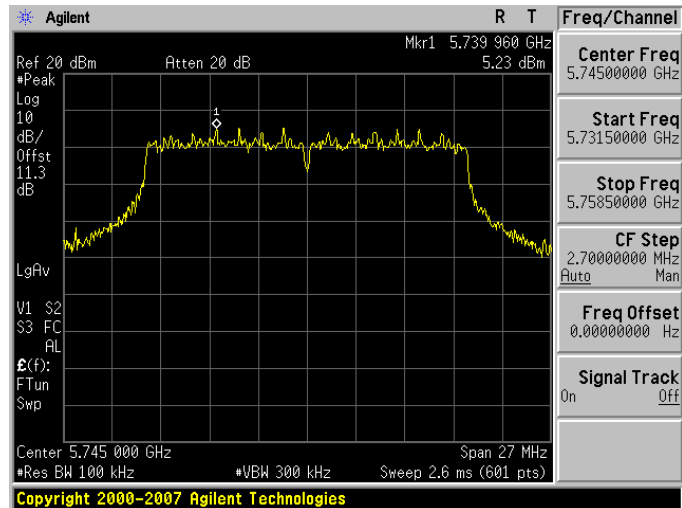


5825

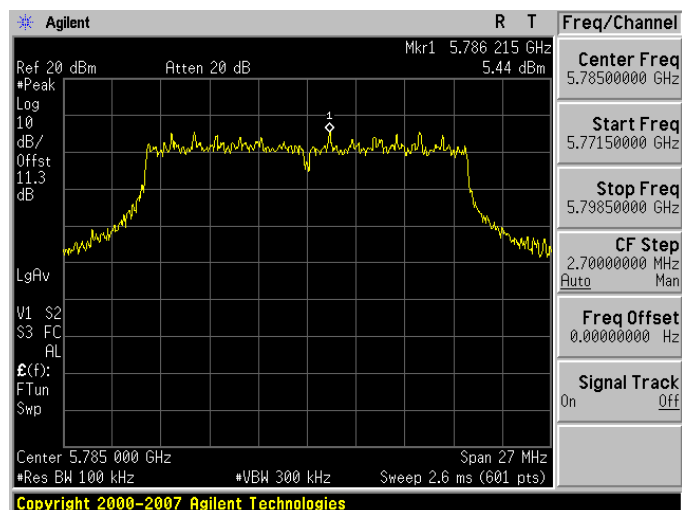


Mode 7: IEEE 802.11n U-NII Band IV 20MHz Link Mode _ ANT1

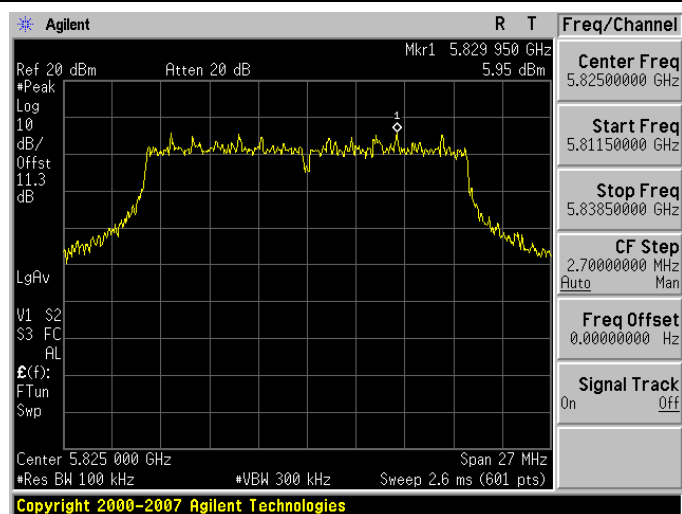
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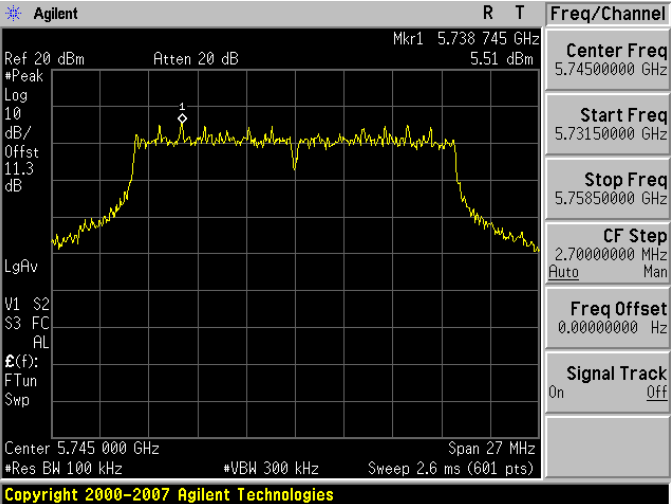
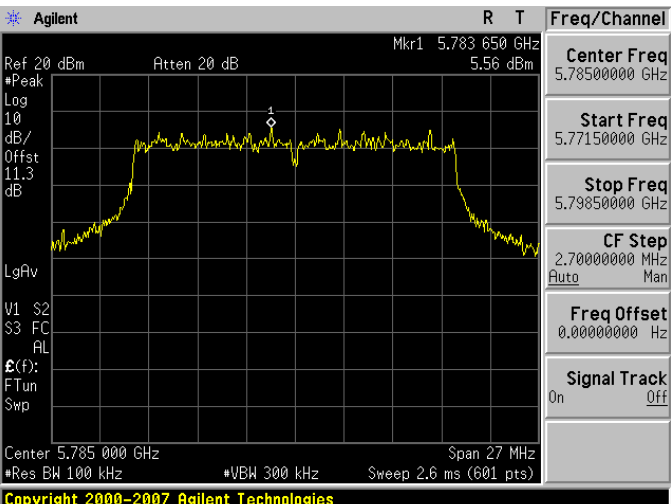
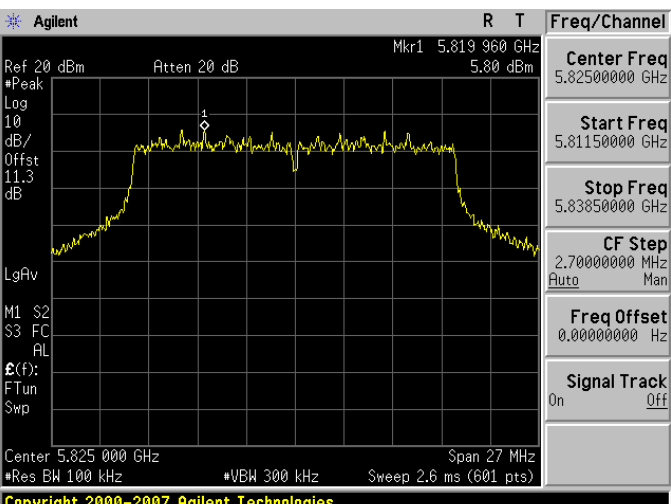
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5825

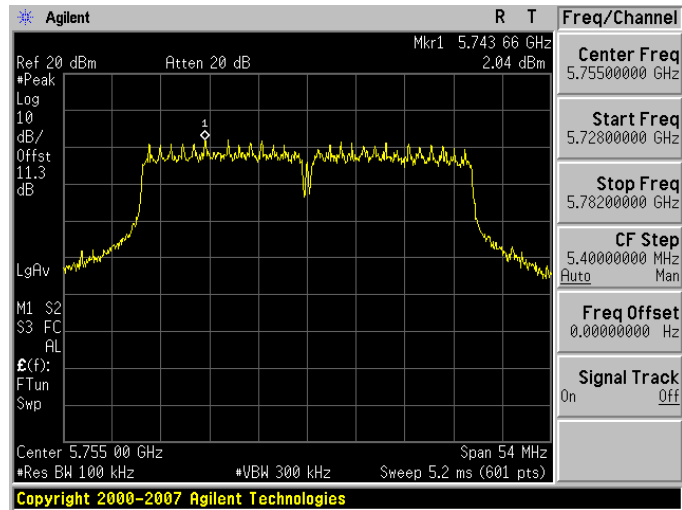


Mode 7: IEEE 802.11n U-NII Band IV 20MHz Link Mode _ ANT2

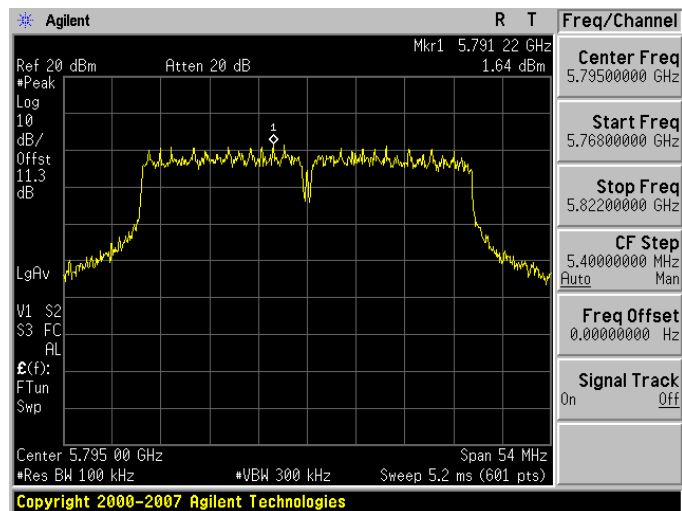
5745	 Copyright 2000-2007 Agilent Technologies
5785	 Copyright 2000-2007 Agilent Technologies
5825	 Copyright 2000-2007 Agilent Technologies

Mode 8: IEEE 802.11n U-NII Band IV 40MHz Link Mode _ ANT1

5755

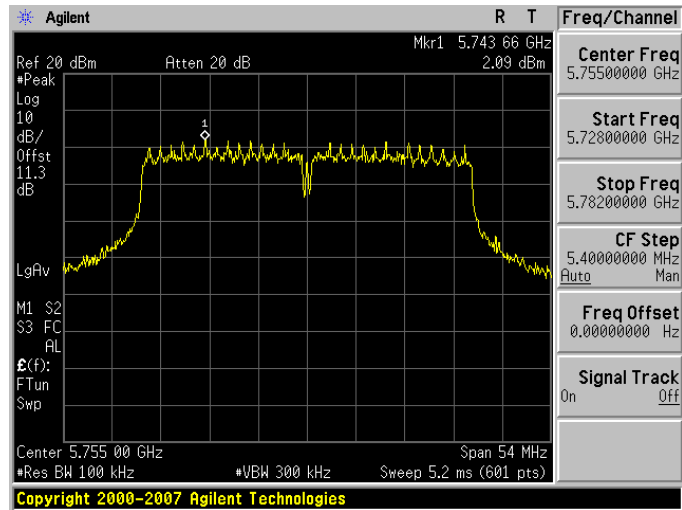


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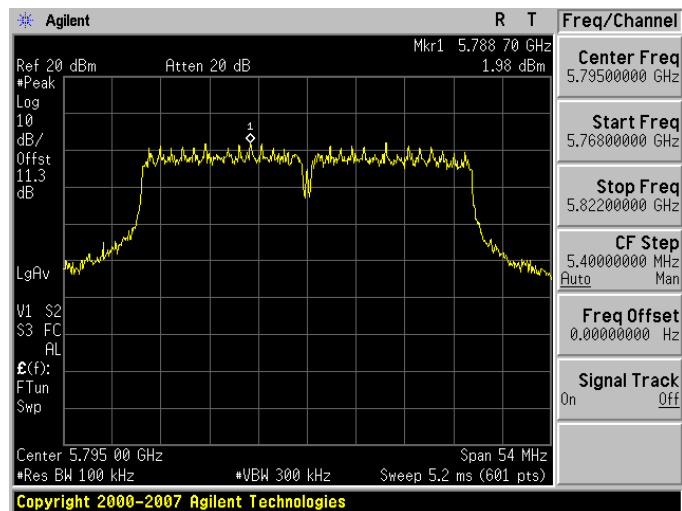


Mode 8: IEEE 802.11n U-NII Band IV 40MHz Link Mode _ANT2

5755



5795

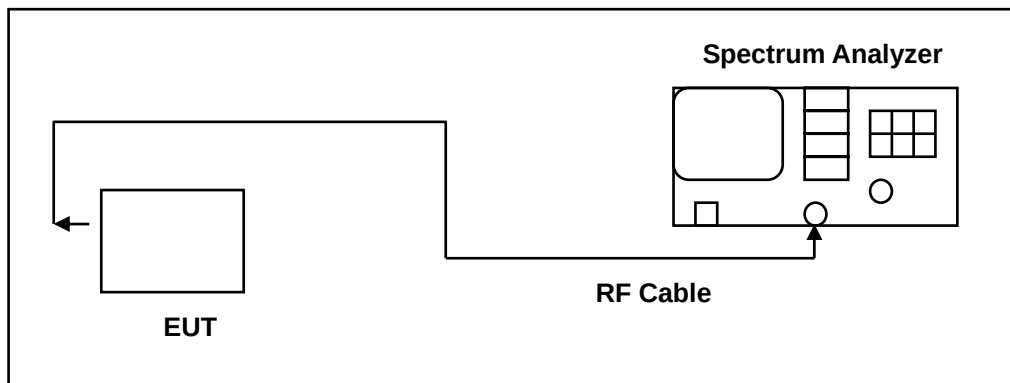


9 Out of Band Conducted Emissions Measurement

9.1. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

9.2. Test Setup



9.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/21/2011	(2)
Spectrum Analyzer	Agilent	E4408B	MY45107753	07/09/2012	(1)
Test Site	ATL	TE05	TE05	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years. (3) Calibration period 3 years.

Note: N.C.R. = No Calibration Request.

9.4. Test Procedure

In any 100 kHz bandwidth outside the EUT pass band, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission, antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

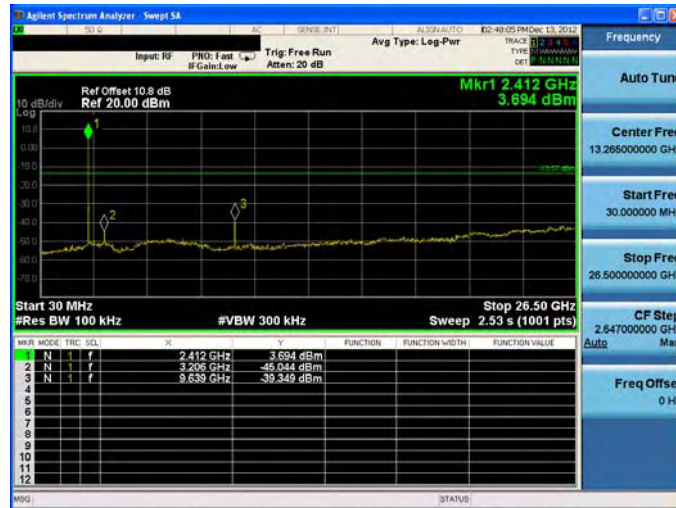
All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the pass band.

The test was performed at 3 channels (Channel 1, 6, 11)

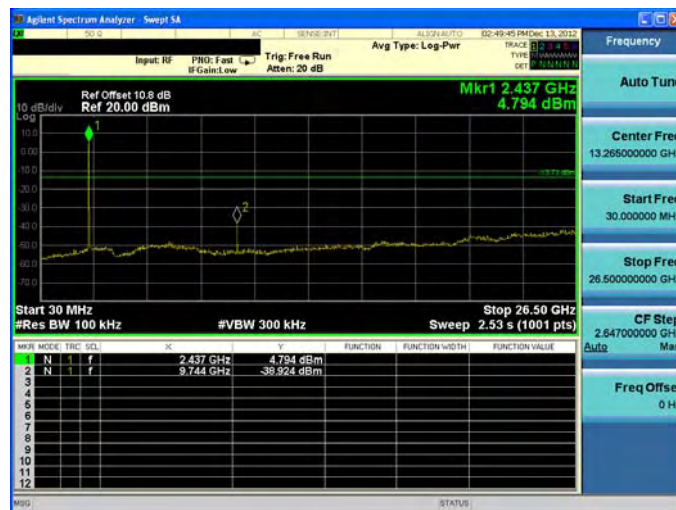
9.5. Test Graphs

Mode 2: IEEE 802.11b Link Mode

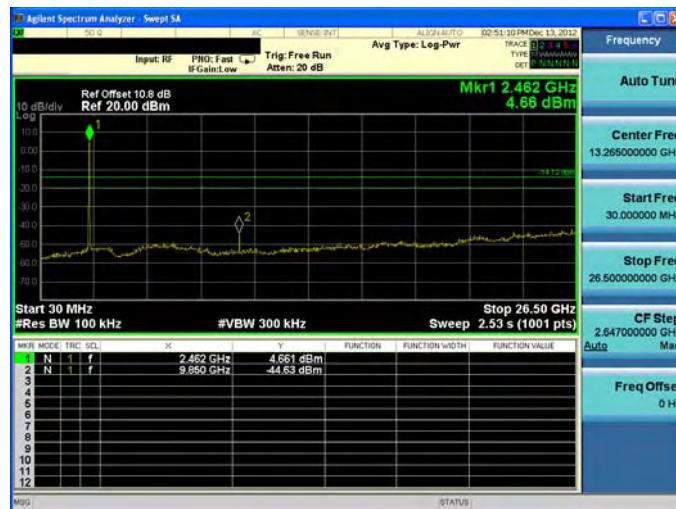
2412



2437

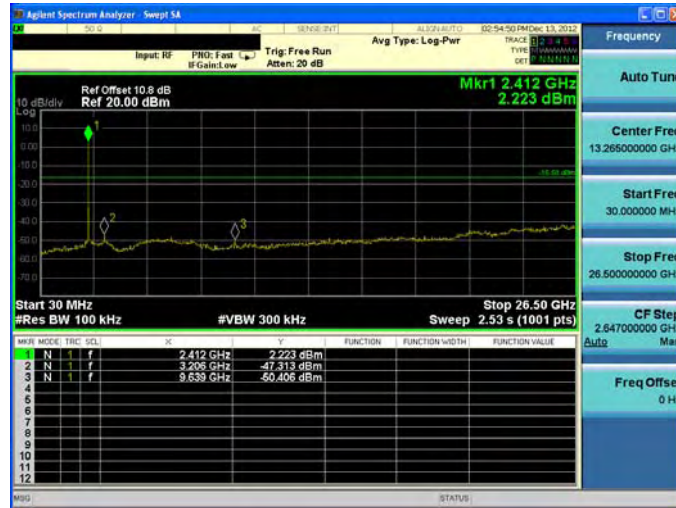


2462



Mode 3: IEEE 802.11g Link Mode

2412



2437



2462



Mode 4: IEEE 802.11n 2.4GHz 20MHz Link Mode _ ANT1

2412



2437



2462

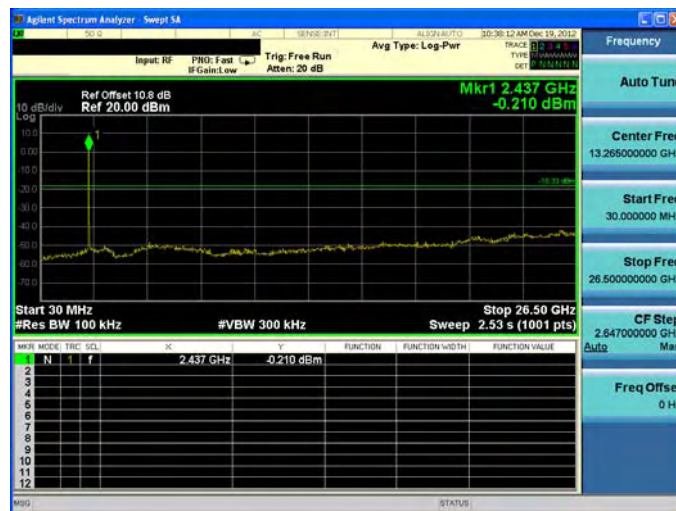


Mode 4: IEEE 802.11n 2.4GHz 20MHz Link Mode _ANT2

2412



2437



2462

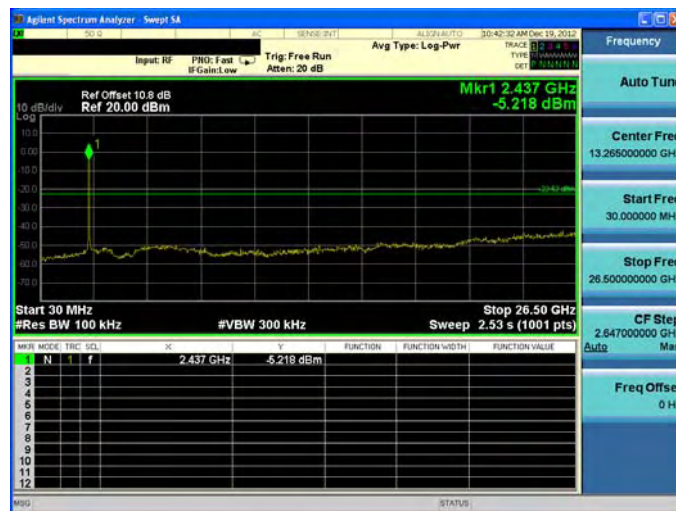


Mode 5: IEEE 802.11n 2.4GHz 40MHz Link Mode _ ANT1

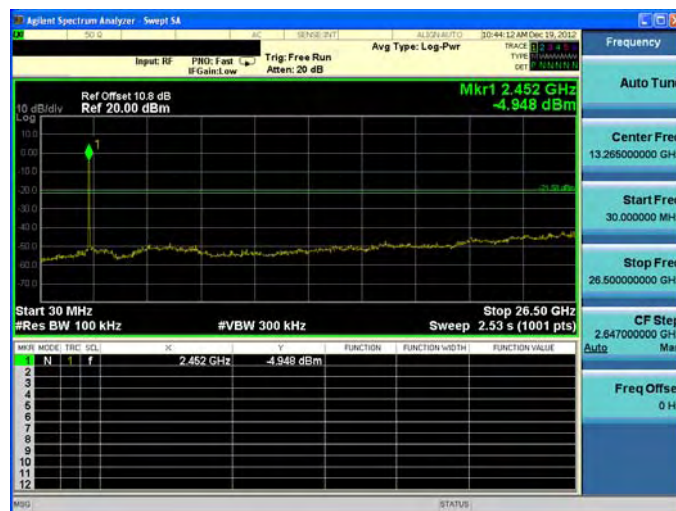
2422



2437

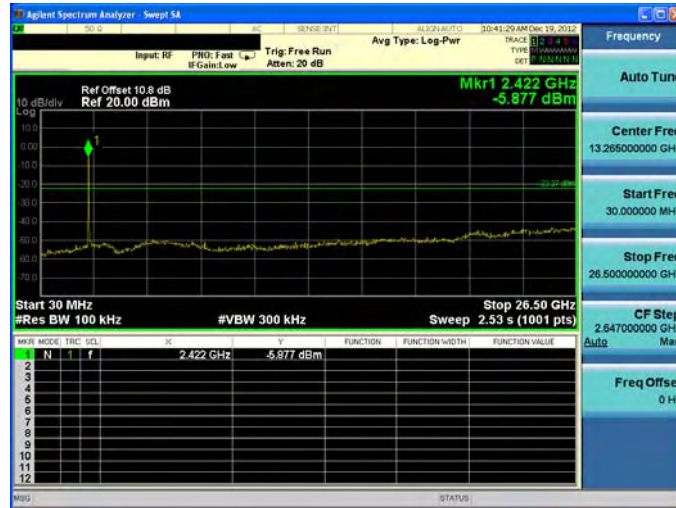


2452



Mode 5: IEEE 802.11n 2.4GHz 40MHz Link Mode _ANT2

2422



2437

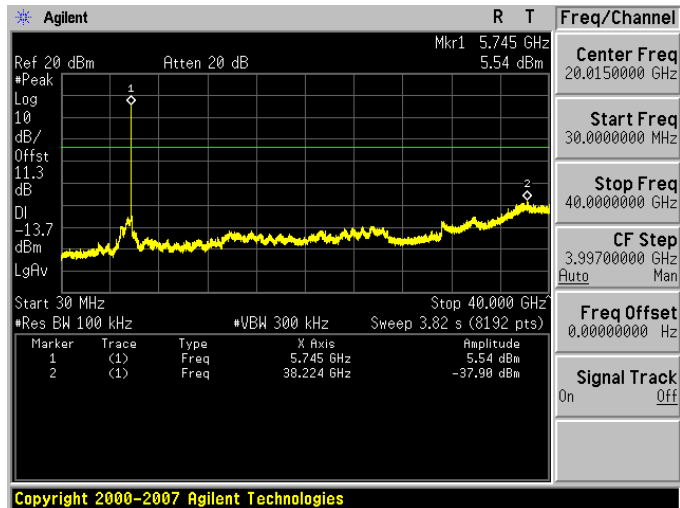


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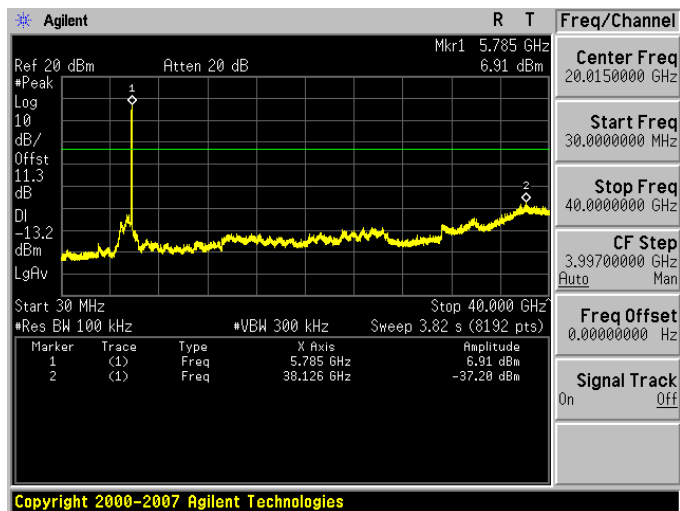


Mode 6: IEEE 802.11a U-NII Band IV Link Mode

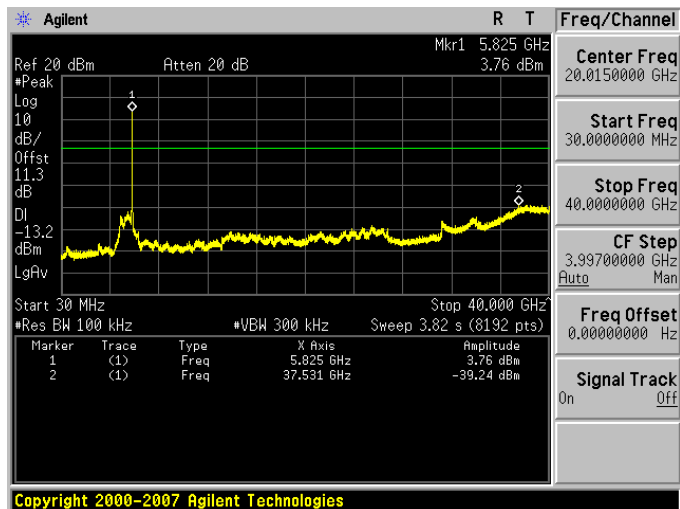
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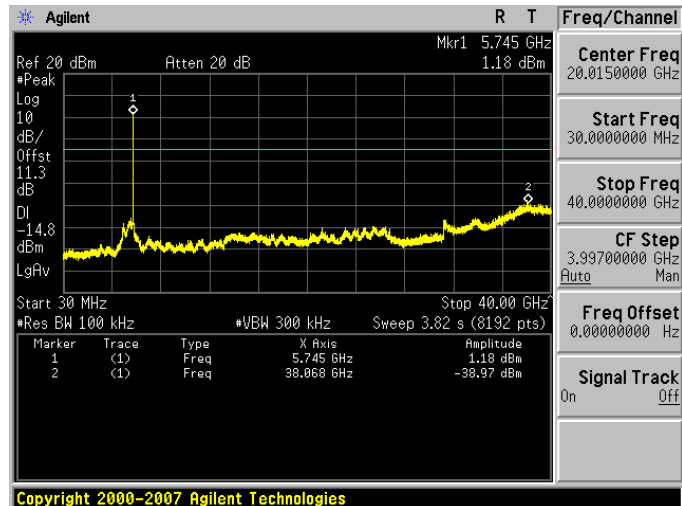


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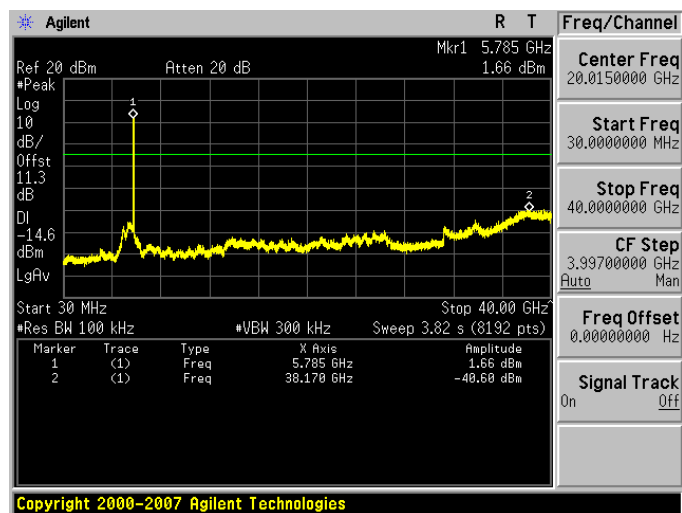


Mode 7: IEEE 802.11n U-NII Band IV 20MHz Link Mode _ ANT1

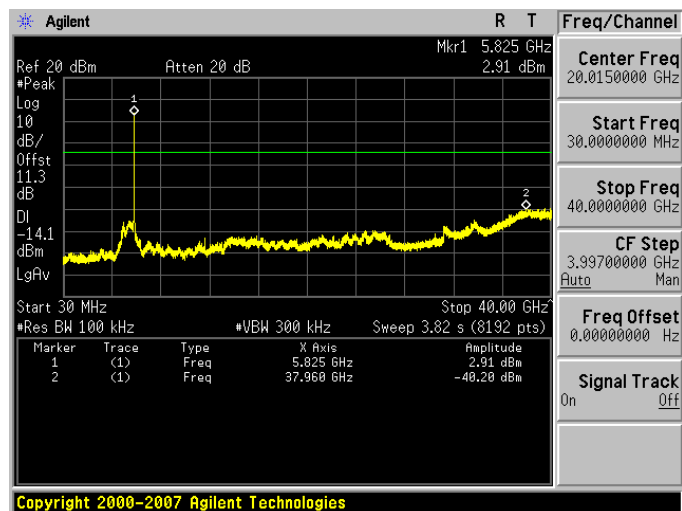
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5785

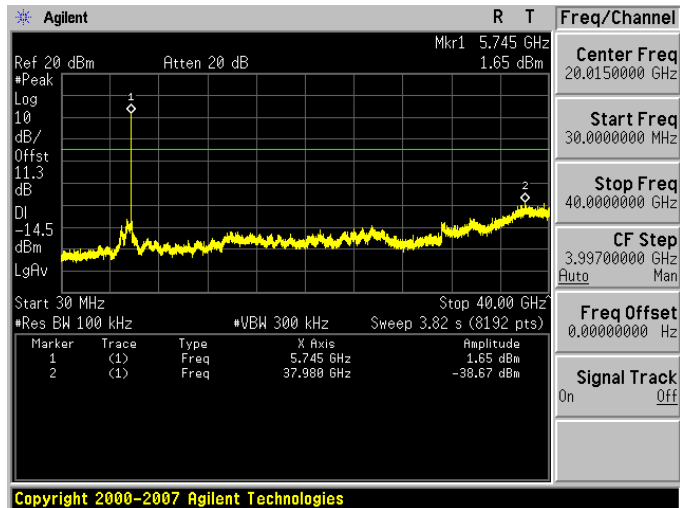


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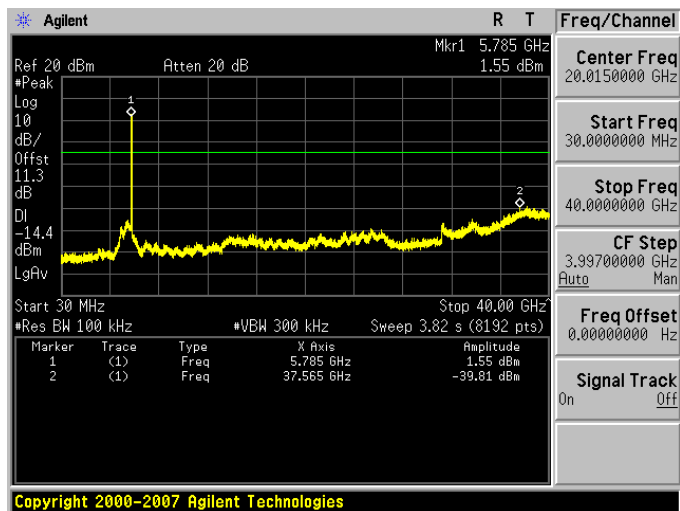


Mode 7: IEEE 802.11n U-NII Band IV 20MHz Link Mode _ ANT2

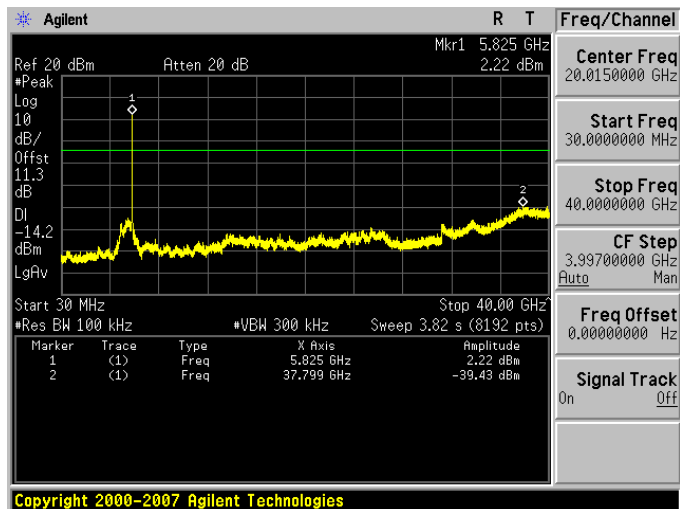
5745



5785

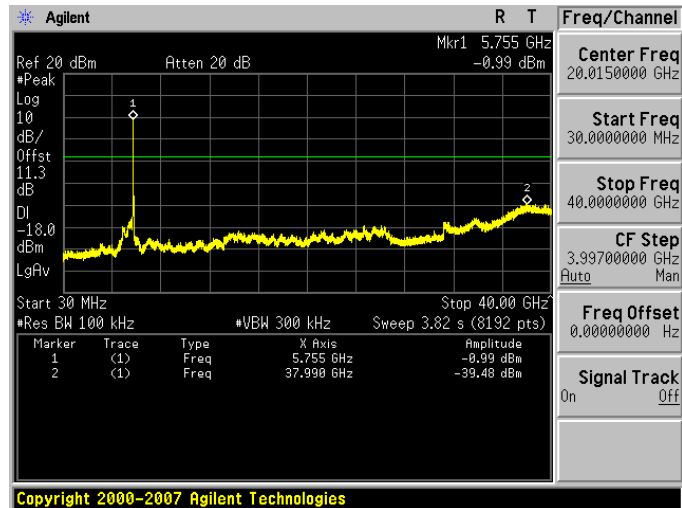


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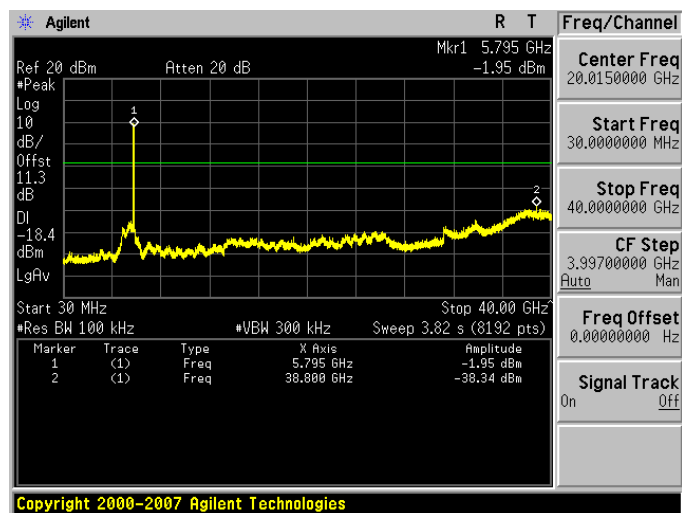


Mode 8: IEEE 802.11n U-NII Band IV 40MHz Link Mode _ ANT1

5755

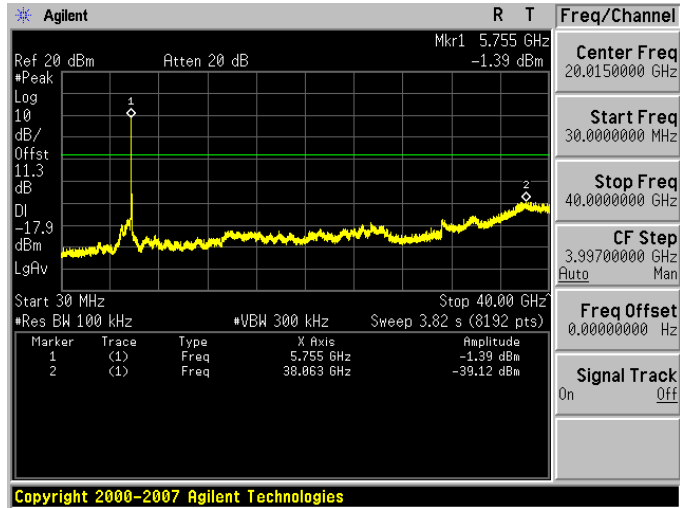


5795

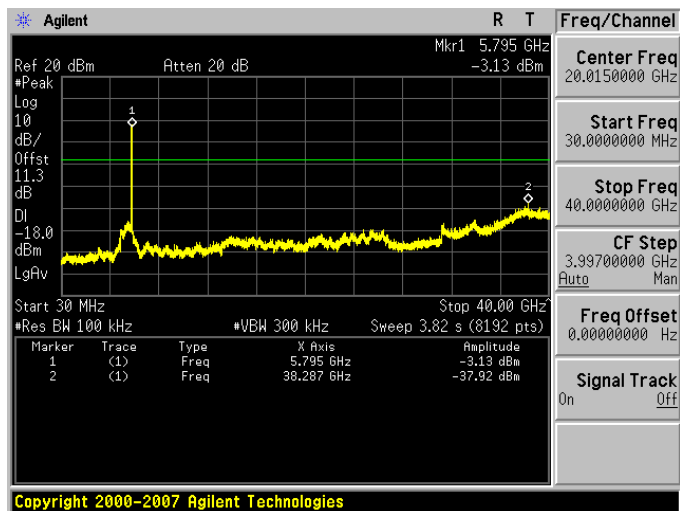


Mode 8: IEEE 802.11n U-NII Band IV 40MHz Link Mode _ ANT2

5755



5795

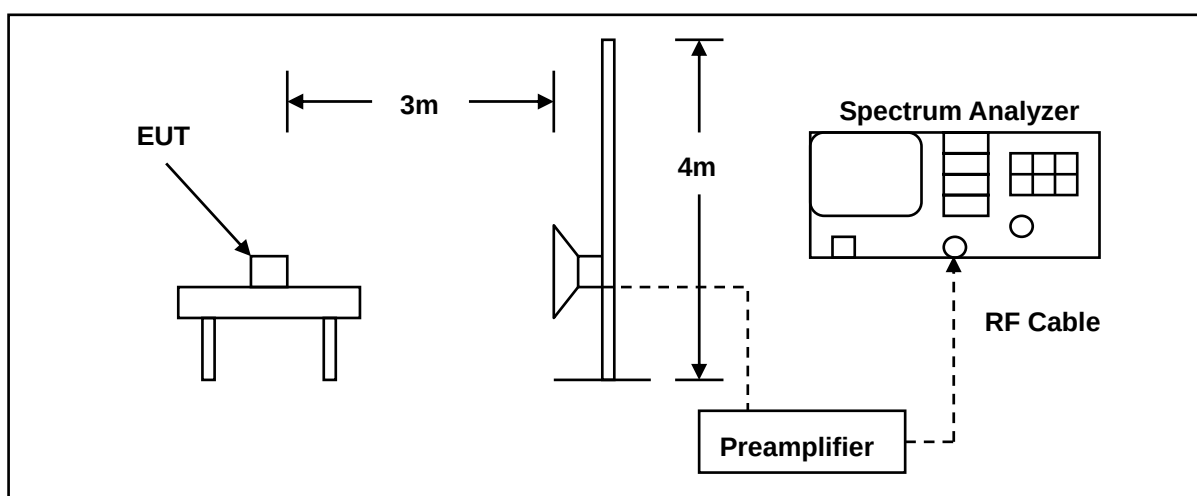


10 Band Edges Measurement

10.1.Limit

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

10.2.Test Setup



10.3.Test Instruments

3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
RF Pre-selector	Agilent	N9039A	MY46520256	01/16/2012	(2)
Spectrum Analyzer	Agilent	E4446A	MY46180578	01/16/2012	(1)
Pre Amplifier	Agilent	8449B	3008A02237	02/22/2012	(1)
Pre Amplifier	Agilent	8447D	2944A10961	02/22/2012	(1)
Broadband Antenna (30MHz~1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	9163-270	06/29/2012	(1)
Horn Antenna (1~18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	06/15/2012	(1)
Test Site	ATL	TE01	888001	08/28/2012	(1)

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years. (3) Calibration period 3 years.

Note: N.C.R. = No Calibration Request.

10.4. Test Procedure

The EUT was setup to ANSI C63.4, 2009; tested to DTS test procedure of Oct 2012 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The emissions on the harmonics frequencies, the limits, and the margin of compliance are presented. These tests were made when the transmitter was in full radiated power. The additional test was performed to show compliance with the requirement at the band-edge frequency 2483.5 MHz and up to 2500 MHz and at 2390.0 MHz.

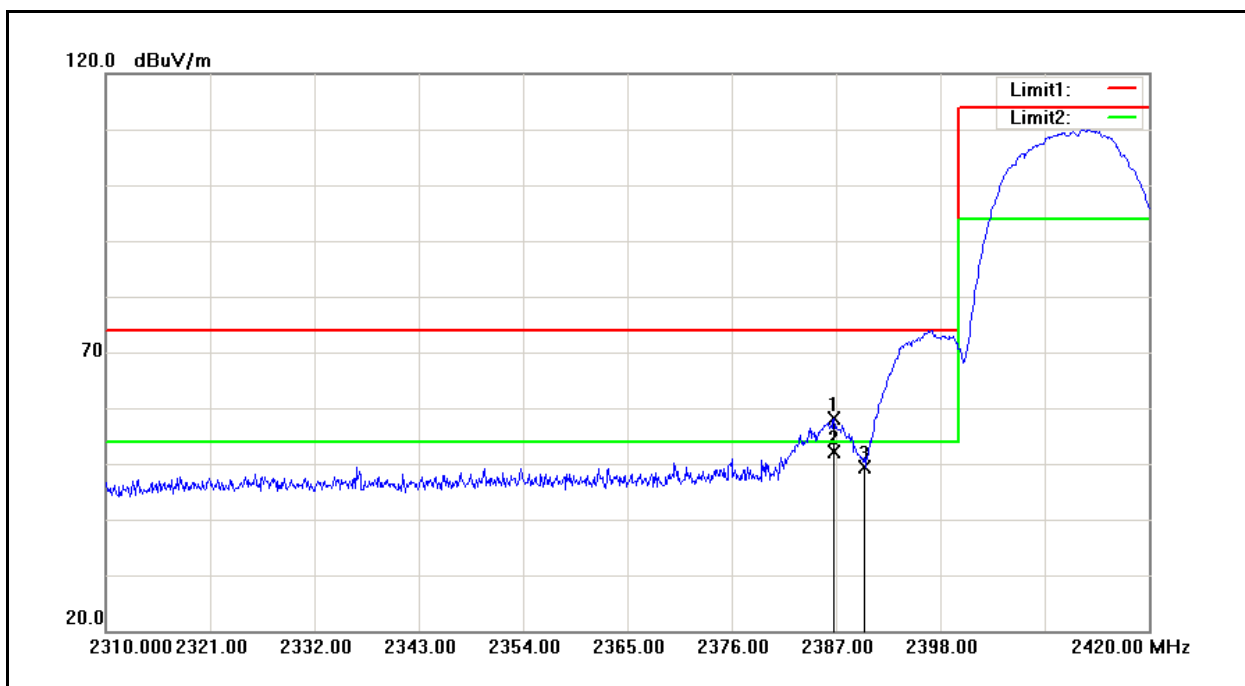
The transmitter was configured with the worst case antenna and setup to transmit at the highest channel. Then the field strength was measured at 2483.5 MHz.

The transmitter was then configured with the worst case antenna and setup to transmit at the lowest channel. Then the field strength was measured at 2390.0 MHz. These tests were performed at 4 different bit rates.

For measurements the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

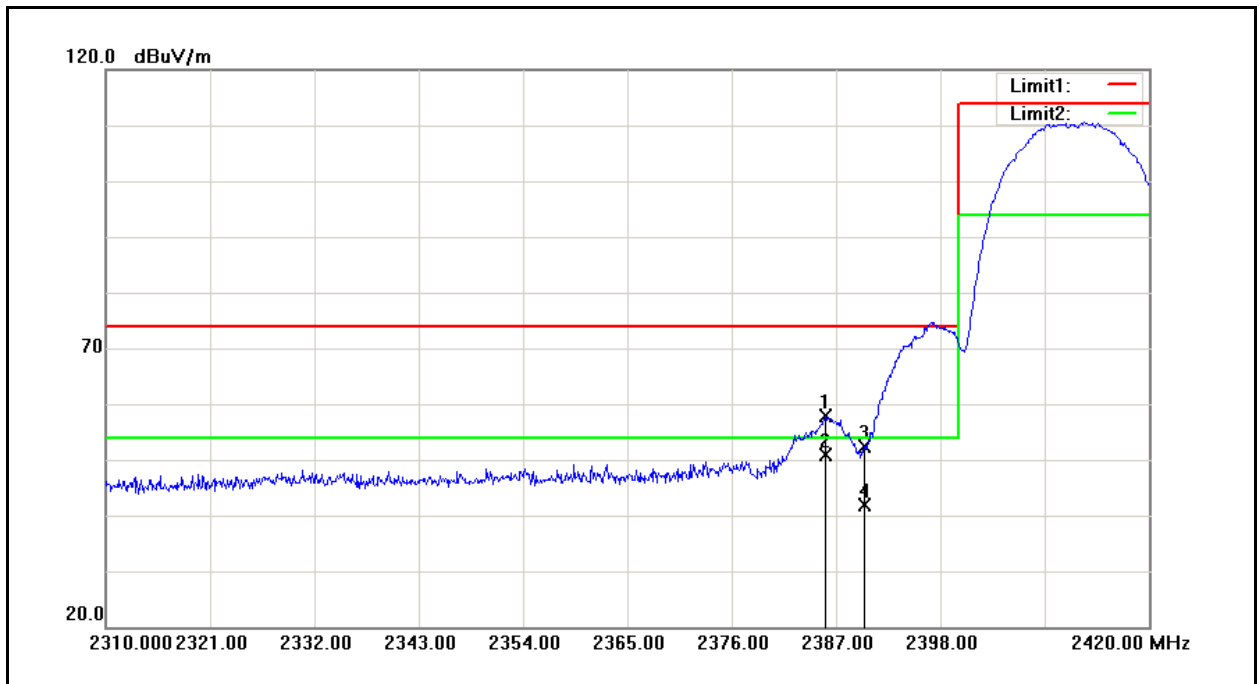
10.5. Test Result

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	2	Date:	12/12/2012
Frequency:	2412 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		



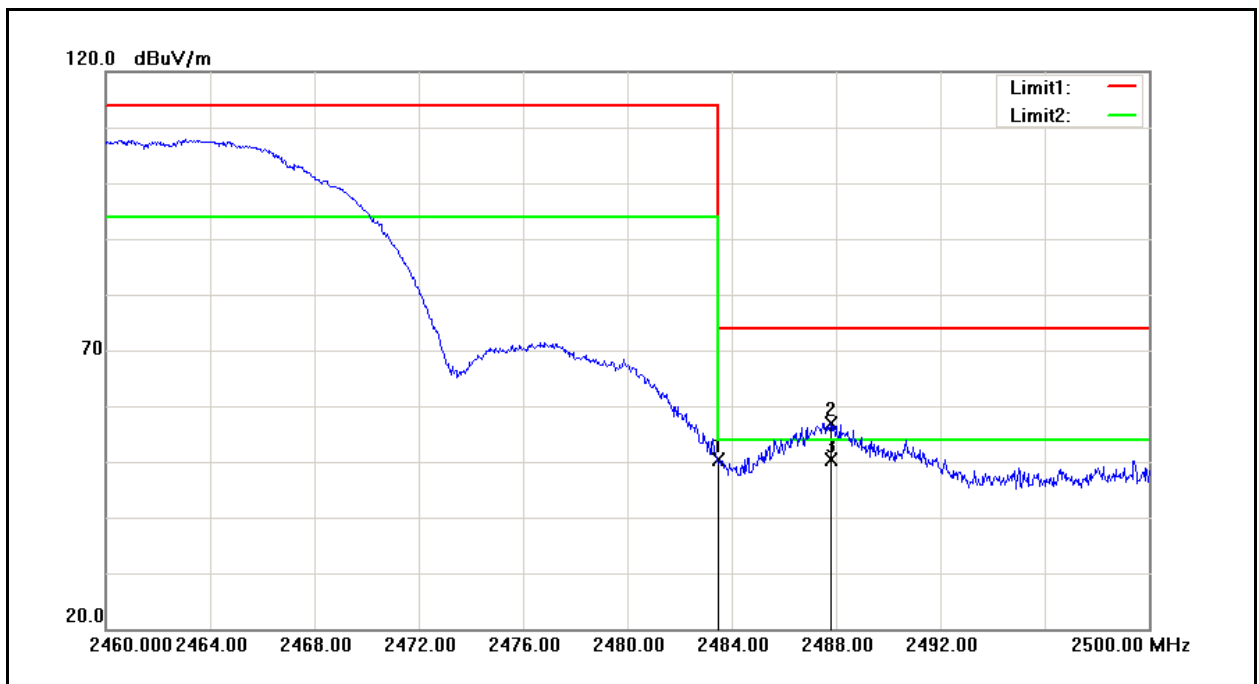
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2386.780	54.21	3.86	58.07	74.00	-15.93	peak
2	2386.780	48.25	3.86	52.11	54.00	-1.89	AVG
3	2390.000	45.46	3.88	49.34	74.00	-24.66	peak

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	2	Date:	12/12/2012
Frequency:	2412 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		



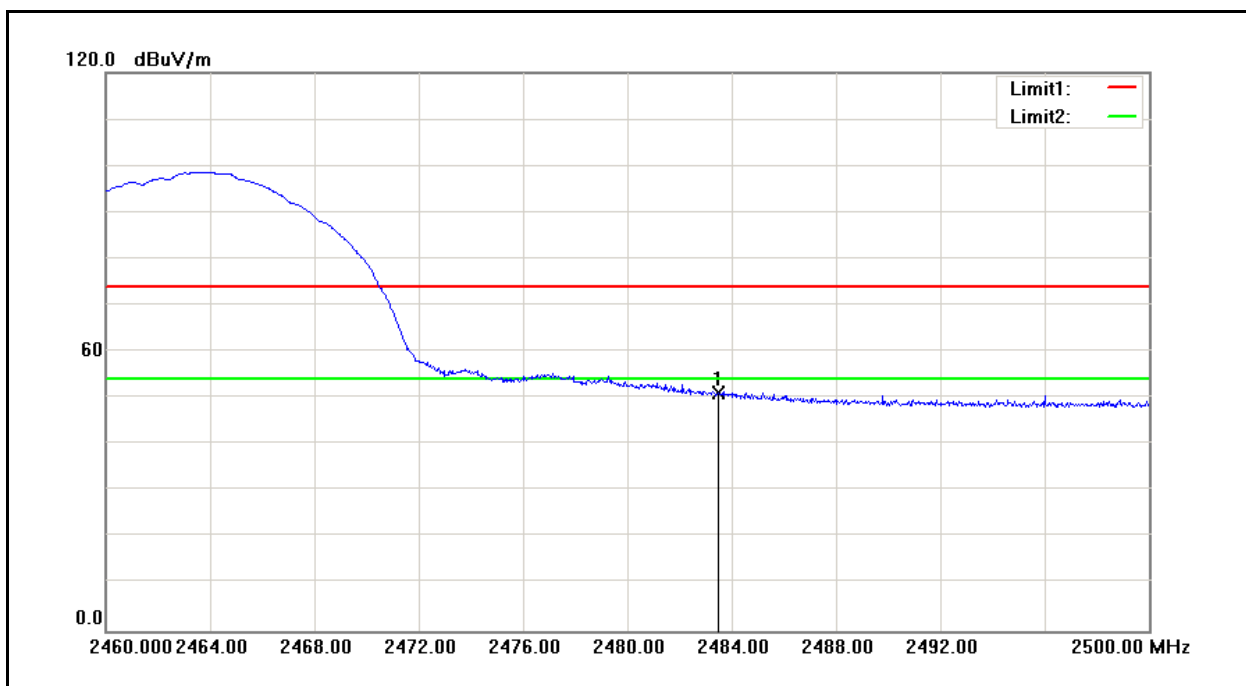
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2385.900	54.02	3.85	57.87	74.00	-16.13	peak
2	2385.900	47.12	3.85	50.97	54.00	-3.03	AVG
3	2390.000	48.50	3.88	52.38	74.00	-21.62	peak
4	2390.000	38.12	3.88	42.00	54.00	-12.00	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	2	Date:	12/12/2012
Frequency:	2462 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		



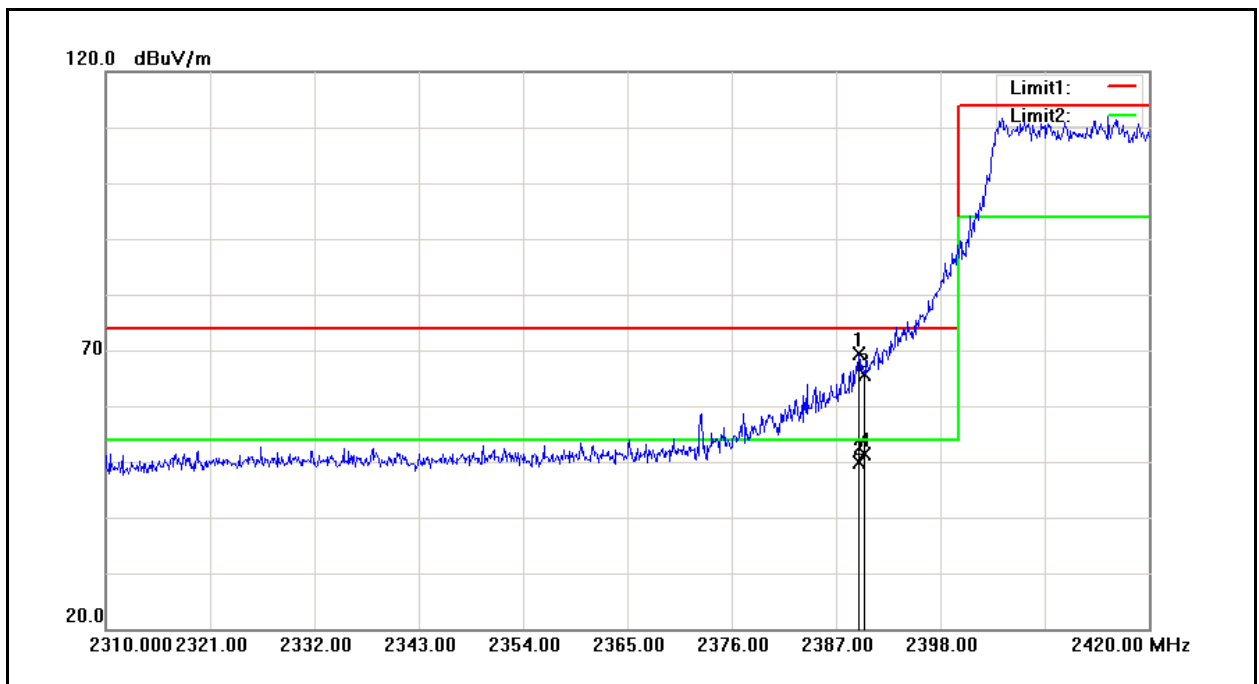
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	45.77	4.50	50.27	74.00	-23.73	peak
2	2487.800	52.30	4.53	56.83	74.00	-17.17	peak
3	2487.800	45.84	4.53	50.37	54.00	-3.63	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	2	Date:	12/12/2012
Frequency:	2462 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		



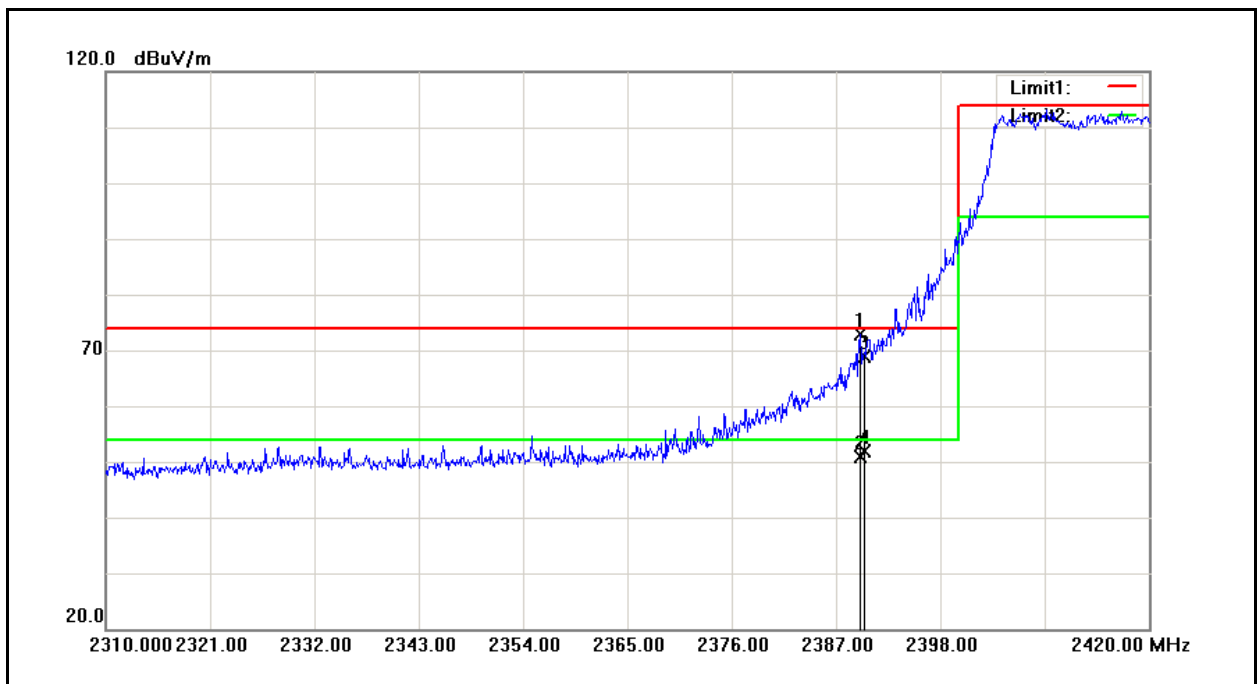
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	48.78	4.50	53.28	74.00	-20.72	peak
2	2483.500	39.96	4.50	44.46	54.00	-9.54	AVG
3	2488.080	55.98	4.53	60.51	74.00	-13.49	peak
4	2488.080	47.84	4.53	52.37	54.00	-1.63	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	3	Date:	12/12/2012
Frequency:	2412 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		



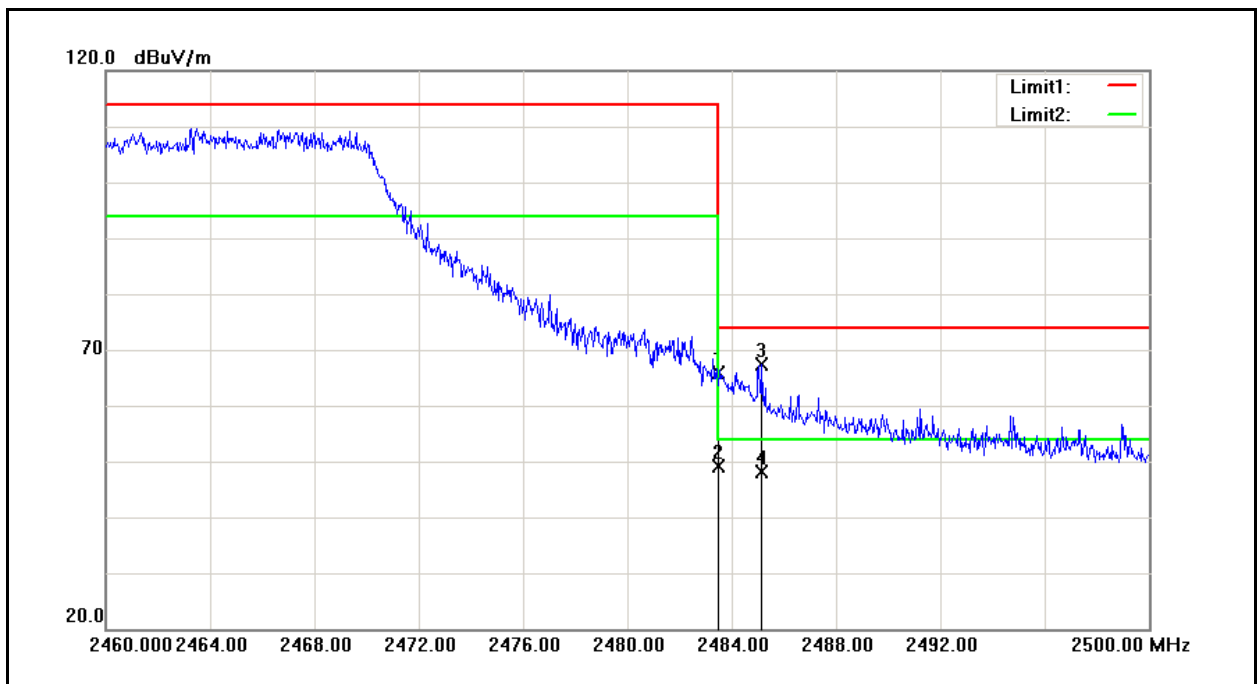
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.420	65.55	3.88	69.43	74.00	-4.57	peak
2	2389.420	46.08	3.88	49.96	54.00	-4.04	AVG
3	2390.000	61.68	3.88	65.56	74.00	-8.44	peak
4	2390.000	47.58	3.88	51.46	54.00	-2.54	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	3	Date:	12/12/2012
Frequency:	2412 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		



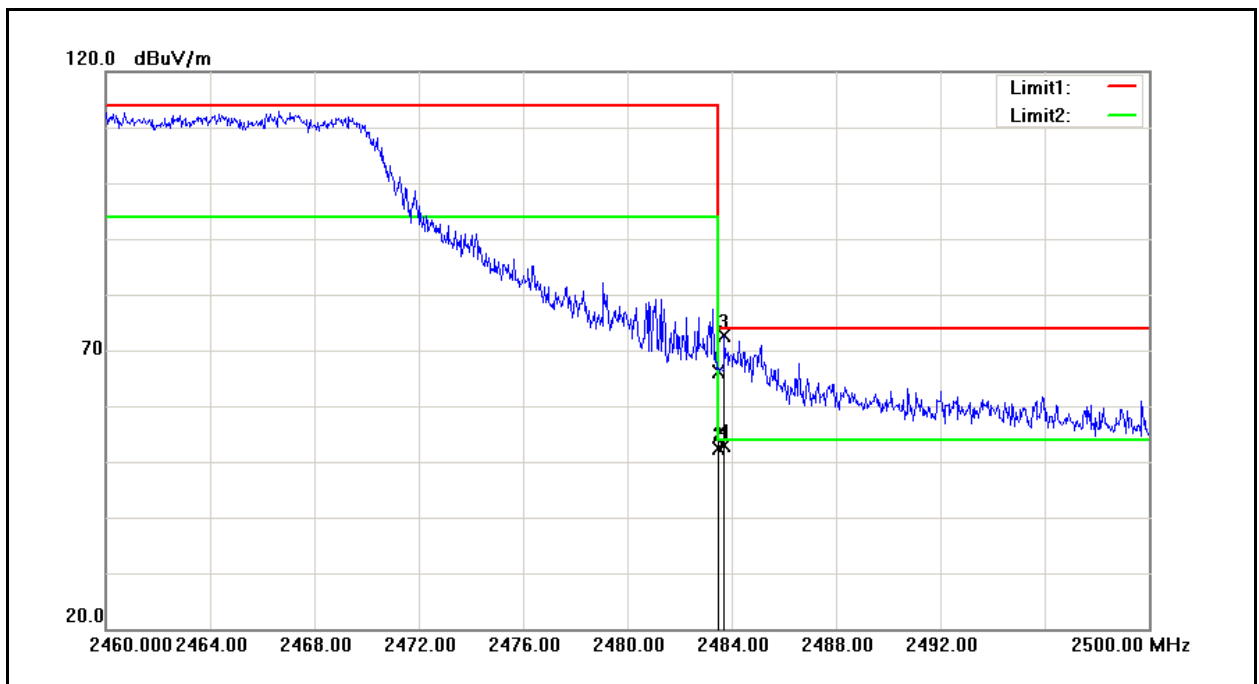
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.530	68.88	3.88	72.76	74.00	-1.24	peak
2	2389.530	46.99	3.88	50.87	54.00	-3.13	AVG
3	2390.000	65.07	3.88	68.95	74.00	-5.05	peak
4	2390.000	48.07	3.88	51.95	54.00	-2.05	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	3	Date:	12/12/2012
Frequency:	2462 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		



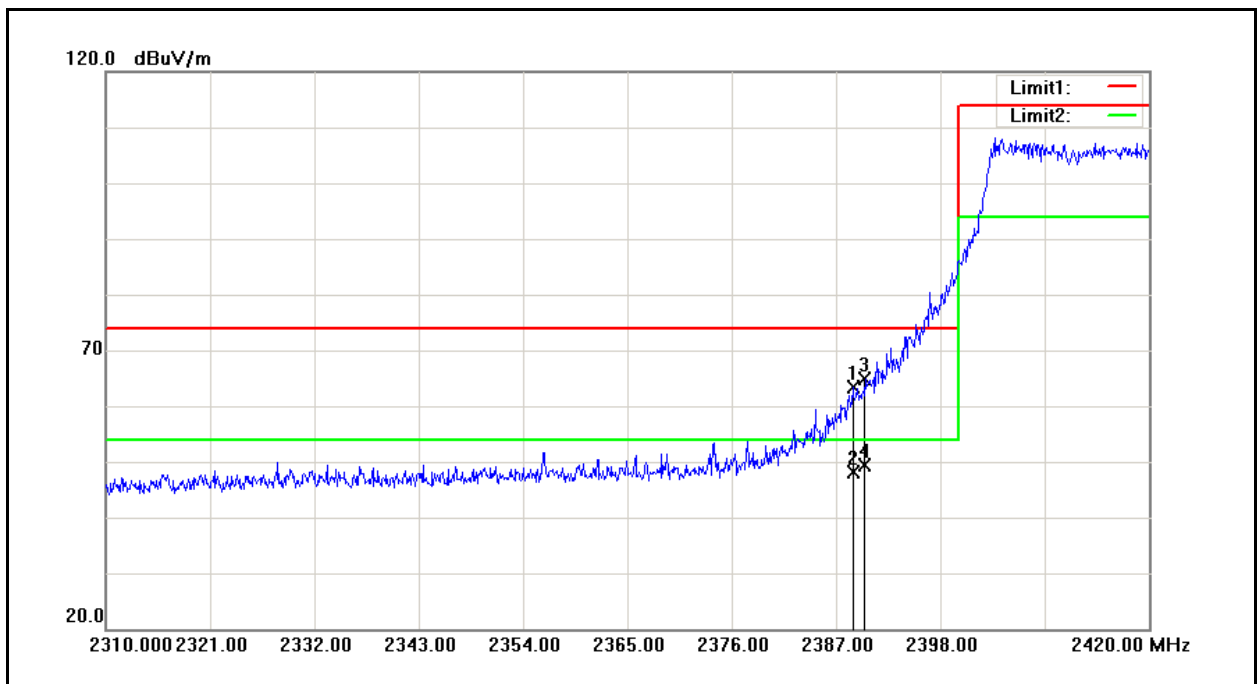
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	61.28	4.50	65.78	74.00	-8.22	peak
2	2483.500	44.53	4.50	49.03	54.00	-4.97	AVG
3	2485.160	62.81	4.52	67.33	74.00	-6.67	peak
4	2485.160	43.70	4.52	48.22	54.00	-5.78	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	3	Date:	12/12/2012
Frequency:	2462 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		



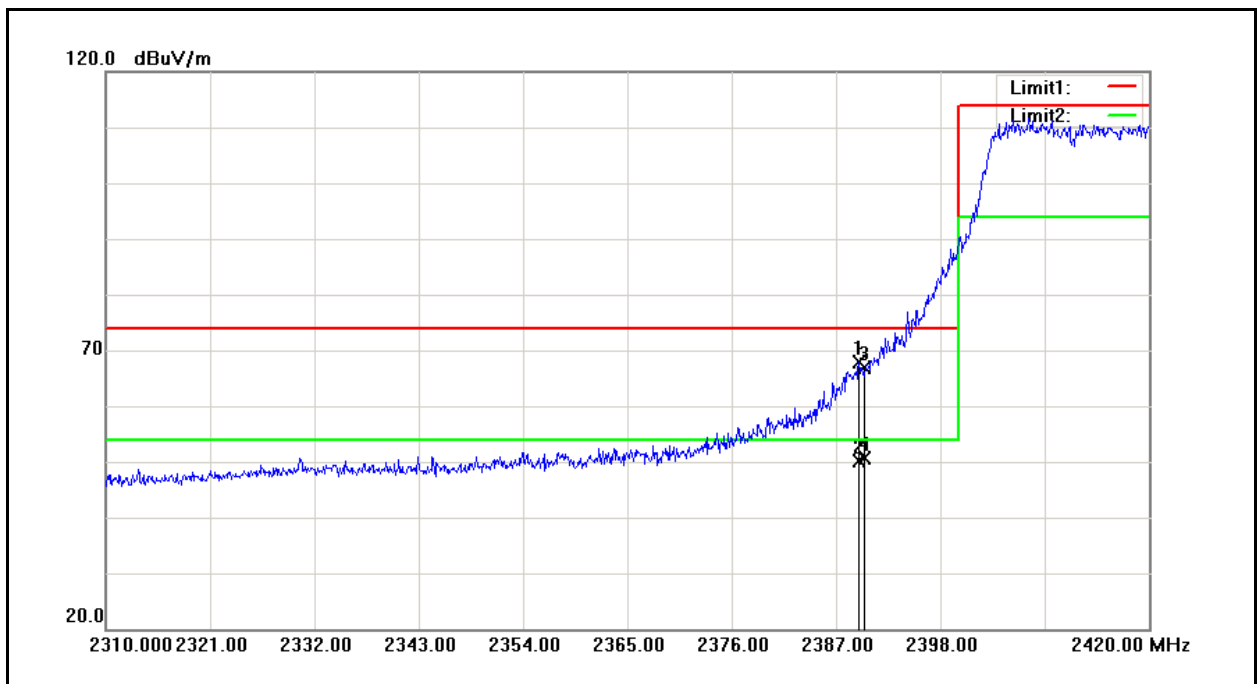
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	61.74	4.50	66.24	74.00	-7.76	peak
2	2483.500	47.98	4.50	52.48	54.00	-1.52	AVG
3	2483.720	68.07	4.50	72.57	74.00	-1.43	peak
4	2483.720	48.45	4.50	52.95	54.00	-1.05	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	4	Date:	12/18/2012
Frequency:	2412 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		



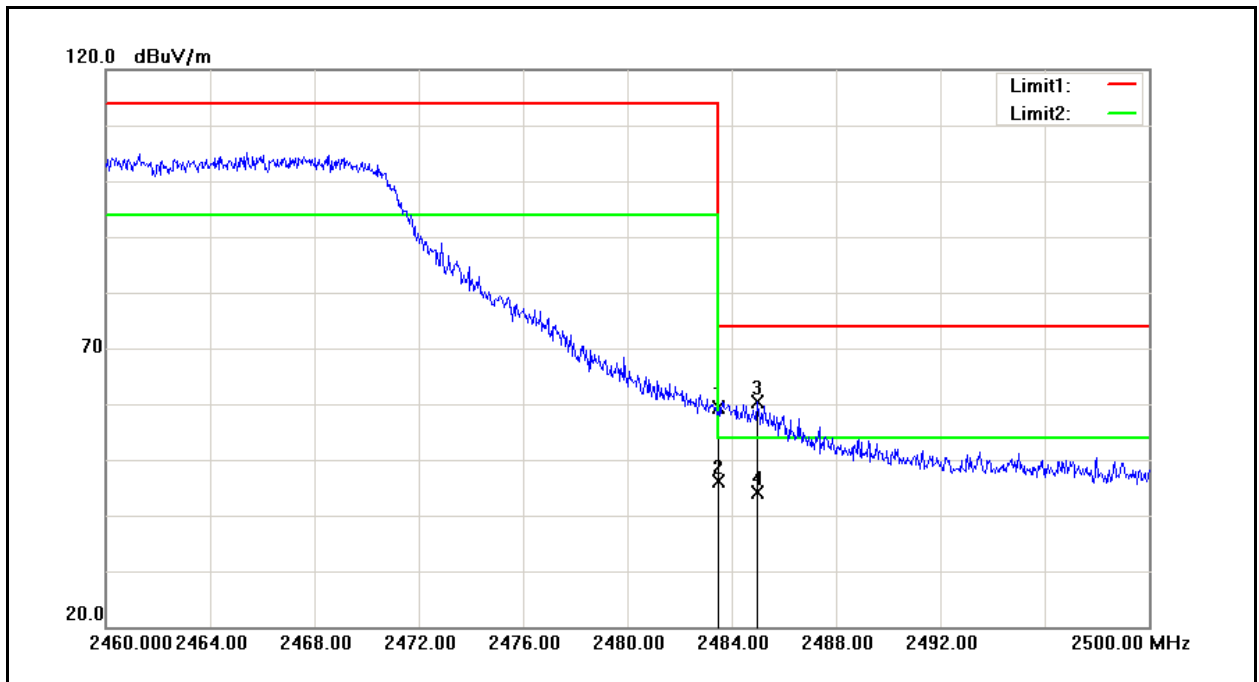
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2388.760	59.59	3.88	63.47	74.00	-10.53	peak
2	2388.760	44.29	3.88	48.17	54.00	-5.83	AVG
3	2390.000	61.04	3.88	64.92	74.00	-9.08	peak
4	2390.000	45.53	3.88	49.41	54.00	-4.59	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	4	Date:	12/18/2012
Frequency:	2412 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		



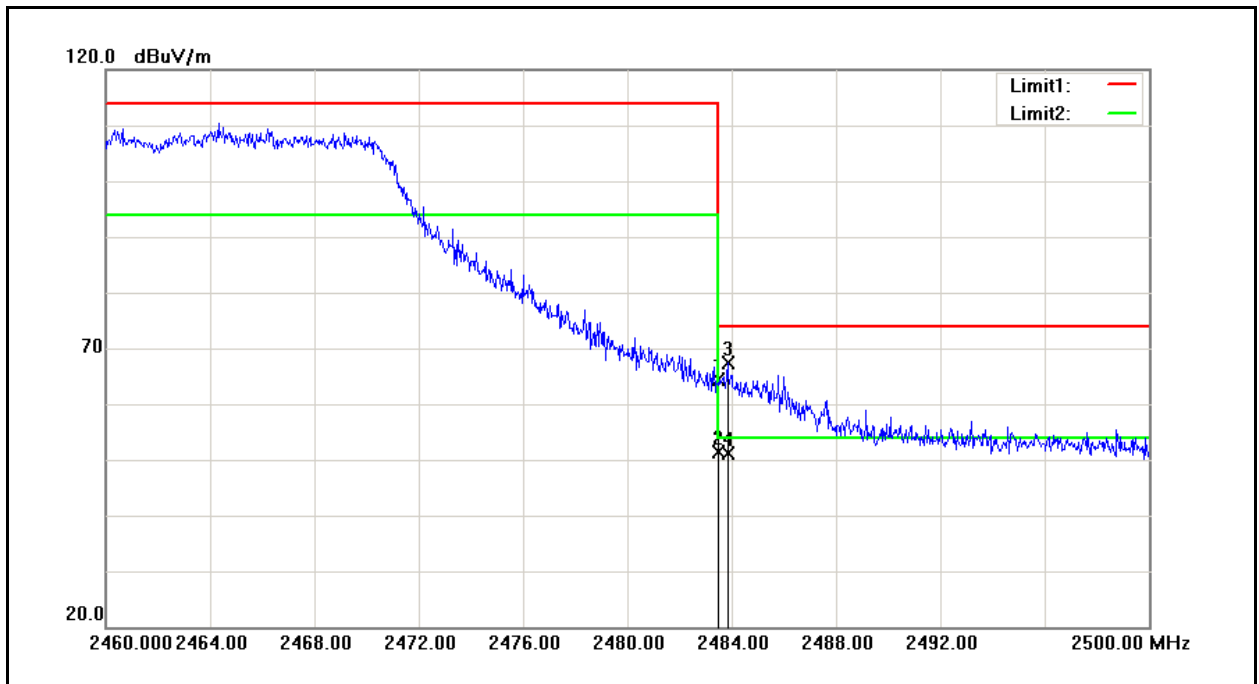
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.420	63.96	3.88	67.84	74.00	-6.16	peak
2	2389.420	46.13	3.88	50.01	54.00	-3.99	AVG
3	2390.000	63.02	3.88	66.90	74.00	-7.10	peak
4	2390.000	46.77	3.88	50.65	54.00	-3.35	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	4	Date:	12/18/2012
Frequency:	2462 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		



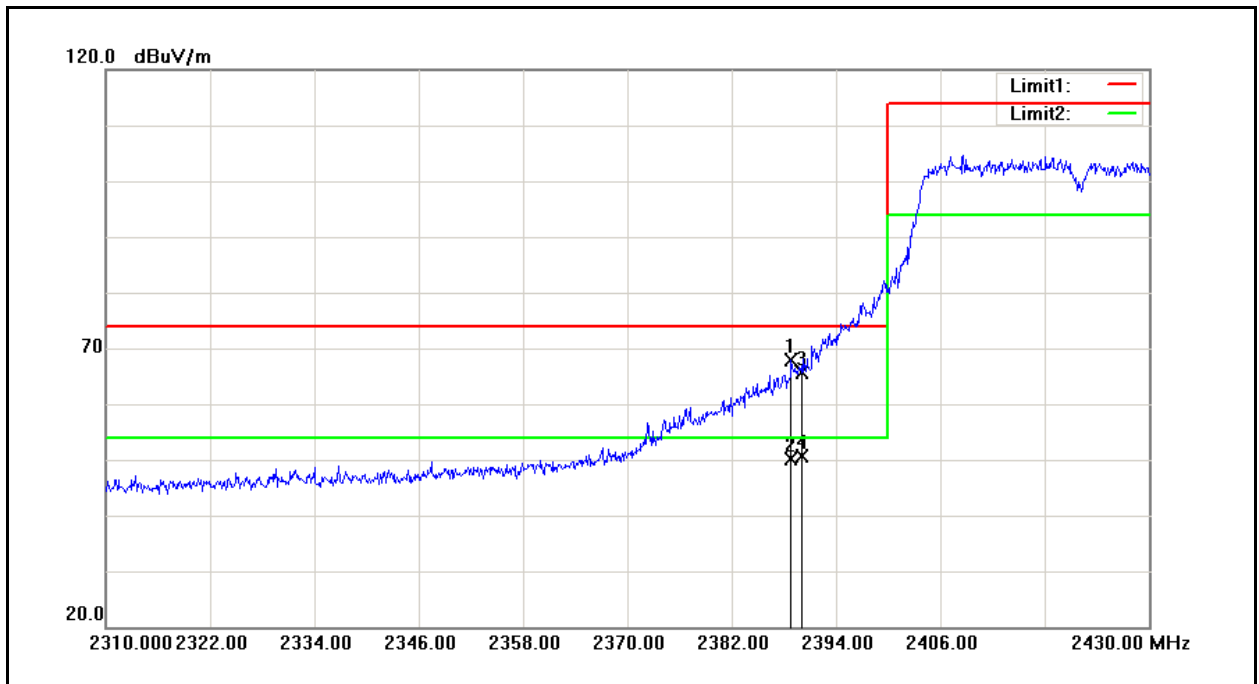
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	54.76	4.50	59.26	74.00	-14.74	peak
2	2483.500	41.54	4.50	46.04	54.00	-7.96	AVG
3	2484.960	55.97	4.51	60.48	74.00	-13.52	peak
4	2484.960	39.60	4.51	44.11	54.00	-9.89	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	4	Date:	12/18/2012
Frequency:	2462 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		



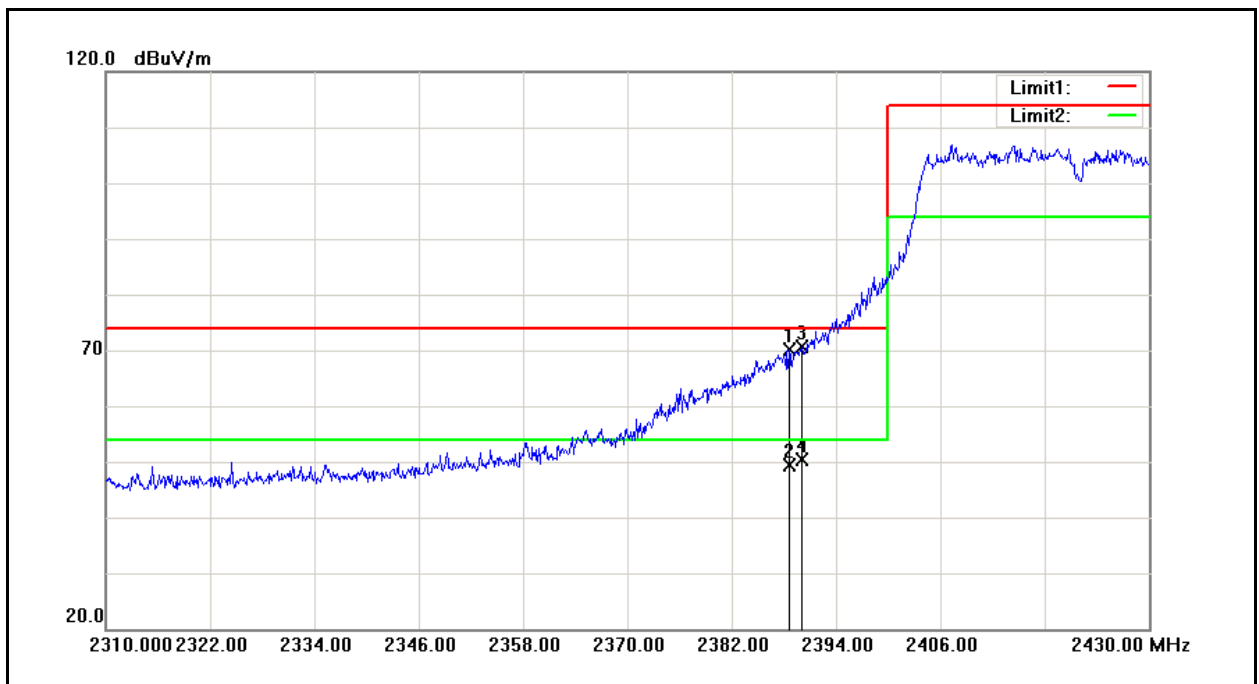
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	59.82	4.50	64.32	74.00	-9.68	peak
2	2483.500	46.96	4.50	51.46	54.00	-2.54	AVG
3	2483.840	62.97	4.51	67.48	74.00	-6.52	peak
4	2483.840	46.63	4.51	51.14	54.00	-2.86	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	5	Date:	12/18/2012
Frequency:	2422 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		



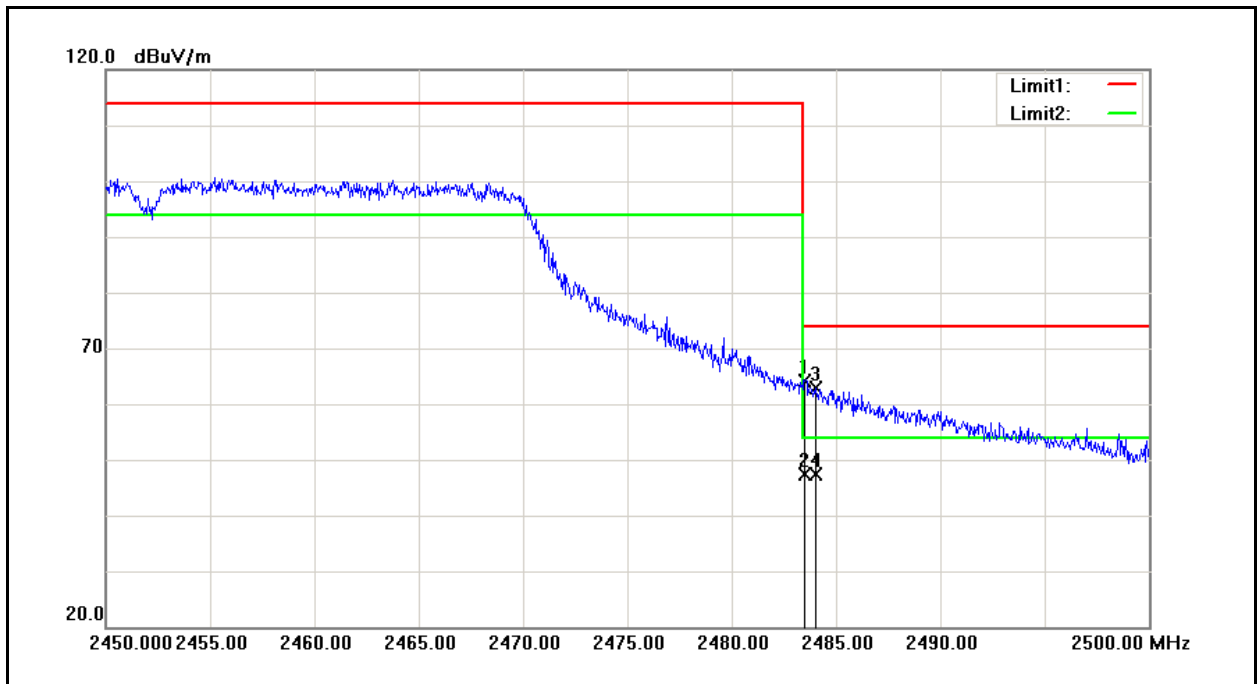
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2388.840	63.90	3.88	67.78	74.00	-6.22	peak
2	2388.840	46.37	3.88	50.25	54.00	-3.75	AVG
3	2390.000	61.65	3.88	65.53	74.00	-8.47	peak
4	2390.000	46.79	3.88	50.67	54.00	-3.33	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	5	Date:	12/18/2012
Frequency:	2422 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		



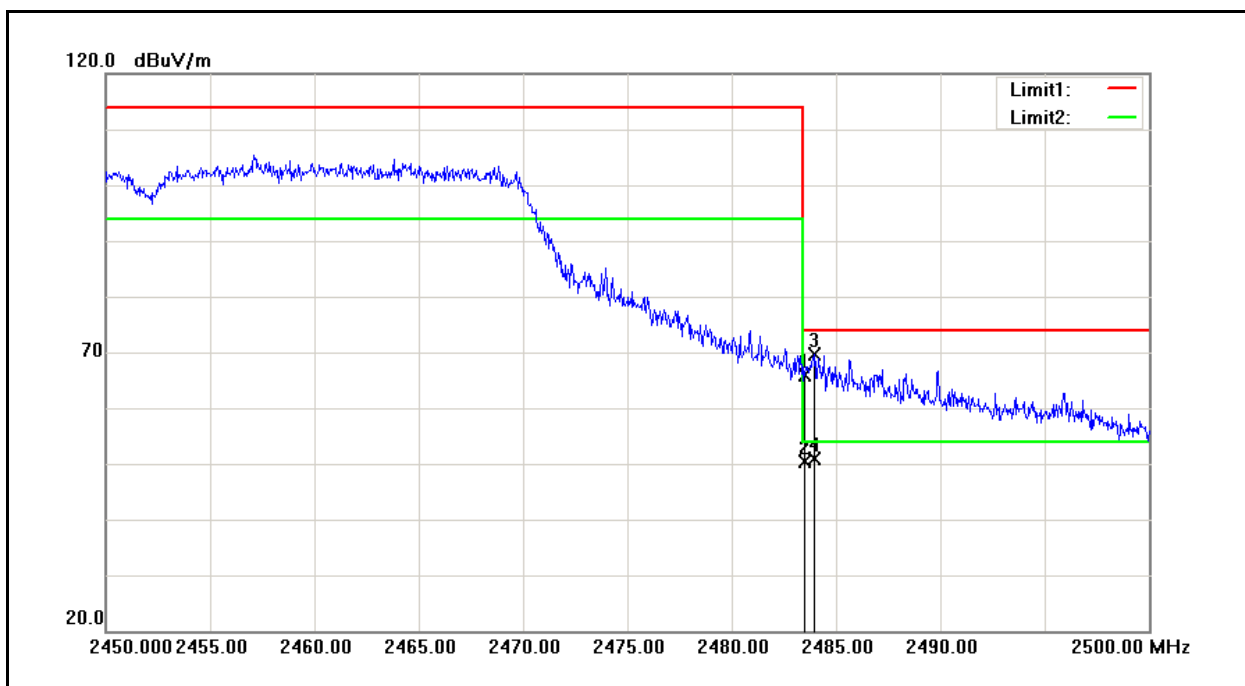
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2388.600	66.24	3.87	70.11	74.00	-3.89	peak
2	2388.600	45.60	3.87	49.47	54.00	-4.53	AVG
3	2390.000	66.81	3.88	70.69	74.00	-3.31	peak
4	2390.000	46.45	3.88	50.33	54.00	-3.67	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	5	Date:	12/18/2012
Frequency:	2452 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	59.67	4.50	64.17	74.00	-9.83	peak
2	2483.500	42.76	4.50	47.26	54.00	-6.74	AVG
3	2484.000	58.41	4.51	62.92	74.00	-11.08	peak
4	2484.000	42.82	4.51	47.33	54.00	-6.67	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VIP4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	5	Date:	12/18/2012
Frequency:	2452 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	61.29	4.50	65.79	74.00	-8.21	peak
2	2483.500	45.97	4.50	50.47	54.00	-3.53	AVG
3	2483.950	65.08	4.51	69.59	74.00	-4.41	peak
4	2483.950	46.32	4.51	50.83	54.00	-3.17	AVG

11 Antenna Measurement

11.1.Limit

For intentional device, according to 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And According to 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2.Antenna Connector Construction

The antenna used in this product is Dipole antenna. And the maximum Gain of this antenna is only 2 dBi.