

FCC 47 CFR PART 15 SUBPART C

Product Type : IPn4G
Applicant : Microhard Systems Inc.
Address : 150 Country Hills Landing NW Calgary, Alberta, Canada
T3K 5P3
Trade Name : Microhard
Model Number : IPn4G
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 : Dec. 07, 2012
Test Period : Dec. 11 ~ Dec. 13, 2012
Issue Date : Feb. 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	Dec. 17, 2012	Initial Issue	
01	Feb. 23, 2013	Revised ID	Joyce Liao

Verification of Compliance

Issued Date: 02/23/2013

Product Type : IPn4G
Applicant : Microhard Systems Inc.
Address : 150 Country Hills Landing NW Calgary, Alberta, Canada
T3K 5P3
Trade Name : Microhard
Model Number : IPn4G
FCC ID : NS9IPN4GNBG30
IC : 3143A-IPN4GNBG30
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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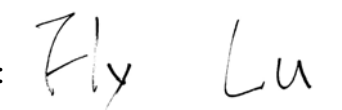
The above equipment was tested by A Test Lab Techno Corp. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2009 and the energy emitted by the sample tested as described in this report is 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)

(Murphy Wang)

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	IPn4G
Trade Name	Microhard
Model No.	IPn4G
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	NS9IPN4GNBG30
IC	3143A-IPN4GNBG30
Frequency Range	IEEE 802.11b / 802.11g: 2412 ~ 2462 MHz
Modulation Type	IEEE 802.11b:DSSS IEEE 802.11g:DSSS + OFDM
Antenna Type	Dipole Antenna
Antenna Gain	2.0 dBi
RF Output Power	IEEE 802.11b: 0.115 W / 20.61 dBm IEEE 802.11g: 0.598 W / 27.77 dBm
Component	
Power Adapter	BI, BI30-120200-AdU Input:100-240Vac, 50/60Hz, 1.2A Output: 12Vdc, 2A Cable out: Non-Shielded, 1.6 m with one 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: 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:

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

IEEE 802.11g mode:

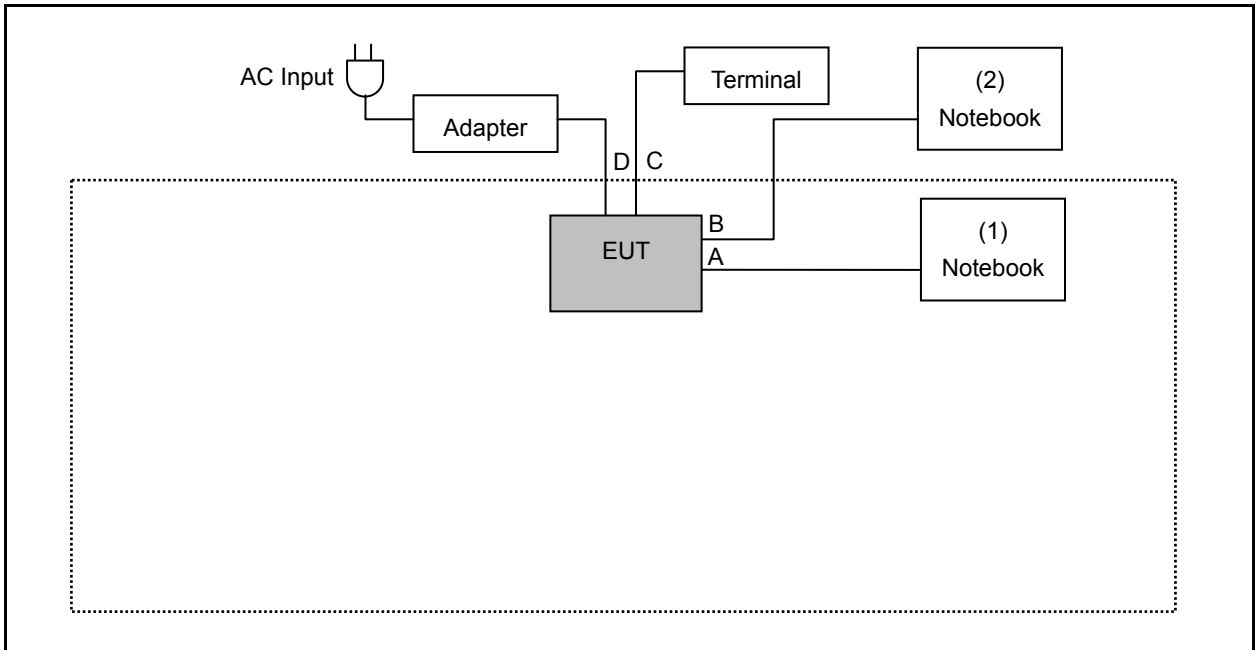
Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6Mbps data rate were chosen for full testing.

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.

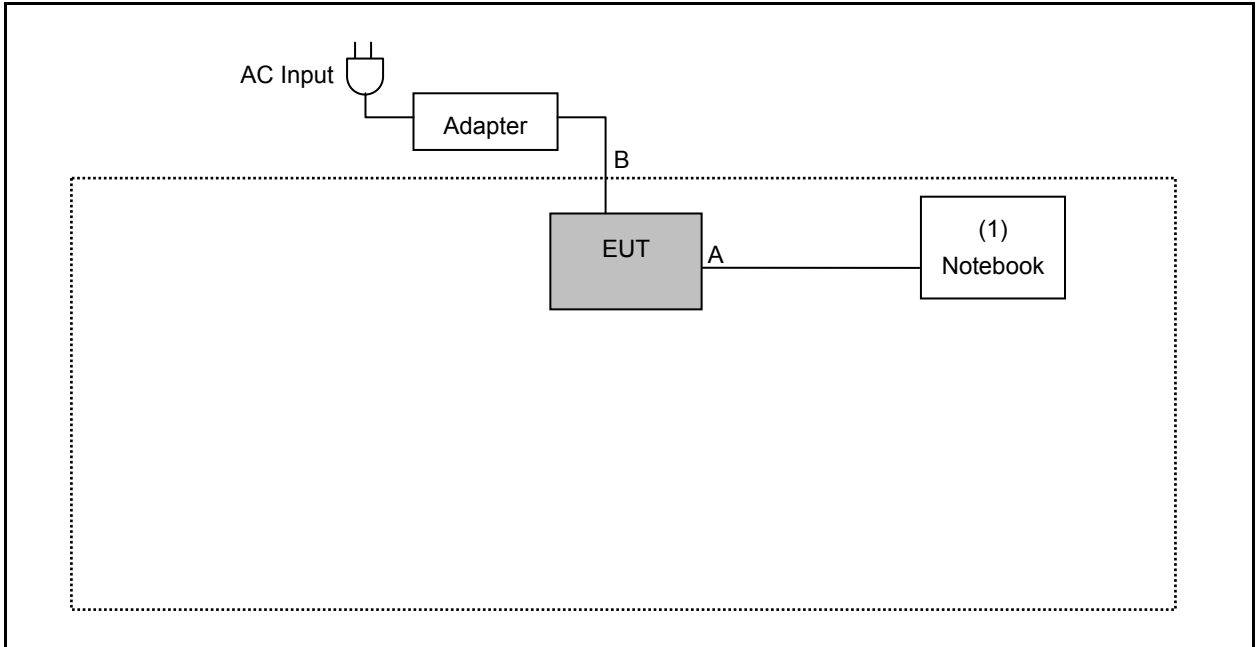
3.3. Configuration of Test System Details

Conducted Emission



Signal Cable Type		Signal Cable Description
A	LAN Cable	Non-Shielded, 3.0m
B	RS-232 Cable	Shielded, 1.8m
C	RS-232 Cable	Shielded, 1.8m
D	DC Power Cable	Non-Shielded, 1.6m with one core

Devices Description					
	Product	Manufacturer	Model Number	Serial Number	Power Cord
(1)	Notebook	DELL	D531	GCD-CD-T6HYQ-3MQ8R-JCPD3-3G8G2	Non-Shielded, 2.0m
(2)	Notebook	DELL	D830	CN-OHN341-48643-88Q-1221	Non-Shielded, 2.0m

Radiated Emission


Signal Cable Type		Signal Cable Description
A	LAN Cable	Non-Shielded, 3.0m
B	DC Power Cable	Non-Shielded, 1.6m with one core

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

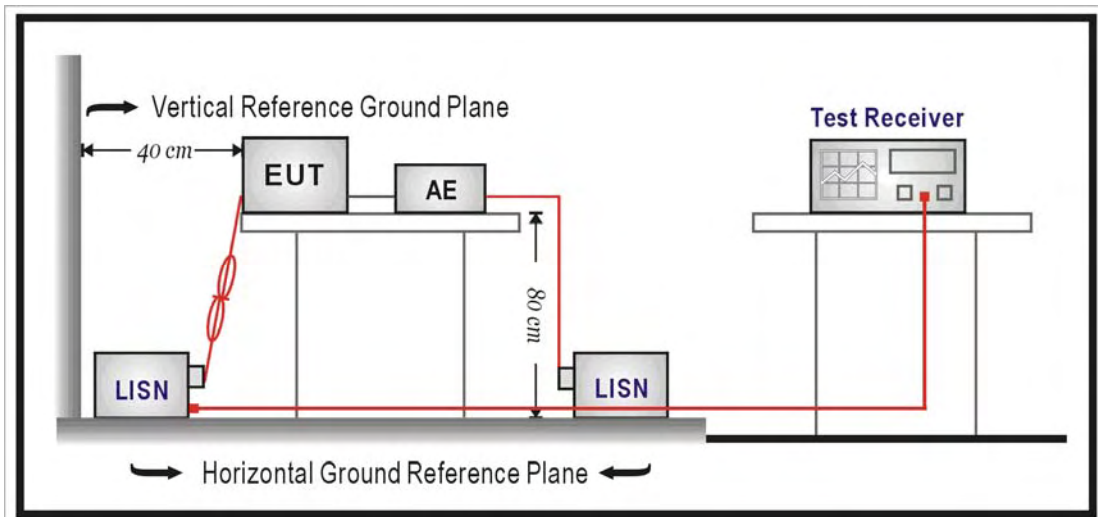
4.2. Test Instruments

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

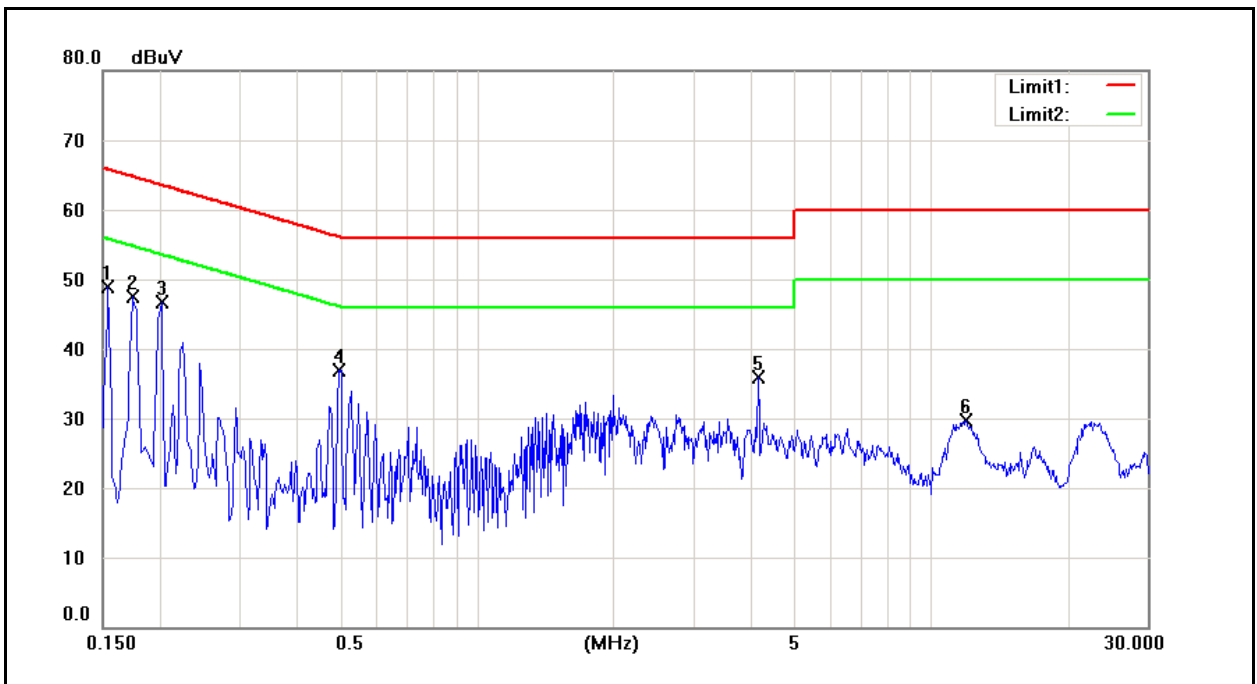
The power line conducted emission measurements were performed in a shielded enclosure. The EUT was assembled on a wooden table which is 80 centimeters high, was placed 40 centimeters from the back wall and at least 1 meter from the sidewall.

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.

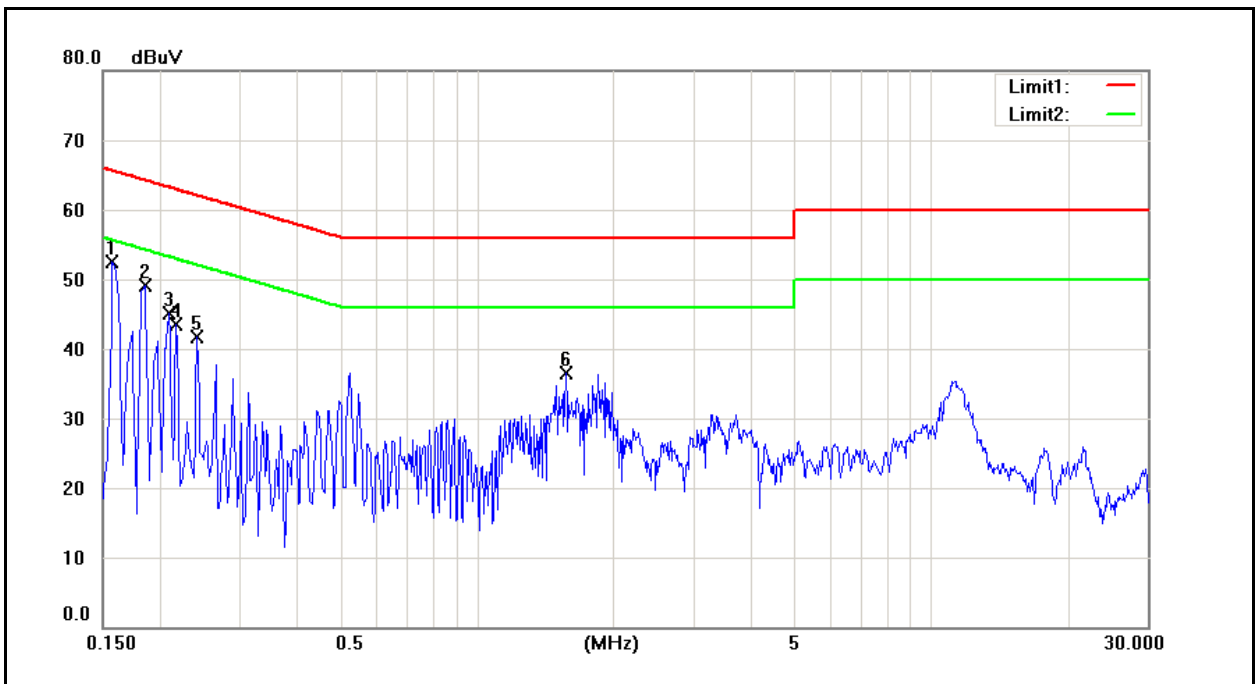
4.5. Test Result

Standard:	FCC Part 15C	Line:	L1
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	IPn4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	1	Date:	12/11/2012
		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	0.1540	42.44	26.95	9.72	52.16	36.67	65.78	55.78	-13.62	-19.11	Pass
2	0.1740	34.90	16.89	9.72	44.62	26.61	64.77	54.77	-20.15	-28.16	Pass
3	0.2020	24.38	10.42	9.72	34.10	20.14	63.53	53.53	-29.43	-33.39	Pass
4	0.4980	27.66	25.33	9.72	37.38	35.05	56.03	46.03	-18.65	-10.98	Pass
5	4.1780	15.39	10.81	9.78	25.17	20.59	56.00	46.00	-30.83	-25.41	Pass
6	11.9500	18.87	12.88	9.92	28.79	22.80	60.00	50.00	-31.21	-27.20	Pass

Standard:	FCC Part 15C	Line:	N
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	IPn4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	1	Date:	12/11/2012
		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	0.1580	42.21	25.66	9.65	51.86	35.31	65.57	55.57	-13.71	-20.26	Pass
2	0.1860	37.64	21.59	9.64	47.28	31.23	64.21	54.21	-16.93	-22.98	Pass
3	0.2100	35.30	19.83	9.64	44.94	29.47	63.21	53.21	-18.27	-23.74	Pass
4	0.2180	28.62	9.99	9.64	38.26	19.63	62.89	52.89	-24.63	-33.26	Pass
5	0.2420	29.41	12.80	9.64	39.05	22.44	62.03	52.03	-22.98	-29.59	Pass
6	1.5740	18.85	15.31	9.70	28.55	25.01	56.00	46.00	-27.45	-20.99	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 ($\mu\text{V}/\text{m}$ 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

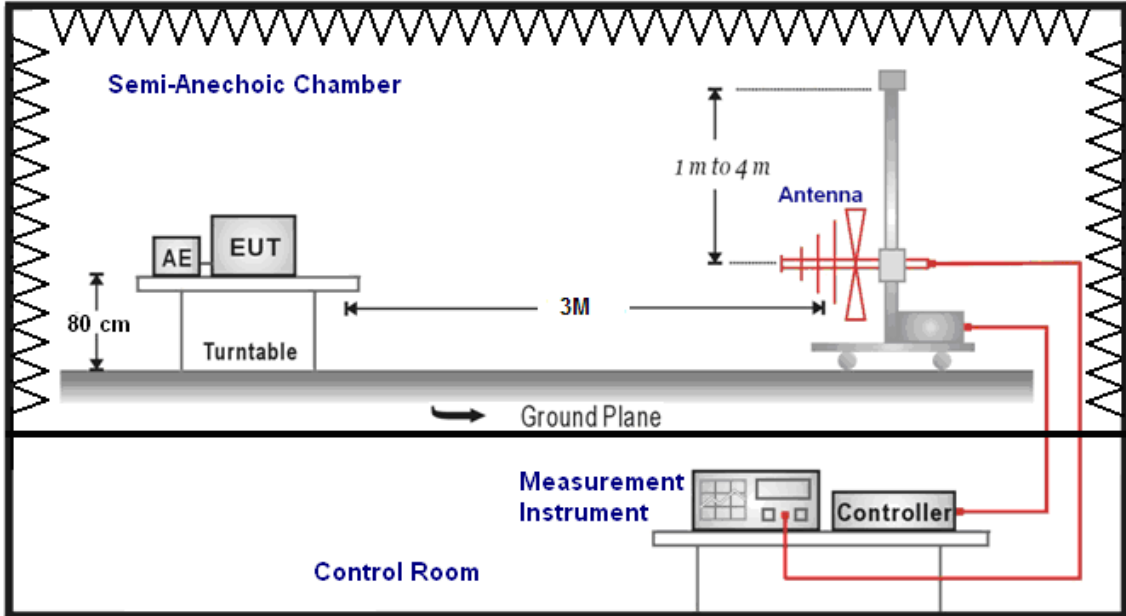
3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
RF Pre-selector	Agilent	N9039A	MY46520256	01/16/2012	(2)
Spectrum Analyzer	Agilent	E4446A	MY46180578	01/16/2012	(1)
Pre Amplifier	Agilent	8449B	3008A02237	02/22/2012	(1)
Pre Amplifier	Agilent	8447D	2944A10961	02/22/2012	(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	08/14/2012	(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.

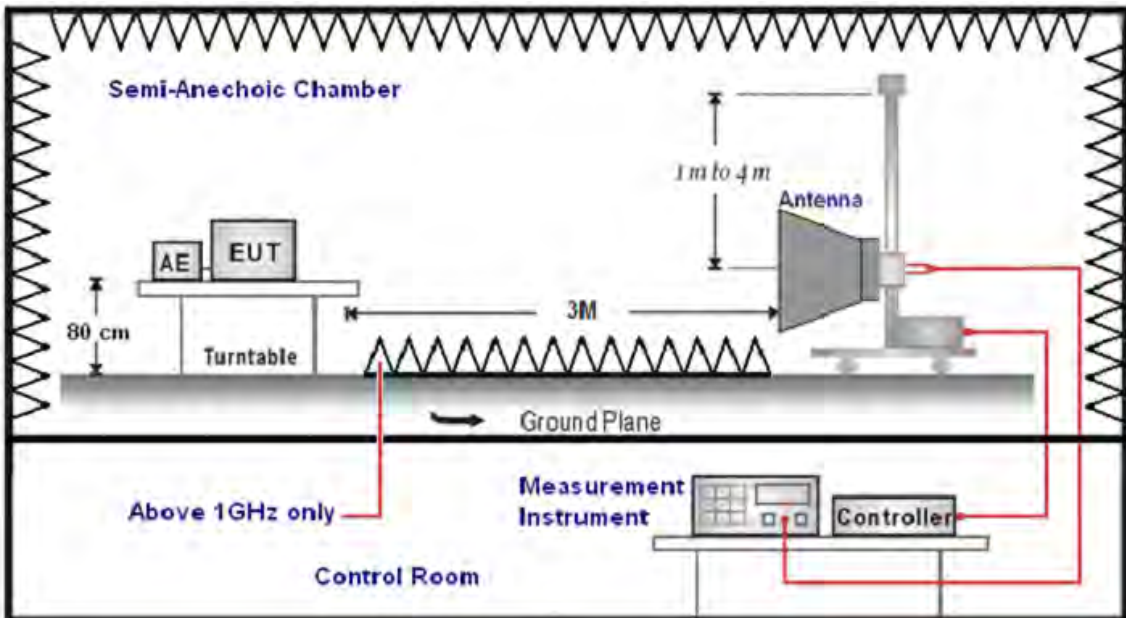
Note: N.C.R. = No Calibration Request.

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 pre 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:	IPn4G	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	53.16	-16.66	36.50	43.50	-7.00	QP	H
266.5000	49.21	-11.71	37.50	46.00	-8.50	QP	H
399.0000	41.38	-8.60	32.78	46.00	-13.22	QP	H
625.0000	42.46	-4.53	37.93	46.00	-8.07	QP	H
750.0000	39.85	-2.46	37.39	46.00	-8.61	QP	H
875.0000	37.70	-0.30	37.40	46.00	-8.60	QP	H
166.5000	51.78	-16.62	35.16	43.50	-8.34	QP	V
300.0000	48.69	-10.53	38.16	46.00	-7.84	QP	V
444.0000	40.16	-8.01	32.15	46.00	-13.85	QP	V
625.0000	40.86	-4.53	36.33	46.00	-9.67	QP	V
750.0000	35.04	-2.46	32.58	46.00	-13.42	QP	V
875.0000	37.19	-0.30	36.89	46.00	-9.11	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:	IPn4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	2	Date:	12/12/2012
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
3051.000	39.25	6.02	45.27	74.00	-28.73	peak	H
4521.000	36.41	10.93	47.34	74.00	-26.66	peak	H
6033.000	34.54	15.98	50.52	74.00	-23.48	peak	H
2960.000	38.39	5.81	44.20	74.00	-29.80	peak	V
4619.000	36.56	11.19	47.75	74.00	-26.25	peak	V
6145.000	34.75	16.32	51.07	74.00	-22.93	peak	V

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	IPn4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	2	Date:	12/12/2012
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
3023.000	38.08	5.96	44.04	74.00	-29.96	peak	H
4591.000	37.20	11.11	48.31	74.00	-25.69	peak	H
6075.000	34.28	16.11	50.39	74.00	-23.61	peak	H
3030.000	38.81	5.97	44.78	74.00	-29.22	peak	V
4654.000	36.82	11.27	48.09	74.00	-25.91	peak	V
6061.000	34.65	16.07	50.72	74.00	-23.28	peak	V

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	IPn4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	2	Date:	12/12/2012
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	38.25	5.86	44.11	74.00	-29.89	peak	H
4591.000	36.63	11.11	47.74	74.00	-26.26	peak	H
5921.000	34.83	15.63	50.46	74.00	-23.54	peak	H
2981.000	38.16	5.86	44.02	74.00	-29.98	peak	V
4472.000	36.74	10.79	47.53	74.00	-26.47	peak	V
5984.000	34.37	15.83	50.20	74.00	-23.80	peak	V

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	IPn4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	3	Date:	12/12/2012
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
3044.000	38.82	6.00	44.82	74.00	-29.18	peak	H
4717.000	37.85	11.43	49.28	74.00	-24.72	peak	H
6145.000	33.25	16.32	49.57	74.00	-24.43	peak	H
3009.000	37.92	5.93	43.85	74.00	-30.15	peak	V
4472.000	36.49	10.79	47.28	74.00	-26.72	peak	V
5900.000	34.67	15.58	50.25	74.00	-23.75	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	IPn4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	3			Date:	12/12/2012		
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
3002.000	37.39	5.91	43.30	74.00	-30.70	peak	H
4563.000	34.77	11.05	45.82	74.00	-28.18	peak	H
6103.000	33.26	16.19	49.45	74.00	-24.55	peak	H
3023.000	37.20	5.96	43.16	74.00	-30.84	peak	V
4549.000	36.26	11.01	47.27	74.00	-26.73	peak	V
6075.000	33.60	16.11	49.71	74.00	-24.29	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	IPn4G			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	3			Date:	12/12/2012		
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
2974.000	38.65	5.84	44.49	74.00	-29.51	peak	H
4591.000	34.70	11.11	45.81	74.00	-28.19	peak	H
6201.000	33.41	16.49	49.90	74.00	-24.10	peak	H
2974.000	36.87	5.84	42.71	74.00	-31.29	peak	V
4549.000	34.26	11.01	45.27	74.00	-28.73	peak	V
5977.000	34.33	15.81	50.14	74.00	-23.86	peak	V

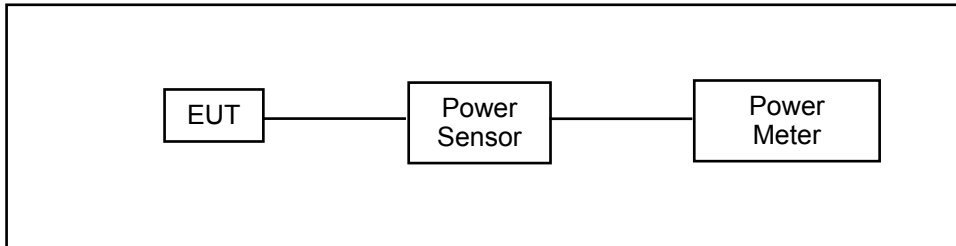
Standard:	RSS-Gen	Test Distance:	3m					
Test item:	Radiated Emission	Power:	AC 120V/60Hz					
Model Number:	IPn4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH					
Mode:	4	Date:	12/12/2012					
Modulation:	IEEE 802.11b	Test By:	Fly Lu					
Frequency:	2437MHz							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/)	Peak (dBuV/m)	AVG. (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2897.000	35.97	5.64	41.61	74.00	54.00	-32.39	peak	H
4591.000	34.31	11.11	45.42	74.00	54.00	-28.58	peak	H
6138.000	32.49	16.30	48.79	74.00	54.00	-25.21	peak	H
2946.000	36.89	5.76	42.65	74.00	54.00	-31.35	peak	V
4577.000	34.97	11.07	46.04	74.00	54.00	-27.96	peak	V
6131.000	33.73	16.29	50.02	74.00	54.00	-23.98	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 $(\text{GAIN} - 6)/3$ 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	IPn4G					
Test Item	Maximum Conducted Output Power					
Test Mode	Mode 2: IEEE 802.11b Link Mode					
Date of Test	12/11/2012			Test Site	TE05	
Frequency (MHz)	Data Rate	Average Power		Peak Power		Limit (dBm)
		(dBm)	(W)	(dBm)	(W)	
2412	1	15.82	0.038	20.61	0.115	< 30
2437		15.33	0.034	20.39	0.109	< 30
2462		14.81	0.030	19.81	0.096	< 30

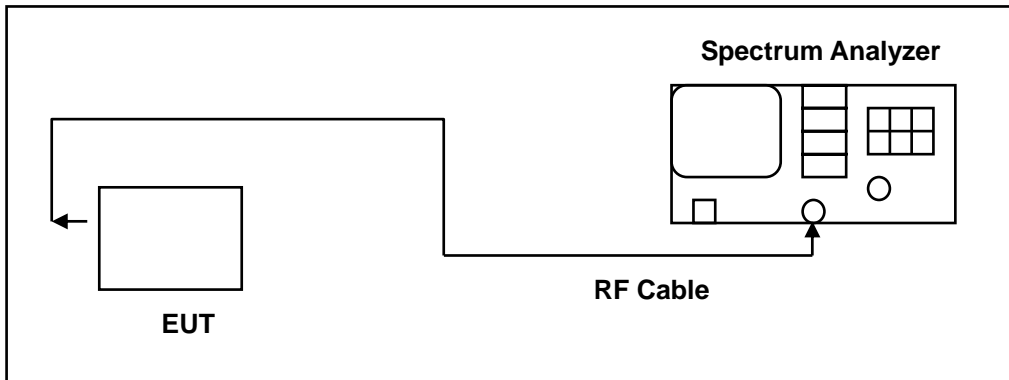
Model Number	IPn4G					
Test Item	Maximum Conducted Output Power					
Test Mode	Mode 3: IEEE 802.11g Link Mode					
Date of Test	12/11/2012			Test Site	TE05	
Frequency (MHz)	Data Rate	Average Power		Peak Power		Limit (dBm)
		(dBm)	(W)	(dBm)	(W)	
2412	6	15.68	0.037	27.22	0.527	< 30
2437		15.84	0.038	27.43	0.553	< 30
2462		15.97	0.040	27.77	0.598	< 30

7 6dB RF Bandwidth Measurement

7.1. Limit

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.

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

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)

7.5. Test Result

Model Number	IPn4G		
Test Item	6dB RF Bandwidth		
Test Mode	Mode 2: IEEE 802.11b Link Mode		
Date of Test	12/13/2012	Test Site	TE05
	Frequency (MHz)	Measurement (kHz)	Limit (kHz)
	2412	12099	> 500
	2437	11150	> 500
	2462	12131	> 500

Model Number	IPn4G		
Test Item	6dB RF Bandwidth		
Test Mode	Mode 3: IEEE 802.11g Link Mode		
Date of Test	12/13/2012	Test Site	TE06
	Frequency (MHz)	Measurement (kHz)	Limit (kHz)
	2412	16430	> 500
	2437	16413	> 500
	2462	16430	> 500

7.6. Test Graphs

Mode 2: IEEE 802.11b Link Mode	
2412	<p>Agilent R T</p> <p>Ch Freq 2.412 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 20 dBm Atten 20 dB</p> <p>#Peak</p> <p>Log</p> <p>10</p> <p>dB/</p> <p>Offst</p> <p>10.8</p> <p>dB</p> <p>Center 2.412 00 GHz Span 30 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 2.88 ms (601 pts)</p> <p>Occupied Bandwidth 15.6094 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -6.00 dB</p> <p>Transmit Freq Error 138.389 kHz</p> <p>x dB Bandwidth 12.099 MHz</p> <p>Copyright 2000-2005 Agilent Technologies</p> <p>Freq/Channel</p> <p>Center Freq 2.41200000 GHz</p> <p>Start Freq 2.39700000 GHz</p> <p>Stop Freq 2.42700000 GHz</p> <p>CF Step 3.00000000 MHz</p> <p>Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p>
2437	<p>Agilent T</p> <p>Ch Freq 2.437 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 20 dBm Atten 20 dB</p> <p>#Peak</p> <p>Log</p> <p>10</p> <p>dB/</p> <p>Offst</p> <p>10.8</p> <p>dB</p> <p>Center 2.437 00 GHz Span 30 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 2.88 ms (601 pts)</p> <p>Occupied Bandwidth 15.5931 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -6.00 dB</p> <p>Transmit Freq Error -98.471 kHz</p> <p>x dB Bandwidth 11.150 MHz</p> <p>Copyright 2000-2005 Agilent Technologies</p> <p>Freq/Channel</p> <p>Center Freq 2.43700000 GHz</p> <p>Start Freq 2.42200000 GHz</p> <p>Stop Freq 2.45200000 GHz</p> <p>CF Step 3.00000000 MHz</p> <p>Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p>
2462	<p>Agilent T</p> <p>Ch Freq 2.462 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 20 dBm Atten 20 dB</p> <p>#Peak</p> <p>Log</p> <p>10</p> <p>dB/</p> <p>Offst</p> <p>10.8</p> <p>dB</p> <p>Center 2.462 00 GHz Span 30 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 2.88 ms (601 pts)</p> <p>Occupied Bandwidth 15.3534 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -6.00 dB</p> <p>Transmit Freq Error -129.773 kHz</p> <p>x dB Bandwidth 12.131 MHz</p> <p>Copyright 2000-2005 Agilent Technologies</p> <p>Freq/Channel</p> <p>Center Freq 2.46200000 GHz</p> <p>Start Freq 2.44700000 GHz</p> <p>Stop Freq 2.47700000 GHz</p> <p>CF Step 3.00000000 MHz</p> <p>Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p>

Mode 3: IEEE 802.11g Link Mode

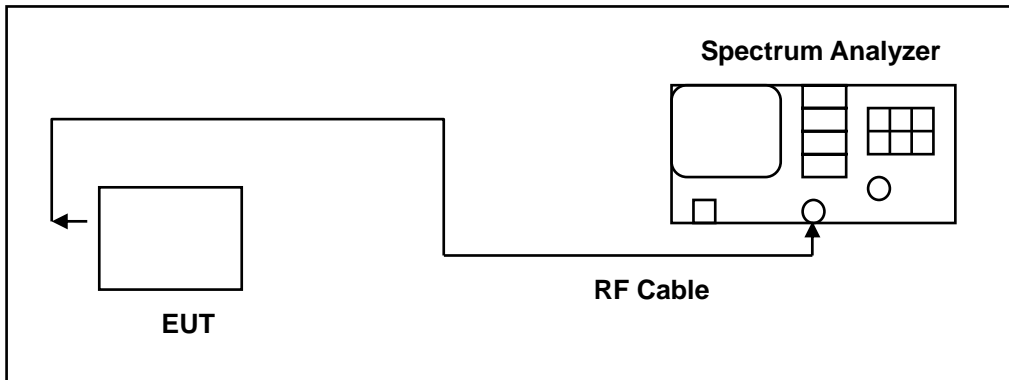
2412	
2437	
2462	

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

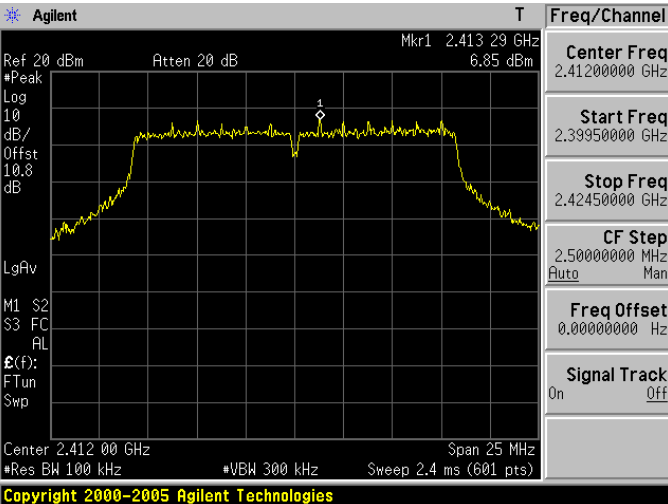
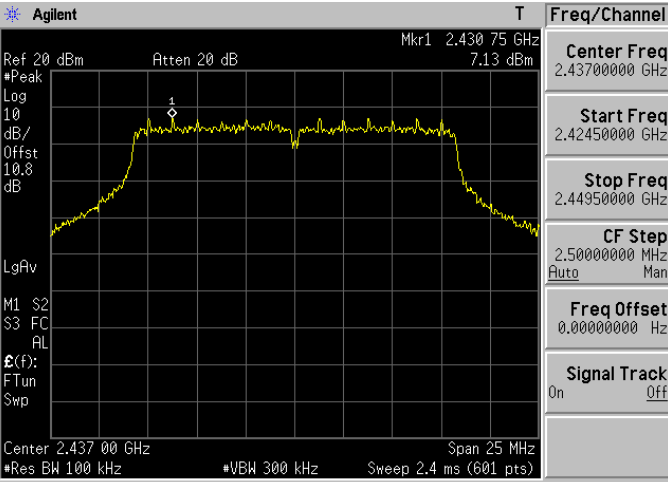
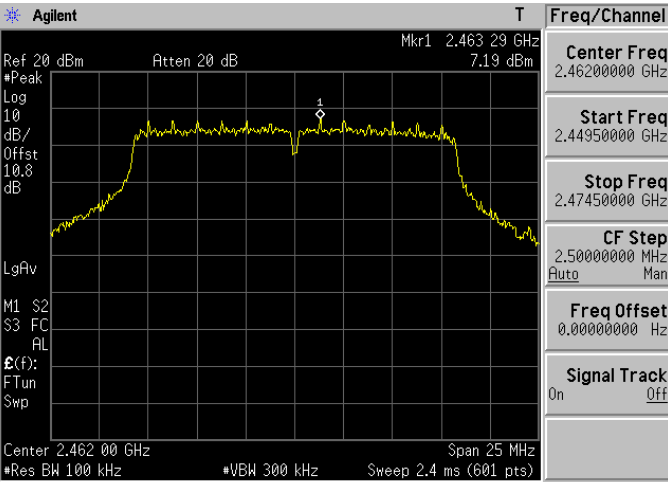
Model Number	IPn4G			
Test Item	Maximum Power Density			
Test Mode	Mode 2: IEEE 802.11b Link Mode			
Date of Test	12/13/2012		Test Site	TE05
Frequency (MHz)	Reading (dBm/100KHz)	BWCF (dB)	Results (dBm/3KHz)	Limit (dBm)
2412	6.96	-15.30	-8.34	< 8
2437	7.15	-15.30	-8.15	< 8
2462	7.40	-15.30	-7.90	< 8

Model Number	IPn4G			
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	6.85	-15.30	-8.45	< 8
2437	7.13	-15.30	-8.17	< 8
2462	7.19	-15.30	-8.11	< 8

8.6. Test Graphs

Mode 2: IEEE 802.11b Link Mode	
2412	<p>Agilent T Freq/Channel</p> <p>Ref 20 dBm Atten 20 dB Mkr1 2.410 99 GHz #Peak 6.96 dBm Center Freq 2.41200000 GHz</p> <p>Log 10 dB/Offst 10.8 dB Start Freq 2.40250000 GHz</p> <p>LgAv Stop Freq 2.42150000 GHz</p> <p>M1 S2 CF Step 1.90000000 MHz S3 FC Auto Man AL</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Center 2.412 00 GHz Span 19 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.84 ms (601 pts)</p> <p>Copyright 2000-2005 Agilent Technologies</p>
2437	<p>Agilent T Freq/Channel</p> <p>Ref 20 dBm Atten 20 dB Mkr1 2.435 00 GHz #Peak 7.15 dBm Center Freq 2.43700000 GHz</p> <p>Log 10 dB/Offst 10.8 dB Start Freq 2.42750000 GHz</p> <p>LgAv Stop Freq 2.44650000 GHz</p> <p>M1 S2 CF Step 1.90000000 MHz S3 FC Auto Man AL</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Center 2.437 00 GHz Span 19 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.84 ms (601 pts)</p> <p>Copyright 2000-2005 Agilent Technologies</p>
2462	<p>Agilent T Freq/Channel</p> <p>Ref 20 dBm Atten 20 dB Mkr1 2.460 00 GHz #Peak 7.40 dBm Center Freq 2.46200000 GHz</p> <p>Log 10 dB/Offst 10.8 dB Start Freq 2.45250000 GHz</p> <p>LgAv Stop Freq 2.47150000 GHz</p> <p>M1 S2 CF Step 1.90000000 MHz S3 FC Auto Man AL</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Center 2.462 00 GHz Span 19 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.84 ms (601 pts)</p> <p>Copyright 2000-2005 Agilent Technologies</p>

Mode 3: IEEE 802.11g Link Mode

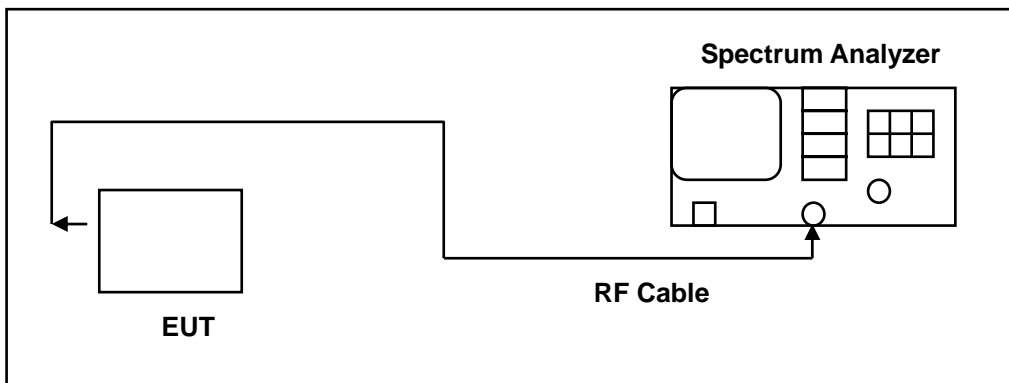
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Center Freq	2.41200000 GHz														
Start Freq	2.39950000 GHz														
Stop Freq	2.42450000 GHz														
CF Step	2.50000000 MHz Auto Man														
Freq Offset	0.00000000 Hz														
Signal Track	On Off														
<p>2437</p>	 <table border="1" data-bbox="1197 918 1321 1397"> <thead> <tr> <th colspan="2">Freq/Channel</th> </tr> </thead> <tbody> <tr> <td>Center Freq</td> <td>2.43700000 GHz</td> </tr> <tr> <td>Start Freq</td> <td>2.42450000 GHz</td> </tr> <tr> <td>Stop Freq</td> <td>2.44950000 GHz</td> </tr> <tr> <td>CF Step</td> <td>2.50000000 MHz Auto Man</td> </tr> <tr> <td>Freq Offset</td> <td>0.00000000 Hz</td> </tr> <tr> <td>Signal Track</td> <td>On Off</td> </tr> </tbody> </table> <p>Copyright 2000-2005 Agilent Technologies</p>	Freq/Channel		Center Freq	2.43700000 GHz	Start Freq	2.42450000 GHz	Stop Freq	2.44950000 GHz	CF Step	2.50000000 MHz Auto Man	Freq Offset	0.00000000 Hz	Signal Track	On Off
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CF Step	2.50000000 MHz Auto Man														
Freq Offset	0.00000000 Hz														
Signal Track	On Off														
<p>2462</p>	 <table border="1" data-bbox="1197 1444 1321 1924"> <thead> <tr> <th colspan="2">Freq/Channel</th> </tr> </thead> <tbody> <tr> <td>Center Freq</td> <td>2.46200000 GHz</td> </tr> <tr> <td>Start Freq</td> <td>2.44950000 GHz</td> </tr> <tr> <td>Stop Freq</td> <td>2.47450000 GHz</td> </tr> <tr> <td>CF Step</td> <td>2.50000000 MHz Auto Man</td> </tr> <tr> <td>Freq Offset</td> <td>0.00000000 Hz</td> </tr> <tr> <td>Signal Track</td> <td>On Off</td> </tr> </tbody> </table> <p>Copyright 2000-2005 Agilent Technologies</p>	Freq/Channel		Center Freq	2.46200000 GHz	Start Freq	2.44950000 GHz	Stop Freq	2.47450000 GHz	CF Step	2.50000000 MHz Auto Man	Freq Offset	0.00000000 Hz	Signal Track	On Off
Freq/Channel															
Center Freq	2.46200000 GHz														
Start Freq	2.44950000 GHz														
Stop Freq	2.47450000 GHz														
CF Step	2.50000000 MHz Auto Man														
Freq Offset	0.00000000 Hz														
Signal Track	On Off														

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	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Input: RF PNO: Fast IF Gain: Low Trig: Free Run Avg Type: Log-Pwr</p> <p>Ref Offset: 10.8 dB Ref: 20.00 dBm</p> <p>Mkr1 2.412 GHz 6.724 dBm</p> <p>Start 30 MHz #Res BW 100 kHz #VBW 300 kHz Stop 26.50 GHz Sweep 2.53 s (1001 pts)</p> <table border="1"> <thead> <tr> <th>MWR MODE</th> <th>TRC</th> <th>SEL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.412 GHz</td> <td></td> <td></td> <td>6.724 dBm</td> </tr> </tbody> </table>	MWR MODE	TRC	SEL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.412 GHz			6.724 dBm
MWR MODE	TRC	SEL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE										
1	N	1	f	2.412 GHz			6.724 dBm										
2437	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Input: RF PNO: Fast IF Gain: Low Trig: Free Run Avg Type: Log-Pwr</p> <p>Ref Offset: 10.8 dB Ref: 20.00 dBm</p> <p>Mkr1 2.437 GHz 6.637 dBm</p> <p>Start 30 MHz #Res BW 100 kHz #VBW 300 kHz Stop 26.50 GHz Sweep 2.53 s (1001 pts)</p> <table border="1"> <thead> <tr> <th>MWR MODE</th> <th>TRC</th> <th>SEL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.437 GHz</td> <td></td> <td></td> <td>6.637 dBm</td> </tr> </tbody> </table>	MWR MODE	TRC	SEL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.437 GHz			6.637 dBm
MWR MODE	TRC	SEL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE										
1	N	1	f	2.437 GHz			6.637 dBm										
2462	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Input: RF PNO: Fast IF Gain: Low Trig: Free Run Avg Type: Log-Pwr</p> <p>Ref Offset: 10.8 dB Ref: 20.00 dBm</p> <p>Mkr1 2.462 GHz 6.628 dBm</p> <p>Start 30 MHz #Res BW 100 kHz #VBW 300 kHz Stop 26.50 GHz Sweep 2.53 s (1001 pts)</p> <table border="1"> <thead> <tr> <th>MWR MODE</th> <th>TRC</th> <th>SEL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.462 GHz</td> <td></td> <td></td> <td>6.628 dBm</td> </tr> </tbody> </table>	MWR MODE	TRC	SEL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.462 GHz			6.628 dBm
MWR MODE	TRC	SEL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE										
1	N	1	f	2.462 GHz			6.628 dBm										

Mode 3: IEEE 802.11g Link Mode

2412



2437



2462

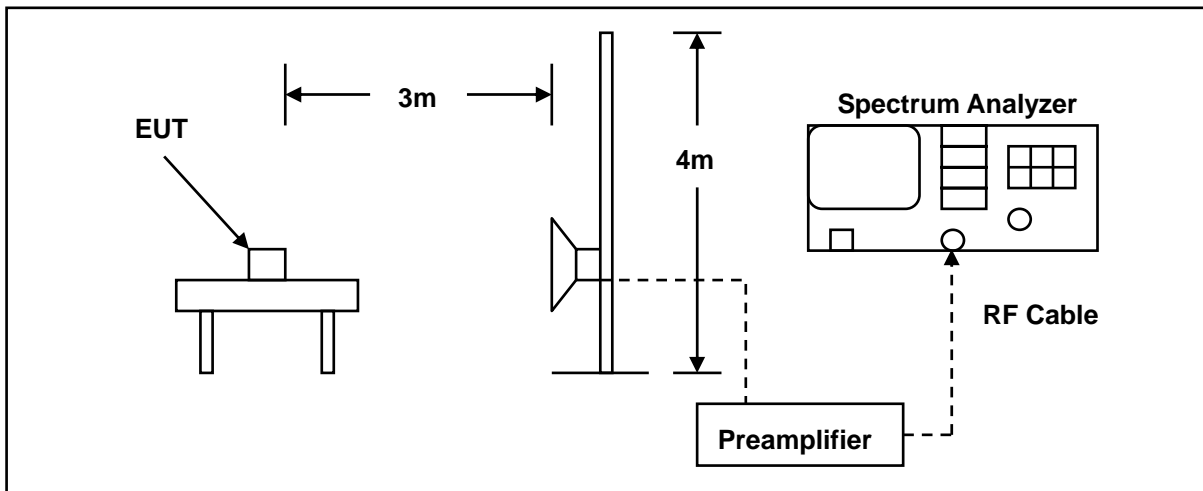


10 Band Edges Measurement

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)
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	08/14/2012	(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.

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.

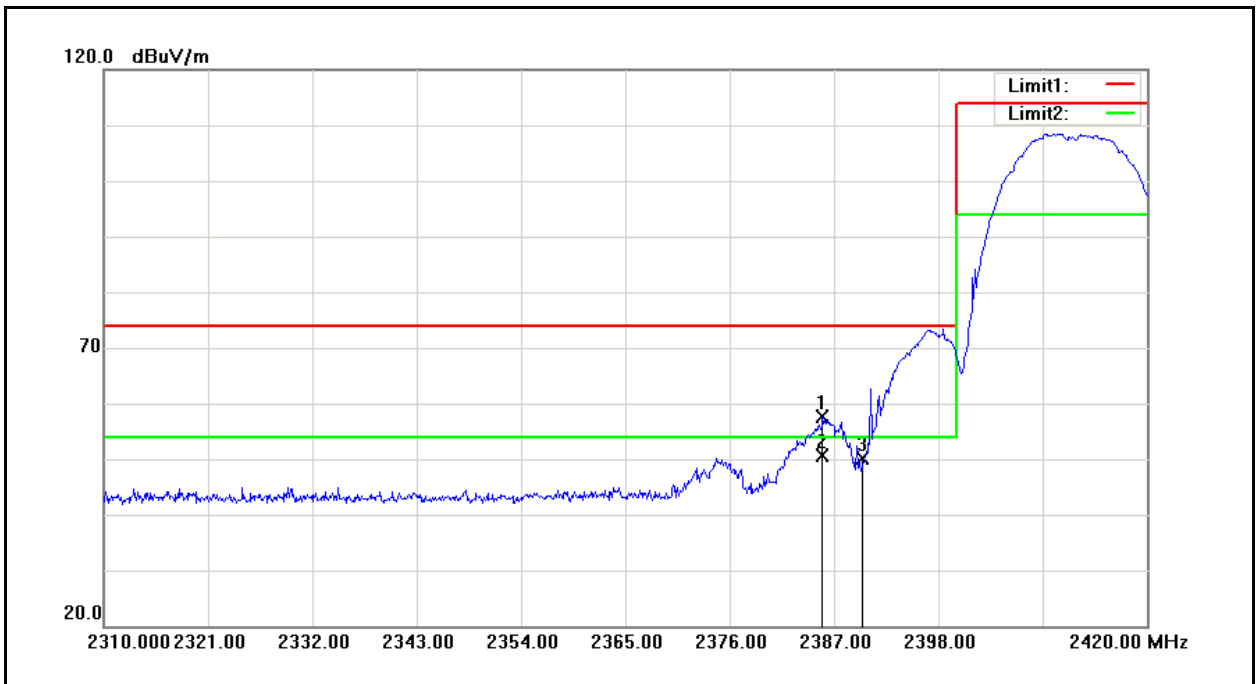
The transmitter was configured with the worst case antenna and setup to transmit at the highest channel. Then the field strength was measured at 2483.5 MHz.

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.

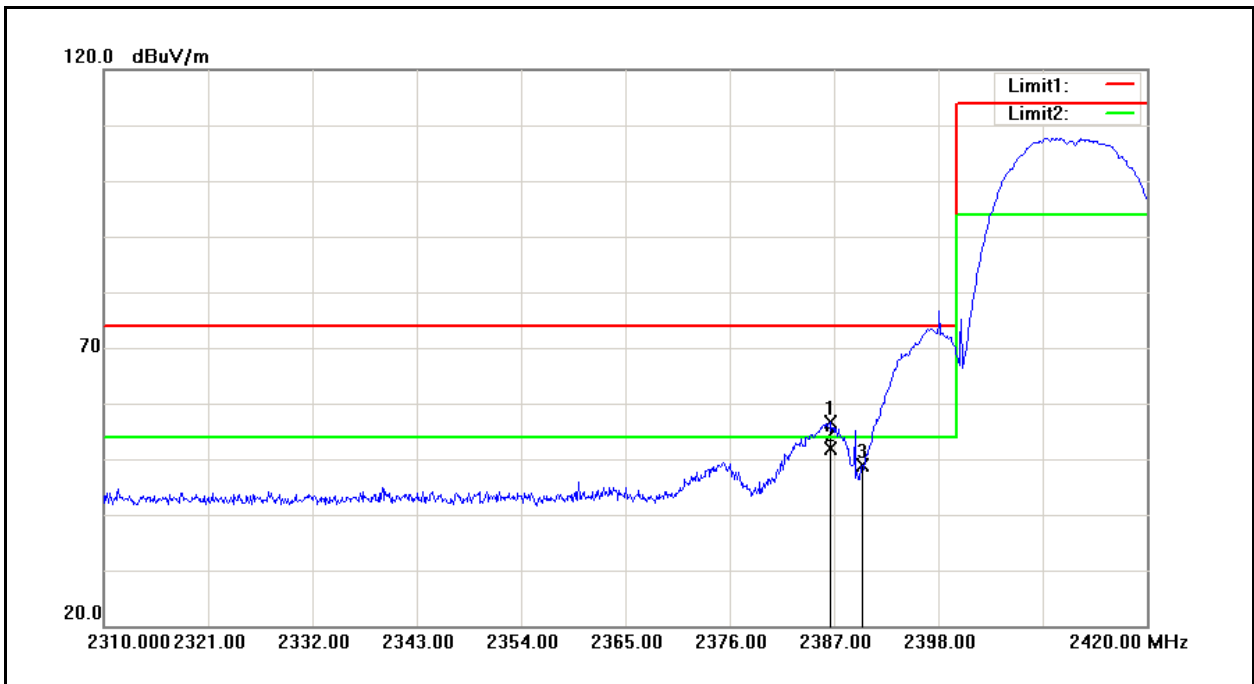
10.5. Test Result

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	IPn4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	2	Date:	12/12/2012
Frequency:	2412 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		



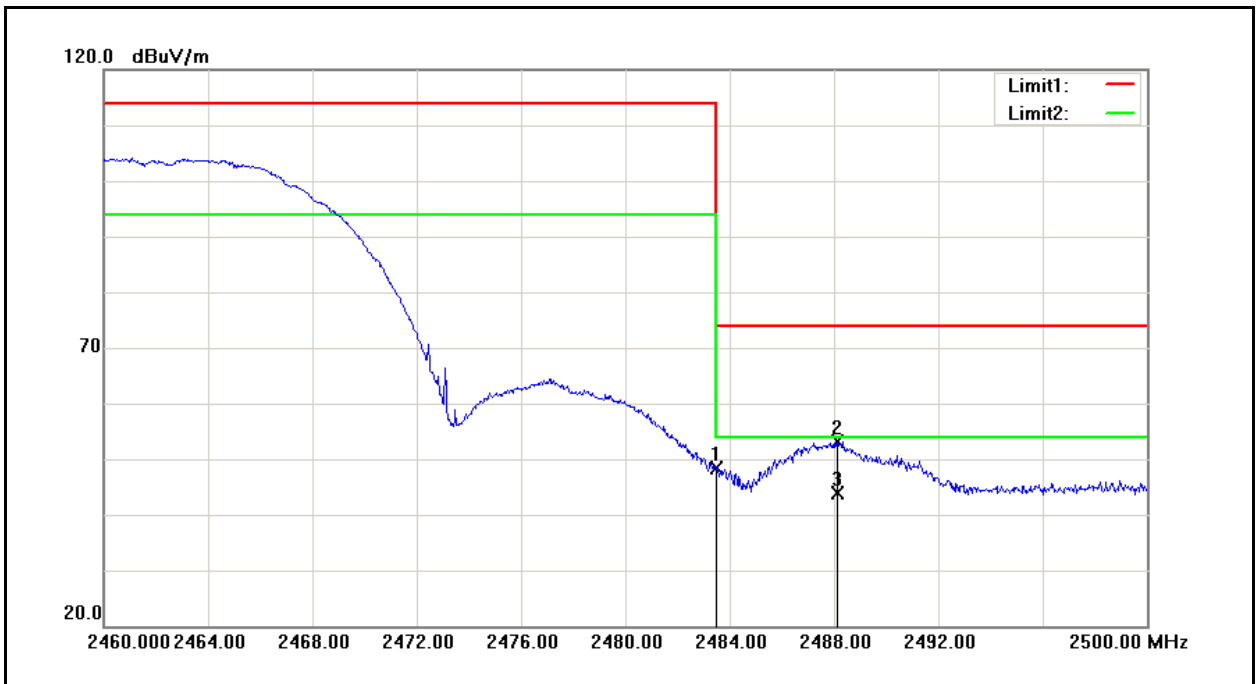
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2385.790	53.67	3.85	57.52	74.00	-16.48	peak
2	2385.790	46.90	3.85	50.75	54.00	-3.25	AVG
3	2390.000	46.27	3.88	50.15	74.00	-23.85	peak

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	IPn4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	2	Date:	12/12/2012
Frequency:	2412 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		



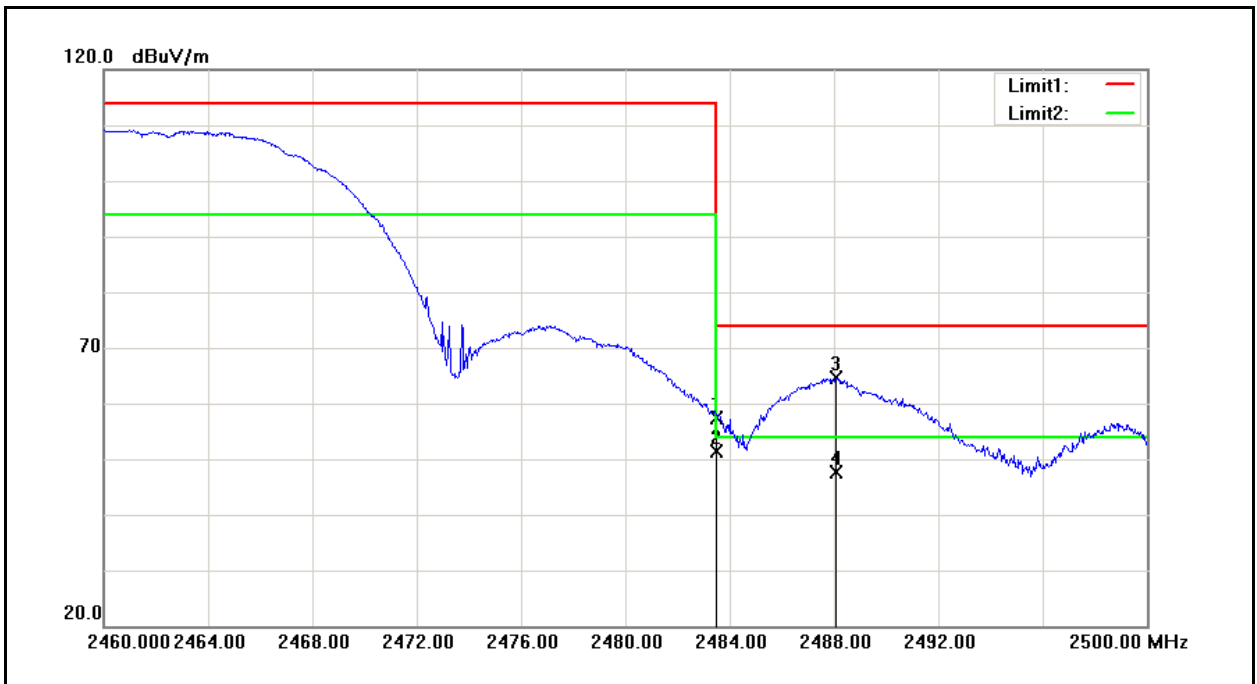
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2386.560	52.74	3.86	56.60	74.00	-17.40	peak
2	2386.560	47.96	3.86	51.82	54.00	-2.18	AVG
3	2390.000	45.10	3.88	48.98	74.00	-25.02	peak

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	IPn4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	2	Date:	12/12/2012
Frequency:	2462 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		



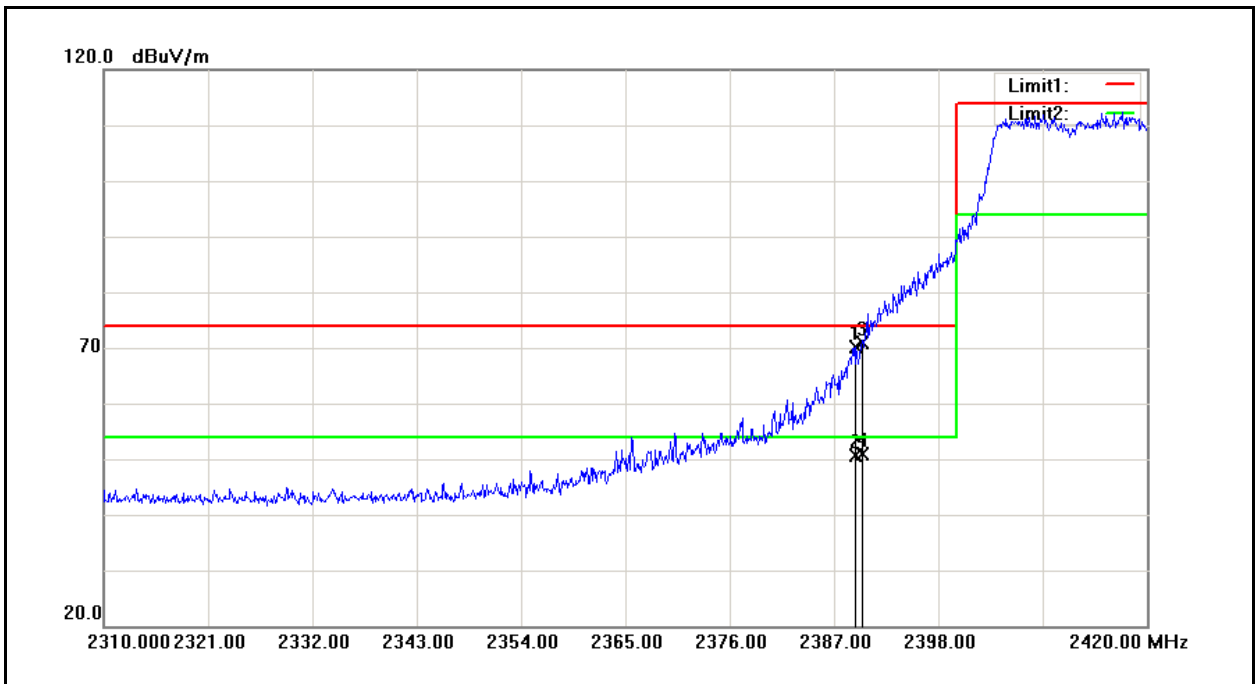
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	43.86	4.50	48.36	74.00	-25.64	peak
2	2488.120	48.57	4.53	53.10	74.00	-20.90	peak
3	2488.120	39.37	4.53	43.90	54.00	-10.10	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	IPn4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	2	Date:	12/12/2012
Frequency:	2462 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		



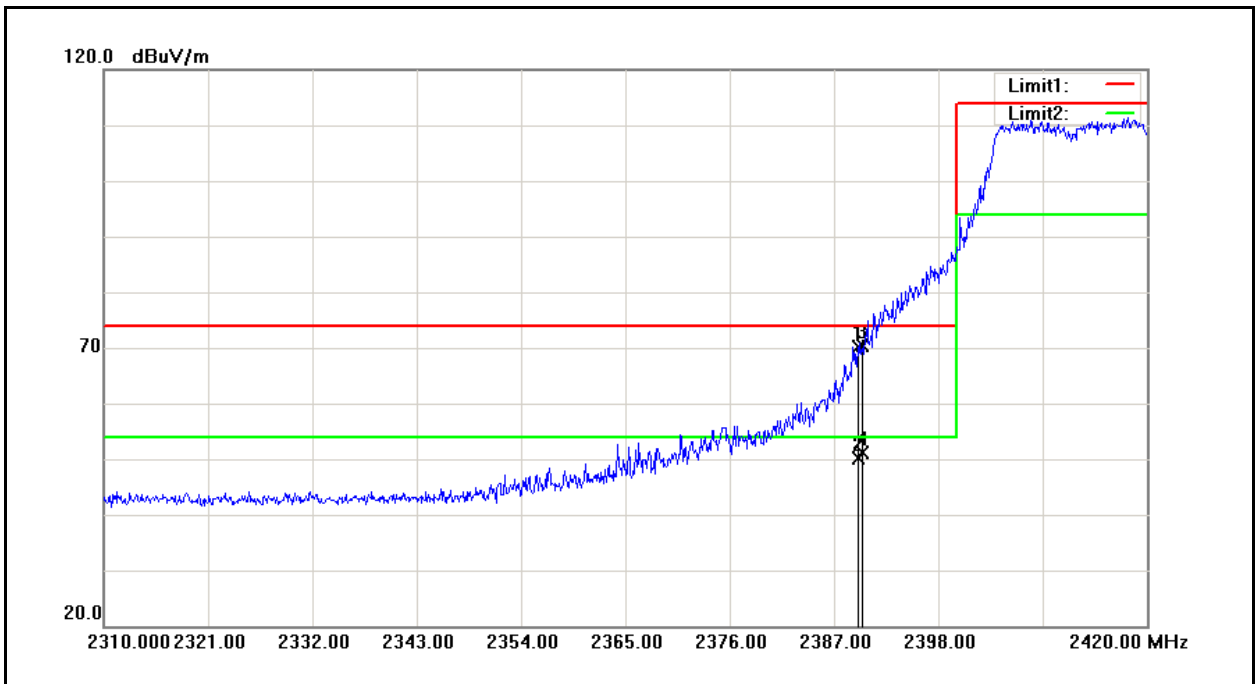
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	52.99	4.50	57.49	74.00	-16.51	peak
2	2483.500	46.91	4.50	51.41	54.00	-2.59	AVG
3	2488.080	60.00	4.53	64.53	74.00	-9.47	peak
4	2488.080	43.17	4.53	47.70	54.00	-6.30	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	IPn4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	3	Date:	12/12/2012
Frequency:	2412 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		



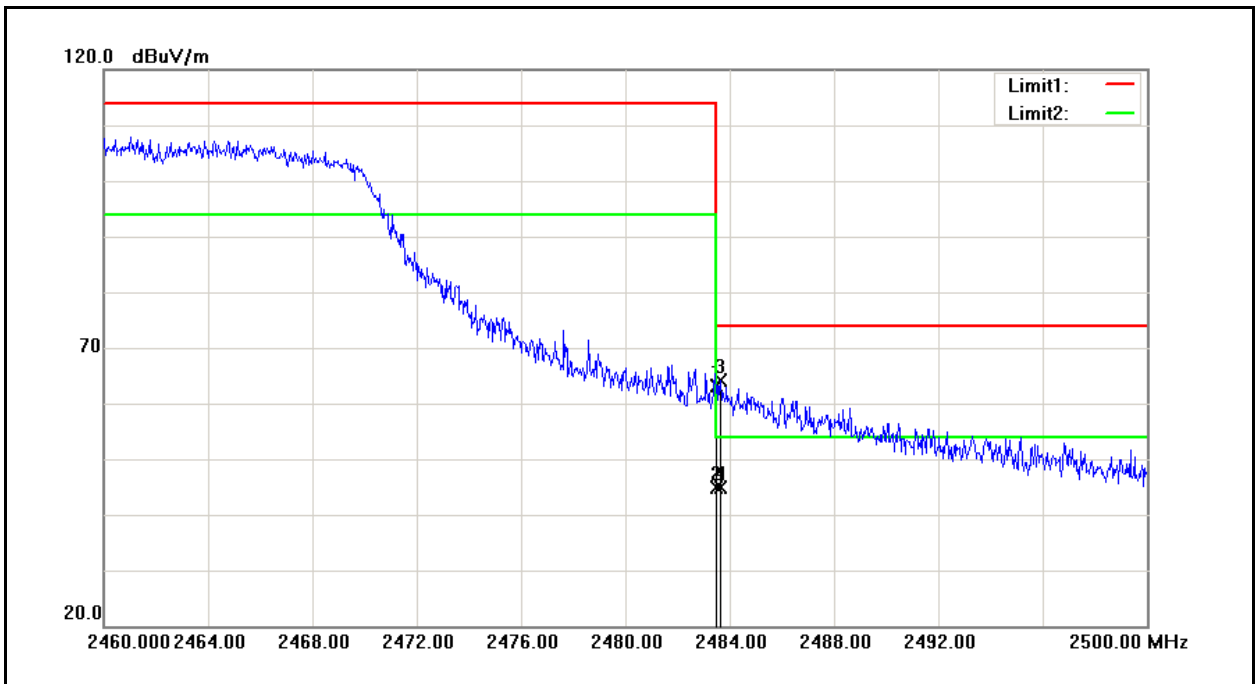
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.310	66.19	3.88	70.07	74.00	-3.93	peak
2	2389.310	46.76	3.88	50.64	54.00	-3.36	AVG
3	2390.000	66.91	3.88	70.79	74.00	-3.21	peak
4	2390.000	47.00	3.88	50.88	54.00	-3.12	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	IPn4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	3	Date:	12/12/2012
Frequency:	2412 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		



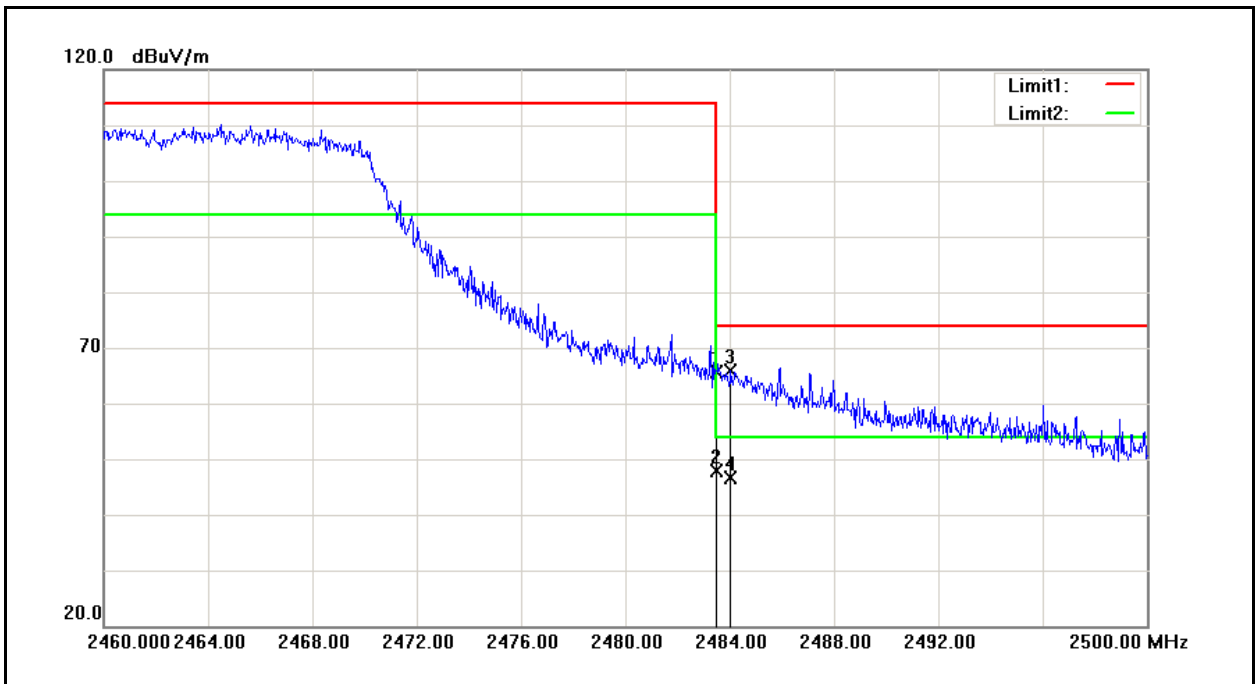
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.530	66.30	3.88	70.18	74.00	-3.82	peak
2	2389.530	46.23	3.88	50.11	54.00	-3.89	AVG
3	2390.000	66.56	3.88	70.44	74.00	-3.56	peak
4	2390.000	47.34	3.88	51.22	54.00	-2.78	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	IPn4G	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	58.54	4.50	63.04	74.00	-10.96	peak
2	2483.500	40.31	4.50	44.81	54.00	-9.19	AVG
3	2483.640	59.59	4.50	64.09	74.00	-9.91	peak
4	2483.640	40.36	4.50	44.86	54.00	-9.14	AVG

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	IPn4G	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	3	Date:	12/12/2012
Frequency:	2462 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		



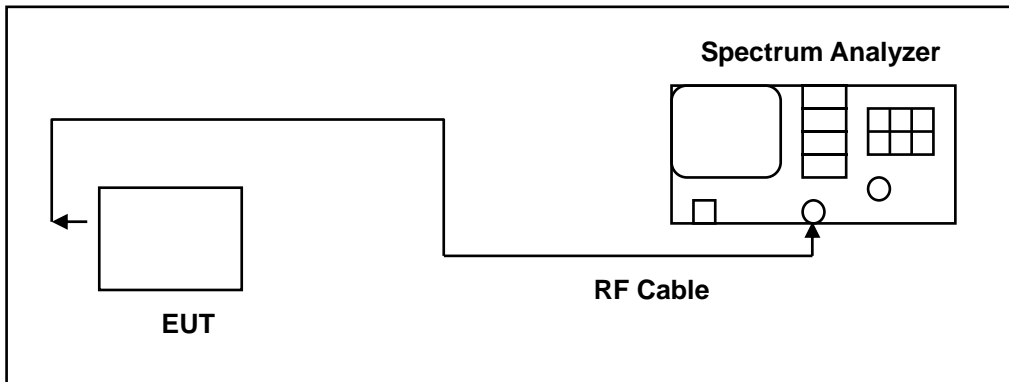
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	61.11	4.50	65.61	74.00	-8.39	peak
2	2483.500	43.29	4.50	47.79	54.00	-6.21	AVG
3	2484.040	61.25	4.51	65.76	74.00	-8.24	peak
4	2484.040	42.16	4.51	46.67	54.00	-7.33	AVG

11 99 % Occupied Bandwidth Measurement

11.1.Limit

N/A

11.2.Test Setup



11.3.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.

11.4.Test Procedure

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.

11.5. Test Result

Model Number	IPn4G		
Test Item	99 % Occupied Bandwidth		
Test Mode	Mode 2: IEEE 802.11b Link Mode		
Date of Test	12/13/2012	Test Site	TE05
	Frequency (MHz)	Measurement (kHz)	Limit (kHz)
	2412	156094	-----
	2437	155931	-----
	2462	153534	-----

Model Number	IPn4G		
Test Item	99 % Occupied Bandwidth		
Test Mode	Mode 3: IEEE 802.11g Link Mode		
Date of Test	12/13/2012	Test Site	TE05
	Frequency (MHz)	Measurement (kHz)	Limit (kHz)
	2412	165174	-----
	2437	164860	-----
	2462	164482	-----

11.6. Test Graphs

Mode 2: IEEE 802.11b Link Mode	
2412	<p>Agilent R T</p> <p>Ch Freq 2.412 GHz Trig Free</p> <p>Center Freq 2.41200000 GHz</p> <p>Start Freq 2.39700000 GHz</p> <p>Stop Freq 2.42700000 GHz</p> <p>CF Step 3.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Ref 20 dBm Atten 20 dB</p> <p>Peak</p> <p>Log</p> <p>10</p> <p>dB/</p> <p>Offst 10.8</p> <p>dB</p> <p>Center 2.412 00 GHz Span 30 MHz</p> <p>Res BW 100 kHz VBW 300 kHz Sweep 2.88 ms (601 pts)</p> <p>Occupied Bandwidth 15.6094 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -6.00 dB</p> <p>Transmit Freq Error 138.389 kHz</p> <p>x dB Bandwidth 12.099 MHz</p> <p>Copyright 2000-2005 Agilent Technologies</p>
2437	<p>Agilent T</p> <p>Ch Freq 2.437 GHz Trig Free</p> <p>Center Freq 2.43700000 GHz</p> <p>Start Freq 2.42200000 GHz</p> <p>Stop Freq 2.45200000 GHz</p> <p>CF Step 3.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Ref 20 dBm Atten 20 dB</p> <p>Peak</p> <p>Log</p> <p>10</p> <p>dB/</p> <p>Offst 10.8</p> <p>dB</p> <p>Center 2.437 00 GHz Span 30 MHz</p> <p>Res BW 100 kHz VBW 300 kHz Sweep 2.88 ms (601 pts)</p> <p>Occupied Bandwidth 15.5931 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -6.00 dB</p> <p>Transmit Freq Error -98.471 kHz</p> <p>x dB Bandwidth 11.150 MHz</p> <p>Copyright 2000-2005 Agilent Technologies</p>
2462	<p>Agilent T</p> <p>Ch Freq 2.462 GHz Trig Free</p> <p>Center Freq 2.46200000 GHz</p> <p>Start Freq 2.44700000 GHz</p> <p>Stop Freq 2.47700000 GHz</p> <p>CF Step 3.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Ref 20 dBm Atten 20 dB</p> <p>Peak</p> <p>Log</p> <p>10</p> <p>dB/</p> <p>Offst 10.8</p> <p>dB</p> <p>Center 2.462 00 GHz Span 30 MHz</p> <p>Res BW 100 kHz VBW 300 kHz Sweep 2.88 ms (601 pts)</p> <p>Occupied Bandwidth 15.3534 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -6.00 dB</p> <p>Transmit Freq Error -129.773 kHz</p> <p>x dB Bandwidth 12.131 MHz</p> <p>Copyright 2000-2005 Agilent Technologies</p>

Mode 3: IEEE 802.11g Link Mode

2412	<p>Agilent T</p> <p>Ch Freq 2.412 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 20 dBm Atten 20 dB</p> <p>#Peak</p> <p>Log</p> <p>10</p> <p>dB/</p> <p>Offst</p> <p>10.8</p> <p>dB</p> <p>Center 2.412 00 GHz Span 30 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 2.88 ms (601 pts)</p> <p>Occupied Bandwidth Occ BW % PWR 99.00 %</p> <p>16.5174 MHz x dB -6.00 dB</p> <p>Transmit Freq Error 26.913 kHz</p> <p>x dB Bandwidth 16.430 MHz</p> <p>Copyright 2000-2005 Agilent Technologies</p> <p>Freq/Channel</p> <p>Center Freq 2.41200000 GHz</p> <p>Start Freq 2.39700000 GHz</p> <p>Stop Freq 2.42700000 GHz</p> <p>CF Step 3.00000000 MHz</p> <p>Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p>
2437	<p>Agilent T</p> <p>Ch Freq 2.437 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 20 dBm Atten 20 dB</p> <p>#Peak</p> <p>Log</p> <p>10</p> <p>dB/</p> <p>Offst</p> <p>10.8</p> <p>dB</p> <p>Center 2.437 00 GHz Span 30 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 2.88 ms (601 pts)</p> <p>Occupied Bandwidth Occ BW % PWR 99.00 %</p> <p>16.4860 MHz x dB -6.00 dB</p> <p>Transmit Freq Error -2.581 kHz</p> <p>x dB Bandwidth 16.413 MHz</p> <p>Copyright 2000-2005 Agilent Technologies</p> <p>Freq/Channel</p> <p>Center Freq 2.43700000 GHz</p> <p>Start Freq 2.42200000 GHz</p> <p>Stop Freq 2.45200000 GHz</p> <p>CF Step 3.00000000 MHz</p> <p>Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p>
2462	<p>Agilent T</p> <p>Ch Freq 2.462 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 20 dBm Atten 20 dB</p> <p>#Peak</p> <p>Log</p> <p>10</p> <p>dB/</p> <p>Offst</p> <p>10.8</p> <p>dB</p> <p>Center 2.462 00 GHz Span 30 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 2.88 ms (601 pts)</p> <p>Occupied Bandwidth Occ BW % PWR 99.00 %</p> <p>16.4482 MHz x dB -6.00 dB</p> <p>Transmit Freq Error -31.759 kHz</p> <p>x dB Bandwidth 16.430 MHz</p> <p>Copyright 2000-2005 Agilent Technologies</p> <p>Freq/Channel</p> <p>Center Freq 2.46200000 GHz</p> <p>Start Freq 2.44700000 GHz</p> <p>Stop Freq 2.47700000 GHz</p> <p>CF Step 3.00000000 MHz</p> <p>Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p>

12 Antenna Measurement

12.1.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.

12.2.Antenna Connector Construction

The antenna used in this product is Dipole antenna. And the maximum Gain of this antenna is only 2.0 dBi.