

FCC 47 CFR PART 15 SUBPART E

Product Type : NBE-M5
Applicant : Ubiquiti Networks, Inc.
Address : 12F, No105, Song Ren Rd., SinYi District, Taipei, Taiwan
Trade Name : UBiQUiTi
Model Number : NBE-M5
Test Specification : FCC 47 CFR PART 15 SUBPART E: Oct., 2012
ANSI C63.4-2009
Application Purpose : Original
Receive Date : Apr. 12, 2013
Test Period : Jun. 04 ~ Aug. 28, 2013
Issue Date : Aug. 29, 2013

Issue by

A Test Lab Techno Corp.
No. 140-1, Changan Street, Bade City,
Taoyuan County 334, Taiwan R.O.C.
Tel : +86-3-2710188 / Fax : +86-3-2710190



Taiwan Accreditation Foundation accreditation number: 1330

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Revision History

Rev.	Issue Date	Revisions	Revised By
00	Jun. 14, 2013	Initial Issue	
01	Aug. 20, 2013	Re-test IEEE 802.11a/ IEEE 802.11n 20MHz frequency 5240MHz and IEEE 802.11n 40MHz frequency 5230MHz test results.	Snow Wang
02	Aug. 27, 2013	Add 20dB bandwidth results.	Joyce Liao
03	Aug. 29, 2013	Revised test results.	Joyce Liao

Verification of Compliance

Issued Date: 08/29/2013

Product Type : NBE-M5
Applicant : Ubiquiti Networks, Inc.
Address : 12F, No105, Song Ren Rd., SinYi District, Taipei, Taiwan
Trade Name : UBIQUITI
Model Number : NBE-M5
FCC ID : SWX-NBM5HP
EUT Rated Voltage : DC 24V, 0.5A
Test Voltage : 120 Vac / 60 Hz
Applicable Standard : FCC 47 CFR PART 15 SUBPART E: Oct., 2012
ANSI C63.4-2009
Test Result : Complied
Application Purpose : Original
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 15.203, 15.407 .
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
15.407(b)(5)	AC Power Conducted Emission	PASS	Meet the requirement of limit.
15.407(b/1/2/3) (b)(5)	Radiated Emission	PASS	Meet the requirement of limit.
15.407(a/1/2/3)	Maximum Conducted Output Power	PASS	Meet the requirement of limit.
---	26dB RF Bandwidth / Occupied Bandwidth	Reference	---
15.407(a)(6)	Peak Power Excursion	PASS	Meet the requirement of limit.
15.407(a/1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Meet the requirement of limit.

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 ± 2.02 dB.

Radiated Emission

The measurement uncertainty is evaluated as ± 3.96 dB for horizontal in 30MHz ~ 1000MHz.

The measurement uncertainty is evaluated as ± 3.57 dB for vertical in 30MHz ~ 1000MHz.

The measurement uncertainty is evaluated as ± 3.072 dB for horizontal in 1000MHz ~ 18000MHz.

The measurement uncertainty is evaluated as ± 3.028 dB for vertical in 1000MHz ~ 18000MHz.

The measurement uncertainty is evaluated as ± 3.622 dB for horizontal in 18000MHz ~ 40000MHz.

The measurement uncertainty is evaluated as ± 3.506 dB for vertical in 18000MHz ~ 40000MHz.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

2 EUT Description

Product	: NBE-M5			
Trade Name	: UBiQUiTi			
Model No.	: NBE-M5			
Applicant	: Ubiquiti Networks, Inc. 12F, No105, Song Ren Rd., SinYi District, Taipei, Taiwan			
Manufacturer	: Ubiquiti Networks, Inc. 12F, No105, Song Ren Rd., SinYi District, Taipei, Taiwan			
FCC ID	: SWX-NBM5HP			
Frequency Range	Band	Mode	Frequency Range (MHz)	Number of Channels
	U-NII Band I	IEEE 802.11a	5180 – 5240	4 Channels
		IEEE 802.11n 20 MHz	5180 – 5240	4 Channels
		IEEE 802.11n 40 MHz	5190 – 5230	2 Channels
Modulation Type	: IEEE 802.11a U-NII Band: OFDM IEEE 802.11n 20MHz U-NII Band I: OFDM IEEE 802.11n 40MHz U-NII Band I: OFDM			
Antenna Type	: Dish Antenna			
Antenna Gain	: 25 dBi			
Antenna Delivery	: 1TX + 1RX			
RF Output Power	: IEEE 802.11a U-NII Band I : 0.0005 W / -2.62 dBm IEEE 802.11n 20MHz U-NII Band I: 0.0006 W / -2.56 dBm IEEE 802.11n 40MHz U-NII Band I: 0.0005 W / -2.75 dBm			

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 802.11a Link Mode
Mode 3: IEEE 802.11n 20MHz Link Mode
Mode 4: IEEE 802.11n 40MHz Link Mode
Mode 5: 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 802.11a mode / 5180 ~ 5240MHz:

Channel Low (5180MHz), Channel Mid (5220MHz) and Channel High (5240MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n 20MHz Channel mode / 5180 ~ 5240MHz:

Channel Low (5180MHz), Channel Mid (5220MHz) and Channel High (5240MHz) with 6.5Mbps data rate were chosen for full testing.

IEEE 802.11n 40 MHz Channel mode / 5190 ~ 5230MHz:

Channel Low (5190MHz) and Channel High (5230MHz) with 13.5Mbps data rate were chosen for full testing.

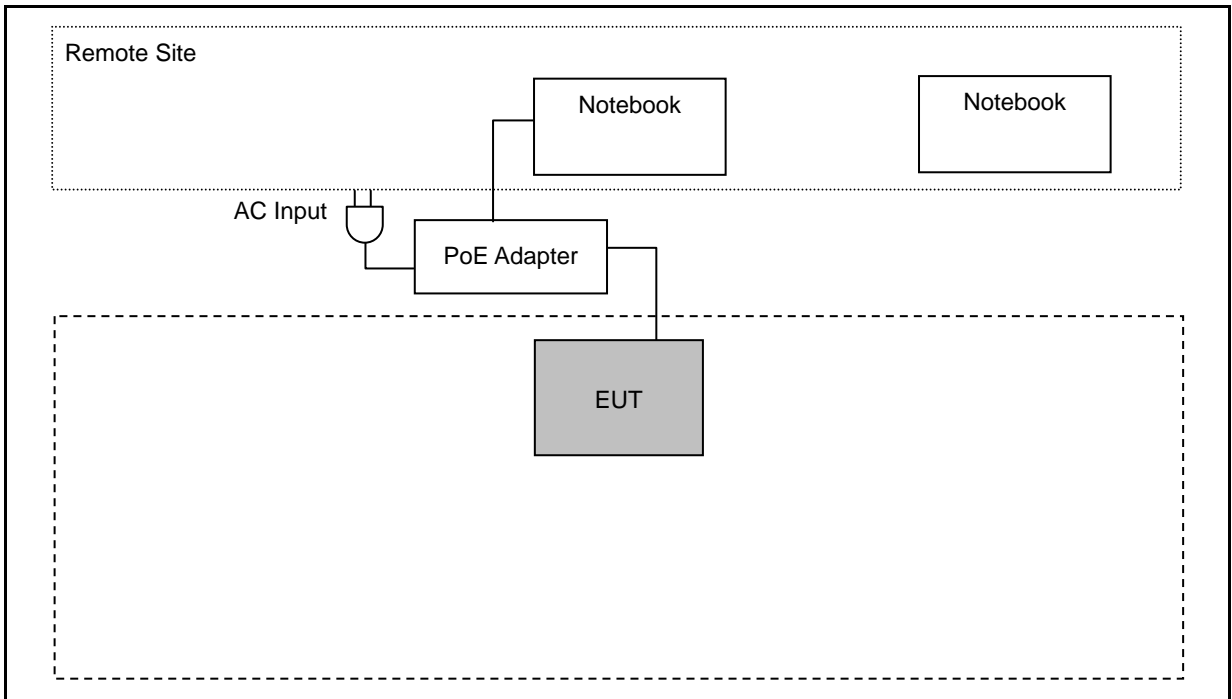
3.2. EUT Exercise Software

The EUT is operated in the engineering mode to fix the TX frequency for the purposes of measurement. According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

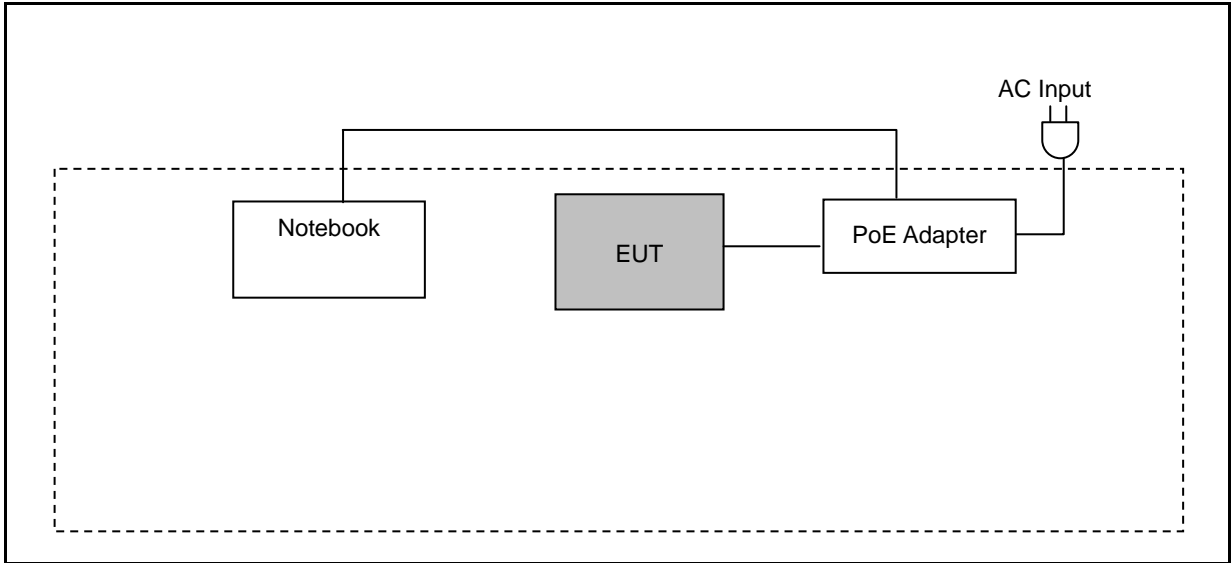
1.	Setup the EUT shown on 3.3.
2.	Turn on the power of all equipment.
3.	Turn on Wi-Fi function link to Notebook.
4.	EUT run test program.

3.3. Configuration of Test System Details

Conducted Emission



Radiated Emission



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 AC Power 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

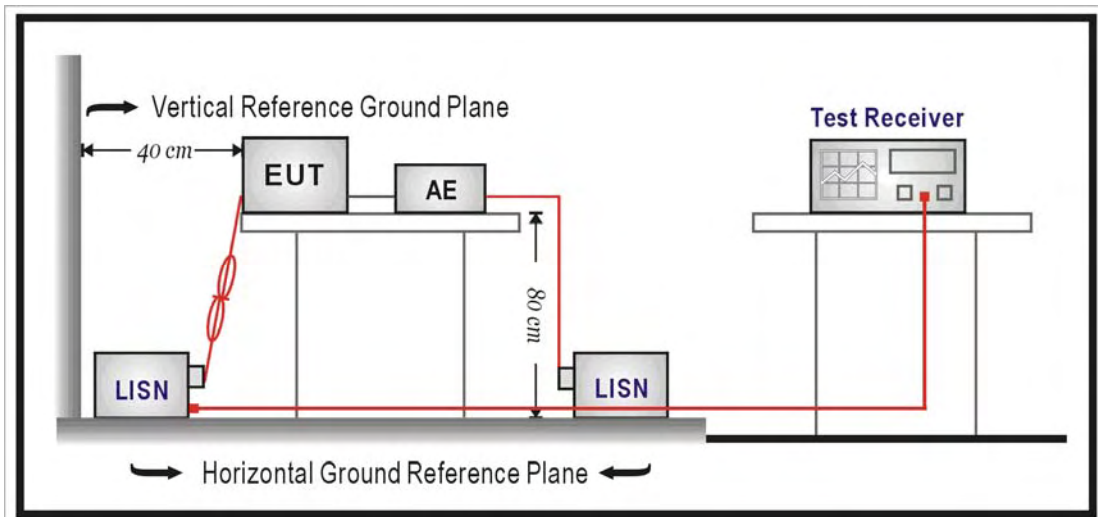
4.2. Test Instruments

Describe	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Test Receiver	R&S	ESCI	100367	06/18/2012	(1)
LISN	R&S	ENV216	101040	03/04/2013	(1)
LISN	R&S	ENV216	101041	03/04/2013	(1)
Test Site	ATL	TE05	TE05	N.C.R.	-----

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

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

4.3. Test Setup



4.4. Test Procedure

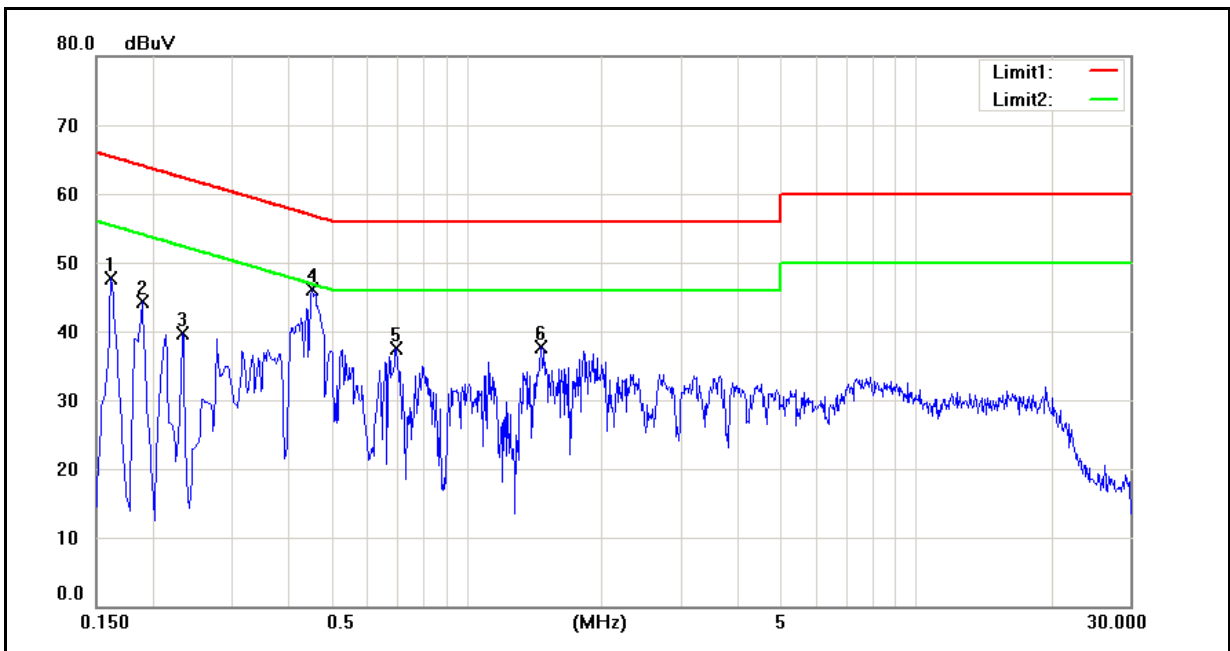
The power line conducted emission measurements were performed in a shielded enclosure. The EUT was assembled on a wooden table which is 80 centimeters high, was placed 40 centimeters from the back wall and at least 1 meter from the sidewall.

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 15E	Line:	L1
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	NBE-M5	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 1	Date:	06/10/2013
		Test By:	Fly Lu
Description:			

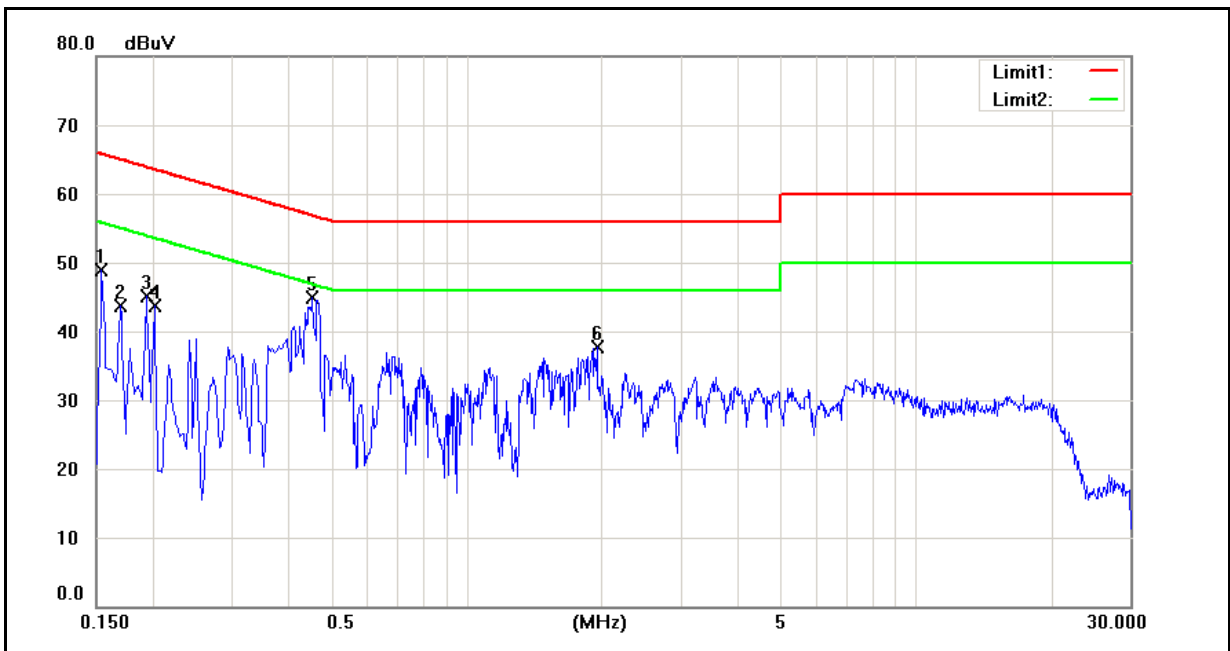


No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1620	36.37	22.48	9.62	45.99	32.10	65.36	55.36	-19.37	-23.26	Pass
2	0.1900	32.49	18.83	9.62	42.11	28.45	64.04	54.04	-21.93	-25.59	Pass
3	0.2340	26.60	9.16	9.62	36.22	18.78	62.31	52.31	-26.09	-33.53	Pass
4	0.4540	34.92	25.76	9.62	44.54	35.38	56.80	46.80	-12.26	-11.42	Pass
5	0.6980	26.40	18.23	9.64	36.04	27.87	56.00	46.00	-19.96	-18.13	Pass
6	1.4700	24.58	18.13	9.68	34.26	27.81	56.00	46.00	-21.74	-18.19	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

Standard:	FCC Part 15E	Line:	N
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	NBE-M5	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 1	Date:	06/10/2013
		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	0.1540	36.08	17.13	9.63	45.71	26.76	65.78	55.78	-20.07	-29.02	Pass
2	0.1700	33.18	15.78	9.63	42.81	25.41	64.96	54.96	-22.15	-29.55	Pass
3	0.1940	31.86	17.59	9.63	41.49	27.22	63.86	53.86	-22.37	-26.64	Pass
4	0.2020	24.95	8.08	9.63	34.58	17.71	63.53	53.53	-28.95	-35.82	Pass
5	0.4540	34.89	25.75	9.63	44.52	35.38	56.80	46.80	-12.28	-11.42	Pass
6	1.9580	22.87	15.33	9.70	32.57	25.03	56.00	46.00	-23.43	-20.97	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

5 Radiated Emission Measurement

5.1. Limit

Limits of Radiated Emission Measurement

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequency Range (MHz)	Field Strength (microvolts/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	10	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

5.2. Test Instruments

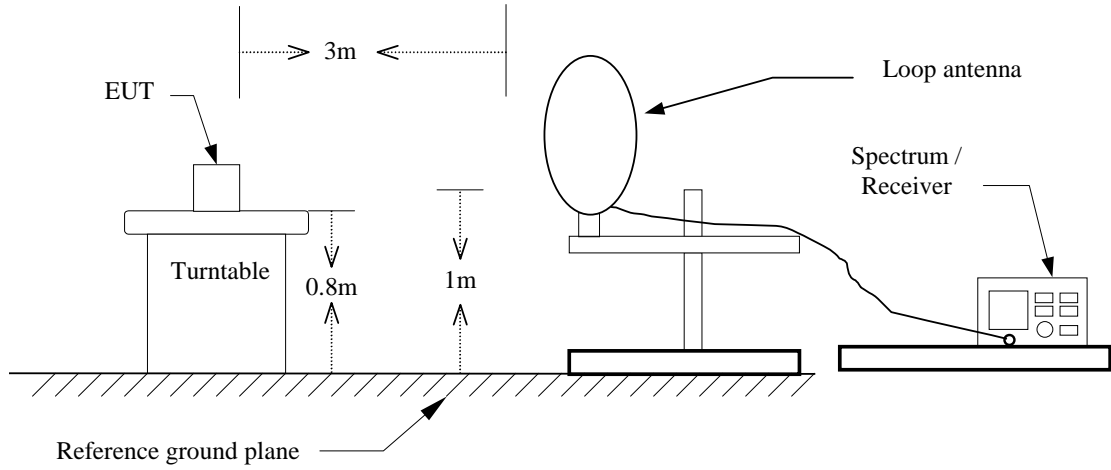
3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
RF Pre-selector	Agilent	N9039A	MY46520256	01/21/2013	(1)
Spectrum Analyzer	Agilent	E4446A	MY46180578	01/21/2013	(1)
Pre Amplifier	Agilent	8449B	3008A02237	02/21/2013	(1)
Pre Amplifier	Agilent	8447D	2944A10961	02/21/2013	(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)
Test Site	ATL	TE01	888001	08/28/2012	(1)

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

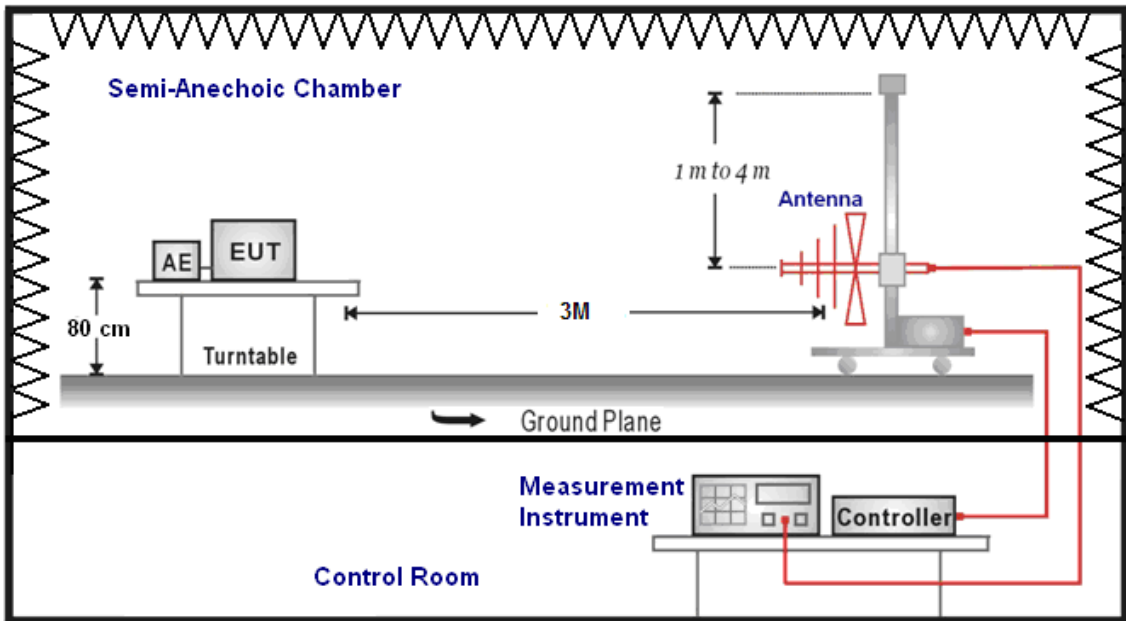
NOTE: N.C.R. = No Calibration Request.

5.3. Setup

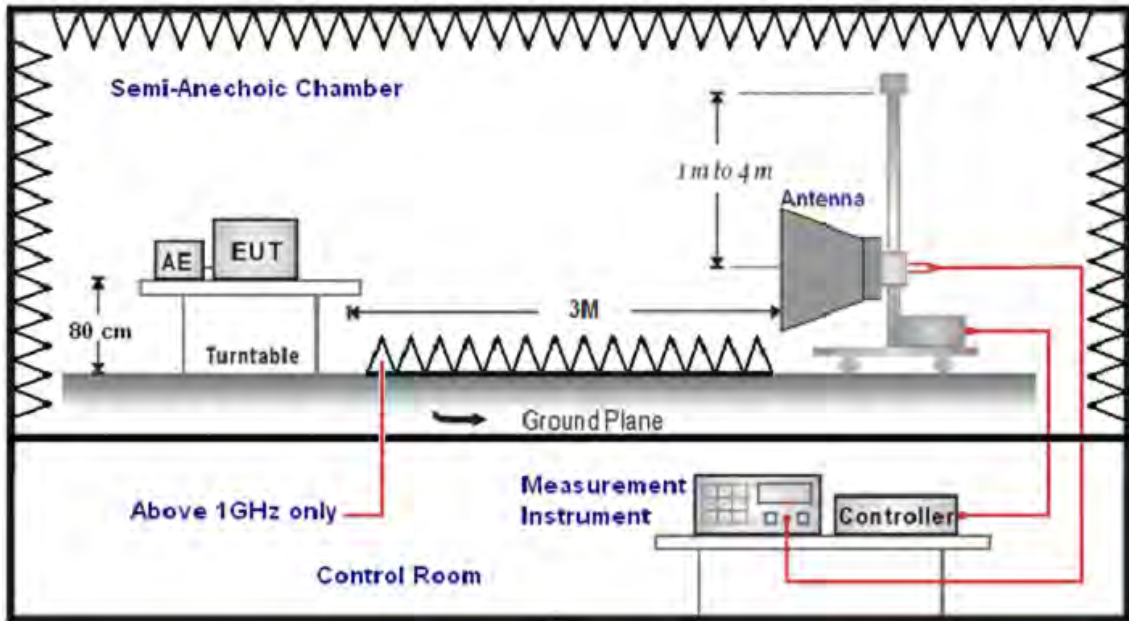
9kHz ~ 30MHz



30MHz ~ 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 40 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 3 MHz for peak measurements and 3 MHz 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 Trilog-Broadband Antenna (mode SB AC VULB) at 3 Meter and the ETS-Lindgren Double-Ridged Waveguide Horn antenna (model 3117) Schwarzbeck Mess-Elektronik Broadband Horn Antenna (BBHA 9170) was used in frequencies 1 – 40 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) Amplitude (dBuV/m) = FI (dBuV) +AF (dBuV) +CL (dBuV)-Gain (dB)

FI= Reading of the field intensity.

AF= Antenna factor.

CL= Cable loss.

P.S Amplitude is auto calculate in spectrum analyzer.

(2) Actual Amplitude (dBuV/m) = Amplitude (dBuV)-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

5.5. Test Result

Below 1GHz

Standard:	FCC Part 15E		Test Distance:	3m			
Test item:	Radiated Emission		Power:	AC 120V/60Hz			
Model Number:	NBE-M5		Temp.(°C)/Hum.(%RH):	26(°C)/60%RH			
Mode:	Mode 1		Date:	06/04/2013			
Ant.Polar.:	Horizontal		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
120.0000	46.89	-16.06	30.83	43.50	-12.67	QP	H
201.5000	49.33	-13.91	35.42	43.50	-8.08	QP	H
399.5000	45.85	-8.60	37.25	46.00	-8.75	QP	H
587.0000	40.02	-5.43	34.59	46.00	-11.41	QP	H
798.0000	35.27	-1.60	33.67	46.00	-12.33	QP	H
942.5000	30.09	0.94	31.03	46.00	-14.97	QP	H
120.0000	45.41	-16.06	29.35	43.50	-14.15	QP	V
215.0000	48.54	-13.67	34.87	43.50	-8.63	QP	V
250.0000	49.46	-11.95	37.51	46.00	-8.49	QP	V
399.0000	46.88	-8.60	38.28	46.00	-7.72	QP	V
644.5000	35.91	-4.16	31.75	46.00	-14.25	QP	V
796.5000	34.67	-1.62	33.05	46.00	-12.95	QP	V

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

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

Above 1GHz

Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	NBE-M5			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 2			Date:	06/04/2013		
Frequency:	5180MHz			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
2757.000	33.88	5.28	39.16	74.00	-34.84	peak	H
4626.000	31.98	11.20	43.18	74.00	-30.82	peak	H
7475.000	28.45	20.76	49.21	74.00	-24.79	peak	H
2729.000	34.42	5.21	39.63	74.00	-34.37	peak	V
4654.000	31.73	11.27	43.00	74.00	-31.00	peak	V
7398.000	29.31	20.63	49.94	74.00	-24.06	peak	V

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	NBE-M5			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 2			Date:	06/04/2013		
Frequency:	5220MHz			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
2757.000	33.58	5.28	38.86	74.00	-35.14	peak	H
4633.000	31.23	11.22	42.45	74.00	-31.55	peak	H
7335.000	27.67	20.50	48.17	74.00	-25.83	peak	H
2799.000	33.15	5.40	38.55	74.00	-35.45	peak	V
4605.000	30.53	11.15	41.68	74.00	-32.32	peak	V
7454.000	27.36	20.73	48.09	74.00	-25.91	peak	V

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	NBE-M5			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 2			Date:	06/04/2013		
Frequency:	5240MHz			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
2771.000	33.43	5.32	38.75	74.00	-35.25	peak	H
4605.000	31.46	11.15	42.61	74.00	-31.39	peak	H
7566.000	28.06	20.85	48.91	74.00	-25.09	peak	H
2799.000	33.92	5.40	39.32	74.00	-34.68	peak	V
4661.000	32.37	11.29	43.66	74.00	-30.34	peak	V
7517.000	29.24	20.82	50.06	74.00	-23.94	peak	V

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	NBE-M5			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 3			Date:	06/04/2013		
Frequency:	5180MHz			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
2778.000	33.59	5.34	38.93	74.00	-35.07	peak	H
4647.000	31.24	11.25	42.49	74.00	-31.51	peak	H
7538.000	28.05	20.83	48.88	74.00	-25.12	peak	H
2757.000	33.67	5.28	38.95	74.00	-35.05	peak	V
4703.000	29.97	11.40	41.37	74.00	-32.63	peak	V
7566.000	27.77	20.85	48.62	74.00	-25.38	peak	V

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	NBE-M5			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 3			Date:	06/04/2013		
Frequency:	5220MHz			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
2806.000	33.94	5.41	39.35	74.00	-34.65	peak	H
4675.000	30.97	11.33	42.30	74.00	-31.70	peak	H
7559.000	29.14	20.84	49.98	74.00	-24.02	peak	H
2778.000	33.67	5.34	39.01	74.00	-34.99	peak	V
4703.000	30.81	11.40	42.21	74.00	-31.79	peak	V
7538.000	28.34	20.83	49.17	74.00	-24.83	peak	V

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	NBE-M5			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 3			Date:	06/04/2013		
Frequency:	5240MHz			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
2806.000	34.27	5.41	39.68	74.00	-34.32	peak	H
4633.000	32.64	11.22	43.86	74.00	-30.14	peak	H
7531.000	29.08	20.82	49.90	74.00	-24.10	peak	H
2771.000	35.27	5.32	40.59	74.00	-33.41	peak	V
4703.000	31.27	11.40	42.67	74.00	-31.33	peak	V
7559.000	29.40	20.84	50.24	74.00	-23.76	peak	V

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	NBE-M5			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 4			Date:	06/04/2013		
Frequency:	5190MHz			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
2785.000	33.62	5.36	38.98	74.00	-35.02	peak	H
4633.000	31.29	11.22	42.51	74.00	-31.49	peak	H
7594.000	29.04	20.85	49.89	74.00	-24.11	peak	H
2778.000	34.07	5.34	39.41	74.00	-34.59	peak	V
4640.000	31.90	11.24	43.14	74.00	-30.86	peak	V
7517.000	28.62	20.82	49.44	74.00	-24.56	peak	V

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

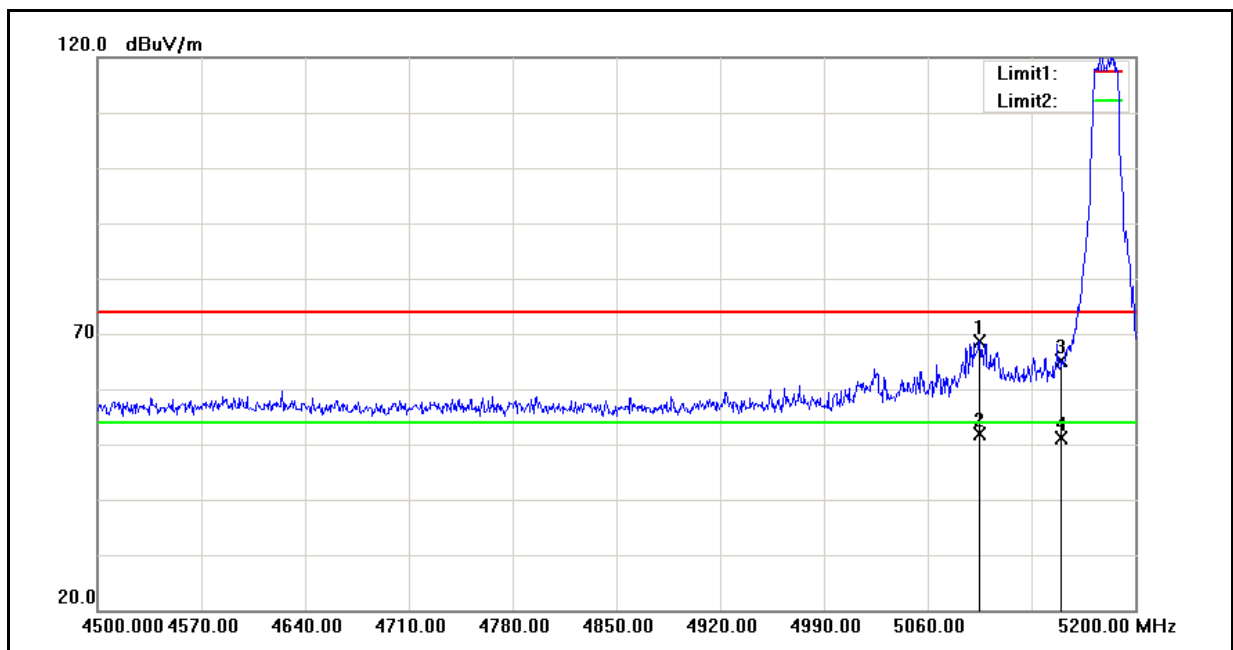
Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	NBE-M5			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 4			Date:	06/04/2013		
Frequency:	5230MHz			Test By:	Fly Lu		
Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2778.000	34.58	5.34	39.92	74.00	-34.08	peak	H
4689.000	32.37	11.37	43.74	74.00	-30.26	peak	H
7622.000	29.28	20.86	50.14	74.00	-23.86	peak	H
2778.000	33.87	5.34	39.21	74.00	-34.79	peak	V
4654.000	32.01	11.27	43.28	74.00	-30.72	peak	V
7594.000	29.30	20.85	50.15	74.00	-23.85	peak	V

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Band Edge

Standard:	FCC Part 15E	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	NBE-M5	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	06/04/2013
Frequency:	5180 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		

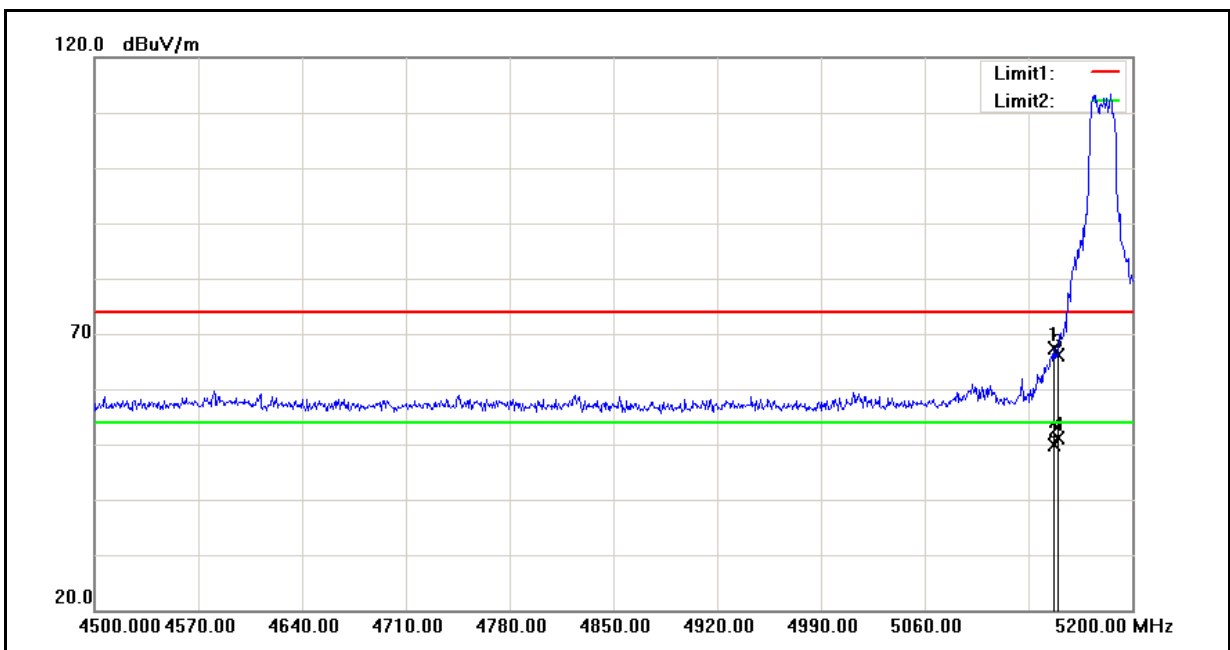


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5095.000	56.11	12.58	68.69	74.00	-5.31	peak
2	5095.000	39.33	12.58	51.91	54.00	-2.09	AVG
3	5150.000	52.40	12.81	65.21	74.00	-8.79	peak
4	5150.000	38.28	12.81	51.09	54.00	-2.91	AVG

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Standard:	FCC Part 15E	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	NBE-M5	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	06/04/2013
Frequency:	5180 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		

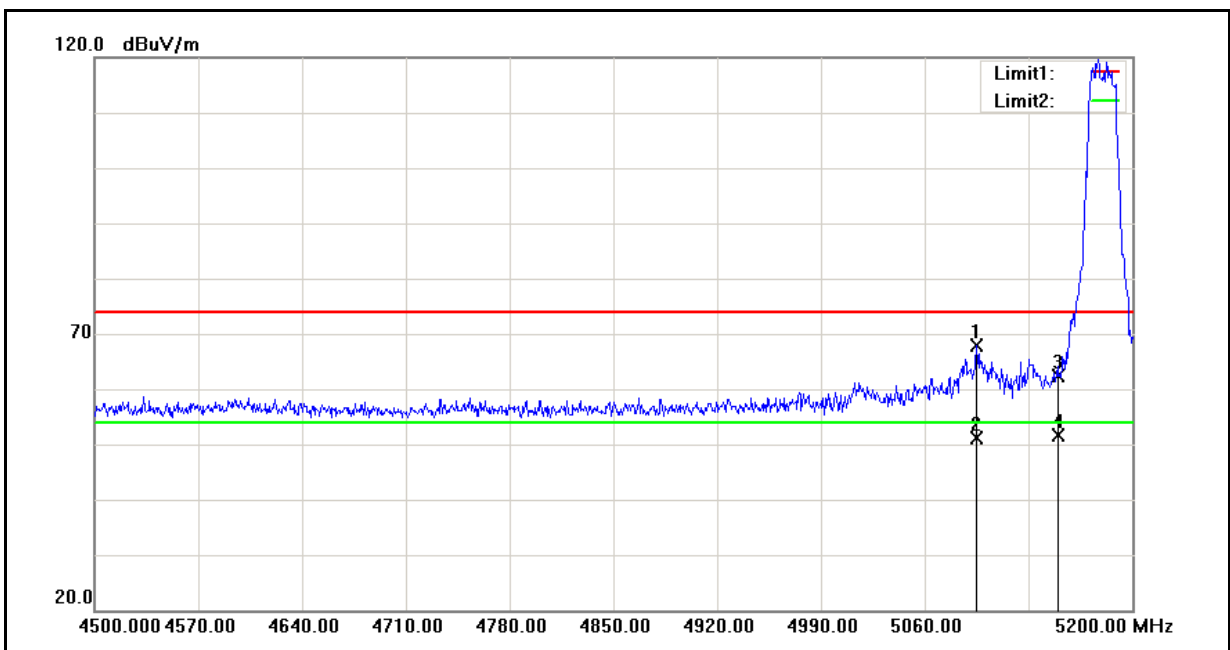


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5146.800	54.52	12.80	67.32	74.00	-6.68	peak
2	5146.800	37.20	12.80	50.00	54.00	-4.00	AVG
3	5150.000	53.39	12.81	66.20	74.00	-7.80	peak
4	5150.000	38.29	12.81	51.10	54.00	-2.90	AVG

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Standard:	FCC Part 15E	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	NBE-M5	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 3	Date:	06/04/2013
Frequency:	5180 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		

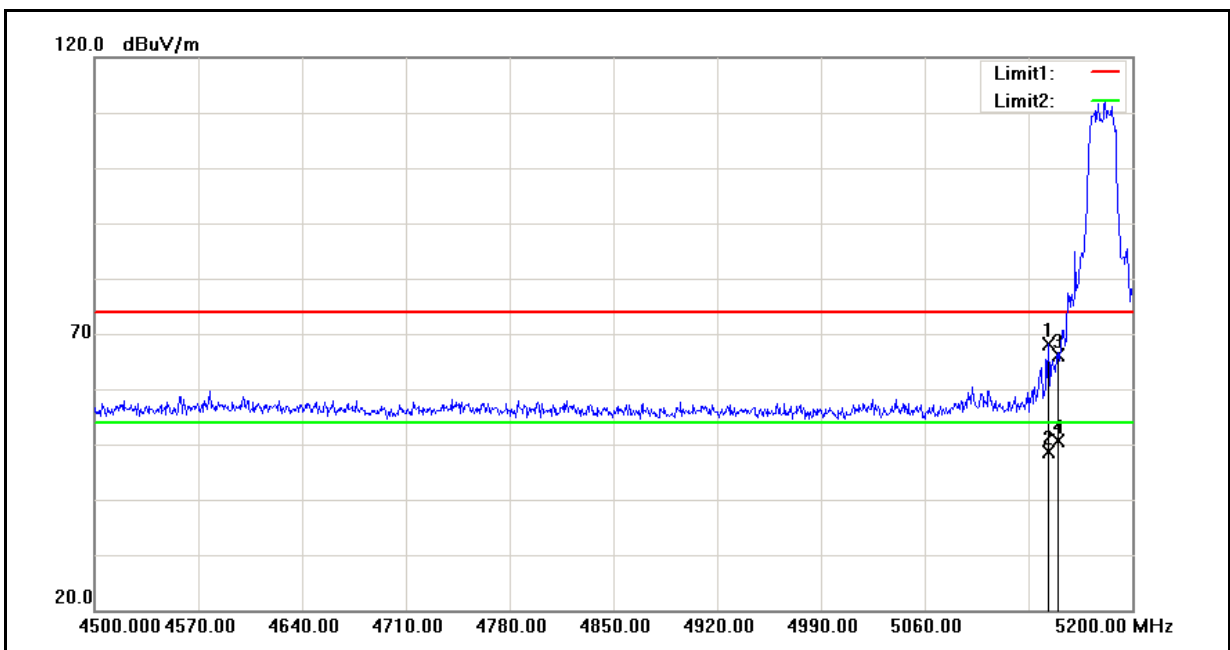


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5095.000	55.33	12.58	67.91	74.00	-6.09	peak
2	5095.000	38.50	12.58	51.08	54.00	-2.92	AVG
3	5150.000	49.59	12.81	62.40	74.00	-11.60	peak
4	5150.000	38.94	12.81	51.75	54.00	-2.25	AVG

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Standard:	FCC Part 15E	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	NBE-M5	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 3	Date:	06/04/2013
Frequency:	5180 MHz	Test By:	Fly Lu
Ant.Polar.:	Vertical		

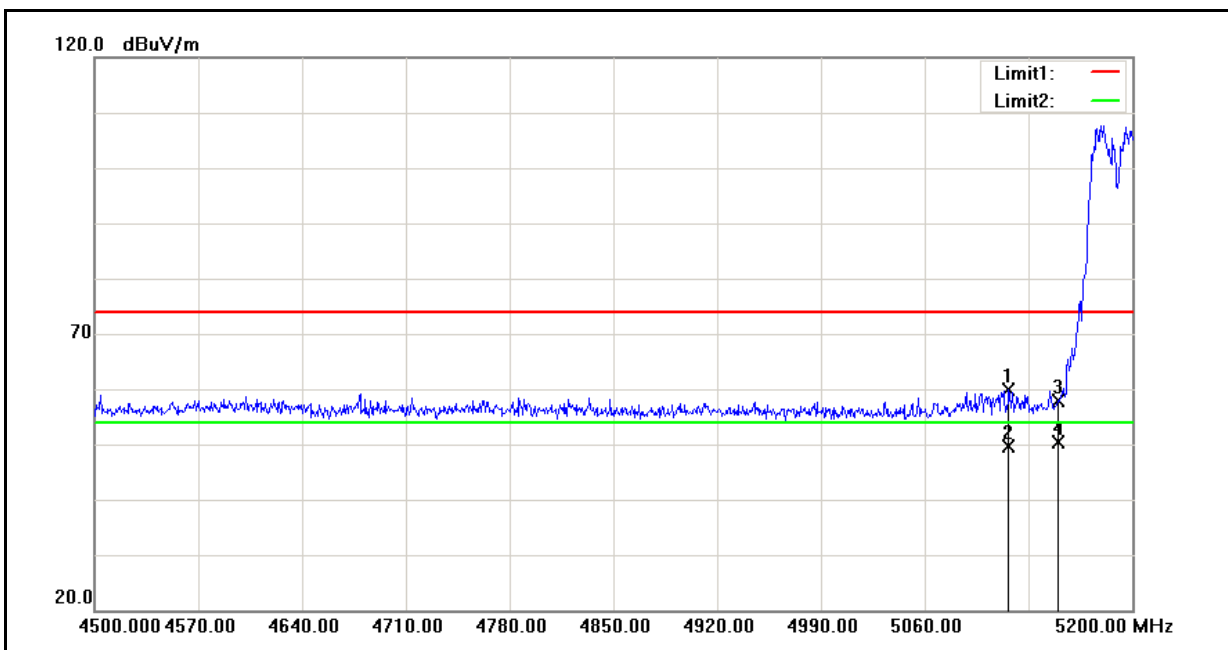


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5143.300	55.41	12.78	68.19	74.00	-5.81	peak
2	5143.300	35.91	12.78	48.69	54.00	-5.31	AVG
3	5150.000	53.21	12.81	66.02	74.00	-7.98	peak
4	5150.000	37.85	12.81	50.66	54.00	-3.34	AVG

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Standard:	FCC Part 15E	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	NBE-M5	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4	Date:	06/04/2013
Frequency:	5190 MHz	Test By:	Fly Lu
Ant.Polar.:	Horizontal		

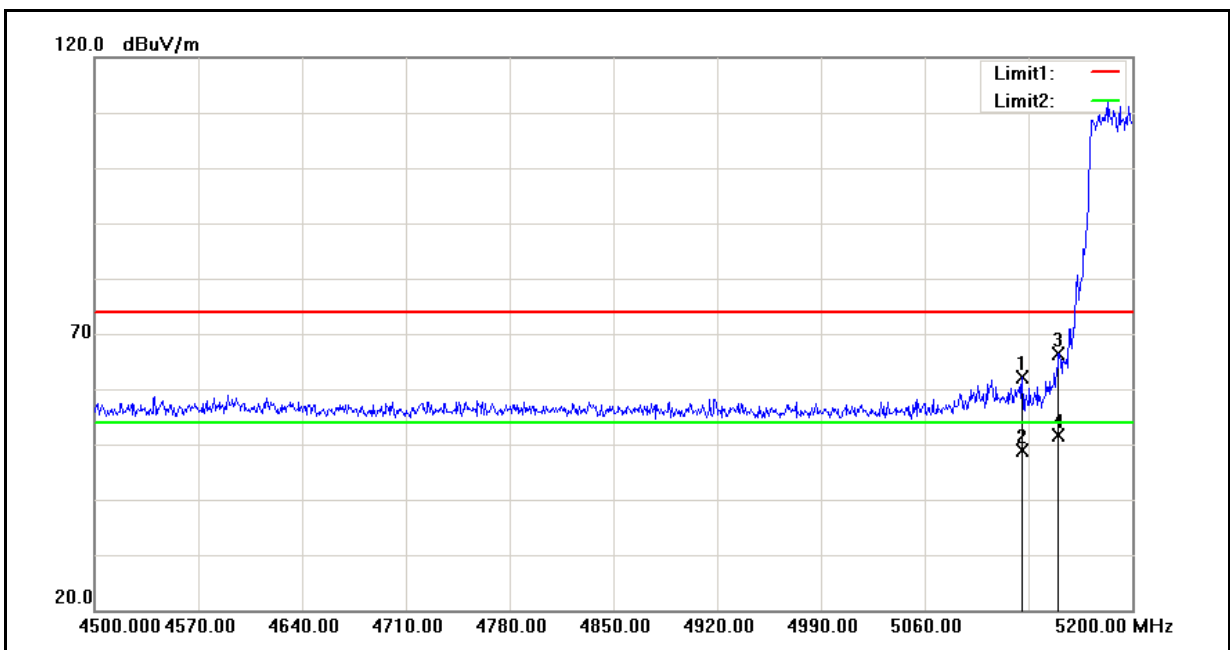


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5116.700	47.13	12.67	59.80	74.00	-14.20	peak
2	5116.700	36.98	12.67	49.65	54.00	-4.35	AVG
3	5150.000	44.99	12.81	57.80	74.00	-16.20	peak
4	5150.000	37.54	12.81	50.35	54.00	-3.65	AVG

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

Standard:	FCC Part 15E	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	NBE-M5	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4	Date:	06/04/2013
Frequency:	5190 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	5125.800	49.38	12.71	62.09	74.00	-11.91	peak
2	5125.800	36.19	12.71	48.90	54.00	-5.10	AVG
3	5150.000	53.57	12.81	66.38	74.00	-7.62	peak
4	5150.000	38.83	12.81	51.64	54.00	-2.36	AVG

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

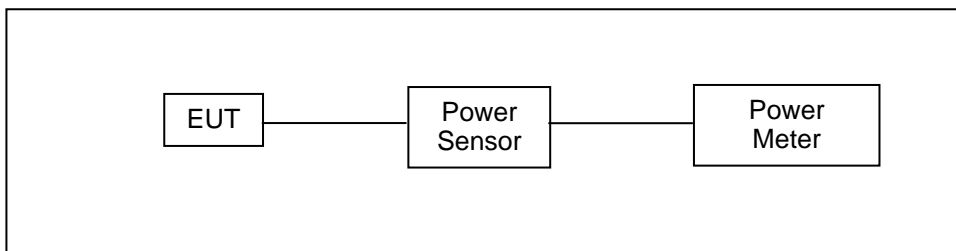
6 Maximum Conducted Output Power Measurement

6.1. Limit

Frequency Range (MHz)	Limit
5.150 ~ 5.250 GHz	The lesser of 50mW (17dBm) or 4dBm + 10logB

Note: Where B is the 26dB emission bandwidth in MHz.

6.2. Test Setup



6.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Power Sensor	Anritsu	MA2411B	1126022	08/14/2012	(1)
Power Meter	Anritsu	ML2495A	1135009	08/14/2012	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

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

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

6.4. Test Procedure

The test is performed in accordance with KDB789033 D01 General UNII Test Procedures v01r03, use Measurement using a power meter (PM)- Method PM (Measurement using an RF average power meter), Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E.

6.5. Test Result

Model Number		NBE-M5				
Test Item		Maximum Conducted Output Power				
Test Mode		Mode 2: IEEE 802.11a Link Mode				
Date of Test		06/05/2013, 08/06/2013		Test Site		TE02
Frequency (MHz)	Data Rate	ANT 0		ANT 1		Limit (dBm)
		(dBm)	(W)	(dBm)	(W)	
5180	6M	-2.63	0.0005	-2.97	0.0005	-2
5200		-2.77	0.0005	-2.66	0.0005	-2
5220		-2.75	0.0005	-2.62	0.0005	-2
5240		-8.78	0.0001	-7.24	0.0002	-2
5180	54M	-2.92	0.0005	-2.85	0.0005	-2
5200		-2.88	0.0005	-2.68	0.0005	-2
5220		-2.87	0.0005	-2.64	0.0005	-2
5240		-8.54	0.0001	-7.30	0.0002	-2

Note: The antenna gain is 25 dBi > 6 dBi of the limit, so calculate the power limit according to the standard.

$$\begin{aligned}
 \text{Limit} &= 17 - (\text{Peak Gain} - 6) \\
 &= 17 - (25 - 6) \\
 &= -2
 \end{aligned}$$

Model Number		NBE-M5				
Test Item		Maximum Conducted Output Power				
Test Mode		Mode 3: IEEE 802.11n 20MHz Link Mode				
Date of Test		06/05/2013, 08/06/2013		Test Site		TE02
Frequency (MHz)	Data Rate	ANT 0		ANT 1		Limit (dBm)
		(dBm)	(W)	(dBm)	(W)	
5180	6.5M	-2.57	0.0006	-2.74	0.0005	-2
5200		-2.65	0.0005	-2.56	0.0006	-2
5220		-2.72	0.0005	-2.75	0.0005	-2
5240		-8.86	0.0001	-7.36	0.0002	-2
5180	130M	-3.04	0.0005	-2.63	0.0005	-2
5200		-2.85	0.0005	-2.88	0.0005	-2
5220		-2.69	0.0005	-3.02	0.0005	-2
5240		-8.71	0.0001	-7.57	0.0002	-2

Note: The antenna gain is 25 dBi > 6 dBi of the limit, so calculate the power limit according to the standard.

$$\begin{aligned}
 \text{Limit} &= 17 - (\text{Peak Gain} - 6) \\
 &= 17 - (25 - 6) \\
 &= -2
 \end{aligned}$$

Model Number		NBE-M5				
Test Item		Maximum Conducted Output Power				
Test Mode		Mode 4: IEEE 802.11n 40MHz Link Mode				
Date of Test		06/05/2013, 08/06/2013		Test Site		TE02
Frequency (MHz)	Data Rate	ANT 0		ANT 1		Limit (dBm)
		(dBm)	(W)	(dBm)	(W)	
5190	13.5M	-2.80	0.0005	-2.75	0.0005	-2
5230		-8.48	0.0001	-7.57	0.0002	-2
5190	270M	-2.82	0.0005	-2.79	0.0005	-2
5230		-8.62	0.0001	-7.80	0.0002	-2

Note: The antenna gain is 25 dBi > 6 dBi of the limit, so calculate the power limit according to the standard.

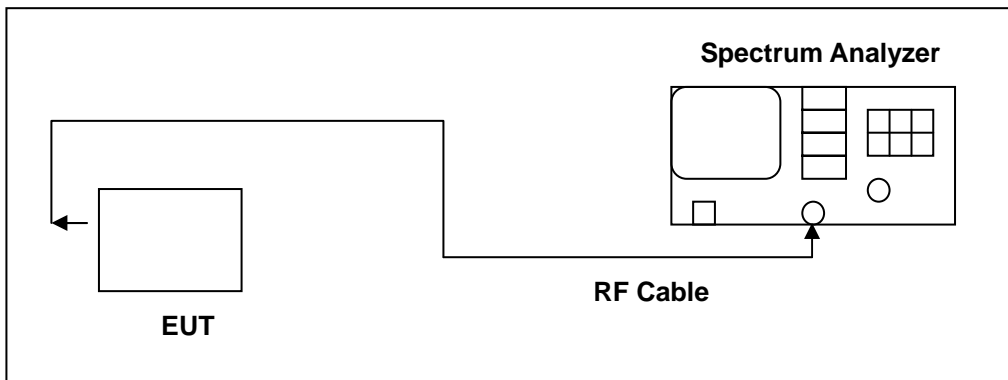
$$\begin{aligned}
 \text{Limit} &= 17 - (\text{Peak Gain} - 6) \\
 &= 17 - (25 - 6) \\
 &= -2
 \end{aligned}$$

7 26dB RF Bandwidth and Occupied Bandwidth Measurement

7.1. Limit

N/A

7.2. Test Setup



7.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/19/2012	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

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

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

7.4. Test Procedure

The test is performed in accordance with KDB789033 D01 General UNII Test Procedures v01r03 , Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E.

7.5. Test Result

Model Number	NBE-M5		
Test Item	26dB RF Bandwidth, Occupied Bandwidth and 20dB RF Bandwidth		
Test Mode	Mode 2: IEEE 802.11a Link Mode		
Date of Test	08/07/2013, 08/28/2013		Test Site TE02
Frequency (MHz)	26dB RF Bandwidth (MHz)	Occupied Bandwidth (MHz)	20dB RF Bandwidth (MHz)
5180	25.435	18.6464	---
5220	24.970	18.5330	---
5240	25.246	18.3283	19.524

Model Number	NBE-M5		
Test Item	26dB RF Bandwidth, Occupied Bandwidth and 20dB RF Bandwidth		
Test Mode	Mode 3: IEEE 802.11n 20MHz Link Mode		
Date of Test	08/07/2013, 08/28/2013		Test Site TE02
Frequency (MHz)	26dB RF Bandwidth (MHz)	Occupied Bandwidth (MHz)	20dB RF Bandwidth (MHz)
5180	26.101	19.1350	---
5220	25.488	19.2353	---
5240	25.707	19.2010	19.725

Model Number	NBE-M5		
Test Item	26dB RF Bandwidth, Occupied Bandwidth and 20dB RF Bandwidth		
Test Mode	Mode 4: IEEE 802.11n 40MHz Link Mode		
Date of Test	08/07/2013, 08/28/2013		Test Site TE02
Frequency (MHz)	26dB RF Bandwidth (MHz)	Occupied Bandwidth (MHz)	20dB RF Bandwidth (MHz)
5190	48.941	37.6167	---
5230	48.928	37.8544	39.674

7.6. Test Graphs

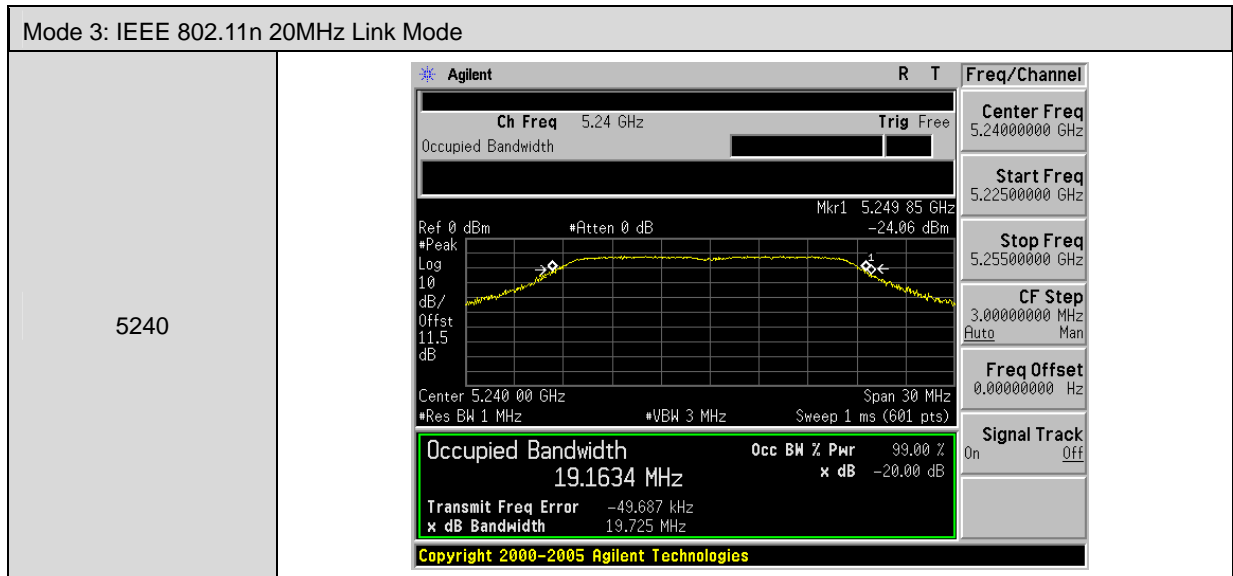
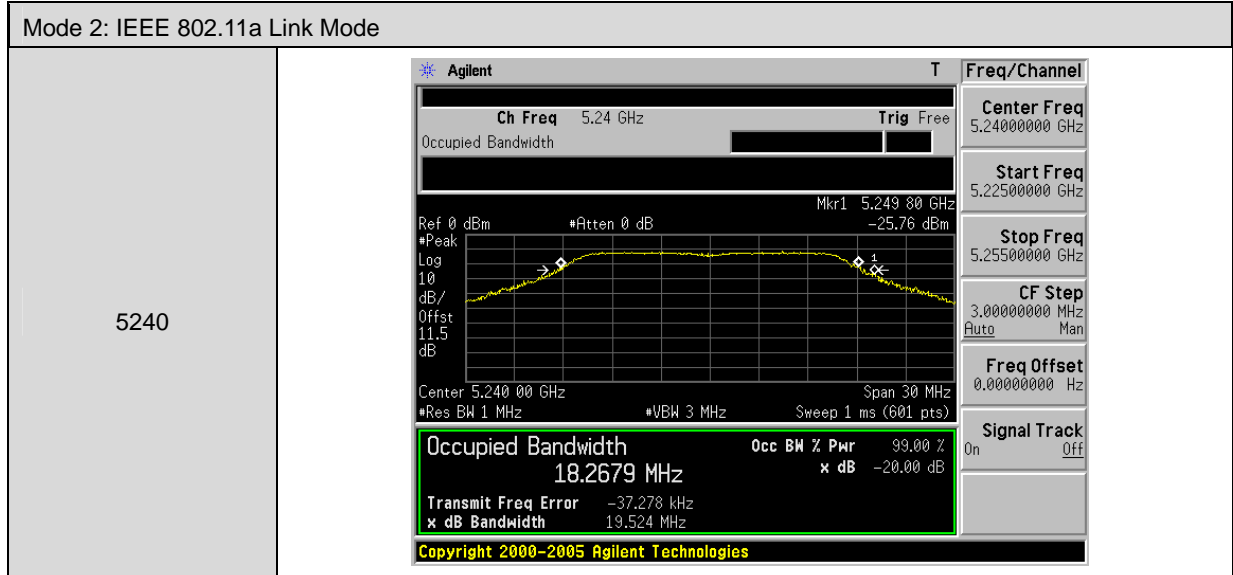
26dB RF Bandwidth and Occupied Bandwidth

Mode 2: IEEE 802.11a Link Mode	
5180	<p>Agilent R T</p> <p>Ch Freq 5.18 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 10 dBm Atten 10 dB</p> <p>#Peak Log 10 dB/ Offst 11.5 dB</p> <p>Center 5.18 GHz Span 50 MHz</p> <p>#Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 18.6464 MHz</p> <p>Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error 38.430 kHz x dB Bandwidth 25.435 MHz</p> <p>Freq/Channel</p> <p>Center Freq 5.18000000 GHz</p> <p>Start Freq 5.15500000 GHz</p> <p>Stop Freq 5.20500000 GHz</p> <p>CF Step 5.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p>
5220	<p>Agilent R T</p> <p>Ch Freq 5.22 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 10 dBm Atten 10 dB</p> <p>#Peak Log 10 dB/ Offst 11.5 dB</p> <p>Center 5.22 GHz Span 50 MHz</p> <p>#Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 18.5330 MHz</p> <p>Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error 45.251 kHz x dB Bandwidth 24.970 MHz</p> <p>Freq/Channel</p> <p>Center Freq 5.22000000 GHz</p> <p>Start Freq 5.19500000 GHz</p> <p>Stop Freq 5.24500000 GHz</p> <p>CF Step 5.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p>
5240	<p>Agilent R T</p> <p>Ch Freq 5.24 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 10 dBm Atten 10 dB</p> <p>#Peak Log 10 dB/ Offst 11.5 dB</p> <p>Center 5.24 GHz Span 50 MHz</p> <p>#Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 18.3283 MHz</p> <p>Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error 1.237 kHz x dB Bandwidth 25.246 MHz</p> <p>Freq/Channel</p> <p>Center Freq 5.24000000 GHz</p> <p>Start Freq 5.21500000 GHz</p> <p>Stop Freq 5.26500000 GHz</p> <p>CF Step 5.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p>

Mode 3: IEEE 802.11n 20MHz Link Mode	
5180	
5220	
5240	

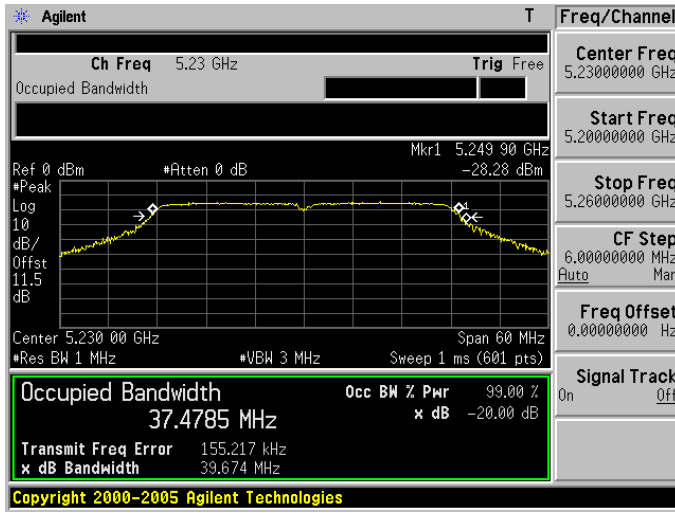
Mode 4: IEEE 802.11n 40MHz Link Mode	
5190	<p>Agilent R T</p> <p>Ch Freq 5.19 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 10 dBm Atten 10 dB</p> <p>#Peak Log 10 dB/ Offset 11.5 dB</p> <p>Center 5.19 GHz Span 100 MHz #Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 37.6167 MHz</p> <p>Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error 268.210 kHz x dB Bandwidth 48.941 MHz</p> <p>Freq/Channel</p> <p>Center Freq 5.19000000 GHz</p> <p>Start Freq 5.14000000 GHz</p> <p>Stop Freq 5.24000000 GHz</p> <p>CF Step 10.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p>
5230	<p>Agilent R T</p> <p>Ch Freq 5.23 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 10 dBm Atten 10 dB</p> <p>#Peak Log 10 dB/ Offset 11.5 dB</p> <p>Center 5.23 GHz Span 100 MHz #Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 37.8544 MHz</p> <p>Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error 283.315 kHz x dB Bandwidth 48.928 MHz</p> <p>Freq/Channel</p> <p>Center Freq 5.23000000 GHz</p> <p>Start Freq 5.18000000 GHz</p> <p>Stop Freq 5.28000000 GHz</p> <p>CF Step 10.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p>

20dB RF Bandwidth



Mode 4: IEEE 802.11n 40MHz Link Mode

5230

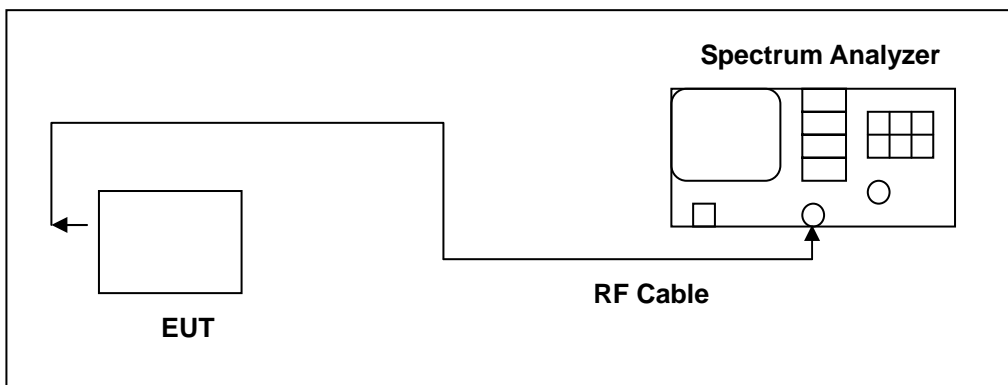


8 Peak Power Excursion Measurement

8.1. Limit

Frequency Range (MHz)	Limit
5.150 ~ 5.250 GHz	13 dB

8.2. Test Setup



8.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/19/2012	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

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

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

8.4. Test Procedure

The test is performed in accordance with KDB789033 D01 General UNII Test Procedures v01r03 , Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E.

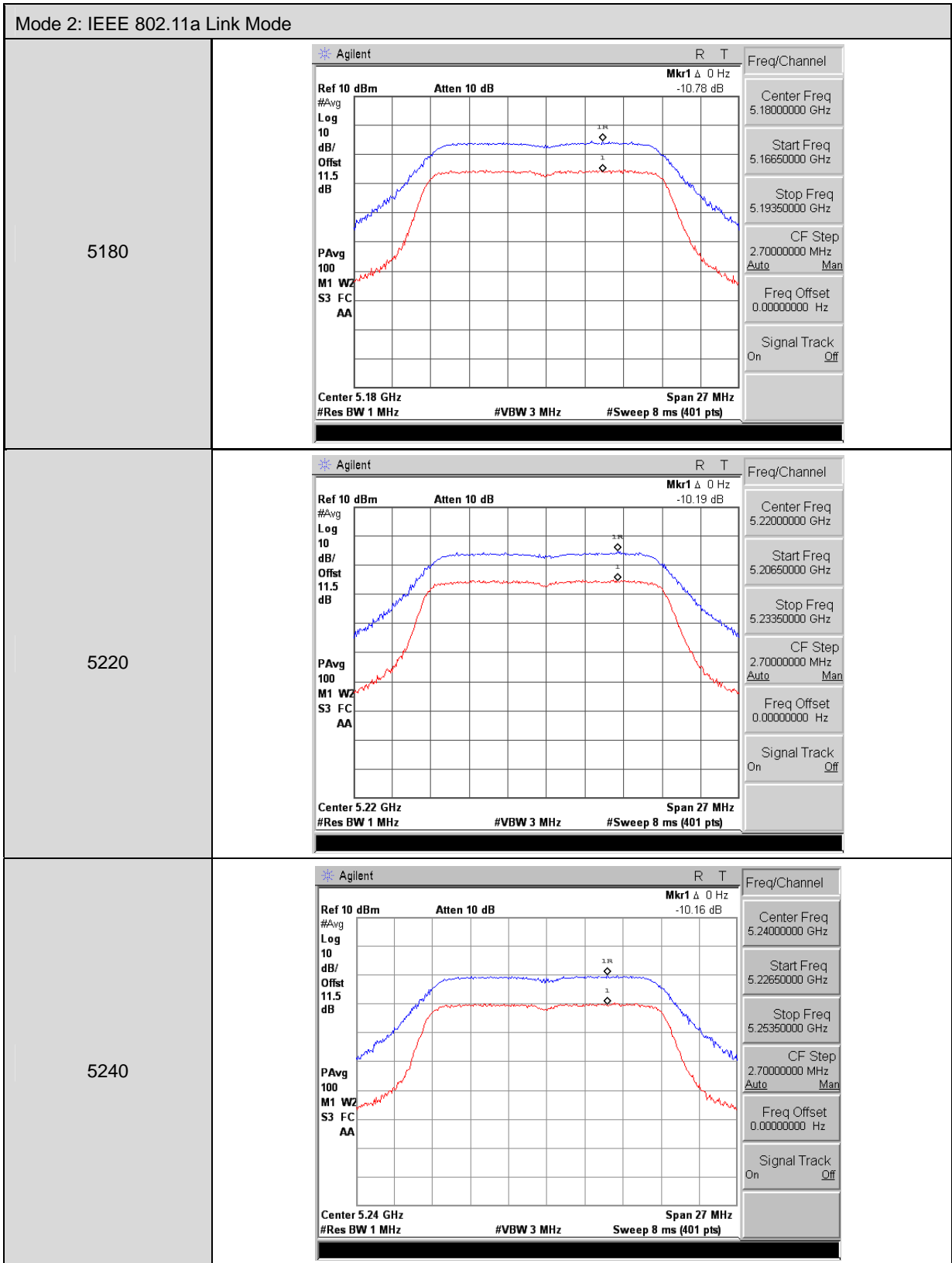
8.5. Test Result

Model Number	NBE-M5		
Test Item	Peak Power Excursion		
Test Mode	Mode 2: IEEE 802.11a Link Mode		
Date of Test	08/07/2013	Test Site	TE02
	Frequency (MHz)	Measurement (dB)	Limit (dB)
	5180	-10.78	< 13
	5220	-10.19	< 13
	5240	-10.16	< 13

Model Number	NBE-M5		
Test Item	Peak Power Excursion		
Test Mode	Mode 3: IEEE 802.11n 20MHz Link Mode		
Date of Test	08/07/2013	Test Site	TE06
	Frequency (MHz)	Measurement (dB)	Limit (dB)
	5180	-10.26	< 13
	5220	-11.26	< 13
	5240	-10.02	< 13

Model Number	NBE-M5		
Test Item	Peak Power Excursion		
Test Mode	Mode 4: IEEE 802.11n 40MHz Link Mode		
Date of Test	06/05/2013	Test Site	TE06
	Frequency (MHz)	Measurement (dB)	Limit (dB)
	5190	-10.80	< 13
	5230	-10.66	< 13

8.6. Test Graphs

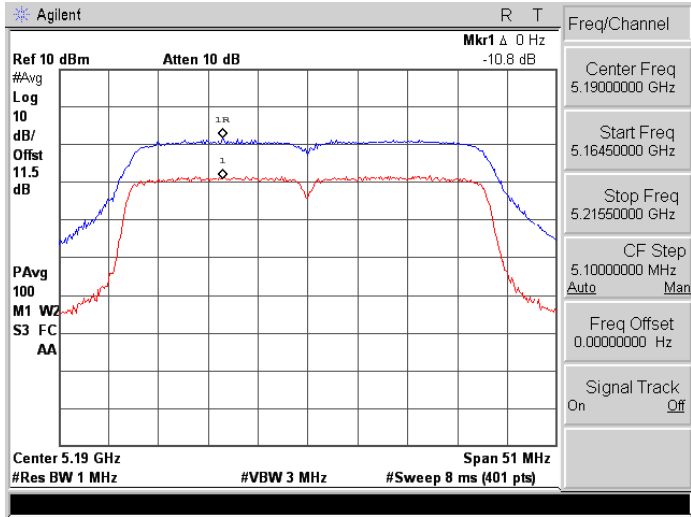


Mode 3: IEEE 802.11n 20MHz Link Mode

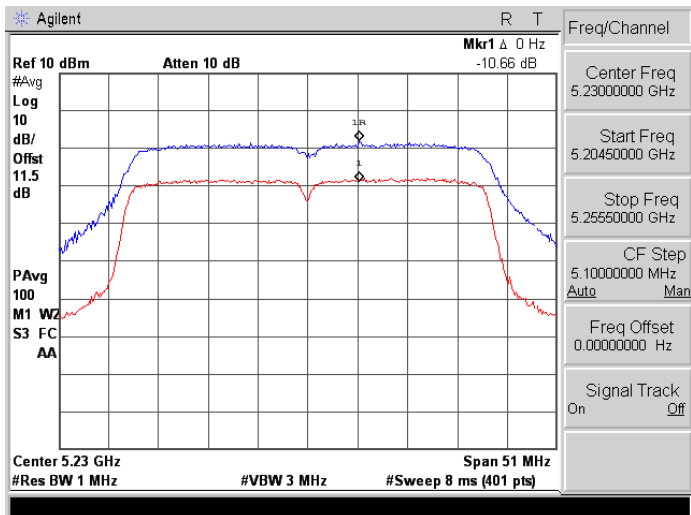
<p>5180</p>	<p>Agilent R T</p> <p>Ref 10 dBm Atten 10 dB Mkr1 Δ 0 Hz -10.26 dB</p> <p>#Avg Log 10 dB/Offst 11.5 dB</p> <p>PAvg 100 M1 WZ S3 FC AA</p> <p>Center 5.18 GHz Span 27 MHz #Res BW 1 MHz #VBW 3 MHz #Sweep 8 ms (401 pts)</p> <p>Freq/Channel</p> <p>Center Freq 5.1800000 GHz</p> <p>Start Freq 5.1665000 GHz</p> <p>Stop Freq 5.1935000 GHz</p> <p>CF Step 2.7000000 MHz Auto Man</p> <p>Freq Offset 0.0000000 Hz</p> <p>Signal Track On Off</p>
<p>5220</p>	<p>Agilent R T</p> <p>Ref 10 dBm Atten 10 dB Mkr1 Δ 0 Hz -11.26 dB</p> <p>#Avg Log 10 dB/Offst 11.5 dB</p> <p>PAvg 100 M1 WZ S3 FC AA</p> <p>Center 5.22 GHz Span 27 MHz #Res BW 1 MHz #VBW 3 MHz #Sweep 8 ms (401 pts)</p> <p>Freq/Channel</p> <p>Center Freq 5.2200000 GHz</p> <p>Start Freq 5.2065000 GHz</p> <p>Stop Freq 5.2335000 GHz</p> <p>CF Step 2.7000000 MHz Auto Man</p> <p>Freq Offset 0.0000000 Hz</p> <p>Signal Track On Off</p>
<p>5240</p>	<p>Agilent R T</p> <p>Ref 10 dBm Atten 10 dB Mkr1 Δ 0 Hz -10.02 dB</p> <p>#Avg Log 10 dB/Offst 11.5 dB</p> <p>PAvg 100 M1 WZ S3 FC AA</p> <p>Center 5.24 GHz Span 27 MHz #Res BW 1 MHz #VBW 3 MHz Sweep 8 ms (401 pts)</p> <p>Freq/Channel</p> <p>Center Freq 5.2400000 GHz</p> <p>Start Freq 5.2265000 GHz</p> <p>Stop Freq 5.2535000 GHz</p> <p>CF Step 2.7000000 MHz Auto Man</p> <p>Freq Offset 0.0000000 Hz</p> <p>Signal Track On Off</p>

Mode 4: IEEE 802.11n 40MHz Link Mode

5190



5230

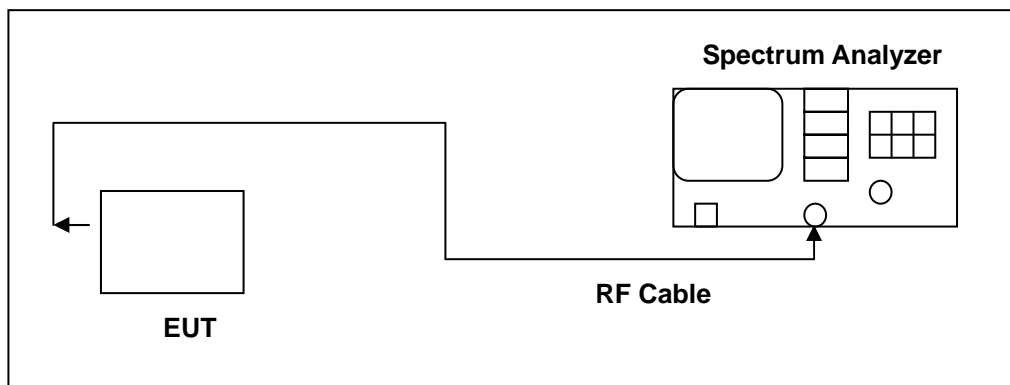


9 Peak Power Spectral Density Measurement

9.1. Limit

Frequency Range (MHz)	Limit
5.150 ~ 5.250 GHz	4 dB

9.2. Test Setup



9.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/19/2012	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

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

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

9.4. Test Procedure

The test is performed in accordance with KDB789033 D01 General UNII Test Procedures v01r03, Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E.

9.5. Test Result

Model Number	NBE-M5		
Test Item	Peak Power Spectral Density		
Test Mode	Mode 2: IEEE 802.11a Link Mode		
Date of Test	08/07/2013	Test Site	TE02
	Frequency (MHz)	Measurement (dBm)	Limit (dBm)
	5180	-16.02	< -15
	5220	-15.30	< -15
	5240	-20.41	< -15

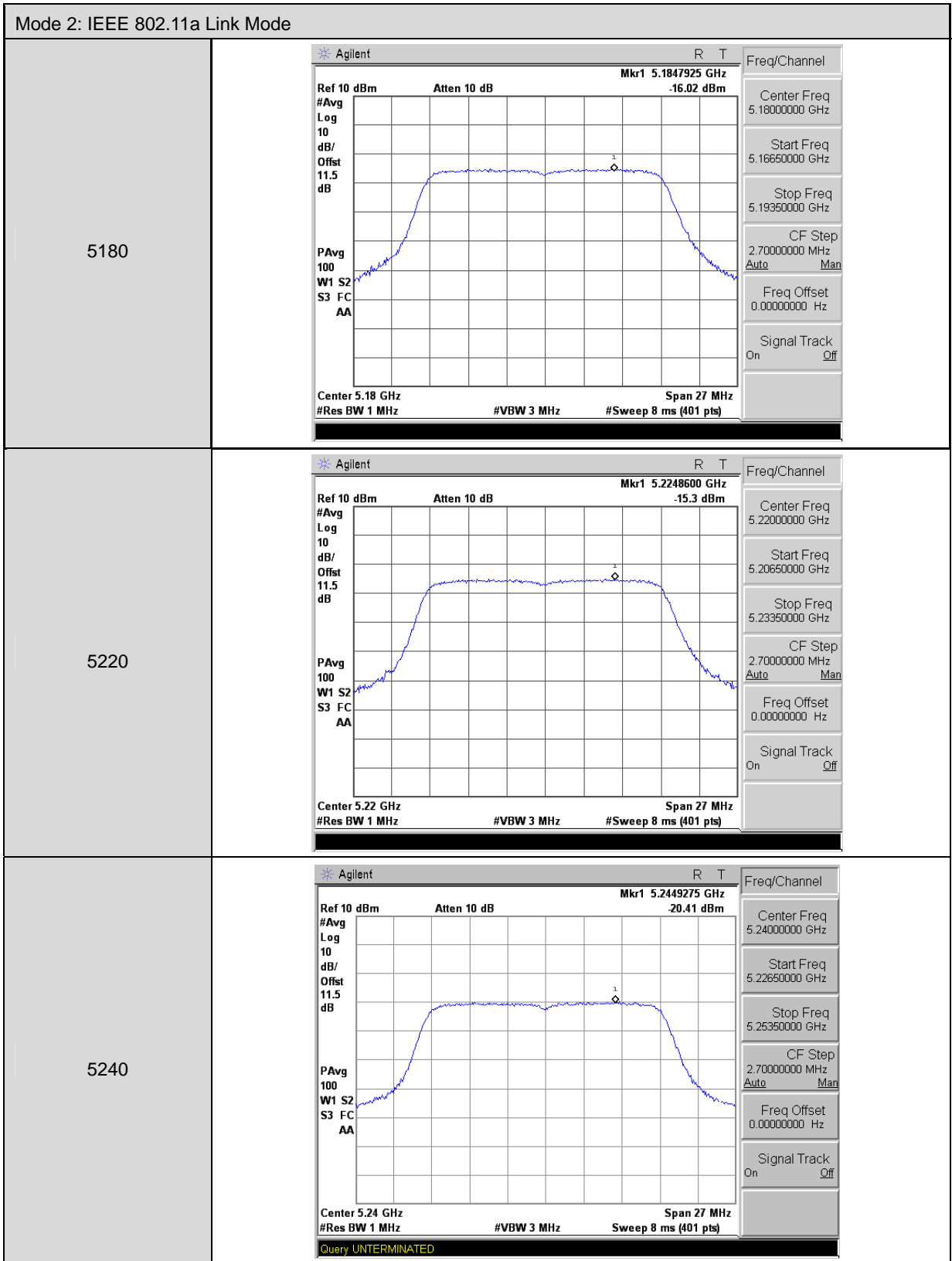
Model Number	NBE-M5		
Test Item	Peak Power Spectral Density		
Test Mode	Mode 3: IEEE 802.11n 20MHz Link Mode		
Date of Test	08/07/2013	Test Site	TE02
	Frequency (MHz)	Measurement (dBm)	Limit (dBm)
	5180	-15.93	< -15
	5220	-16.17	< -15
	5240	-20.57	< -15

Model Number	NBE-M5		
Test Item	Peak Power Spectral Density		
Test Mode	Mode 4: IEEE 802.11n 40MHz Link Mode		
Date of Test	08/07/2013	Test Site	TE02
	Frequency (MHz)	Measurement (dBm)	Limit (dBm)
	5190	-19.73	< -15
	5230	-23.57	< -15

Note: The antenna gain is 25 dBi > 6 dBi of the limit, so calculate the power limit according to the standard.

$$\begin{aligned}
 \text{Limit} &= 4 - (\text{Peak Gain} - 6) \\
 &= 4 - (25 - 6) \\
 &= -15
 \end{aligned}$$

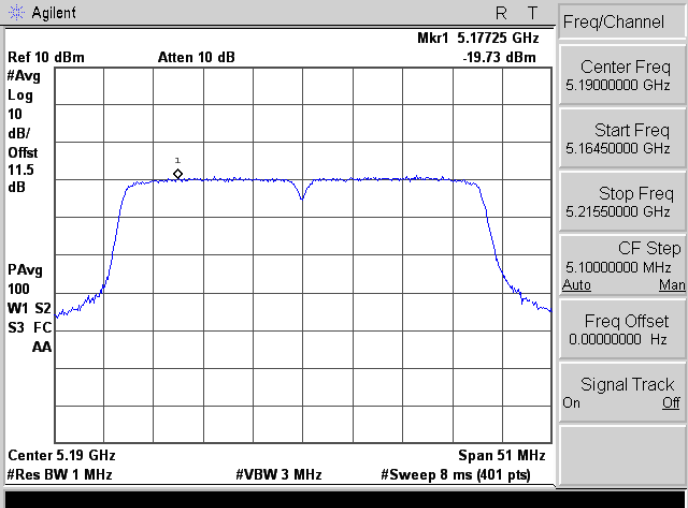
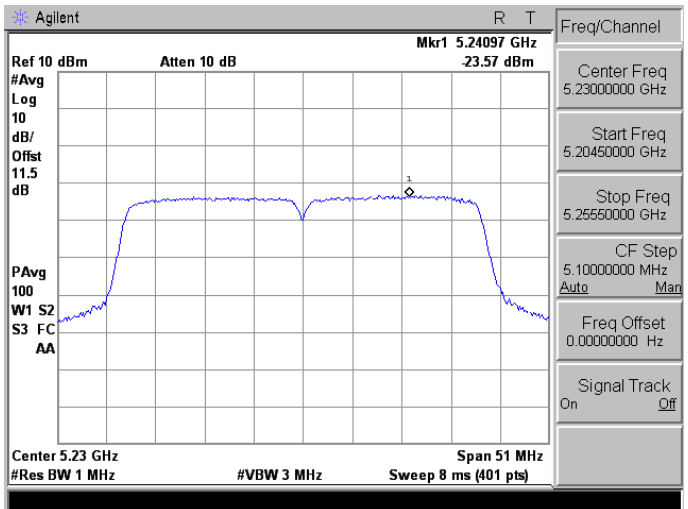
9.6. Test Graphs



Mode 3: IEEE 802.11n 20MHz Link Mode

<p>5180</p>	
<p>5220</p>	
<p>5240</p>	

Mode 4: IEEE 802.11n 40MHz Link Mode

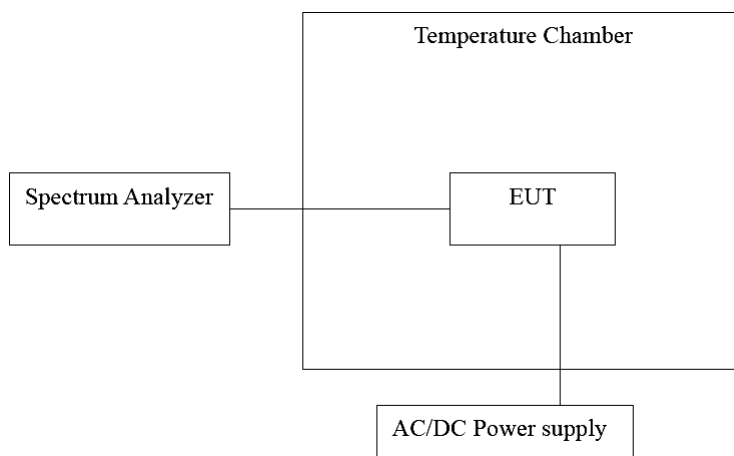
5190	
5230	

10 Frequency Stability Measurement

10.1. Limit

The frequency tolerance of the carrier signal shall be maintained within the band of operation frequency over a temperature variation of -30 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

10.2. Test Setup



10.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4408B	MY45107753	07/09/2012	(1)
Temperature & Humidity Chamber	TAICHY	MHU-225LA	980729	08/07/2012	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

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

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

10.4. Test Procedure

1. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

10.5. Test Result

Temperature Variations

Model Number	NBE-M5				
Mode	Mode 2				
Frequency	5220 MHz				
Date of Test	06/05/2013			Test Site	TE02
Temp. (°C)	Voltage (VAC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (ppm)	Result (Pass/Fail)
-30	120	5220.0025	2500	-0.479	Pass
-20		5219.9955	-4500	0.862	Pass
-10		5219.9865	-13500	2.586	Pass
0		5219.9625	-37500	7.184	Pass
10		5219.9555	-44500	8.525	Pass
20		5219.9765	-23500	4.502	Pass
30		5219.9975	-2500	0.479	Pass
40		5220.0035	3500	-0.670	Pass
50		5220.0205	20500	-3.927	Pass

Model Number	NBE-M5				
Mode	Mode 3				
Frequency	5220 MHz				
Date of Test	06/05/2013			Test Site	TE02
Temp. (°C)	Voltage (VAC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (ppm)	Result (Pass/Fail)
-30	120	5220.005	5000	-0.958	Pass
-20		5219.979	-21000	4.023	Pass
-10		5219.974	-26500	5.077	Pass
0		5219.964	-36000	6.897	Pass
10		5219.961	-39500	7.567	Pass
20		5219.973	-27500	5.268	Pass
30		5219.989	-11000	2.107	Pass
40		5219.979	-21500	4.119	Pass
50		5219.954	-46500	8.908	Pass

Model Number	NBE-M5				
Mode	Mode 4				
Frequency	5190 MHz				
Date of Test	06/05/2013			Test Site	TE02
Temp. (°C)	Voltage (VAC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (ppm)	Result (Pass/Fail)
-30	120	5189.9705	-29500	5.684	Pass
-20		5189.9535	-46500	8.960	Pass
-10		5189.9600	-40000	7.707	Pass
0		5190.0975	97500	-18.786	Pass
10		5190.0315	31500	-6.069	Pass
20		5190.0620	62000	-11.946	Pass
30		5190.0755	75500	-14.547	Pass
40		5190.0680	68000	-13.102	Pass
50		5189.9995	-500	0.096	Pass

Voltage Variations

Model Number	NBE-M5				
Mode	Mode 2				
Frequency	5220 MHz				
Date of Test	06/05/2013			Test Site	TE02
Temp. (°C)	Voltage (VAC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (ppm)	Result (Pass/Fail)
20	138	5220.0375	37500	-7.184	Pass
	120	5220.0155	15500	-2.969	Pass
	102	5219.9895	-10500	2.011	Pass

Model Number	NBE-M5				
Mode	Mode 3				
Frequency	5220 MHz				
Date of Test	06/05/2013			Test Site	TE02
Temp. (°C)	Voltage (VAC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (ppm)	Result (Pass/Fail)
20	138	5220.0610	61000	-11.686	Pass
	120	5220.0400	40000	-7.663	Pass
	102	5219.9485	-51500	9.866	Pass

Model Number	NBE-M5				
Mode	Mode 4				
Frequency	5190 MHz				
Date of Test	06/05/2013			Test Site	TE02
Temp. (°C)	Voltage (VAC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (ppm)	Result (Pass/Fail)
20	138	5190.0565	56500	-10.886	Pass
	120	5190.0325	32500	-6.262	Pass
	102	5189.9865	-13500	2.601	Pass

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 15.407 (a), 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 **Dish Antenna**. And the maximum Gain of this antenna is only **25 dBi**.