

FCC 47 CFR PART 15 SUBPART C

RF Test Report

Applicant : Lenovo (Shanghai) Electronics Technology Co., Ltd.

Applicant Address : No. 68 Building, 199 Fenju Road, Wai Gao Qiao FTZ , Shanghai ,
China

Product Type : Lenovo Pocket Projector

Trade Name : Lenovo

Model Number : P0510

Applicable Standard : FCC 47 CFR PART 15 SUBPART C: Oct., 2014
ANSI C63.10:2013

Receive Date : Jul. 16, 2015

Test Period : Aug. 28 ~ Sep. 11, 2015

Issue Date : Sep. 15, 2015

Issue by

A Test Lab Techno Corp.
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Taiwan Accreditation Foundation accreditation number: 1330

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Revision History

Rev.	Issue Date	Revisions	Revised By
00	Sep. 15, 2015	Initial Issue	

Verification of Compliance

Issued Date: 09/15/2015

Applicant : Lenovo (Shanghai) Electronics Technology Co., Ltd.
Address Applicant : No. 68 Building, 199 Fenju Road, Wai Gao Qiao FTZ ,
Shanghai , China
Product Type : Lenovo Pocket Projector
Trade Name : Lenovo
Model Number : P0510
FCC ID : O57P0510
EUT Rated Voltage : DC 5.2V, 2A
Test Voltage : 120 Vac / 60 Hz
Applicable Standard : FCC 47 CFR PART 15 SUBPART C: Oct., 2014
ANSI C63.10:2013
Test Result : Complied
Performing Lab. : A Test Lab Techno Corp.

No. 140-1, Changan Street, Bade City,
Taoyuan County 334, Taiwan R.O.C.
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Taiwan Accreditation Foundation accreditation number: 1330
<http://www.atl-lab.com.tw/e-index.htm>

A Test Lab Techno Corp. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by A Test Lab Techno Corp. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

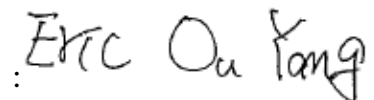
Approved By



(Manager)

(Fly Lu)

Reviewed By



(Testing Engineer)

(Eric Ou Yang)

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1 General Information

1.1 Summary of Test Result

Standard	Item	Result	Remark
15.247			
15.207	AC Power Conducted Emission	PASS	-----
Standard	Item	Result	Remark
15.247			
15.247(d)	Transmitter Radiated Emissions	PASS	-----
15.247(b)(3)	Max. Output Power	PASS	-----
15.247(a)(2)	6dB RF Bandwidth	PASS	-----
15.247(e)	Power Spectral Density	PASS	-----
15.247(d)	Out of Band Conducted Spurious Emission	PASS	-----
15.247(d)	Band Edge 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

Test Item	Frequency Range		Uncertainty (dB)
Conducted Emission	9kHz ~ 30MHz		± 2.02
Radiated Emission	30MHz ~ 1000MHz	Horizontal	± 3.98
		Vertical	± 3.62
	1000MHz ~ 18000MHz	Horizontal	± 3.11
		Vertical	± 3.07
	18000MHz ~ 40000MHz	Horizontal	± 3.66
		Vertical	± 3.54

2 EUT Description

Applicant	Lenovo (Shanghai) Electronics Technology Co., Ltd. No. 68 Building, 199 Fenju Road, Wai Gao Qiao FTZ , Shanghai , China			
Manufacturer	Lenovo PC HK Limited 23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong, China			
Product Type	Lenovo Pocket Projector			
Trade Name	Lenovo			
Model Number	P0510			
FCC ID	O57P0510			
Operate Freq. Band	Frequency Range (MHz)	Modulation	Channel Bandwidth	Data Rate
IEEE 802.11b	2412 ~ 2462	DSSS	20MHz	Up to 11Mbps
IEEE 802.11g	2412 ~ 2462	DSSS+OFDM	20MHz	Up to 54Mbps
IEEE 802.11n 2.4GHz 20MHz	2412 ~ 2462	OFDM	20MHz	Up to 144.4Mbps
IEEE 802.11n 2.4GHz 40MHz	2422 ~ 2452	OFDM	40MHz	Up to 300Mbps
Antenna Delivery	2TX + 2RX			
Antenna Type	FPC Antenna			
Antenna Gain	2 dBi			

Frequency Band	Max. RF Output Power (W)
IEEE 802.11b	0.031
IEEE 802.11g	0.061
IEEE 802.11n 2.4GHz 20MHz	0.086
IEEE 802.11n 2.4GHz 40MHz	0.088

3 Test Methodology

3.1. Mode of Operation

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

Test Mode
Mode 1: Normal operation mode
Mode 2: IEEE 802.11b link mode
Mode 3: IEEE 802.11g link mode
Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode
Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode

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.

Test Mode	ANT-0	ANT-1	ANT-0+1
Mode 2: IEEE 802.11b link mode	V	V	
Mode 3: IEEE 802.11g link mode	V	V	
Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode	V	V	V
Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode	V	V	V

Test Mode	Antenna Delivery	Test Channel	Data Rate
Mode 2: IEEE 802.11b link mode	1TX / 1RX	1, 6, 11	1
Mode 3: IEEE 802.11g link mode	1TX / 1RX	1, 6, 11	6
Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode	2TX / 2RX	1, 6, 11	13
Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode	2TX / 2RX	3, 6, 9	27

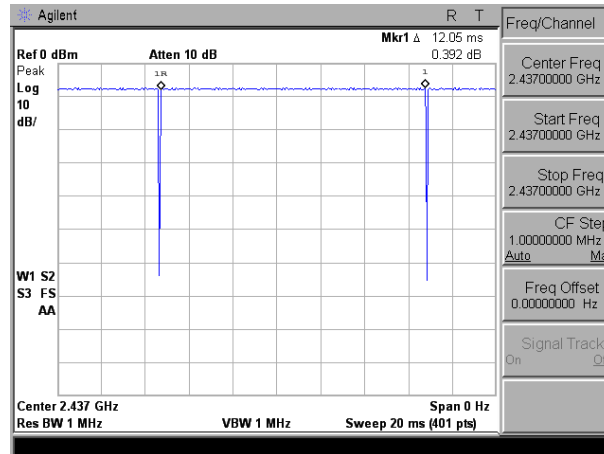
Duty cycle

Test Mode	Frequency (MHz)	on time (ms)	on+off time (ms)	Duty cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
Mode 2: IEEE 802.11b link mode	2437.0	12.050	12.200	0.988	0.054	0.010
Mode 3: IEEE 802.11g link mode	2437.0	8.125	20.000	0.406	3.912	0.123
Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode	2437.0	3.875	20.000	0.194	7.128	0.258
Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode	2437.0	1.875	20.030	0.094	10.287	0.533

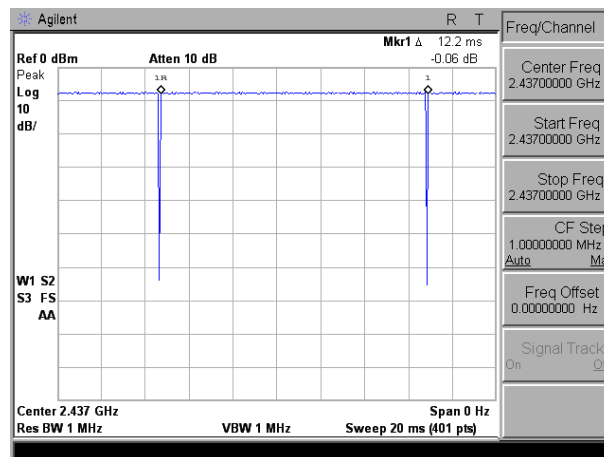
Duty Cycle Graphs

Mode 2: IEEE 802.11b link mode

On time

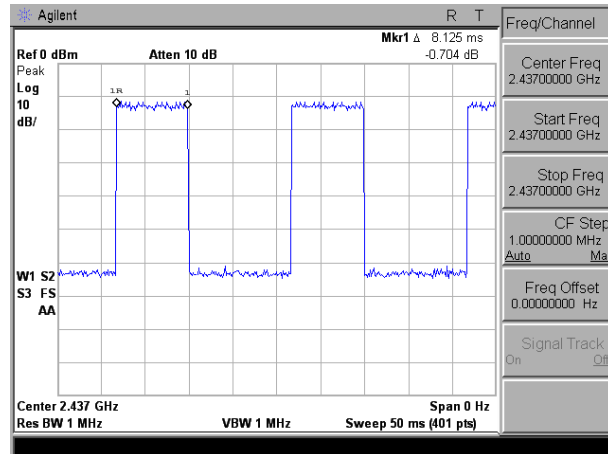


On+off time

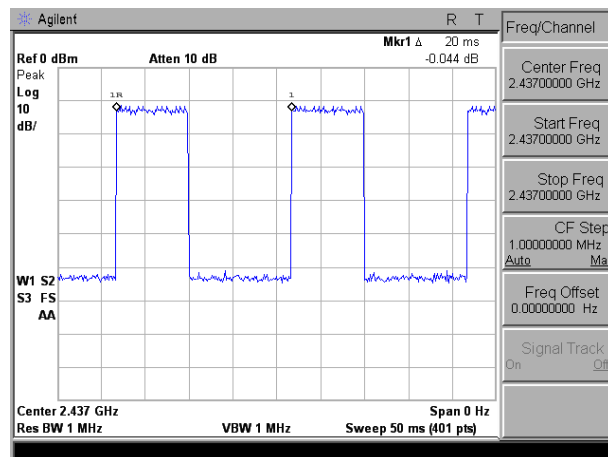


Mode 3: IEEE 802.11g Mode

On time

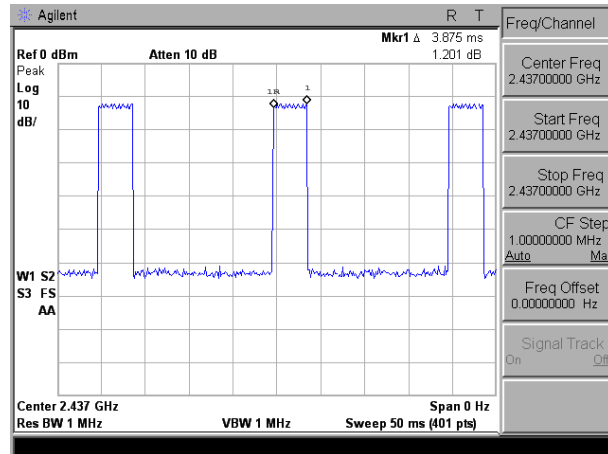


On+off time

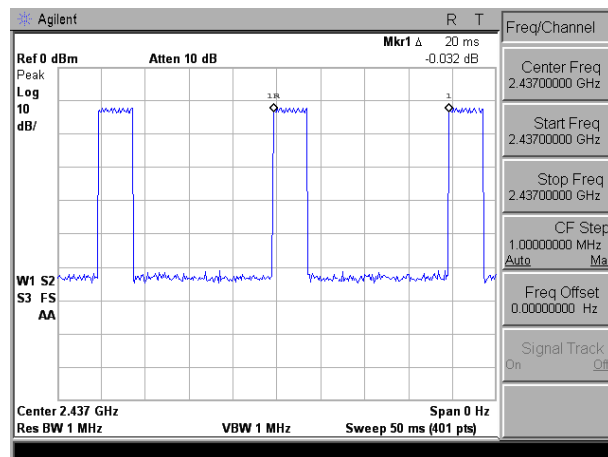


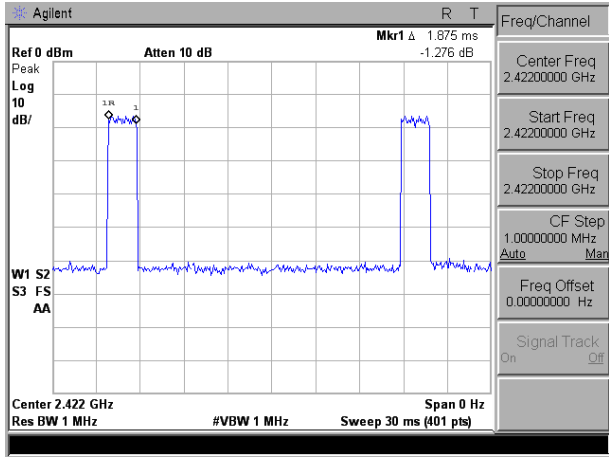
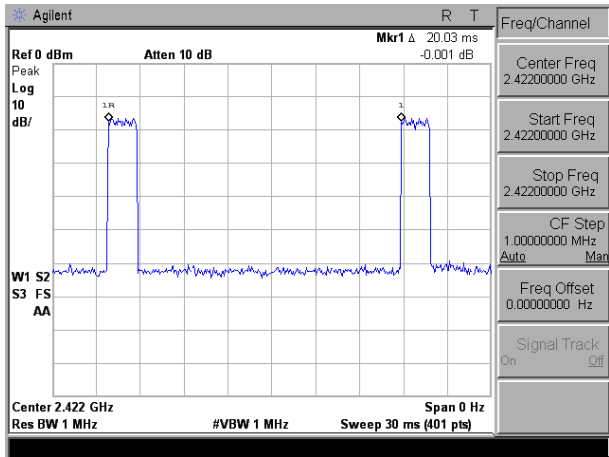
Mode 4: IEEE 802.11n 2.4GHz 20MHz Mode

On time



On+off time



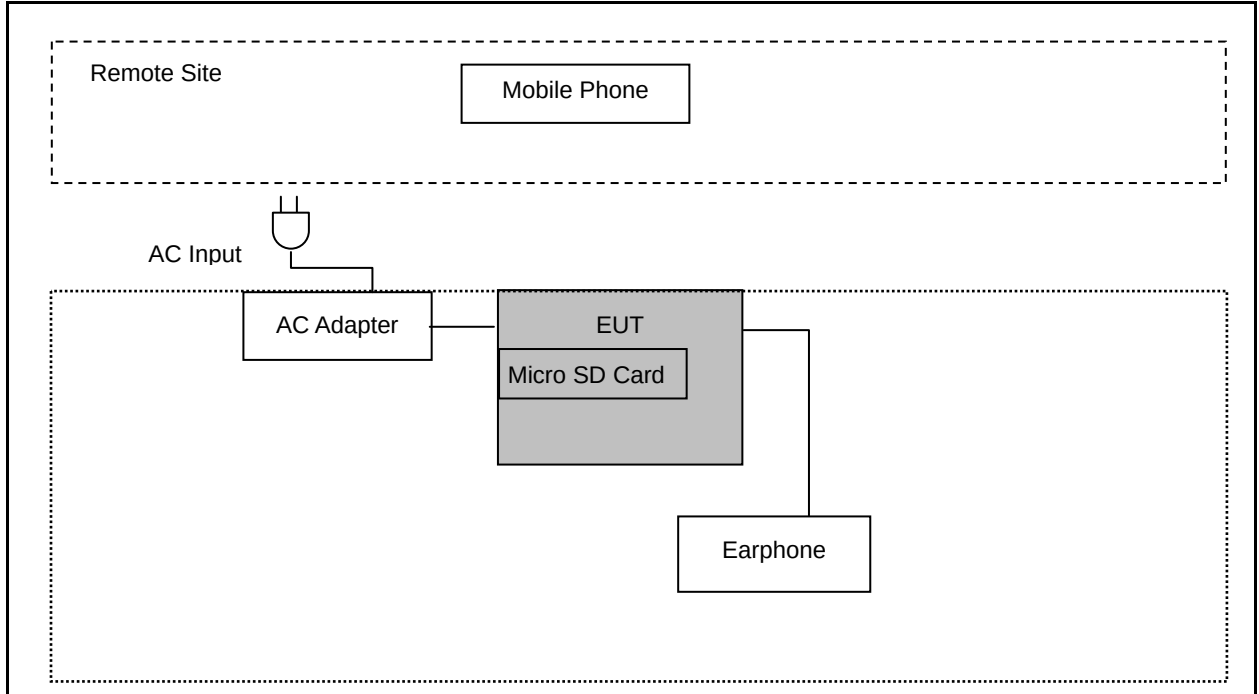
Mode 5: IEEE 802.11n 2.4GHz 40MHz Mode	
On time	
On+off time	

3.2. EUT Exercise Software

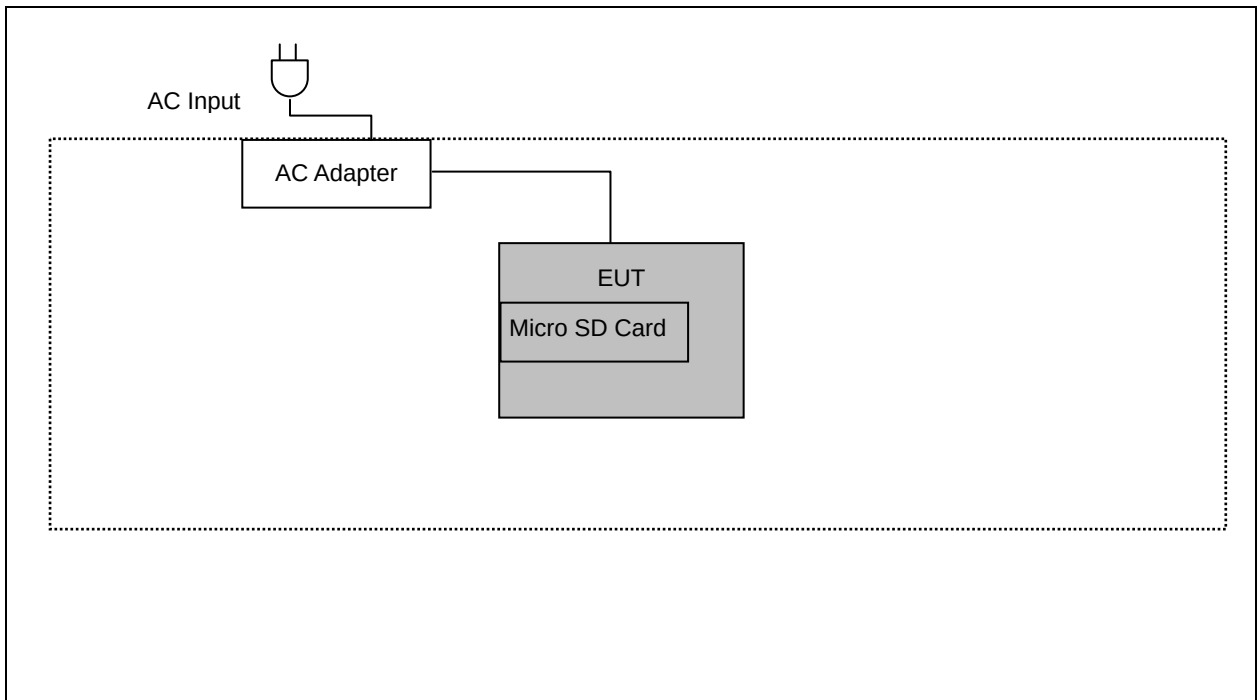
1. Setup the EUT shown on 3.3.
2. Turn on the power of all equipment.
3. Turn on Wi-Fi function.
4. EUT run test program.

3.3. Configuration of Test System Details

Conducted Emissions



Radiated Emissions



3.4. Test Site Environment

Items	Required (IEC 60068-1)	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

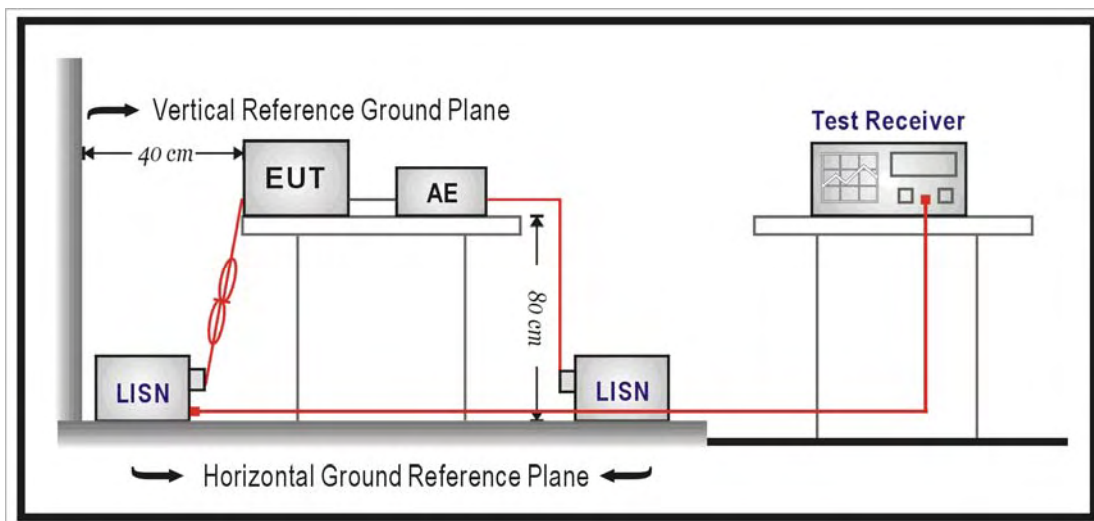
4.2. Test Instruments

Describe	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Test Receiver	R&S	ESCI	100367	06/25/2015	(1)
LISN	R&S	ENV216	101040	03/10/2015	(1)
LISN	R&S	ENV216	101041	03/06/2015	(1)
RF Cable	Woken	00100D1380194M	TE-02-02	06/26/2015	(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

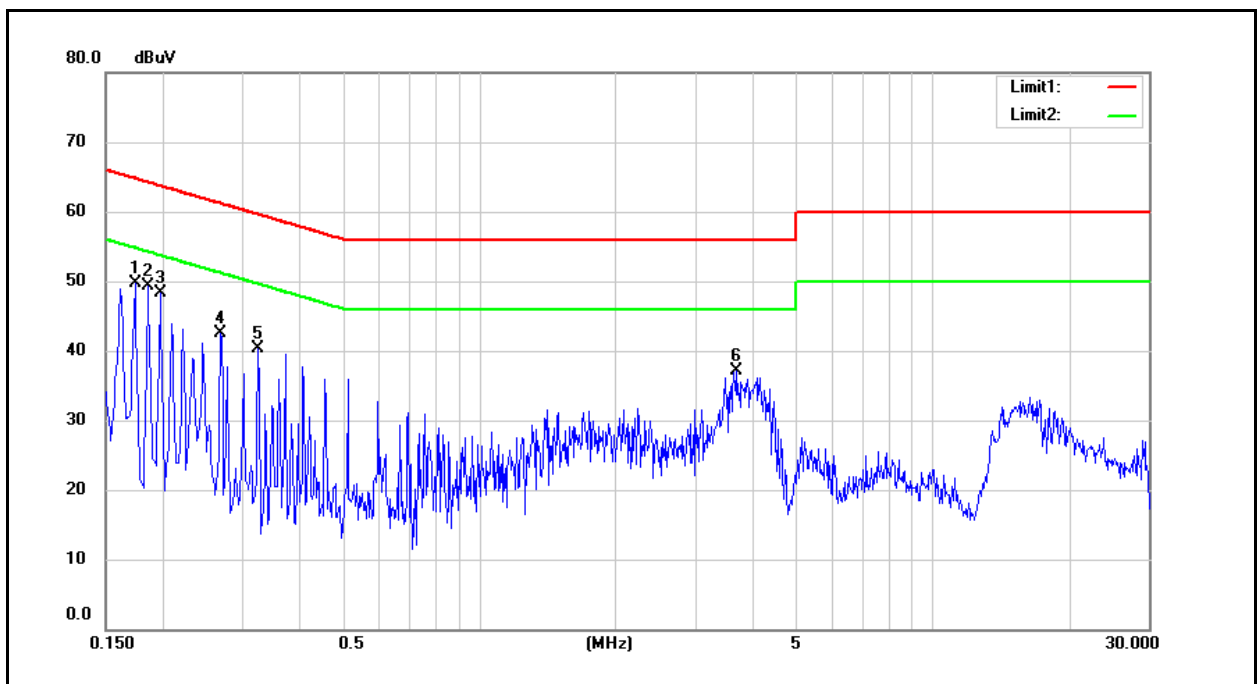
The power line conducted emission measurements were performed in a shielded enclosure. The EUT was assembled on a wooden table which is 80 centimeters high, was placed 40 centimeters from the back wall and at least 1 meter from the sidewall.

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:	P0510	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 1	Date:	08/28/2015
		Test By:	Eric Ou Yang
Description:			

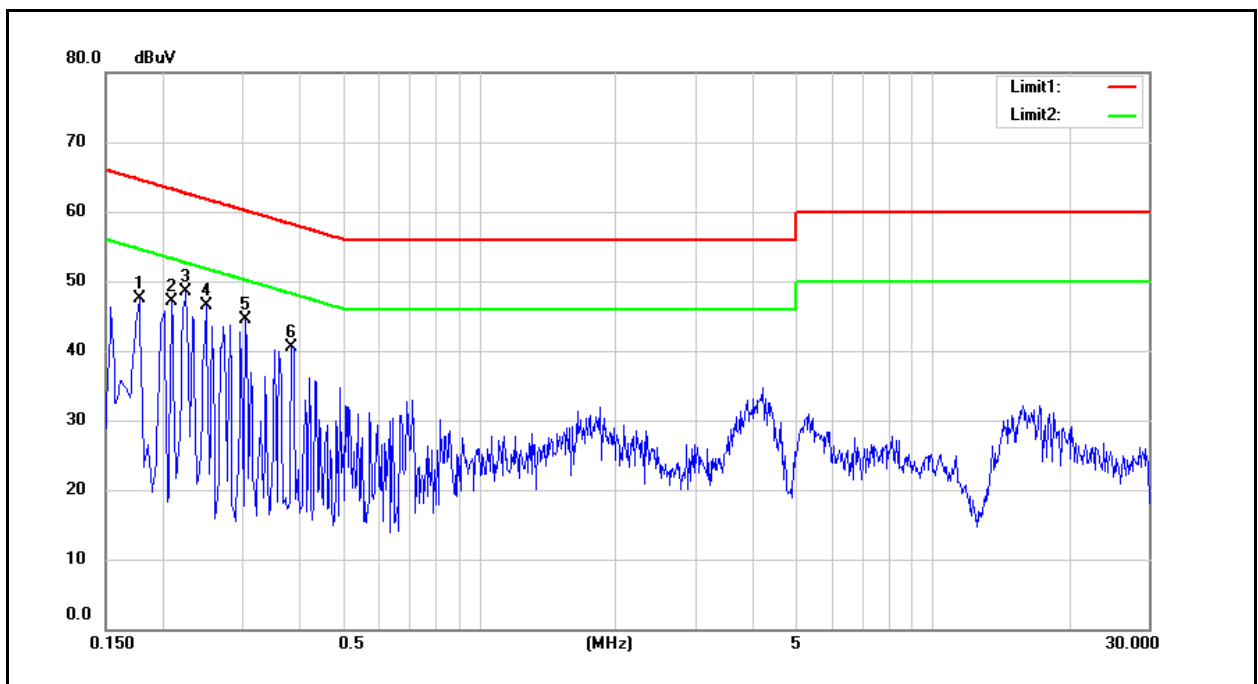


No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1740	33.16	10.11	9.58	42.74	19.69	64.77	54.77	-22.03	-35.08	Pass
2	0.1860	32.48	8.69	9.58	42.06	18.27	64.21	54.21	-22.15	-35.94	Pass
3	0.1980	32.61	8.53	9.58	42.19	18.11	63.69	53.69	-21.50	-35.58	Pass
4	0.2700	27.20	5.04	9.59	36.79	14.63	61.12	51.12	-24.33	-36.49	Pass
5	0.3260	24.32	4.07	9.59	33.91	13.66	59.55	49.55	-25.64	-35.89	Pass
6	3.7180	21.00	7.18	9.71	30.71	16.89	56.00	46.00	-25.29	-29.11	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 15C	Line:	N
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	P0510	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 1	Date:	08/28/2015
		Test By:	Eric Ou Yang
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	0.1780	33.35	10.55	9.58	42.93	20.13	64.58	54.58	-21.65	-34.45	Pass
2	0.2100	31.05	6.86	9.58	40.63	16.44	63.21	53.21	-22.58	-36.77	Pass
3	0.2260	29.52	6.10	9.58	39.10	15.68	62.60	52.60	-23.50	-36.92	Pass
4	0.2500	28.58	5.66	9.59	38.17	15.25	61.76	51.76	-23.59	-36.51	Pass
5	0.3060	24.94	3.66	9.59	34.53	13.25	60.08	50.08	-25.55	-36.83	Pass
6	0.3860	20.68	2.88	9.59	30.27	12.47	58.15	48.15	-27.88	-35.68	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

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

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

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

5.2. Test Instruments

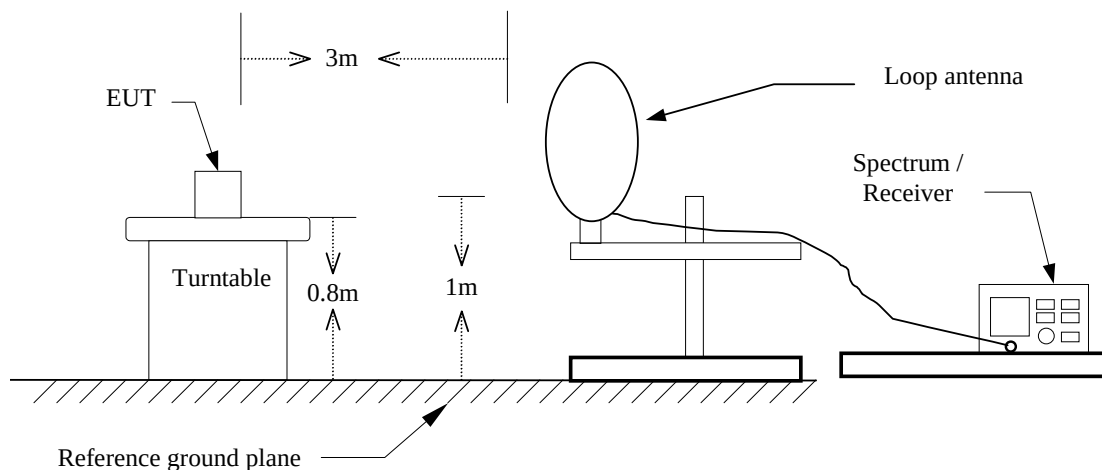
3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
RF Pre-selector	Agilent	N9039A	MY46520256	01/06/2015	(1)
Spectrum Analyzer	Agilent	E4446A	MY46180578	01/06/2015	(1)
Pre Amplifier	Agilent	8449B	3008A02237	02/24/2015	(1)
Pre Amplifier	Agilent	8447D	2944A10961	02/24/2015	(1)
Broadband Antenna (30MHz~1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	9163-270	08/11/2015	(1)
Horn Antenna (1~18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	06/12/2015	(1)
Horn Antenna (18~40GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9170	9170-320	07/06/2015	(1)
Loop Antenna	COM-POWER CORPORATION	AL-130	121014	02/02/2015	(1)
Microwave Cable	EMCI	EMC-104-SM-S M-14000	140202	02/24/2015	(1)
Microwave Cable	EMCI	EMC104-SM-S M-600	140301	02/24/2015	(1)
Test Site	ATL	TE01	888001	08/28/2015	(1)

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

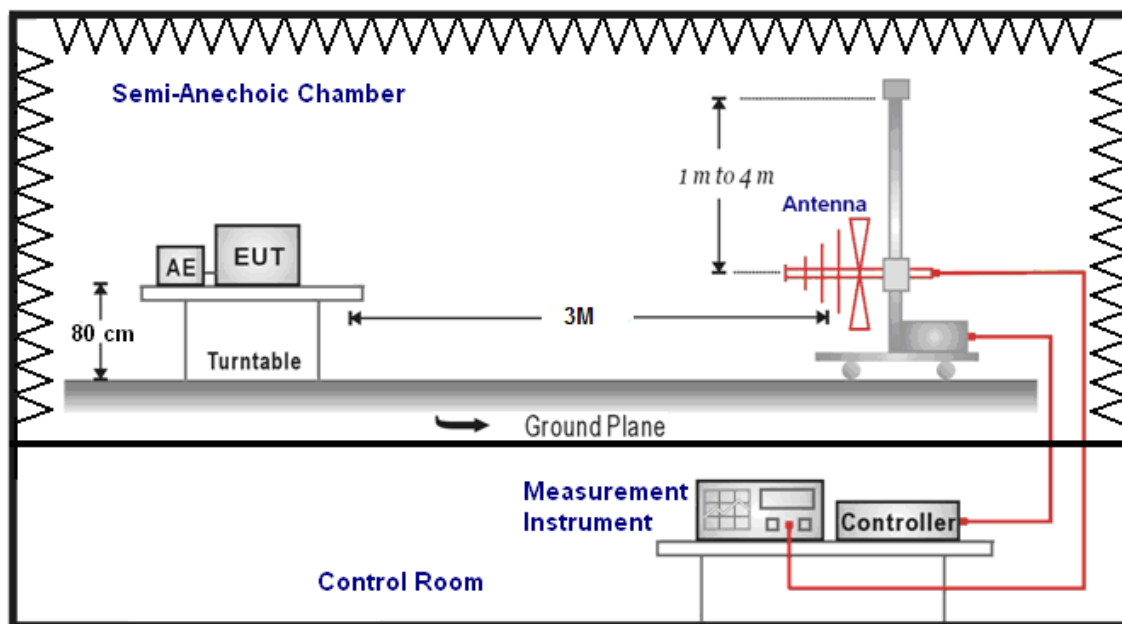
Note: N.C.R. = No Calibration Request.

5.3. Setup

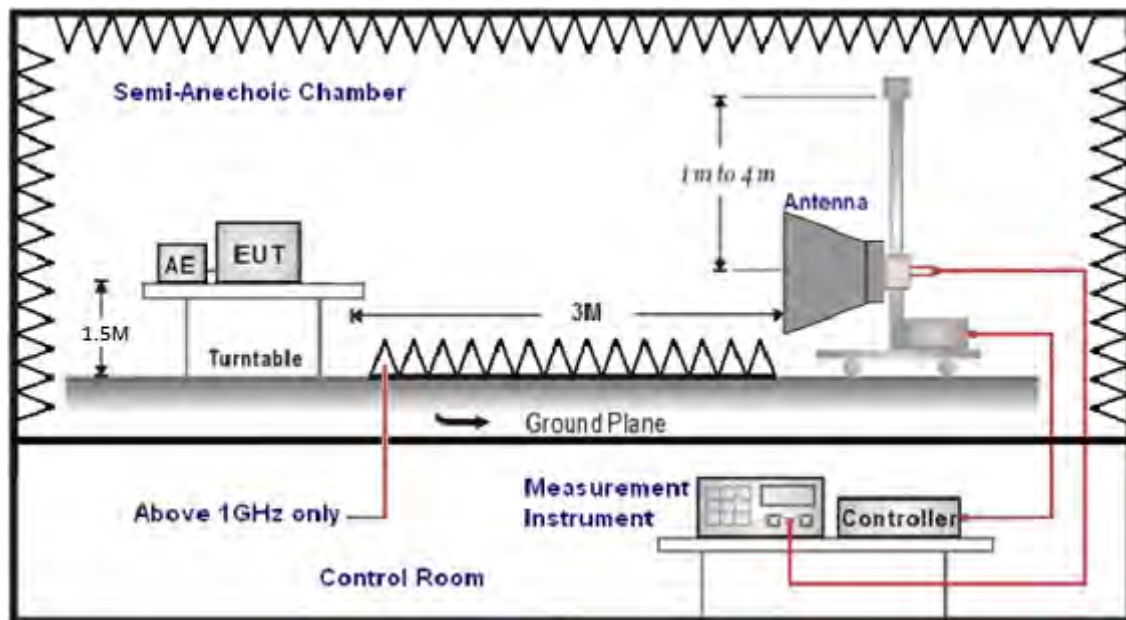
9kHz ~ 30MHz



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 or 1.5 meters height (below 1GHz use 0.8m turntable / above 1GHz use 1.5m turntable), 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 when Duty cycle >98% / 1/T for average measurements when Duty cycle <98%. 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 (model VULB9163) at 3 Meter and the SCHWARZBECK Double Ridged Guide Antenna (model BBHA9120D&9170) was used in frequencies 1 – 26.5 GHz at a distance of 1 meter. All test results were extrapolated to equivalent signal at 3 meters utilizing an inverse linear distance extrapolation Factor (20dB/decade).

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

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

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

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

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

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

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

FI= Reading of the field intensity.

AF= Antenna factor.

CL= Cable loss.

P.S Amplitude is auto calculate in spectrum analyzer.

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

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

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

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

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

5.5. Test Result

Below 1GHz

Standard:		FCC Part 15C		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		P0510		Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Mode:		Mode 1		Date:		09/11/2015	
				Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
235.0000	46.25	-15.04	31.21	46.00	-14.79	QP	H
396.0000	44.22	-11.30	32.92	46.00	-13.08	QP	H
482.5000	39.56	-9.97	29.59	46.00	-16.41	QP	H
600.0000	37.68	-7.84	29.84	46.00	-16.16	QP	H
705.5000	31.43	-6.53	24.90	46.00	-21.10	QP	H
838.0000	33.43	-4.50	28.93	46.00	-17.07	QP	H
137.5000	39.42	-14.28	25.14	43.50	-18.36	QP	V
232.0000	42.57	-15.27	27.30	46.00	-18.70	QP	V
400.0000	42.62	-11.24	31.38	46.00	-14.62	QP	V
482.5000	38.74	-9.97	28.77	46.00	-17.23	QP	V
600.0000	41.41	-7.84	33.57	46.00	-12.43	QP	V
779.5000	31.61	-5.28	26.33	46.00	-19.67	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:		P0510		Temp.(℃)/Hum.(%RH):		26(℃)/60%RH	
Mode:		Mode 2		Date:		09/02/2015	
Frequency:		2412MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3009.000	37.22	1.75	38.97	74.00	-35.03	peak	H
4570.000	32.75	6.68	39.43	74.00	-34.57	peak	H
6726.000	33.16	12.10	45.26	74.00	-28.74	peak	H
3051.000	38.57	1.94	40.51	74.00	-33.49	peak	V
4824.000	41.80	7.48	49.28	74.00	-24.72	peak	V
6733.000	33.01	12.11	45.12	74.00	-28.88	peak	V

Standard:		FCC Part 15C		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		P0510		Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Mode:		Mode 2		Date:		09/02/2015	
Frequency:		2437MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3037.000	35.32	1.87	37.19	74.00	-36.81	peak	H
4591.000	31.90	6.74	38.64	74.00	-35.36	peak	H
6670.000	31.42	11.96	43.38	74.00	-30.62	peak	H
3030.000	38.55	1.85	40.40	74.00	-33.60	peak	V
4874.000	42.02	7.63	49.65	74.00	-24.35	peak	V
6670.000	33.38	11.96	45.34	74.00	-28.66	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	P0510			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 2			Date:	09/02/2015		
Frequency:	2462MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3023.000	35.58	1.81	37.39	74.00	-36.61	peak	H
4598.000	32.59	6.77	39.36	74.00	-34.64	peak	H
6719.000	31.57	12.08	43.65	74.00	-30.35	peak	H
3023.000	37.69	1.81	39.50	74.00	-34.50	peak	V
4924.000	42.07	7.79	49.86	74.00	-24.14	peak	V
6733.000	33.36	12.11	45.47	74.00	-28.53	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	P0510			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 3			Date:	09/02/2015		
Frequency:	2412MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3009.000	38.03	1.75	39.78	74.00	-34.22	peak	H
4570.000	32.55	6.68	39.23	74.00	-34.77	peak	H
6691.000	33.85	12.02	45.87	74.00	-28.13	peak	H
3065.000	37.97	2.00	39.97	74.00	-34.03	peak	V
4824.000	42.35	7.48	49.83	74.00	-24.17	peak	V
6670.000	33.90	11.96	45.86	74.00	-28.14	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	P0510			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 3			Date:	09/02/2015		
Frequency:	2437MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3030.000	35.76	1.85	37.61	74.00	-36.39	peak	H
4591.000	32.06	6.74	38.80	74.00	-35.20	peak	H
6698.000	31.77	12.03	43.80	74.00	-30.20	peak	H
3051.000	35.80	1.94	37.74	74.00	-36.26	peak	V
4874.000	41.57	7.63	49.20	74.00	-24.80	peak	V
6677.000	33.23	11.97	45.20	74.00	-28.80	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	P0510			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 3			Date:	09/02/2015		
Frequency:	2462MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3002.000	36.82	1.72	38.54	74.00	-35.46	peak	H
4542.000	31.96	6.59	38.55	74.00	-35.45	peak	H
6726.000	33.53	12.10	45.63	74.00	-28.37	peak	H
3030.000	38.08	1.85	39.93	74.00	-34.07	peak	V
4924.000	41.20	7.79	48.99	74.00	-25.01	peak	V
6663.000	31.92	11.94	43.86	74.00	-30.14	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	P0510			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 4			Date:	09/02/2015		
Frequency:	2412MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3030.000	37.12	1.85	38.97	74.00	-35.03	peak	H
4598.000	32.50	6.77	39.27	74.00	-34.73	peak	H
6691.000	32.58	12.02	44.60	74.00	-29.40	peak	H
2995.000	36.05	1.70	37.75	74.00	-36.25	peak	V
4549.000	32.52	6.61	39.13	74.00	-34.87	peak	V
6649.000	32.17	11.91	44.08	74.00	-29.92	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	P0510			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 4			Date:	09/02/2015		
Frequency:	2437MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3023.000	36.46	1.81	38.27	74.00	-35.73	peak	H
4824.000	42.72	7.48	50.20	74.00	-23.80	peak	H
6635.000	32.83	11.88	44.71	74.00	-29.29	peak	H
3058.000	36.12	1.97	38.09	74.00	-35.91	peak	V
4874.000	41.80	7.63	49.43	74.00	-24.57	peak	V
6677.000	32.33	11.97	44.30	74.00	-29.70	peak	V

Standard:		FCC Part 15C		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		P0510		Temp.(℃)/Hum.(%RH):		26(℃)/60%RH	
Mode:		Mode 4		Date:		09/02/2015	
Frequency:		2462MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3051.000	36.24	1.94	38.18	74.00	-35.82	peak	H
4626.000	31.95	6.85	38.80	74.00	-35.20	peak	H
6670.000	31.91	11.96	43.87	74.00	-30.13	peak	H
3009.000	35.63	1.75	37.38	74.00	-36.62	peak	V
4924.000	42.13	7.79	49.92	74.00	-24.08	peak	V
6705.000	32.53	12.05	44.58	74.00	-29.42	peak	V

Standard:		FCC Part 15C		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		P0510		Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Mode:		Mode 5		Date:		09/02/2015	
Frequency:		2422MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3009.000	37.22	1.75	38.97	74.00	-35.03	peak	H
4605.000	32.55	6.79	39.34	74.00	-34.66	peak	H
6698.000	31.76	12.03	43.79	74.00	-30.21	peak	H
3002.000	37.05	1.72	38.77	74.00	-35.23	peak	V
4563.000	31.04	6.66	37.70	74.00	-36.30	peak	V
6677.000	31.95	11.97	43.92	74.00	-30.08	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	P0510			Temp.(℃)/Hum.(%RH):	26(℃)/60%RH		
Mode:	Mode 5			Date:	09/02/2015		
Frequency:	2437MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3030.000	36.88	1.85	38.73	74.00	-35.27	peak	H
4521.000	32.15	6.52	38.67	74.00	-35.33	peak	H
6670.000	32.20	11.96	44.16	74.00	-29.84	peak	H
3065.000	36.72	2.00	38.72	74.00	-35.28	peak	V
4570.000	32.44	6.68	39.12	74.00	-34.88	peak	V
6614.000	33.16	11.83	44.99	74.00	-29.01	peak	V

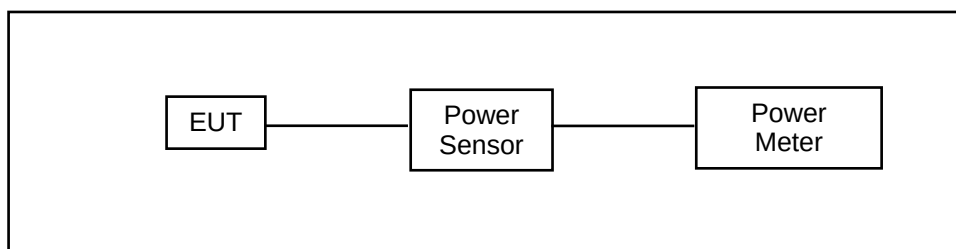
Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	P0510			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 5			Date:	09/02/2015		
Frequency:	2452MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
3009.000	37.17	1.75	38.92	74.00	-35.08	peak	H
4619.000	32.25	6.83	39.08	74.00	-34.92	peak	H
6698.000	30.95	12.03	42.98	74.00	-31.02	peak	H
3030.000	37.12	1.85	38.97	74.00	-35.03	peak	V
4598.000	32.50	6.77	39.27	74.00	-34.73	peak	V
6691.000	32.58	12.02	44.60	74.00	-29.40	peak	V

6 Maximum Conducted Output Power Measurement

6.1. Limit

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

6.2. Test Setup



6.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Power Sensor	Anritsu	MA2411B	1126022	08/24/2015	(1)
Power Meter	Anritsu	ML2495A	1135009	08/24/2015	(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 output power shall not exceed 1 watt.

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

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

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

6.5. Test Result

Model Number	P0510									
Test Item	Maximum Conducted Output Power									
Test Mode	Mode 2: IEEE 802.11b link mode									
Date of Test	08/28/2015							Test Site		TE05
Frequency (MHz)	Data Rate	Average Power				Peak Power				Limit (dBm)
		ANT-0		ANT-1		ANT-0		ANT-1		
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	
2412	1M	11.94	0.016	11.35	0.014	14.36	0.027	13.79	0.024	< 30
2437		12.33	0.017	11.84	0.015	14.72	0.030	14.27	0.027	< 30
2462		12.53	0.018	12.44	0.018	14.92	0.031	14.87	0.031	< 30
2437	2M	12.31	0.017	11.82	0.015	14.71	0.030	14.26	0.027	< 30
2437	5.5M	12.30	0.017	11.81	0.015	14.69	0.029	14.24	0.027	< 30
2437	11M	12.27	0.017	11.78	0.015	14.65	0.029	14.21	0.026	< 30

Model Number	P0510									
Test Item	Maximum Conducted Output Power									
Test Mode	Mode 3: IEEE 802.11g link mode									
Date of Test	08/28/2015							Test Site		TE05
Frequency (MHz)	Data Rate	Average Power				Peak Power				Limit (dBm)
		ANT-0		ANT-1		ANT-0		ANT-1		
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	
2412	6M	7.12	0.005	6.87	0.005	17.27	0.053	17.05	0.051	< 30
2437		7.54	0.006	7.48	0.006	17.70	0.059	17.57	0.057	< 30
2462		7.72	0.006	7.68	0.006	17.85	0.061	17.79	0.060	< 30
2437	9M	7.51	0.006	7.45	0.006	17.66	0.058	17.54	0.057	< 30
2437	12M	7.46	0.006	7.41	0.006	17.64	0.058	17.50	0.056	< 30
2437	18M	7.44	0.006	7.38	0.005	17.62	0.058	17.47	0.056	< 30
2437	24M	7.41	0.006	7.33	0.005	17.58	0.057	17.44	0.055	< 30
2437	36M	7.36	0.005	7.30	0.005	17.55	0.057	17.41	0.055	< 30
2437	48M	7.34	0.005	7.25	0.005	17.51	0.056	17.37	0.055	< 30
2437	54M	7.29	0.005	7.52	0.006	17.47	0.056	17.35	0.054	< 30

Model Number	P0510									
Test Item	Maximum Conducted Output Power									
Test Mode	Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode									
Date of Test	08/28/2015							Test Site		TE05
Frequency (MHz)	Data Rate	Average Power				Peak Power				Limit (dBm)
		ANT-0		ANT-1		ANT-0		ANT-1		
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	
2412	13M	6.82	0.005	6.59	0.005	15.72	0.037	15.83	0.038	< 30
2437		7.01	0.005	6.72	0.005	16.02	0.040	15.68	0.037	< 30
2462		7.18	0.005	7.19	0.005	16.24	0.042	16.45	0.044	< 30
2437	26M	6.96	0.005	6.69	0.005	15.99	0.040	15.66	0.037	< 30
2437	39M	6.94	0.005	6.64	0.005	15.95	0.039	15.63	0.037	< 30
2437	52M	6.89	0.005	6.61	0.005	15.93	0.039	15.59	0.036	< 30
2437	78M	6.85	0.005	6.58	0.005	15.89	0.039	15.54	0.036	< 30
2437	104M	6.81	0.005	6.53	0.004	15.86	0.039	15.52	0.036	< 30
2437	117M	6.78	0.005	6.50	0.004	15.83	0.038	15.49	0.035	< 30
2437	130M	6.74	0.005	6.48	0.004	15.81	0.038	15.47	0.035	< 30
Frequency (MHz)	Data Rate	Average Power				Peak Power				Limit (dBm)
		ANT-0+1				ANT-0+1				
		(dBm)		(W)		(dBm)		(W)		
2412	13M	9.72		0.009		18.79		0.076		< 30
2437		9.88		0.010		18.86		0.077		< 30
2462		10.20		0.010		19.36		0.086		< 30
2437	26M	9.84		0.010		18.84		0.077		< 30
2437	39M	9.80		0.010		18.80		0.076		< 30
2437	52M	9.76		0.009		18.77		0.075		< 30
2437	78M	9.73		0.009		18.73		0.075		< 30
2437	104M	9.68		0.009		18.70		0.074		< 30
2437	117M	9.65		0.009		18.67		0.074		< 30
2437	130M	9.62		0.009		18.65		0.073		< 30

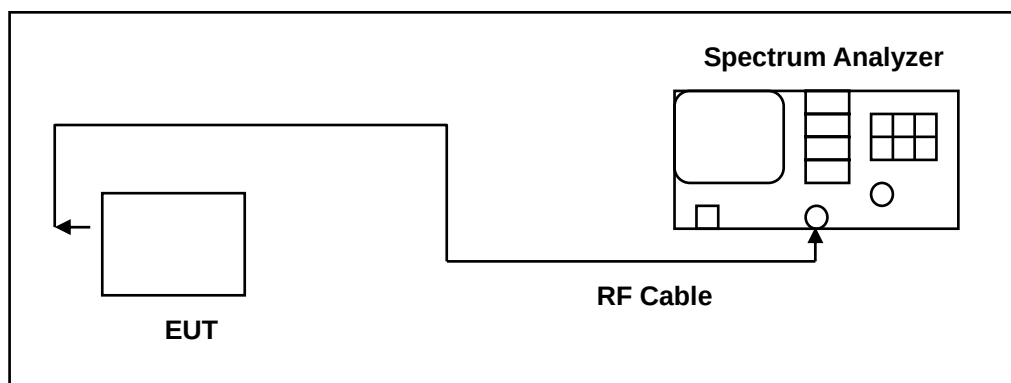
Model Number	P0510									
Test Item	Maximum Conducted Output Power									
Test Mode	Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode									
Date of Test	08/28/2015							Test Site		TE05
Frequency (MHz)	Data Rate	Average Power				Peak Power				Limit (dBm)
		ANT-0		ANT-1		ANT-0		ANT-1		
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	
2422	27M	5.98	0.004	6.05	0.004	15.56	0.036	15.96	0.039	< 30
2437		6.18	0.004	6.37	0.004	15.99	0.040	16.24	0.042	< 30
2452		6.51	0.004	6.79	0.005	16.37	0.043	16.52	0.045	< 30
2437	54M	6.16	0.004	6.34	0.004	15.96	0.039	16.22	0.042	< 30
2437	81M	6.12	0.004	6.30	0.004	15.92	0.039	16.18	0.041	< 30
2437	108M	6.09	0.004	6.28	0.004	15.89	0.039	16.15	0.041	< 30
2437	162M	6.05	0.004	6.25	0.004	15.86	0.039	16.13	0.041	< 30
2437	216M	6.01	0.004	6.21	0.004	15.83	0.038	16.10	0.041	< 30
2437	243M	5.98	0.004	6.18	0.004	15.79	0.038	16.06	0.040	< 30
2437	270M	5.95	0.004	6.15	0.004	15.76	0.038	16.03	0.040	< 30
Frequency (MHz)	Data Rate	Average Power				Peak Power				Limit (dBm)
		ANT-0+1				ANT-0+1				
		(dBm)		(W)		(dBm)		(W)		
2422	27M	9.03		0.008		18.77		0.075		< 30
2437		9.29		0.008		19.13		0.082		< 30
2452		9.66		0.009		19.46		0.088		< 30
2437	54M	9.26		0.008		19.10		0.081		< 30
2437	81M	9.22		0.008		19.06		0.081		< 30
2437	108M	9.20		0.008		19.03		0.080		< 30
2437	162M	9.16		0.008		19.01		0.080		< 30
2437	216M	9.12		0.008		18.98		0.079		< 30
2437	243M	9.09		0.008		18.94		0.078		< 30
2437	270M	9.06		0.008		18.91		0.078		< 30

7 6dB RF Bandwidth Measurement

7.1. Limit

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

7.2. Test Setup



7.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/16/2014	(1)
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 tested to DTS test procedure of KDB558074D01 for compliance to FCC 47CFR 15.247 requirements.

6dB RF Bandwidth: The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES RBW 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 low, middle, high)

99 % Occupied Bandwidth: The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

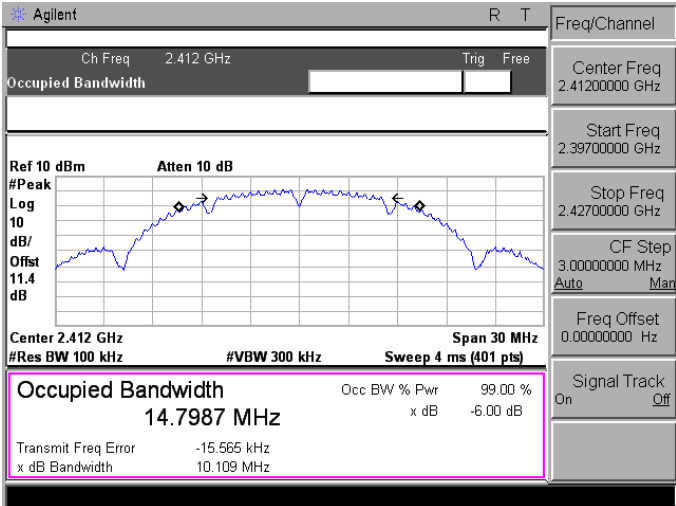
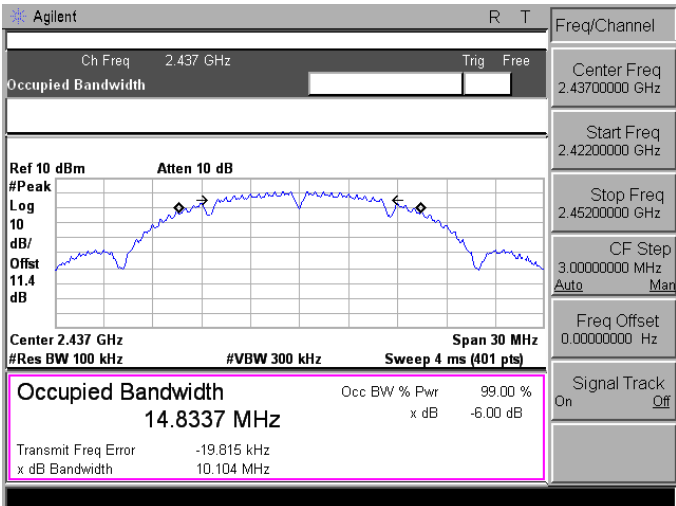
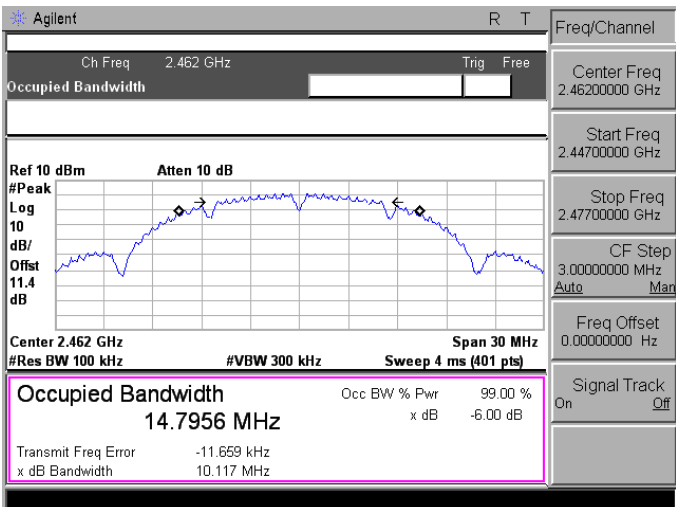
The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

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

7.5. Test Result

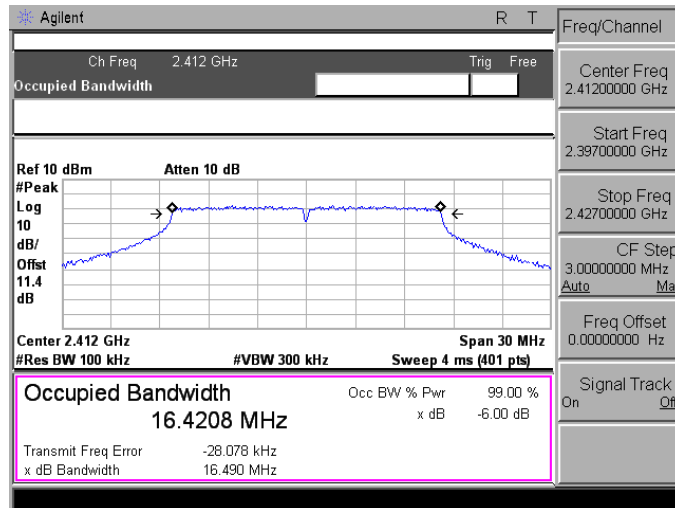
Model Number	P0510			
Test Item	6dB RF Bandwidth			
Test Mode	Mode 2: IEEE 802.11b link mode Mode 3: IEEE 802.11g link mode Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode			
Date of Test	09/02/2015		Test Site	TE05
Test Mode	Frequency (MHz)	Measurement (MHz)		Limit (MHz)
		ANT-0	ANT-1	
Mode 2	2412	10.109	---	> 0.500
	2437	10.104	---	> 0.500
	2462	10.117	---	> 0.500
Mode 3	2412	16.490	---	> 0.500
	2437	16.514	---	> 0.500
	2462	16.497	---	> 0.500
Mode 4	2412	17.718	17.709	> 0.500
	2437	17.733	17.736	> 0.500
	2462	17.700	17.704	> 0.500
Mode 5	2422	36.412	36.341	> 0.500
	2437	36.370	36.349	> 0.500
	2452	36.414	36.407	> 0.500

7.6. Test Graphs

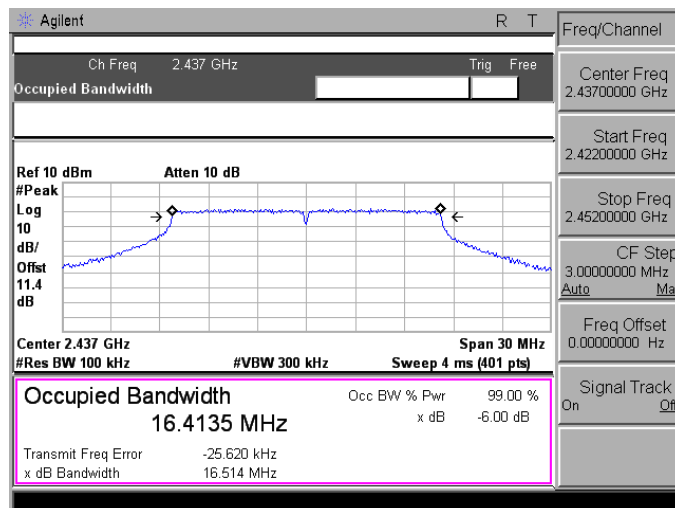
Mode 2: IEEE 802.11b link mode_ANT-0	
2412	 Agilent R T Ch Freq 2.412 GHz Trig Free Occupied Bandwidth Ref 10 dBm Atten 10 dB #Peak Log 10 dB/ Offst 11.4 dB Center 2.412 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 4 ms (401 pts) Occupied Bandwidth 14.7987 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -15.565 kHz x dB Bandwidth 10.109 MHz Freq/Channel Center Freq 2.41200000 GHz Start Freq 2.39700000 GHz Stop Freq 2.42700000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off
2437	 Agilent R T Ch Freq 2.437 GHz Trig Free Occupied Bandwidth Ref 10 dBm Atten 10 dB #Peak Log 10 dB/ Offst 11.4 dB Center 2.437 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 4 ms (401 pts) Occupied Bandwidth 14.8337 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -19.815 kHz x dB Bandwidth 10.104 MHz Freq/Channel Center Freq 2.43700000 GHz Start Freq 2.42200000 GHz Stop Freq 2.45200000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off
2462	 Agilent R T Ch Freq 2.462 GHz Trig Free Occupied Bandwidth Ref 10 dBm Atten 10 dB #Peak Log 10 dB/ Offst 11.4 dB Center 2.462 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 4 ms (401 pts) Occupied Bandwidth 14.7956 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -11.659 kHz x dB Bandwidth 10.117 MHz Freq/Channel Center Freq 2.46200000 GHz Start Freq 2.44700000 GHz Stop Freq 2.47700000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off

Mode 3: IEEE 802.11g link mode_ANT-0

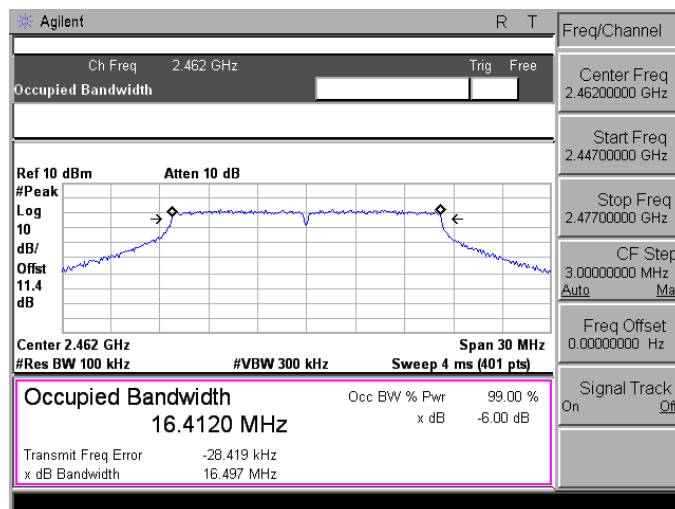
2412



2437

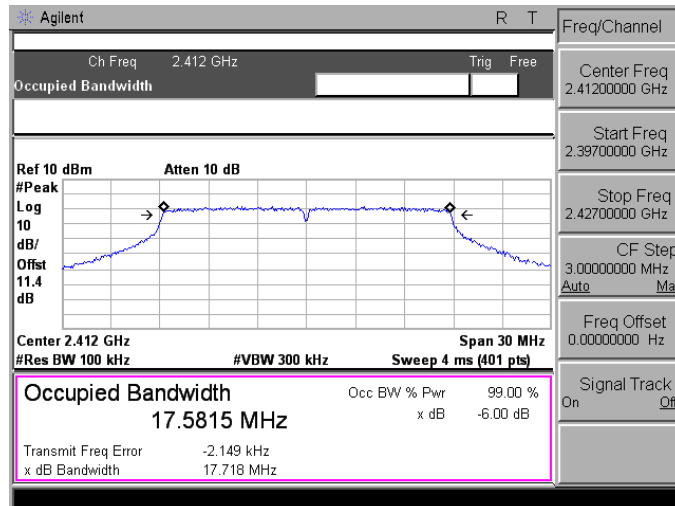


2462

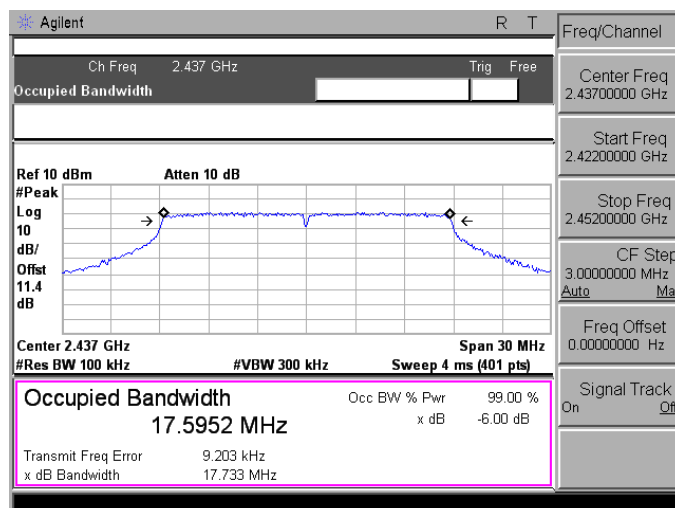


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode_ANT-0

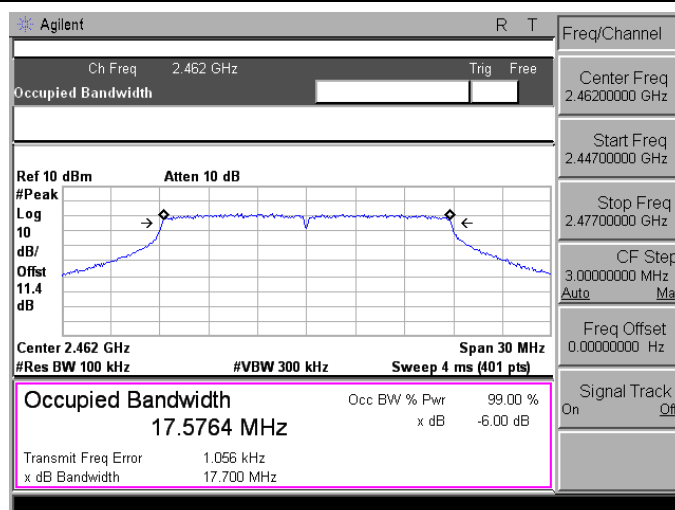
2412



2437

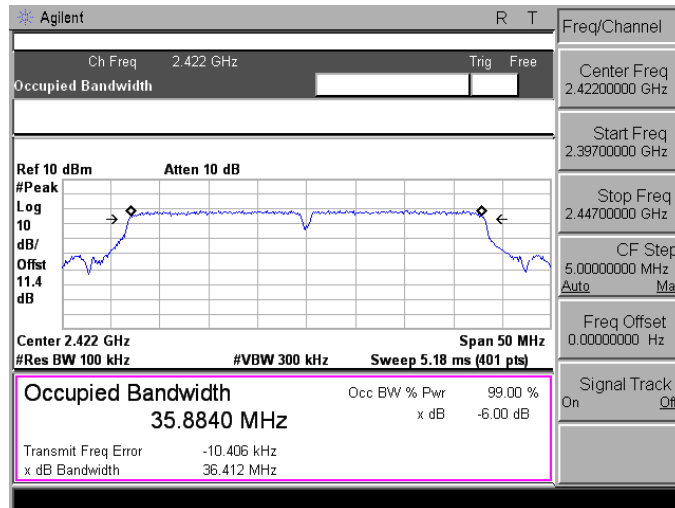


2462

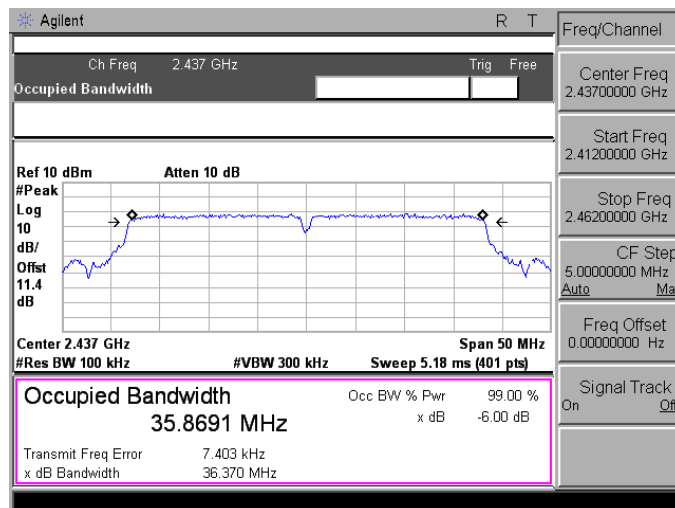


Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode_ANT-0

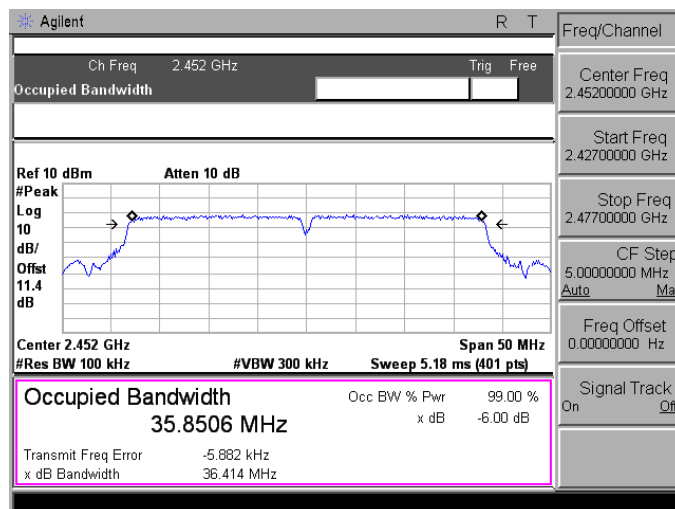
2422



2437

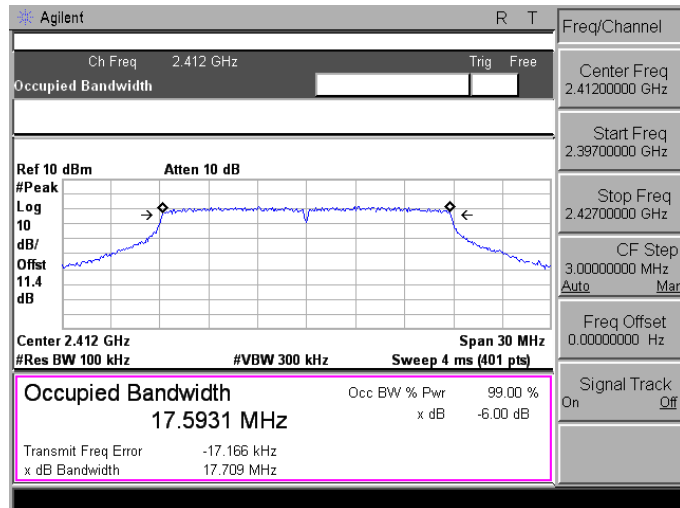


2452

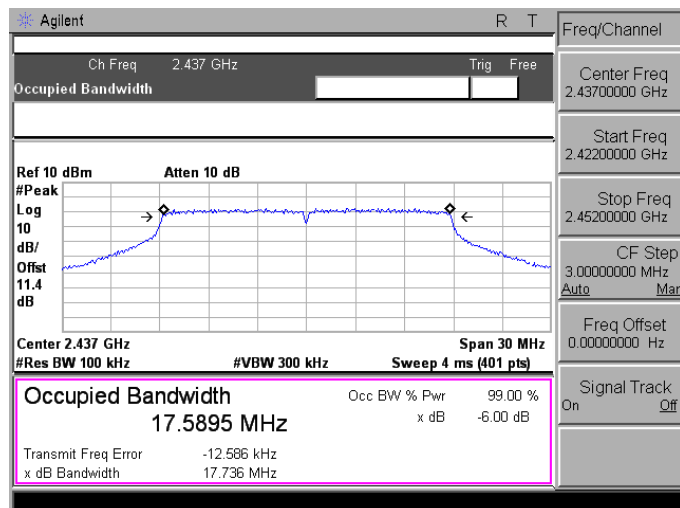


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode_ANT-1

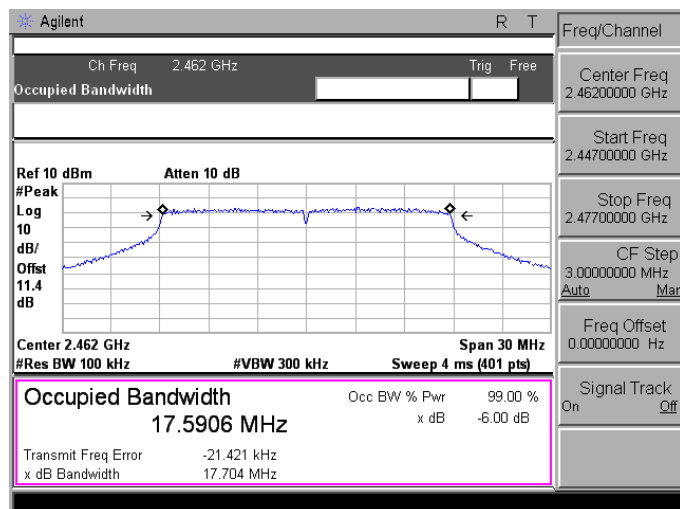
2412



2437

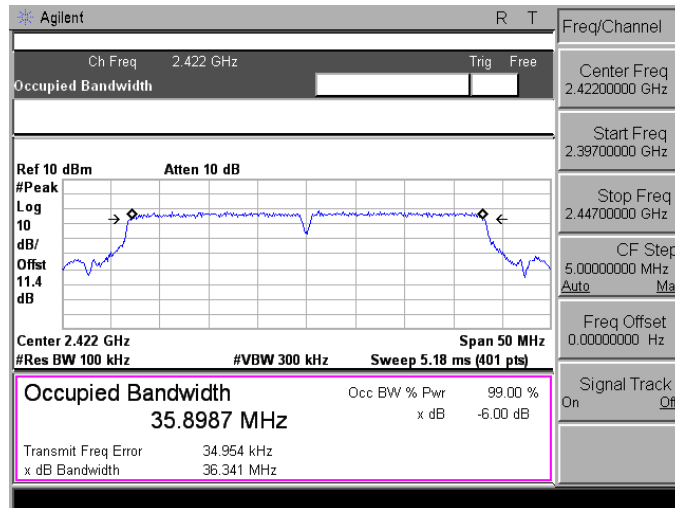


2462

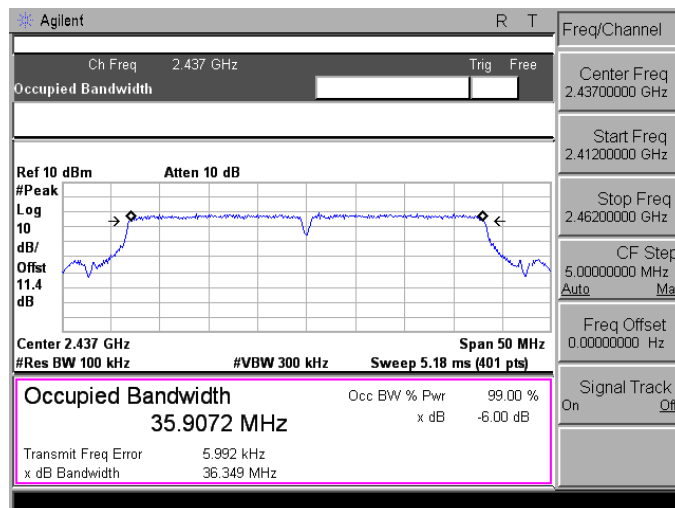


Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode_ANT-1

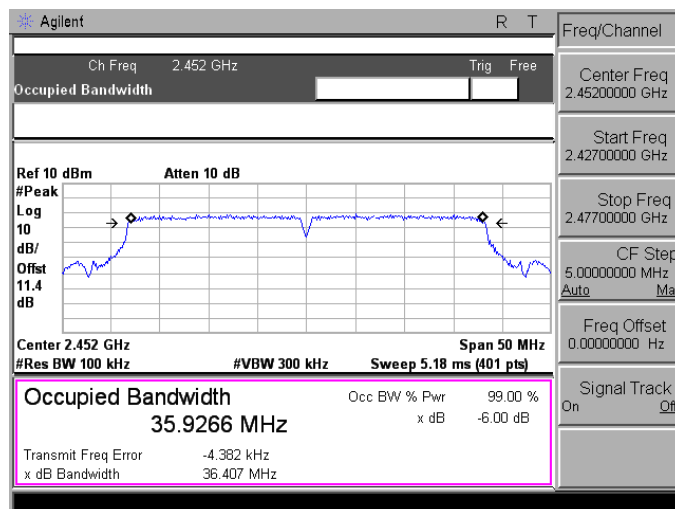
2422



2437



2452

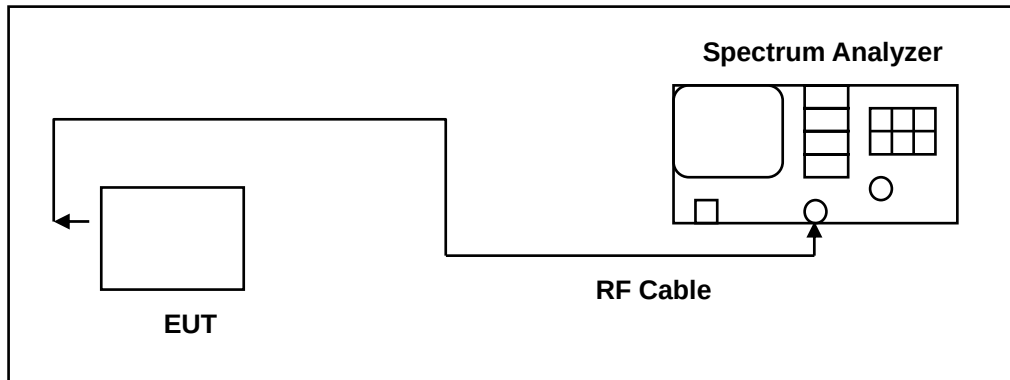


8 Maximum Power Density Measurement

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	12/16/2014	(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.

8.4. Test Procedure

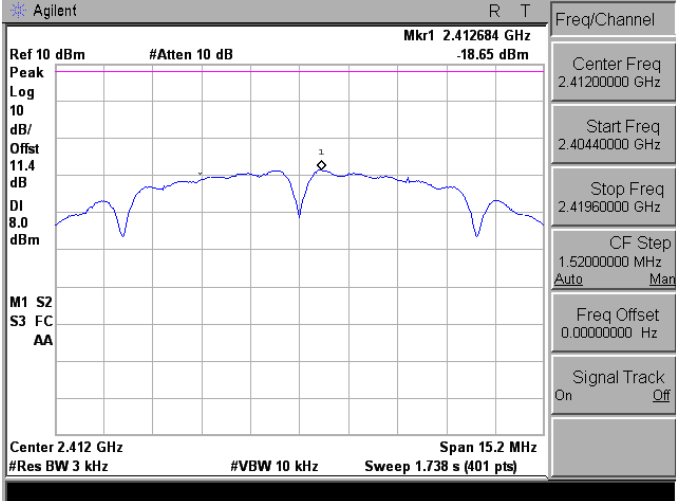
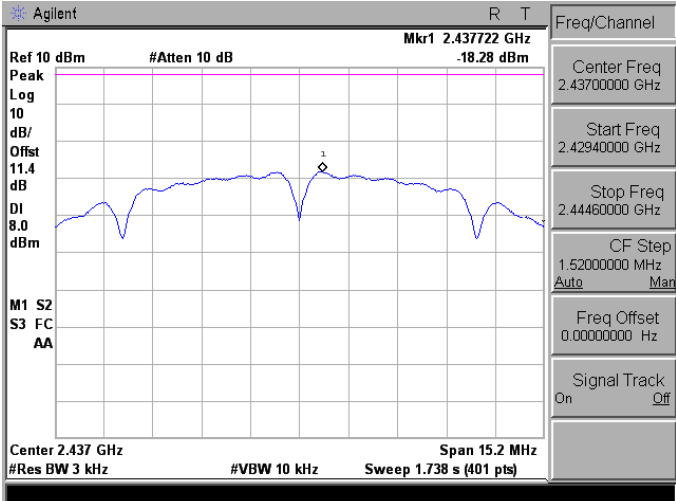
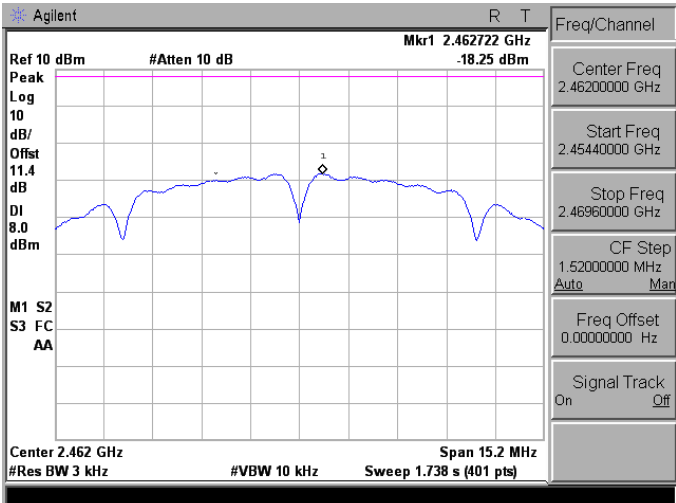
The EUT tested to DTS test procedure of KDB558074D01 for compliance to FCC 47CFR 15.247 requirements.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

8.5. Test Result

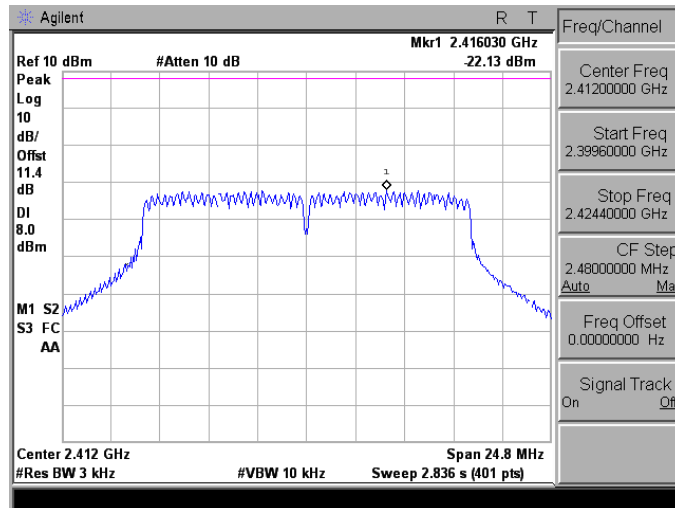
Model Number	P0510				
Test Item	Maximum Power Density				
Test Mode	Mode 2: IEEE 802.11b link mode Mode 3: IEEE 802.11g link mode Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode				
Date of Test	09/02/2015			Test Site	TE05
Test Mode	Frequency (MHz)	Measurement (dBm/3KHz)			Limit (dBm/3KHz)
		ANT-0	ANT-1	ANT-0+1	
Mode 2	2412	-18.65	---	---	< 8
	2437	-18.28	---	---	< 8
	2462	-18.25	---	---	< 8
Mode 3	2412	-22.13	---	---	< 8
	2437	-22.18	---	---	< 8
	2462	-22.18	---	---	< 8
Mode 4	2412	-22.26	-22.74	-19.48	< 8
	2437	-21.33	-22.01	-18.65	< 8
	2462	-21.47	-21.77	-18.61	< 8
Mode 5	2422	-23.23	-25.56	-21.23	< 8
	2437	-25.15	-25.39	-22.26	< 8
	2452	-24.06	-25.79	-21.83	< 8

8.6. Test Graphs

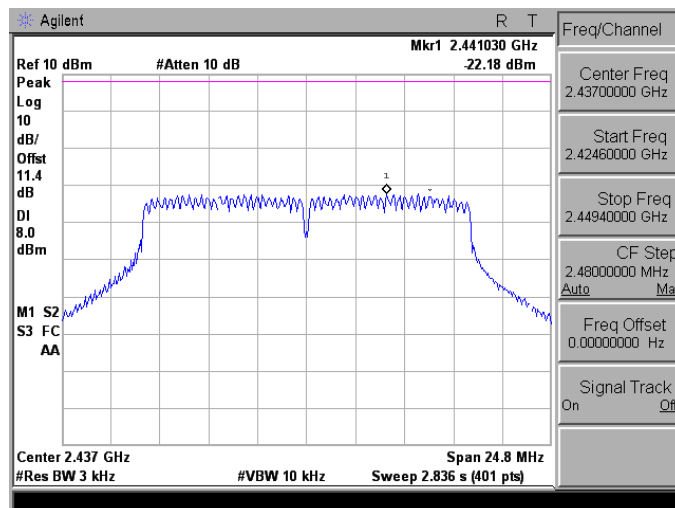
Mode 2: IEEE 802.11b link mode_ANT-0	
2412	
2437	
2462	

Mode 3: IEEE 802.11g link mode_ANT-0

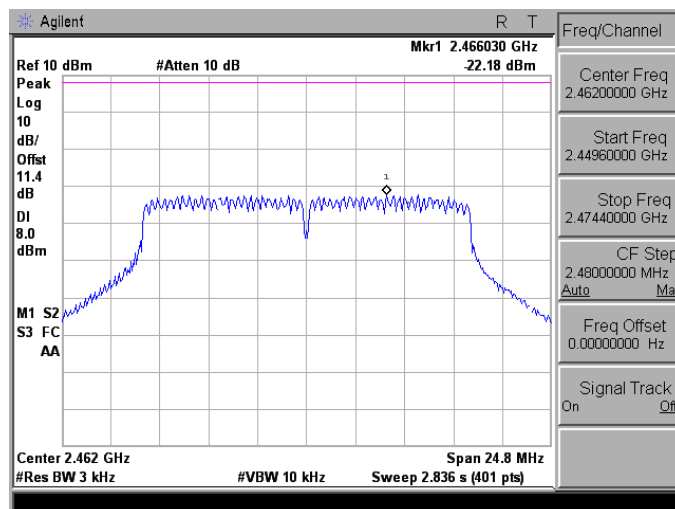
2412



2437

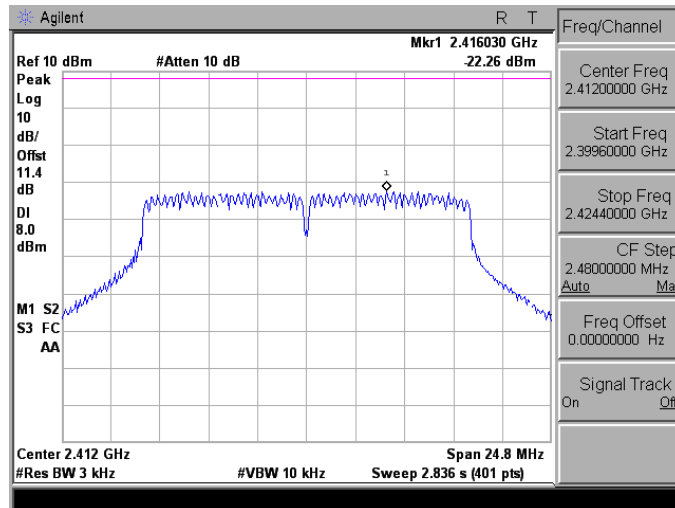


2462

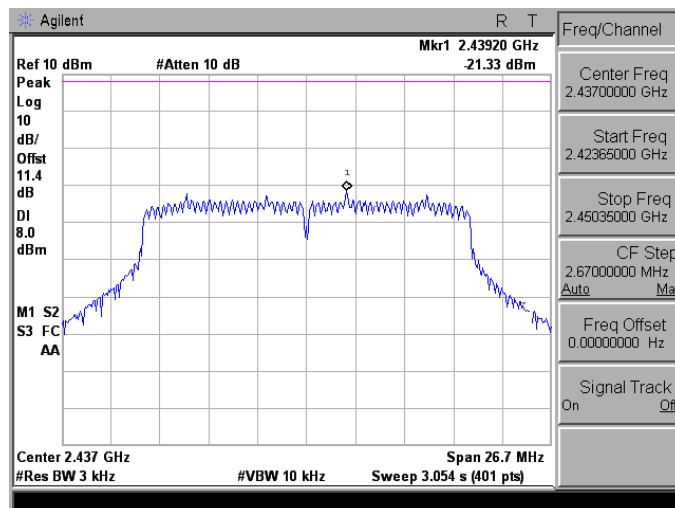


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode_ANT-0

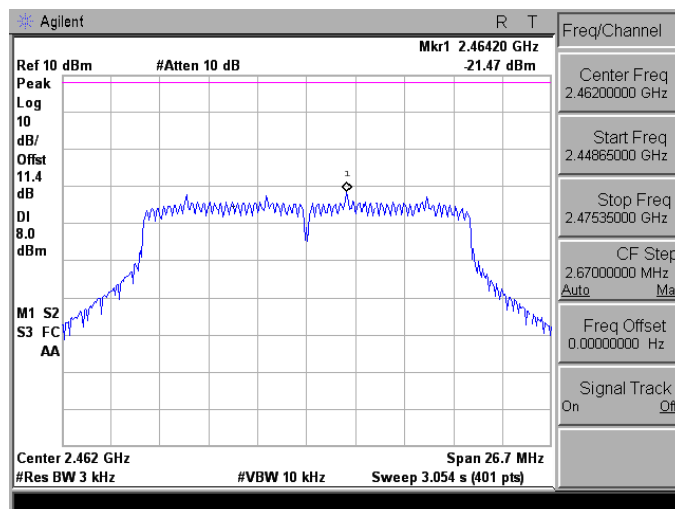
2412



2437

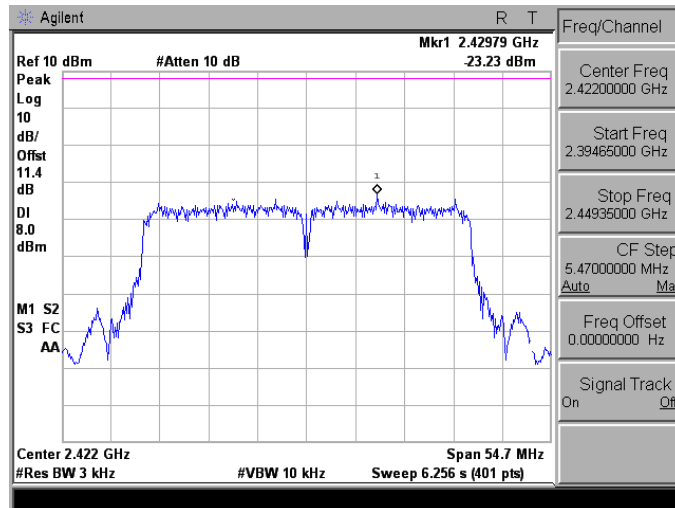


2462

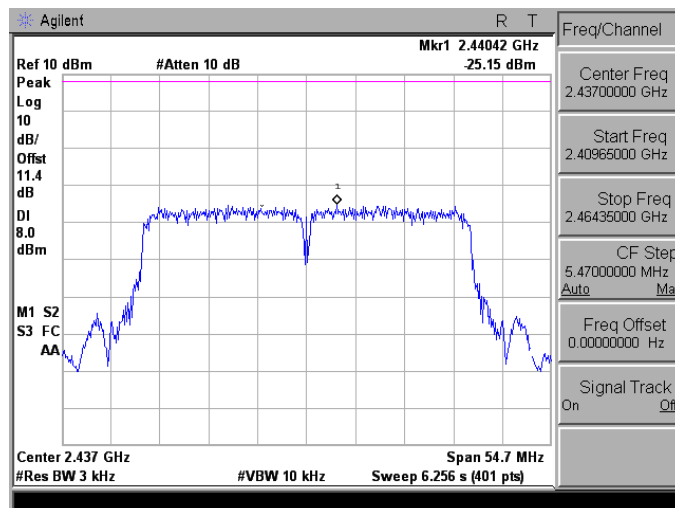


Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode_ANT-0

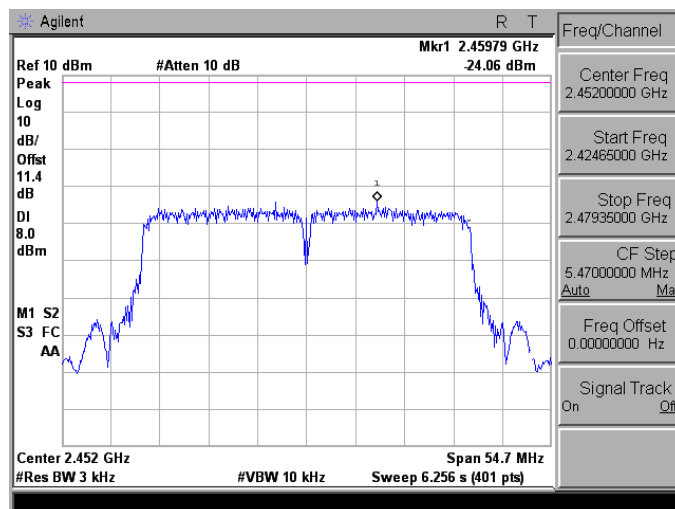
2422



2437

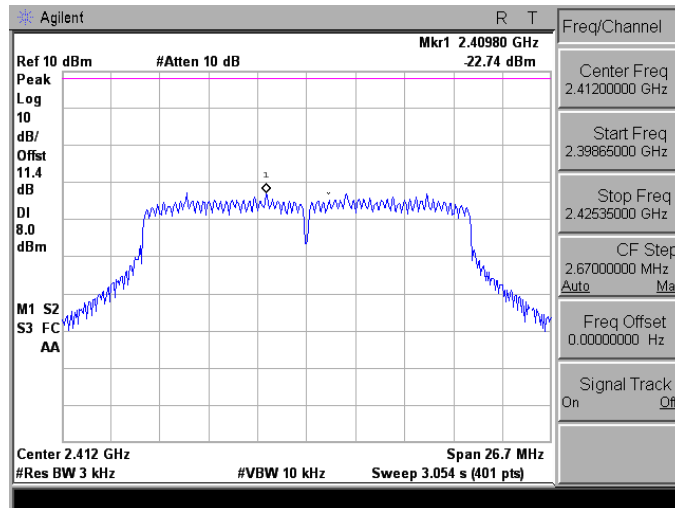


2452

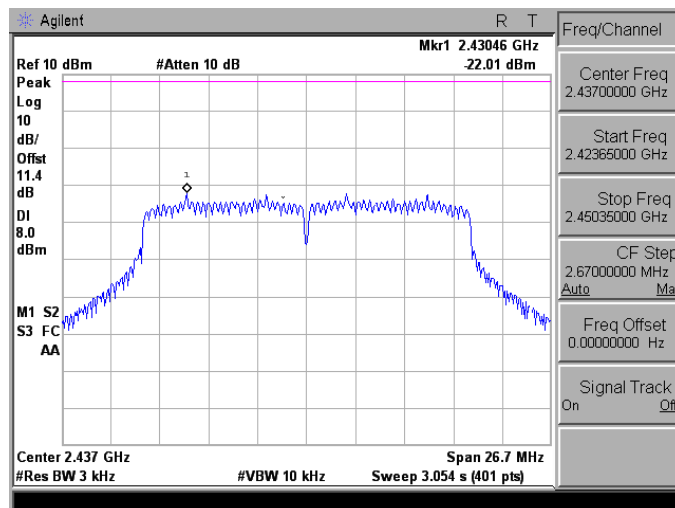


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode_ANT-1

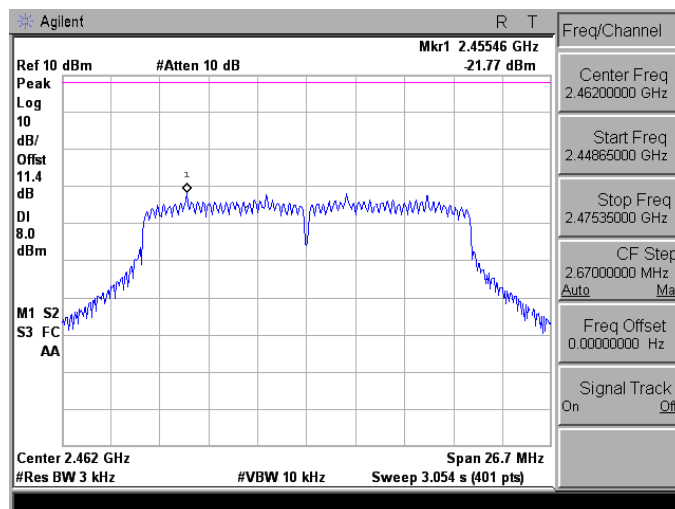
2412



2437

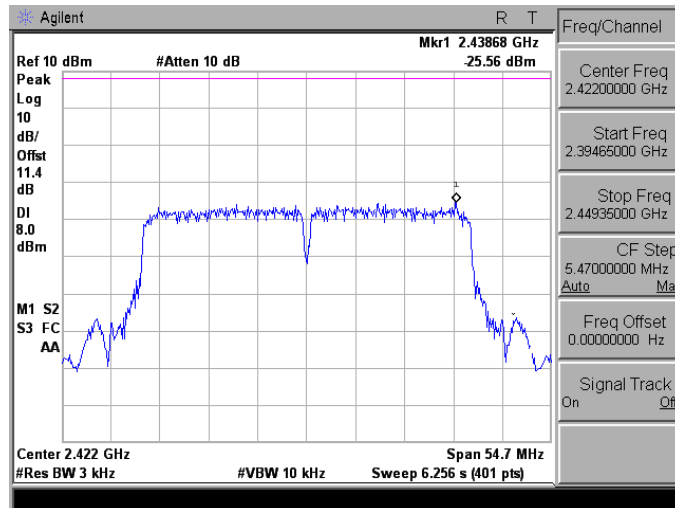


2462

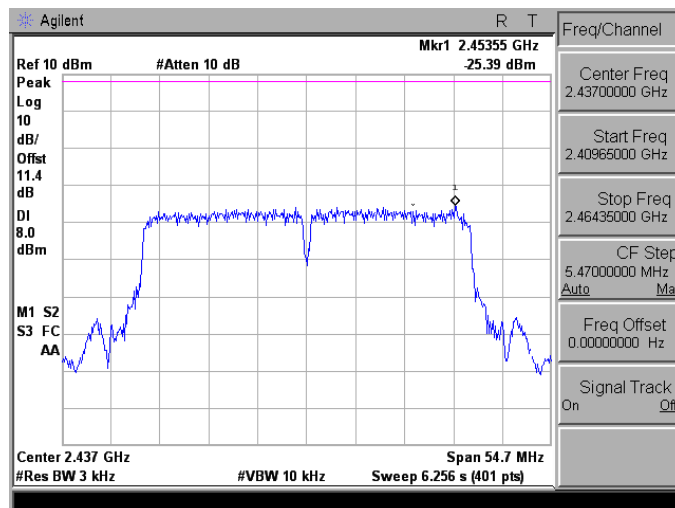


Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode_ANT-1

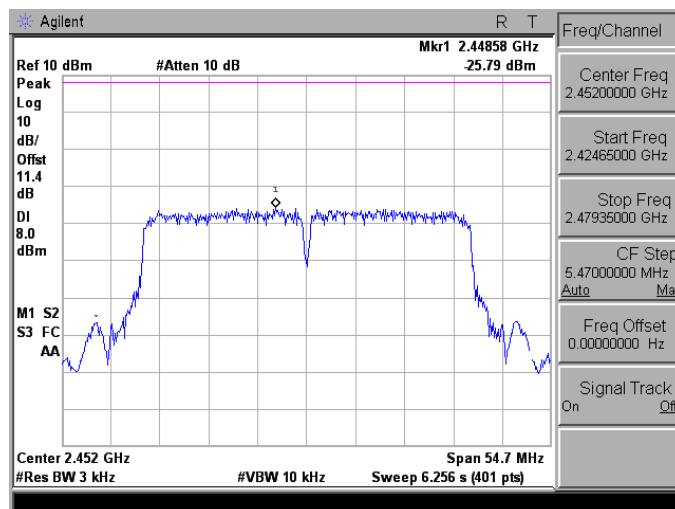
2422



2437



2452

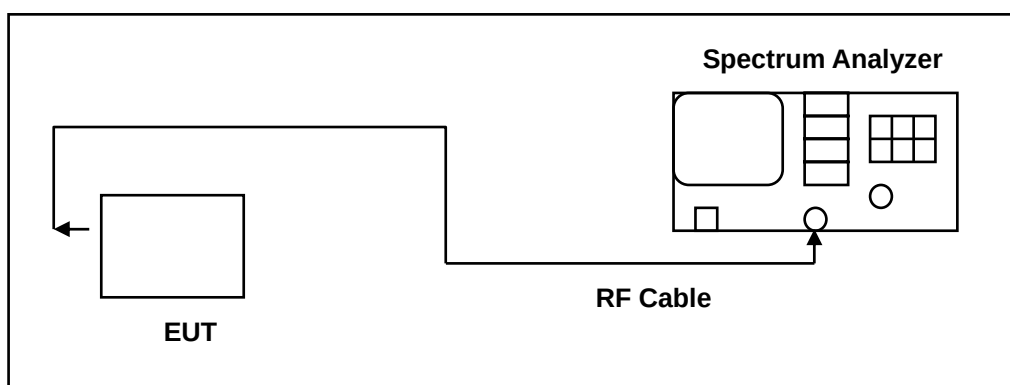


9 Out of Band Conducted Emissions Measurement

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	12/16/2014	(1)
Spectrum Analyzer	Agilent	E4408B	MY45107753	07/27/2015	(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.

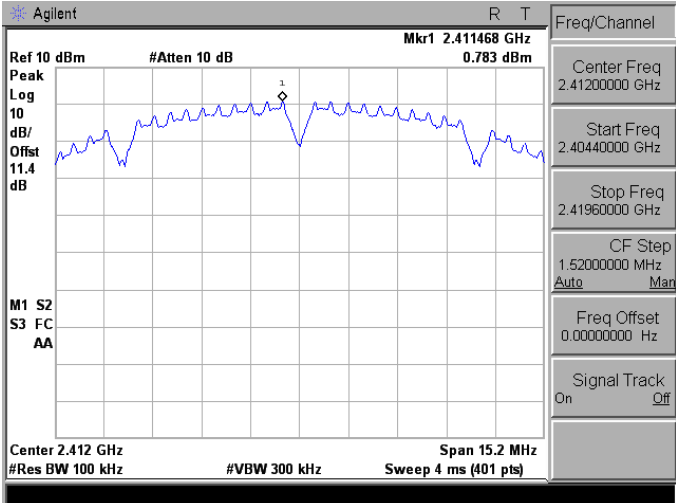
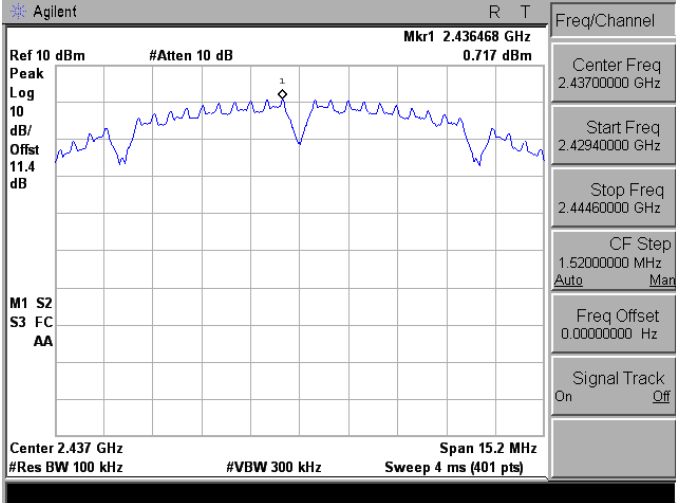
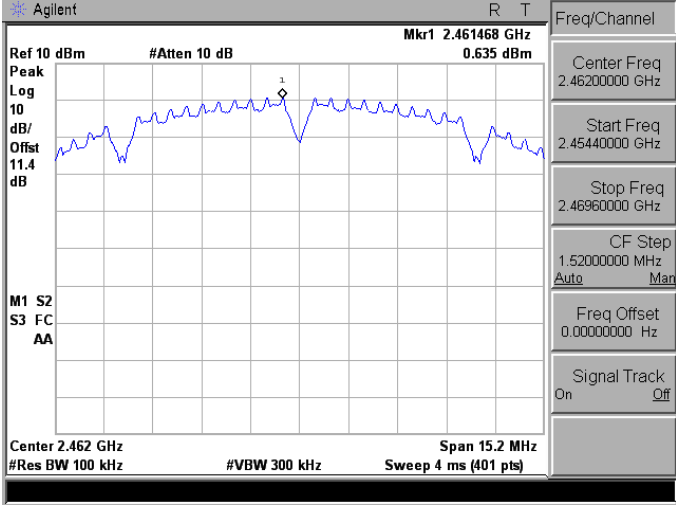
9.4. Test Procedure

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.

9.5. Test Graphs

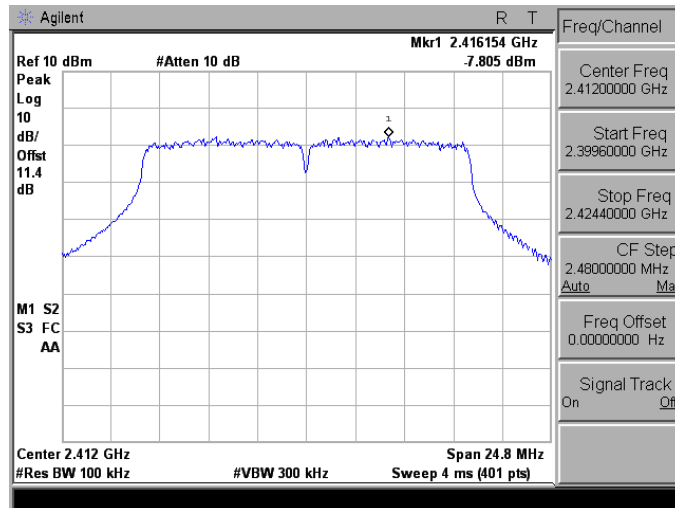
Reference level

Mode 2: IEEE 802.11b link mode_ANT-0

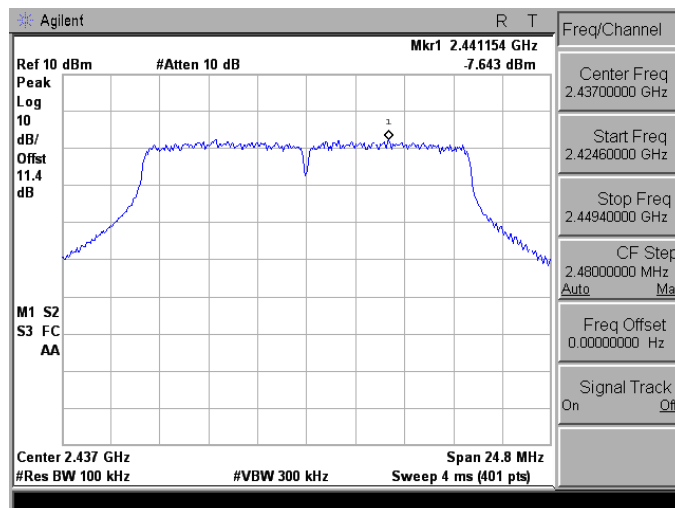
2412	
2437	
2462	

Mode 3: IEEE 802.11g link mode_ANT-0

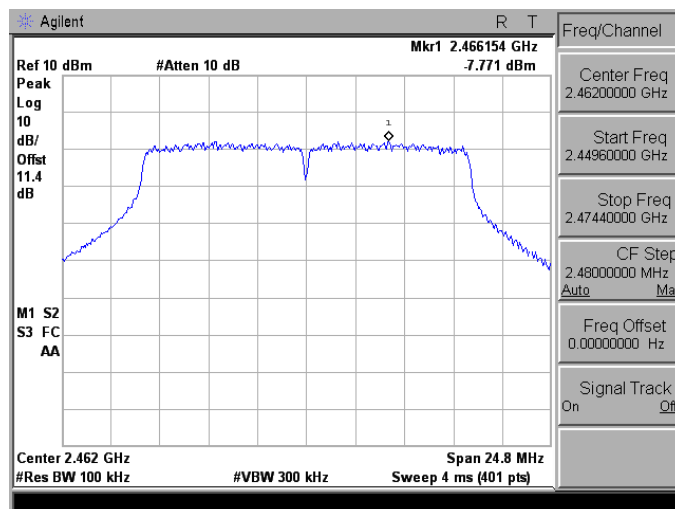
2412



2437

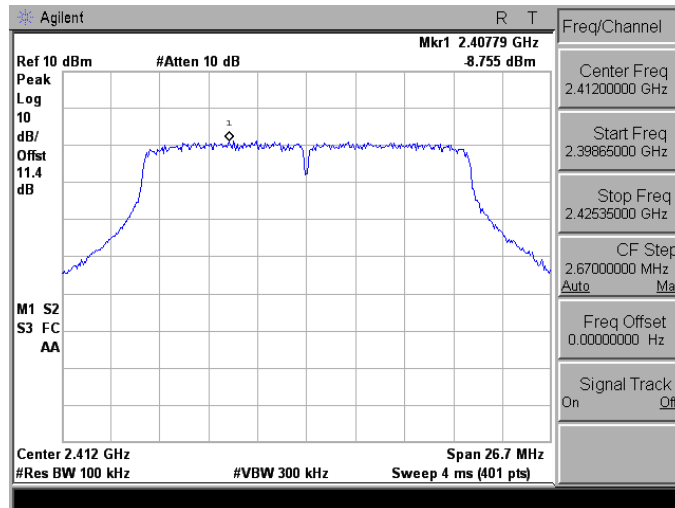


2462

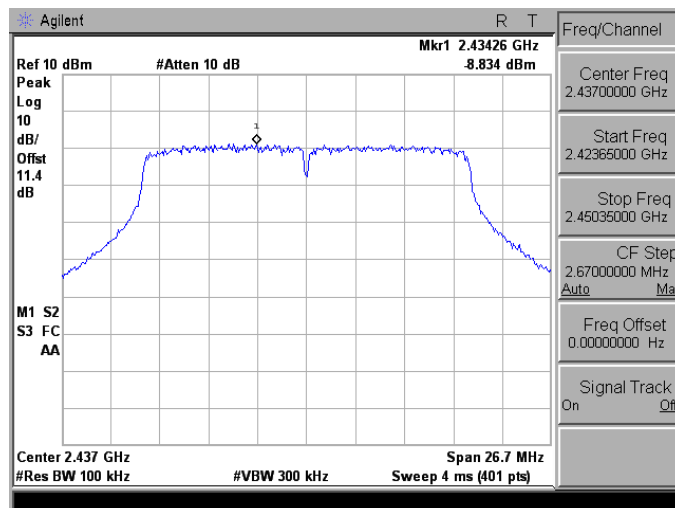


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode_ANT-0

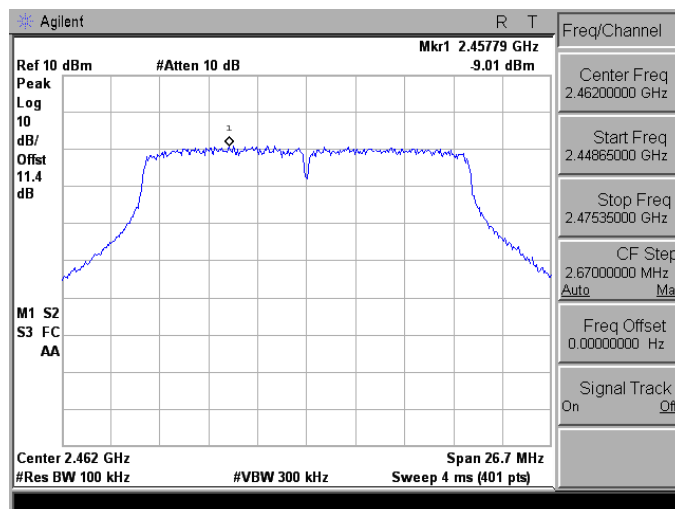
2412



2437

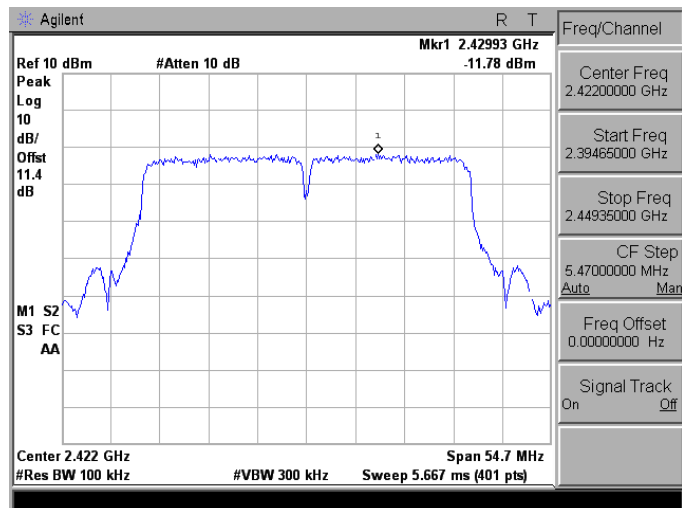


2462

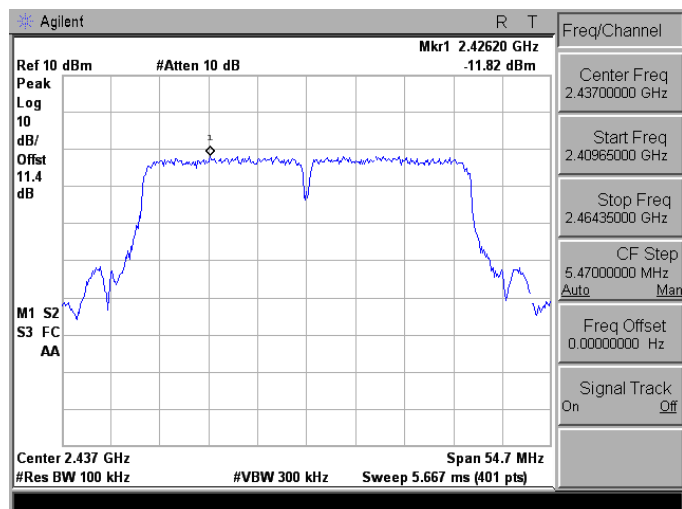


Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode_ANT-0

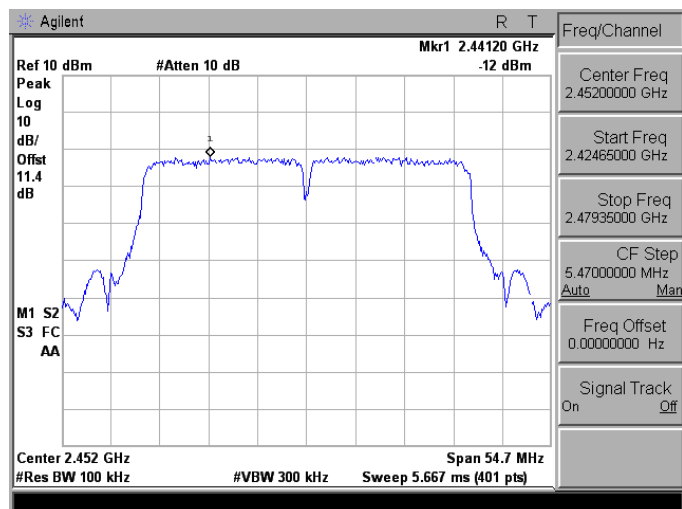
2422



2437

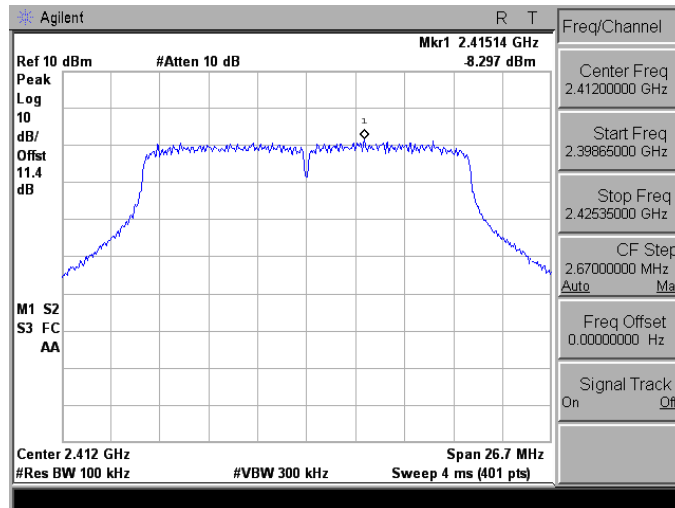


2452

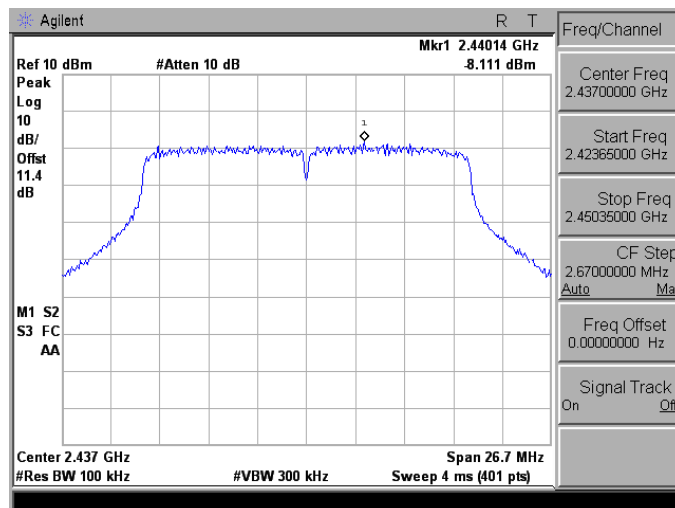


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode_ANT-1

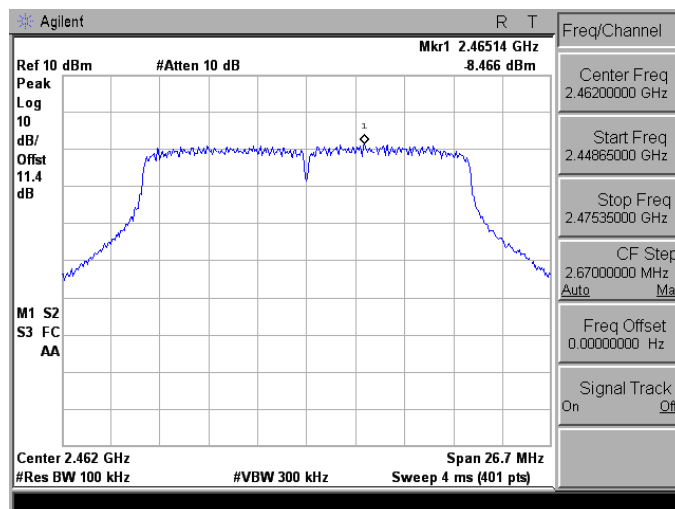
2412



2437

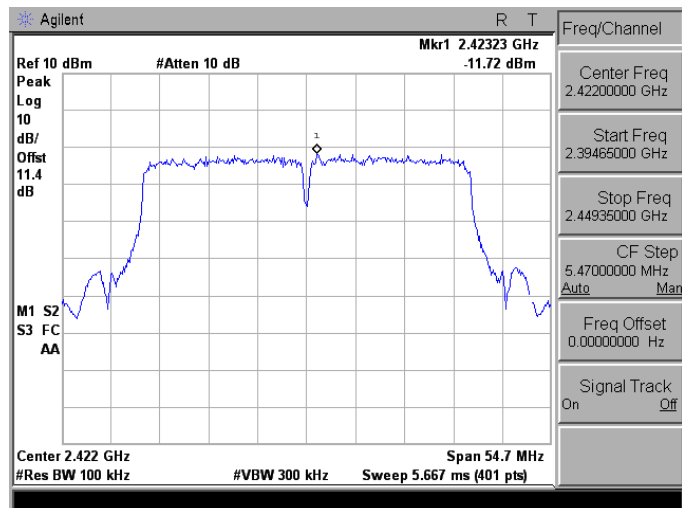


2462

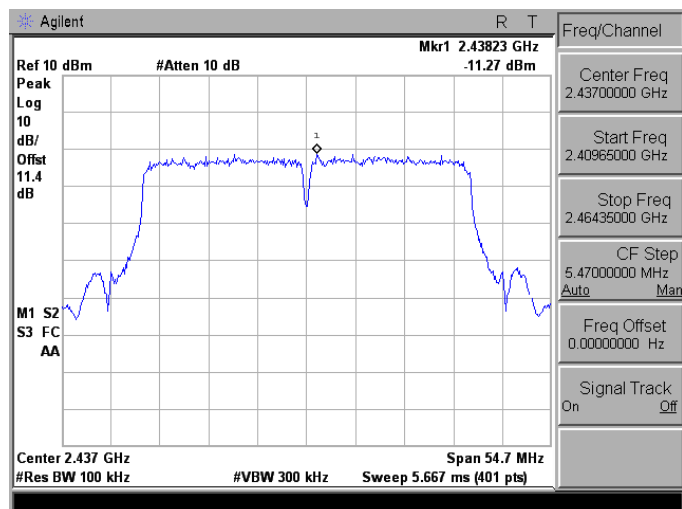


Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode_ANT-1

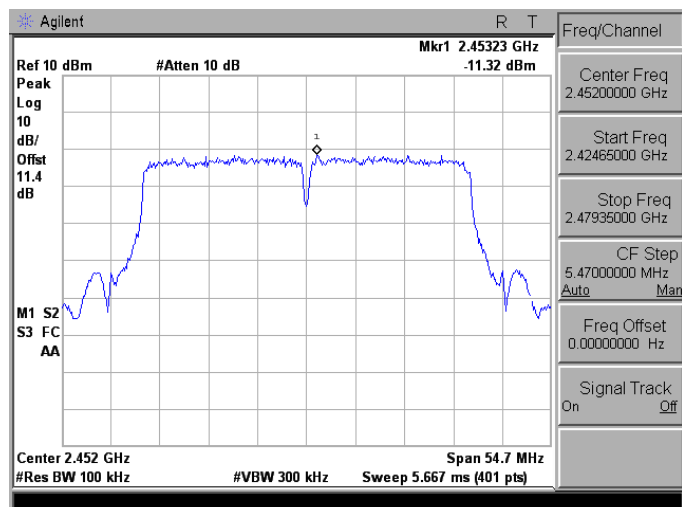
2422



2437



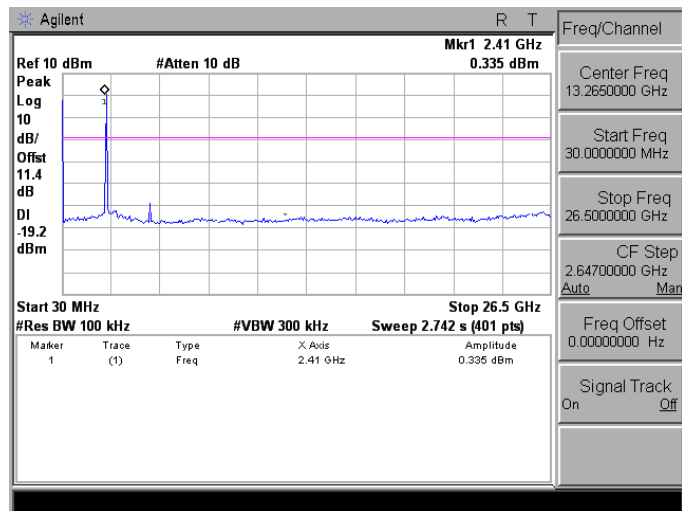
2452



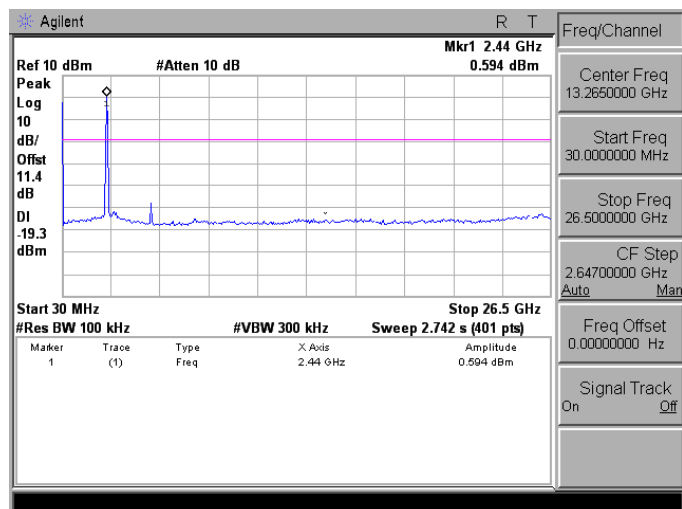
Out of Band Conducted Emissions

Mode 2: IEEE 802.11b link mode_ANT-0

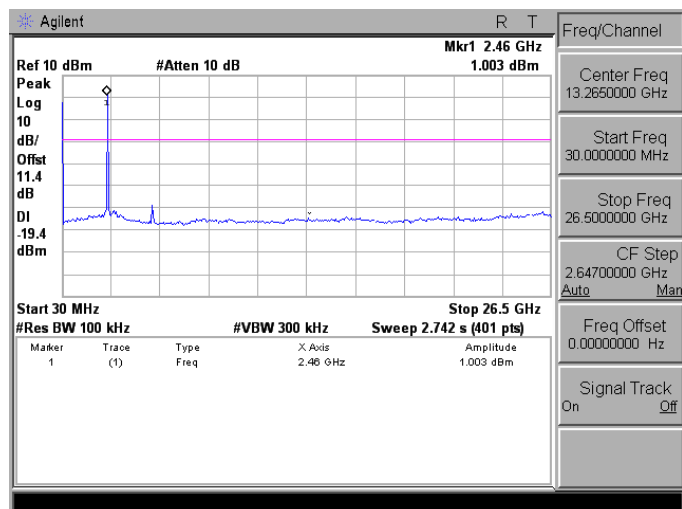
2412



2437

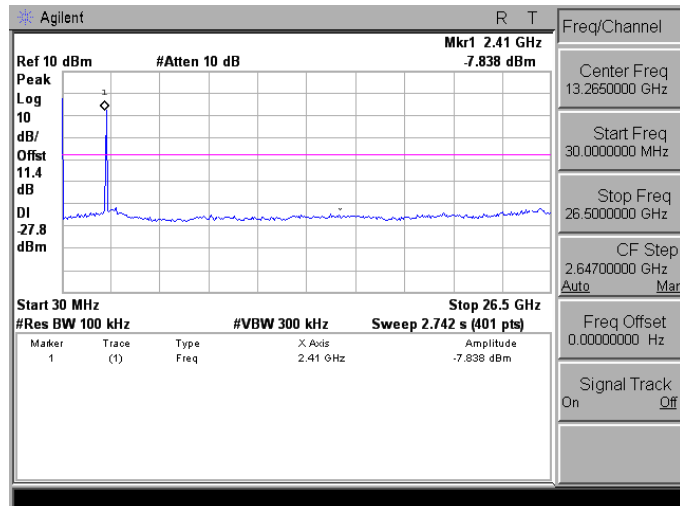


2462

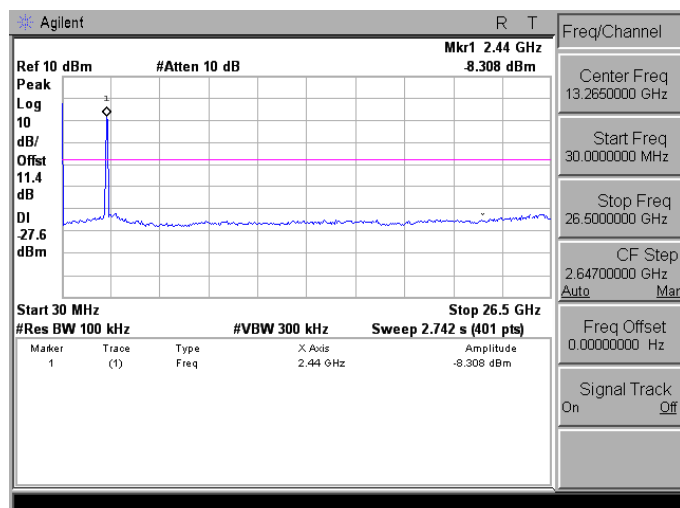


Mode 3: IEEE 802.11g link mode_ANT-0

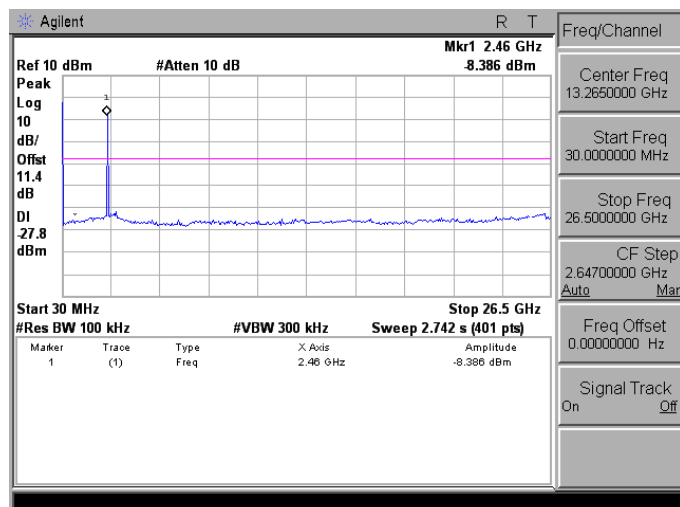
2412



2437

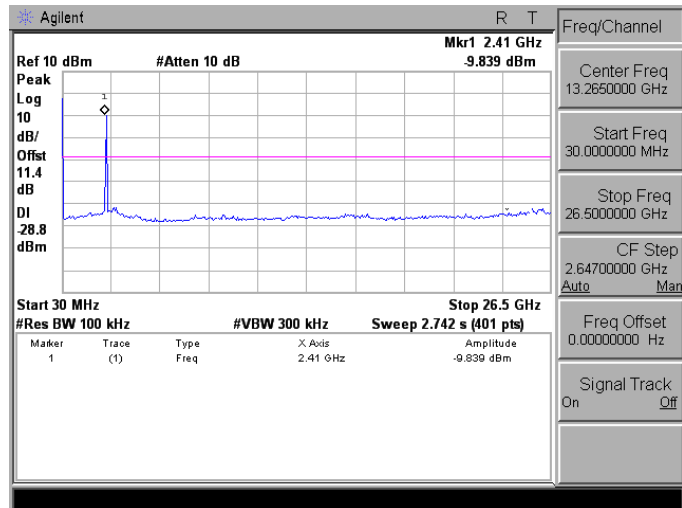


2462

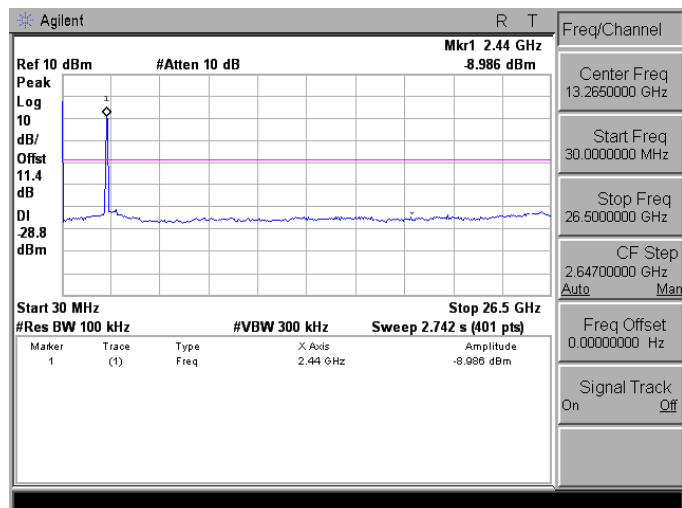


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode_ANT-0

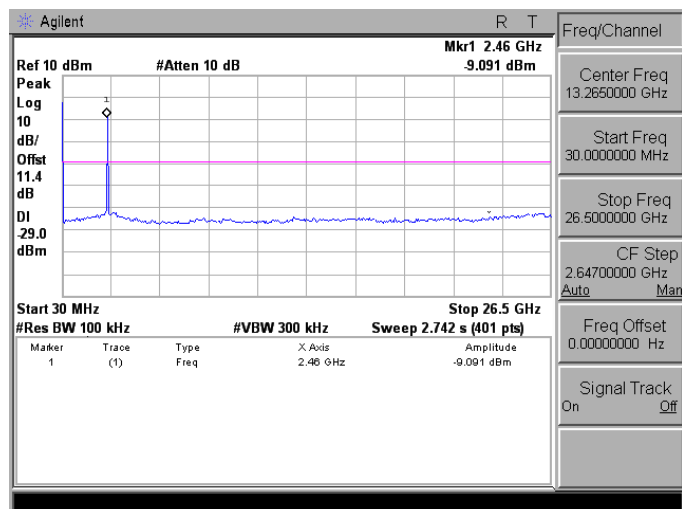
2412



2437

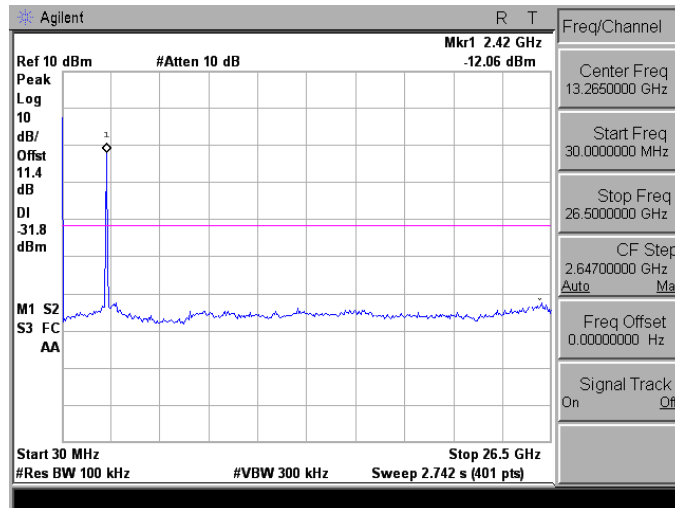


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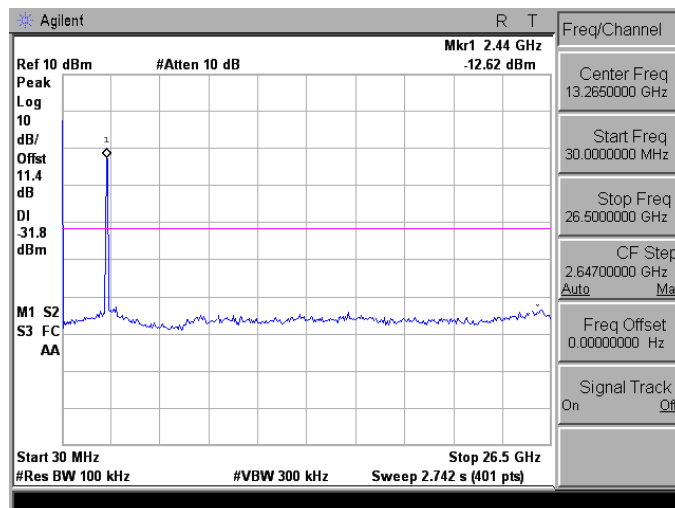


Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode_ANT-0

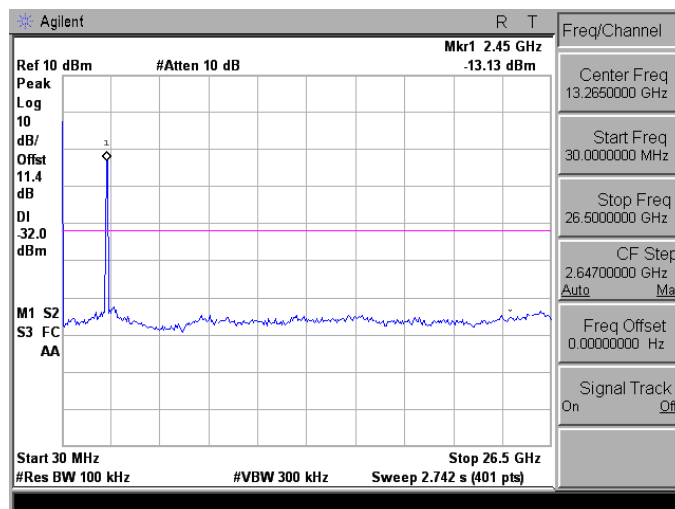
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2437

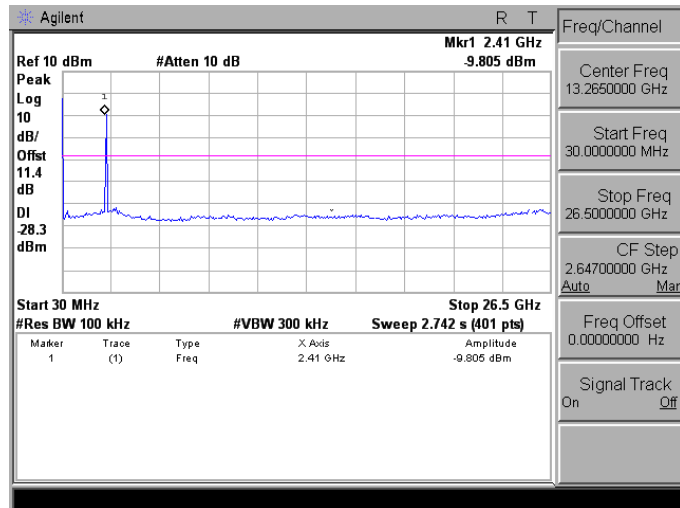


2452

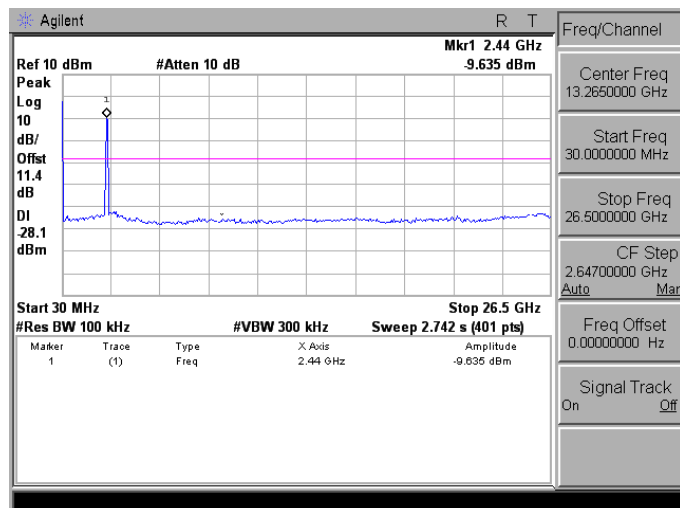


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode_ANT-1

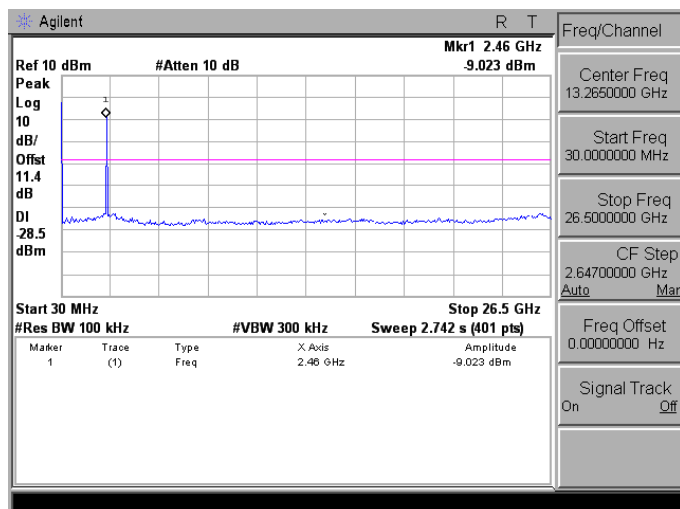
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2437

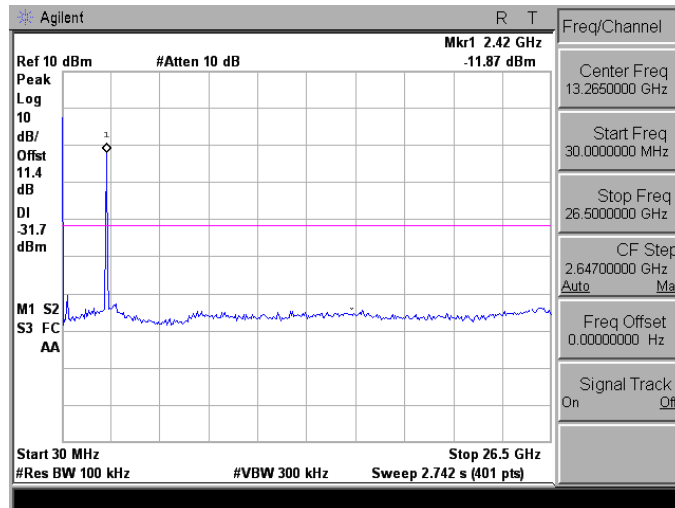


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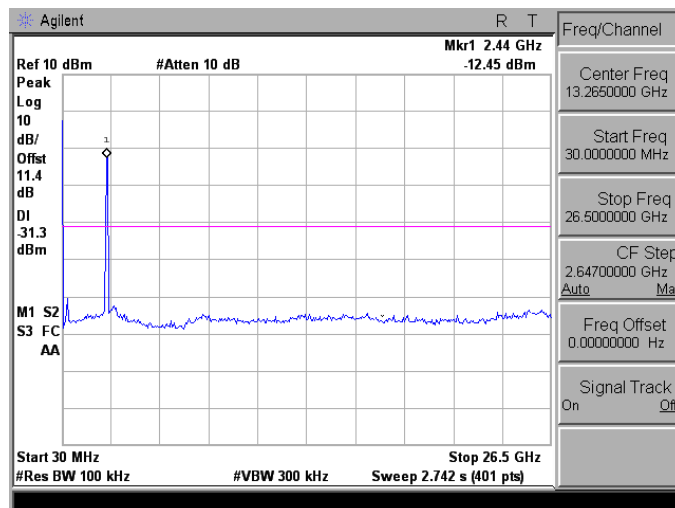


Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode_ANT-1

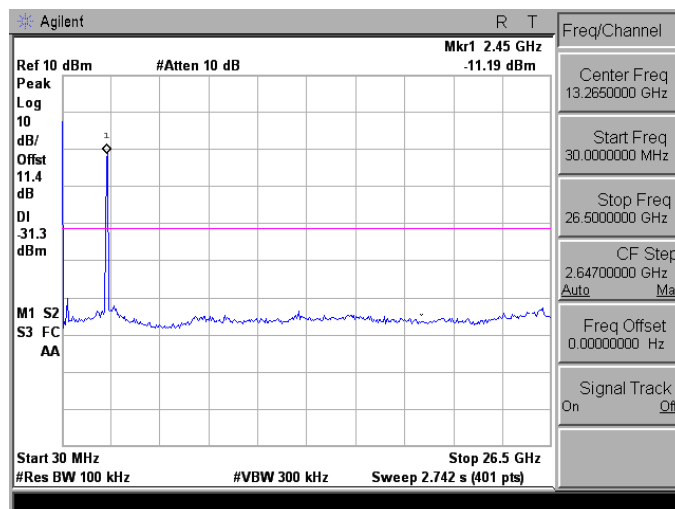
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2437



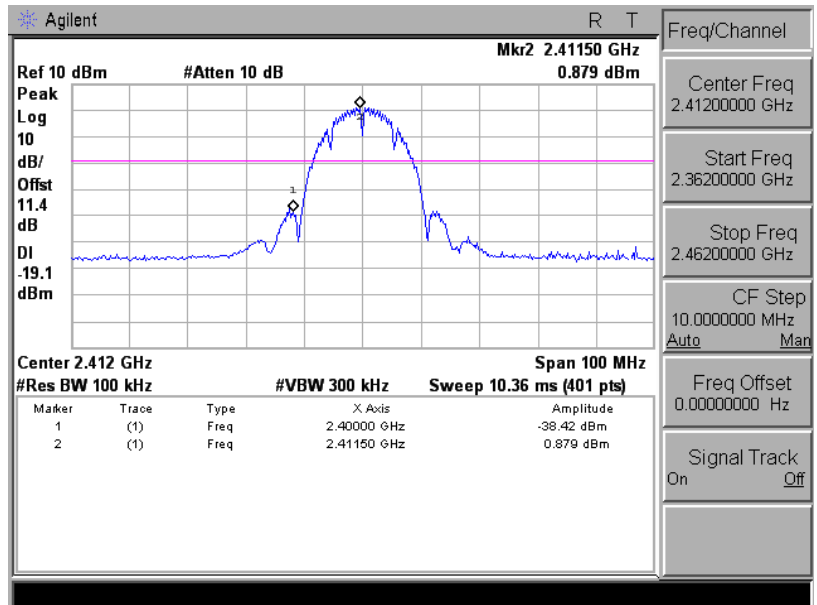
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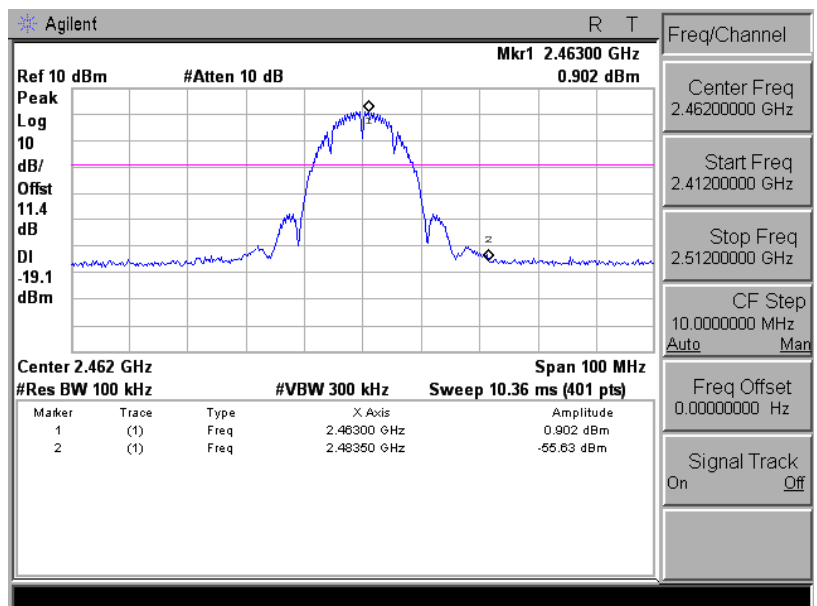
Conducted Band Edge

Mode 2: IEEE 802.11b link mode_ANT-0

2412

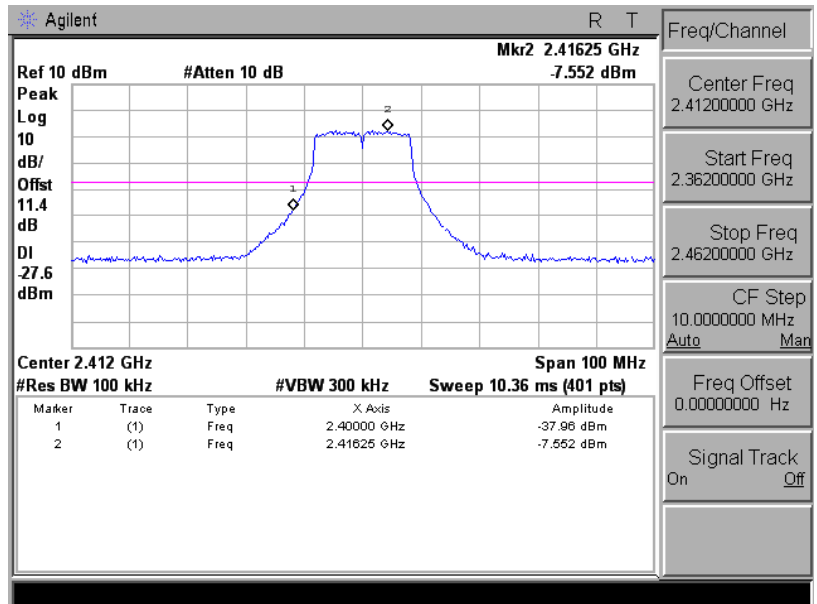


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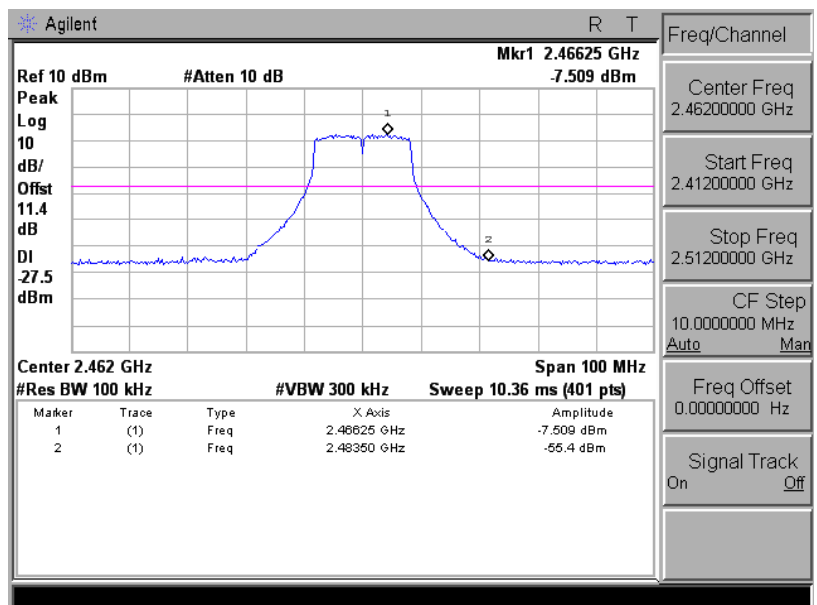


Mode 3: IEEE 802.11g link mode_ANT-0

2412

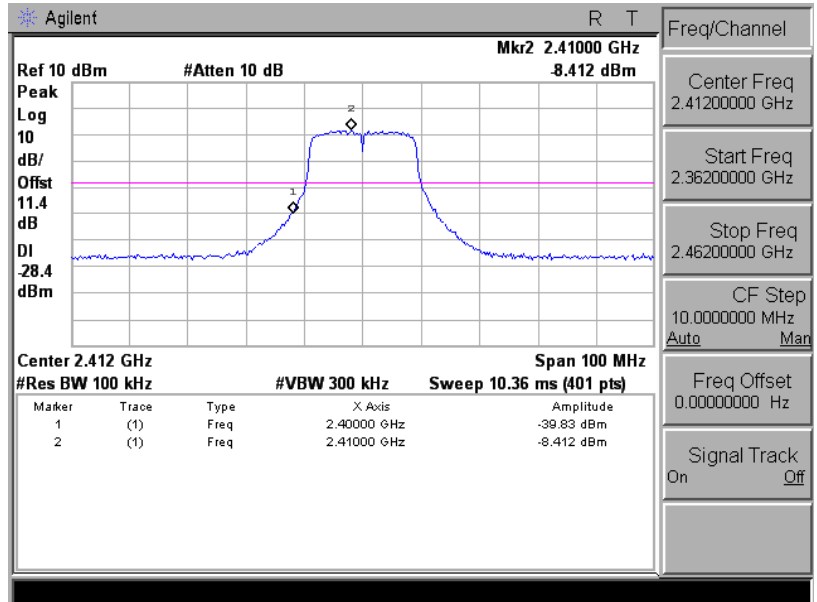


2462

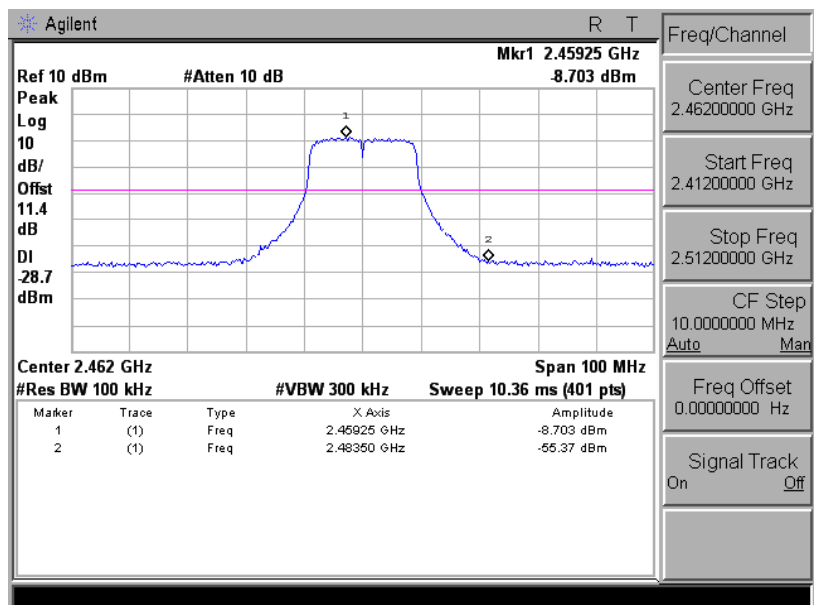


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode_ANT-0

2412

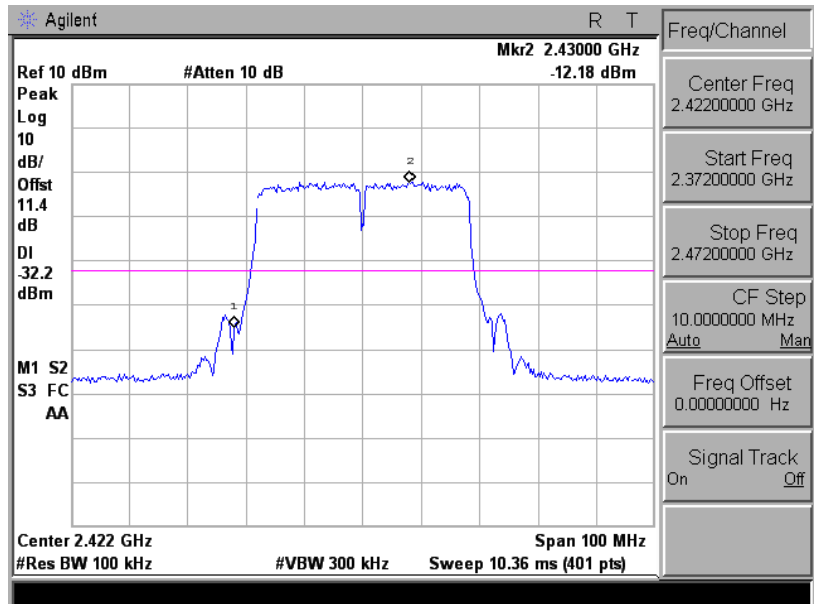


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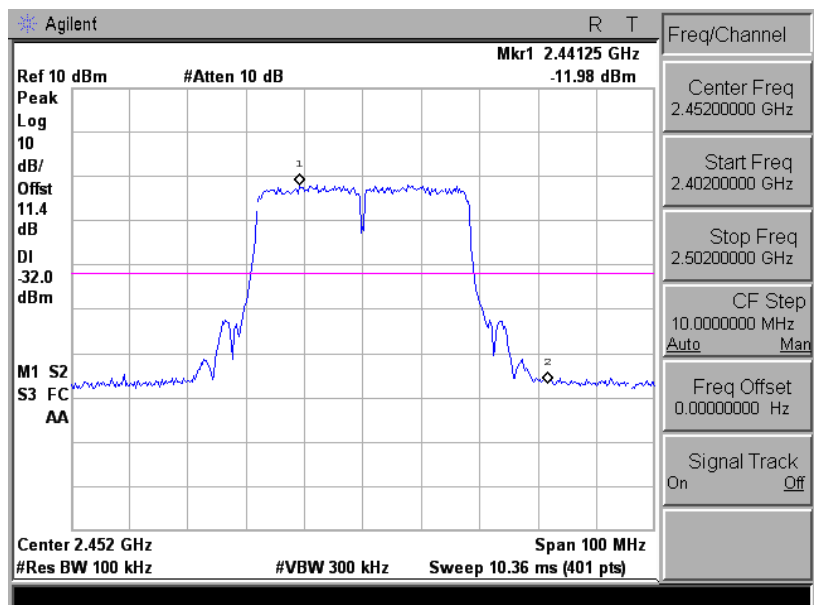


Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode_ANT-0

2422

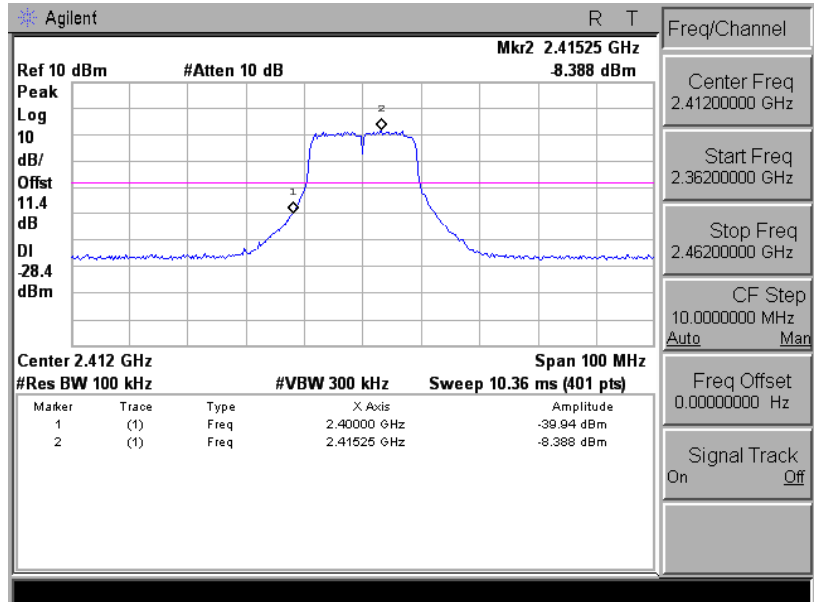


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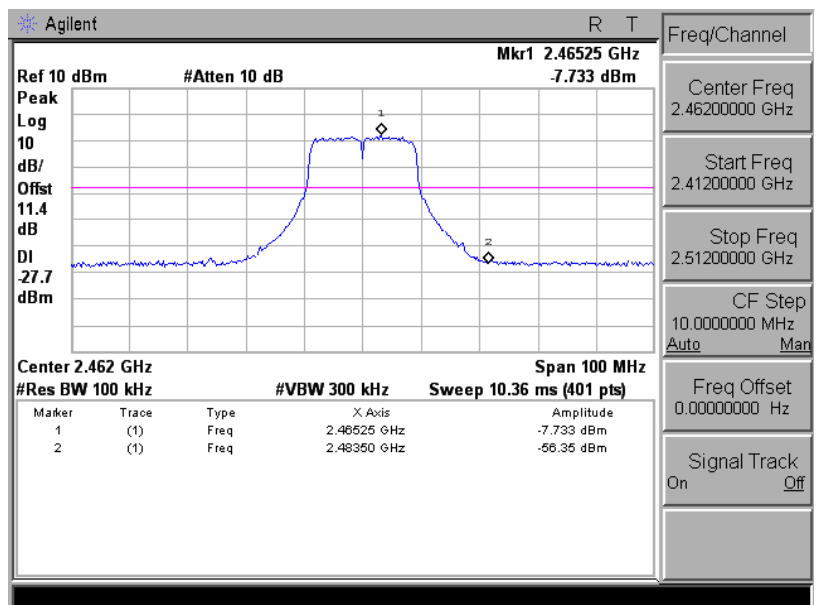


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode_ANT-1

2412

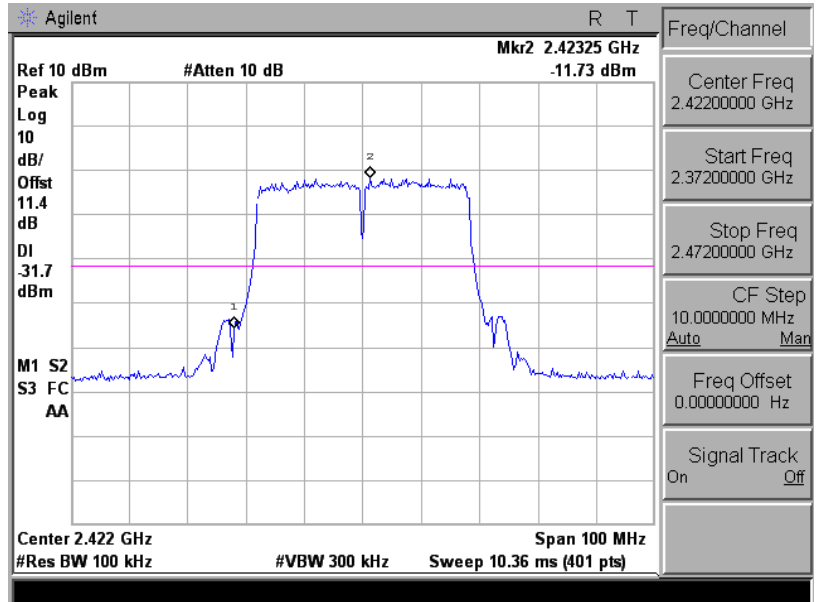


2462

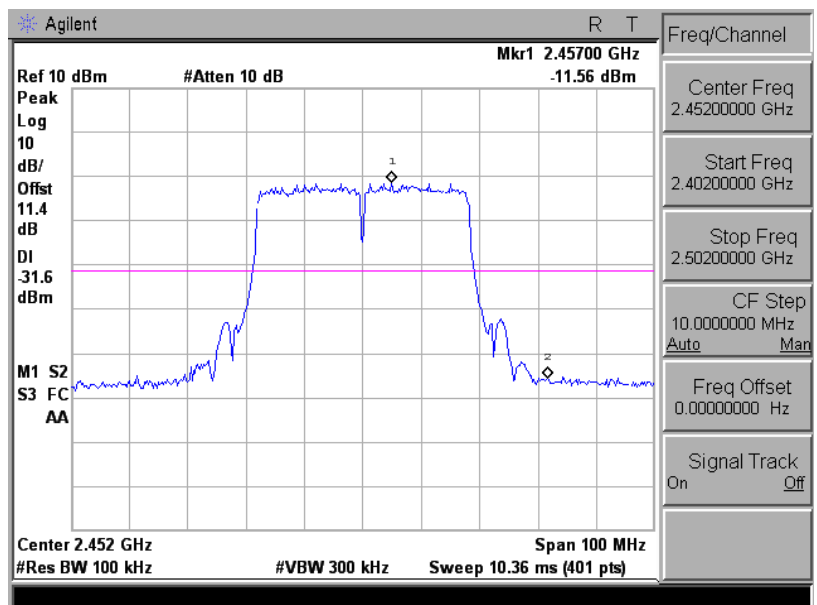


Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode_ANT-1

2422



2452

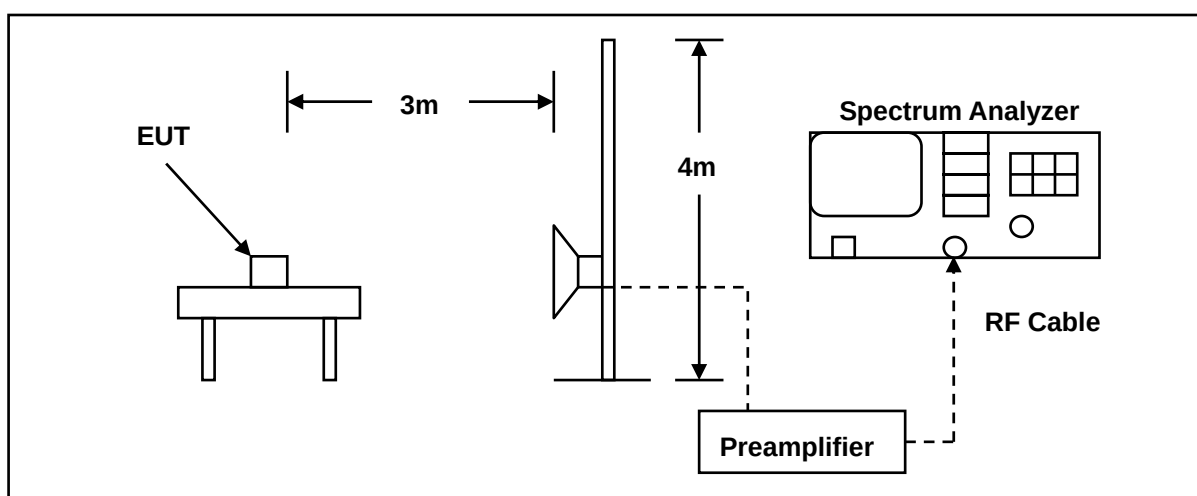


10 Band Edges Measurement

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	01/06/2015	(1)
Spectrum Analyzer	Agilent	E4446A	MY46180578	01/06/2015	(1)
Pre Amplifier	Agilent	8449B	3008A02237	02/24/2015	(1)
Pre Amplifier	Agilent	8447D	2944A10961	02/24/2015	(1)
Horn Antenna (1~18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	06/12/2015	(1)
Microwave Cable	EMCI	EMC-104-SM-S M-14000	140202	02/24/2015	(1)
Microwave Cable	EMCI	EMC104-SM-S M-600	140301	02/24/2015	(1)
Test Site	ATL	TE01	888001	08/28/2015	(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 tested to DTS test procedure of KDB558074D01 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 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 when Duty cycle >98% / 1/T for average measurements when Duty cycle <98%.

10.5. Test Result

Standard:		FCC Part 15C		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		P0510		Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Mode:		Mode 2		Date:		09/02/2015	
Frequency:		2412 MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2379.630	50.65	-0.51	50.14	74.00	-23.86	peak	H
2390.000	47.87	-0.46	47.41	74.00	-26.59	peak	H
2349.380	50.22	-0.64	49.58	74.00	-24.42	peak	V
2390.000	47.77	-0.46	47.31	74.00	-26.69	peak	V

Standard:		FCC Part 15C		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		P0510		Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Mode:		Mode 2		Date:		09/02/2015	
Frequency:		2462 MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2483.500	48.12	-0.06	48.06	74.00	-25.94	peak	H
2490.880	50.22	-0.03	50.19	74.00	-23.81	peak	H
2483.500	47.83	-0.06	47.77	74.00	-26.23	peak	V
2485.640	49.72	-0.05	49.67	74.00	-24.33	peak	V

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	P0510	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 3	Date:	09/02/2015
Frequency:	2412 MHz	Test By:	Eric Ou Yang

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2334.420	50.11	-0.71	49.40	74.00	-24.60	peak	H
2390.000	48.20	-0.46	47.74	74.00	-26.26	peak	H
2376.550	52.04	-0.53	51.51	74.00	-22.49	peak	V
2390.000	47.96	-0.46	47.50	74.00	-26.50	peak	V

Standard:		FCC Part 15C		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		P0510		Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Mode:		Mode 3		Date:		09/02/2015	
Frequency:		2462 MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2483.500	47.24	-0.06	47.18	74.00	-26.82	peak	H
2490.240	49.63	-0.03	49.60	74.00	-24.40	peak	H
2483.500	49.18	-0.06	49.12	74.00	-24.88	peak	V
2496.480	50.31	0.00	50.31	74.00	-23.69	peak	V

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	P0510	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4	Date:	09/02/2015
Frequency:	2412 MHz	Test By:	Eric Ou Yang

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2375.780	49.65	-0.53	49.12	74.00	-24.88	peak	H
2390.000	48.33	-0.46	47.87	74.00	-26.13	peak	H
2375.230	50.40	-0.53	49.87	74.00	-24.13	peak	V
2390.000	48.70	-0.46	48.24	74.00	-25.76	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	P0510			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 4			Date:	09/02/2015		
Frequency:	2462 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2483.500	47.30	-0.06	47.24	74.00	-26.76	peak	H
2486.320	49.23	-0.05	49.18	74.00	-24.82	peak	H
2483.500	48.50	-0.06	48.44	74.00	-25.56	peak	V
2484.200	50.48	-0.06	50.42	74.00	-23.58	peak	V

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	P0510	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 5	Date:	09/02/2015
Frequency:	2422 MHz	Test By:	Eric Ou Yang

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2350.560	50.45	-0.64	49.81	74.00	-24.19	peak	H
2390.000	48.39	-0.46	47.93	74.00	-26.07	peak	H
2376.120	50.54	-0.53	50.01	74.00	-23.99	peak	V
2390.000	49.30	-0.46	48.84	74.00	-25.16	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	P0510			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 5			Date:	09/02/2015		
Frequency:	2452 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2483.500	47.96	-0.06	47.90	74.00	-26.10	peak	H
2487.400	49.88	-0.05	49.83	74.00	-24.17	peak	H
2483.500	48.95	-0.06	48.89	74.00	-25.11	peak	V
2485.000	51.40	-0.06	51.34	74.00	-22.66	peak	V

11 Antenna Measurement

11.1.Limit

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

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

11.2.Antenna Connector Construction

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