

Test Report

FCC Part15 Subpart C

Product Name : 300Mbps Multi-Function Wireless N Router
Model No. : TL-WR842N
FCC ID : TE7WR842NV3

Applicant : TP-LINK TECHNOLOGIES CO., LTD.
Address : Building 24 (floors 1,3,4,5) and 28 (floors1-4)
Central Science and Technology Park, Shennan
Rd, Nanshan, Shenzhen, China

Date of Receipt : Sept. 02, 2015
Test Date : Sept. 02, 2015~ Nov. 18, 2015
Issued Date : Dec. 31, 2015
Report No. : 1590163R-RF-US-P06V01
Report Version : V1.1

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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Test Report Certification

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Manufacturer : TP-LINK TECHNOLOGIES CO., LTD
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and Technology Park, Shennan Rd, Nanshan, Shenzhen,
China
Model No. : TL-WR842N
FCC ID : TE7WR842NV3
EUT Voltage : AC 120V/60Hz
Brand Name : TP-LINK
Applicable Standard : FCC CFR Title 47 Part 15 Subpart C: 2014
ANSI C63.4:2014;
ANSI C63.10:2013;
KDB 558074 D01v03r03
KDB 662911 D01 Multiple Transmitter Output v02r01
Test Result : Complied
Performed Location : Suzhou EMC Laboratory
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TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098
FCC Registration Number: 800392; IC Lab Code: 4075B

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Laboratory Information

We, **Quietek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted(audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scope:

Taiwan R.O.C.	:	BSMI, NCC, TAF
USA	:	FCC
Japan	:	VCCI
China	:	CNAS

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site :<http://www.quietek.com/tw/ctg/cts/accreditations.htm>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site :
<http://www.quietek.com/>

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
1590163R-RF-US-P06V01	V1.0	Initial Issued Report	Nov. 20, 2015
1590163R-RF-US-P06V01	V1.1	Modify the limit of PSD	Dec. 31, 2015

1. General Information

1.1. EUT Description

Product Name	300Mbps Multi-Function Wireless N Router
Brand Name	TP-LINK
Model No.	TL-WR842N
EUT Voltage	AC 120V/60Hz
Frequency Range	For 2.4GHz Band 802.11b/g/n(20MHz): 2412~2462MHz 802.11n(40MHz): 2422~2452MHz
Channel Number	For 2.4GHz Band 802.11b/g/n(20MHz): 11 802.11n(40MHz): 7
Type of Modulation	802.11b: DSSS 802.11/g/n: OFDM
Data Rate	802.11g: 6/9/12/18/24/36/48/54 Mbps 802.11b: 1/2/5.5/11 Mbps 802.11n: up to 300 Mbps
Channel Control	Auto
Antenna Delivery	2*Tx + 2*Rx
Antenna Type	Reference to Antenna List
Peak Antenna Gain	Reference to Antenna List

For 2.4GHz Band

802.11b/g/n(20MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz	04	2427 MHz
05	2432 MHz	06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	10	2457 MHz	11	2462 MHz	N/A	N/A
802.11n(40MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
03	2422 MHz	04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz	N/A	N/A

Antenna List

Antenna	Type	Model No.	Peak Gain	Directional gain
Antenna	N/A	N/A	4.0dBi	7.0dBi

- Note: 1: The EUT uses CDD technology by 802.11b/g and MIMO technology by 802.11n mode .The EUT always operate with the antennas transmitting simultaneously, so we only test the mode when the antennas transmitting simultaneously.
- 2: The EUT has two antennas, and each port has same gain, they transmit signals are correlated with each other. According to KDB 662911 D01v02r01, the Directional gain Calculation is $\text{Gain}_{\text{ANT}} + 10 \log(\text{N}_{\text{ANT}})$ dBi.

Power Parameter Value of the test software

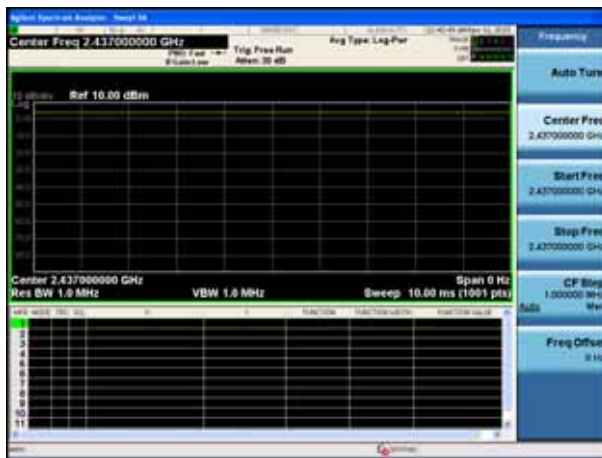
Test Mode	Test Channel	Ant1	Ant2	MODE(Ant1+2)
802.11b	2412	x	x	20.5
	2437	x	x	18
	2462	x	x	19
802.11g	2412	x	x	16
	2437	x	x	23
	2462	x	x	16
802.11n(20MHz)	2412	x	x	15.5
	2437	x	x	24
	2462	x	x	16
802.11n(40MHz)	2422	x	x	12.5
	2437	x	x	17
	2452	x	x	14

Duty Cycle

2.4GHz Band

Test Mode	Tx On (μ s)	T (μ s)	VBW (Hz)	Tx Off (μ s)	Duty Cycle
802.11b	N/A	N/A	10Hz	0	100 %
802.11g	5350	5350	10Hz	60	98.89 %
802.11n(20MHz)	4960	4960	10Hz	60	98.80 %
802.11n(40MHz)	2360	2360	430Hz	90	96.33%

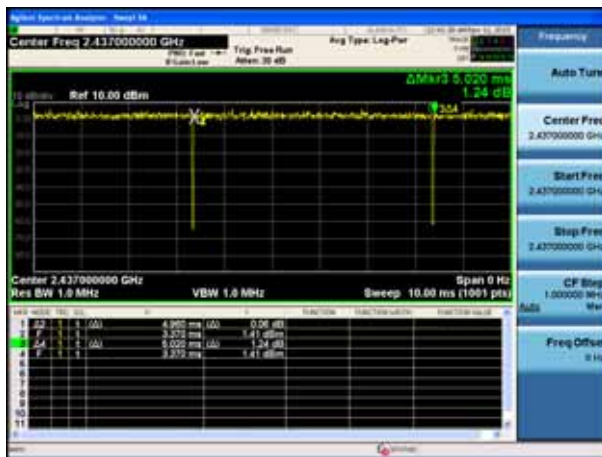
802.11b



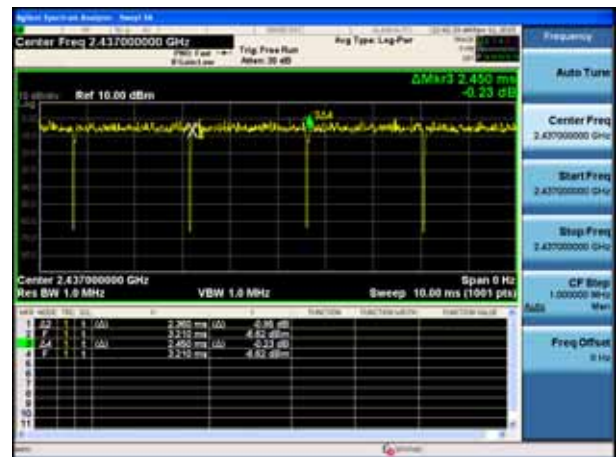
802.11g



802.11n(20MHz)



802.11n(40MHz)



Note: 1. T means the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

2. According to KDB 558074, when test for Radiated Emission Band Edge and Radiated Emission, $VBW \geq 1/T$ will be used.

1.2. Mode of Operation

QuieTek 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: Transmit by 802.11b(Ant1+2;)
Mode 2: Transmit by 802.11g(Ant1+2;)
Mode 3: Transmit by 802.11n(20MHz) (Ant1+2;)
Mode 4: Transmit by 802.11n(40MHz) (Ant1+2;)

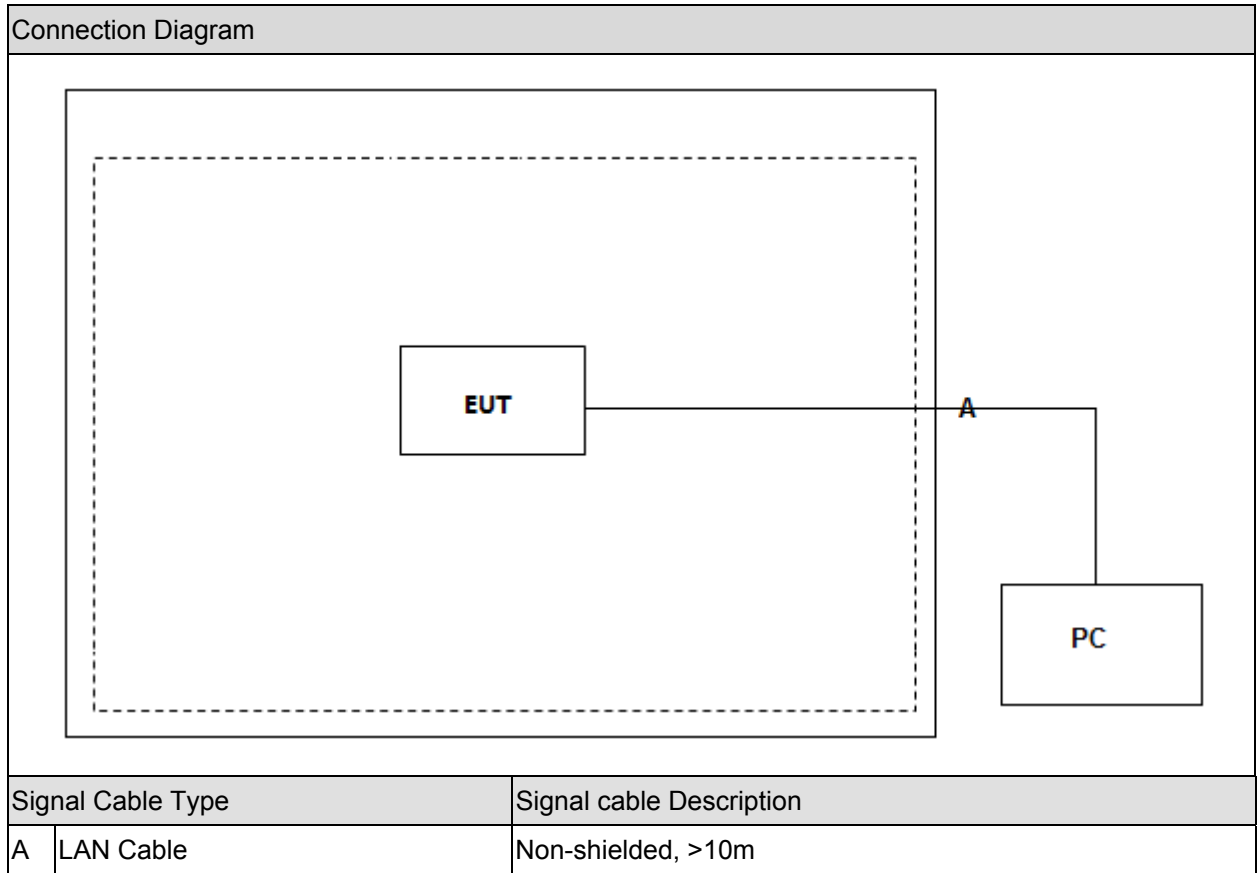
Note: Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, and be shown on this report.

1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook	Lenovo	Think pad x220	SUA0600195	Non-shielded

1.4. Configuration of Tested System



1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of equipment.
3	Input launch command, and set the test mode and channel, then press OK to start continue Transmit or receive.

2. Technical Test

2.1. Summary of Test Result

- ☒ No deviations from the test standards
- ☐ Deviations from the test standards as below description:

Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.207	Yes	No
Radiated Emission	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.209	Yes	No
RF Antenna Conducted Spurious	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.247(d)	Yes	No
Radiated Emission Band Edge	FCC CFR Title 47 Part 15 Subpart C: 2014 15.247(d)	Yes	No
Operation Frequency Range of 20dB Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2014 15.215(c)	Yes	No
Occupied Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.247(a)(2)	Yes	No
Power Output	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.247(b)(3)	Yes	No
Power Spectral Density	FCC CFR Title 47 Part 15 Subpart C: 2014 Section 15.247(e)	Yes	No

2.2. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	21
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

3. Conducted Emission

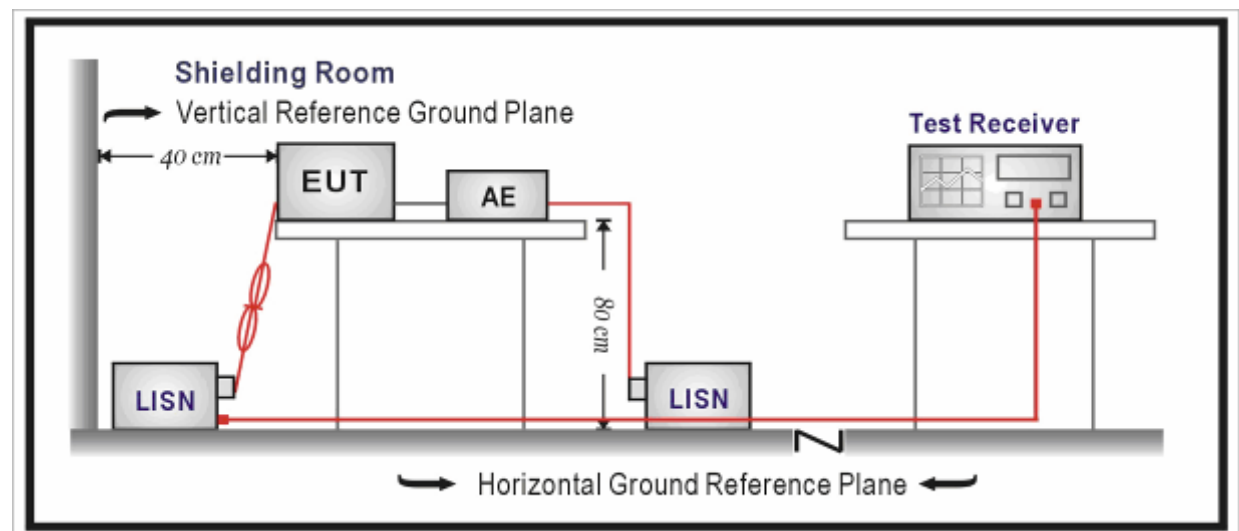
3.1. Test Equipment

Conducted Emission / TR-1

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100726	2016.03.28
Two-Line V-Network	R&S	ENV216	100043	2016.03.28
Two-Line V-Network	R&S	ENV216	100044	2016.09.16
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	2016.03.01
50ohm Termination	SHX	TF2	07081401	2016.09.16
Temperature/Humidity Meter	zhichen	ZC1-2	TR1-TH	2016.01.08

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

3.2. Test Setup



3.3. Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 – 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

3.4. Test Procedure

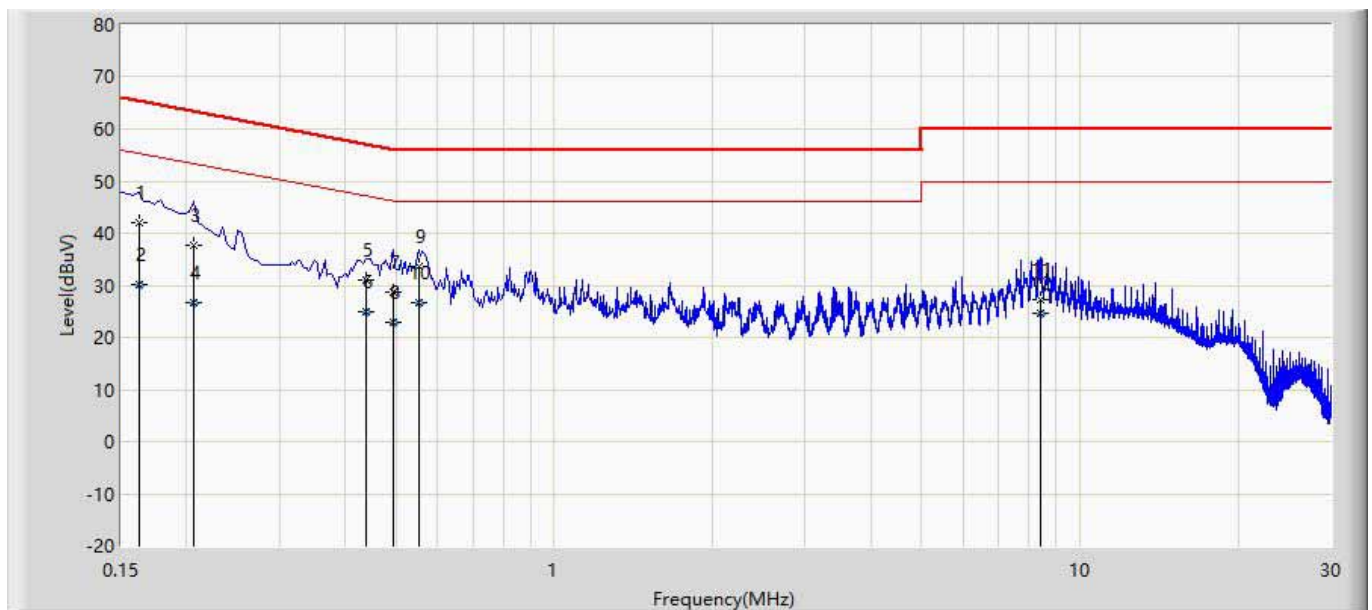
The EUT was setup according to ANSI C63.4, 2014 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

3.5. Uncertainty

The measurement uncertainty is defined as ± 2.02 dB

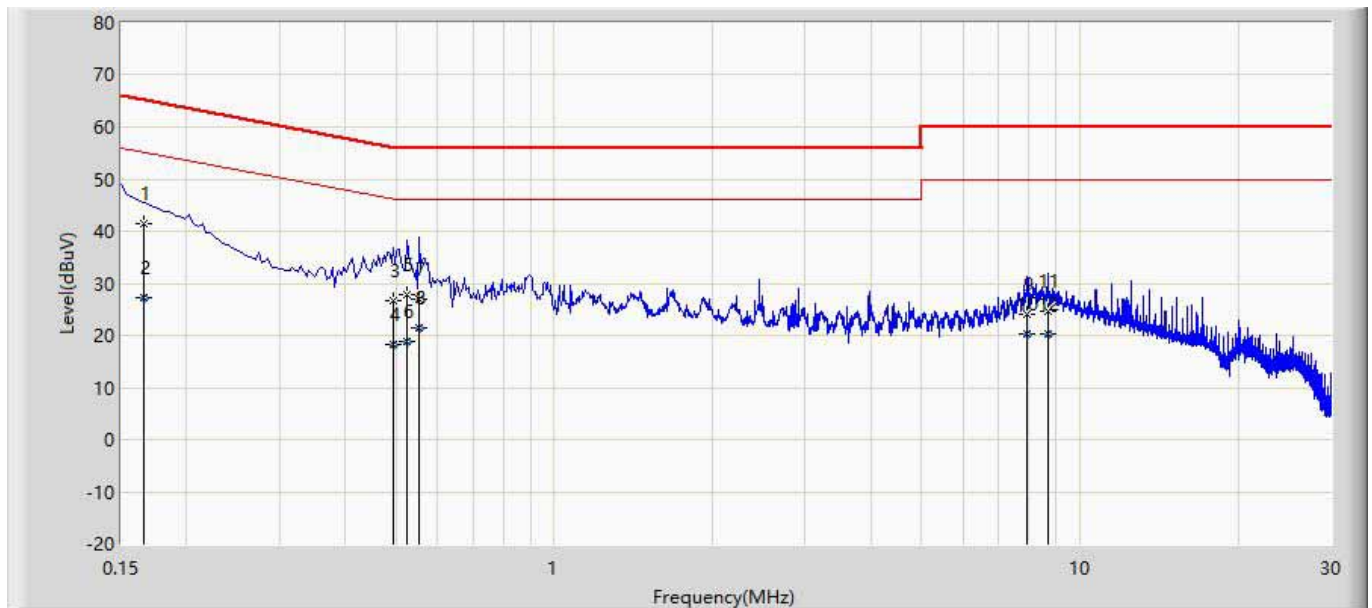
3.6. Test Result

Engineer: Scott	
Site: TR5	Time: 2015/09/06
Limit: FCC_Part15.207_CE_AC Power_ClassB	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Line
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		0.162	42.119	32.304	-23.241	65.361	9.815	QP
2		0.162	30.183	20.368	-25.178	55.361	9.815	AV
3		0.206	37.698	27.865	-25.667	63.365	9.833	QP
4		0.206	26.802	16.969	-26.563	53.365	9.833	AV
5		0.438	30.945	21.071	-26.154	57.100	9.874	QP
6		0.438	25.033	15.158	-22.067	47.100	9.875	AV
7		0.494	28.785	18.904	-27.316	56.100	9.881	QP
8		0.494	23.002	13.121	-23.099	46.100	9.881	AV
9		0.554	33.720	23.852	-22.280	56.000	9.868	QP
10	*	0.554	26.757	16.889	-19.243	46.000	9.868	AV
11		8.410	27.326	17.411	-32.674	60.000	9.915	QP
12		8.410	24.576	14.660	-25.424	50.000	9.916	AV

Engineer: Scott	
Site: TR5	Time: 2015/09/06
Limit: FCC_Part15.207_CE_AC Power_ClassB	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Neutral
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1	*	0.166	41.371	31.426	-23.787	65.158	9.945	QP
2		0.166	27.341	17.396	-27.817	55.158	9.945	AV
3		0.494	26.592	16.566	-29.509	56.100	10.026	QP
4		0.494	18.251	8.226	-27.850	46.100	10.025	AV
5		0.526	27.730	17.715	-28.270	56.000	10.015	QP
6		0.526	18.805	8.791	-27.195	46.000	10.014	AV
7		0.554	26.901	16.912	-29.099	56.000	9.989	QP
8		0.554	21.395	11.407	-24.605	46.000	9.988	AV
9		7.914	24.119	13.880	-35.881	60.000	10.239	QP
10		7.914	20.388	10.149	-29.612	50.000	10.239	AV
11		8.706	24.728	14.457	-35.272	60.000	10.271	QP
12		8.706	20.415	10.144	-29.585	50.000	10.271	AV

Note: All the test modes are pretested and mode 1 802.11b mode was found to be the worst mode, so the data of this test mode was recorded.

4. Radiated Emission

4.1. Test Equipment

Radiated Emission / AC-2

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100573	2016.03.28
Loop Antenna	R&S	HFH2-Z2	833799/003	2015.11.17
Bilog Chainenna	Teseq GmbH	CBL6112D	27611	2016.10.15
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2016.03.01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC2-TH	2016.01.08

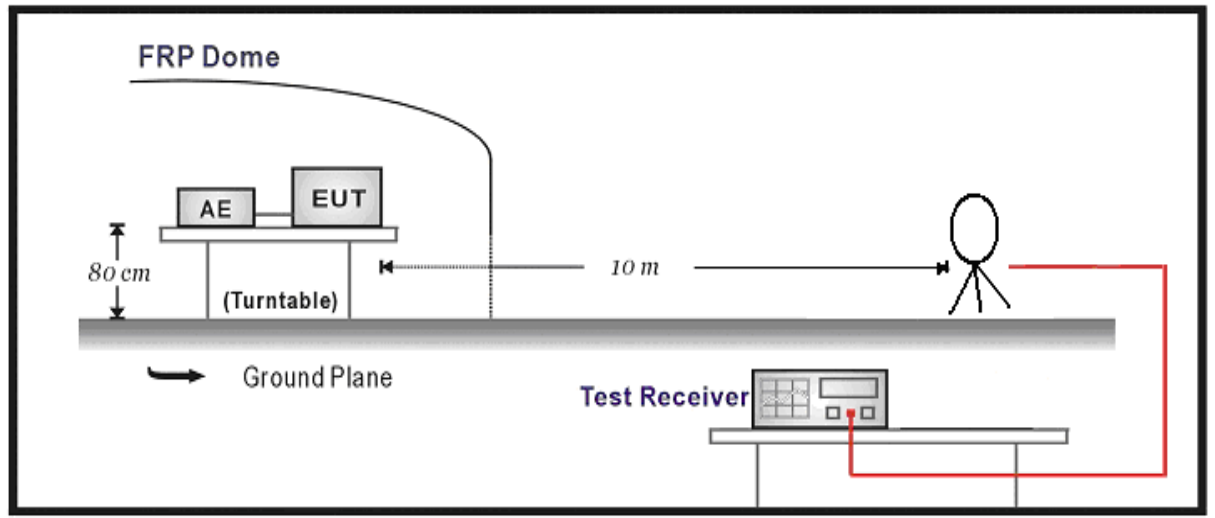
Radiated Emission / AC-5

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9020A	MY49100159	2016.03.28
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.07
Preamplifier	Miteq	NSP1800-25	1364185	2016.05.05
Preamplifier	QuieTek	AP-040G	CHM-0906001	2016.05.05
DRG Horn	ETS-Lindgren	3117	00123988	2016.01.21
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2015.11.24
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2016.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2016.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2016.03.01
EMI Receiver	Agilent	N9038A	MY51210196	2016.06.09
Temperature/Humidity Meter	Zhichen	ZC1-2	AC5-TH	2016.01.08

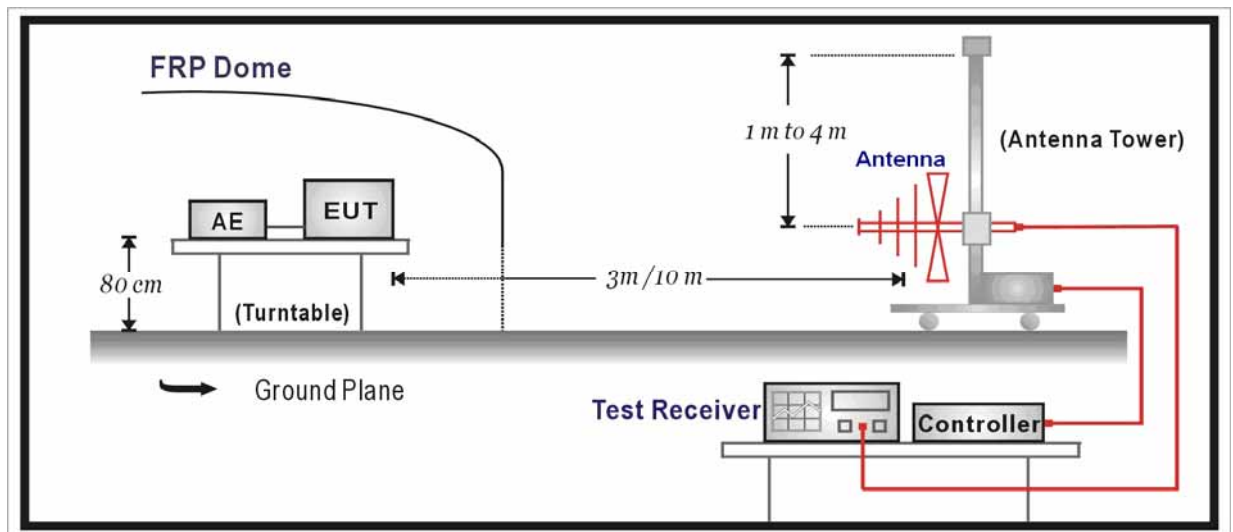
Note 1: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

4.2. Test Setup

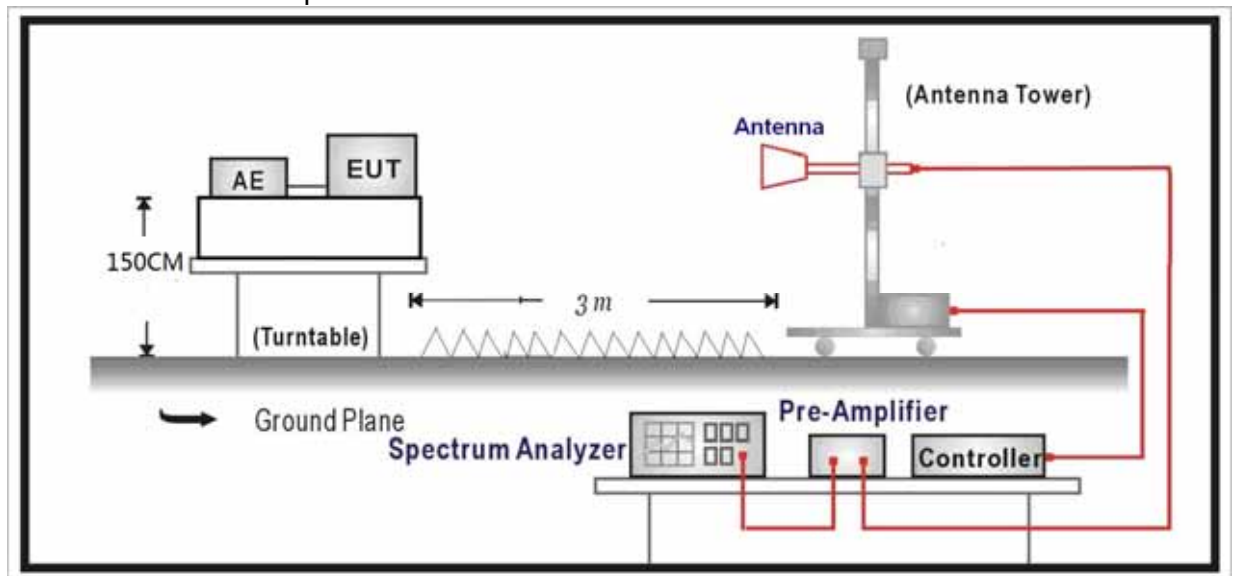
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



4.3. Limit

FCC Part 15 Subpart C Paragraph 15.209		
Frequency (MHz)	Distance (m)	Level (dBuV/m)
30 - 88	3	40
88 - 216	3	43.5
216 - 960	3	46
Above 960	3	54

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument Antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)

4.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2014 and tested according to ANSI C63.10, 2013.

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from Antenna to the EUT was 3 meters.

The Antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This

is repeated for both horizontal and vertical polarization of the Antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2014 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

The frequency range from 30MHz to 10th harmonic is checked.

Note: When doing emission measurement above 1GHz, the horn Antenna will be bended down a little (as horn Antenna has the narrow beamwidth) in order to keeping the Antenna in the “cone of radiation” of EUT. The 3dB beamwidth is 10~60 degrees for H-plane and 10~90 degrees for E-plane.

If continuous transmission of the EUT (i.e., duty cycle ≥ 98 percent) cannot be achieved and the duty cycle is not constant (i.e., duty cycle variations exceed ± 2 percent), then the following procedure shall be used:

- a) Set RBW = 1 MHz.
- b) Set VBW $\geq 1/T$.
- c) Video bandwidth mode or display mode
 - 1) The instrument shall be set to ensure that video filtering is applied in the power domain. Typically, this requires setting the detector mode to RMS and setting the Average-VBW Type to Power (RMS).
 - 2) As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode.
- d) Detector = Peak.
- e) Sweep time = auto.
- f) Trace mode = max hold.
- g) Allow max hold to run for at least 50 times (1/duty cycle) traces.

4.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB
below 1G is defined as ± 3.8 dB

4.6. Test Result

Mode1: Transmit by 802.11b

Chain	CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
Ant 1+2	1	H	4825.0	37.6	7.3	44.9	54(note3)	-9.1	PK
		V	4825.0	44.6	7.3	51.9	54(note3)	-2.1	PK
		H	7236.0	32.3	12.7	45.0	54(note3)	-9.0	PK
		V	7239.0	35.7	12.7	48.4	54(note3)	-5.6	PK
		H	9648.0	32.0	14.8	46.8	54(note3)	-7.2	PK
		V	9644.5	37.3	14.9	52.2	54(note3)	-1.8	PK
	6	H	4874.0	36.7	7.4	44.1	54(note3)	-9.9	PK
		V	4876.0	48.3	7.4	55.7	74	-18.3	PK
		V	4874.0	46.4	7.4	53.8	54	-0.2	AV
		H	7311.0	32.3	12.5	44.8	54(note3)	-9.2	PK
		V	7307.0	38.7	12.3	51.0	54(note3)	-3.0	PK
		H	9748.0	30.8	14.8	45.6	54(note3)	-8.4	PK
		V	9746.5	36.6	14.8	51.4	54(note3)	-2.6	PK
	11	H	4924.0	35.8	7.6	43.3	54(note3)	-10.7	PK
		V	4927.0	49.5	7.5	57.1	74	-16.9	PK
		V	4924.0	46.0	7.6	53.5	54	-0.5	AV
		H	7386.0	33.3	12.3	45.6	54(note3)	-8.4	PK
		V	7383.5	41.9	12.4	54.3	74	-19.7	PK
		V	7381.3	39.8	12.4	52.2	54	-1.8	AV
		H	9848.0	31.5	15.3	46.8	54(note3)	-7.2	PK
		V	9848.5	39.7	15.3	55.0	74	-19.0	PK
		V	9845.2	36.9	15.2	52.1	54	-1.9	AV

Note: 1. Measure Level = Reading Level + Factor.

- The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.
- This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Mode2: Transmit by 802.11g

Chain	CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
Ant 1+2	1	H	4824.0	34.9	7.3	42.2	54(note3)	-11.8	PK
		V	4825.0	41.7	7.3	49.0	54(note3)	-5.0	PK
		H	7236.0	31.4	12.7	44.1	54(note3)	-9.9	PK
		V	7236.0	34.7	12.7	47.4	54(note3)	-6.6	PK
		H	9648.0	30.8	14.8	45.6	54(note3)	-8.4	PK
		V	9648.0	31.4	14.8	46.2	54(note3)	-7.8	PK
	6	H	4876.0	44.3	7.4	51.7	54(note3)	-2.3	PK
		V	4884.5	55.3	7.5	62.8	74	-11.2	PK
		V	4872.4	44.2	7.3	51.6	54	-2.4	AV
		H	7311.0	33.8	12.5	46.2	54(note3)	-7.8	PK
		V	7307.0	48.7	12.3	61.0	74	-13.0	PK
		V	7305.5	37.4	12.3	49.7	54	-4.3	AV
		H	9748.0	30.6	14.8	45.4	54(note3)	-8.6	PK
		V	9755.0	43.3	14.8	58.2	74	-15.8	PK
		V	9753.5	34.1	14.8	49.0	54	-5.0	AV
	11	H	4924.0	33.7	7.6	41.3	54(note3)	-12.7	PK
		V	4927.0	41.9	7.5	49.5	54(note3)	-4.5	PK
		H	7386.0	32.5	12.3	44.8	54(note3)	-9.2	PK
		V	7386.0	35.4	12.3	47.7	54(note3)	-6.3	PK
		H	9848.0	29.6	15.3	44.9	54(note3)	-9.1	PK
		V	9848.0	31.4	15.3	46.6	54(note3)	-7.4	PK

Note: 1. Measure Level = Reading Level + Factor.

- The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.
- This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Mode3: Transmit by 802.11n(20MHz)

Chain	CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
Ant 1+2	1	H	4824.0	35.1	7.3	42.4	54(note3)	-11.6	PK
		V	4825.0	42.2	7.3	49.5	54(note3)	-4.5	PK
		H	7236.0	31.6	12.7	44.3	54(note3)	-9.7	PK
		V	7236.0	33.8	12.7	46.4	54(note3)	-7.6	PK
		H	9648.0	30.4	14.8	45.2	54(note3)	-8.8	PK
		V	9648.0	31.2	14.8	46.0	54(note3)	-8.0	PK
	6	H	4874.0	43.5	7.4	50.8	54(note3)	-3.2	PK
		V	4876.0	57.5	7.4	64.9	74	-9.1	PK
		V	4870.8	44.9	7.3	52.2	54	-1.8	AV
		H	7311.0	34.0	12.5	46.4	54(note3)	-7.6	PK
		V	7315.5	50.0	12.6	62.6	74	-11.4	PK
		V	7312.9	37.8	12.5	50.3	54	-3.7	AV
		H	9748.0	32.1	14.8	46.8	54(note3)	-7.2	PK
		V	9746.5	44.1	14.8	58.8	74	-15.2	PK
		V	9743.8	34.0	14.8	48.8	54	-5.2	AV
	11	H	4924.0	34.0	7.6	41.5	54(note3)	-12.5	PK
		V	4927.0	40.6	7.5	48.2	54(note3)	-5.8	PK
		H	7386.0	32.0	12.3	44.3	54(note3)	-9.7	PK
		V	7386.0	35.7	12.3	48.0	54(note3)	-6.0	PK
		H	9848.0	29.4	15.3	44.6	54(note3)	-9.4	PK
		V	9848.0	31.4	15.3	46.7	54(note3)	-7.3	PK

Note: 1. Measure Level = Reading Level + Factor.

- The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.
- This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Mode4: Transmit by 802.11n(40MHz)

Chain	CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
Ant 1+2	3	H	4844.0	34.5	7.5	42.1	54(note3)	-11.9	PK
		V	4844.0	35.2	7.5	42.7	54(note3)	-11.3	PK
		H	7266.0	32.0	12.5	44.5	54(note3)	-9.5	PK
		V	7266.0	32.1	12.5	44.6	54(note3)	-9.4	PK
		H	9688.0	30.3	14.6	44.9	54(note3)	-9.1	PK
		V	9688.0	29.7	14.6	44.3	54(note3)	-9.7	PK
	6	H	4874.0	33.8	7.4	41.2	54(note3)	-12.8	PK
		V	4874.0	37.5	7.4	44.9	54(note3)	-9.1	PK
		H	7311.0	31.9	12.5	44.4	54(note3)	-9.6	PK
		V	7311.0	32.4	12.5	44.8	54(note3)	-9.2	PK
		H	9748.0	29.4	14.8	44.2	54(note3)	-9.8	PK
		V	9748.0	30.2	14.8	45.0	54(note3)	-9.0	PK
	9	H	4904.0	34.5	7.6	42.1	54(note3)	-11.9	PK
		V	4904.0	35.4	7.6	43.0	54(note3)	-11.0	PK
		H	7356.0	32.4	13.0	45.4	54(note3)	-8.6	PK
		V	7356.0	32.1	13.0	45.1	54(note3)	-8.9	PK
		H	9808.0	30.5	14.9	45.5	54(note3)	-8.5	PK
		V	9808.0	30.1	14.9	45.1	54(note3)	-8.9	PK

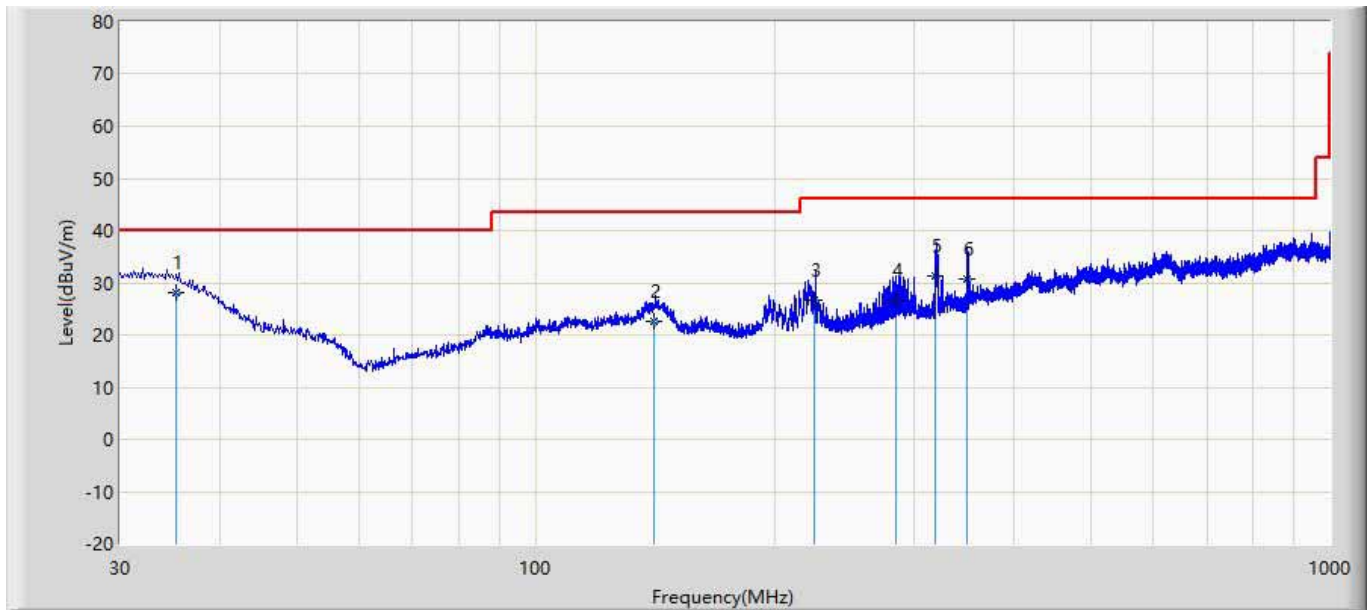
Note: 1. Measure Level = Reading Level + Factor.

2. The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

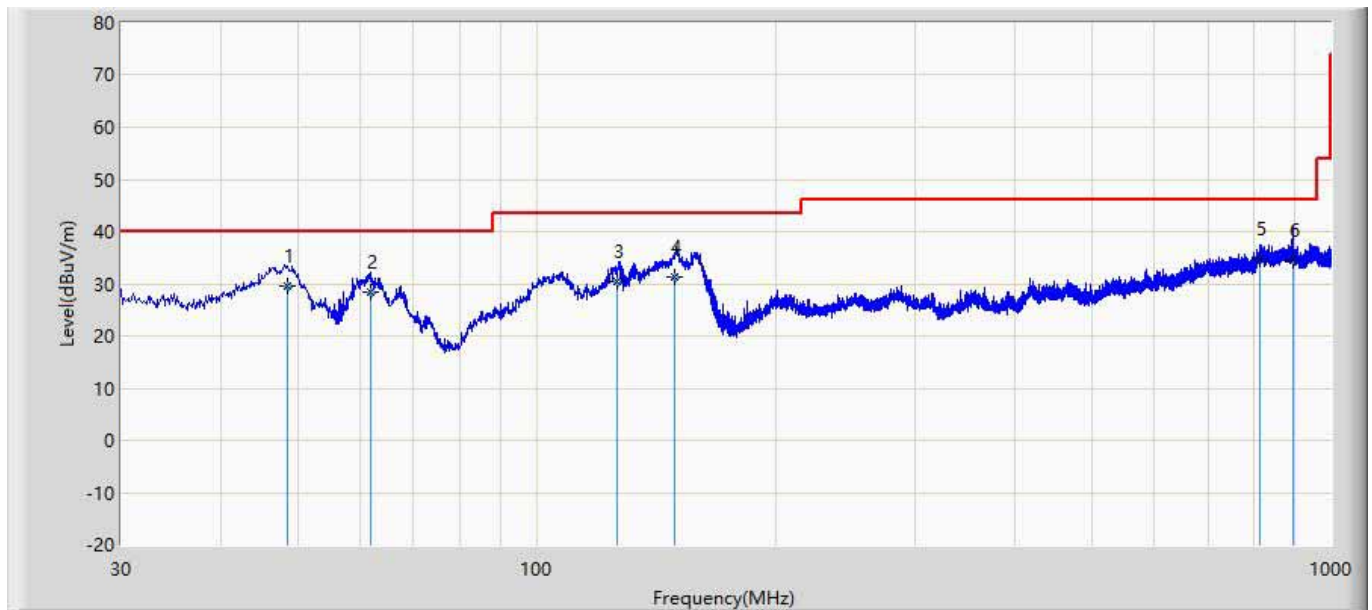
The worst case of Radiated Emission below 1GHz:

Site: AC2	Time: 2015/09/14
Limit: FCC_Part15.209_RE(3m)_ClassB	Margin: 0
Probe: AC2_10M(30-1000M)20150408	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	34.522	29.360	35.709	-10.640	40.000	-6.349	QP
2		144.518	25.356	36.247	-18.144	43.500	-10.891	QP
3		184.218	27.124	39.516	-16.376	43.500	-12.392	QP
4		619.180	32.091	32.967	-13.909	46.000	-0.876	QP
5		862.210	34.638	33.573	-11.362	46.000	1.065	QP
6		895.218	30.057	29.047	-15.943	46.000	1.010	QP

Site: AC2	Time: 2015/09/14
Limit: FCC_Part15.209_RE(3m)_ClassB	Margin: 0
Probe: AC2_10M(30-1000M)20150408	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	48.621	29.434	43.025	-10.566	40.000	-13.591	QP
2		61.852	28.412	44.141	-11.588	40.000	-15.729	QP
3		126.211	30.531	40.272	-12.969	43.500	-9.741	QP
4		149.214	31.204	42.338	-12.296	43.500	-11.134	QP
5		814.222	34.798	33.909	-11.202	46.000	0.889	QP
6		895.810	34.623	33.612	-11.377	46.000	1.011	QP

Note: All the test modes are pretested and mode 1 802.11b mode was found to be the worst mode, so the data of this test mode was recorded.

5. RF Antenna Conducted Spurious

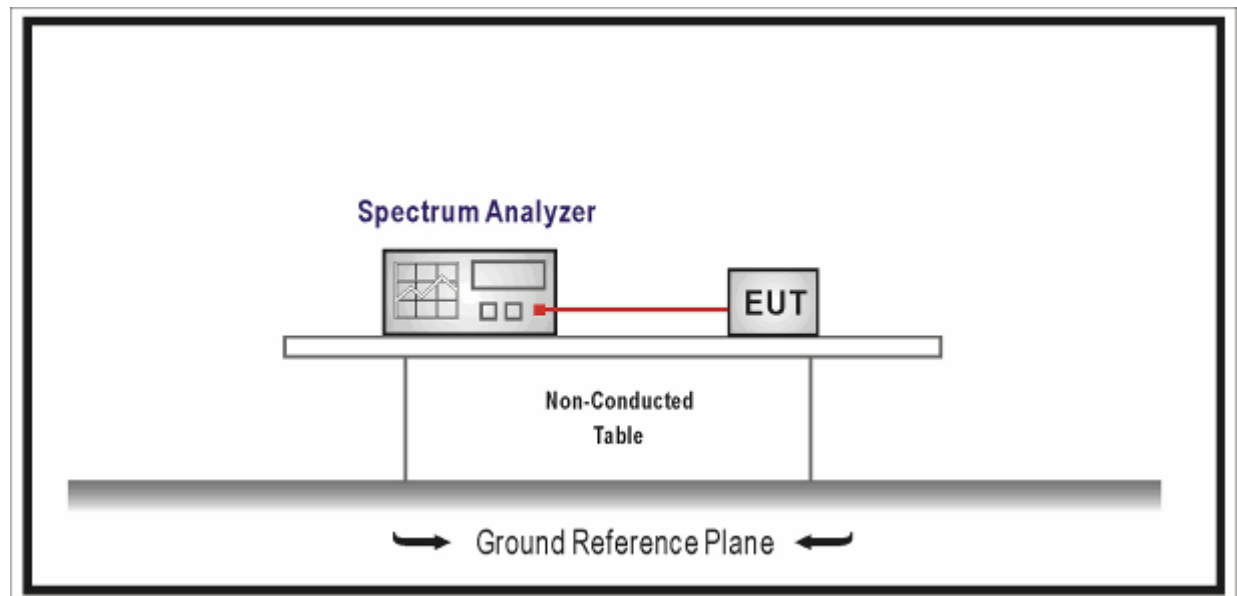
5.1. Test Equipment

RF Antenna Conducted Spurious / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.07
Temperature/Humidity Meter	zhichen	ZC1-2	TR8-TH	2016.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

5.2. Test Setup



5.3. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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, based on either an RF conducted or a radiated measurement.

If maximum conducted (average) output power was used to determine compliance as described in 11.9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc)

5.4. Test Procedure

The EUT was tested according to ANSI C63.10 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

5.5. Uncertainty

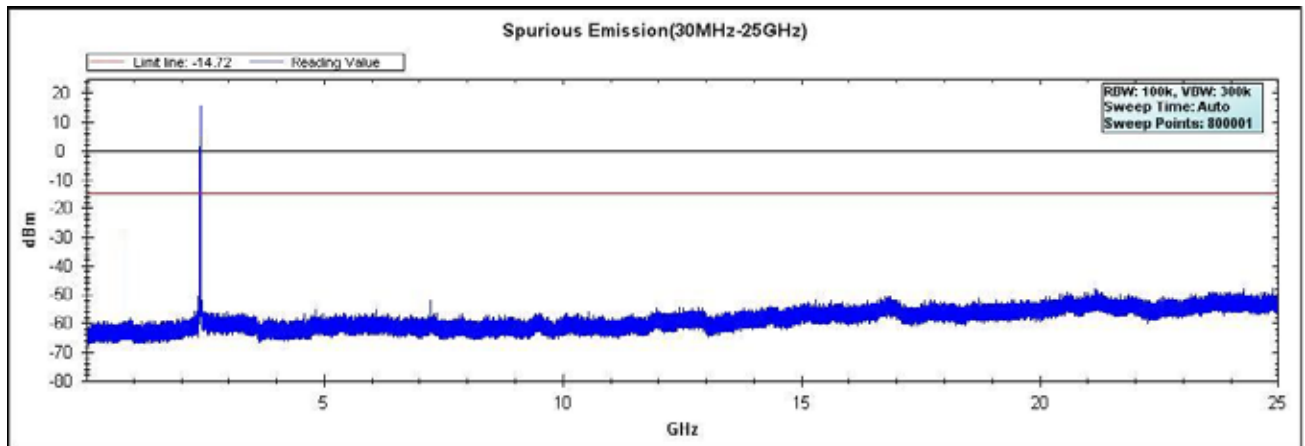
The measurement uncertainty is defined as ± 1.27 dB

5.6. Test Result

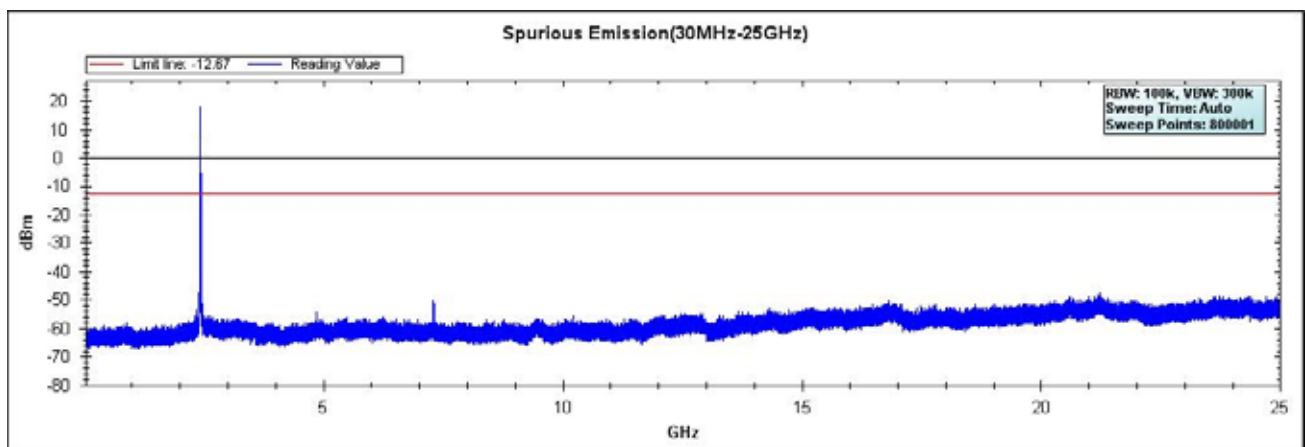
Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11b (Ant 1+2)

ANT 1

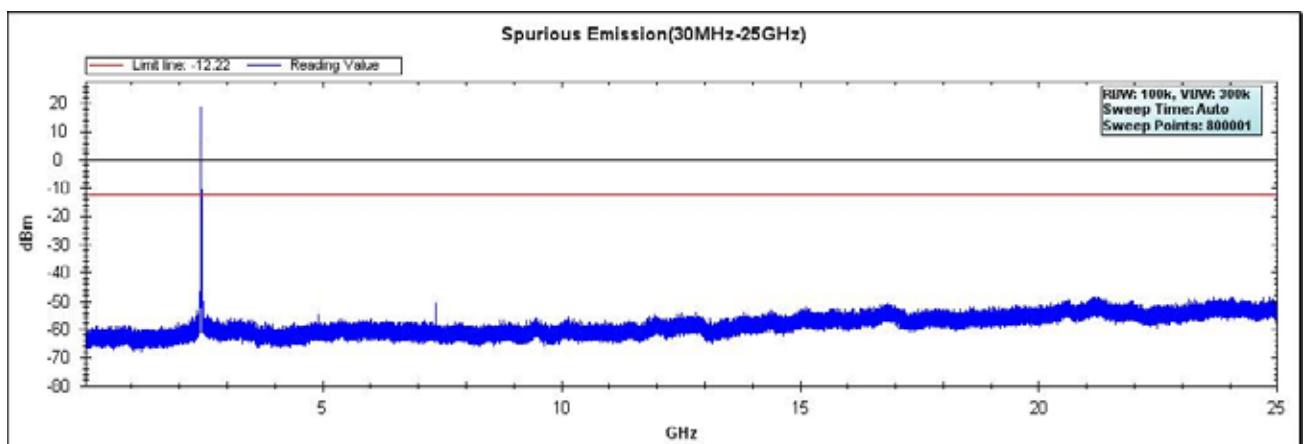
Channel 01 (2412MHz)



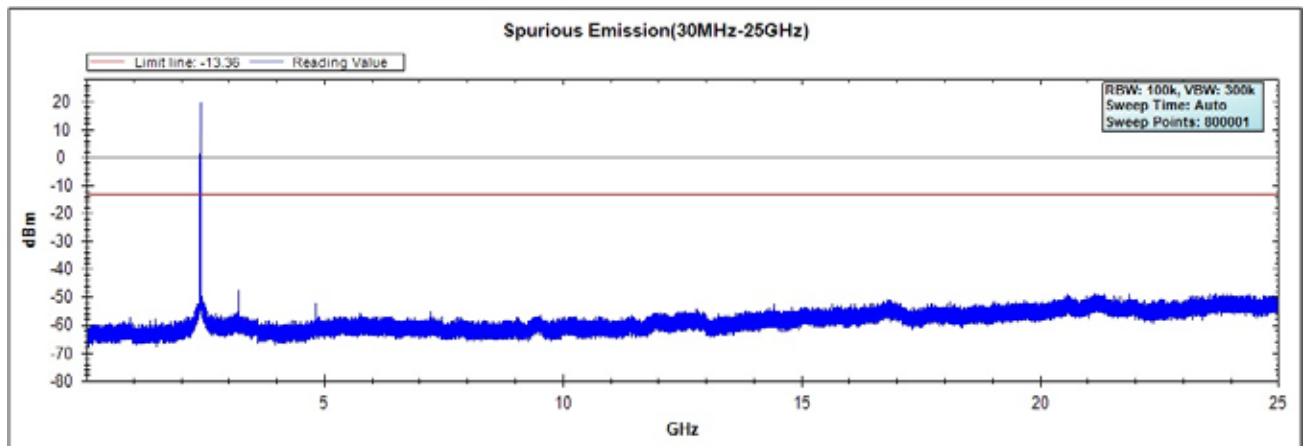
Channel 06 (2437MHz)



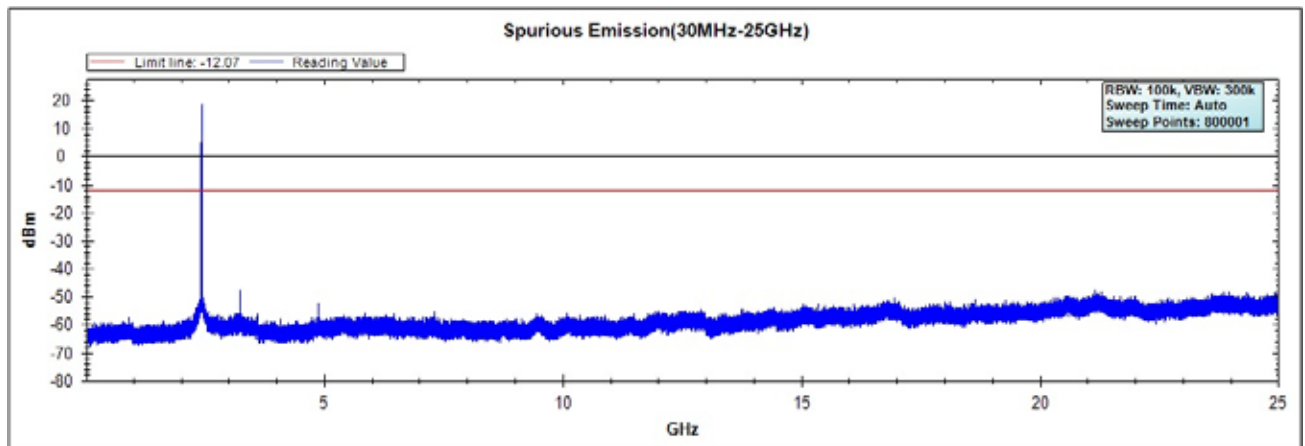
Channel 11 (2462MHz)



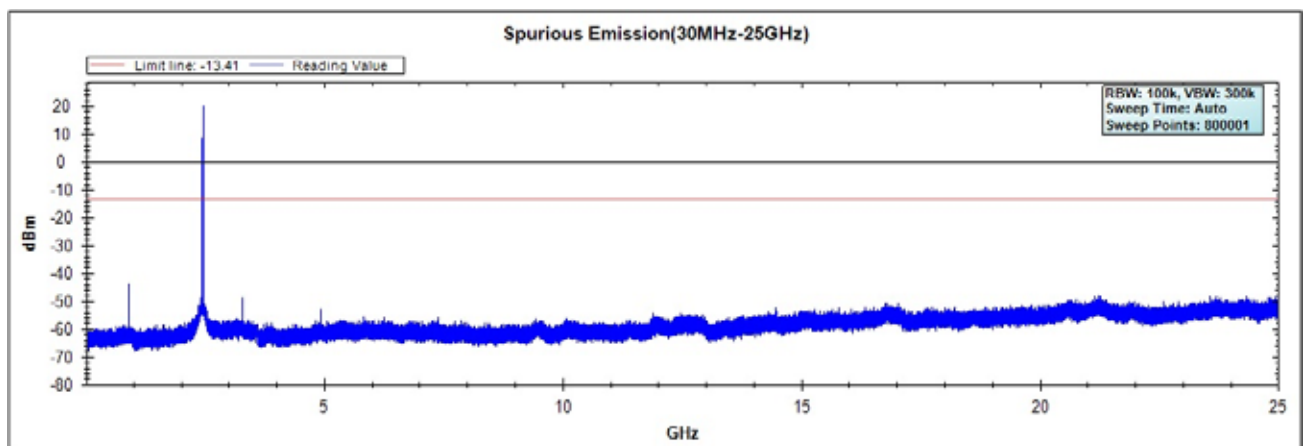
ANT 2
Channel 01 (2412MHz)



Channel 06 (2437MHz)



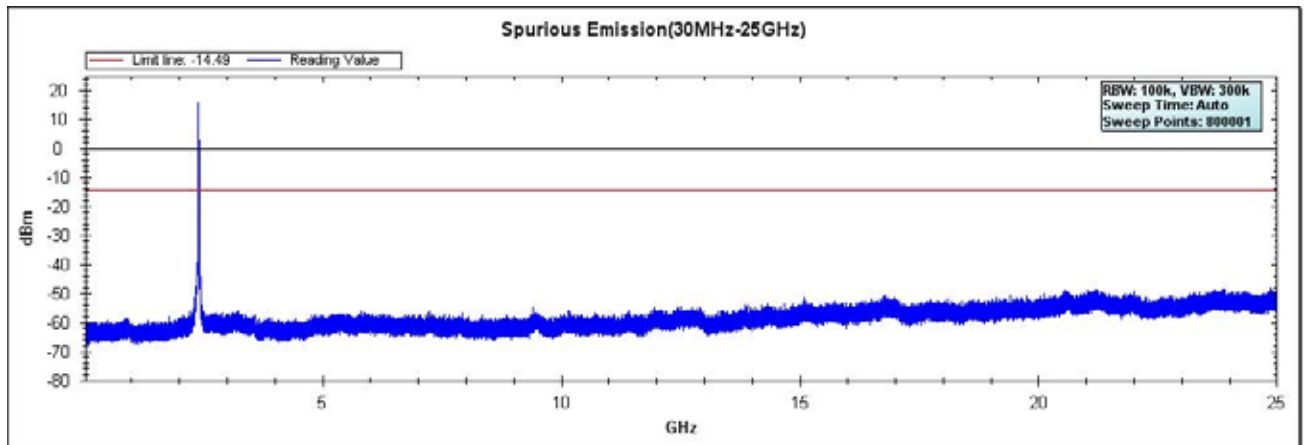
Channel 11 (2462MHz)



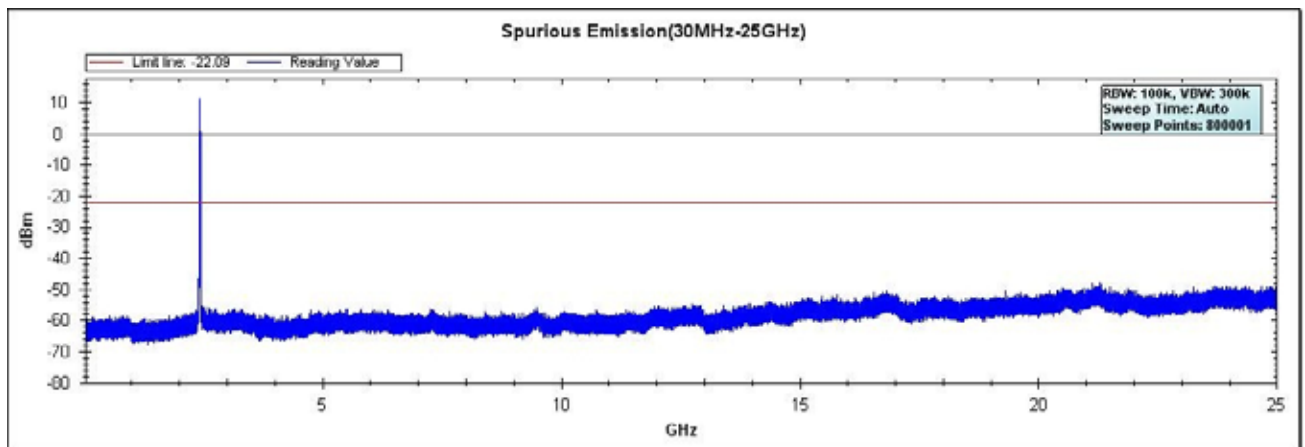
Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11g (Ant 1+2)

ANT 1

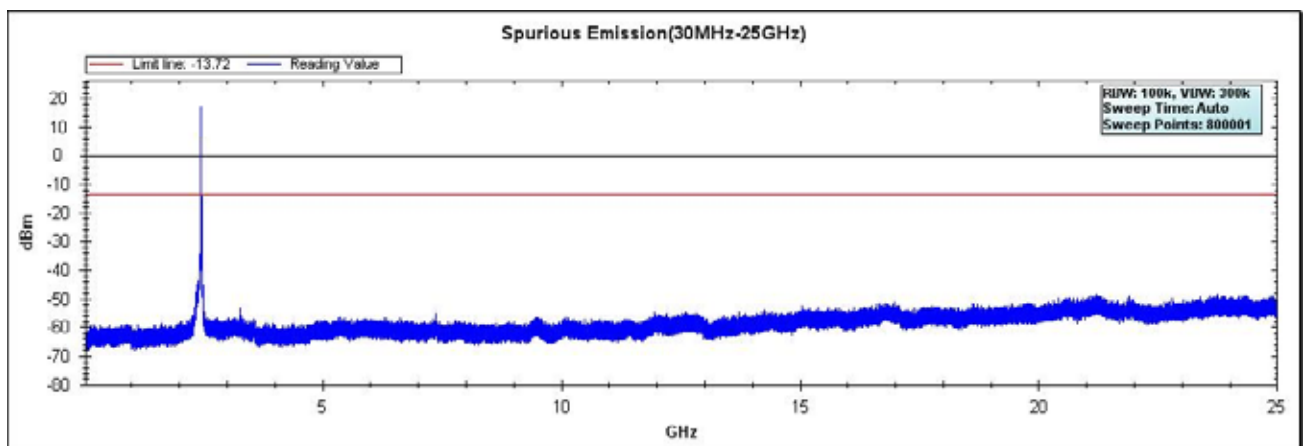
Channel 01 (2412MHz)



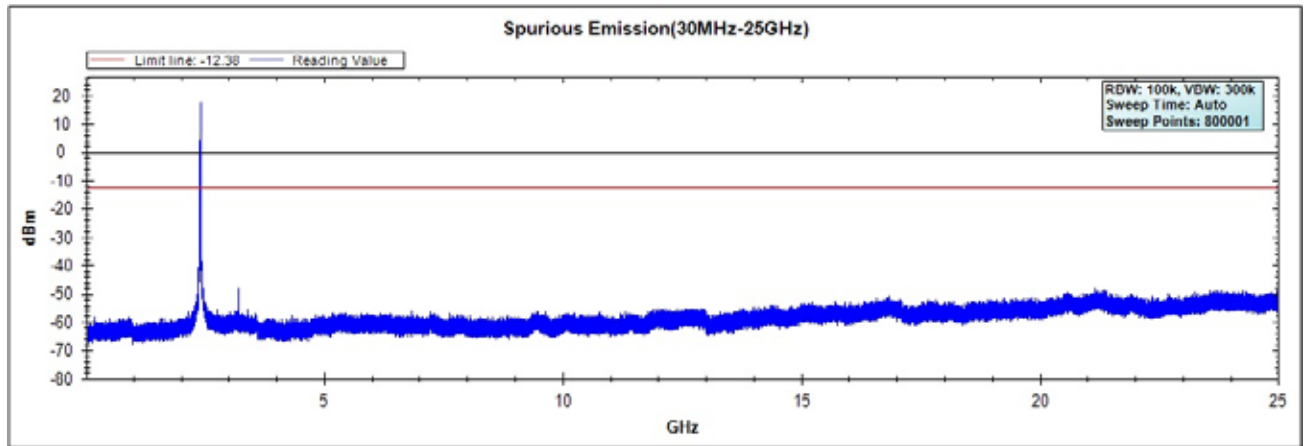
Channel 06 (2437MHz)



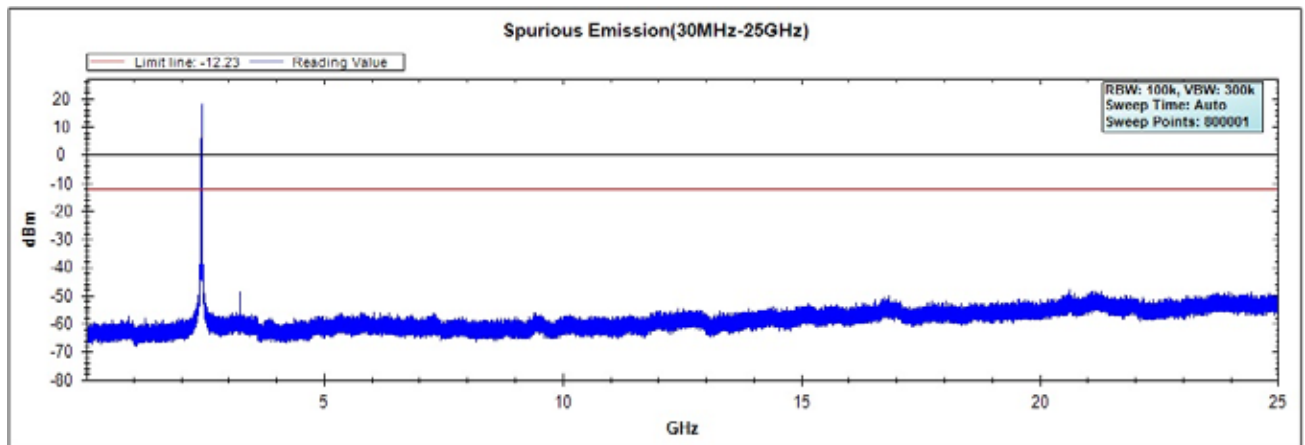
Channel 11 (2462MHz)



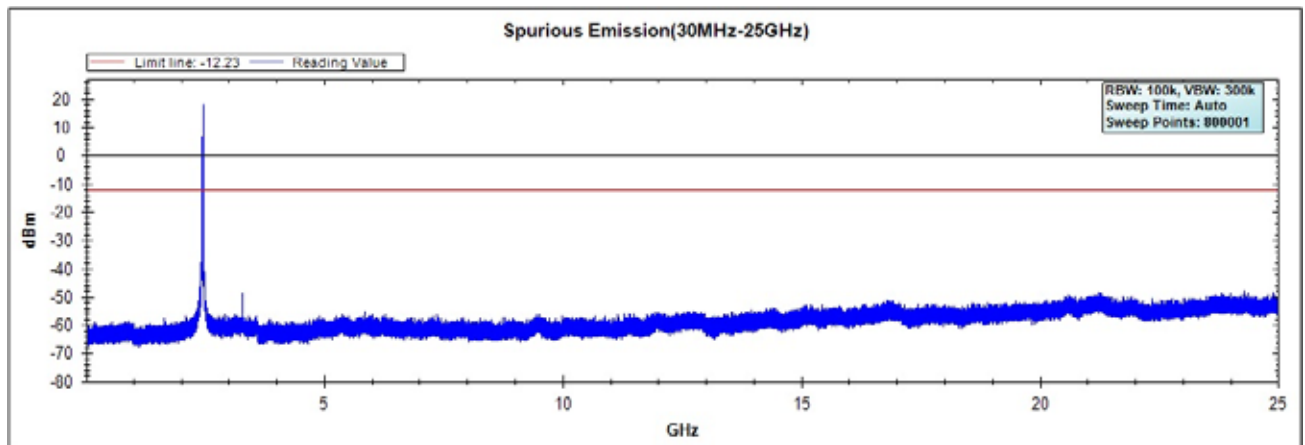
ANT 2
Channel 01 (2412MHz)



Channel 06 (2437MHz)



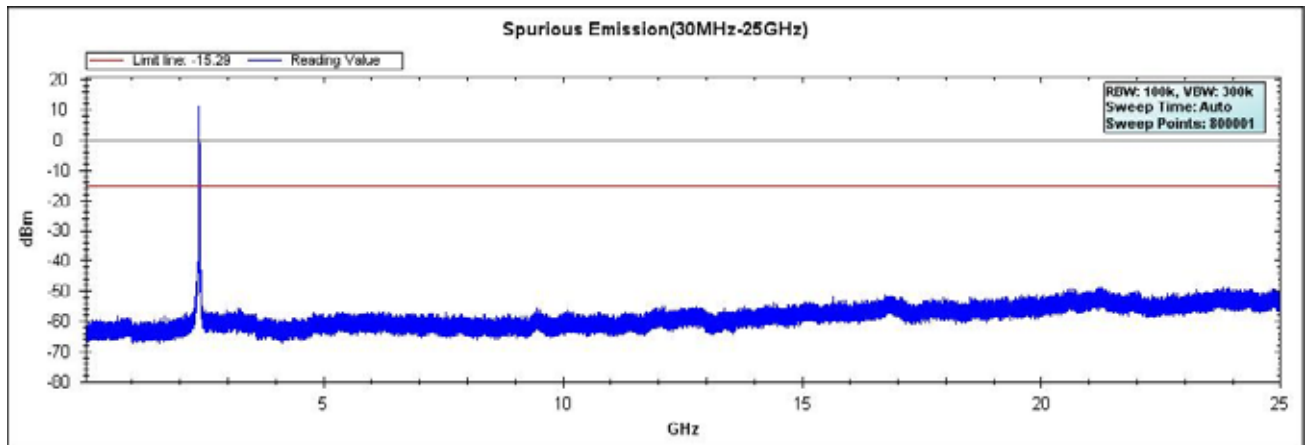
Channel 11 (2462MHz)



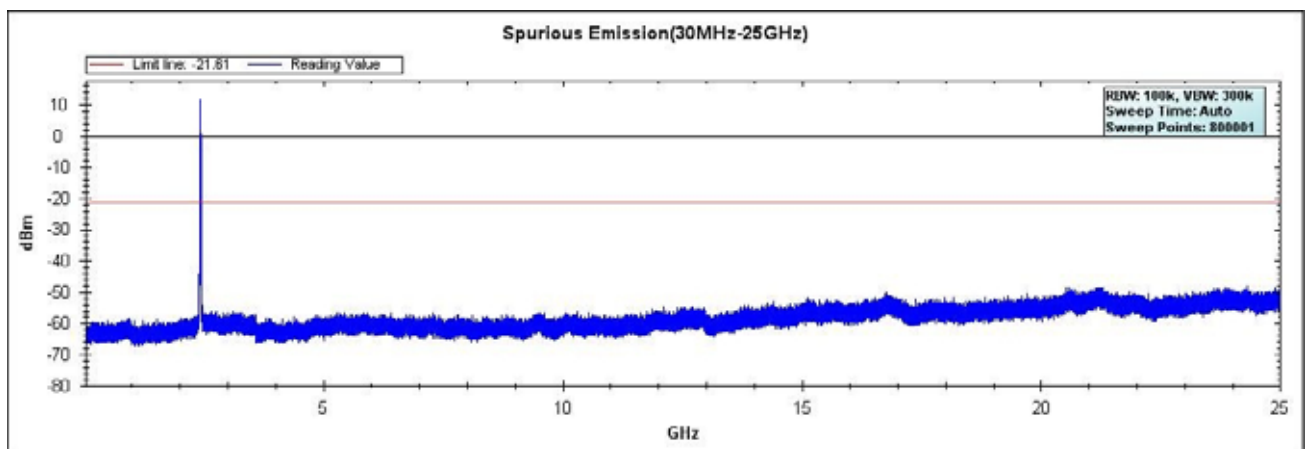
Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz) (Ant 1+2)

Ant 1

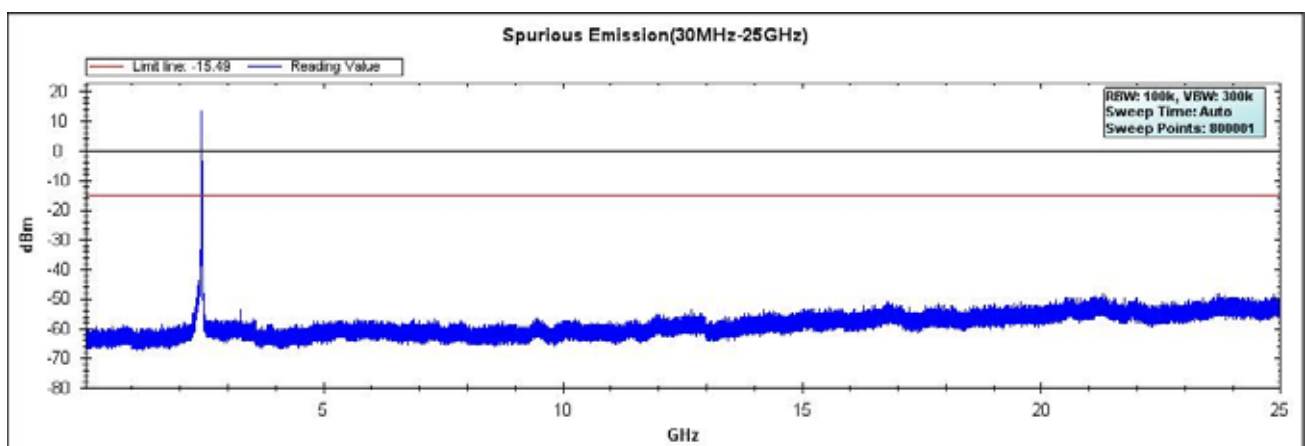
Channel 01 (2412MHz)



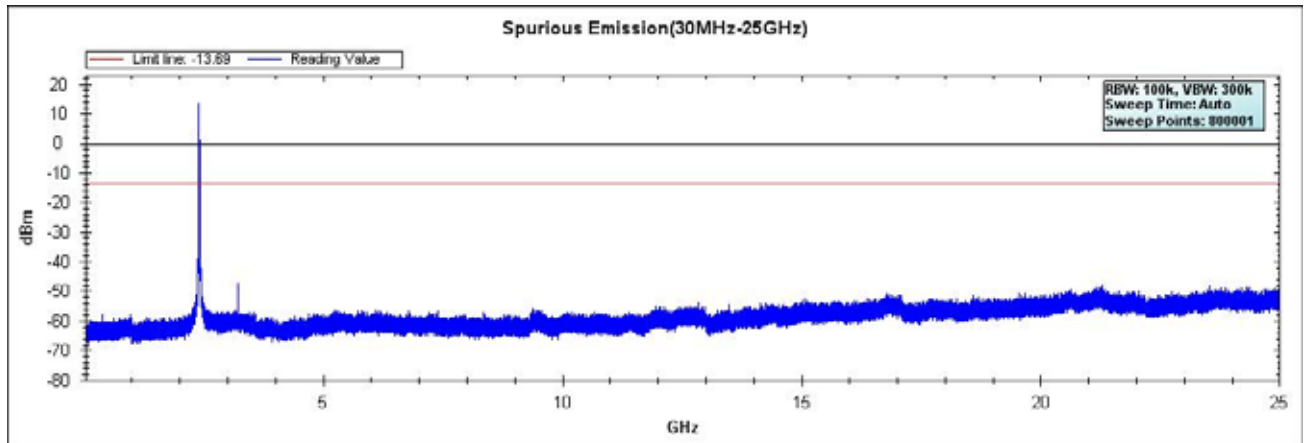
Channel 06 (2437MHz)



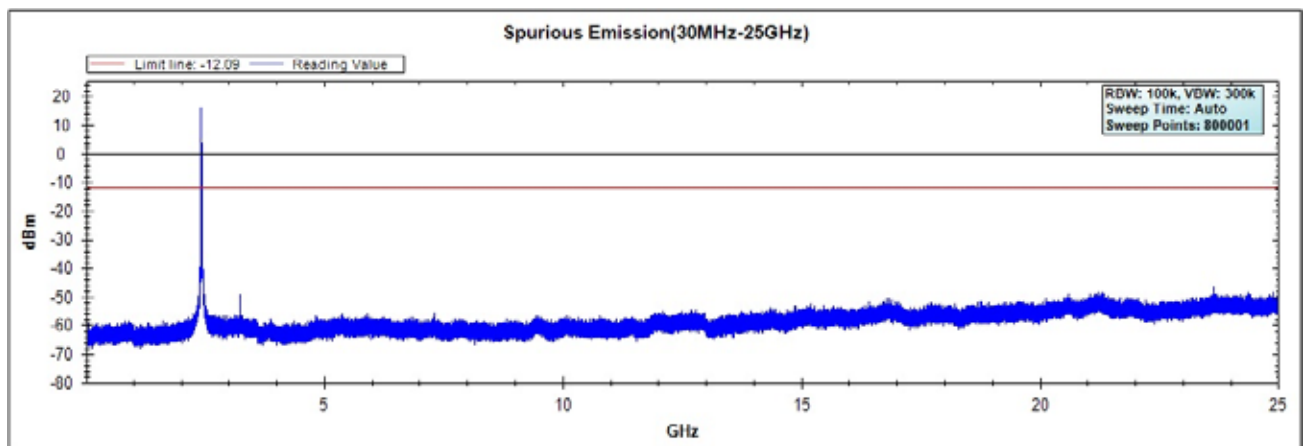
Channel 11 (2462MHz)



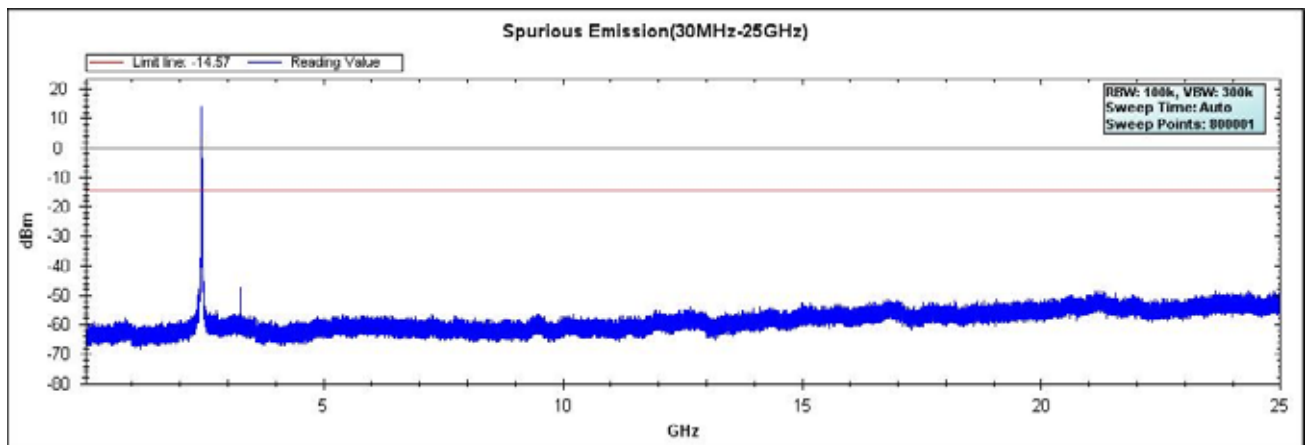
Ant 2
Channel 01 (2412MHz)



Channel 06 (2437MHz)



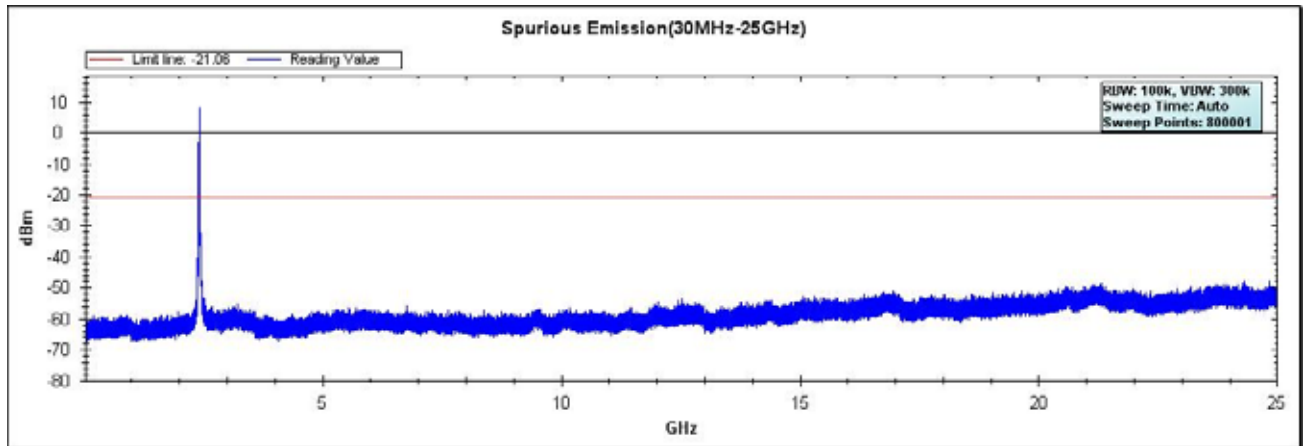
Channel 11 (2462MHz)



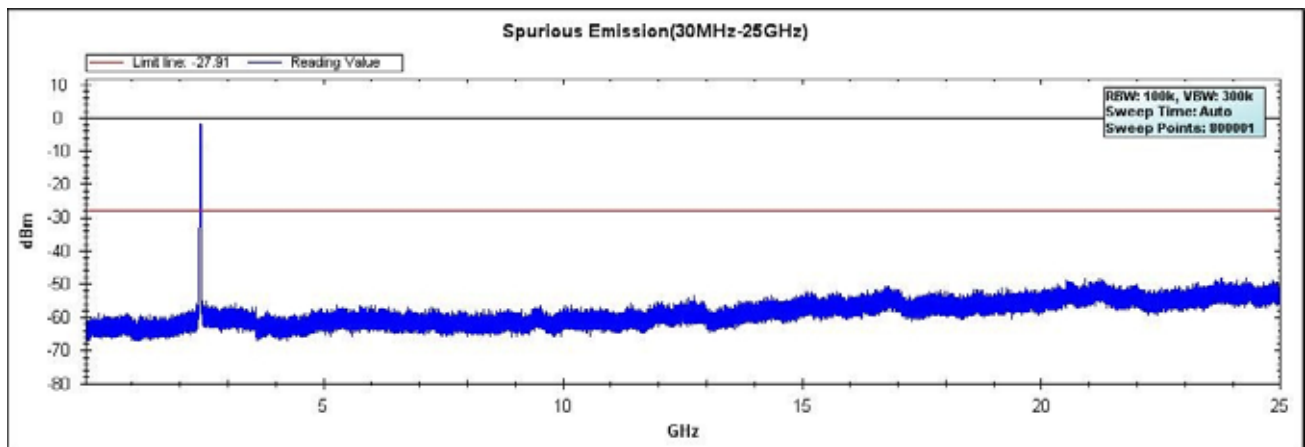
Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	TR-8
Test Mode	:	Mode 4: Transmit by 802.11n(40MHz) (Ant 1+2)

ANT 1

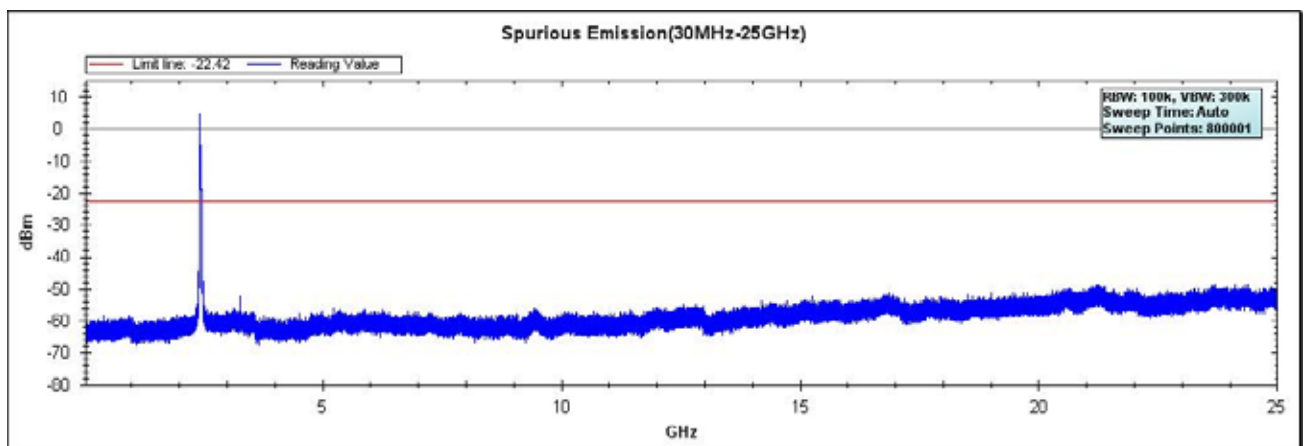
Channel 03 (2422MHz)



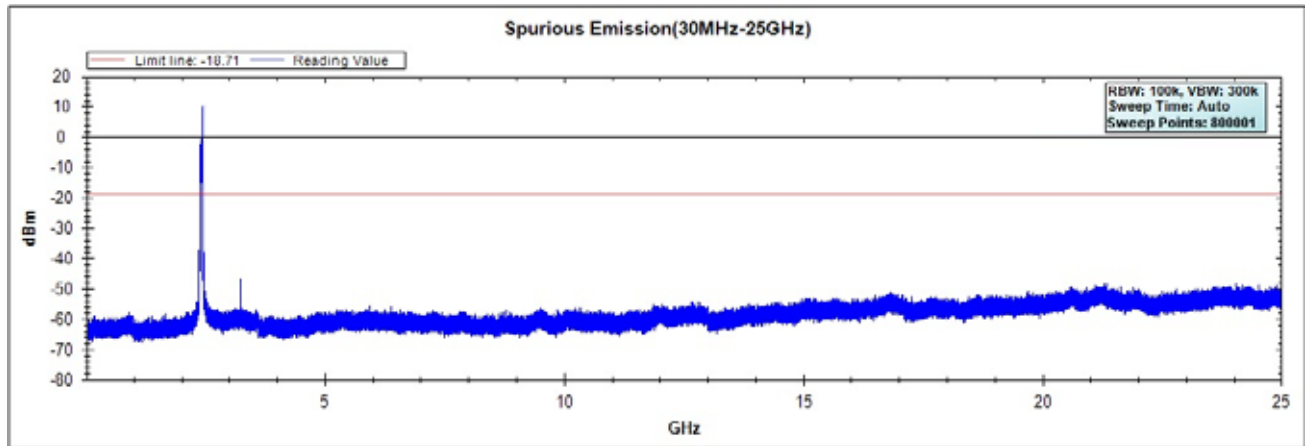
Channel 06 (2437MHz)



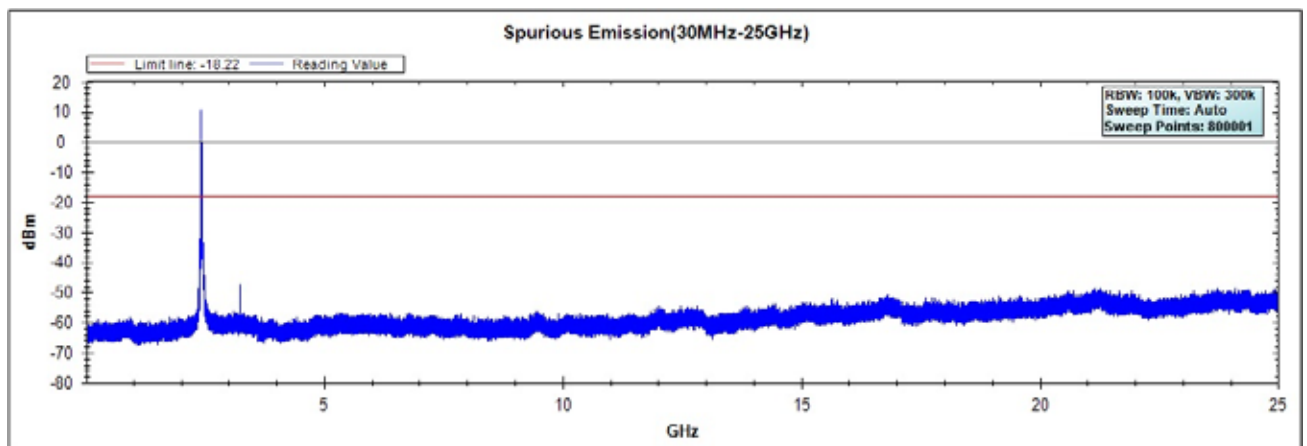
Channel 09 (2452MHz)



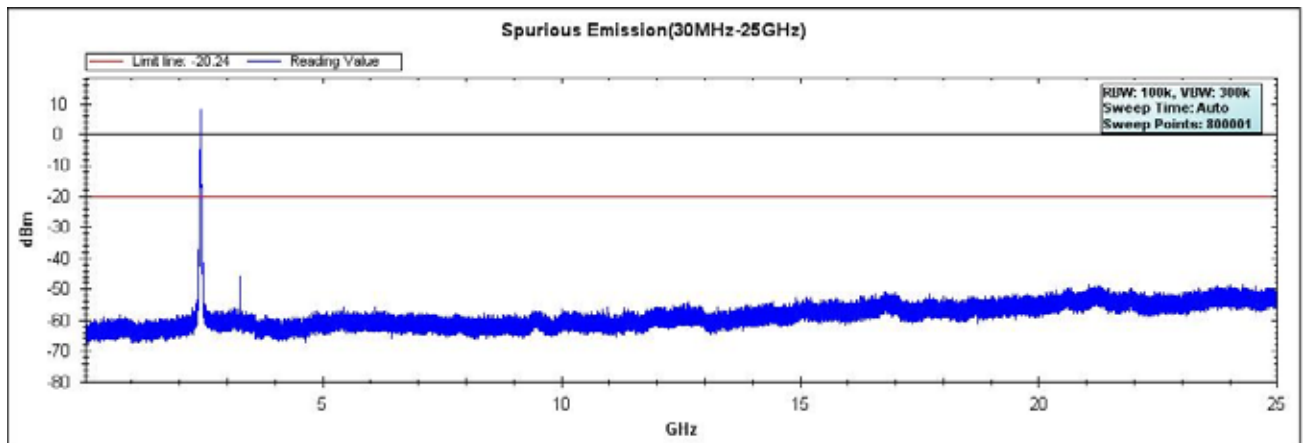
ANT 2
Channel 03 (2422MHz)



Channel 06 (2437MHz)



Channel 09 (2452MHz)



6. Radiated Emission Band Edge

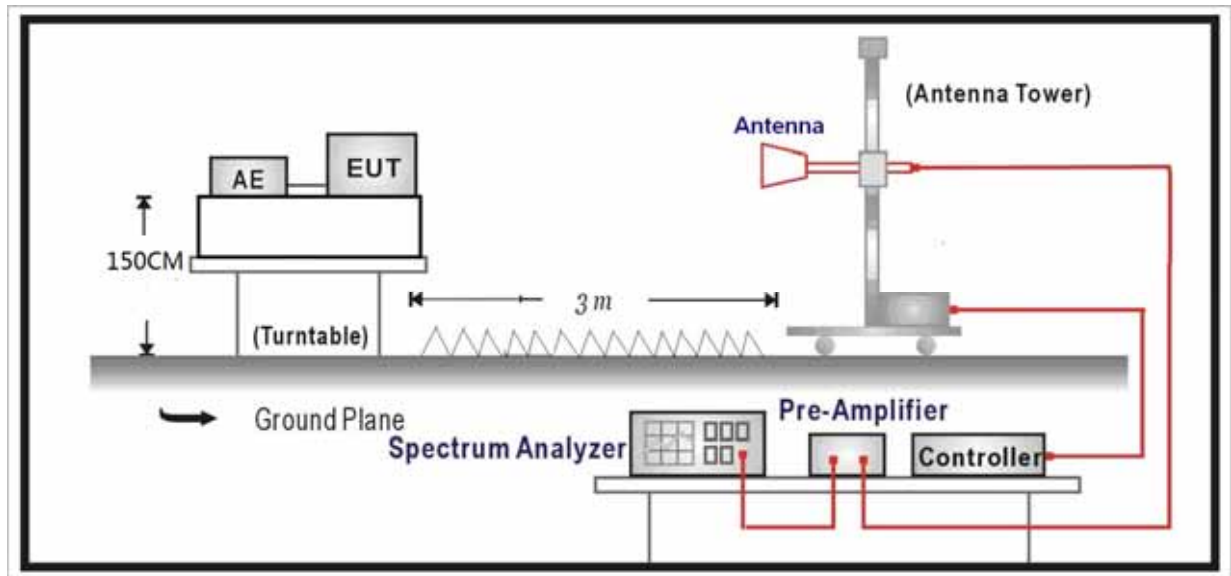
6.1. Test Equipment

☒ Radiated Emission Band Edge / AC-5

Instrument	Manufacturer	Type No.	Serial No.	Cali. Due Date
Preamplifier	Miteq	NSP1800-25	1364185	2016.05.03
Preamplifier	QuieTek	AP-040G	CHM-0906001	2016.05.03
Bilog Antenna	Teseq GmbH	CBL6112D	27612	2016.10.15
DRG Horn	ETS-Lindgren	3117	00123988	2016.01.07
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2016.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2016.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2016.03.01
EMI Receiver	Agilent	N9038A	MY51210196	2016.06.09
Temperature/Humidity Meter	Zhichen	ZC1-2	AC5-TH	2016.01.08

Note 1: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

6.2. Test Setup



6.3. Limit

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.4. Test Procedure

According to ANSI C63.10: 2013.

This test is required for any spurious emission or modulation product that falls in a Restricted Band, as defined in Section 15.205 of FCC part 15. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being

corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b) of FCC part 15.

Now set the VBW $\geq 1 / T$ (the minimum transmission duration), while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209 of FCC Part 15.

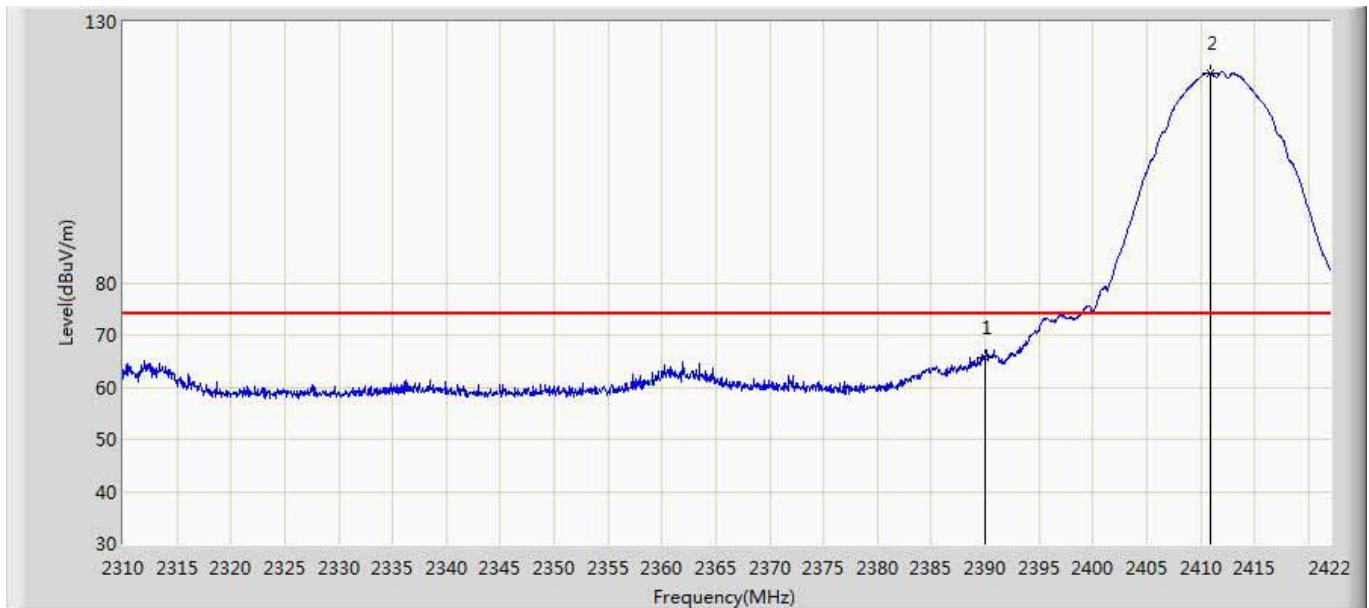
If the emission on which a radiated measurement must be made is located at the edge of the authorized band of operation, then the alternative “marker-delta” method may be employed.

6.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB

6.6. Test Result

Site: AC5	Time: 2015/11/04 - 23:29
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode1: Transmit at CH2412 by 802.11b	



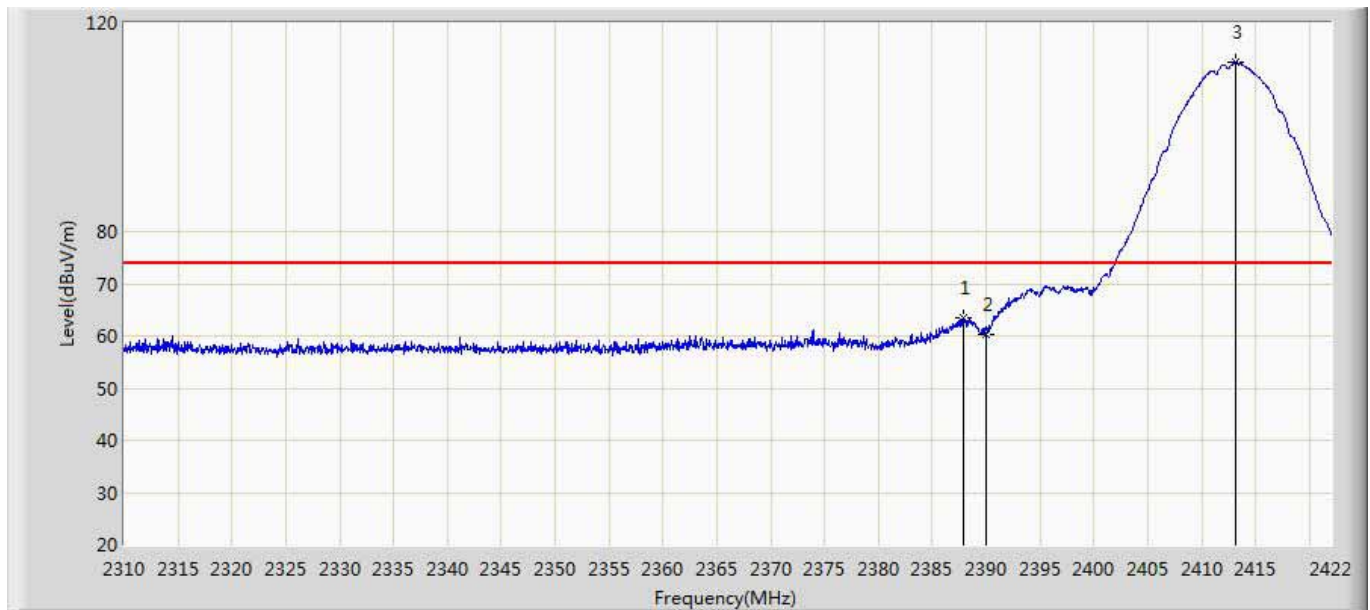
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	65.659	28.304	-8.341	74.000	37.355	PK
2	*	2410.912	120.284	82.956	46.284	74.000	37.328	PK

Site: AC5	Time: 2015/11/04 - 23:32
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode1: Transmit at CH2412 by 802.11b	



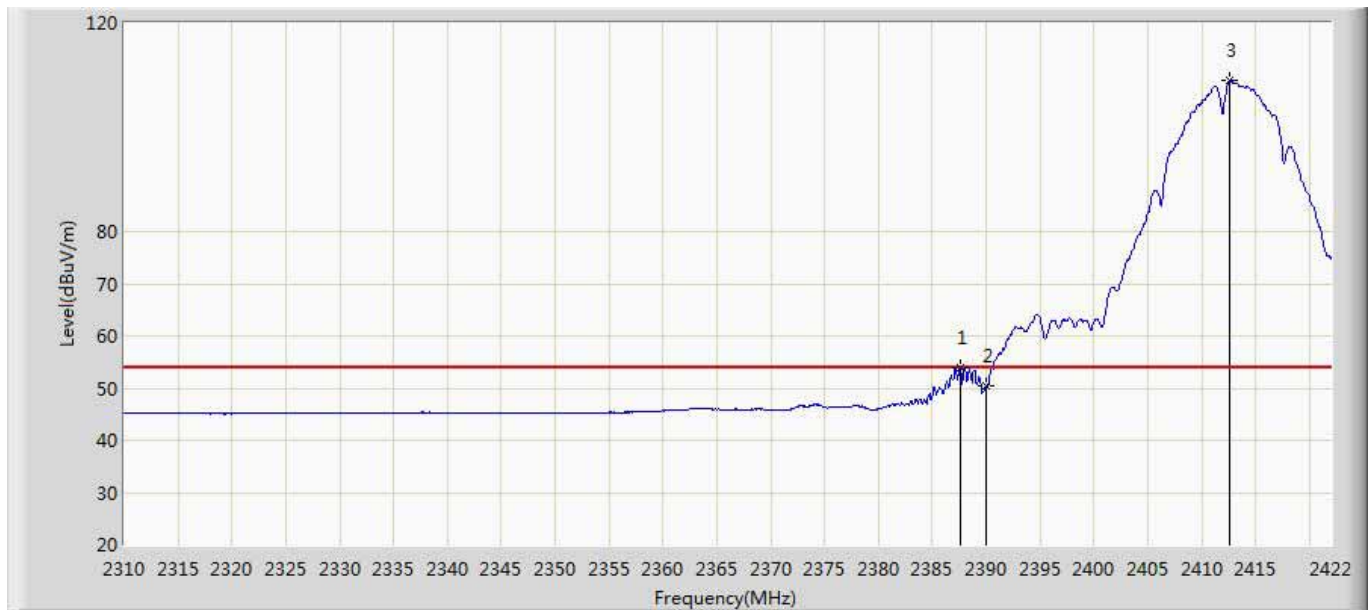
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2389.352	53.530	16.174	-0.470	54.000	37.355	AV
2		2390.000	50.624	13.269	-3.376	54.000	37.355	AV
3	*	2412.816	114.649	77.309	60.649	54.000	37.340	AV

Site: AC5	Time: 2015/11/04 - 23:35
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode1: Transmit at CH2412 by 802.11b	



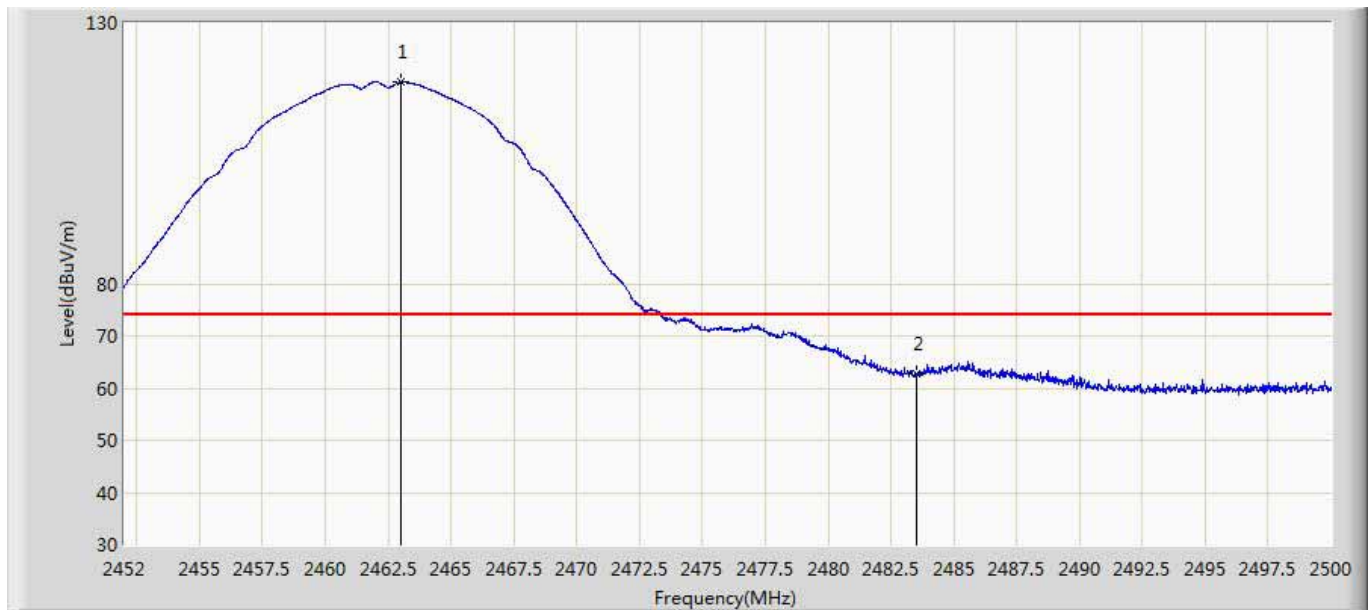
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2387.952	63.441	26.085	-10.559	74.000	37.356	PK
2		2390.000	60.404	23.049	-13.596	74.000	37.355	PK
3	*	2413.152	112.399	75.057	38.399	74.000	37.342	PK

Site: AC5	Time: 2015/11/04 - 23:36
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode1: Transmit at CH2412 by 802.11b	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2387.560	53.918	16.562	-0.082	54.000	37.356	AV
2		2390.000	50.399	13.044	-3.601	54.000	37.355	AV
3	*	2412.648	109.014	71.675	55.014	54.000	37.339	AV

Site: AC5	Time: 2015/11/04 - 23:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode1: Transmit at CH2462 by 802.11b	



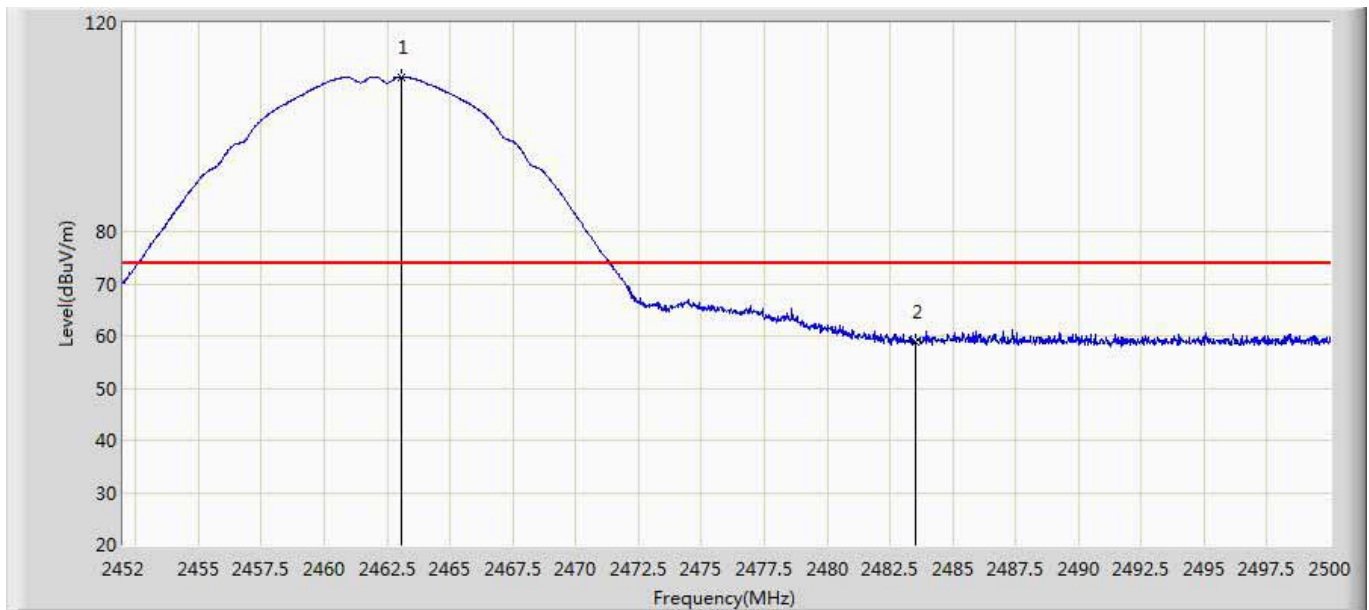
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2463.016	118.603	81.179	44.603	74.000	37.424	PK
2		2483.500	62.668	25.157	-11.332	74.000	37.511	PK

Site: AC5	Time: 2015/11/04 - 23:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode1: Transmit at CH2462 by 802.11b	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2461.192	110.591	73.170	56.591	54.000	37.421	AV
2		2483.500	49.145	11.634	-4.855	54.000	37.511	AV

Site: AC5	Time: 2015/11/04 - 23:53
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode1: Transmit at CH2462 by 802.11b	



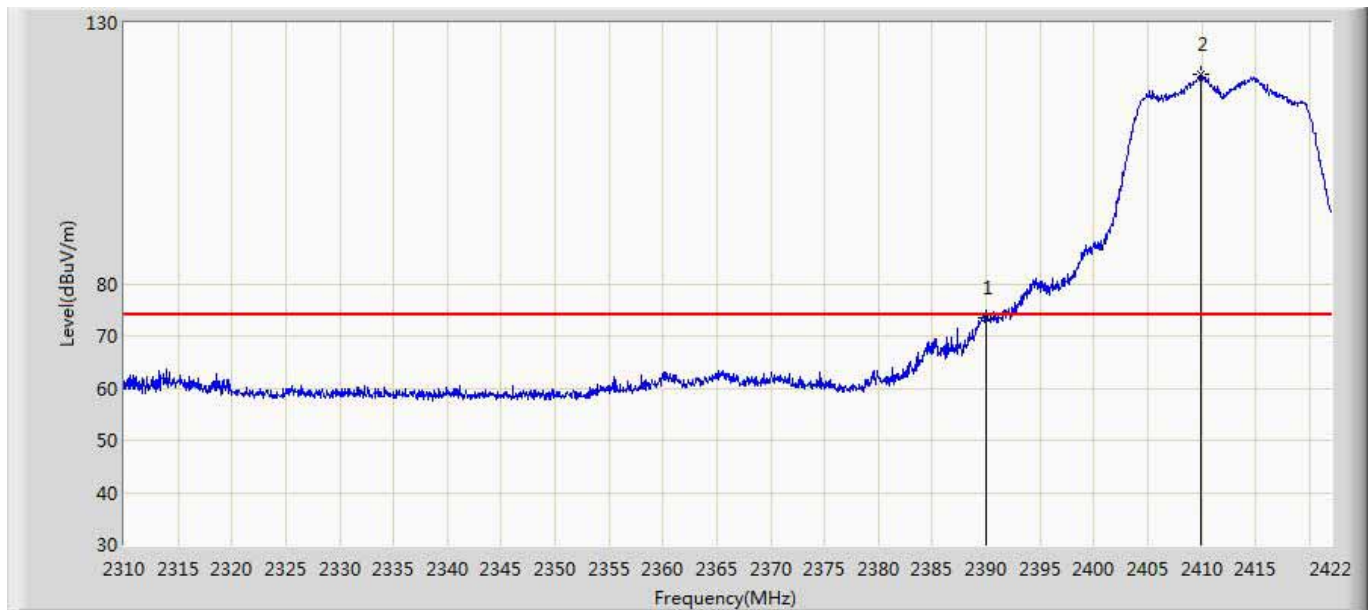
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2463.088	109.603	72.179	35.603	74.000	37.424	PK
2		2483.500	58.849	21.338	-15.151	74.000	37.511	PK

Site: AC5	Time: 2015/11/04 - 23:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode1: Transmit at CH2462 by 802.11b	



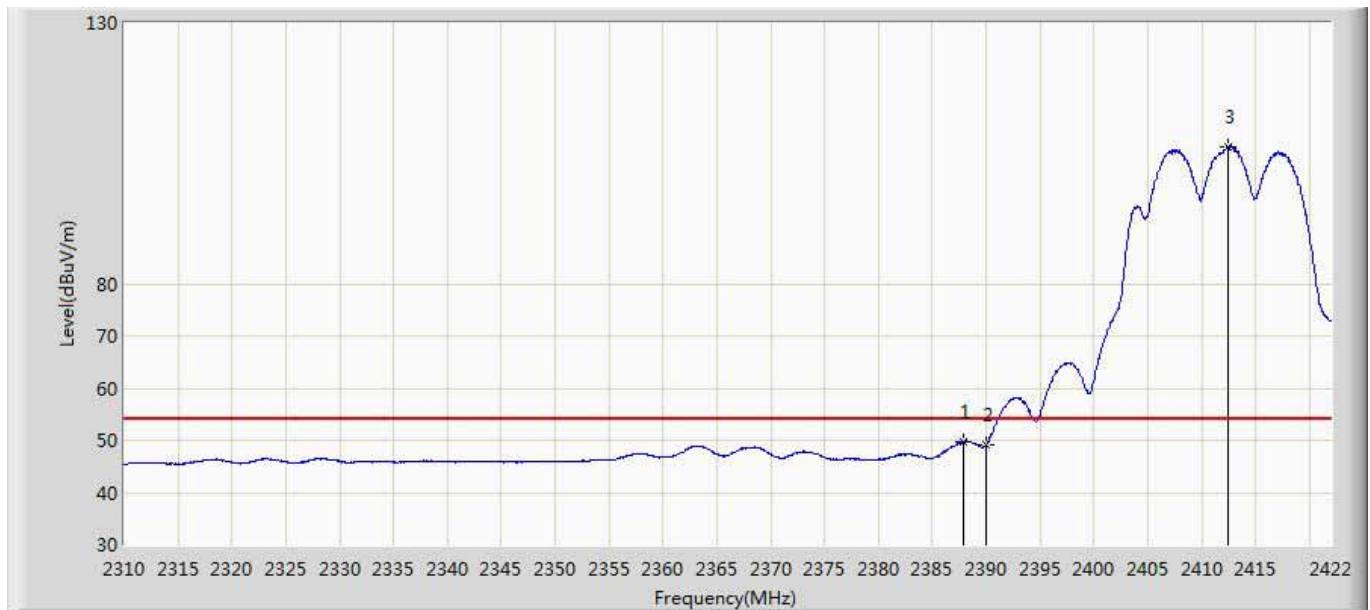
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2459.344	94.804	57.382	40.804	54.000	37.423	AV
2		2483.500	45.746	8.235	-8.254	54.000	37.511	AV

Site: AC5	Time: 2015/11/04 - 23:57
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode2: Transmit at CH2412 by 802.11g	



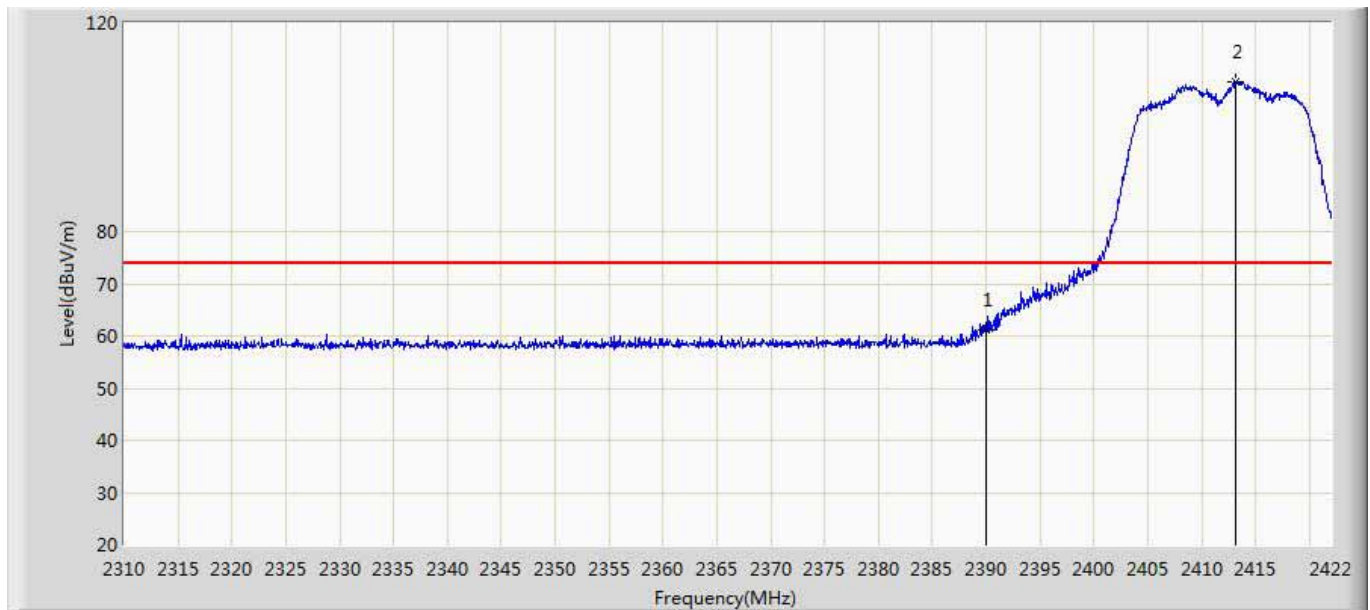
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	73.417	36.062	-0.583	74.000	37.355	PK
2	*	2409.960	120.042	82.713	46.042	74.000	37.329	PK

Site: AC5	Time: 2015/11/04 - 23:58
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode2: Transmit at CH2412 by 802.11g	



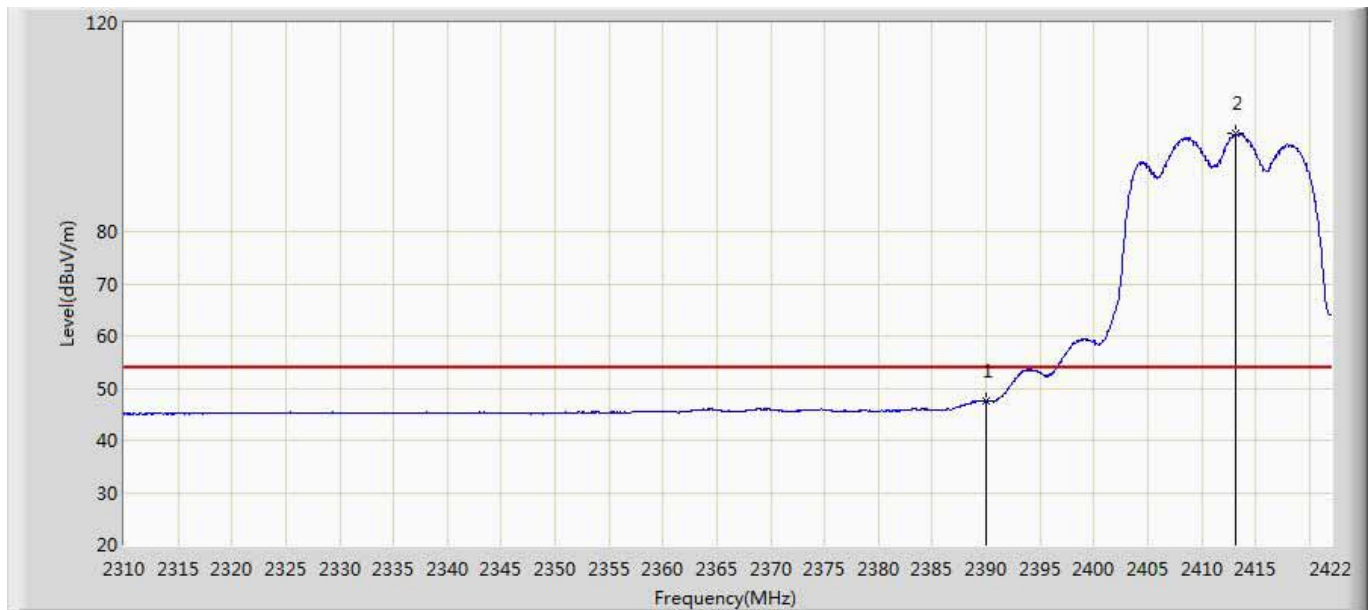
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2387.840	49.723	12.367	-4.277	54.000	37.356	AV
2		2390.000	49.124	11.769	-4.876	54.000	37.355	AV
3	*	2412.480	106.258	68.921	52.258	54.000	37.338	AV

Site: AC5	Time: 2015/11/05 - 00:12
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode2: Transmit at CH2412 by 802.11g	



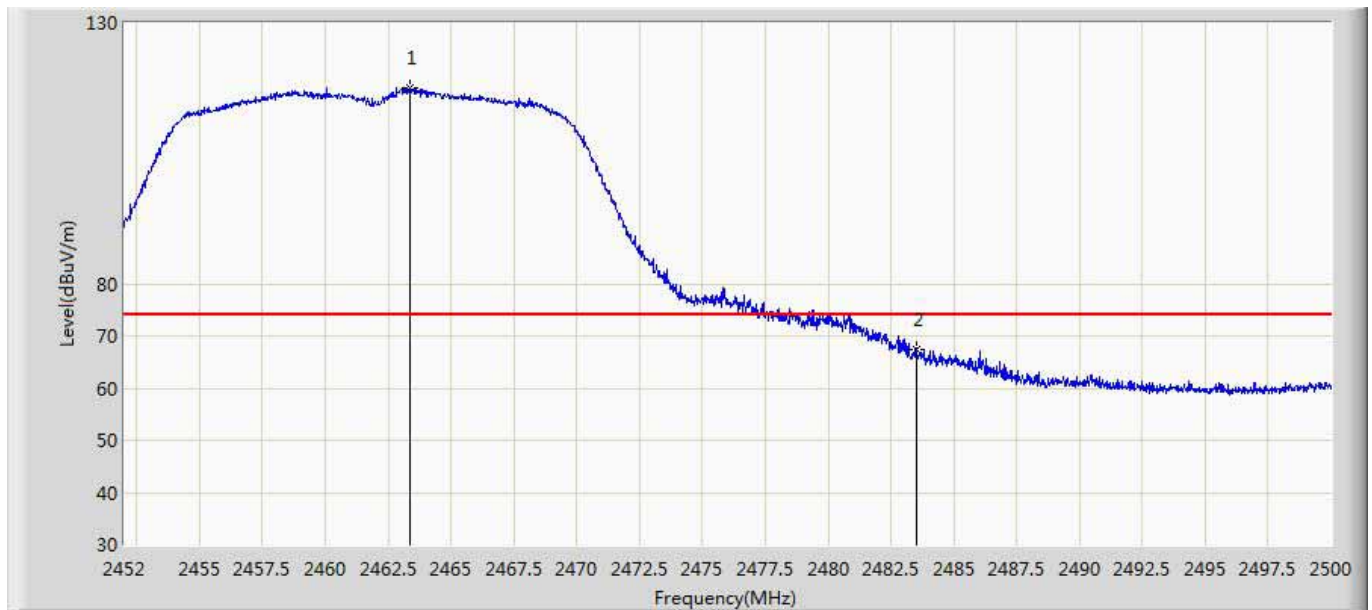
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	61.217	23.862	-12.783	74.000	37.355	PK
2	*	2413.152	108.777	71.435	34.777	74.000	37.342	PK

Site: AC5	Time: 2015/11/05 - 00:19
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode2: Transmit at CH2412 by 802.11g	



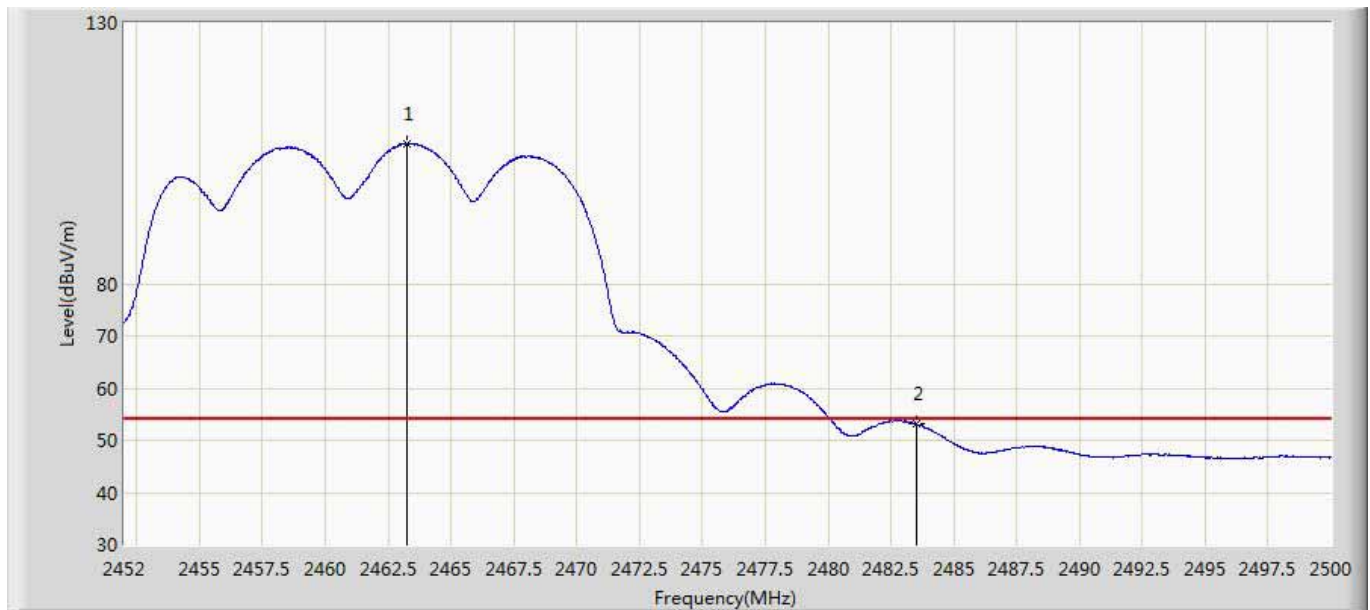
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	47.438	10.083	-6.562	54.000	37.355	AV
2	*	2413.208	98.789	61.447	44.789	54.000	37.343	AV

Site: AC5	Time: 2015/11/05 - 00:32
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode2: Transmit at CH2462 by 802.11g	



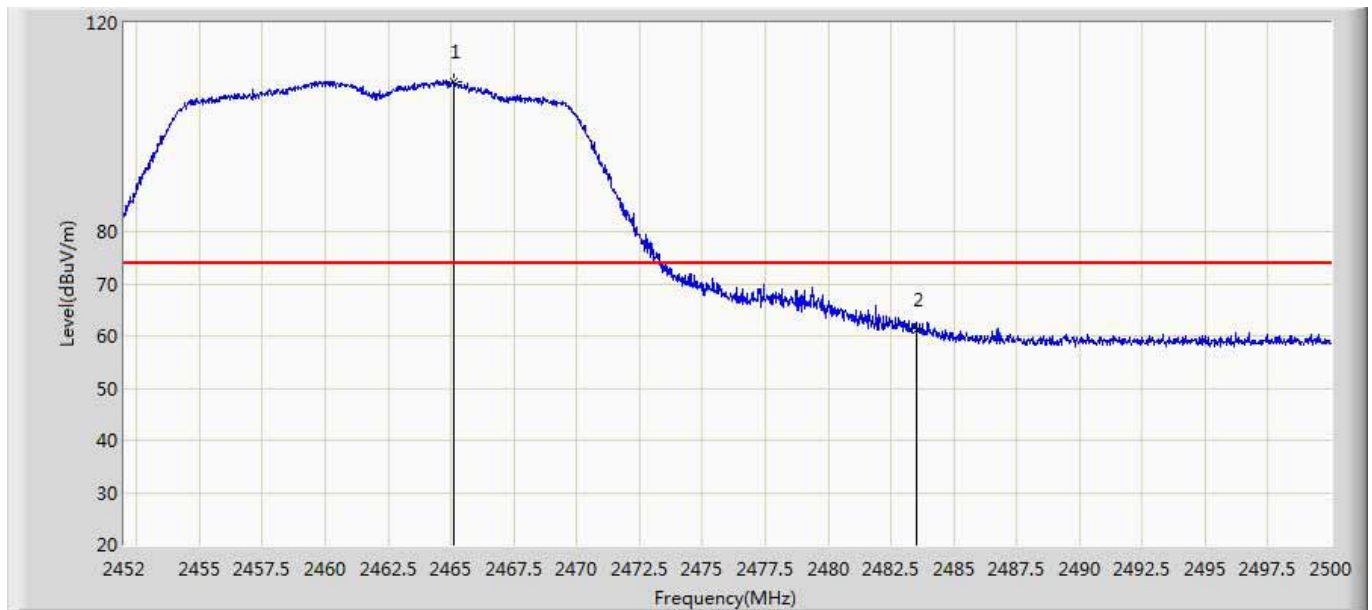
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2463.352	117.496	80.071	43.496	74.000	37.425	PK
2		2483.500	67.330	29.819	-6.670	74.000	37.511	PK

Site: AC5	Time: 2015/11/05 - 00:32
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode2: Transmit at CH2462 by 802.11g	



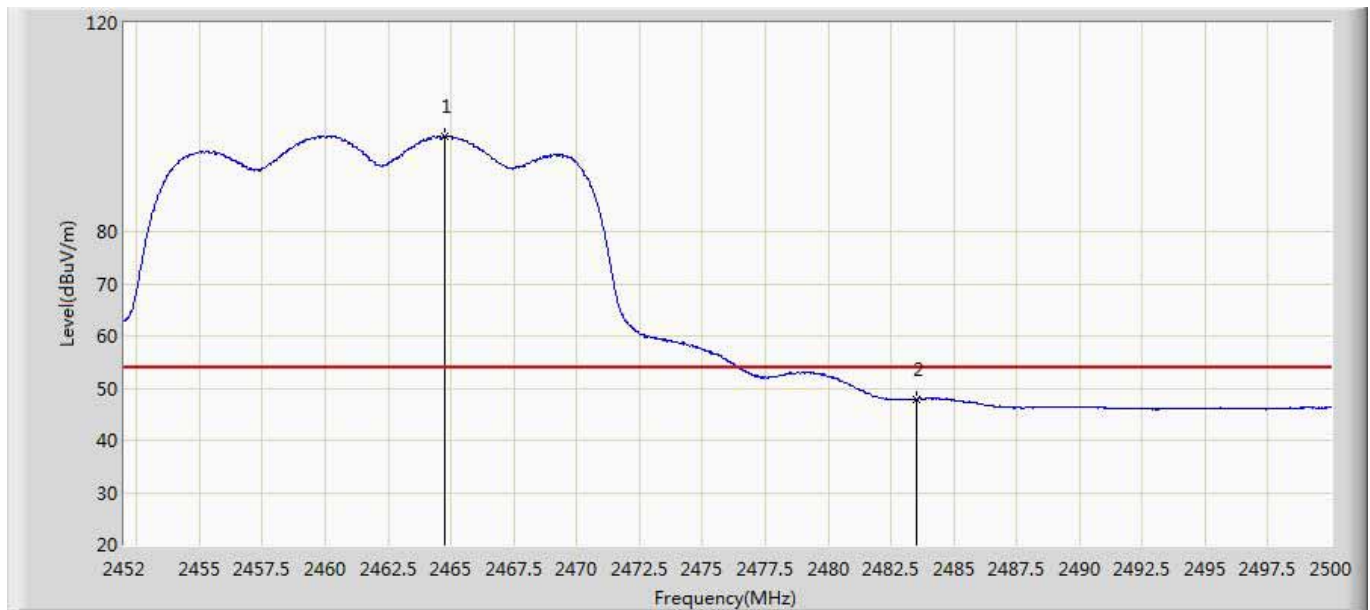
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2463.256	106.875	69.450	52.875	54.000	37.425	AV
2		2483.500	53.077	15.566	-0.923	54.000	37.511	AV

Site: AC5	Time: 2015/11/05 - 00:35
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode2: Transmit at CH2462 by 802.11g	



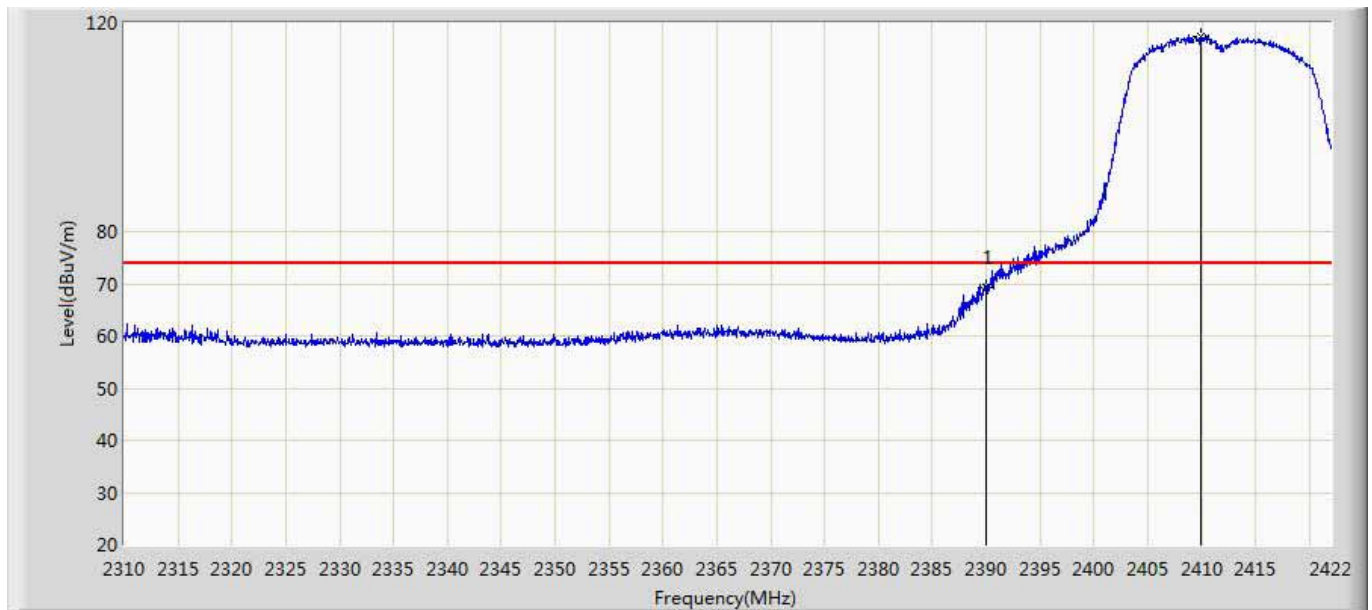
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2465.128	108.787	71.356	34.787	74.000	37.431	PK
2		2483.500	61.276	23.765	-12.724	74.000	37.511	PK

Site: AC5	Time: 2015/11/05 - 00:35
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode2: Transmit at CH2462 by 802.11g	



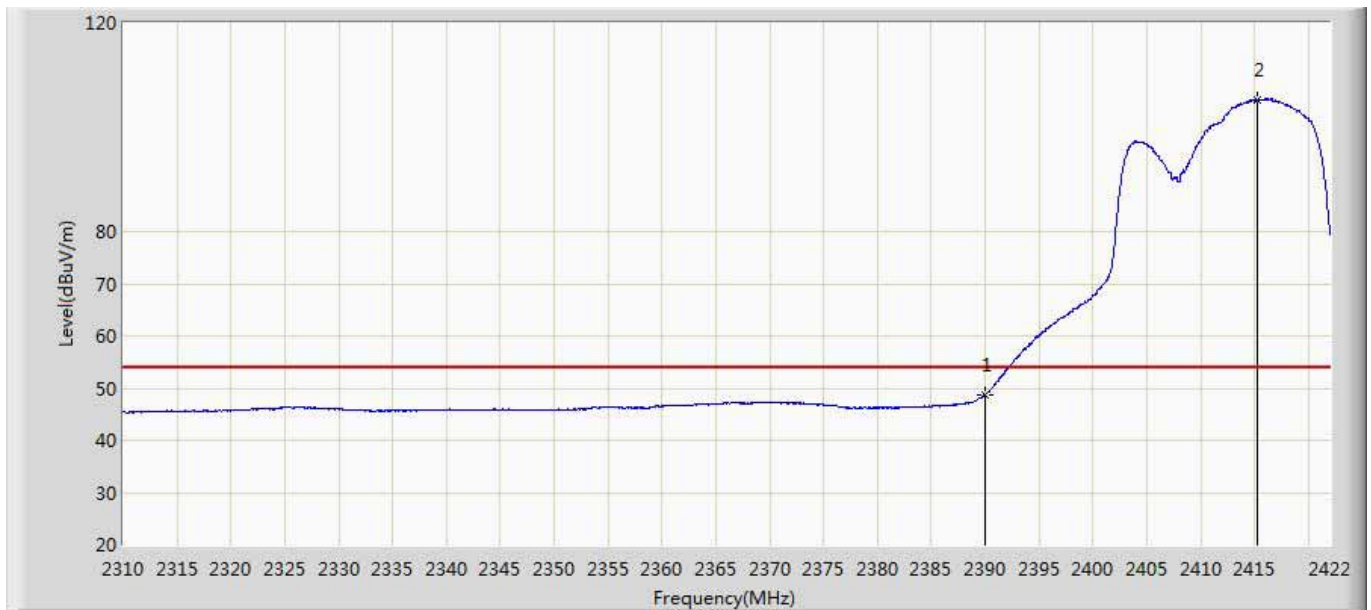
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2464.744	98.156	60.726	44.156	54.000	37.429	AV
2		2483.500	47.862	10.351	-6.138	54.000	37.511	AV

Site: AC5	Time: 2015/11/05 - 00:40
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode3: Transmit at CH2412 by 802.11n(20MHz)	



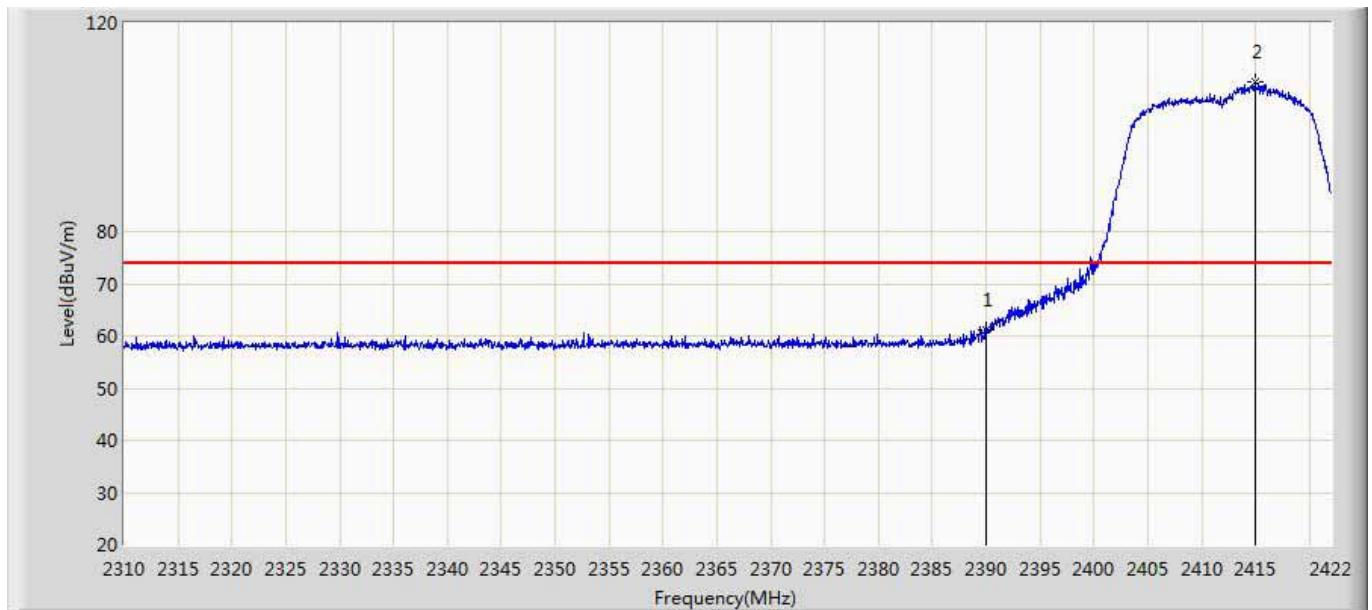
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	69.184	31.829	-4.816	74.000	37.355	PK
2	*	2409.904	117.382	80.053	43.382	74.000	37.330	PK

Site: AC5	Time: 2015/11/05 - 00:41
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode3: Transmit at CH2412 by 802.11n(20MHz)	



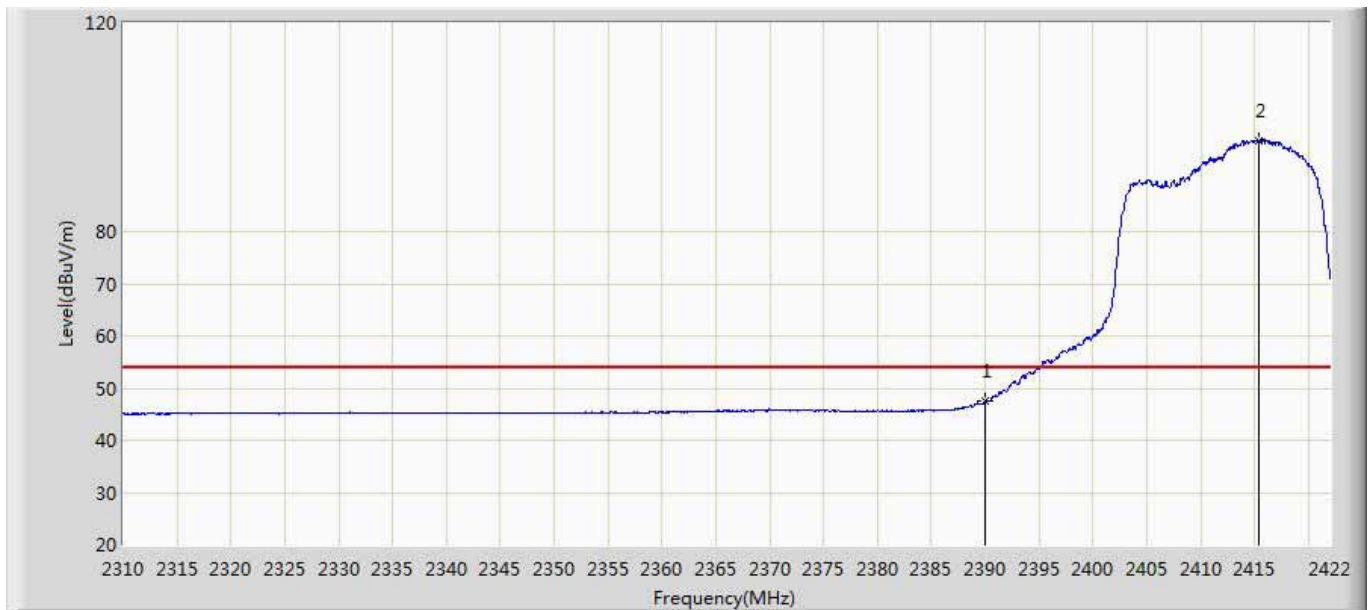
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	48.788	11.433	-5.212	54.000	37.355	AV
2	*	2415.280	105.328	67.972	51.328	54.000	37.356	AV

Site: AC5	Time: 2015/11/05 - 00:44
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode3: Transmit at CH2412 by 802.11n(20MHz)	



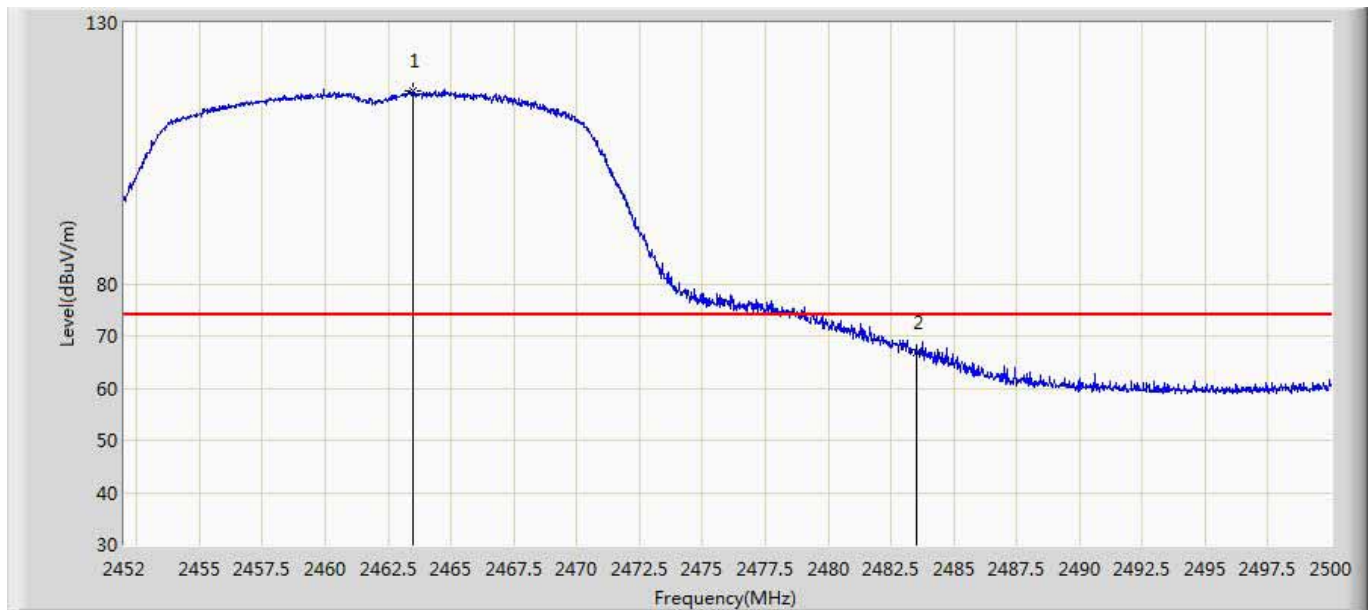
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	61.089	23.734	-12.911	74.000	37.355	PK
2	*	2414.944	108.718	71.364	34.718	74.000	37.354	PK

Site: AC5	Time: 2015/11/05 - 00:45
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode3: Transmit at CH2412 by 802.11n(20MHz)	



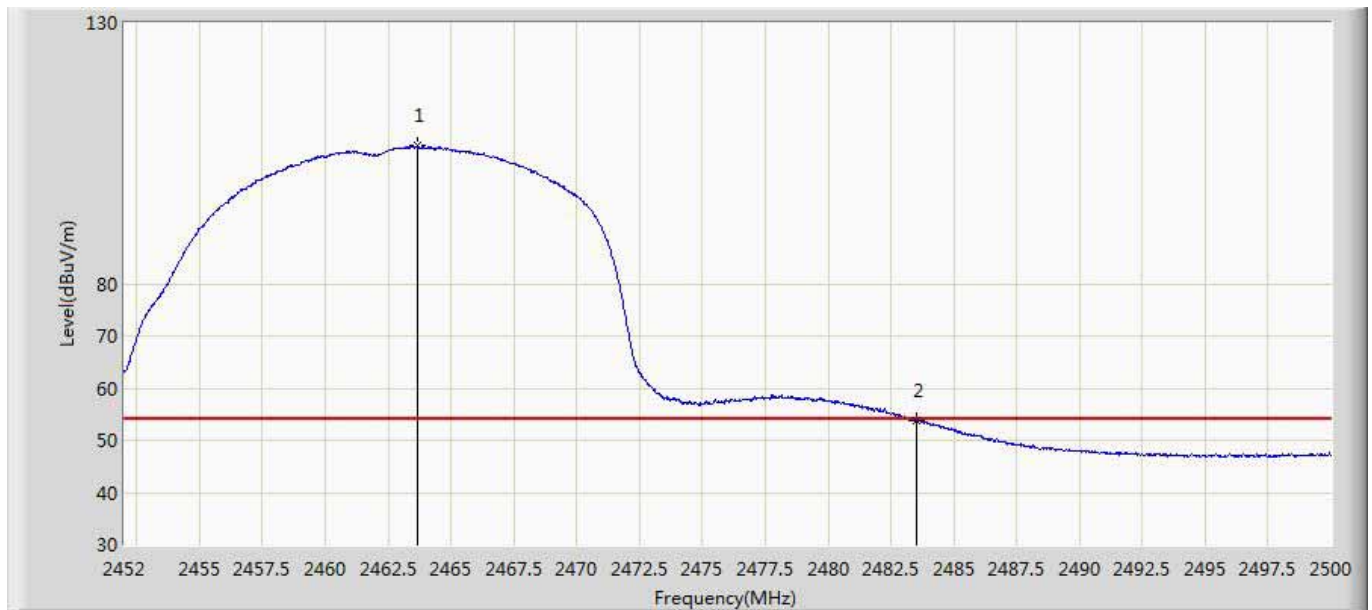
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	47.455	10.100	-6.545	54.000	37.355	AV
2	*	2415.336	97.504	60.147	43.504	54.000	37.356	AV

Site: AC5	Time: 2015/11/05 - 00:55
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode3: Transmit at CH2462 by 802.11n(20MHz)	



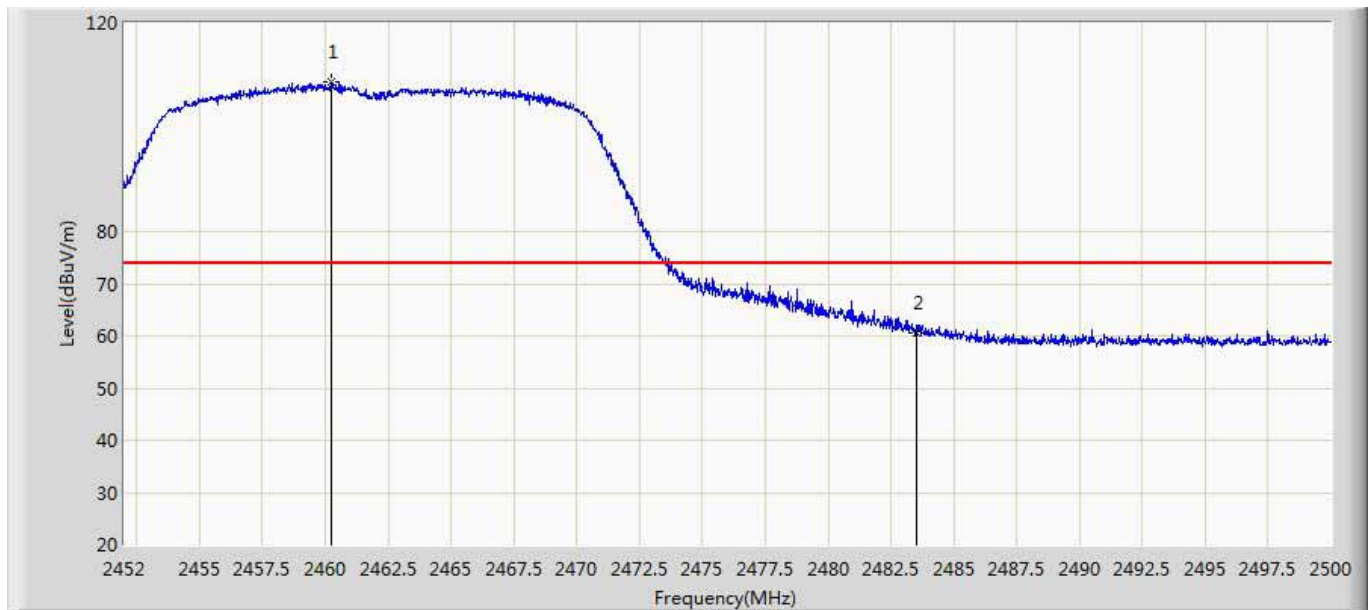
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2463.496	116.920	79.494	42.920	74.000	37.426	PK
2		2483.500	66.796	29.285	-7.204	74.000	37.511	PK

Site: AC5	Time: 2015/11/05 - 00:56
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode3: Transmit at CH2462 by 802.11n(20MHz)	



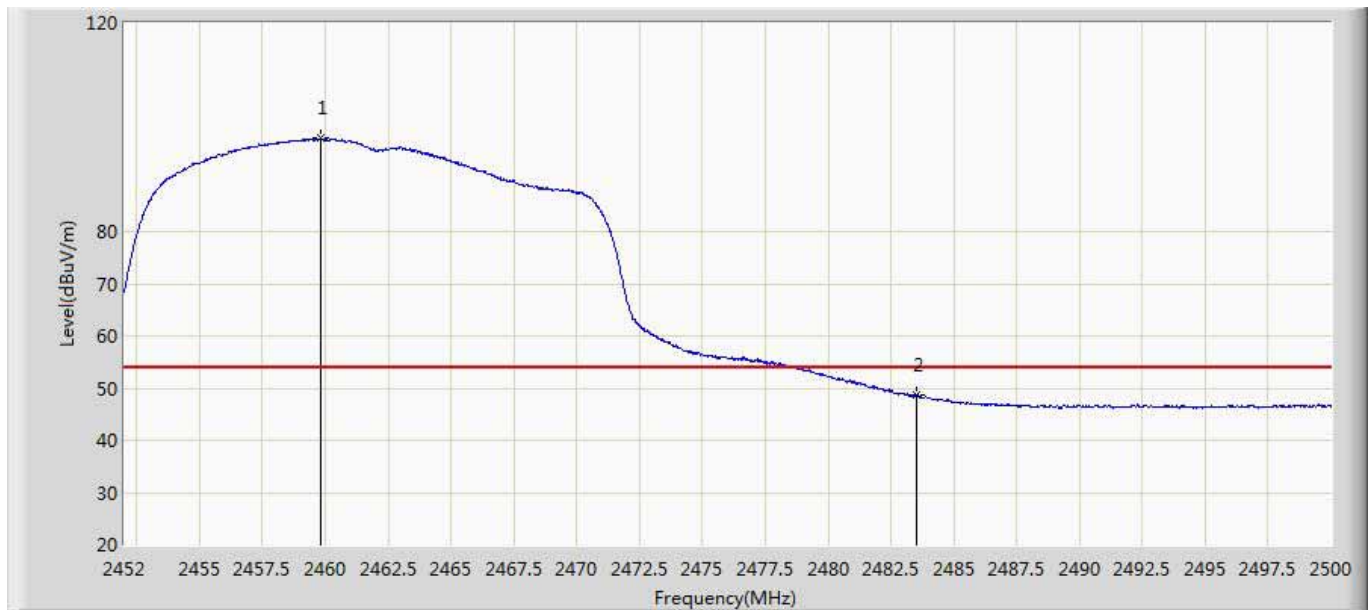
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2463.640	106.468	69.042	52.468	54.000	37.426	AV
2		2483.500	53.728	16.217	-0.272	54.000	37.511	AV

Site: AC5	Time: 2015/11/05 - 00:59
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode3: Transmit at CH2462 by 802.11n(20MHz)	



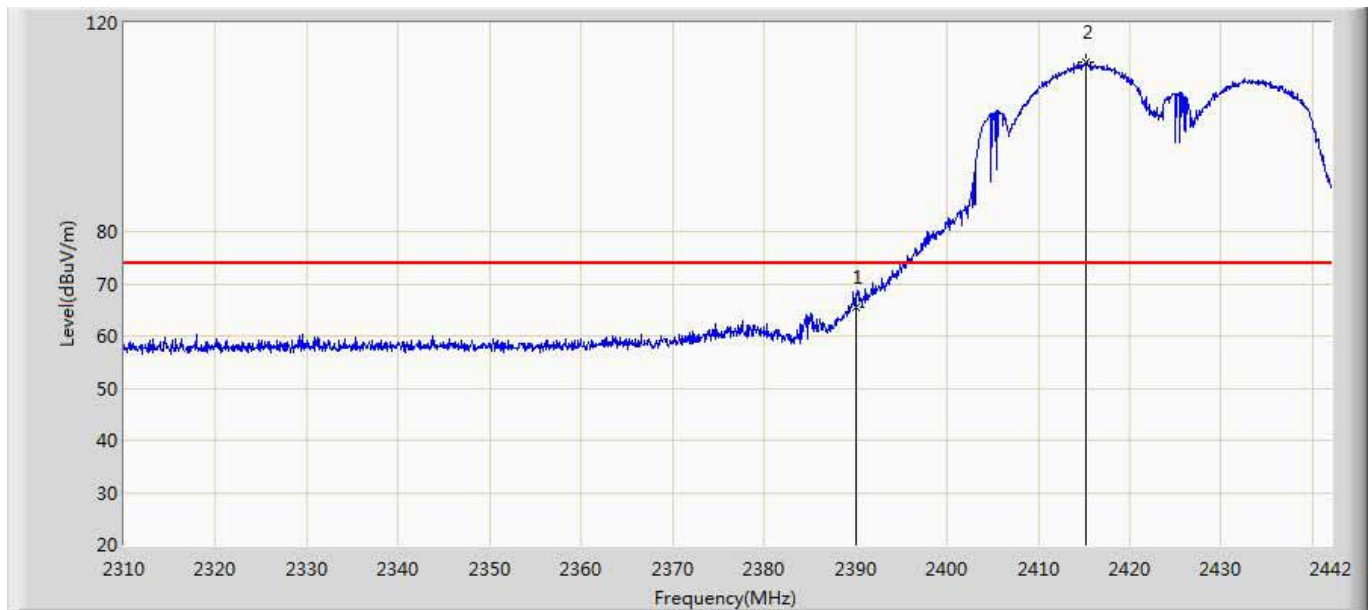
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2460.256	108.661	71.239	34.661	74.000	37.422	PK
2		2483.500	60.612	23.101	-13.388	74.000	37.511	PK

Site: AC5	Time: 2015/11/05 - 00:59
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode3: Transmit at CH2462 by 802.11n(20MHz)	



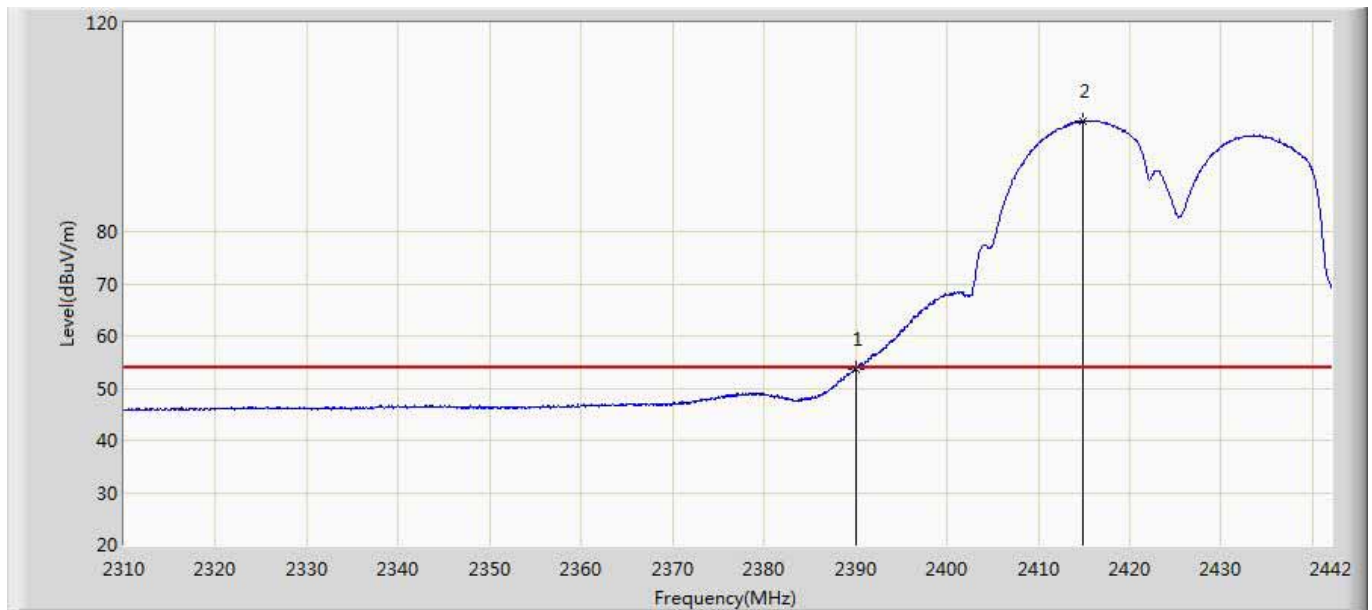
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2459.848	97.836	60.414	43.836	54.000	37.422	AV
2		2483.500	48.563	11.052	-5.437	54.000	37.511	AV

Site: AC5	Time: 2015/11/05 - 01:02
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode4: Transmit at CH2422 by 802.11n(40MHz)	



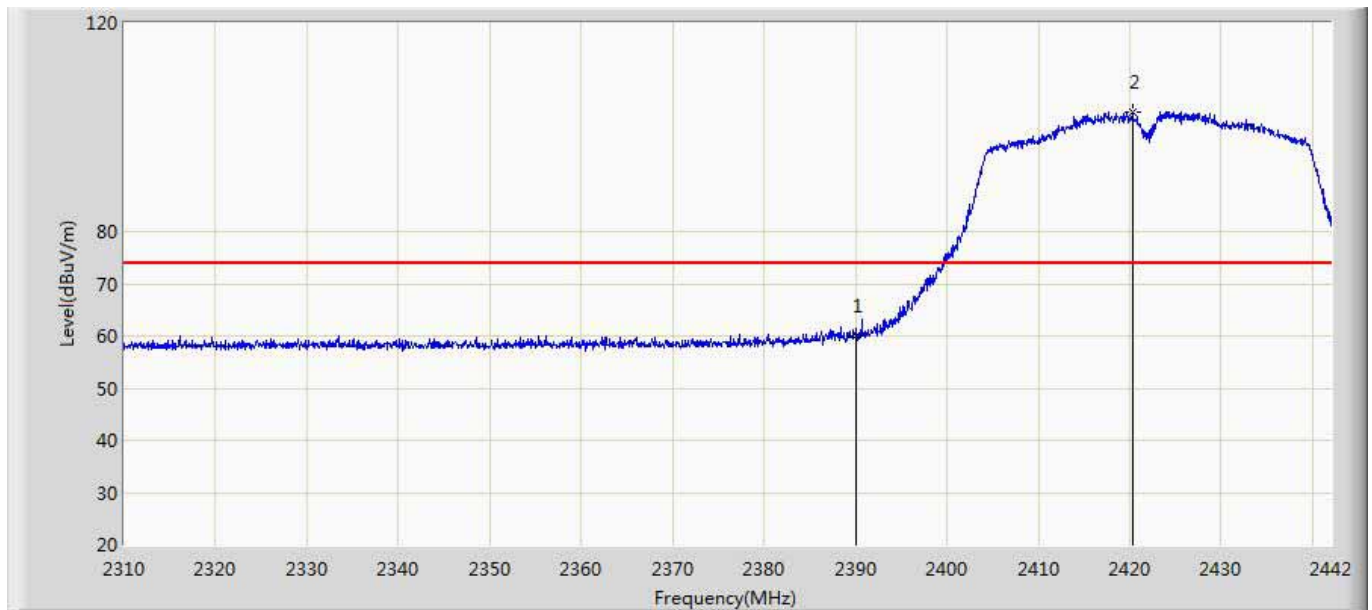
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	65.641	28.286	-8.359	74.000	37.355	PK
2	*	2415.204	112.404	75.048	38.404	74.000	37.356	PK

Site: AC5	Time: 2015/11/05 - 01:03
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode4: Transmit at CH2422 by 802.11n(40MHz)	



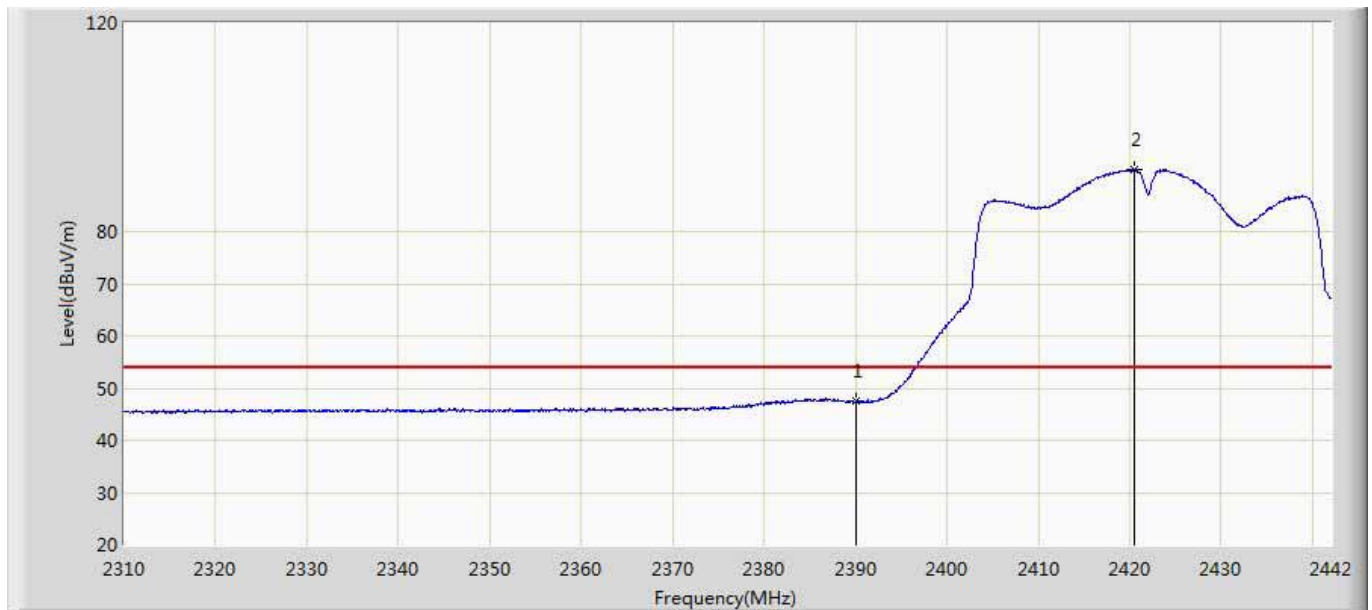
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	53.724	16.369	-0.276	54.000	37.355	AV
2	*	2414.874	101.212	63.858	47.212	54.000	37.354	AV

Site: AC5	Time: 2015/11/05 - 01:09
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode4: Transmit at CH2422 by 802.11n(40MHz)	



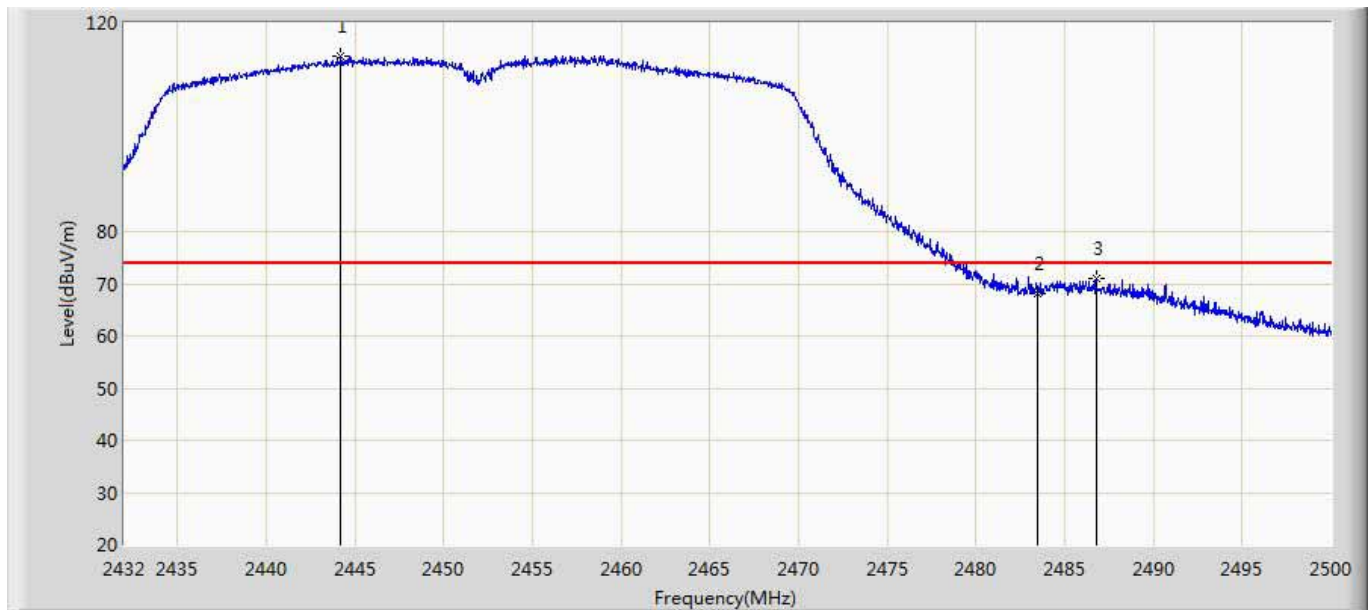
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	60.066	22.711	-13.934	74.000	37.355	PK
2	*	2420.286	102.829	65.439	28.829	74.000	37.390	PK

Site: AC5	Time: 2015/11/05 - 01:09
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode4: Transmit at CH2422 by 802.11n(40MHz)	



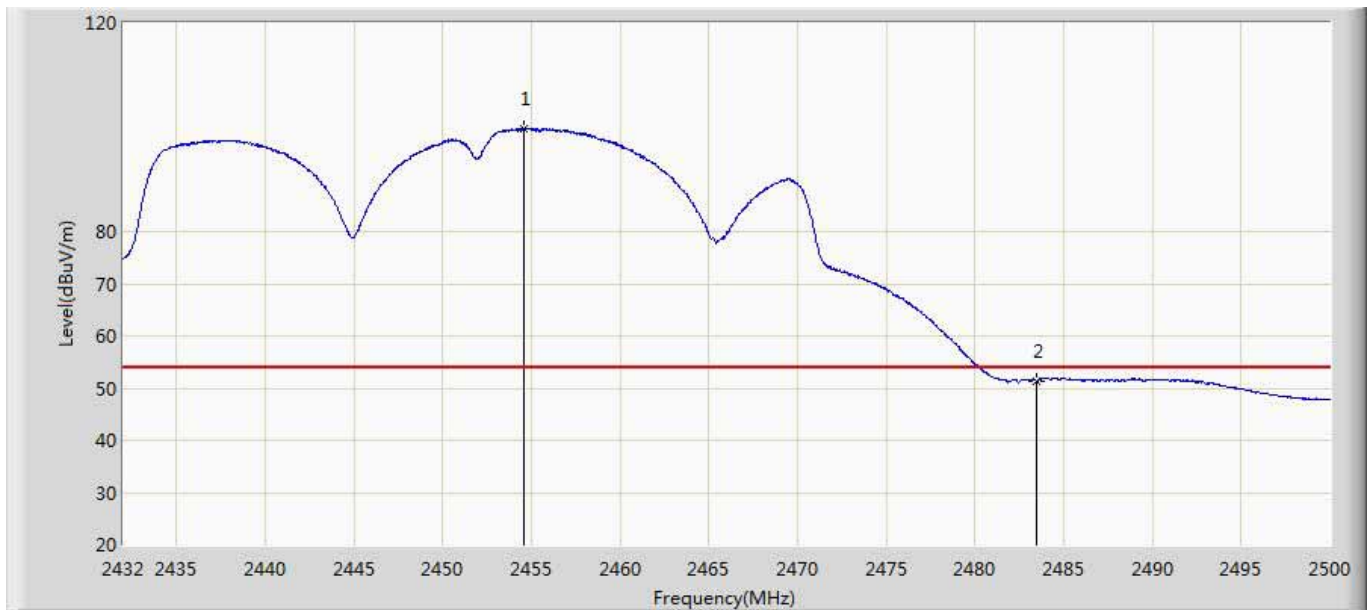
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	47.408	10.053	-6.592	54.000	37.355	AV
2	*	2420.484	91.945	54.554	37.945	54.000	37.392	AV

Site: AC5	Time: 2015/11/05 - 01:25
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode4: Transmit at CH2452 by 802.11n(40MHz)	



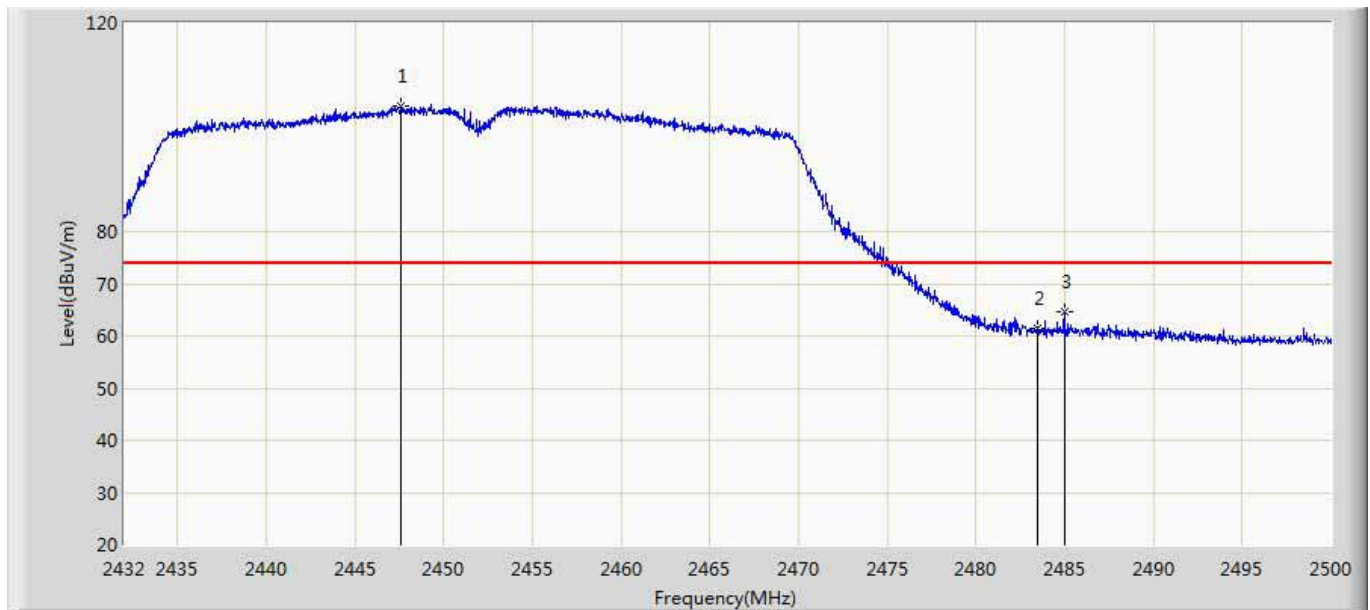
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2444.206	113.661	76.227	39.661	74.000	37.434	PK
2		2483.500	68.036	30.525	-5.964	74.000	37.511	PK
3		2486.774	70.888	33.353	-3.112	74.000	37.535	PK

Site: AC5	Time: 2015/11/05 - 01:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode4: Transmit at CH2452 by 802.11n(40MHz)	



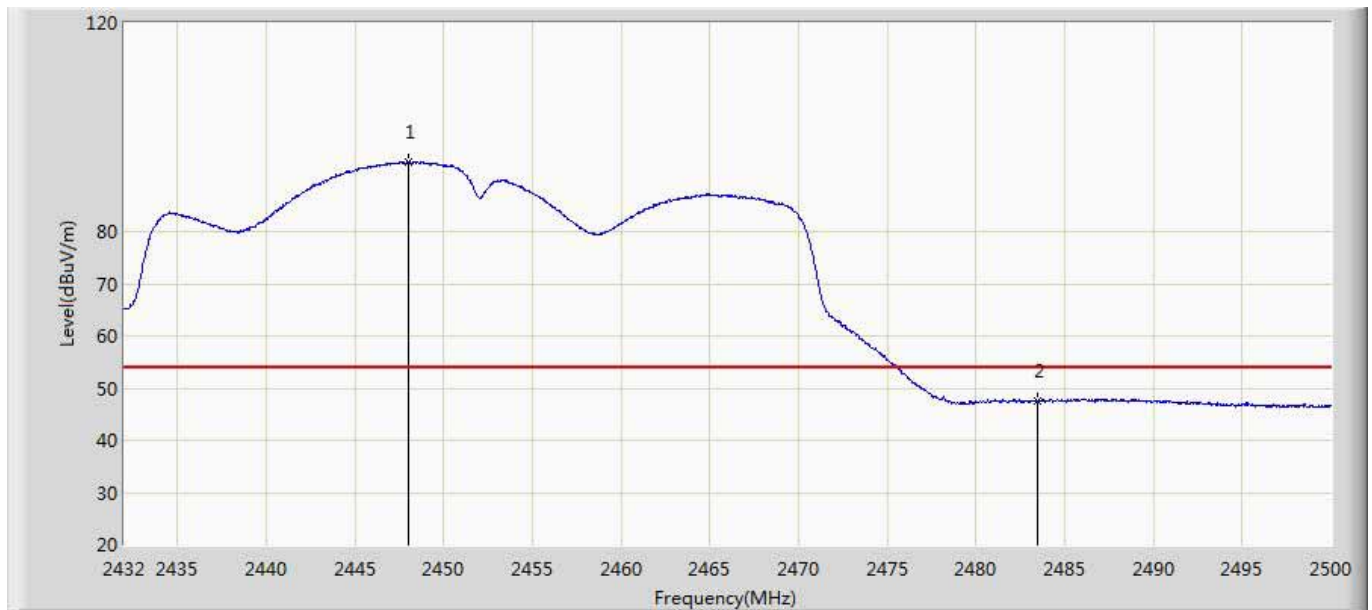
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2454.542	99.666	62.240	45.666	54.000	37.426	AV
2		2483.500	51.289	13.778	-2.711	54.000	37.511	AV

Site: AC5	Time: 2015/11/05 - 01:33
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode4: Transmit at CH2452 by 802.11n(40MHz)	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2447.572	104.106	66.675	30.106	74.000	37.431	PK
2		2483.500	61.514	24.003	-12.486	74.000	37.511	PK
3		2484.972	64.715	27.193	-9.285	74.000	37.522	PK

Site: AC5	Time: 2015/11/05 - 01:33
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 300Mbps Multi-Function Wireless N Router	Power: AC 120V/60Hz
Note: Mode4: Transmit at CH2452 by 802.11n(40MHz)	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2448.048	93.267	55.836	39.267	54.000	37.432	AV
2		2483.500	47.508	9.997	-6.492	54.000	37.511	AV

7. Operation Frequency Range of 20dB Bandwidth

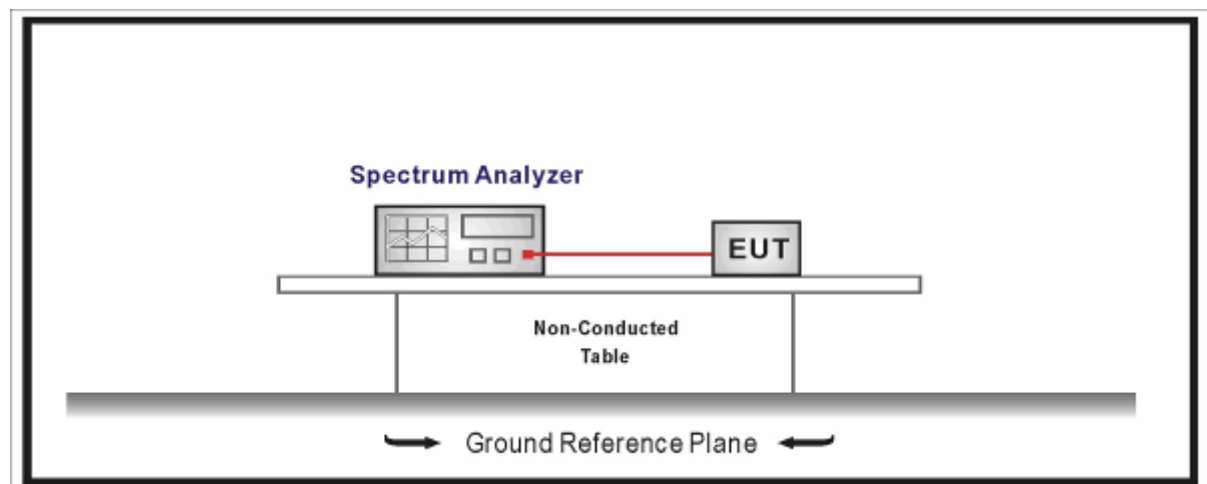
7.1. Test Equipment

Operation Frequency Range of 20dB Bandwidth / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.07
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

7.2. Test Setup



7.3. Limit

20 dB bandwidth of the emission is contained within the operation frequency band.

7.4. Test Procedure

The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Span greater than RBW.

7.5. Uncertainty

The measurement uncertainty is defined as ± 1 kHz

7.6. Test Result

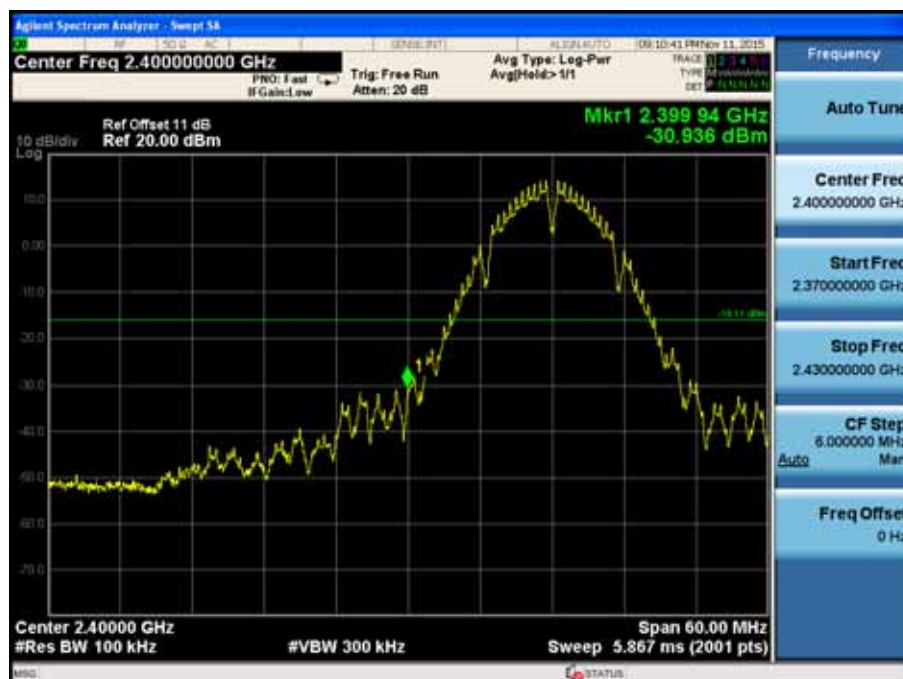
Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	Operation Frequency Range of 20dB Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11b

Channel 01 (2412MHz)

Reference Level – Frequency L Ant 1



Low Band Edge - Frequency L Ant 1



Channel 11 (2462MHz)

Reference Level – Frequency H Ant 1



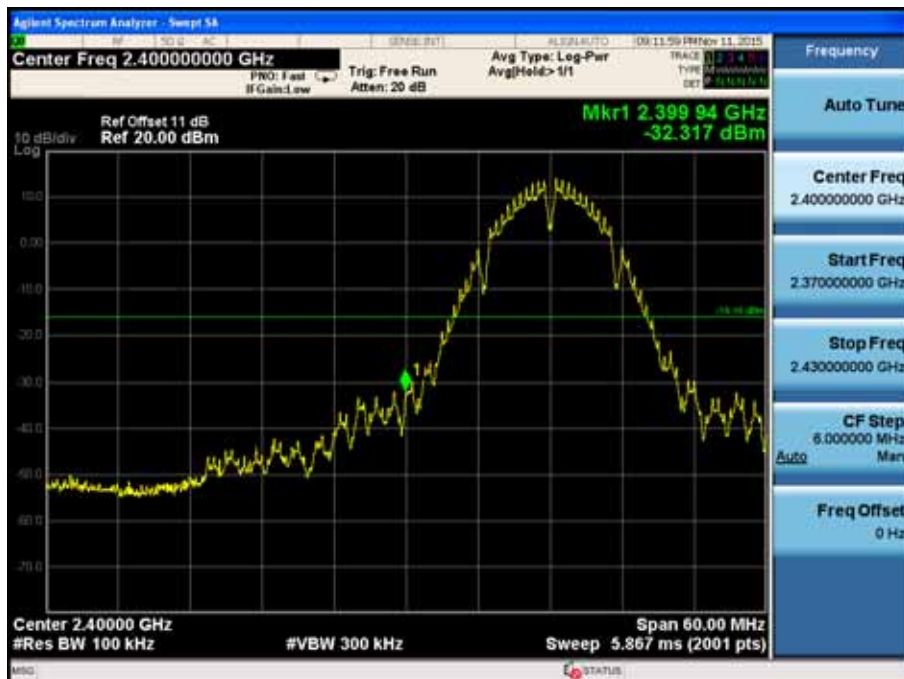
High Band Edge - Frequency H Ant 1



Reference Level – Frequency L Ant 2



Low Band Edge - Frequency L Ant 2



Channel 11 (2462MHz)

Reference Level – Frequency H Ant 2



High Band Edge - Frequency H Ant 2



Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	Operation Frequency Range of 20dB Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11g (Ant 1+2)

Channel 01 (2412MHz)

Reference Level – Frequency L Ant 1



Low Band Edge - Frequency L Ant 1



Channel 11 (2462MHz)

Reference Level – Frequency H Ant 1



High Band Edge - Frequency H Ant 1

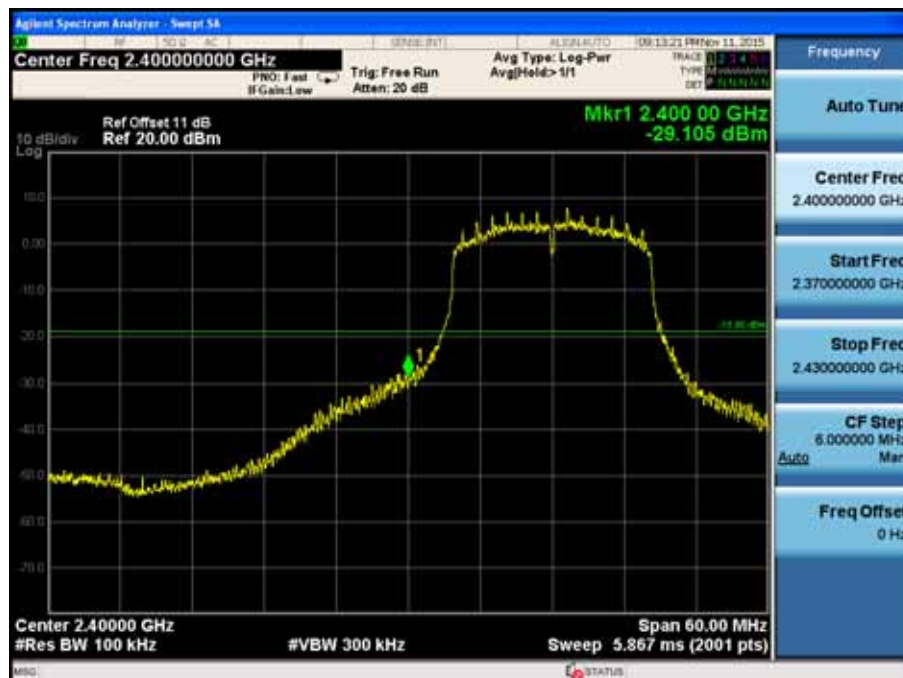


Channel 01 (2412MHz)

Reference Level – Frequency L Ant 2



Low Band Edge - Frequency L Ant 2



Channel 11 (2462MHz)

Reference Level – Frequency H Ant 2



High Band Edge - Frequency H Ant 2



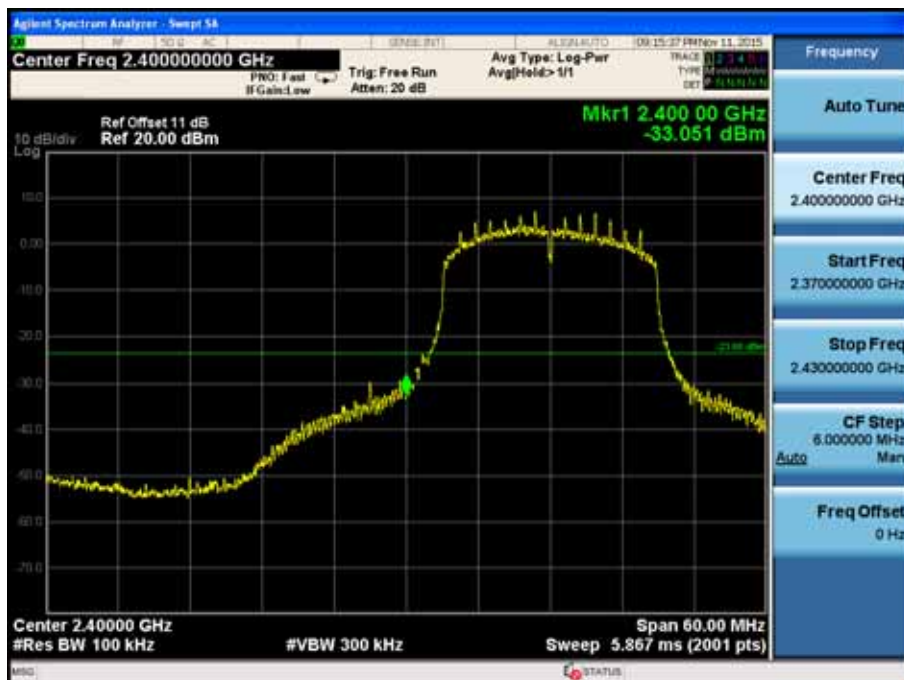
Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	Operation Frequency Range of 20dB Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz) (Ant 1+2)

Channel 01 (2412MHz)

Reference Level – Frequency L Ant 1



Low Band Edge - Frequency L Ant 1



Channel 11 (2462MHz)

Reference Level – Frequency H Ant 1



High Band Edge - Frequency H Ant 1

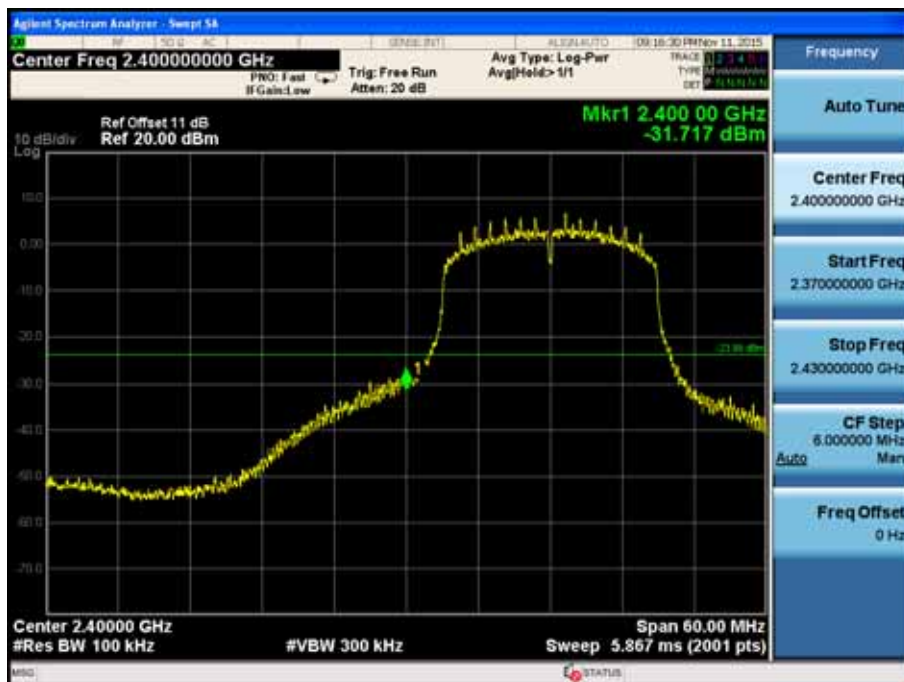


Channel 01 (2412MHz)

Reference Level – Frequency L Ant 2



Low Band Edge - Frequency L Ant 2



Channel 11 (2462MHz)

Reference Level – Frequency H Ant 2



High Band Edge - Frequency H Ant 2



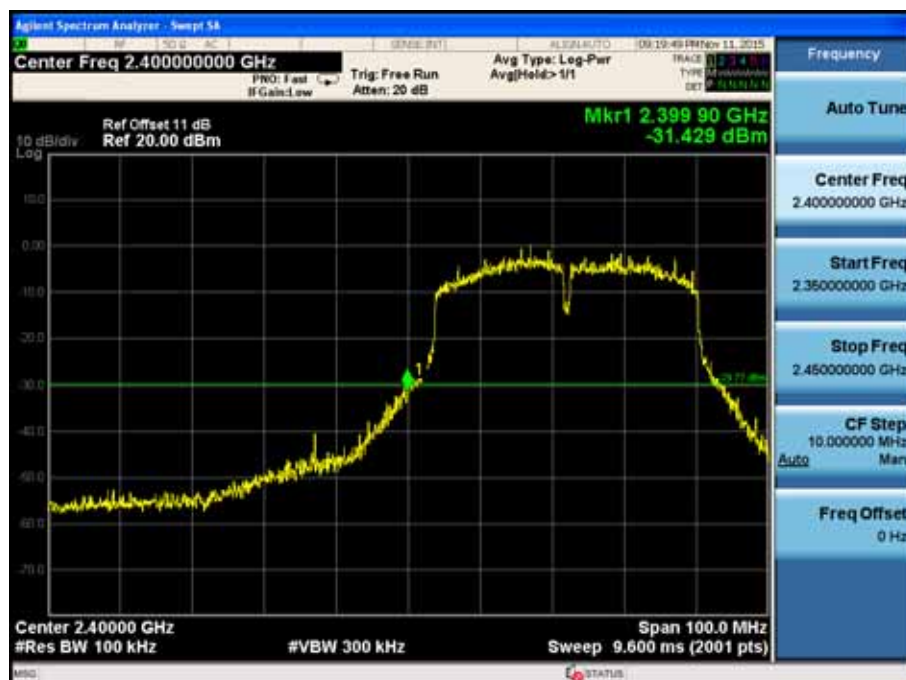
Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	Operation Frequency Range of 20dB Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 4: Transmit by 802.11n(40MHz) (Ant 1+2)

Channel 03 (2422MHz)

Reference Level – Frequency L Ant 1



Low Band Edge - Frequency L Ant 1



Channel 09 (2452MHz)

Reference Level – Frequency H Ant 1



High Band Edge - Frequency H Ant 1



Channel 03(2422MHz)

Reference Level – Frequency L Ant 2



Low Band Edge - Frequency L Ant 2



Channel 09 (2452MHz)

Reference Level – Frequency H Ant 2



High Band Edge - Frequency H Ant 2



8. Occupied Bandwidth

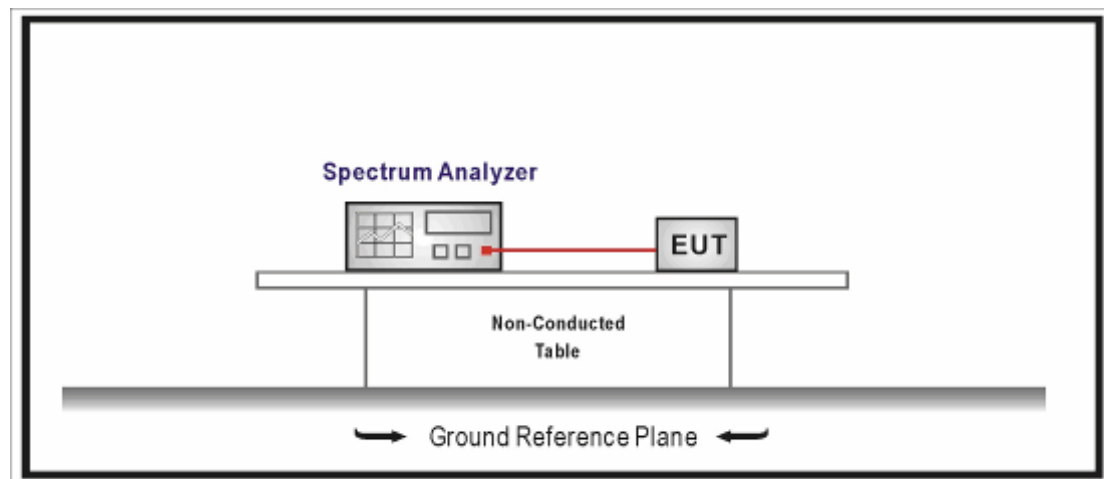
8.1. Test Equipment

Occupied Bandwidth / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.07
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

8.2. Test Setup



8.3. Limit

According to ANSI C63.10 11.2 c) test 99% occupied bandwidth.
Should be less than the nominal bandwidth.

8.4. Test Procedure

The EUT was setup according to ANSI C63.4: 2014; tested according to DTS test procedure of ANSI C63.10 requirements.

When the average power is exercised, the measured power is to be referenced to the OBW (99% occupied bandwidth) rather than to the DTS bandwidth according to Clause 11.9.2.1 of ANSI C63.10.

The 99% bandwidth test is using ANSI C63.10 Section 6.9.3 method.

- Set RBW = in the range of 1% to 5% of the OBW.
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW.

- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

8.5. Uncertainty

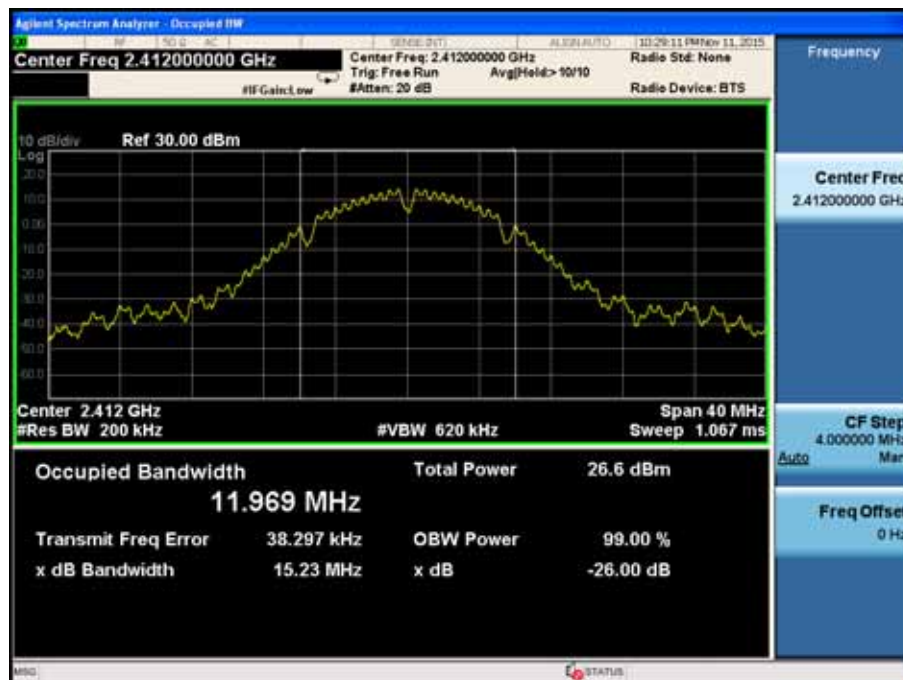
The measurement uncertainty is defined as ± 1 kHz

8.6. Test Result

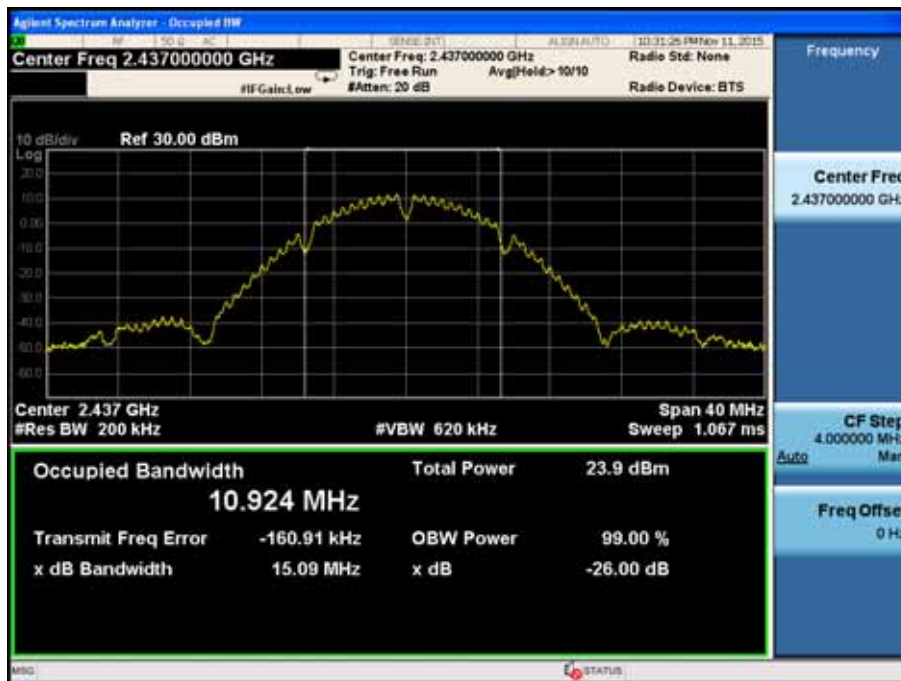
Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	99% Occupied Bandwidth
Test Mode	:	Mode 1: Transmit by 802.11b

Channel No.	Frequency (MHz)	Occupied Bandwidth (kHz)	Limit (kHz)	Result
01	2412	11969	20000	Pass
06	2437	10924	20000	Pass
11	2462	11058	20000	Pass

Channel 01 (2412MHz) (Ant 2)



Channel 06 (2437MHz) (Ant 2)



Channel 11 (2462MHz) (Ant 2)

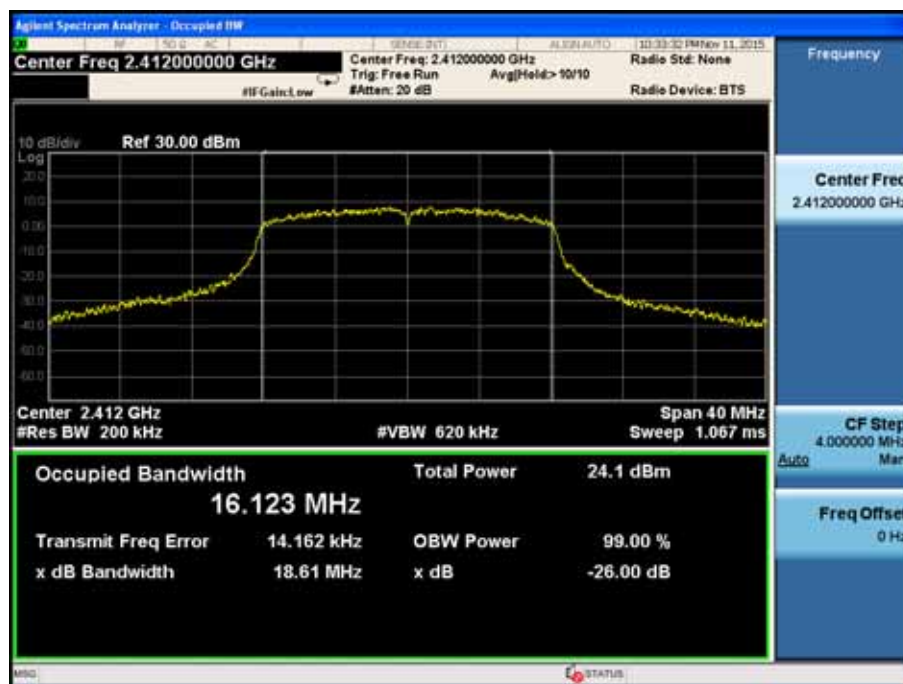


Note: For this test item, each modulation we have evaluated two antennas, presented data in the report is the worst case.

Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	99% Occupied Bandwidth
Test Mode	:	Mode 2: Transmit by 802.11g

Channel No.	Frequency (MHz)	Occupied Bandwidth (kHz)	Limit (kHz)	Result
01	2412	16123	20000	Pass
06	2437	17248	20000	Pass
11	2462	16131	20000	Pass

Channel 01 (2412MHz) (Ant 2)



Channel 06 (2437MHz) (Ant 2)



Channel 11 (2462MHz) (Ant 2)

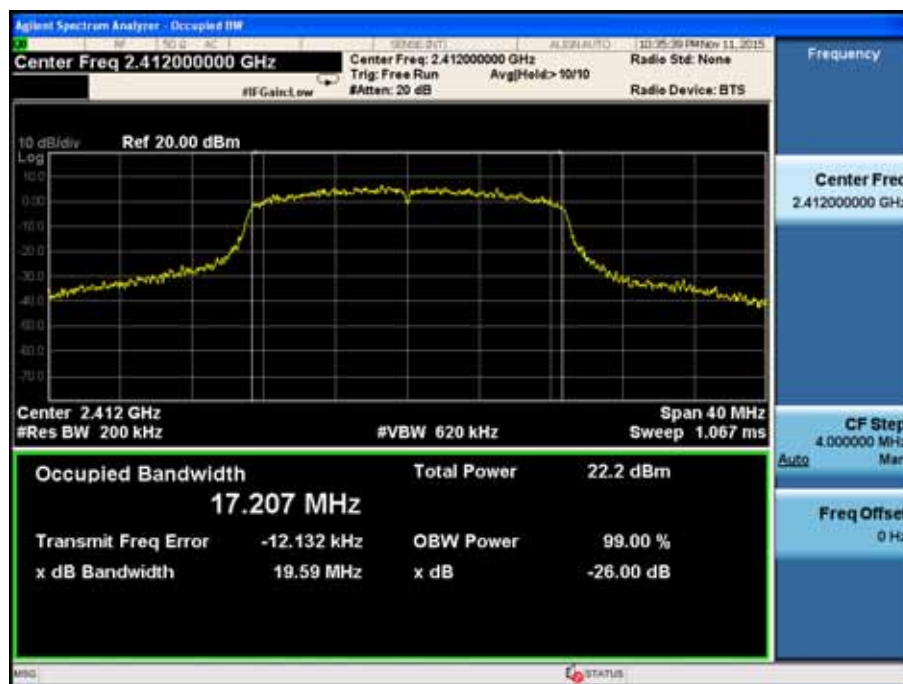


Note: For this test item, each modulation we have evaluated two antennas, presented data in the report is the worst case.

Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	99% Occupied Bandwidth
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz)

Channel No.	Frequency (MHz)	Occupied Bandwidth (kHz)	Limit (kHz)	Result
01	2412	17207	20000	Pass
06	2437	18643	20000	Pass
11	2462	17161	20000	Pass

Channel 01 (2412MHz) (Ant 2)



Channel 06 (2437MHz) (Ant 2)



Channel 11 (2462MHz) (Ant 2)

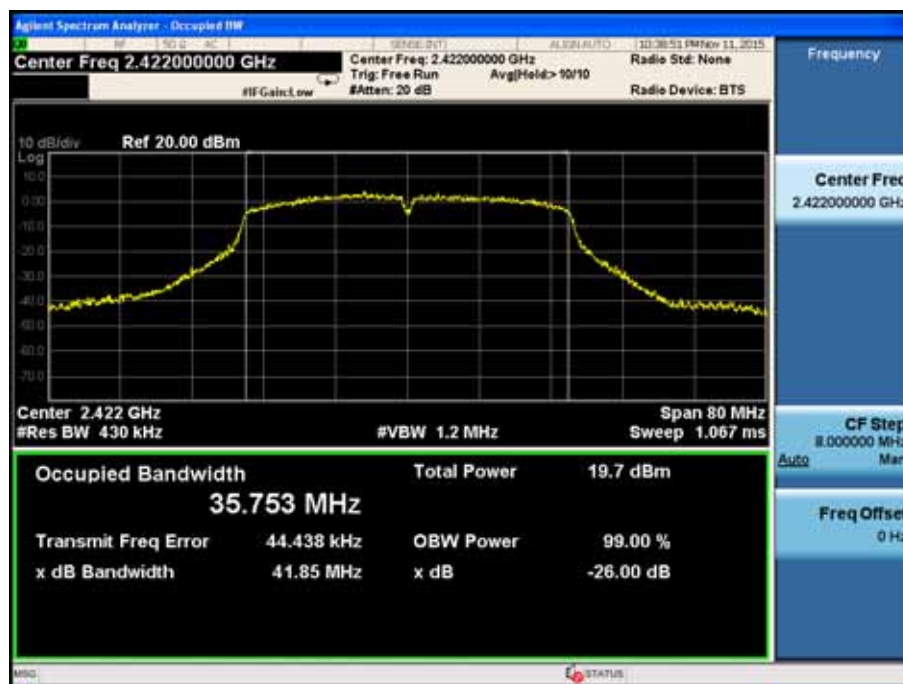


Note: For this test item, each modulation we have evaluated two antennas, presented data in the report is the worst case.

Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	99% Occupied Bandwidth
Test Mode	:	Mode 4: Transmit by 802.11n(40MHz)

Channel No.	Frequency (MHz)	Occupied Bandwidth (kHz)	Limit (kHz)	Result
03	2422	35753	40000	Pass
06	2437	35671	40000	Pass
09	2452	35742	40000	Pass

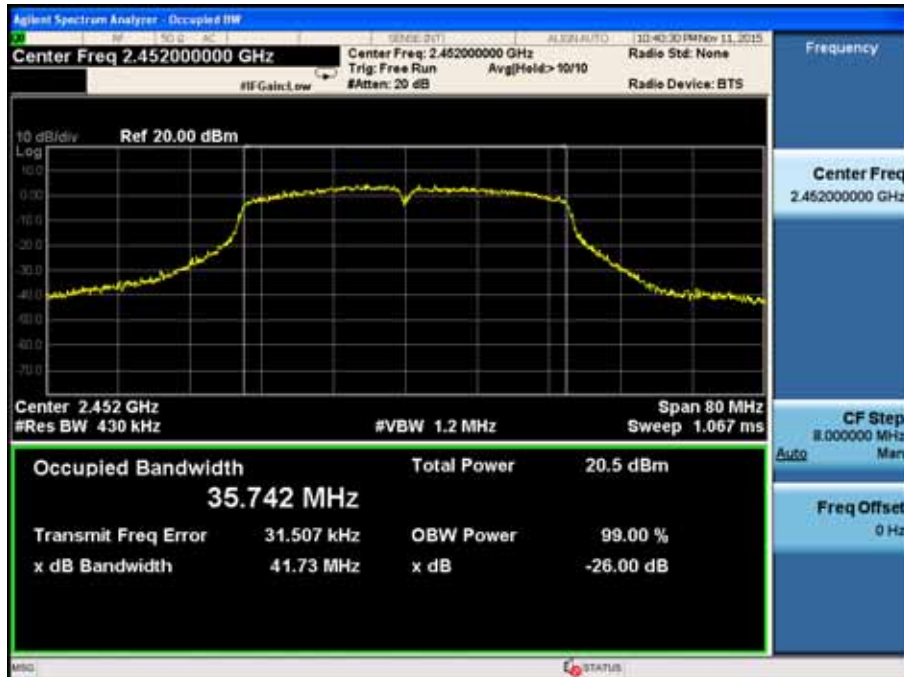
Channel 03 (2422MHz) (Ant 2)



Channel 06 (2437MHz) (Ant 2)



Channel 09 (2452MHz) (Ant 2)



Note: For this test item, each modulation we have evaluated two antennas, presented data in the report is the worst case.

9. Power Output

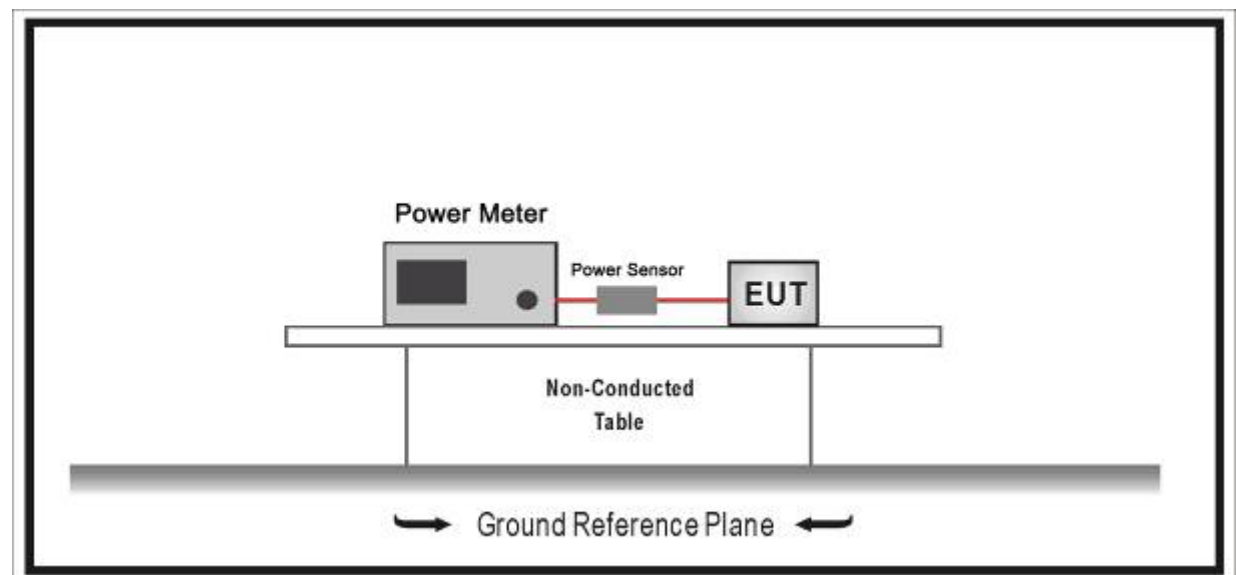
9.1. Test Equipment

Power Output / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Wideband Peak Power Meter	Anritsu	ML2495A	0905006	2016.11.10
Power Sensor	Anritsu	MA2411B	0846014	2016.11.10
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

9.2. Test Setup



9.3. Limit

The maximum peak power shall be less 1 Watt (30dBm).

Note: the conducted output power limit specified above is based on the use the antennas with directional gains that do not exceed 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values above, as appropriate, by the amount in dB that the directional gain of antenna exceeds 6 dBi.

Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

9.4. Test Procedure

- (1) The EUT was tested according to DTS test procedure of ANSI C63.10 for compliance to FCC 47CFR 15.247 requirements. The maximum conducted output power using ANSI C63.10 section 11.9.2.3 AVGPM Average power meter method.
1. Power meter and sensor's minimum video bandwidth is 50MHz, larger than 802.11n(40MHz) bandwidth;
 2. Fast responding diode sensors respond immediately to changes in power level to reduce total test time.
 3. Use average detector to test.
- (2) According to 662911 and KDB 558074

Cyclic Delay Diversity (CDD) [also known as cyclic shift diversity (CSD)]. CDD signals are correlated and create unintended array gain that varies with signal bandwidth, antenna geometry, and cyclic delay values. Consequently, depending on system parameters, it may be appropriate to use different values of array gain for compliance with power limits versus compliance with power spectral density limits. CAUTION: The term CDD, as used here, does not apply to any transmission mode in which the cyclic delay values are chosen to optimize performance at a given receiver; such a system shall be classified as an intentional beamforming system. CDD refers only to cases in which the cyclic delay values are selected apriori with out regard to the specific communication device pair.

For CDD transmissions, directional gain is calculated as follows. In all formulas,

NANT = number of transmit antennas and

NSS = number of spatial streams. (Assume NSS = 1 unless you have specific information to the contrary.)

CAUTION: Most devices can operate with one spatial stream (NSS = 1) even if they also are capable of more spatial streams. The worst case directional gain will occur when NSS = 1; therefore, it is especially important to ensure that the device complies with all emission limits for the case of NSS = 1 (or with the lowest possible value of NSS, if the device always uses spatial multiplexing).

For power measurements on IEEE 802.11 devices

Array Gain = 0 dB (i.e., no array gain) for $NANT \leq 4$;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;

Array Gain = $5 \log(NANT/NSS)$ dB or 3 dB, whichever is less, for 20-MHz channel widths with $NANT \geq 5$

The conducted output power limits for DTS EUTs are based on the use of transmit antennas with directional gains that do not exceed 6 dBi. If transmit antennas with an effective directional gain greater than 6 dBi are used, then the conducted output power from the EUT shall be reduced, as specified in the applicable requirements for DTS. For those cases where the rule specifies that

the conducted output power be reduced by the amount in dB that the directional gain of the transmitting antenna exceeds 6 dBi, the applicable output power limit shall be calculated as follows: $P_{out} = P_{Limit} - (G_{Tx} - 6)$

9.5. Uncertainty

The measurement uncertainty is defined as ± 1.27 dB

9.6. Test Result

Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (blue marker) for final test of each channel.

Power output at various data rates:

Test Mode	Bandwidth	Frequency (MHz)	Channel	Data Rate	Average Power (dBm)
802.11b	20	2437	6	1	22.98
				5.5	22.69
				11	22.72
802.11g(Ant 1+2)	20	2437	6	6	26.78
				24	26.71
				54	26.66
802.11n (Ant 1+2)	20	2437	6	MCS0	27.17
				MCS4	27.03
				MCS7	27.04
802.11n (Ant 1+2)	40	2437	6	MCS0	21.51
				MCS4	21.43
				MCS7	21.38

Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	Power Output
Test Site	:	TR8
Test Mode	:	Mode 1: Transmit by 802.11b

Channel No.	Frequency (MHz)	Measurement Power Output (Average) (dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant 1	Ant 2			
1	2412	22.40	22.29	25.36	30.00	Pass
6	2437	19.96	19.98	22.98	30.00	Pass
11	2462	21.53	20.96	24.26	30.00	Pass

Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	Power Output
Test Site	:	TR8
Test Mode	:	Mode 2: Transmit by 802.11g (Ant 1+2)

Channel No.	Frequency (MHz)	Measurement Power Output (Average) (dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant 1	Ant 2			
1	2412	18.10	18.26	21.19	30.00	Pass
6	2437	23.80	23.74	26.78	30.00	Pass
11	2462	18.35	17.15	20.80	30.00	Pass

Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	Power Output
Test Site	:	TR8
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz) (Ant 1+2)

Channel No.	Frequency (MHz)	Measurement Power Output (Average) (dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant 1	Ant 2			
1	2412	17.16	16.91	20.05	30.00	Pass
6	2437	24.29	24.03	27.17	30.00	Pass
11	2462	18.10	16.91	20.56	30.00	Pass

Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	Power Output
Test Site	:	TR8
Test Mode	:	Mode 4: Transmit by 802.11n(40MHz) (Ant 1+2)

Channel No.	Frequency (MHz)	Measurement Power Output (Average) (dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant 1	Ant 2			
3	2422	14.20	14.02	17.12	30.00	Pass
6	2437	18.66	18.34	21.51	30.00	Pass
9	2452	15.53	14.94	18.26	30.00	Pass

Note : Directional gain = $G_{ANT} + \text{Array Gain} = 4.0\text{dBi} < 6\text{dBi}$, so The Limit is 30dBm

10. Power Spectral Density

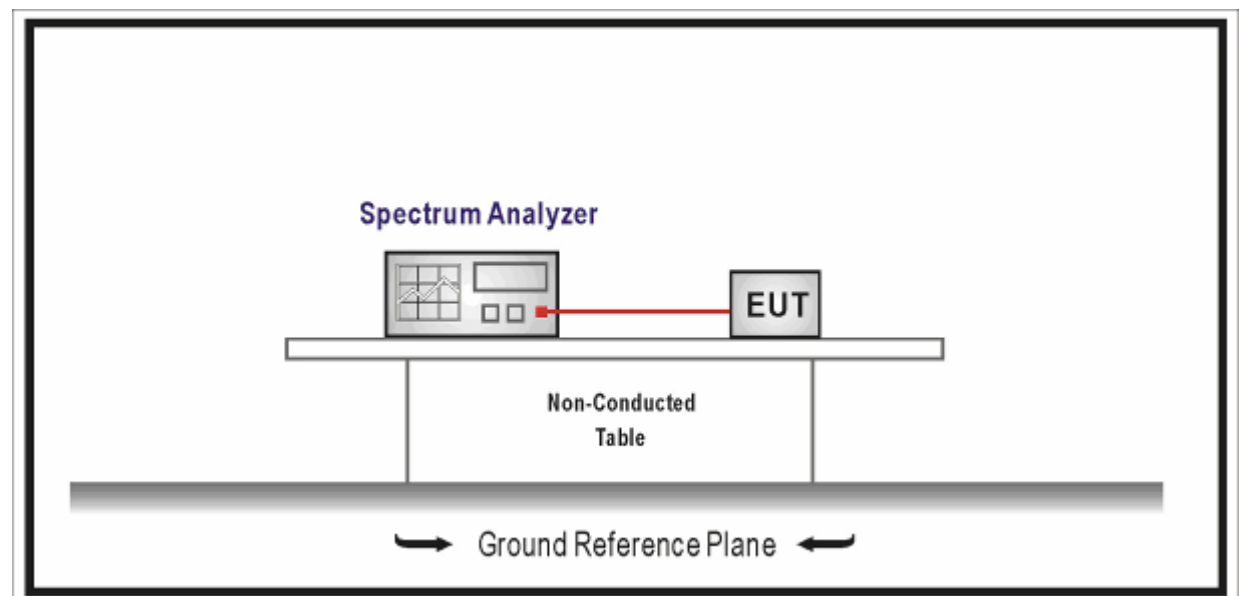
10.1. Test Equipment

Power Spectral Density / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.07
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

10.2. Test Setup



10.3. Limit

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

10.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2014; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$. (Actually we use 3kHz RBW)
- d) Set the VBW $\geq 3 \times \text{RBW}$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the band.
- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Cyclic Delay Diversity (CDD) [also known as cyclic shift diversity (CSD)]. CDD signals are correlated and create unintended array gain that varies with signal bandwidth, antenna geometry, and cyclic delay values. Consequently, depending on system parameters, it may be appropriate to use different values of array gain for compliance with power limits versus compliance with power spectral density limits. CAUTION: The term CDD, as used here, does not apply to any transmission mode in which the cyclic delay values are chosen to optimize performance at a given receiver; such a system shall be classified as an intentional beamforming system. CDD refers only to cases in which the cyclic delay values are selected apriori with out regard to the specific communication device pair.

For CDD transmissions, directional gain is calculated as follows. In all formulas,

NANT = number of transmit antennas and

NSS = number of spatial streams. (Assume NSS = 1 unless you have specific information to the contrary.)

CAUTION: Most devices can operate with one spatial stream (NSS = 1) even if they also are capable of more spatial streams. The worst case directional gain will occur when NSS = 1; therefore, it is especially important to ensure that the device complies with all emission limits for the case of NSS = 1 (or with the lowest possible value of NSS, if the device always uses spatial multiplexing).

Directional gain = $G_{\text{ANT}} + \text{Array Gain}$,

For power spectral density (PSD) measurements on all devices,

Array Gain = $10 \log(\text{NANT}/\text{NSS}) \text{ dB}$.

For power measurements on IEEE 802.11 devices

Array Gain = 0 dB (i.e., no array gain) for $\text{NANT} \leq 4$;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;

Array Gain = $5 \log(\text{NANT}/\text{NSS})$ dB or 3 dB, whichever is less, for 20-MHz channel widths with $\text{NANT} \geq 5$

The conducted output power limits for DTS EUTs are based on the use of transmit antennas with directional gains that do not exceed 6 dBi. If transmit antennas with an effective directional gain greater than 6 dBi are used, then the conducted output power from the EUT shall be reduced, as specified in the applicable requirements for DTS. For those cases where the rule specifies that the conducted output power be reduced by the amount in dB that the directional gain of the transmitting antenna exceeds 6 dBi, the applicable output power limit shall be calculated as follows:

$$P_{\text{out}} = P_{\text{Limit}} - (G_{\text{Tx}} - 6)$$

10.5. Uncertainty

The measurement uncertainty is defined as ± 1.27 dB

10.6. Test Result

Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11b

Channel No.	Frequency (MHz)	Measurement PPSD (dBm)		Total PPSD (dBm)	Limit (dBm)	Result
		Ant 1	Ant 2			
01	2412	0.819	-1.123	2.966	7.0	Pass
06	2437	-2.287	-3.304	0.245	7.0	Pass
11	2462	-2.352	-1.082	1.340	7.0	Pass

Note: Directional gain = $G_{ANT} + \text{Array Gain} = 7.0\text{dBi}$, so The Limit = $8\text{dBm} - (\text{Directional gain} - 6\text{dB}) = 7.0\text{dBm}$

Channel 01 (2412MHz) Ant 1



Channel 06 (2437MHz) Ant 1



Channel 11 (2462MHz) Ant 1



Channel 01 (2412MHz) Ant 2



Channel 06 (2437MHz) Ant 2



Channel 11 (2462MHz) Ant 2

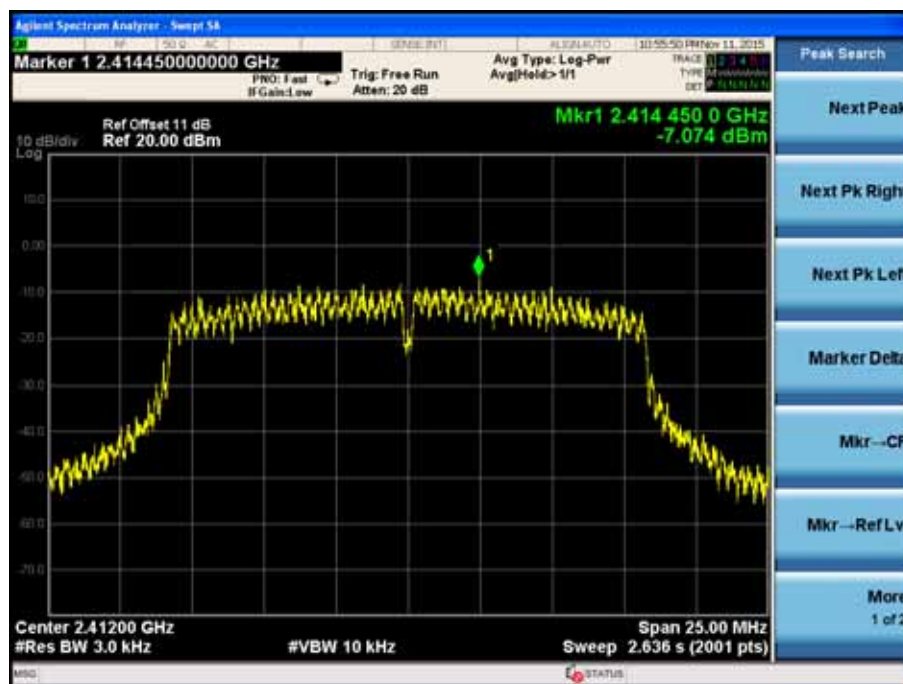


Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11g (Ant 1+2)

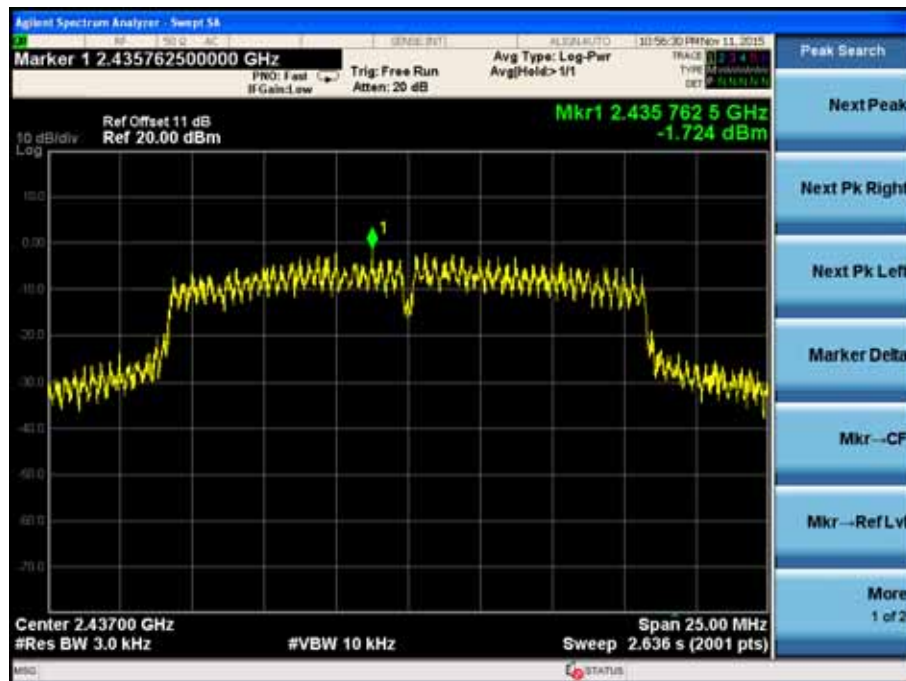
Channel No.	Frequency (MHz)	Measurement PPSD (dBm)		Total PPSD (dBm)	Limit (dBm)	Result
		Ant 1	Ant 2			
01	2412	-7.074	-6.432	-3.731	7.0	Pass
06	2437	-1.724	-1.558	1.370	7.0	Pass
11	2462	-8.022	-6.451	-4.156	7.0	Pass

Note: Directional gain = $G_{ANT} + \text{Array Gain} = 7.0\text{dBi}$, so The Limit = $8\text{dBm} - (\text{Directional gain} - 6\text{dB}) = 7.0\text{dBm}$

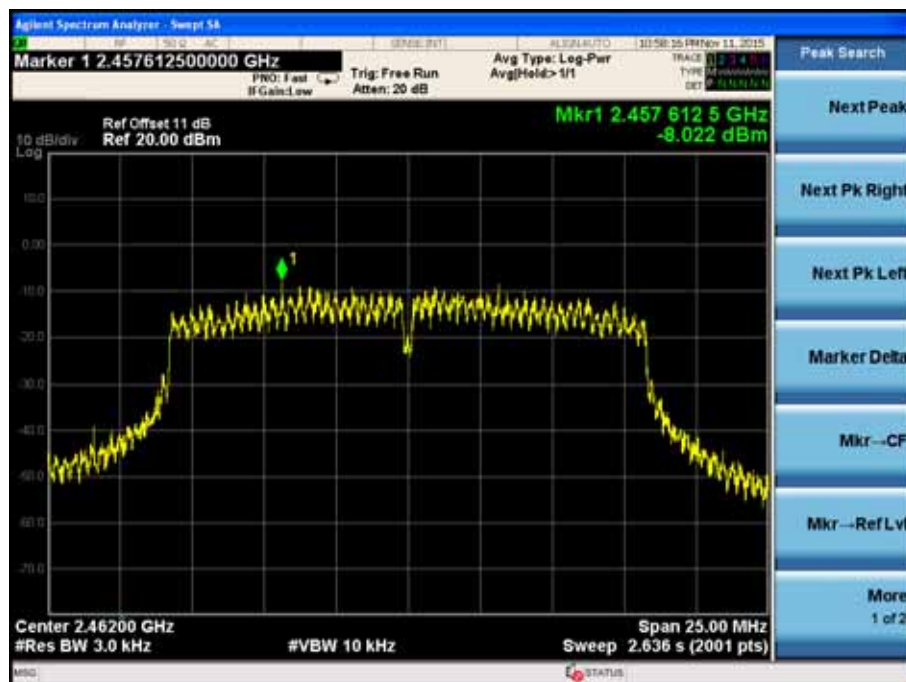
Channel 01 (2412MHz) Ant 1



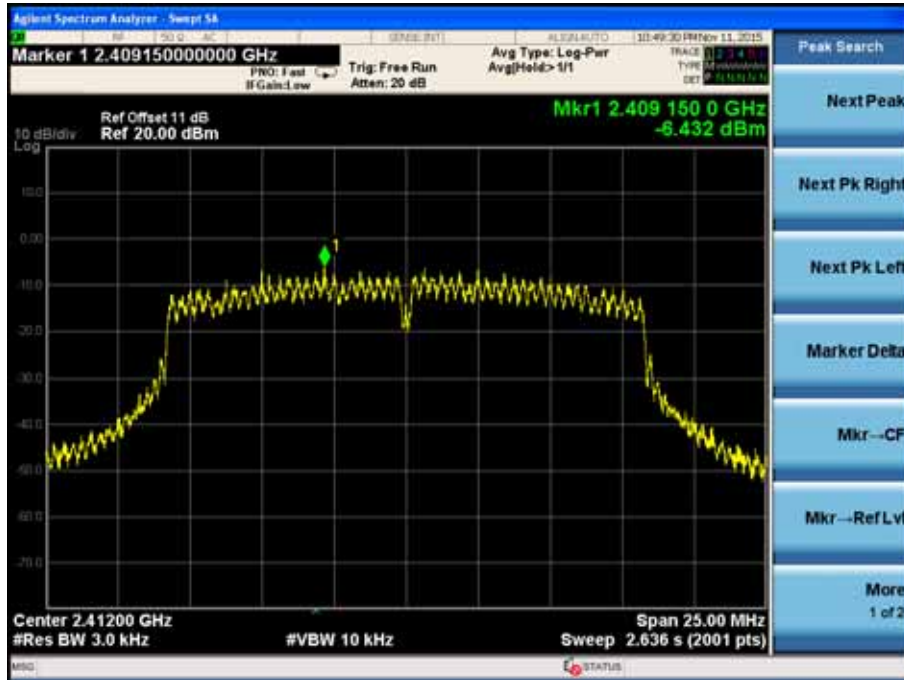
Channel 06 (2437MHz) Ant 1



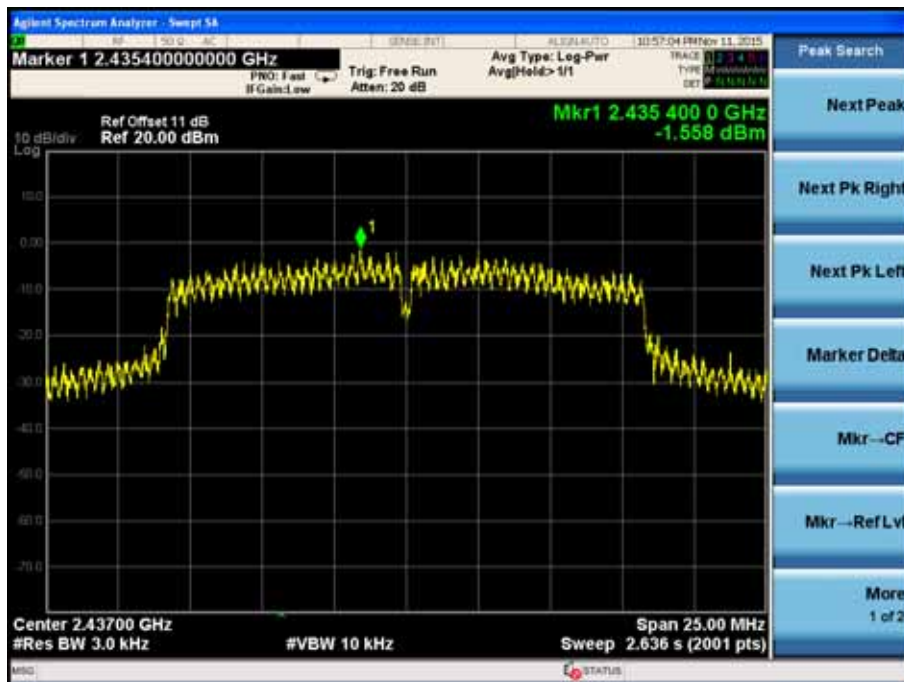
Channel 11 (2462MHz) Ant 1



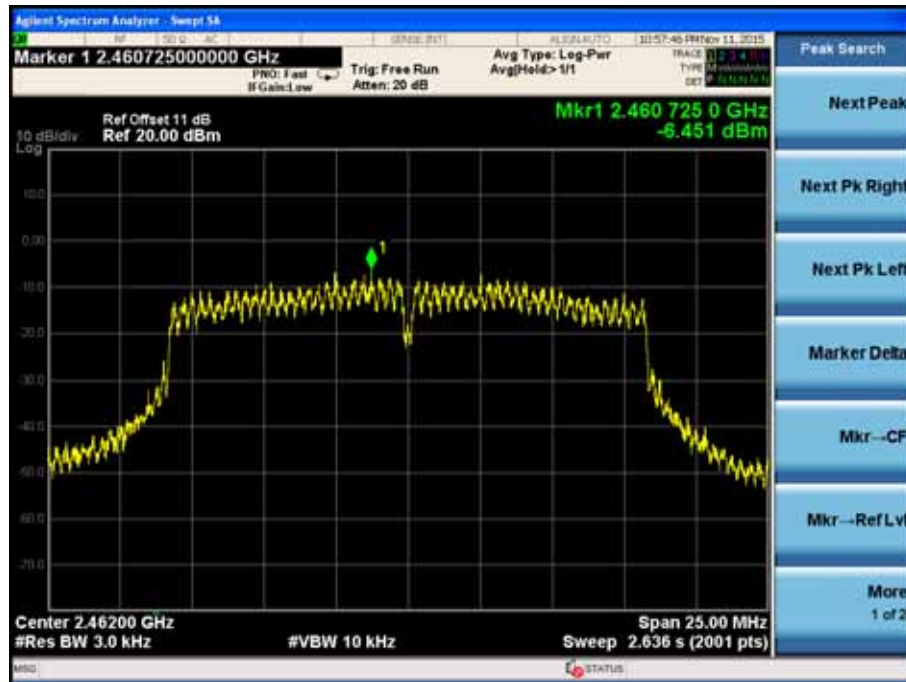
Channel 01 (2412MHz) Ant 2



Channel 06 (2437MHz) Ant 2



Channel 11 (2462MHz) Ant 2

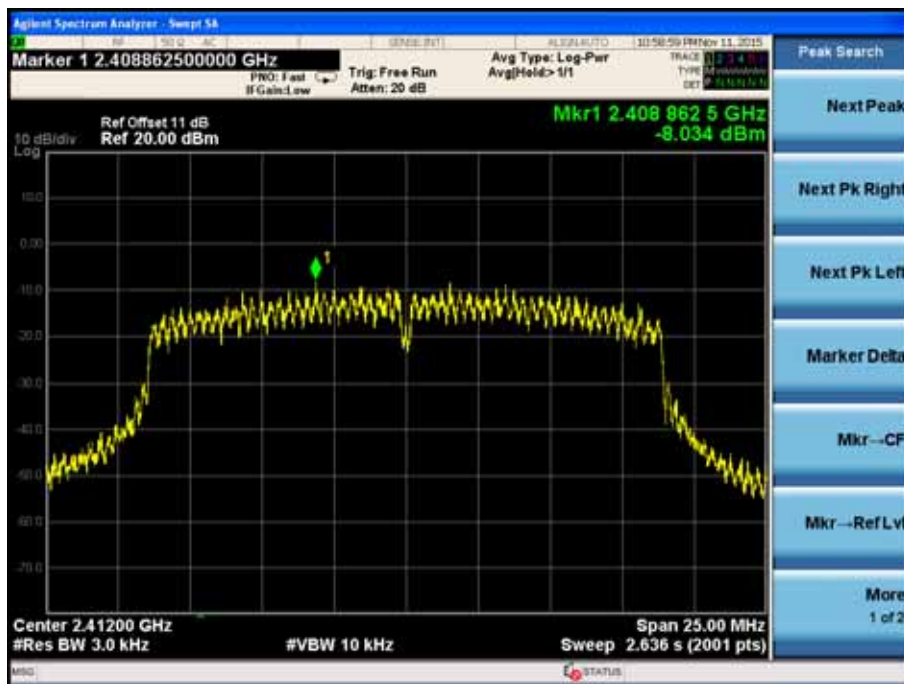


Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz) (Ant 1+2)

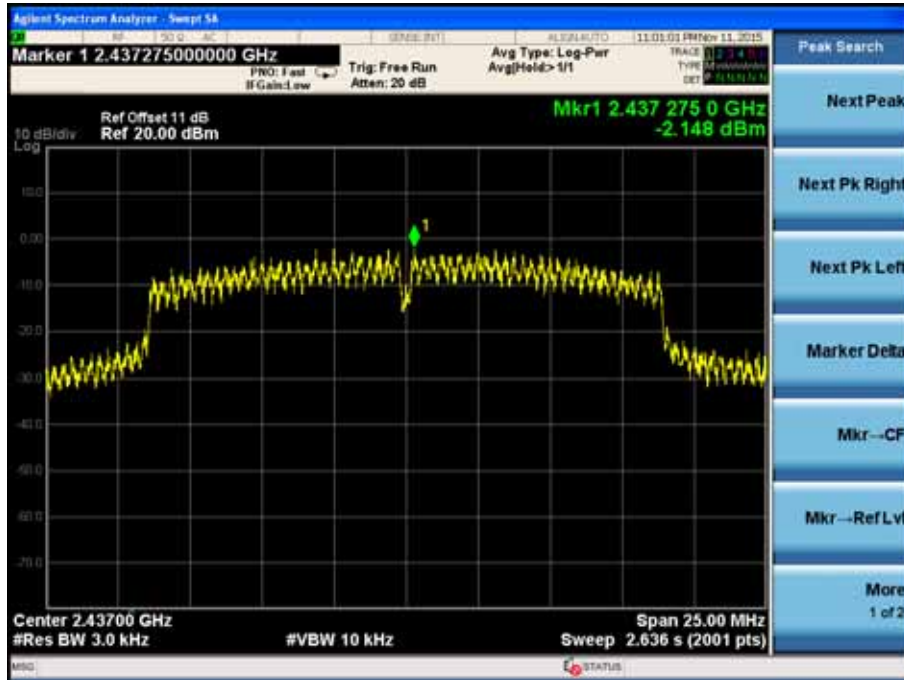
Channel No.	Frequency (MHz)	Measurement PPSD (dBm)		Total PPSD (dBm)	Limit (dBm)	Result
		Ant 1	Ant 2			
01	2412	-8.034	-7.418	-4.705	7.0	Pass
06	2437	-2.148	-1.961	0.957	7.0	Pass
11	2462	-7.887	-7.821	-4.844	7.0	Pass

Note: Directional gain = $G_{ANT} + \text{Array Gain} = 7.0\text{dBi}$, so The Limit = $8\text{dBm} - (\text{Directional gain} - 6\text{dB}) = 7.0\text{dBm}$

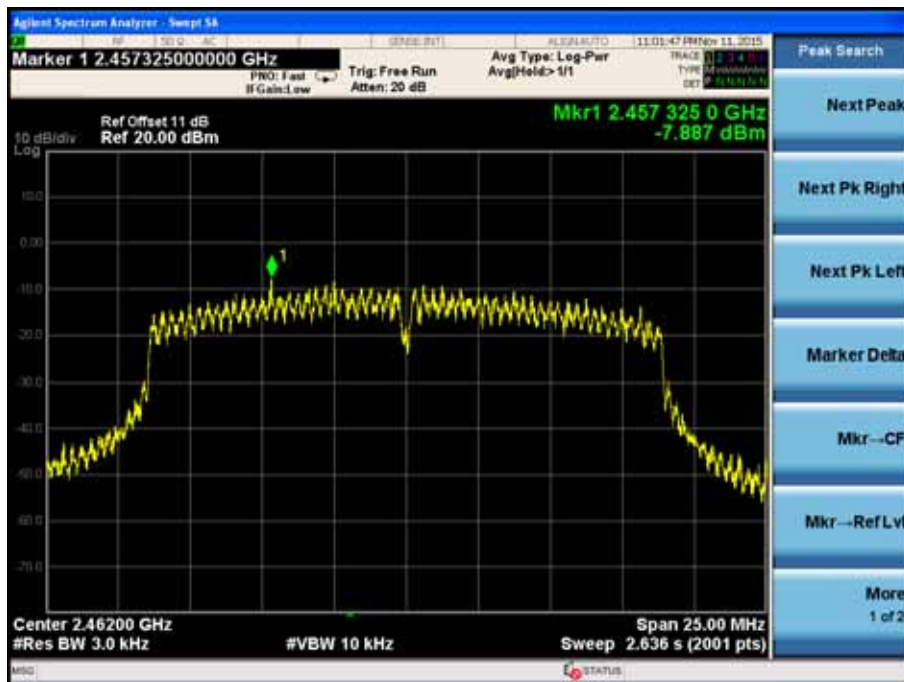
Channel 01 (2412MHz) Ant 1



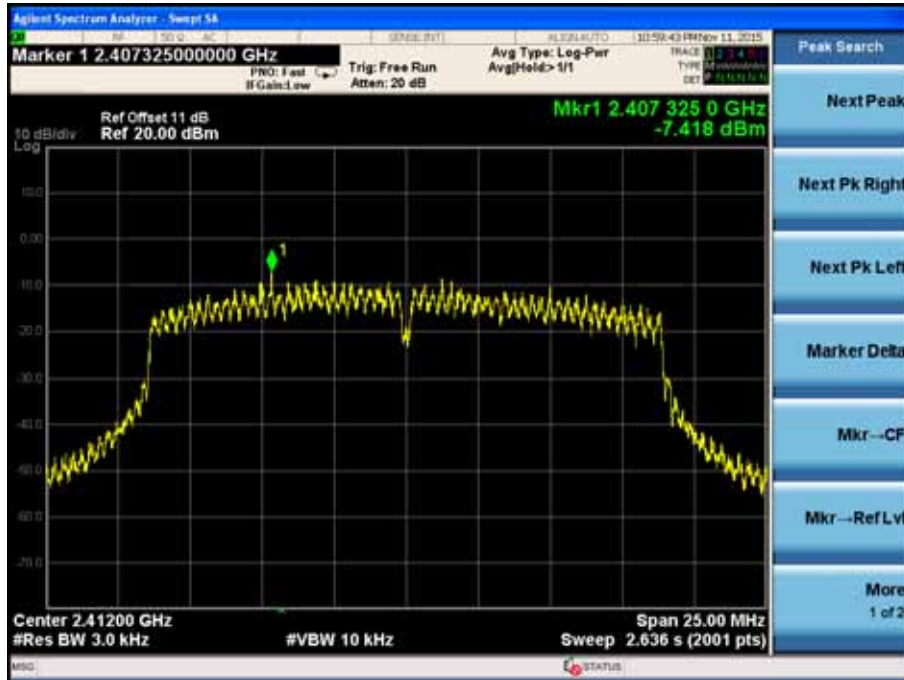
Channel 06 (2437MHz) Ant 1



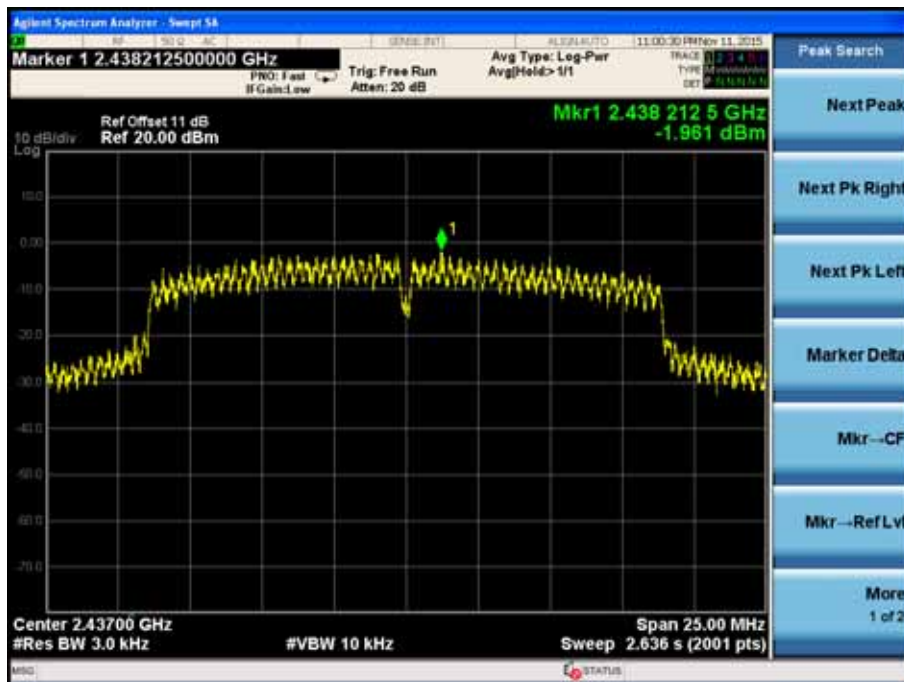
Channel 11 (2462MHz) Ant 1



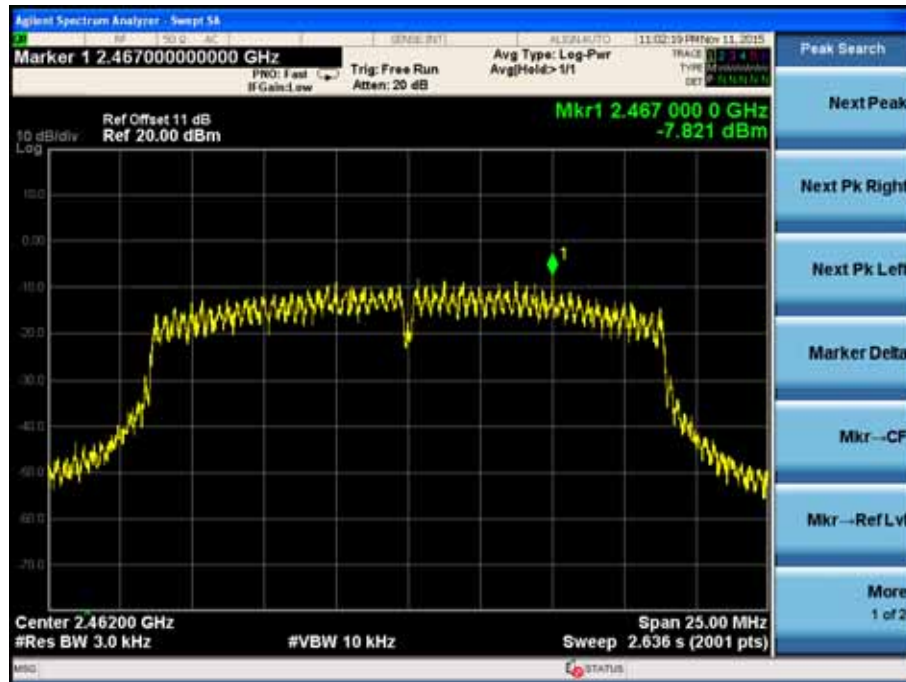
Channel 01 (2412MHz) Ant 2



Channel 06 (2437MHz) Ant 2



Channel 11 (2462MHz) Ant 2

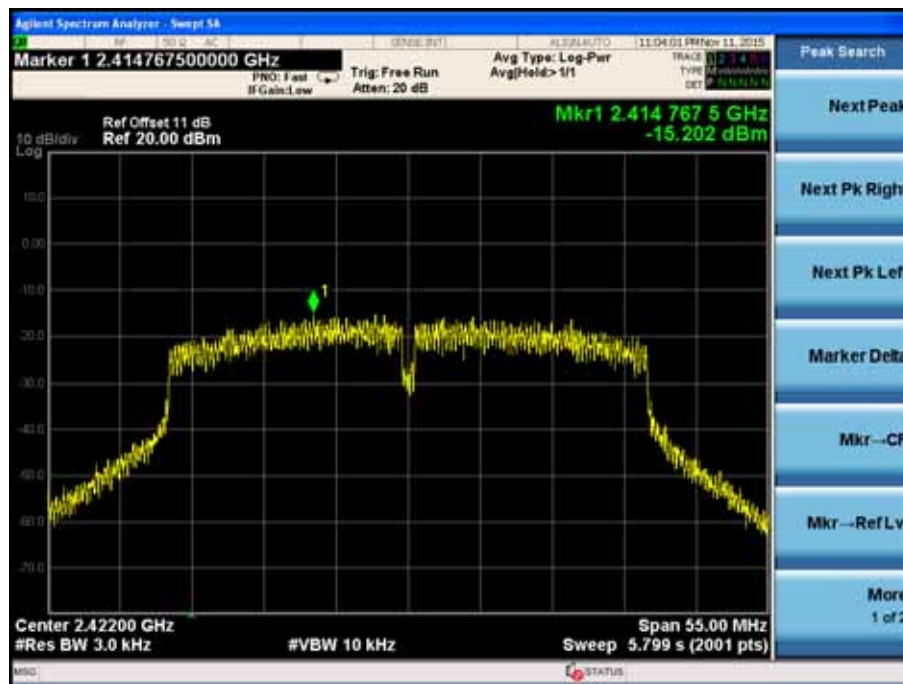


Product	:	300Mbps Multi-Function Wireless N Router
Test Item	:	Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 4: Transmit by 802.11n(40MHz) (Ant 1+2)

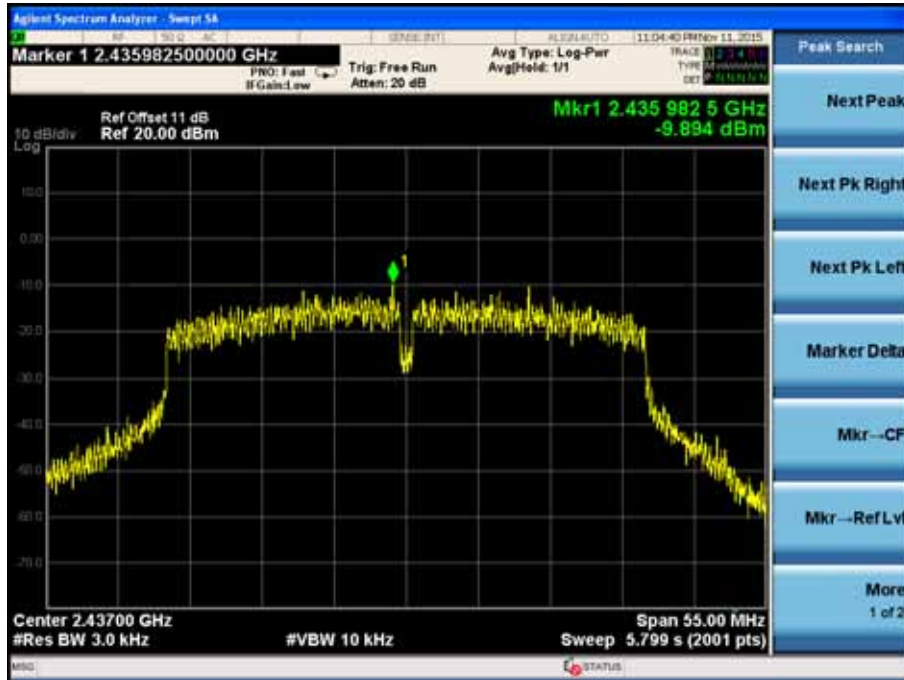
Channel No.	Frequency (MHz)	Measurement PPSD (dBm)		Total PPSD (dBm)	Limit (dBm)	Result
		Ant 1	Ant 2			
03	2422	-15.202	-14.897	-12.037	7.0	Pass
06	2437	-9.894	-8.167	-5.935	7.0	Pass
09	2452	-14.248	-12.766	-10.434	7.0	Pass

Note: Directional gain = $G_{ANT} + \text{Array Gain} = 7.0\text{dBi}$, so The Limit = $8\text{dBm} - (\text{Directional gain} - 6\text{dB}) = 7.0\text{dBm}$

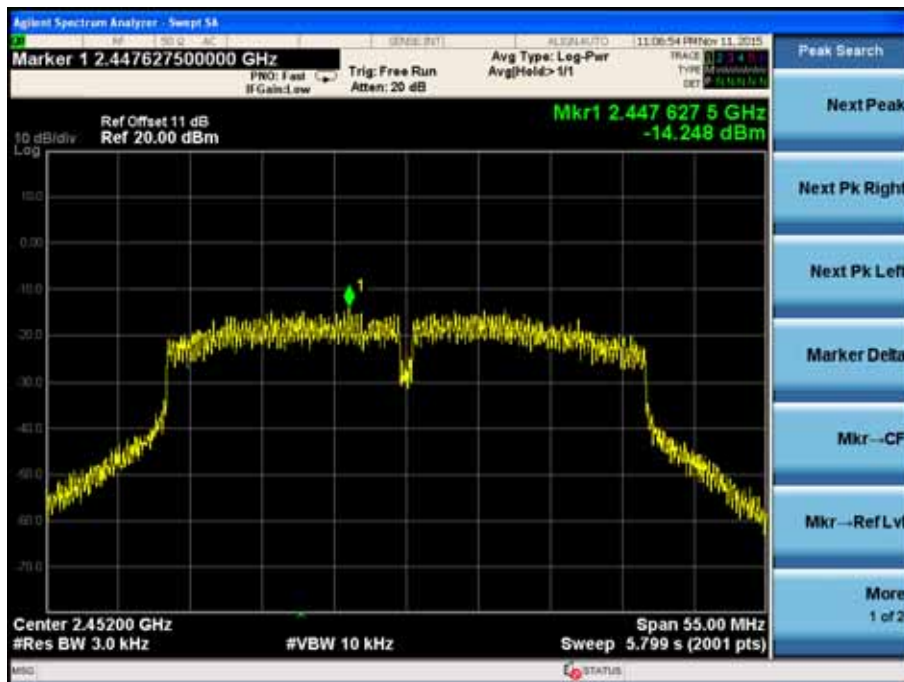
Channel 03 (2422MHz) Ant 1



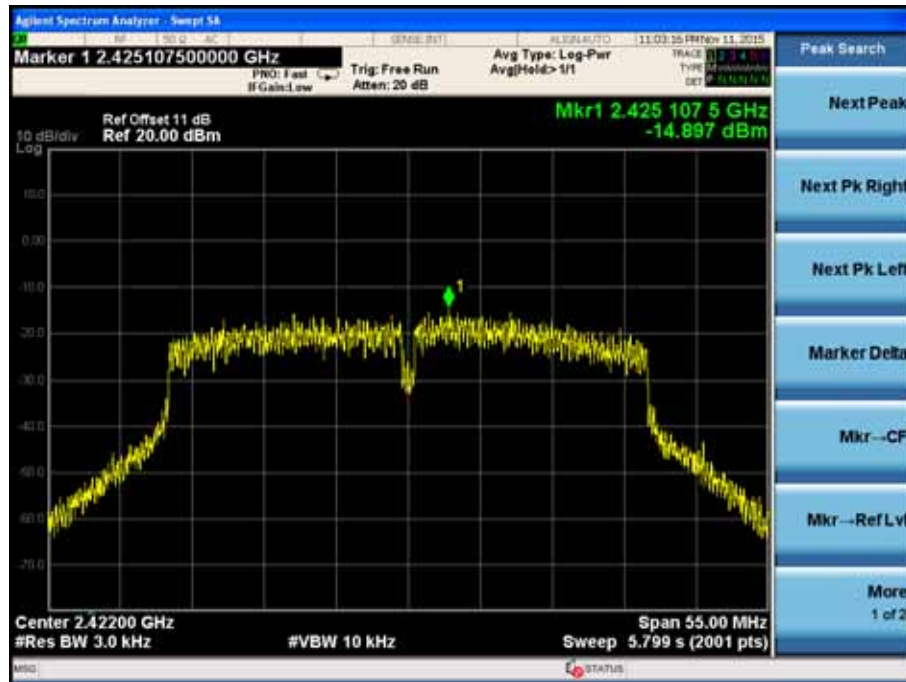
Channel 06 (2437MHz) Ant 1



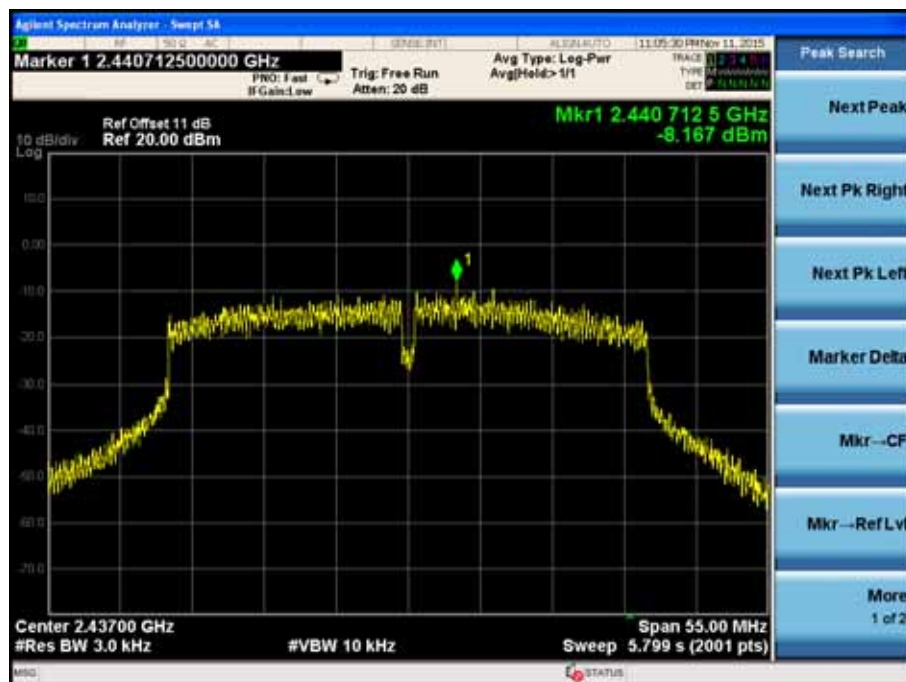
Channel 09 (2452MHz) Ant 1



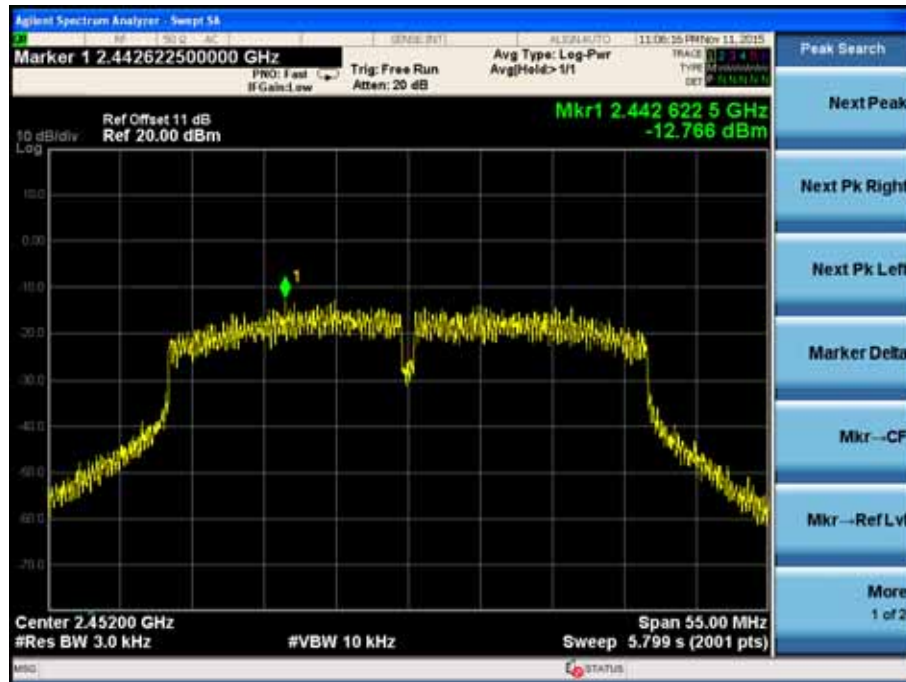
Channel 03 (2422MHz) Ant 2



Channel 06 (2437MHz) Ant 2



Channel 09 (2452MHz) Ant 2



The End