

HCT CO., LTD.

CERTIFICATE OF COMPLIANCE FCC Certification

Applicant Name: LG Electronics Inc.	Date of Issue: July 11, 2014
Address: 222 LG-ro Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 451-713, Korea	Test Site/Location: HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeo, Icheon-si, Gyeonggi-do, Korea Report No.: HCT-R-1407-F011-1 HCT FRN: 0005866421 IC Recognition No.: 5944A-3

FCC ID	: BEJ9QK-TWFMB008D
IC	: 2703H-TWFMB008D
APPLICANT	: LG Electronics Inc.

FCC/ IC Model(s):	TWFM-B008D
EUT Type:	WLAN Module
Max. RF Output Power:	Ant.0: Wi-Fi 802.11b(22.26 dBm) / Wi-Fi 802.11g (23.11 dBm) / Wi-Fi 802.11n_20 MHz (23.53 dBm) / Wi-Fi 802.11n_40 MHz (24.78 dBm) / Wi-Fi 802.11a (5745~5825) (20.06 dBm) / Wi-Fi 802.11n_20 MHz (5745~5825) (20.54 dBm) / Wi-Fi 802.11n_40 MHz (5755~5795) (21.02 dBm)
	Ant.1: Wi-Fi 802.11b(21.11 dBm) / Wi-Fi 802.11g (22.26 dBm) / Wi-Fi 802.11n_20 MHz (22.64 dBm) / Wi-Fi 802.11n_40 MHz (23.55 dBm) / Wi-Fi 802.11a (5745~5825) (20.45 dBm) / Wi-Fi 802.11n_20 MHz (5745~5825) (20.80 dBm) / Wi-Fi 802.11n_40 MHz (5755~5795) (21.05 dBm)
	Sum data of Ant.0 & 1: Wi-Fi 802.11g (25.72 dBm) / Wi-Fi 802.11n_20 MHz (26.09 dBm) / Wi-Fi 802.11n_40 MHz (27.14 dBm) / Wi-Fi 802.11a (5745~5825) (23.26 dBm) / Wi-Fi 802.11n_20 MHz (5745~5825) (23.68 dBm) / Wi-Fi 802.11n_40 MHz (5755~5795) (23.91 dBm)
Frequency Range:	2412 MHz - 2462 MHz (2.4 GHz Band) _20 MHz BW 2422 MHz - 2452 MHz (2.4 GHz Band) _40 MHz BW 5745 MHz - 5825 MHz (5.8 GHz Band) _20 MHz BW, 5755 MHz - 5795 MHz (5.8 GHz Band) _40 MHz BW
Modulation type:	CCK/DSSS/OFDM
FCC Classification:	Digital Transmission System(DTS)
FCC Rule Part(s):	Part 15.247
IC Rule :	RSS-GEN Issue 3(December 2010), RSS-210 Issue 8(December 2010)

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998, 21 U.S. C.853(a)



Report prepared by
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Approved by
: Chang Seok Choi
Manager of RF Team

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1407-F011	July 03, 2014	- First Approval Report
HCT-R-1407-F011-1	July 11, 2014	-Add the Port0 & 1 Sum Max. RF Output Power on page 1 -Revised the Antenna gain Section 6

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1. GENERAL INFORMATION

Applicant: LG Electronics Inc.
Address: 222 LG-ro Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 451-713, Korea
FCC ID: BEJ9QK-TWFM-B008D
IC: 2703H-TWFM-B008D
EUT Type: WLAN Module
FCC/ IC Model name(s): TWFM-B008D
Date(s) of Tests: June 16, 2014 ~ June 30, 2014
Place of Tests: HCT Co., Ltd.
 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea.
 (IC Recognition No. : 5944A-3)

2. EUT DESCRIPTION

EUT Type	WLAN Module	
FCC/ IC Model Name	TWFM-B008D	
Power Supply	DC 3.5 V	
Frequency Range	TX	: 2412 MHz~2462 MHz_2 MHz BW, 2422 MHz - 2452 MHz_40 MHz BW, 5745 MHz~5825 MHz_20 MHz, 5755 MHz~5795 MHz_40 MHz
	RX	: 2412 MHz~2462 MHz_2 MHz BW, 2422 MHz - 2452 MHz_40 MHz BW, 5745 MHz~5825 MHz_20 MHz, 5755 MHz~5795 MHz_40 MHz
Ant.0 Max. RF Output Power	Peak	Wi-Fi 802.11b(22.26 dBm) / Wi-Fi 802.11g (23.11 dBm) / Wi-Fi 802.11n_20 MHz (23.53 dBm) / Wi-Fi 802.11n_40 MHz (24.78 dBm) / Wi-Fi 802.11a (5745~5825) (23.07 dBm) / Wi-Fi 802.11n_20 MHz (5745~5825) (20.54 dBm) / Wi-Fi 802.11n_40 MHz (5755~5795) (21.02 dBm)
	Average	Wi-Fi 802.11b(16.12 dBm) / Wi-Fi 802.11g (14.48 dBm) / Wi-Fi 802.11n_20 MHz (15.14 dBm) / Wi-Fi 802.11n_40 MHz (16.06 dBm) / Wi-Fi 802.11a (5745~5825) (15.42 dBm) / Wi-Fi 802.11n_20 MHz (5745~5825) (13.31 dBm) / Wi-Fi 802.11n_40 MHz (5755~5795) (13.22 dBm)
Ant.1 Max. RF Output Power	Peak	Wi-Fi 802.11b(21.11 dBm) / Wi-Fi 802.11g (22.26 dBm) / Wi-Fi 802.11n_20 MHz (22.64 dBm) / Wi-Fi 802.11n_40 MHz (23.55 dBm) / Wi-Fi 802.11a (5745~5825) (24.11 dBm) / Wi-Fi 802.11n_20 MHz (5745~5825) (20.80 dBm) / Wi-Fi 802.11n_40 MHz (5755~5795) (21.05 dBm)
	Average	Wi-Fi 802.11b(15.30 dBm) / Wi-Fi 802.11g (13.52 dBm) / Wi-Fi 802.11n_20 MHz (14.35 dBm) / Wi-Fi 802.11n_40 MHz (14.89 dBm) / Wi-Fi 802.11a (5745~5825) (16.49 dBm) / Wi-Fi 802.11n_20 MHz (5745~5825) (13.33 dBm) / Wi-Fi 802.11n_40 MHz (5755~5795) (13.26 dBm)
Modulation Type	DSSS/CCK(802.11b), OFDM(802.11a, 802.11g, 802.11n)	
Antenna Specification	Manufacturer: Amotech Antenna type: PCB Antenna Peak Gain : cf. Section 6	

2.1 EUT OPERATING MODE

▣ Operating mode

2.4 GHz Band

Mode	Operating Mode	Operating Ant.
802.11b/g/n	SISO	Ant 0, Ant1
802.11g/n	MIMO	Ant 0 & 1

5.8 GHz Band

Mode	Operating Mode	Operating Ant.
802.11a/n	SISO	Ant 0
		Ant 1
	MIMO	Ant 0 & 1

Note :

1. In case of radiation test, we have done all test case. Worst case is Ant 0 & 1 for 802.11a/g/n. And in case of 802.11b, worst case is Ant 0. So, we attached the results of only worst case.

3. TEST METHODOLOGY

FCC KDB 558074 D01 DTS Meas Guidance v03r02 dated June 05, 2014 entitled "Guidance for Performing Compliance Measurements on Digital Transmission Systems(DTS) Operating Under §15.247" and the measurement procedure described in the American National Standard for Testing Unlicensed Wireless Devices(ANSI C63.4-2003) were used in the measurement.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4. (Version :2003) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4. (Version: 2003)

Conducted Antenna Terminal

See Section from 9.1 to 9.2.(KDB 558074)

3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low, mid and high with highest data rate (worst case) is chosen for full testing.

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated February 28, 2014 (Registration Number: 90661)

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

* The antennas of this E.U.T are permanently attached.

*The E.U.T Complies with the requirement of §15.203

▣ Directional Gain Calculations

- If any transmit signals are correlated with each other(802.11a,g,n),

$$\text{Directional gain} = 10 \cdot \log\left[\frac{(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2}{N}\right] \text{ dBi}$$

- If all transmit signals are completely uncorrelated with each other(802.11n)

$$\text{Directional gain} = 10 \cdot \log\left[\frac{(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10})}{N}\right] \text{ dBi}$$

▣ Antenna Gain

2.4 GHz Band(CDD mode)

Antenna Gain	802.11b/g/n	Ant 0	1.16 dBi
		Ant 1	3.70 dBi
Directional Antenna Gain	802.11g/n	Ant 0 & 1	5.53 dB

5.8 GHz Band(CDD mode)

Antenna Gain	802.11a	Ant 0	5.58 dBi
		Ant 1	3.13 dBi
Directional Antenna Gain	802.11a/n	Ant 0 & 1	7.45 dB

7. SUMMARY TEST OF RESULTS

7.1 FCC Part

Test Description	IC Part Section(s)	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	RSS-210 [A8.2]	§15.247(a)(2)	> 500 kHz	CONDUCTED	PASS
Conducted Maximum Peak Output Power	RSS-210 [A8.4]	§15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	RSS-210 [A8.2]	§15.247(e)	< 8 dBm / 3 kHz Band		PASS
Band Edge(Out of Band Emissions)	RSS-210 [A8.5]	§15.247(d)	Conducted > 20 dBc		PASS
AC Power line Conducted Emissions	RSS-GEN [7.2.2]	§15.207	cf. Section 8.8		PASS
Radiated Spurious Emissions	RSS-210 [A8.5]	§15.205, 15.209	cf. Section 8.7.1	RADIATED	PASS
Radiated Restricted Band Edge	RSS-210 [A8.5]	§15.247(d), 15.205, 15.209	cf. Section 8.7.3		PASS

7.2 IC Part

Test Description	IC Part Section(s)	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	RSS-210 [A8.2]	§15.247(a)(2)	> 500 kHz	CONDUCTED	PASS
99% Bandwidth (only for IC)	RSS-GEN [4.6.1]	NA	NA		NA
Conducted Maximum Peak Output Power And e.i.r.p.	RSS-210 [A8.4]	§15.247(b)(3)	< 1 Watt <4 Watt(e.i.r.p.)		PASS
Power Spectral Density	RSS-210 [A8.2]	§15.247(e)	< 8 dBm / 3 kHz Band		PASS
Band Edge(Out of Band Emissions)	RSS-210 [A8.5]	§15.247(d)	Conducted > 20 dBc		PASS
AC Power line Conducted Emissions	RSS-GEN [7.2.2]	§15.207	cf. Section 8.8		PASS
Radiated Spurious Emissions	RSS-210 [A8.5]	§15.205, 15.209	cf. Section 8.7.1	RADIATED	PASS
Receiver Spurious Emissions	RSS-GEN, Section 7.2.3	§15.109	cf. Section 8.7.2		PASS
Radiated Restricted Band Edge	RSS-210 [A8.5]	§15.247(d), 15.205, 15.209	cf. Section 8.7.3		PASS

8. TEST RESULT

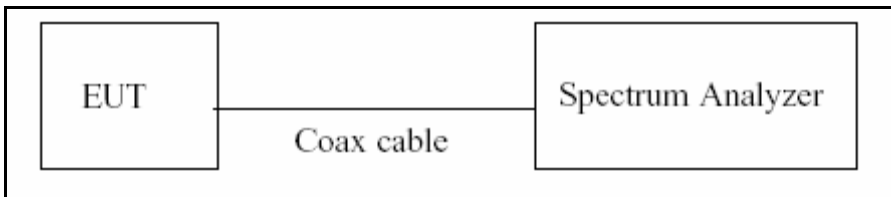
8.1 DUTY CYCLE (802.11a/b/g/n)

■ TEST PROCEDURE

According to KDB558074)6)b), issued 06/05/2014)

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set $RBW \geq OBW$ if possible; otherwise, set RBW to the largest available value. Set $VBW \geq RBW$. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)

■ TEST CONFIGURATION



■ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We tested according to the zero-span measurement method, 6.0)b) in KDB 558074(issued 06/05/2014)

The largest available value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if $T \leq 6.25$ microseconds. ($50/6.25 = 8$)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are $> 50/T$.

1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (\geq RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor = $10 * \log(1/Duty\ Cycle)$

■ Duty Cycle Factor

Mode	Data Rate	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
2.4 GHz Band 802.11b	1	12.420	13.070	0.95026779	0.222
	2	6.205	6.533	0.94979336	0.224
	5.5	2.315	2.440	0.94877049	0.228
	11	1.200	1.266	0.94786730	0.233
2.4 GHz Band 802.11g and 5.8 GHz Band 802.11a	6	2.057	2.177	0.94487827	0.246
	9	1.380	1.455	0.94845361	0.230
	12	1.038	1.095	0.94794521	0.232
	18	0.700	0.740	0.94594595	0.241
	24	0.529	0.558	0.94802867	0.232
	36	0.362	0.388	0.93298969	0.301
	48	0.275	0.299	0.91973244	0.363
2.4 GHz Band 802.11n_20 MHz BW and 5.8 GHz Band 802.11n_20 MHz BW	54	0.247	0.272	0.90808824	0.419
	6.5	1.902	2.007	0.94768311	0.233
	13	0.966	1.017	0.94985251	0.223
	19.5	0.650	0.684	0.95029240	0.221
	26	0.492	0.518	0.94980695	0.224
	39	0.338	0.364	0.92857143	0.322
	52	0.259	0.283	0.91519435	0.385
	58.5	0.236	0.260	0.90769231	0.421
5.8 GHz Band 802.11n_40 MHz BW	65	0.215	0.239	0.89958159	0.460
	13.5	0.927	1.029	0.90087464	0.453
	27	0.478	0.528	0.90530303	0.432
	40.5	0.327	0.362	0.90331492	0.442
	54	0.251	0.275	0.91272727	0.397
	81	0.176	0.199	0.88442211	0.533
	108	0.140	0.163	0.85889571	0.661
	121.5	0.127	0.151	0.84105960	0.752
135	0.115	0.139	0.82733813	0.823	

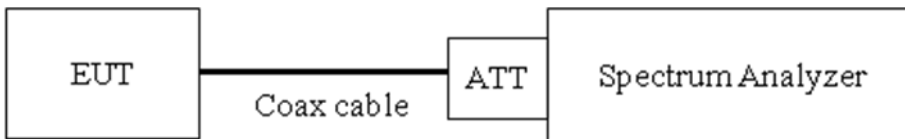
8.2 6dB BANDWIDTH (802.11a/b/g/n)

Test Requirements and limit, §15.247(a)(2)

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

The minimum permissible 6dB bandwidth is 500 kHz.

■ TEST CONFIGURATION



■ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to (Page 5 in KDB 558074, issued 06/05/2014)

RBW = 100 kHz

VBW \geq 3 x RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

Note : We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

Ant.0

▣ TEST RESULTS

2.4 GHz Band

Conducted 6dB Bandwidth Measurements for 802.11b

802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	8.131	0.500	Pass
2437	6	8.130	0.500	Pass
2462	11	8.108	0.500	Pass

Conducted 6dB Bandwidth Measurements for 802.11g

802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	15.13	0.500	Pass
2437	6	15.09	0.500	Pass
2462	11	15.42	0.500	Pass

Conducted 6dB Bandwidth Measurements for 802.11n_20 MHz BW

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	15.12	0.500	Pass
2437	6	15.12	0.500	Pass
2462	11	15.11	0.500	Pass

Conducted 6dB Bandwidth Measurements for 802.11n_40 MHz BW

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2422	3	36.35	0.500	Pass
2437	6	35.23	0.500	Pass
2452	9	36.40	0.500	Pass

5.8 GHz Band

Conducted 6 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Frequency [MHz]			
5745	149	14.92	0.500	Pass
5785	157	15.17	0.500	Pass
5825	165	14.83	0.500	Pass

Conducted 6 dB Bandwidth Measurements for 802.11n_20 MHz BW

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	14.88	0.500	Pass
5785	157	15.13	0.500	Pass
5825	165	15.35	0.500	Pass

Conducted 6 dB Bandwidth Measurements for 802.11n_40 MHz BW

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	36.26	0.500	Pass
5795	159	36.31	0.500	Pass

Ant.1

■ TEST RESULTS

2.4 GHz Band

Conducted 6dB Bandwidth Measurements for 802.11b

802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	8.116	0.500	Pass
2437	6	8.119	0.500	Pass
2462	11	8.107	0.500	Pass

Conducted 6dB Bandwidth Measurements for 802.11g

802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	15.38	0.500	Pass
2437	6	15.15	0.500	Pass
2462	11	15.13	0.500	Pass

Conducted 6dB Bandwidth Measurements for 802.11n_20 MHz BW

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	15.10	0.500	Pass
2437	6	15.14	0.500	Pass
2462	11	16.03	0.500	Pass

Conducted 6dB Bandwidth Measurements for 802.11n_40 MHz BW

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2422	3	35.83	0.500	Pass
2437	6	35.80	0.500	Pass
2452	9	36.01	0.500	Pass

5.8 GHz Band

Conducted 6 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Frequency [MHz]			
5745	149	15.85	0.500	Pass
5785	157	15.31	0.500	Pass
5825	165	15.10	0.500	Pass

Conducted 6 dB Bandwidth Measurements for 802.11n_20 MHz BW

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.62	0.500	Pass
5785	157	15.11	0.500	Pass
5825	165	15.21	0.500	Pass

Conducted 6 dB Bandwidth Measurements for 802.11n_40 MHz BW

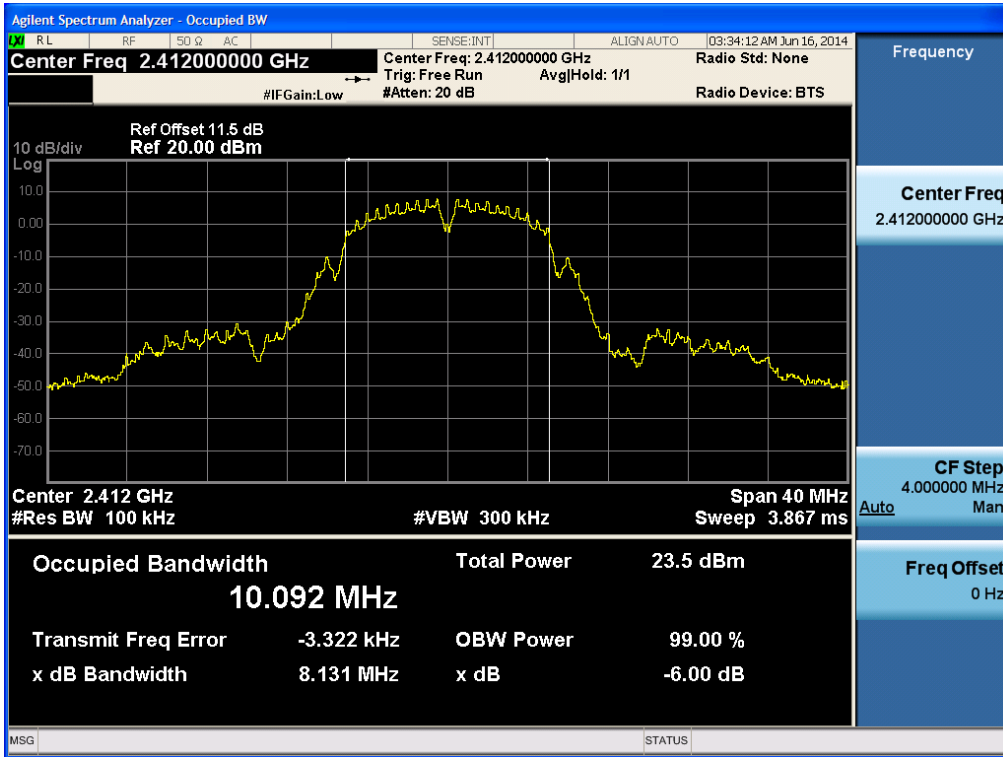
802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.14	0.500	Pass
5795	159	36.40	0.500	Pass

Note : In order to simplify the report, attached plots were only the most wide 6 dB BW channel.

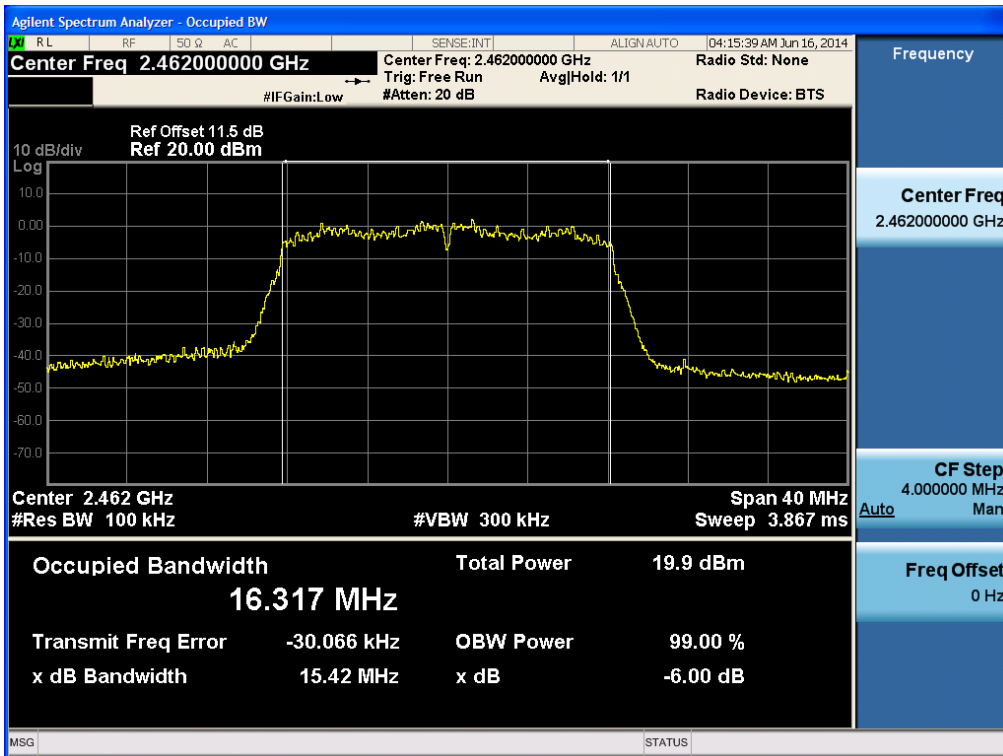
RESULT PLOTS Ant.0

2.4 GHz Band

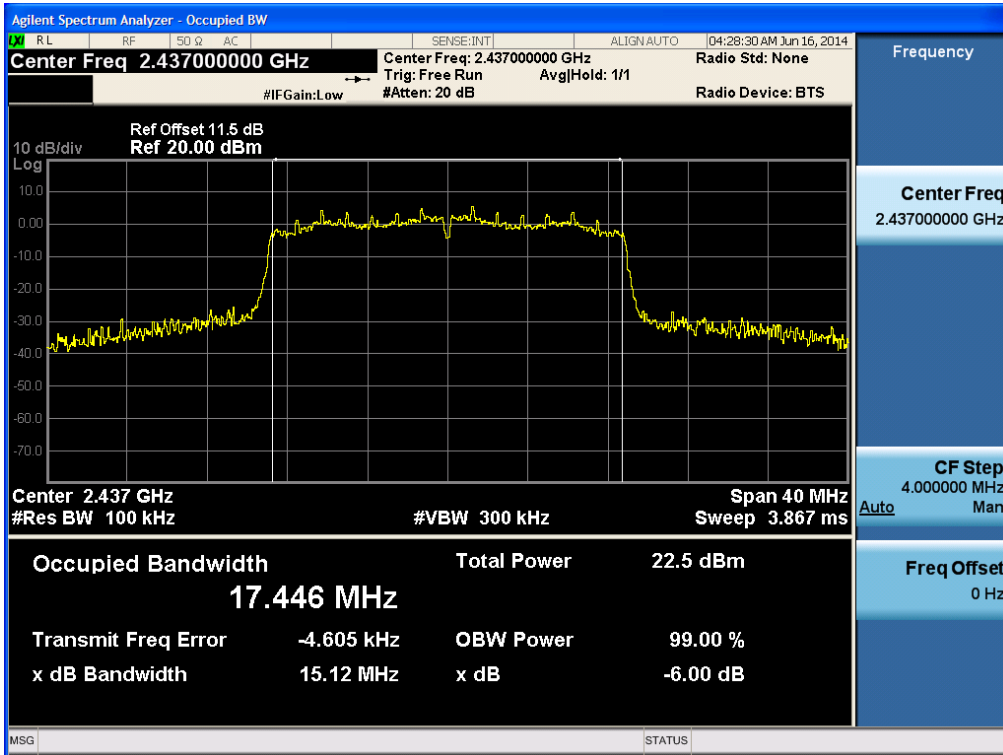
6dB Bandwidth plot (802.11b-CH 1)



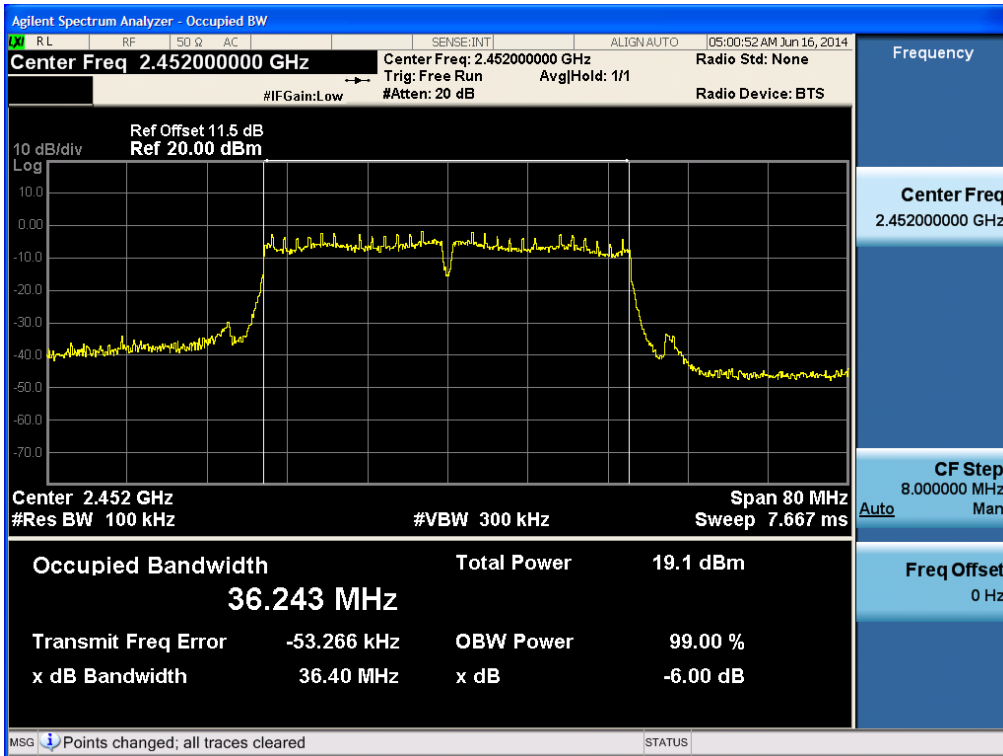
6dB Bandwidth plot (802.11g-CH 11)



6dB Bandwidth plot (802.11n-CH 6) _20 MHz BW

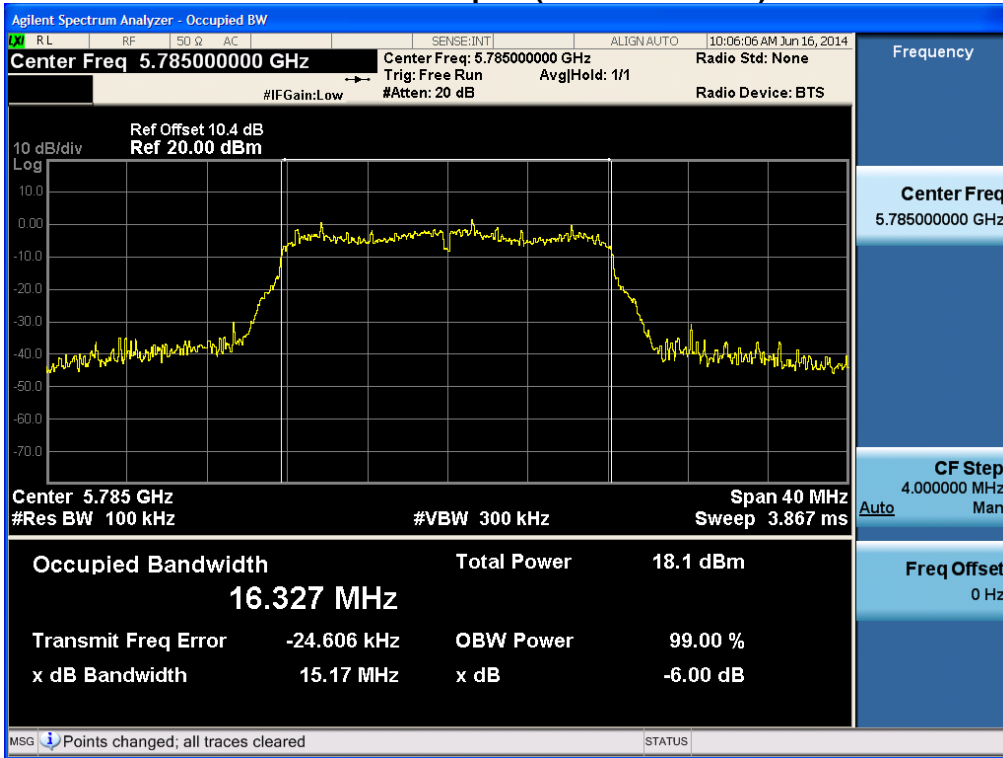


6dB Bandwidth plot (802.11n-CH 9) _40 MHz BW

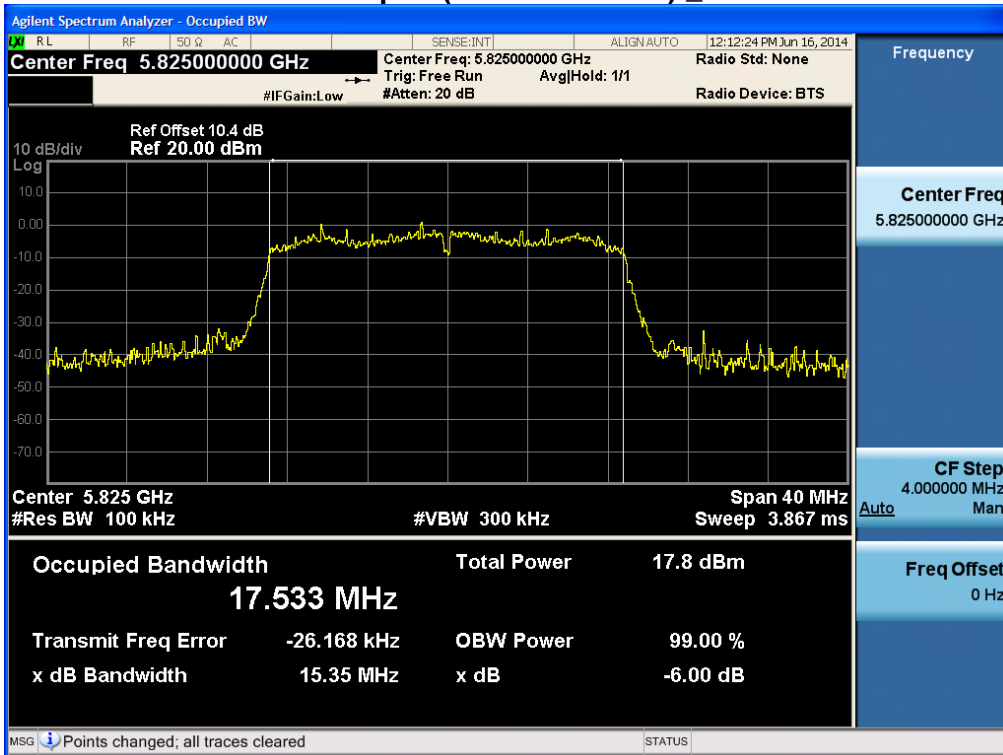


5.8 GHz Band

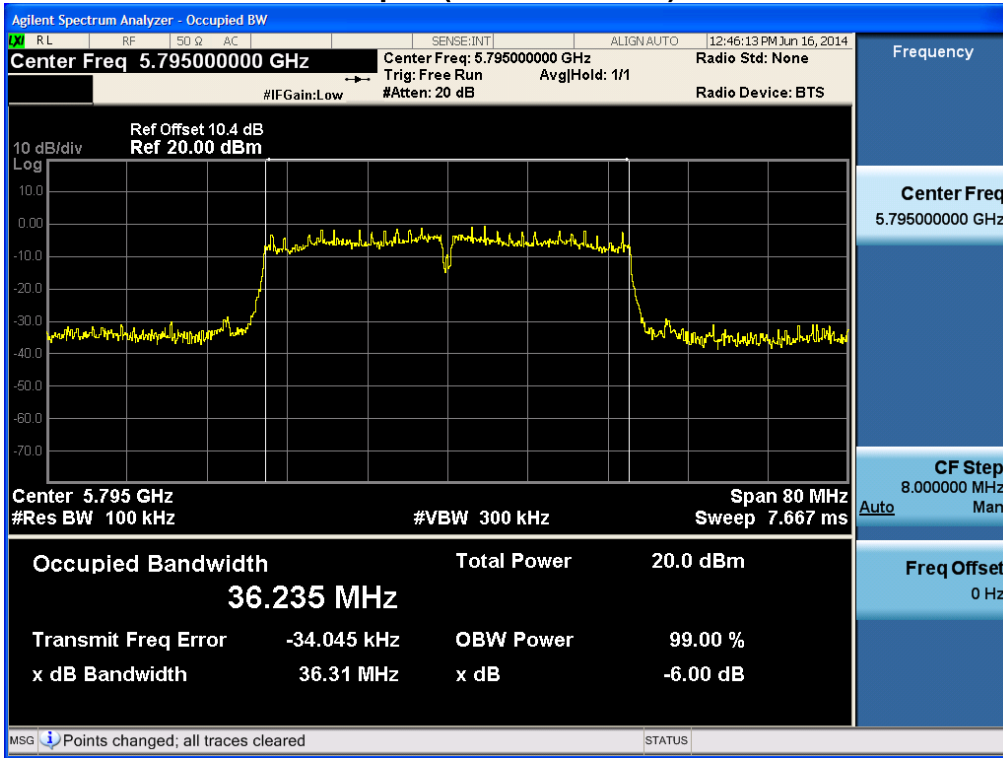
6dB Bandwidth plot (802.11a-CH 157)



6dB Bandwidth plot (802.11n-CH 165) _20 MHz BW



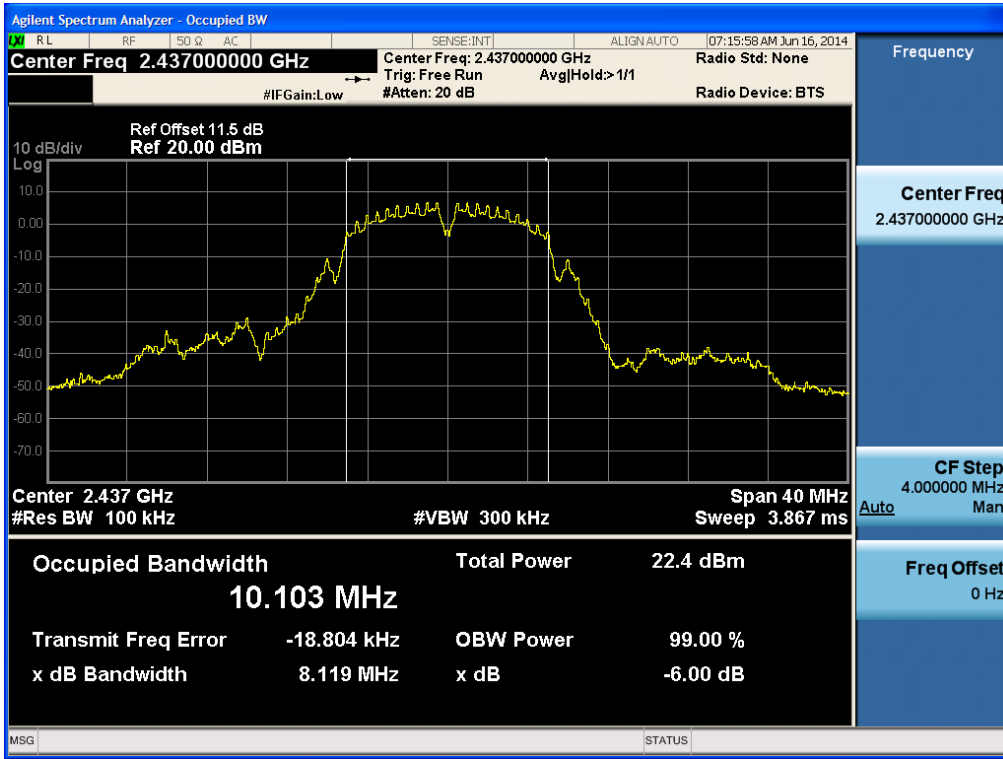
6dB Bandwidth plot (802.11n-CH 159) _40 MHz BW



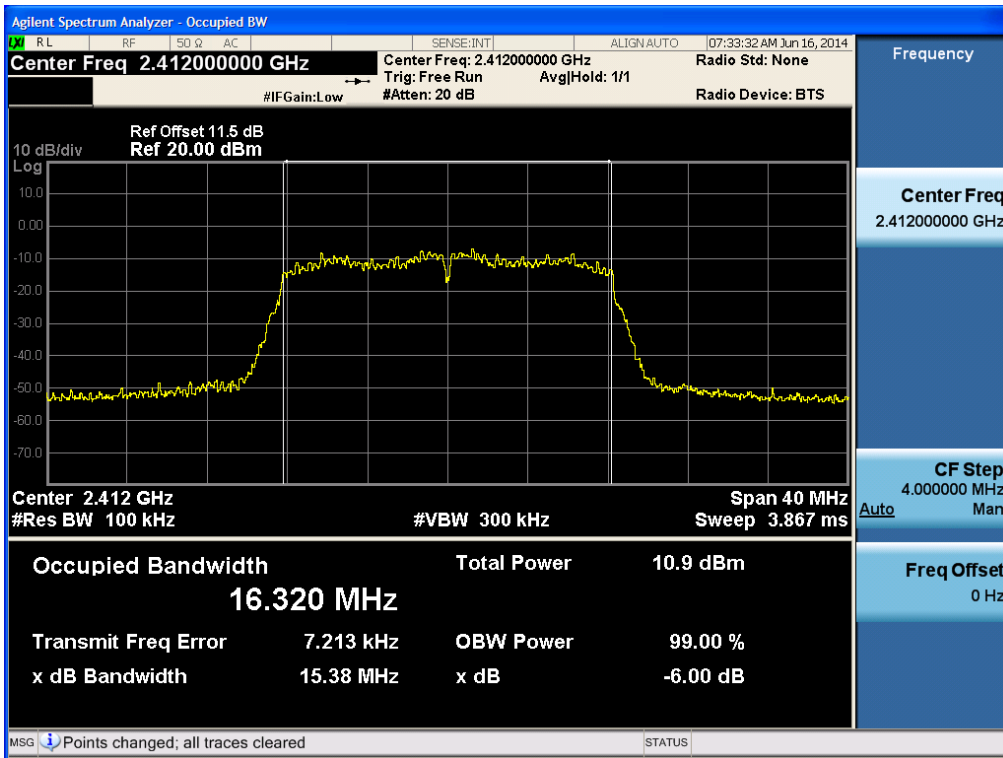
RESULT PLOTS Ant.1

2.4 GHz Band

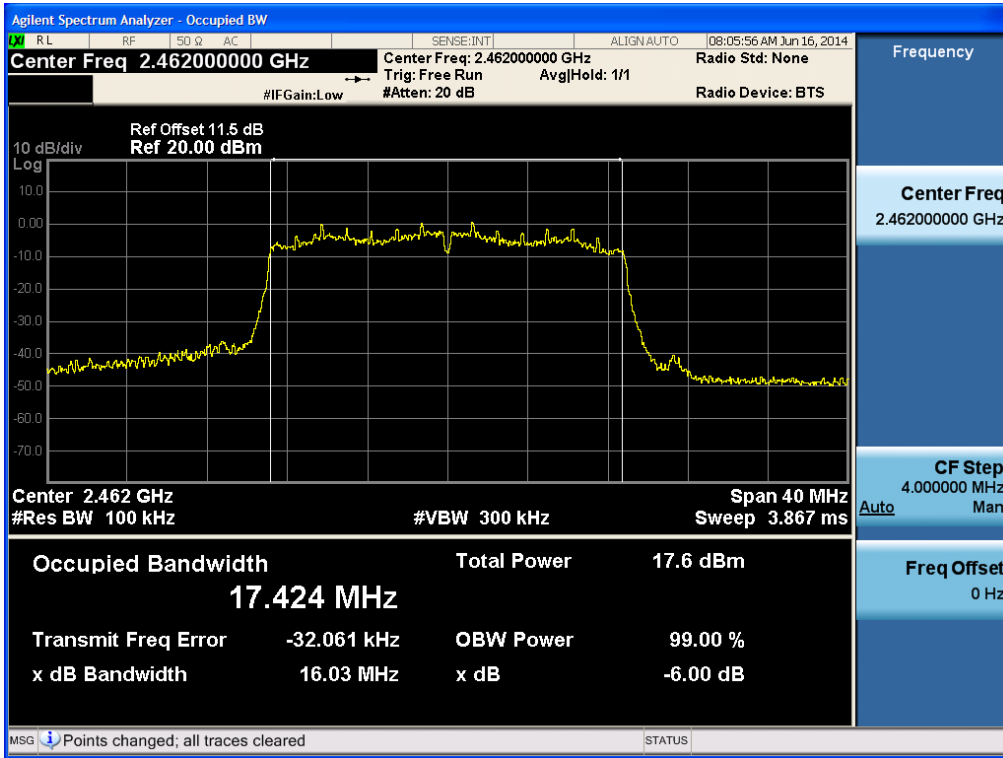
6dB Bandwidth plot (802.11b-CH 6)



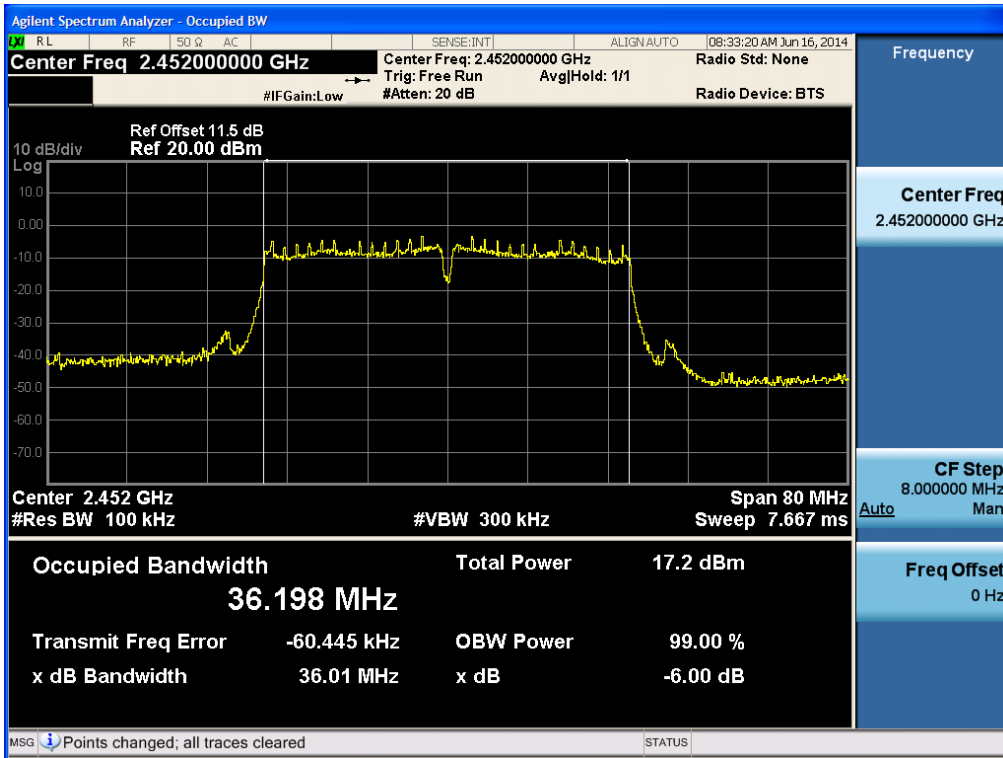
6dB Bandwidth plot (802.11g-CH 1)



6dB Bandwidth plot (802.11n-CH 11) _20 MHz BW

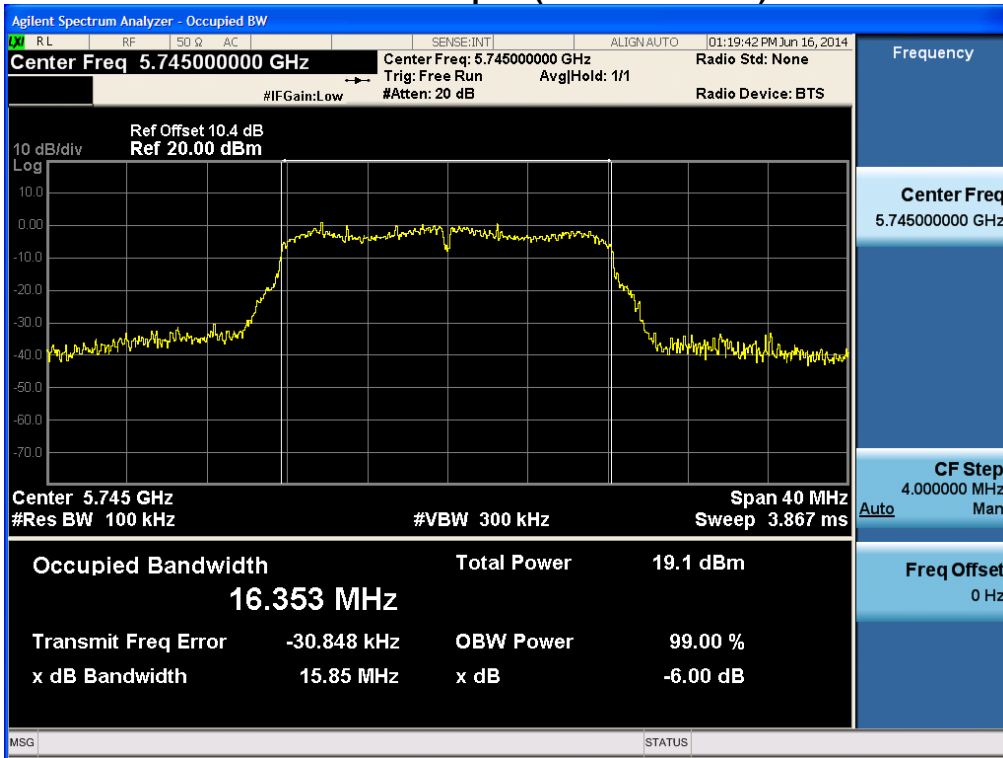


6dB Bandwidth plot (802.11n-CH 9) _40 MHz BW

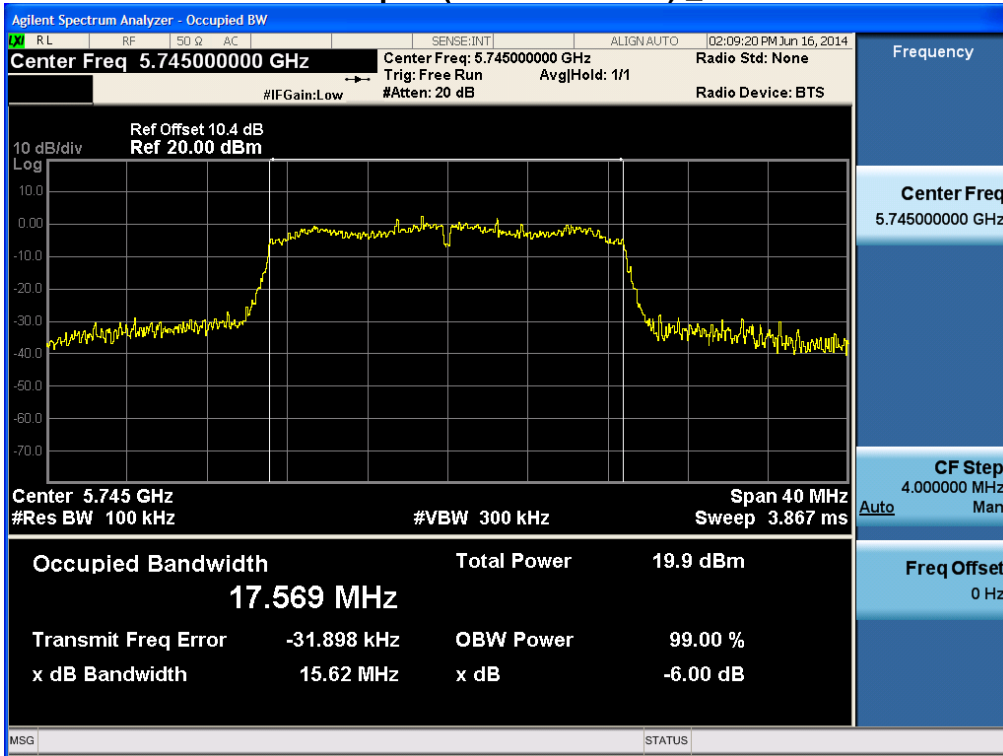


5.8 GHz Band

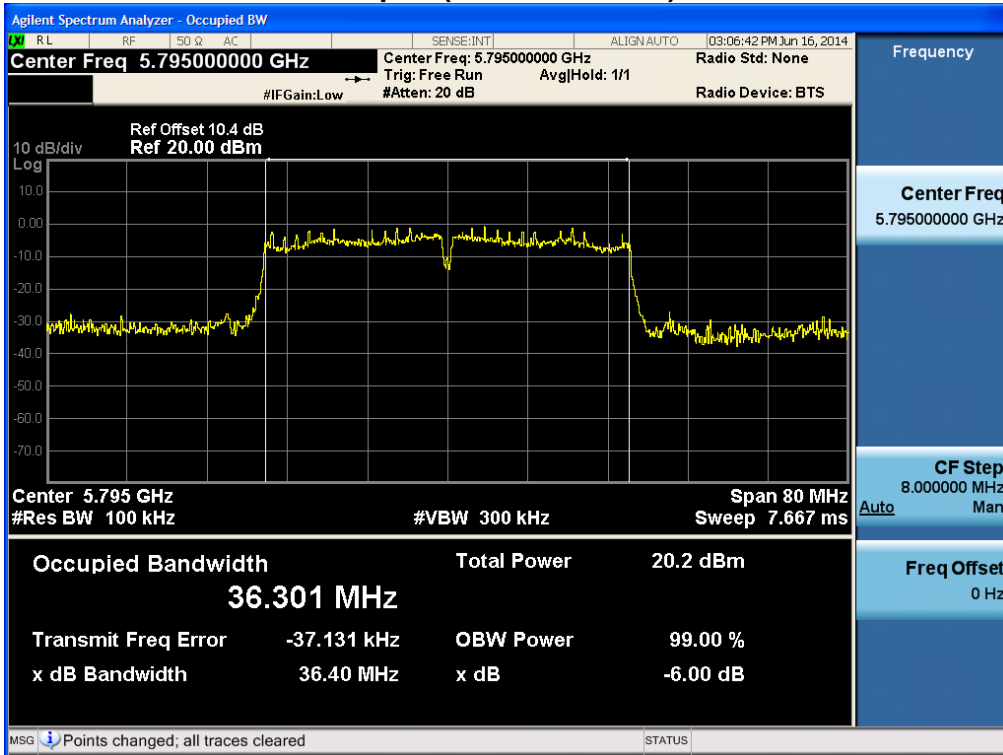
6dB Bandwidth plot (802.11a-CH 149)



6dB Bandwidth plot (802.11n-CH 149) _20 MHz BW



6dB Bandwidth plot (802.11n-CH 159) _40 MHz BW

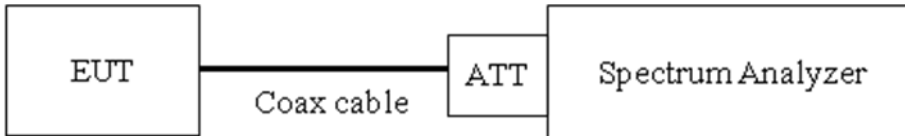


8.3 99% BANDWIDTH (802.11a/b/g/n)

limit

None; for IC reporting purposes only

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to as close to 1% of the selected span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RBW = 1% of the total span

VBW \geq 3 x RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

■ TEST RESULTS Ant.0

2.4 GHz Band

Conducted 99% Bandwidth Measurements for 802.11b

802.11b Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
2412	1	10.246
2437	6	10.223
2462	11	10.236

Conducted 99% Bandwidth Measurements for 802.11g

802.11g Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
2412	1	16.454
2437	6	16.466
2462	11	16.461

Conducted 99% Bandwidth Measurements for 802.11n_20 MHz BW

802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
2412	1	17.413
2437	6	17.431
2462	11	17.427

Conducted 99% Bandwidth Measurements for 802.11n_40 MHz BW

802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
2422	3	36.636
2437	6	36.606
2452	9	36.604

5.8 GHz Band

Conducted 99% Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5745	149	16.502
5785	157	16.539
5825	165	16.699

Conducted 99% Bandwidth Measurements for 802.11n_20 MHz BW

802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5745	149	17.627
5785	157	17.662
5825	165	17.613

Conducted 99% Bandwidth Measurements for 802.11n_40 MHz BW

802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5755	151	36.598
5795	159	36.505

■ TEST RESULTS Ant.1

2.4 GHz Band

Conducted 99% Bandwidth Measurements for 802.11b

802.11b Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
2412	1	10.290
2437	6	10.233
2462	11	10.227

Conducted 99% Bandwidth Measurements for 802.11g

802.11g Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
2412	1	16.471
2437	6	16.479
2462	11	16.435

Conducted 99% Bandwidth Measurements for 802.11n_20 MHz BW

802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
2412	1	17.406
2437	6	17.424
2462	11	17.416

Conducted 99% Bandwidth Measurements for 802.11n_40 MHz BW

802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
2422	3	36.646
2437	6	36.573
2452	9	36.655

5.8 GHz Band

Conducted 99% Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5745	149	16.576
5785	157	16.529
5825	165	16.723

Conducted 99% Bandwidth Measurements for 802.11n_20 MHz BW

802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5745	149	17.648
5785	157	17.609
5825	165	17.619

Conducted 99% Bandwidth Measurements for 802.11n_40 MHz BW

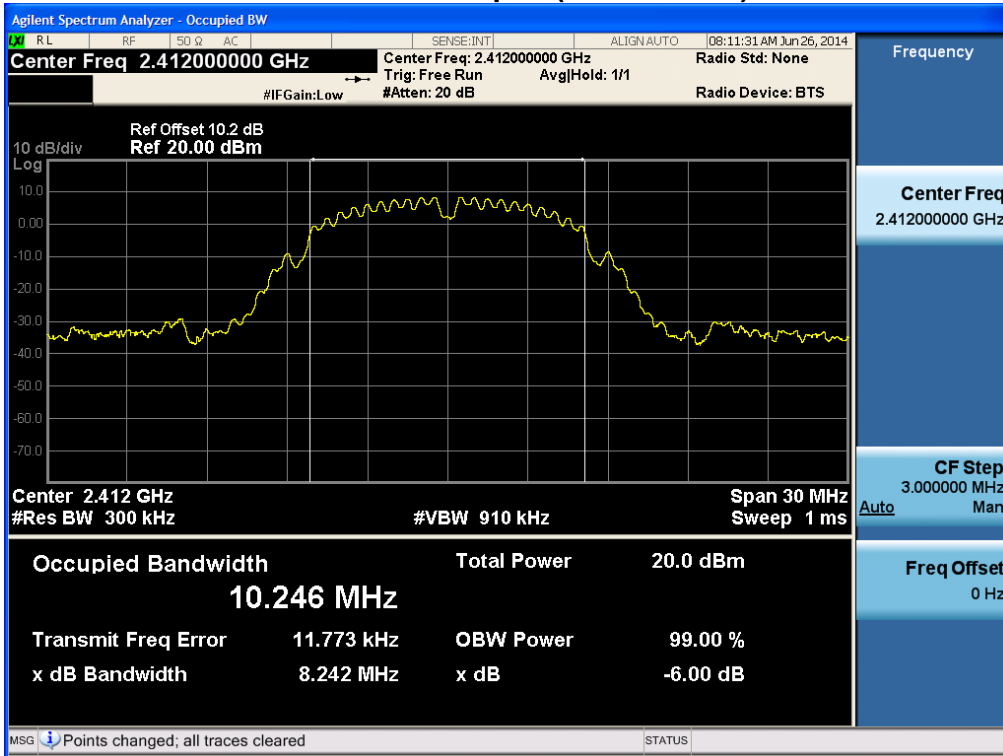
802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5755	151	36.567
5795	159	36.620

Note : In order to simplify the report, attached plots were only the most wide 99 % BW channel.

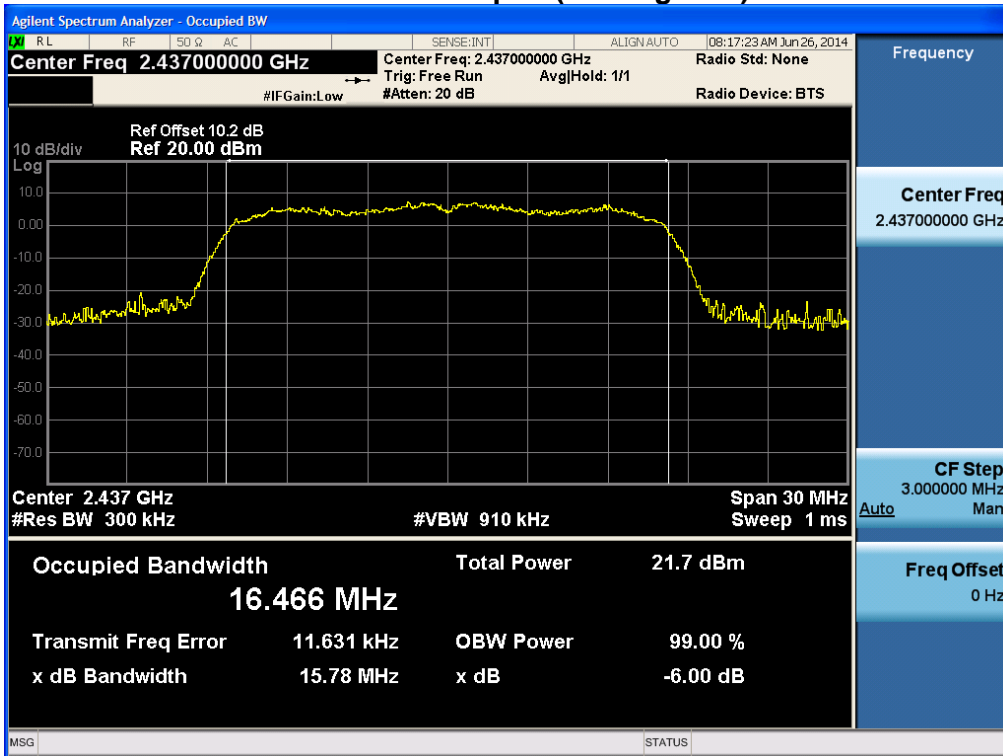
RESULT PLOTS Ant.0

2.4 GHz Band

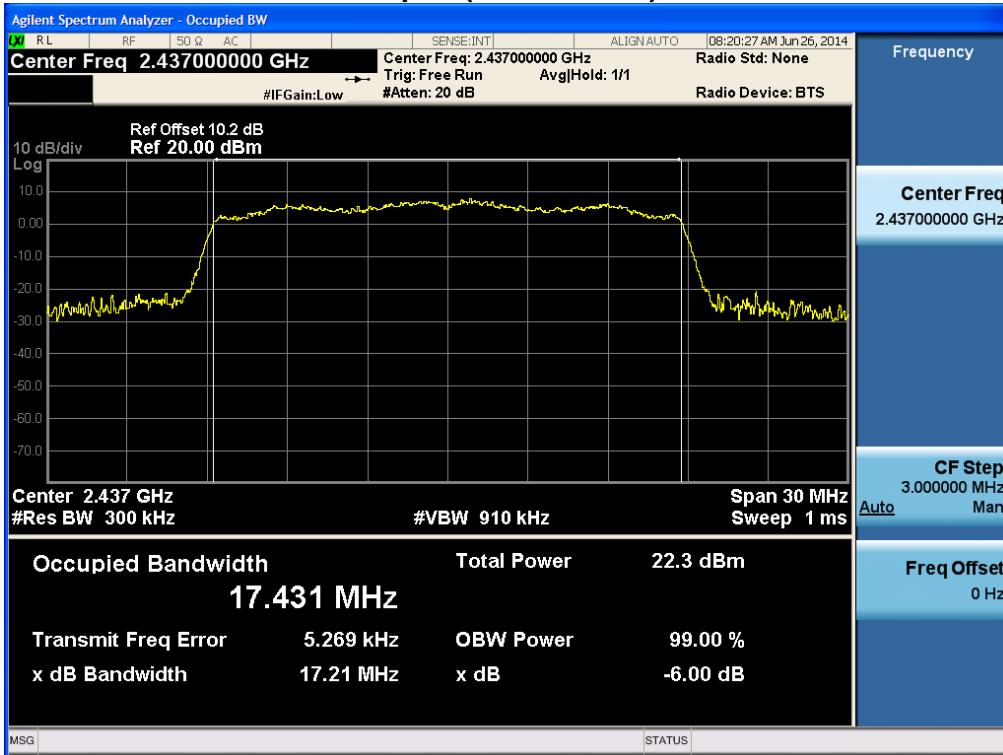
99% Bandwidth plot (802.11b-CH1)



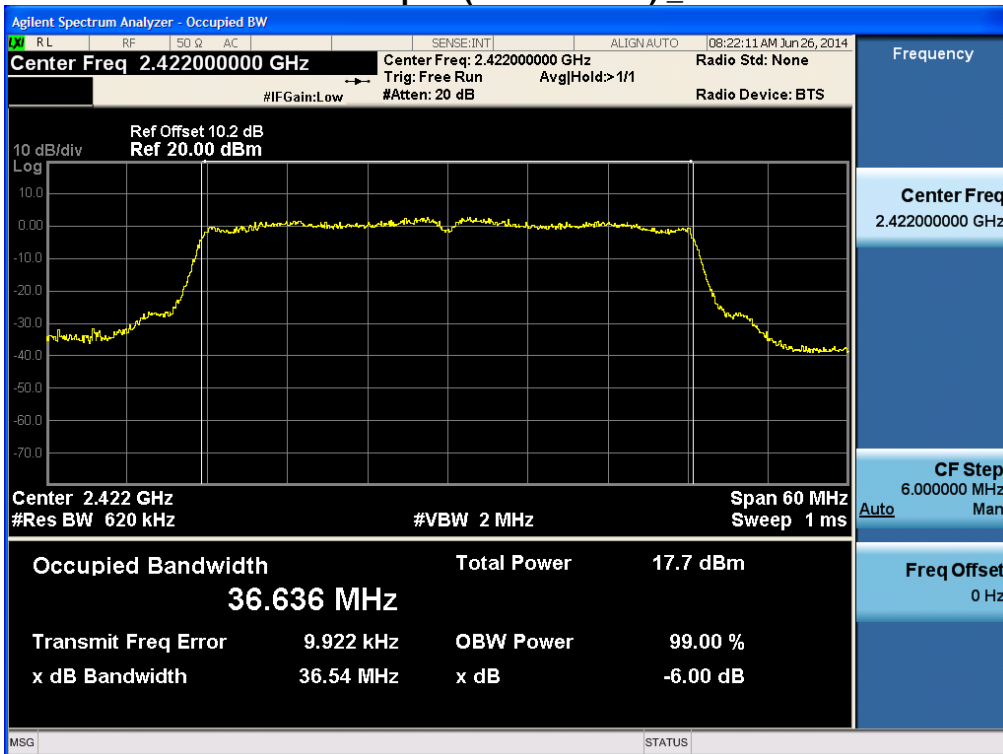
99% Bandwidth plot (802.11g-CH6)



99% Bandwidth plot (802.11n-CH6) _20 MHz BW

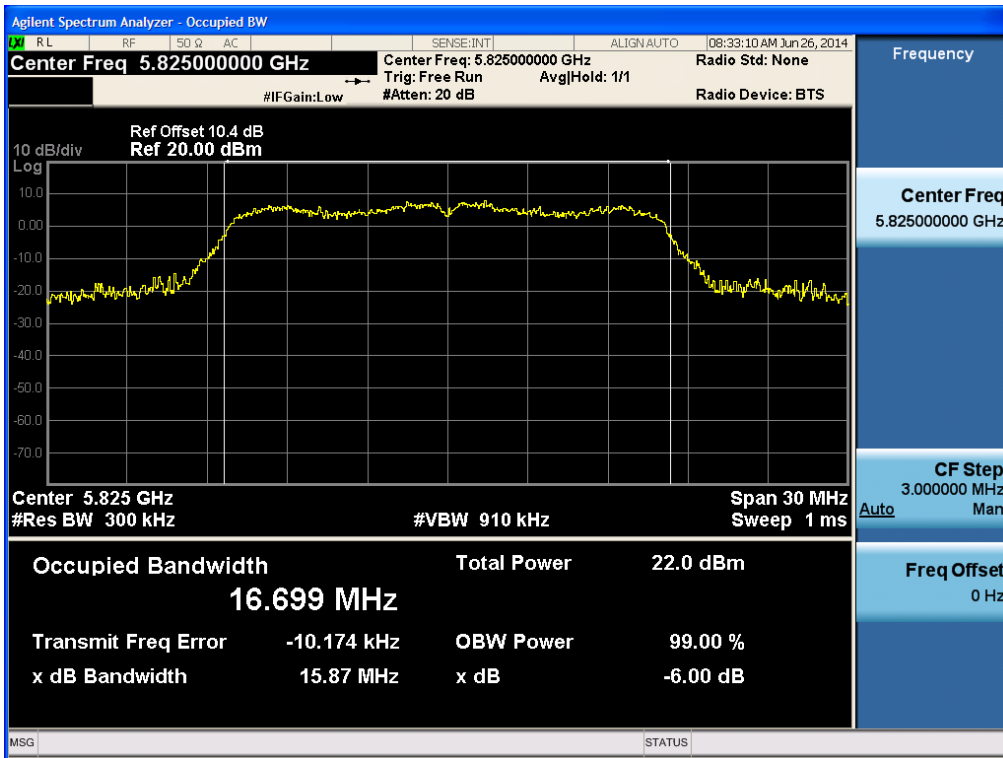


99% Bandwidth plot (802.11n-CH3) _40 MHz BW

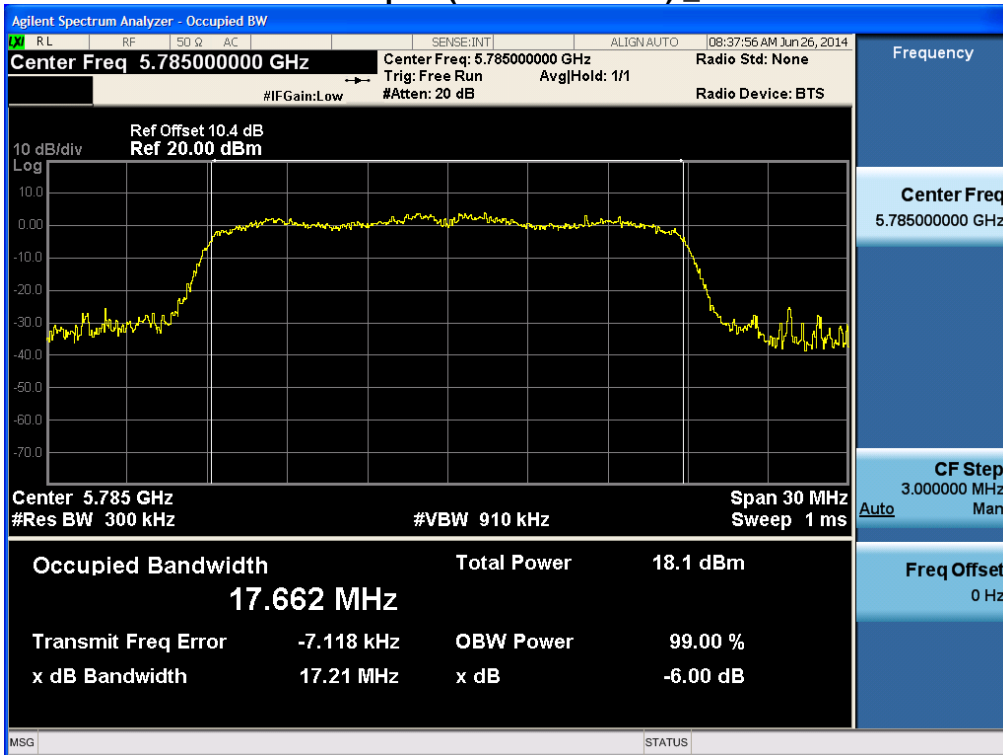


5.8 GHz Band

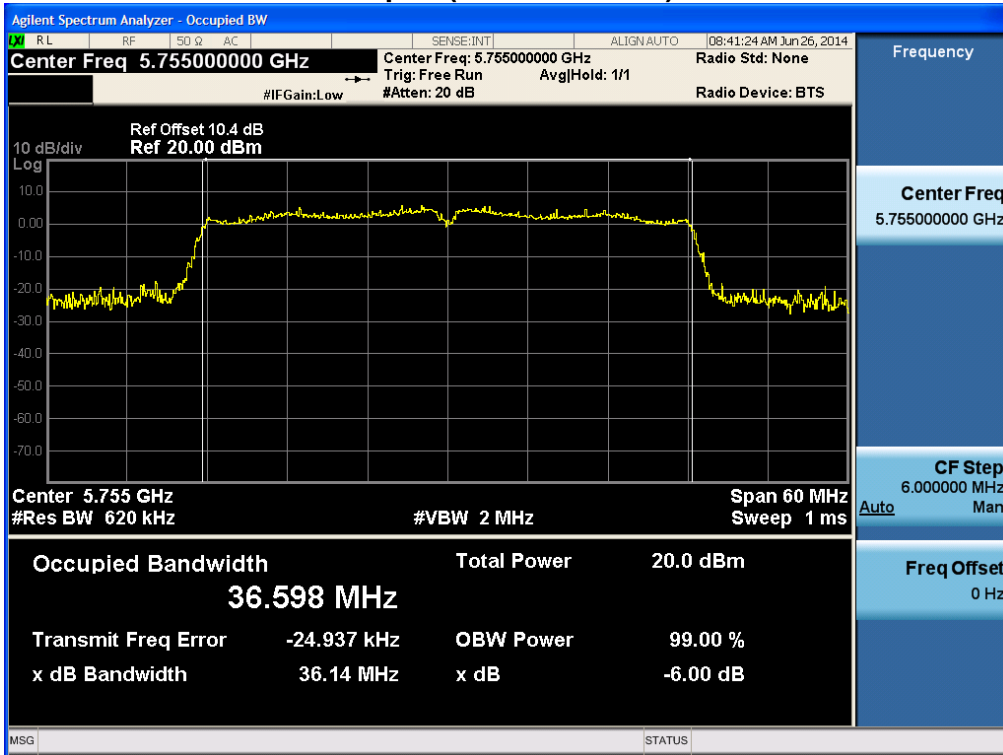
99% Bandwidth plot (802.11a-CH165)



99% Bandwidth plot (802.11n-CH157) 20 MHz BW



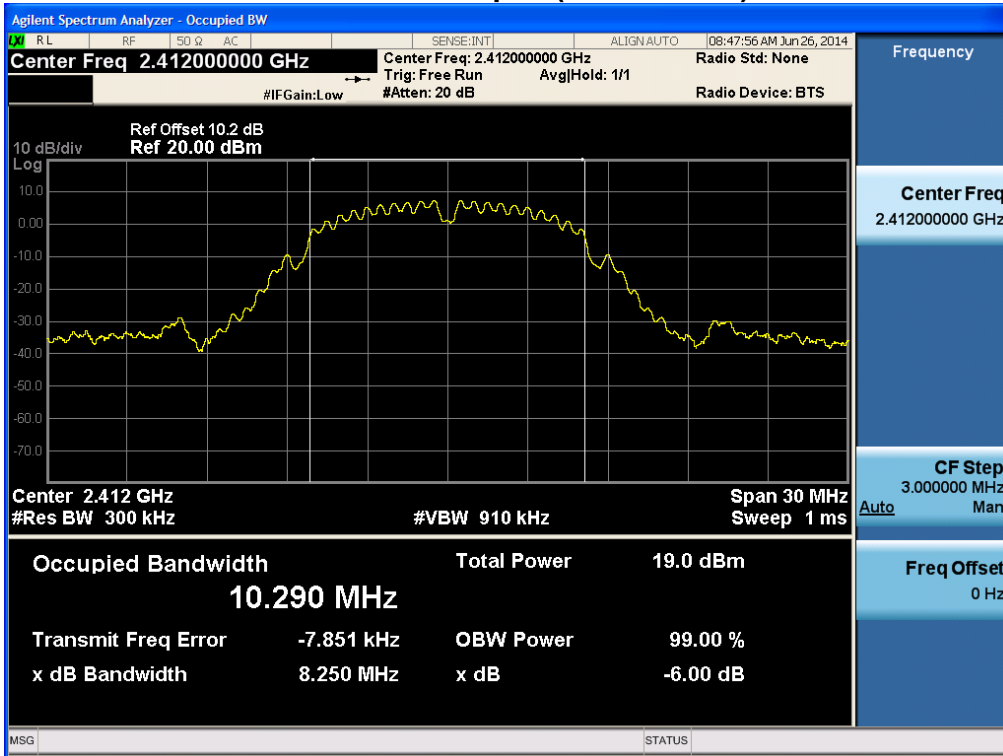
99% Bandwidth plot (802.11n-CH151) _40 MHz BW



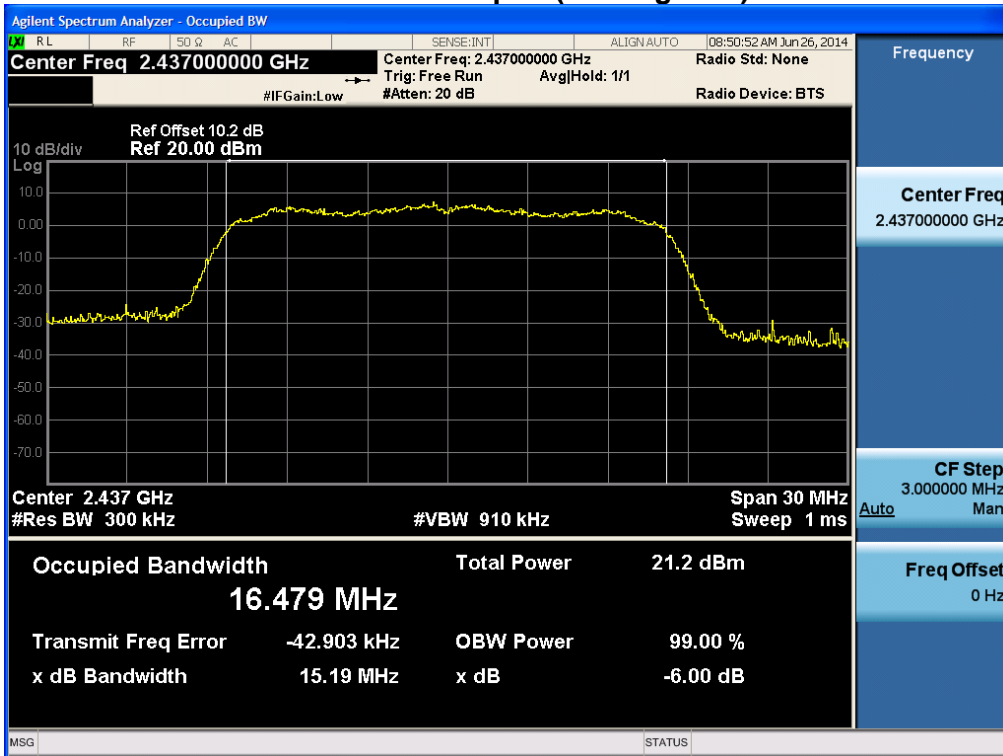
RESULT PLOTS Ant.1

2.4 GHz Band

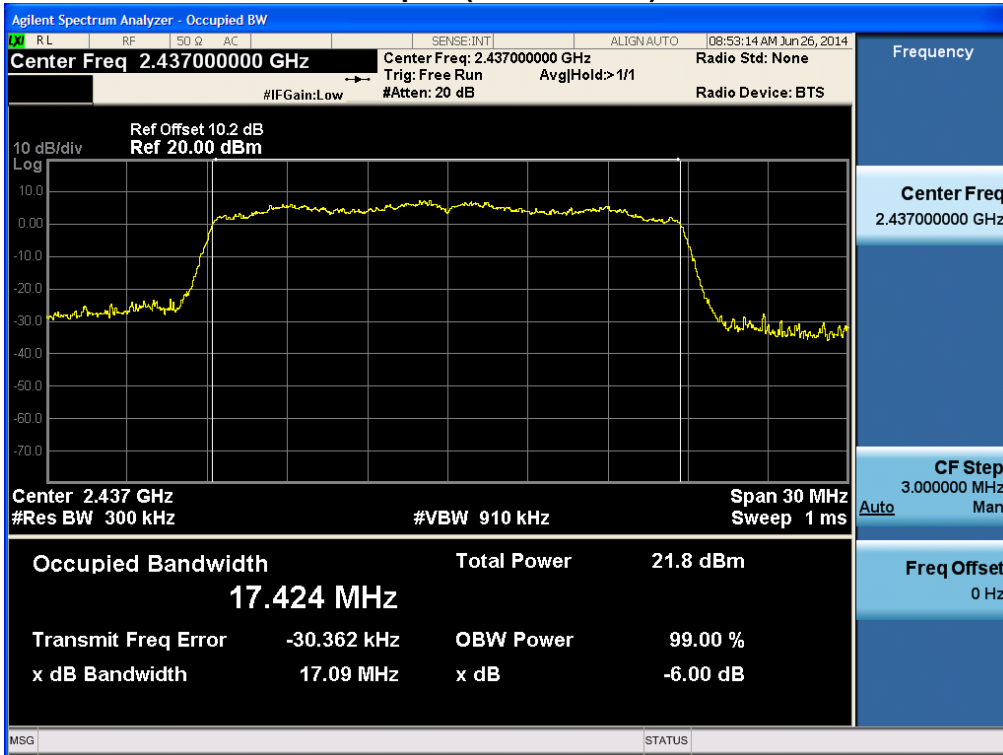
99% Bandwidth plot (802.11b-CH1)



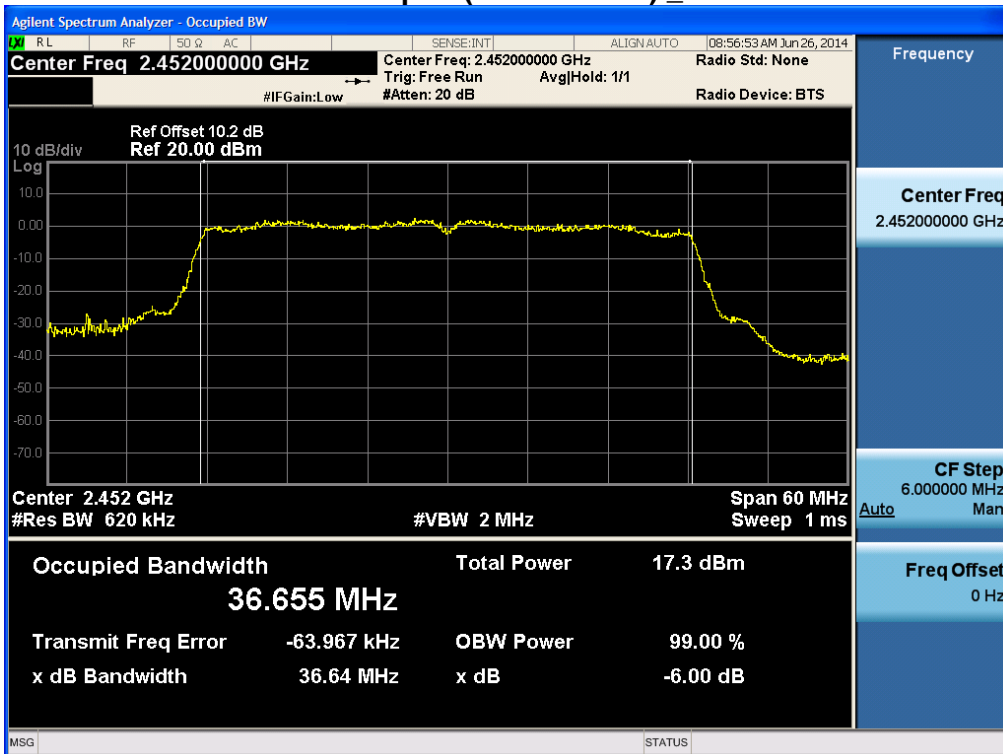
99% Bandwidth plot (802.11g-CH6)



99% Bandwidth plot (802.11n-CH6) _20 MHz BW

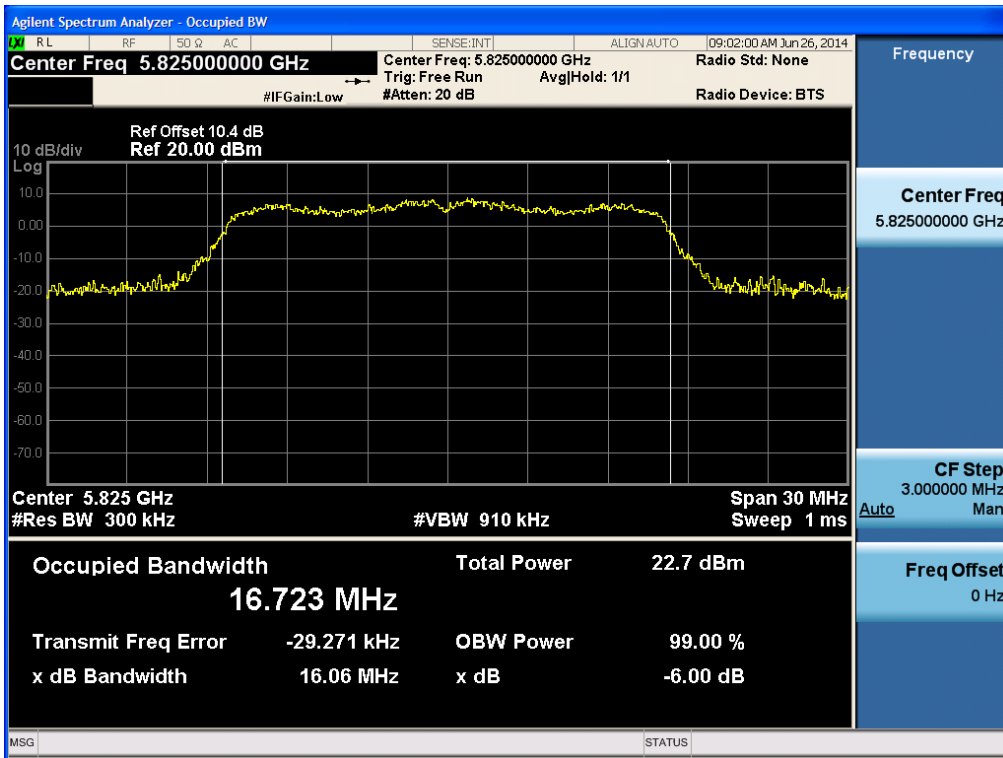


99% Bandwidth plot (802.11n-CH9) _40 MHz BW

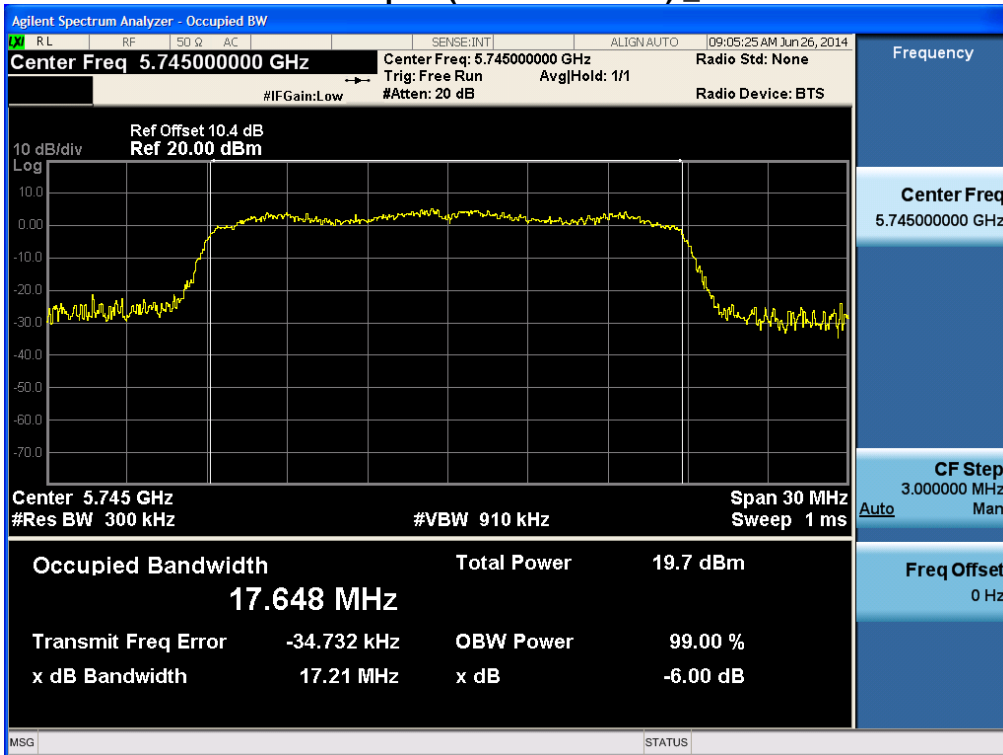


5.8 GHz Band

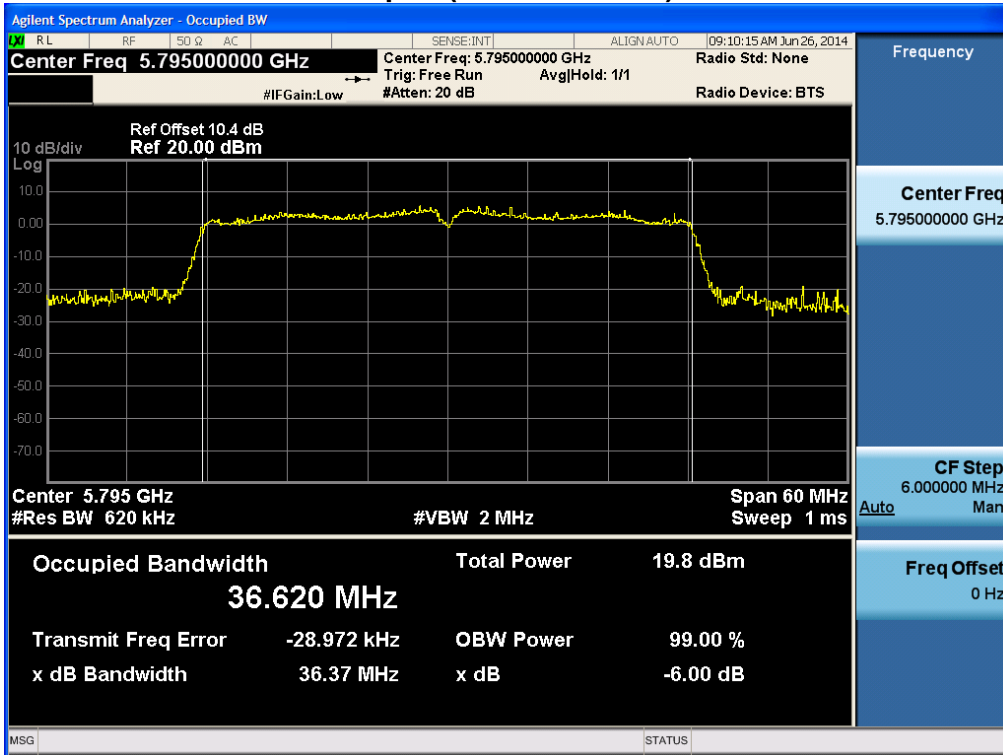
99% Bandwidth plot (802.11a-CH165)



99% Bandwidth plot (802.11n-CH149) 20 MHz BW



99% Bandwidth plot (802.11n-CH159) _40 MHz BW



8.4 OUTPUT POWER (802.11a/b/g/n)

Test Requirements and limit, §15.247(b)(3)

The transmitter output is connected to the input of an RF power sensor. Measurement is made using a broadband power meter capable of making peak and average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

■ Limit(CDD)

1. Maximum Conducted Output Power(for FCC & IC)

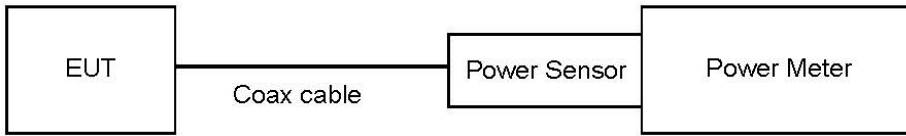
Operating Mode	Band	Mode	Ant. Port	Ant. Gain (dBi)	Limit (dBm)
SISO	2.4 GHz	802.11b/g/n	0	1.16	30
		802.11b/g/n	1	3.70	30
MIMO(2 TX)		802.11g/n	0 & 1	5.53	30
SISO	5.8 GHz	802.11a/n	0	5.58	30
			1	3.13	30
MIMO(2 TX)		802.11a/n	0 & 1	7.45	28.55

Note : Above the limits is calculated according to antenna gain. Because antenna gain is higher than 6 dBi.

2. Maximum EIRP(for & IC) : 4 W

Note : The limits of conducted power were applied the antenna gain. Therefore, if conducted power is pass, EIRP is also pass. So, we attached only conducted power table.

■ **TEST CONFIGURATION(20 MHz BW)**



■ **TEST PROCEDURE(20 MHz BW)**

- Peak Power (Procedure 9.1.3 in KDB 558074, issued 06/05/2014)
 1. Measure the peak power of the transmitter.
- Average Power (Procedure 9.2.3.1 in KDB 558074, issued 06/05/2014)
 1. Measure the duty cycle.
 2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
 3. Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

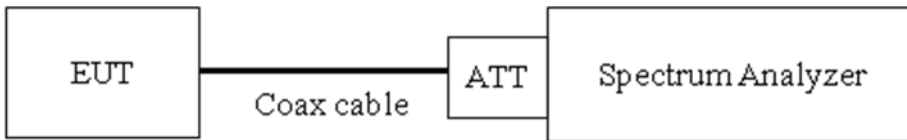
Note :

1. We apply to the offset in the 2.4 GHz and 5.8 GHz range that was rounded off to the closest tenth dB.

Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
2.4 GHz	10.2
5.8 GHz	10.4

(Actual value of loss for the attenuator and cable combination)

■ TEST CONFIGURATION(40 MHz BW)**■ TEST PROCEDURE(40 MHz BW)**

Power sensor(N9121A) is supported only implemented a VBW of 30 MHz. So in case of 40 MHz power measurement, we used the integrated band power method.

The transmitter output is connected to the Spectrum Analyzer. We use the spectrum analyzer's integrated band power measurement function.

The Spectrum Analyzer is set to

- Peak Power (Integrated Band Power Method)

RBW = 1 MHz

VBW $\geq 3 \times$ RBW

SPAN $\geq 1.5 \times$ DTS bandwidth

Detector Mode = Peak

Sweep = auto couple

Trace Mode = max hold

Allow trace to fully stabilize.

Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector).

- Average Power (Procedure 9.2.2.4 in KDB 558074, issued 06/05/2014)

Measure the duty cycle

Set span to at least 1.5 times the OBW

RBW = 1-5 % of the OBW, not to exceed 1 MHz.

VBW $\geq 3 \times$ RBW.

Number of points in sweep $\geq 2 \times$ span / RBW. (This gives bin-to-bin spacing \leq RBW/2, so that narrowband signals are not lost between frequency bins.)

Sweep time = auto.

Detector = RMS(i.e., power averaging)

Do not use sweep triggering. Allow the sweep to "free run".

Trace average at least 100 traces in power averaging(RMS) mode.

Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.

Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Note :

1. Spectrum reading values are not plot data. The power results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 2.4 GHz and 5.8 GHz range that was rounded off to the closest tenth dB.

Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
2.4 GHz	10.2
5.8 GHz	10.4

(Actual value of loss for the attenuator and cable combination)

■ **Sample Calculation (Conducted)**

Output Power = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor

■ **Sample Calculation (EIRP)**

Output Power = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor + Ant. Gain

2.4 GHz Band

■ TEST RESULTS_Ant.0

Conducted Output Power Measurements (802.11b Mode)

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	1 Mbps	18.58	30
		2 Mbps	18.63	30
		5.5 Mbps	20.25	30
		11 Mbps	22.11	30
2437	6	1 Mbps	18.75	30
		2 Mbps	19.11	30
		5.5 Mbps	20.47	30
		11 Mbps	22.26	30
2462	11	1 Mbps	18.73	30
		2 Mbps	18.83	30
		5.5 Mbps	20.17	30
		11 Mbps	21.99	30

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11b Mode)

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	1 Mbps	18.06	30
		2 Mbps	17.98	30
		5.5 Mbps	19.19	30
		11 Mbps	21.11	30
2437	6	1 Mbps	17.37	30
		2 Mbps	17.74	30
		5.5 Mbps	19.13	30
		11 Mbps	21.03	30
2462	11	1 Mbps	17.36	30
		2 Mbps	17.48	30
		5.5 Mbps	18.97	30
		11 Mbps	20.77	30

■ TEST RESULTS Ant 0

Conducted Output Power Measurements (802.11g Mode)

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6 Mbps	14.85	30
		9 Mbps	14.86	30
		12 Mbps	15.05	30
		18 Mbps	15.07	30
		24 Mbps	15.51	30
		36 Mbps	15.57	30
		48 Mbps	15.73	30
		54 Mbps	15.64	30
2437	6	6 Mbps	22.45	30
		9 Mbps	22.37	30
		12 Mbps	22.56	30
		18 Mbps	22.51	30
		24 Mbps	22.99	30
		36 Mbps	22.97	30
		48 Mbps	22.99	30
		54 Mbps	23.11	30
2462	11	6 Mbps	19.61	30
		9 Mbps	19.64	30
		12 Mbps	19.85	30
		18 Mbps	19.87	30
		24 Mbps	20.28	30
		36 Mbps	20.29	30
		48 Mbps	20.37	30
		54 Mbps	20.42	30

■ TEST RESULTS Ant 1

Conducted Output Power Measurements (802.11g Mode)

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6 Mbps	10.63	30
		9 Mbps	10.54	30
		12 Mbps	10.83	30
		18 Mbps	10.77	30
		24 Mbps	11.39	30
		36 Mbps	11.23	30
		48 Mbps	11.45	30
		54 Mbps	11.39	30
2437	6	6 Mbps	21.42	30
		9 Mbps	21.38	30
		12 Mbps	21.58	30
		18 Mbps	21.59	30
		24 Mbps	22.04	30
		36 Mbps	22.06	30
		48 Mbps	22.15	30
		54 Mbps	22.26	30
2462	11	6 Mbps	18.03	30
		9 Mbps	18.20	30
		12 Mbps	18.36	30
		18 Mbps	18.28	30
		24 Mbps	18.94	30
		36 Mbps	18.78	30
		48 Mbps	18.94	30
		54 Mbps	18.92	30

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Conducted Output Power Measurements (802.11g Mode)

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6 Mbps	16.24	30
		9 Mbps	16.23	30
		12 Mbps	16.44	30
		18 Mbps	16.44	30
		24 Mbps	16.93	30
		36 Mbps	16.93	30
		48 Mbps	17.11	30
		54 Mbps	17.03	30
2437	6	6 Mbps	24.98	30
		9 Mbps	24.91	30
		12 Mbps	25.11	30
		18 Mbps	25.08	30
		24 Mbps	25.55	30
		36 Mbps	25.55	30
		48 Mbps	25.60	30
		54 Mbps	25.72	30
2462	11	6 Mbps	21.90	30
		9 Mbps	21.99	30
		12 Mbps	22.18	30
		18 Mbps	22.16	30
		24 Mbps	22.67	30
		36 Mbps	22.61	30
		48 Mbps	22.72	30
		54 Mbps	22.74	30

■ TEST RESULTS Ant 0

Conducted Output Power Measurements (802.11n Mode) _20 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6.5 Mbps	14.95	30
		13 Mbps	14.98	30
		19.5 Mbps	14.94	30
		26 Mbps	15.44	30
		39 Mbps	15.38	30
		52 Mbps	15.42	30
		58.5 Mbps	15.46	30
		65 Mbps	15.44	30
2437	6	6.5 Mbps	22.86	30
		13 Mbps	23.09	30
		19.5 Mbps	22.99	30
		26 Mbps	23.47	30
		39 Mbps	23.42	30
		52 Mbps	23.50	30
		58.5 Mbps	23.51	30
		65 Mbps	23.53	30
2462	11	6.5 Mbps	19.43	30
		13 Mbps	19.40	30
		19.5 Mbps	19.57	30
		26 Mbps	20.02	30
		39 Mbps	19.95	30
		52 Mbps	20.09	30
		58.5 Mbps	20.19	30
		65 Mbps	20.14	30

■ TEST RESULTS Ant 1

Conducted Output Power Measurements (802.11n Mode) _20 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6.5 Mbps	10.56	30
		13 Mbps	10.78	30
		19.5 Mbps	10.63	30
		26 Mbps	11.20	30
		39 Mbps	11.11	30
		52 Mbps	11.23	30
		58.5 Mbps	11.23	30
		65 Mbps	11.14	30
2437	6	6.5 Mbps	22.08	30
		13 Mbps	22.19	30
		19.5 Mbps	22.10	30
		26 Mbps	22.64	30
		39 Mbps	22.46	30
		52 Mbps	22.49	30
		58.5 Mbps	22.56	30
		65 Mbps	22.55	30
2462	11	6.5 Mbps	18.16	30
		13 Mbps	18.49	30
		19.5 Mbps	18.47	30
		26 Mbps	18.90	30
		39 Mbps	18.90	30
		52 Mbps	18.97	30
		58.5 Mbps	18.87	30
		65 Mbps	18.89	30

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Conducted Output Power Measurements (802.11n Mode) _20 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6.5 Mbps	16.30	30
		13 Mbps	16.38	30
		19.5 Mbps	16.31	30
		26 Mbps	16.83	30
		39 Mbps	16.76	30
		52 Mbps	16.82	30
		58.5 Mbps	16.85	30
		65 Mbps	16.81	30
2437	6	6.5 Mbps	25.50	30
		13 Mbps	25.67	30
		19.5 Mbps	25.58	30
		26 Mbps	26.09	30
		39 Mbps	25.98	30
		52 Mbps	26.03	30
		58.5 Mbps	26.07	30
		65 Mbps	26.08	30
2462	11	6.5 Mbps	21.85	30
		13 Mbps	21.98	30
		19.5 Mbps	22.07	30
		26 Mbps	22.51	30
		39 Mbps	22.47	30
		52 Mbps	22.58	30
		58.5 Mbps	22.59	30
		65 Mbps	22.57	30

■ TEST RESULTS Ant 0

Conducted Output Power Measurements (802.11n Mode) _40 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2422	3	13.5 Mbps	18.32	30
		27 Mbps	18.40	30
		40.5 Mbps	18.59	30
		54 Mbps	18.93	30
		81 Mbps	18.77	30
		108 Mbps	18.90	30
		121.5 Mbps	18.84	30
		135 Mbps	18.90	30
2437	6	13.5 Mbps	23.90	30
		27 Mbps	24.43	30
		40.5 Mbps	23.91	30
		54 Mbps	24.40	30
		81 Mbps	24.27	30
		108 Mbps	24.78	30
		121.5 Mbps	24.43	30
		135 Mbps	24.42	30
2452	9	13.5 Mbps	19.66	30
		27 Mbps	19.85	30
		40.5 Mbps	19.33	30
		54 Mbps	19.75	30
		81 Mbps	19.69	30
		108 Mbps	19.66	30
		121.5 Mbps	19.60	30
		135 Mbps	19.61	30

■ TEST RESULTS Ant 1

Conducted Output Power Measurements (802.11n Mode) _40 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2422	3	13.5 Mbps	16.55	30
		27 Mbps	16.65	30
		40.5 Mbps	16.59	30
		54 Mbps	17.03	30
		81 Mbps	16.68	30
		108 Mbps	16.82	30
		121.5 Mbps	16.80	30
		135 Mbps	16.87	30
2437	6	13.5 Mbps	22.99	30
		27 Mbps	22.99	30
		40.5 Mbps	23.05	30
		54 Mbps	23.49	30
		81 Mbps	23.39	30
		108 Mbps	23.36	30
		121.5 Mbps	23.46	30
		135 Mbps	23.55	30
2452	9	13.5 Mbps	17.78	30
		27 Mbps	17.92	30
		40.5 Mbps	17.78	30
		54 Mbps	18.39	30
		81 Mbps	18.23	30
		108 Mbps	18.29	30
		121.5 Mbps	18.44	30
		135 Mbps	18.26	30

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Conducted Output Power Measurements (802.11n Mode) _40 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2422	3	13.5 Mbps	20.53	30
		27 Mbps	20.62	30
		40.5 Mbps	20.71	30
		54 Mbps	21.09	30
		81 Mbps	20.86	30
		108 Mbps	20.99	30
		121.5 Mbps	20.95	30
		135 Mbps	21.01	30
2437	6	13.5 Mbps	26.48	30
		27 Mbps	26.78	30
		40.5 Mbps	26.51	30
		54 Mbps	26.98	30
		81 Mbps	26.86	30
		108 Mbps	27.14	30
		121.5 Mbps	26.98	30
		135 Mbps	27.02	30
2452	9	13.5 Mbps	21.83	30
		27 Mbps	22.00	30
		40.5 Mbps	21.63	30
		54 Mbps	22.13	30
		81 Mbps	22.03	30
		108 Mbps	22.04	30
		121.5 Mbps	22.07	30
		135 Mbps	22.00	30

5.8 GHz Band

■ TEST RESULTS_Ant.0

Conducted Output Power Measurements (802.11a Mode: 5745~5825)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5745	149	6 Mbps	19.79	30
		9 Mbps	19.74	30
		12 Mbps	19.48	30
		18 Mbps	19.44	30
		24 Mbps	20.06	30
		36 Mbps	19.98	30
		48 Mbps	20.05	30
		54 Mbps	19.95	30
5785	157	6 Mbps	18.68	30
		9 Mbps	18.75	30
		12 Mbps	18.67	30
		18 Mbps	18.59	30
		24 Mbps	19.06	30
		36 Mbps	19.05	30
		48 Mbps	19.10	30
		54 Mbps	19.12	30
5825	165	6 Mbps	18.11	30
		9 Mbps	18.43	30
		12 Mbps	18.21	30
		18 Mbps	18.12	30
		24 Mbps	18.59	30
		36 Mbps	18.65	30
		48 Mbps	18.73	30
		54 Mbps	18.71	30

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11a Mode: 5745~5825)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5745	149	6 Mbps	19.96	30
		9 Mbps	19.96	30
		12 Mbps	19.69	30
		18 Mbps	19.77	30
		24 Mbps	20.27	30
		36 Mbps	20.22	30
		48 Mbps	20.44	30
		54 Mbps	20.45	30
5785	157	6 Mbps	19.18	30
		9 Mbps	19.38	30
		12 Mbps	19.12	30
		18 Mbps	18.82	30
		24 Mbps	19.19	30
		36 Mbps	19.24	30
		48 Mbps	19.32	30
		54 Mbps	19.72	30
5825	165	6 Mbps	18.20	30
		9 Mbps	18.23	30
		12 Mbps	18.00	30
		18 Mbps	18.30	30
		24 Mbps	18.67	30
		36 Mbps	18.39	30
		48 Mbps	18.43	30
		54 Mbps	18.58	30

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Conducted Output Power Measurements (802.11a Mode: 5745~5825)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5745	149	6 Mbps	22.89	28.55
		9 Mbps	22.86	28.55
		12 Mbps	22.60	28.55
		18 Mbps	22.62	28.55
		24 Mbps	23.18	28.55
		36 Mbps	23.11	28.55
		48 Mbps	23.26	28.55
		54 Mbps	23.22	28.55
5785	157	6 Mbps	21.95	28.55
		9 Mbps	22.09	28.55
		12 Mbps	21.91	28.55
		18 Mbps	21.72	28.55
		24 Mbps	22.14	28.55
		36 Mbps	22.16	28.55
		48 Mbps	22.22	28.55
		54 Mbps	22.44	28.55
5825	165	6 Mbps	21.17	28.55
		9 Mbps	21.34	28.55
		12 Mbps	21.12	28.55
		18 Mbps	21.22	28.55
		24 Mbps	21.64	28.55
		36 Mbps	21.53	28.55
		48 Mbps	21.59	28.55
		54 Mbps	21.66	28.55

■ TEST RESULTS_Ant.0

Conducted Output Power Measurements (802.11n Mode: 5745~5825) _20 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5745	149	6.5 Mbps	20.38	30
		13 Mbps	20.04	30
		19.5 Mbps	19.99	30
		26 Mbps	20.32	30
		39 Mbps	20.53	30
		52 Mbps	20.53	30
		58.5 Mbps	20.47	30
		65 Mbps	20.54	30
5785	157	6.5 Mbps	18.71	30
		13 Mbps	18.41	30
		19.5 Mbps	18.41	30
		26 Mbps	18.82	30
		39 Mbps	18.90	30
		52 Mbps	18.99	30
		58.5 Mbps	19.00	30
		65 Mbps	19.06	30
5825	165	6.5 Mbps	18.37	30
		13 Mbps	17.96	30
		19.5 Mbps	18.04	30
		26 Mbps	18.56	30
		39 Mbps	18.60	30
		52 Mbps	18.64	30
		58.5 Mbps	18.65	30
		65 Mbps	18.57	30

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11n Mode: 5745~5825) _20 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5745	149	6.5 Mbps	20.62	30
		13 Mbps	20.19	30
		19.5 Mbps	20.18	30
		26 Mbps	20.73	30
		39 Mbps	19.85	30
		52 Mbps	20.80	30
		58.5 Mbps	20.69	30
		65 Mbps	19.67	30
5785	157	6.5 Mbps	18.76	30
		13 Mbps	18.57	30
		19.5 Mbps	18.44	30
		26 Mbps	18.91	30
		39 Mbps	18.96	30
		52 Mbps	19.44	30
		58.5 Mbps	19.06	30
		65 Mbps	18.90	30
5825	165	6.5 Mbps	18.86	30
		13 Mbps	18.31	30
		19.5 Mbps	18.39	30
		26 Mbps	18.86	30
		39 Mbps	18.76	30
		52 Mbps	18.82	30
		58.5 Mbps	18.85	30
		65 Mbps	19.27	30

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Conducted Output Power Measurements (802.11n Mode: 5745~5825) _20 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5745	149	6.5 Mbps	23.51	28.55
		13 Mbps	23.13	28.55
		19.5 Mbps	23.10	28.55
		26 Mbps	23.54	28.55
		39 Mbps	23.21	28.55
		52 Mbps	23.68	28.55
		58.5 Mbps	23.59	28.55
		65 Mbps	23.14	28.55
5785	157	6.5 Mbps	21.75	28.55
		13 Mbps	21.50	28.55
		19.5 Mbps	21.44	28.55
		26 Mbps	21.88	28.55
		39 Mbps	21.94	28.55
		52 Mbps	22.23	28.55
		58.5 Mbps	22.04	28.55
		65 Mbps	21.99	28.55
5825	165	6.5 Mbps	21.63	28.55
		13 Mbps	21.15	28.55
		19.5 Mbps	21.23	28.55
		26 Mbps	21.72	28.55
		39 Mbps	21.69	28.55
		52 Mbps	21.74	28.55
		58.5 Mbps	21.76	28.55
		65 Mbps	21.94	28.55

■ TEST RESULTS_Ant.0

Conducted Output Power Measurements (802.11n Mode: 5755~5795) _40 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5755	151	13.5 Mbps	20.73	30
		27 Mbps	20.37	30
		40.5 Mbps	20.49	30
		54 Mbps	21.02	30
		81 Mbps	20.79	30
		108 Mbps	20.93	30
		121.5 Mbps	20.94	30
		135 Mbps	20.99	30
5795	159	13.5 Mbps	20.58	30
		27 Mbps	20.19	30
		40.5 Mbps	20.18	30
		54 Mbps	20.65	30
		81 Mbps	20.70	30
		108 Mbps	20.70	30
		121.5 Mbps	20.77	30
		135 Mbps	20.74	30

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11n Mode: 5755~5795) _40 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5755	151	13.5 Mbps	20.60	30
		27 Mbps	20.21	30
		40.5 Mbps	20.25	30
		54 Mbps	20.77	30
		81 Mbps	20.62	30
		108 Mbps	20.78	30
		121.5 Mbps	20.74	30
		135 Mbps	20.73	30
5795	159	13.5 Mbps	20.62	30
		27 Mbps	20.52	30
		40.5 Mbps	20.41	30
		54 Mbps	20.88	30
		81 Mbps	20.74	30
		108 Mbps	21.05	30
		121.5 Mbps	20.95	30
		135 Mbps	20.78	30

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Conducted Output Power Measurements (802.11n Mode: 5755~5795) _40 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5755	151	13.5 Mbps	23.68	28.55
		27 Mbps	23.30	28.55
		40.5 Mbps	23.38	28.55
		54 Mbps	23.91	28.55
		81 Mbps	23.72	28.55
		108 Mbps	23.87	28.55
		121.5 Mbps	23.85	28.55
		135 Mbps	23.87	28.55
5795	159	13.5 Mbps	23.61	28.55
		27 Mbps	23.37	28.55
		40.5 Mbps	23.31	28.55
		54 Mbps	23.78	28.55
		81 Mbps	23.73	28.55
		108 Mbps	23.89	28.55
		121.5 Mbps	23.87	28.55
		135 Mbps	23.77	28.55

■ TEST RESULTS-Average

2.4 GHz Band

■ TEST RESULTS_Ant.0

Conducted Output Power Measurements (802.11b Mode)

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	1 Mbps	15.68	0.222	15.91	30
		2 Mbps	15.49	0.224	15.71	30
		5.5 Mbps	15.48	0.228	15.71	30
		11 Mbps	15.53	0.233	15.76	30
2437	6	1 Mbps	15.90	0.222	16.12	30
		2 Mbps	15.56	0.224	15.78	30
		5.5 Mbps	15.63	0.228	15.86	30
		11 Mbps	15.73	0.233	15.96	30
2462	11	1 Mbps	15.68	0.222	15.90	30
		2 Mbps	15.63	0.224	15.86	30
		5.5 Mbps	15.63	0.228	15.86	30
		11 Mbps	15.56	0.233	15.79	30

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11b Mode)

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	1 Mbps	15.07	0.222	15.30	30
		2 Mbps	14.58	0.224	14.80	30
		5.5 Mbps	14.42	0.228	14.65	30
		11 Mbps	14.46	0.233	14.69	30
2437	6	1 Mbps	14.44	0.222	14.66	30
		2 Mbps	14.43	0.224	14.66	30
		5.5 Mbps	14.53	0.228	14.76	30
		11 Mbps	14.44	0.233	14.68	30
2462	11	1 Mbps	14.33	0.222	14.55	30
		2 Mbps	14.35	0.224	14.57	30
		5.5 Mbps	14.36	0.228	14.59	30
		11 Mbps	14.37	0.233	14.60	30

■ TEST RESULTS_Ant.0

Conducted Output Power Measurements (802.11g Mode)

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	6 Mbps	6.64	0.246	6.88	30
		9 Mbps	6.76	0.230	6.99	30
		12 Mbps	6.89	0.232	7.12	30
		18 Mbps	6.71	0.241	6.95	30
		24 Mbps	6.67	0.232	6.90	30
		36 Mbps	6.62	0.301	6.93	30
		48 Mbps	6.62	0.363	6.98	30
		54 Mbps	6.50	0.419	6.91	30
2437	6	6 Mbps	14.18	0.246	14.43	30
		9 Mbps	14.15	0.230	14.38	30
		12 Mbps	14.16	0.232	14.40	30
		18 Mbps	14.17	0.241	14.41	30
		24 Mbps	14.17	0.232	14.40	30
		36 Mbps	14.12	0.301	14.42	30
		48 Mbps	14.05	0.363	14.41	30
		54 Mbps	14.06	0.419	14.48	30
2462	11	6 Mbps	11.40	0.246	11.65	30
		9 Mbps	11.48	0.230	11.71	30
		12 Mbps	11.46	0.232	11.69	30
		18 Mbps	11.44	0.241	11.68	30
		24 Mbps	11.40	0.232	11.64	30
		36 Mbps	11.55	0.301	11.85	30
		48 Mbps	11.31	0.363	11.67	30
		54 Mbps	11.26	0.419	11.68	30

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11g Mode)

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	6 Mbps	2.36	0.246	2.61	30
		9 Mbps	2.50	0.230	2.73	30
		12 Mbps	2.47	0.232	2.70	30
		18 Mbps	2.59	0.241	2.83	30
		24 Mbps	2.42	0.232	2.65	30
		36 Mbps	2.46	0.301	2.76	30
		48 Mbps	2.25	0.363	2.61	30
		54 Mbps	2.25	0.419	2.66	30
2437	6	6 Mbps	13.16	0.246	13.41	30
		9 Mbps	13.22	0.230	13.45	30
		12 Mbps	13.16	0.232	13.39	30
		18 Mbps	13.19	0.241	13.43	30
		24 Mbps	13.20	0.232	13.43	30
		36 Mbps	13.16	0.301	13.46	30
		48 Mbps	13.16	0.363	13.52	30
		54 Mbps	13.08	0.419	13.50	30
2462	11	6 Mbps	9.85	0.246	10.10	30
		9 Mbps	9.86	0.230	10.09	30
		12 Mbps	9.91	0.232	10.14	30
		18 Mbps	9.94	0.241	10.18	30
		24 Mbps	9.98	0.232	10.21	30
		36 Mbps	9.95	0.301	10.25	30
		48 Mbps	9.86	0.363	10.22	30
		54 Mbps	9.88	0.419	10.30	30

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Conducted Output Power Measurements (802.11g Mode)

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6 Mbps	8.26	30
		9 Mbps	8.37	30
		12 Mbps	8.46	30
		18 Mbps	8.37	30
		24 Mbps	8.29	30
		36 Mbps	8.34	30
		48 Mbps	8.33	30
		54 Mbps	8.30	30
2437	6	6 Mbps	16.96	30
		9 Mbps	16.95	30
		12 Mbps	16.93	30
		18 Mbps	16.96	30
		24 Mbps	16.95	30
		36 Mbps	16.98	30
		48 Mbps	17.00	30
		54 Mbps	17.03	30
2462	11	6 Mbps	13.95	30
		9 Mbps	13.99	30
		12 Mbps	13.99	30
		18 Mbps	14.00	30
		24 Mbps	13.99	30
		36 Mbps	14.13	30
		48 Mbps	14.02	30
		54 Mbps	14.05	30

■ TEST RESULTS_Ant.0

Conducted Output Power Measurements (802.11n Mode) _20 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	6.5 Mbps	6.84	0.233	7.07	30
		13 Mbps	6.92	0.223	7.14	30
		19.5 Mbps	6.87	0.221	7.09	30
		26 Mbps	6.92	0.224	7.14	30
		39 Mbps	6.87	0.322	7.20	30
		52 Mbps	6.71	0.385	7.09	30
		58.5 Mbps	6.75	0.421	7.17	30
		65 Mbps	6.78	0.460	7.24	30
2437	6	6.5 Mbps	14.71	0.233	14.95	30
		13 Mbps	14.82	0.223	15.04	30
		19.5 Mbps	14.81	0.221	15.04	30
		26 Mbps	14.85	0.224	15.08	30
		39 Mbps	14.80	0.322	15.13	30
		52 Mbps	14.69	0.385	15.07	30
		58.5 Mbps	14.71	0.421	15.13	30
		65 Mbps	14.68	0.460	15.14	30
2462	11	6.5 Mbps	11.37	0.233	11.61	30
		13 Mbps	11.47	0.223	11.70	30
		19.5 Mbps	11.47	0.221	11.69	30
		26 Mbps	11.46	0.224	11.68	30
		39 Mbps	11.42	0.322	11.74	30
		52 Mbps	11.39	0.385	11.78	30
		58.5 Mbps	11.25	0.421	11.67	30
		65 Mbps	11.21	0.460	11.67	30

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11n Mode) _20 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	6.5 Mbps	2.50	0.233	2.73	30
		13 Mbps	2.36	0.223	2.58	30
		19.5 Mbps	2.62	0.221	2.84	30
		26 Mbps	2.71	0.224	2.93	30
		39 Mbps	2.36	0.322	2.69	30
		52 Mbps	2.30	0.385	2.69	30
		58.5 Mbps	2.29	0.421	2.71	30
		65 Mbps	2.29	0.460	2.75	30
2437	6	6.5 Mbps	14.07	0.233	14.30	30
		13 Mbps	14.01	0.223	14.23	30
		19.5 Mbps	14.04	0.221	14.26	30
		26 Mbps	14.08	0.224	14.30	30
		39 Mbps	14.01	0.322	14.33	30
		52 Mbps	13.93	0.385	14.32	30
		58.5 Mbps	13.93	0.421	14.35	30
		65 Mbps	13.87	0.460	14.33	30
2462	11	6.5 Mbps	9.95	0.233	10.18	30
		13 Mbps	9.98	0.223	10.20	30
		19.5 Mbps	10.01	0.221	10.23	30
		26 Mbps	10.00	0.224	10.23	30
		39 Mbps	9.94	0.322	10.26	30
		52 Mbps	9.87	0.385	10.26	30
		58.5 Mbps	9.84	0.421	10.26	30
		65 Mbps	9.91	0.460	10.37	30

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Conducted Output Power Measurements (802.11n Mode) _20 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6.5 Mbps	8.43	30
		13 Mbps	8.44	30
		19.5 Mbps	8.48	30
		26 Mbps	8.54	30
		39 Mbps	8.52	30
		52 Mbps	8.44	30
		58.5 Mbps	8.50	30
		65 Mbps	8.56	30
2437	6	6.5 Mbps	17.65	30
		13 Mbps	17.66	30
		19.5 Mbps	17.68	30
		26 Mbps	17.72	30
		39 Mbps	17.76	30
		52 Mbps	17.72	30
		58.5 Mbps	17.77	30
		65 Mbps	17.76	30
2462	11	6.5 Mbps	13.96	30
		13 Mbps	14.02	30
		19.5 Mbps	14.03	30
		26 Mbps	14.03	30
		39 Mbps	14.07	30
		52 Mbps	14.10	30
		58.5 Mbps	14.03	30
		65 Mbps	14.08	30

■ TEST RESULTS_Ant.0

Conducted Output Power Measurements (802.11n Mode) _40 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2422	3	6.5 Mbps	9.70	0.453	10.15	30
		13 Mbps	9.81	0.432	10.24	30
		19.5 Mbps	10.06	0.442	10.50	30
		26 Mbps	9.82	0.397	10.22	30
		39 Mbps	9.66	0.533	10.19	30
		52 Mbps	9.41	0.661	10.07	30
		58.5 Mbps	9.35	0.752	10.10	30
		65 Mbps	9.17	0.823	9.99	30
2437	6	6.5 Mbps	15.25	0.453	15.71	30
		13 Mbps	15.63	0.432	16.06	30
		19.5 Mbps	15.38	0.442	15.82	30
		26 Mbps	15.35	0.397	15.74	30
		39 Mbps	15.25	0.533	15.78	30
		52 Mbps	15.31	0.661	15.97	30
		58.5 Mbps	15.11	0.752	15.86	30
		65 Mbps	15.01	0.823	15.83	30
2452	9	6.5 Mbps	11.04	0.453	11.49	30
		13 Mbps	11.03	0.432	11.46	30
		19.5 Mbps	10.50	0.442	10.94	30
		26 Mbps	10.60	0.397	10.99	30
		39 Mbps	10.35	0.533	10.88	30
		52 Mbps	10.35	0.661	11.01	30
		58.5 Mbps	10.30	0.752	11.05	30
		65 Mbps	10.26	0.823	11.08	30

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11n Mode) _40 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2422	3	6.5 Mbps	7.88	0.453	8.33	30
		13 Mbps	7.92	0.432	8.35	30
		19.5 Mbps	8.01	0.442	8.45	30
		26 Mbps	7.99	0.397	8.39	30
		39 Mbps	7.84	0.533	8.38	30
		52 Mbps	7.72	0.661	8.38	30
		58.5 Mbps	7.50	0.752	8.25	30
		65 Mbps	7.62	0.823	8.44	30
2437	6	6.5 Mbps	14.34	0.453	14.79	30
		13 Mbps	14.35	0.432	14.78	30
		19.5 Mbps	14.34	0.442	14.78	30
		26 Mbps	14.36	0.397	14.76	30
		39 Mbps	14.24	0.533	14.78	30
		52 Mbps	14.21	0.661	14.87	30
		58.5 Mbps	14.14	0.752	14.89	30
		65 Mbps	13.99	0.823	14.81	30
2452	9	6.5 Mbps	9.17	0.453	9.63	30
		13 Mbps	9.04	0.432	9.47	30
		19.5 Mbps	9.08	0.442	9.52	30
		26 Mbps	9.23	0.397	9.62	30
		39 Mbps	9.09	0.533	9.62	30
		52 Mbps	9.01	0.661	9.67	30
		58.5 Mbps	9.00	0.752	9.75	30
		65 Mbps	8.93	0.823	9.76	30

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Conducted Output Power Measurements (802.11n Mode) _40 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2422	3	6.5 Mbps	12.34	30
		13 Mbps	12.41	30
		19.5 Mbps	12.61	30
		26 Mbps	12.41	30
		39 Mbps	12.39	30
		52 Mbps	12.32	30
		58.5 Mbps	12.28	30
		65 Mbps	12.29	30
2437	6	6.5 Mbps	18.28	30
		13 Mbps	18.48	30
		19.5 Mbps	18.34	30
		26 Mbps	18.29	30
		39 Mbps	18.32	30
		52 Mbps	18.47	30
		58.5 Mbps	18.41	30
		65 Mbps	18.36	30
2452	9	6.5 Mbps	13.67	30
		13 Mbps	13.59	30
		19.5 Mbps	13.30	30
		26 Mbps	13.37	30
		39 Mbps	13.31	30
		52 Mbps	13.40	30
		58.5 Mbps	13.46	30
		65 Mbps	13.48	30

5.8 GHz Band

■ TEST RESULTS_Ant.0

Conducted Output Power Measurements (802.11a Mode: 5745~5825)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	6 Mbps	12.18	0.246	12.43	30
		9 Mbps	12.08	0.230	12.31	30
		12 Mbps	12.12	0.232	12.35	30
		18 Mbps	12.11	0.241	12.35	30
		24 Mbps	12.13	0.232	12.36	30
		36 Mbps	12.15	0.301	12.45	30
		48 Mbps	12.03	0.363	12.40	30
		54 Mbps	12.09	0.419	12.51	30
5785	157	6 Mbps	11.07	0.246	11.32	30
		9 Mbps	11.16	0.230	11.39	30
		12 Mbps	11.26	0.232	11.50	30
		18 Mbps	11.28	0.241	11.52	30
		24 Mbps	11.30	0.232	11.54	30
		36 Mbps	11.16	0.301	11.46	30
		48 Mbps	11.05	0.363	11.41	30
		54 Mbps	11.20	0.419	11.62	30
5825	165	6 Mbps	10.80	0.246	11.04	30
		9 Mbps	11.00	0.230	11.23	30
		12 Mbps	10.76	0.232	10.99	30
		18 Mbps	10.69	0.241	10.93	30
		24 Mbps	10.72	0.232	10.95	30
		36 Mbps	10.71	0.301	11.01	30
		48 Mbps	10.63	0.363	11.00	30
		54 Mbps	10.59	0.419	11.01	30

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11a Mode: 5745~5825)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	6 Mbps	12.17	0.246	12.41	30
		9 Mbps	12.16	0.230	12.39	30
		12 Mbps	12.21	0.232	12.44	30
		18 Mbps	12.24	0.241	12.48	30
		24 Mbps	12.38	0.232	12.61	30
		36 Mbps	12.33	0.301	12.63	30
		48 Mbps	12.24	0.363	12.60	30
		54 Mbps	12.18	0.419	12.60	30
5785	157	6 Mbps	11.44	0.246	11.68	30
		9 Mbps	11.70	0.230	11.93	30
		12 Mbps	11.71	0.232	11.94	30
		18 Mbps	11.32	0.241	11.56	30
		24 Mbps	11.39	0.232	11.62	30
		36 Mbps	11.21	0.301	11.51	30
		48 Mbps	11.16	0.363	11.52	30
		54 Mbps	11.53	0.419	11.95	30
5825	165	6 Mbps	10.64	0.246	10.89	30
		9 Mbps	10.70	0.230	10.93	30
		12 Mbps	10.65	0.232	10.88	30
		18 Mbps	10.88	0.241	11.12	30
		24 Mbps	10.98	0.232	11.22	30
		36 Mbps	10.67	0.301	10.97	30
		48 Mbps	10.54	0.363	10.91	30
		54 Mbps	10.52	0.419	10.94	30

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Conducted Output Power Measurements (802.11a Mode: 5745~5825)

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5745	149	6 Mbps	15.43	28.55
		9 Mbps	15.36	28.55
		12 Mbps	15.41	28.55
		18 Mbps	15.43	28.55
		24 Mbps	15.50	28.55
		36 Mbps	15.55	28.55
		48 Mbps	15.51	28.55
		54 Mbps	15.57	28.55
5785	157	6 Mbps	14.51	28.55
		9 Mbps	14.68	28.55
		12 Mbps	14.74	28.55
		18 Mbps	14.55	28.55
		24 Mbps	14.59	28.55
		36 Mbps	14.50	28.55
		48 Mbps	14.48	28.55
		54 Mbps	14.80	28.55
5825	165	6 Mbps	13.98	28.55
		9 Mbps	14.09	28.55
		12 Mbps	13.95	28.55
		18 Mbps	14.04	28.55
		24 Mbps	14.10	28.55
		36 Mbps	14.00	28.55
		48 Mbps	13.97	28.55
		54 Mbps	13.99	28.55

■ TEST RESULTS_Ant.0

Conducted Output Power Measurements (802.11n Mode: 5745~5825) _20 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	6.5 Mbps	12.98	0.233	13.21	30
		13 Mbps	12.95	0.223	13.17	30
		19.5 Mbps	13.05	0.221	13.27	30
		26 Mbps	12.97	0.224	13.19	30
		39 Mbps	12.98	0.322	13.31	30
		52 Mbps	12.83	0.385	13.22	30
		58.5 Mbps	12.78	0.421	13.20	30
		65 Mbps	12.79	0.460	13.25	30
5785	157	6.5 Mbps	11.36	0.233	11.60	30
		13 Mbps	11.34	0.223	11.56	30
		19.5 Mbps	11.33	0.221	11.55	30
		26 Mbps	11.37	0.224	11.60	30
		39 Mbps	11.29	0.322	11.61	30
		52 Mbps	11.21	0.385	11.60	30
		58.5 Mbps	11.20	0.421	11.62	30
		65 Mbps	11.19	0.460	11.65	30
5825	165	6.5 Mbps	10.91	0.233	11.14	30
		13 Mbps	10.86	0.223	11.08	30
		19.5 Mbps	10.86	0.221	11.08	30
		26 Mbps	11.01	0.224	11.23	30
		39 Mbps	10.78	0.322	11.10	30
		52 Mbps	10.80	0.385	11.18	30
		58.5 Mbps	10.81	0.421	11.24	30
		65 Mbps	10.71	0.460	11.17	30

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11n Mode: 5745~5825) _20 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	6.5 Mbps	13.01	0.233	13.24	30
		13 Mbps	12.91	0.223	13.13	30
		19.5 Mbps	12.95	0.221	13.17	30
		26 Mbps	12.94	0.224	13.17	30
		39 Mbps	12.87	0.322	13.19	30
		52 Mbps	12.94	0.385	13.33	30
		58.5 Mbps	12.74	0.421	13.16	30
		65 Mbps	12.71	0.460	13.17	30
5785	157	6.5 Mbps	11.23	0.233	11.46	30
		13 Mbps	11.33	0.223	11.56	30
		19.5 Mbps	11.18	0.221	11.40	30
		26 Mbps	11.28	0.224	11.50	30
		39 Mbps	11.21	0.322	11.53	30
		52 Mbps	11.42	0.385	11.81	30
		58.5 Mbps	11.19	0.421	11.61	30
		65 Mbps	11.17	0.460	11.63	30
5825	165	6.5 Mbps	11.38	0.233	11.62	30
		13 Mbps	11.01	0.223	11.24	30
		19.5 Mbps	11.09	0.221	11.31	30
		26 Mbps	11.11	0.224	11.33	30
		39 Mbps	11.07	0.322	11.40	30
		52 Mbps	10.96	0.385	11.34	30
		58.5 Mbps	10.95	0.421	11.37	30
		65 Mbps	11.34	0.460	11.80	30

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

Conducted Output Power Measurements (802.11n Mode: 5745~5825) _20 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5745	149	6.5 Mbps	16.24	28.55
		13 Mbps	16.16	28.55
		19.5 Mbps	16.23	28.55
		26 Mbps	16.19	28.55
		39 Mbps	16.26	28.55
		52 Mbps	16.29	28.55
		58.5 Mbps	16.19	28.55
		65 Mbps	16.22	28.55
5785	157	6.5 Mbps	14.54	28.55
		13 Mbps	14.57	28.55
		19.5 Mbps	14.49	28.55
		26 Mbps	14.56	28.55
		39 Mbps	14.58	28.55
		52 Mbps	14.72	28.55
		58.5 Mbps	14.63	28.55
		65 Mbps	14.65	28.55
5825	165	6.5 Mbps	14.40	28.55
		13 Mbps	14.17	28.55
		19.5 Mbps	14.21	28.55
		26 Mbps	14.29	28.55
		39 Mbps	14.26	28.55
		52 Mbps	14.27	28.55
		58.5 Mbps	14.32	28.55
		65 Mbps	14.51	28.55

■ TEST RESULTS_Ant.0

Conducted Output Power Measurements (802.11n Mode: 5755~5795) _40 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5755	151	13.5 Mbps	12.65	0.453	13.10	30
		27 Mbps	12.75	0.432	13.18	30
		40.5 Mbps	12.71	0.442	13.15	30
		54 Mbps	12.73	0.397	13.13	30
		81 Mbps	12.59	0.533	13.12	30
		108 Mbps	12.46	0.661	13.12	30
		121.5 Mbps	12.41	0.752	13.16	30
		135 Mbps	12.39	0.823	13.22	30
5795	159	13.5 Mbps	12.50	0.453	12.96	30
		27 Mbps	12.51	0.432	12.94	30
		40.5 Mbps	12.41	0.442	12.85	30
		54 Mbps	12.59	0.397	12.99	30
		81 Mbps	12.30	0.533	12.83	30
		108 Mbps	12.19	0.661	12.85	30
		121.5 Mbps	12.20	0.752	12.95	30
		135 Mbps	12.06	0.823	12.88	30

■ TEST RESULTS_Ant.1

Conducted Output Power Measurements (802.11n Mode: 5755~5795) _40 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5755	151	13.5 Mbps	12.61	0.453	13.06	30
		27 Mbps	12.61	0.432	13.04	30
		40.5 Mbps	12.59	0.442	13.03	30
		54 Mbps	12.61	0.397	13.01	30
		81 Mbps	12.48	0.533	13.01	30
		108 Mbps	12.31	0.661	12.97	30
		121.5 Mbps	12.25	0.752	13.00	30
		135 Mbps	12.19	0.823	13.02	30
5795	159	13.5 Mbps	12.59	0.453	13.04	30
		27 Mbps	12.82	0.432	13.26	30
		40.5 Mbps	12.67	0.442	13.11	30
		54 Mbps	12.63	0.397	13.02	30
		81 Mbps	12.38	0.533	12.91	30
		108 Mbps	12.50	0.661	13.16	30
		121.5 Mbps	12.42	0.752	13.17	30
		135 Mbps	12.12	0.823	12.94	30

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

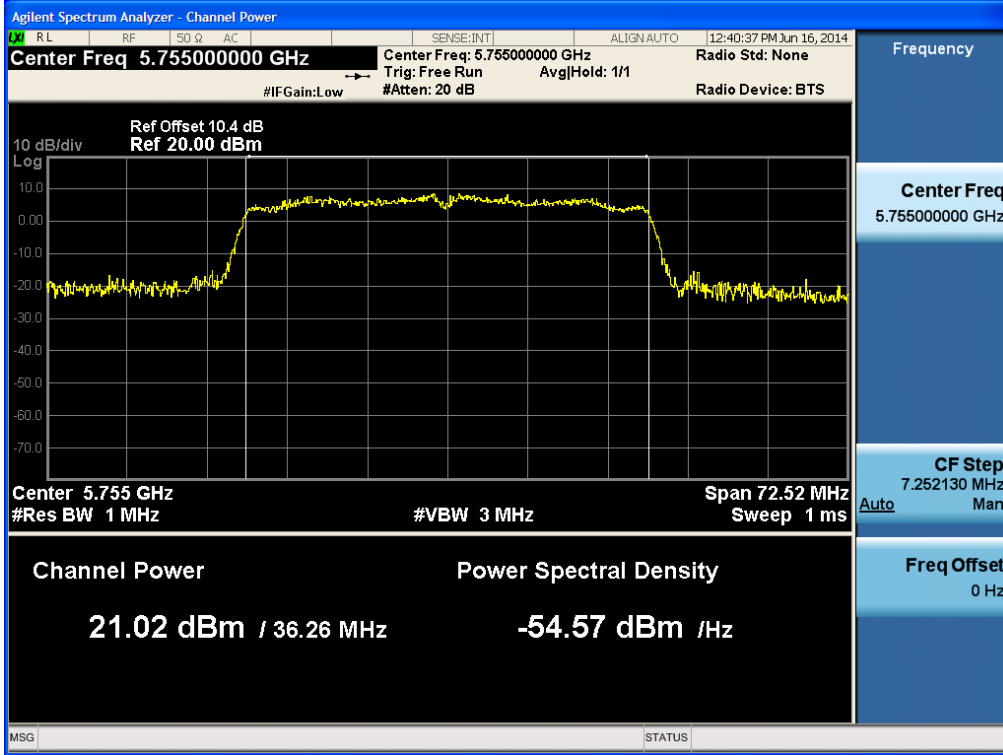
Conducted Output Power Measurements (802.11n Mode: 5755~5795) _40 MHz BW

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5755	151	13.5 Mbps	16.09	28.55
		27 Mbps	16.12	28.55
		40.5 Mbps	16.10	28.55
		54 Mbps	16.08	28.55
		81 Mbps	16.08	28.55
		108 Mbps	16.06	28.55
		121.5 Mbps	16.09	28.55
		135 Mbps	16.13	28.55
5795	159	13.5 Mbps	16.01	28.55
		27 Mbps	16.11	28.55
		40.5 Mbps	15.99	28.55
		54 Mbps	16.02	28.55
		81 Mbps	15.88	28.55
		108 Mbps	16.02	28.55
		121.5 Mbps	16.07	28.55
		135 Mbps	15.92	28.55

Note : In order to simplify the report, attached plots were only the highest conducted power channel and data rate.

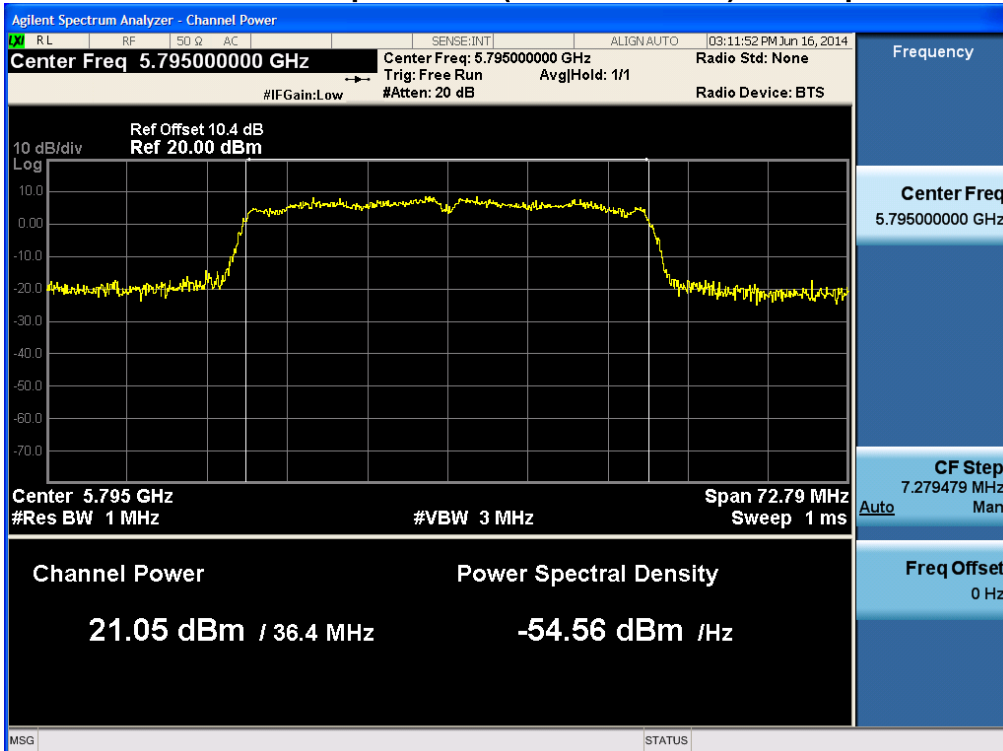
■ RESULT PLOTS-Peak Ant.0
40 MHz BW
(5755 MHz ~5795 MHz)

Conducted Output Power (802.11n-CH 151) 54 Mbps



■ RESULT PLOTS-Peak Ant.1
40 MHz BW
(5755 MHz ~5795 MHz)

Conducted Output Power (802.11n-CH 159) 108 Mbps



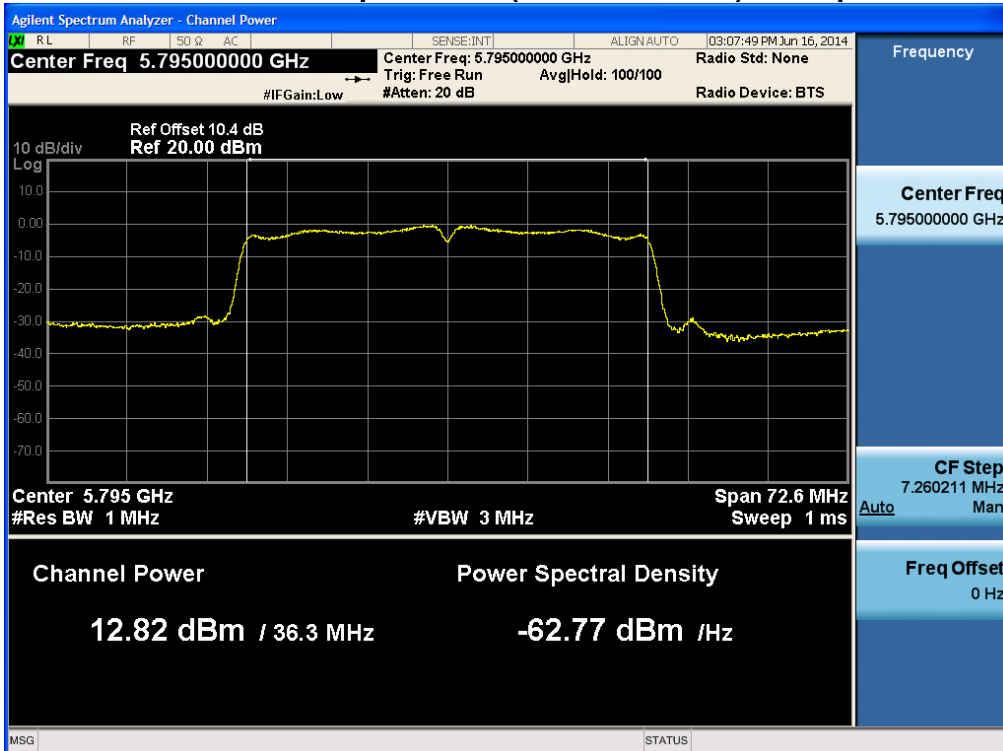
■ RESULT PLOTS-Average Ant.0
40 MHz BW
(5755 MHz ~5795 MHz)

Conducted Output Power (802.11n-CH 151) 135 Mbps



■ RESULT PLOTS-Average Ant.1
40 MHz BW
(5755 MHz ~5795 MHz)

Conducted Output Power (802.11n-CH 159) 27 Mbps



8.5 POWER SPECTRAL DENSITY (802.11a/b/g/n)

Test Requirements and limit, §15.247(e)

The peak power spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

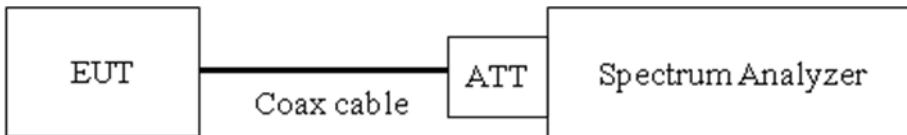
Minimum Standard – the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

■ Limit

Operating Mode	Band	Mode	Ant. Port	Ant. Gain (dBi)	Limit (dBm)
SISO	2.4 GHz	802.11b/g/n	0	1.16	8
			1	3.70	8
MIMO(2 TX)		802.11g/n	0 & 1	5.53	8
SISO	5.8 GHz	802.11a/n	0	5.58	8
			1	3.13	8
MIMO(2 TX)		802.11a/n	0 & 1	7.45	6.55

Note : Above the limits is calculated according to antenna gain. Because antenna gain is higher than 6 dBi.

■ TEST CONFIGURATION



■ TEST PROCEDURE

We tested according to Procedure 10.2 in KDB 558074, issued 06/05/2014

The spectrum analyzer is set to :

Set analyzer center frequency to DTS channel center frequency.

Span = 1.5 times the DTS channel bandwidth.

RBW = 3 kHz ≤ RBW ≤ 100 kHz.

VBW ≥ 3 x RBW.

Sweep = auto couple

Detector = peak

Trace Mode = max hold

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

■ **Sample Calculation**

PSD = Reading Value + ATT loss + Cable loss(1 ea)

Output Power = -5 dBm + 10 dB + 0.8 dB = 5.8 dBm

Note :

1. Spectrum reading values are not plot data. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 2.4 GHz and 5.8 GHz range that was rounded off to the closest tenth dB.

Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
2.4 GHz	10.2
5.8 GHz	10.4

(Actual value of loss for the attenuator and cable combination)

■ TEST RESULTS_Ant.0

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			PSD (dBm)	Limit (dBm)	Pass/Fail
2412	1	802.11b	-6.901	8	Pass
2437	6		-5.994		Pass
2462	11		-6.978		Pass
2412	1	802.11g	-17.346		Pass
2437	6		-9.773		Pass
2462	11		-12.552		Pass
2412	1	802.11n (20 MHz BW)	-16.831		Pass
2437	6		-9.797		Pass
2462	11		-12.137		Pass
2422	3	802.11n (40 MHz BW)	-17.363		Pass
2437	6		-11.517		Pass
2452	9		-16.579		Pass
5745	149	802.11a	-11.050		Pass
5785	157		-11.545		Pass
5825	165		-13.794		Pass
5745	149	802.11n_20 MHz BW 5.8 GHz Band	-10.748	Pass	
5785	157		-12.082	Pass	
5825	165		-12.451	Pass	
5755	151	802.11n_40 MHz BW 5.8 GHz Band	-14.838	Pass	
5795	159		-13.541	Pass	

■ TEST RESULTS_Ant.1

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			PSD (dBm)	Limit (dBm)	Pass/Fail
2412	1	802.11b	-7.124	8	Pass
2437	6		-7.830		Pass
2462	11		-7.693		Pass
2412	1	802.11g	-21.772		Pass
2437	6		-9.577		Pass
2462	11		-13.921		Pass
2412	1	802.11n (20 MHz BW)	-22.341		Pass
2437	6		-9.998		Pass
2462	11		-14.420		Pass
2422	3	802.11n (40 MHz BW)	-19.684		Pass
2437	6		-12.960		Pass
2452	9		-18.289		Pass
5745	149	802.11a	-11.704		Pass
5785	157		-12.688		Pass
5825	165		-12.809		Pass
5745	149	802.11n_20 MHz BW 5.8 GHz Band	-10.987	Pass	
5785	157		-13.087	Pass	
5825	165		-13.183	Pass	
5755	151	802.11n_40 MHz BW 5.8 GHz Band	-14.968	Pass	
5795	159		-14.566	Pass	

Note :

1. In order to simplify the report, attached plots were only the highest PSD channel.

■ TEST RESULTS_Sum Data of Ant.0 and Ant.1

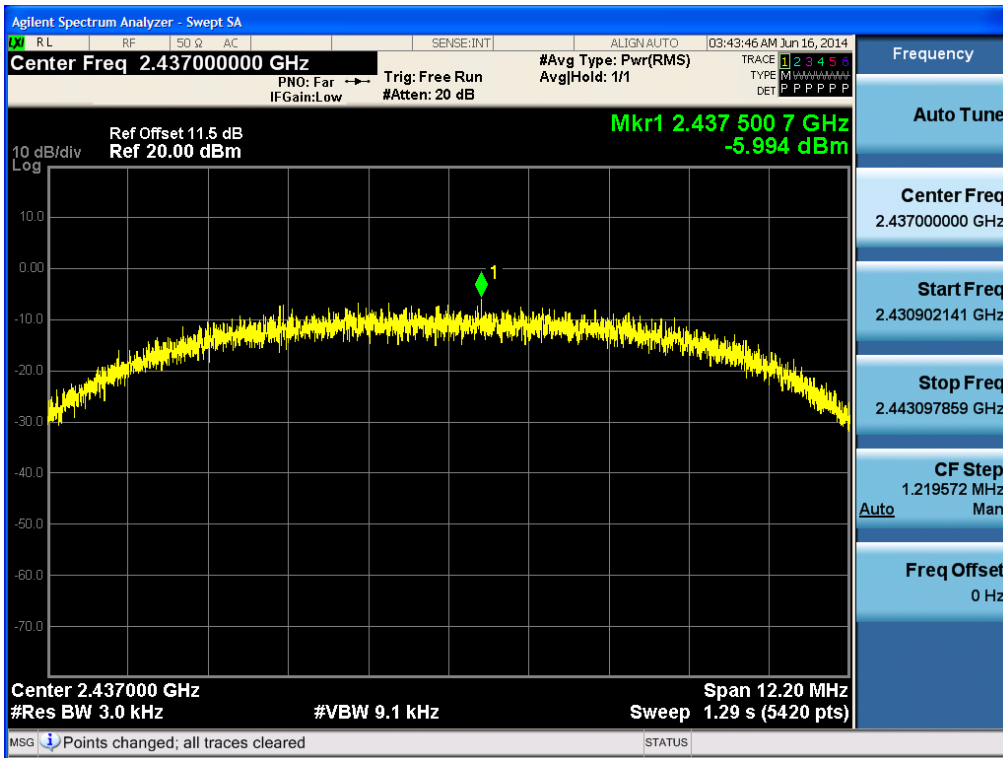
Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			PSD (dBm)	Limit (dBm)	Pass/Fail
2412	1	802.11g	-16.01	6.55	Pass
2437	6		-6.66		Pass
2462	11		-10.17		Pass
2412	1	802.11n (20 MHz BW)	-15.75		Pass
2437	6		-6.89		Pass
2462	11		-10.12		Pass
2422	3	802.11n (40 MHz BW)	-15.36		Pass
2437	6		-9.17		Pass
2452	9		-14.34		Pass
5745	149	802.11a	-8.35		Pass
5785	157		-9.07		Pass
5825	165		-10.26		Pass
5745	149	802.11n_20 MHz BW 5.8 GHz Band	-7.86		Pass
5785	157		-9.55		Pass
5825	165		-9.79		Pass
5755	151	802.11n_40 MHz BW 5.8 GHz Band	-11.89	Pass	
5795	159		-11.01	Pass	

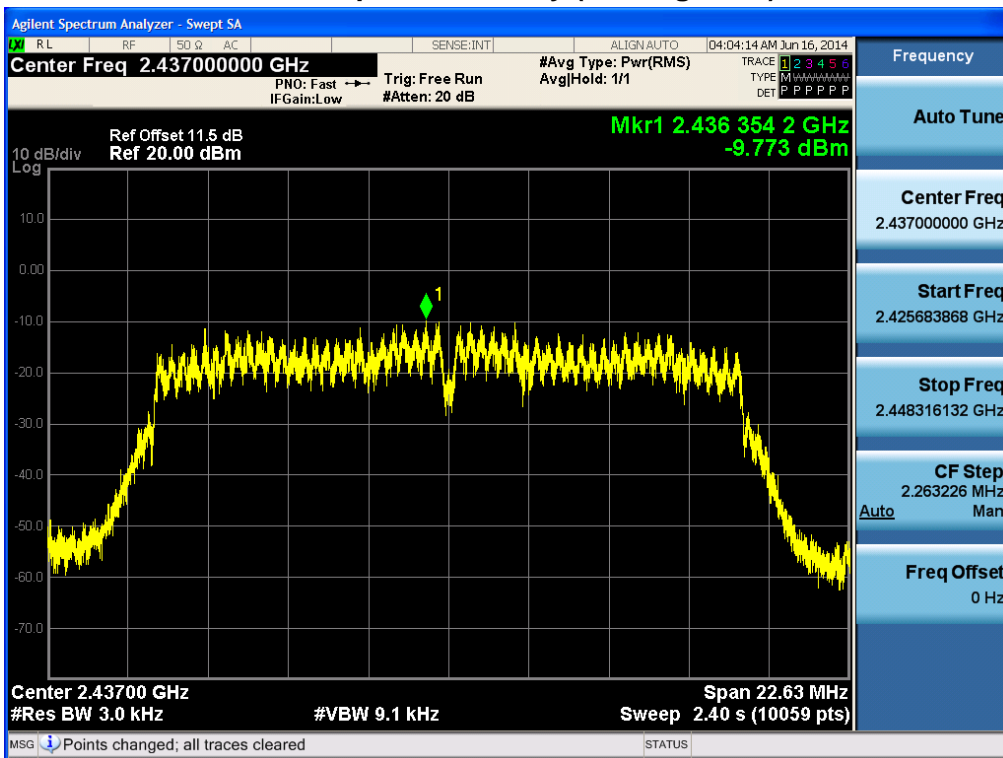
RESULT PLOTS Ant.0

2.4 GHz Band

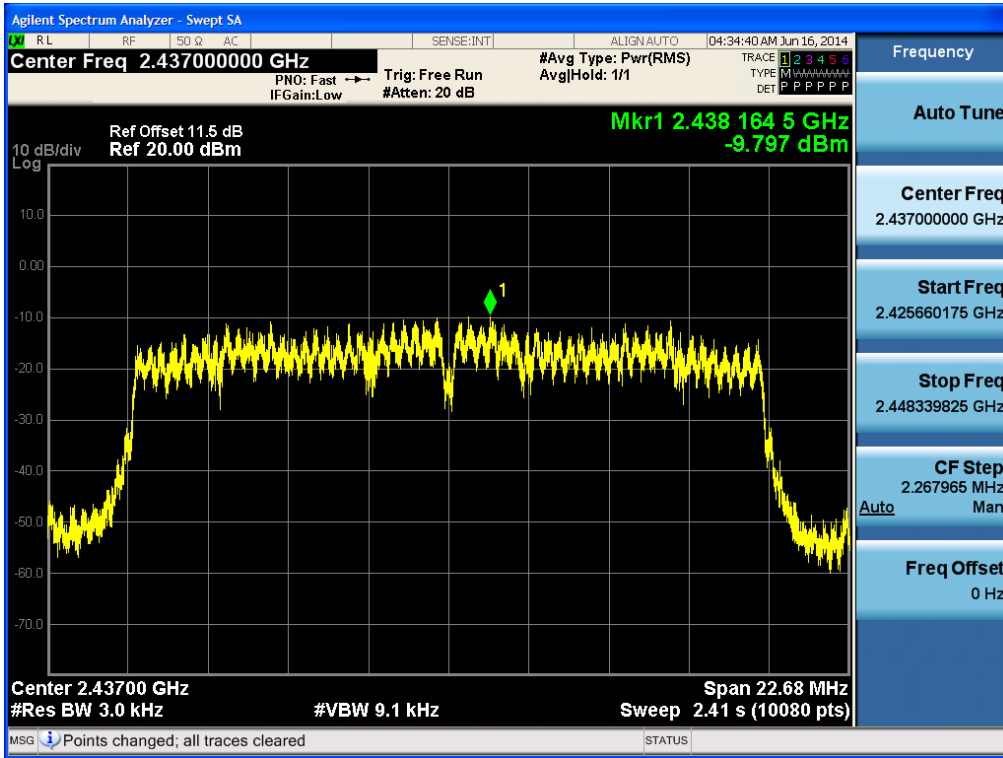
Power Spectral Density (802.11b-CH 6)



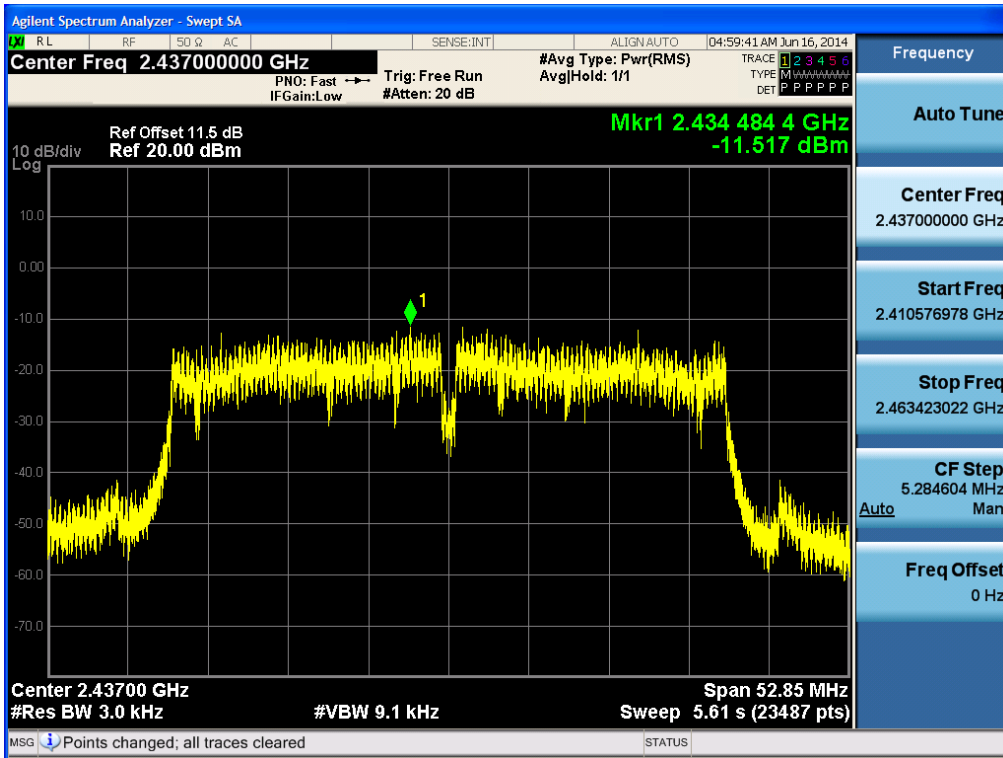
Power Spectral Density (802.11g-CH 6)



Power Spectral Density (802.11n-CH 6) _ 20 MHz BW

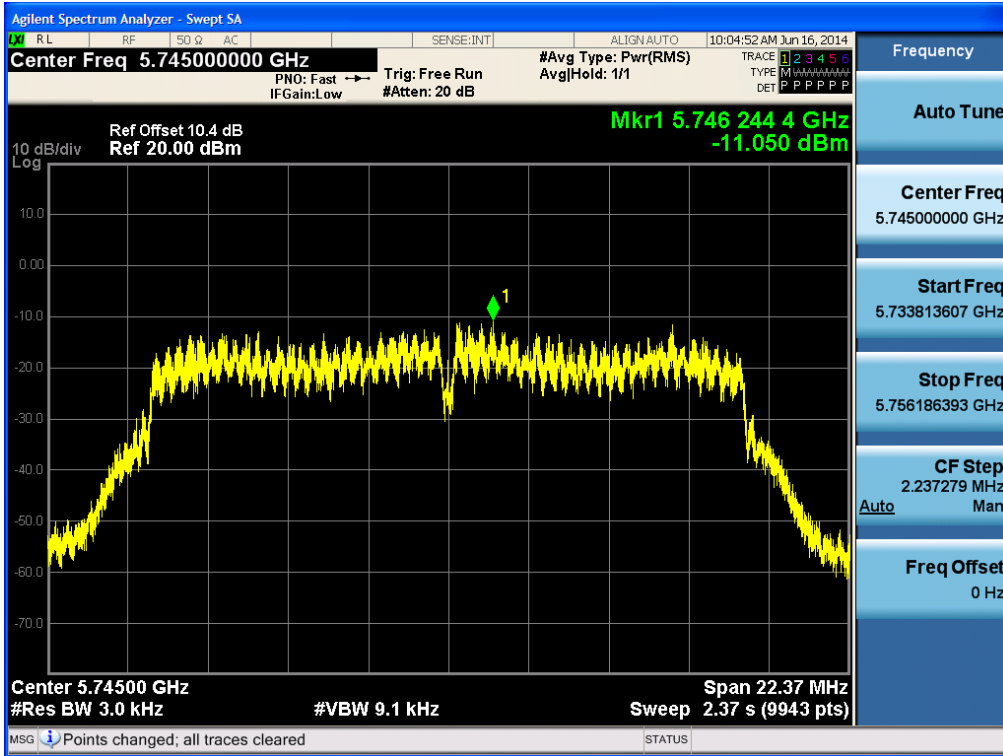


Power Spectral Density (802.11n-CH 6) _ 40 MHz BW

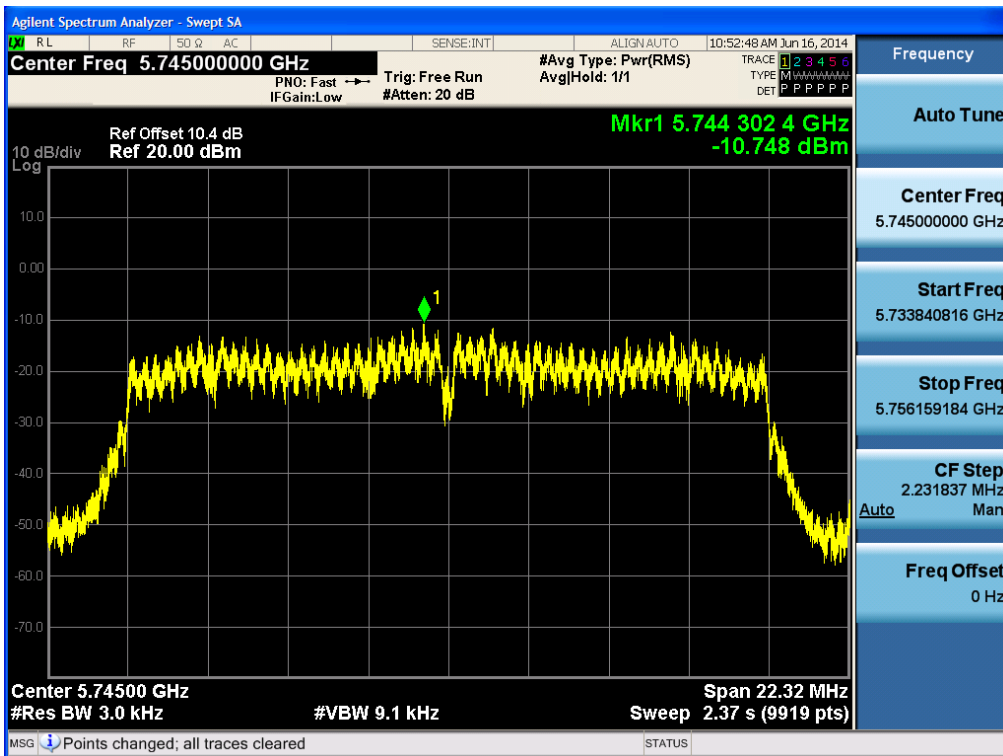


5.8 GHz Band

Power Spectral Density (802.11a-CH 149)



Power Spectral Density (802.11n -CH 149) _20 MHz BW



Power Spectral Density (802.11n -CH 159) _40 MHz BW

