

HCT CO., LTD.

CERTIFICATE OF COMPLIANCE FCC Certification

Applicant Name: LG Electronics MobileComm U.S.A., Inc.	Date of Issue: July 01, 2013
Address: 1000 Sylvan Avenue, Englewood Cliffs NJ 07632	Test Site/Location: HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, Korea
	Report No.: HCTR1306FR04-3
	HCT FRN: 00058664212

FCC ID : ZNFE989

APPLICANT : LG Electronics MobileComm U.S.A., Inc.

FCC Model(s):	LG-E989
EUT Type:	GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 a/b/g/n(2.4/5GHz)/NFC
Max. RF Output Power:	Wi-Fi 802.11b (22.46 dBm) / Wi-Fi 802.11g (20.63 dBm)/ Wi-Fi 802.11n (2.4 GHz) (19.36 dBm) / Wi-Fi 802.11a (5.8 GHz) (22.25 dBm)/ Wi-Fi 802.11n_20 MHz BW (5.8 GHz) (17.41 dBm) / Wi-Fi 802.11n_40 MHz BW (5.8 GHz) (16.82 dBm)
Frequency Range:	2412 MHz - 2462 MHz (2.4 GHz Band) 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

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
: Jae Chul Shin
Test engineer of RF Team


Approved by
: Chang Seok Choi
Manager of RF Team

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FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1306FR04-3	Date of Issue: July 01, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 a/b/g/n(2.4/5GHz)/NFC	FCC ID: ZNFE989

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1306FR04	June 05, 2013	- First Approval Report
HCTR1306FR04-1	June 17, 2013	- Added Section 8.1 Duty Cycle
HCTR1306FR04-2	June 26, 2013	- Updated the Duty Cycle in Section 8.1 - Add RSE Test with Wireless Charger
HCTR1306FR04-3	July 01, 2013	- Revised to 'T > 6.25' from 'T < 6.25'

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1. GENERAL INFORMATION

Applicant: LG Electronics MobileComm U.S.A., Inc.

Address: 1000 Sylvan Avenue, Englewood Cliffs NJ 07632

FCC ID: ZNFE989

EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 a/b/g/n(2.4/5GHz)/NFC

Model name(s): LG-E989

Date(s) of Tests: May 20, 2013 ~ June 04, 2013

Place of Tests: HCT Co., Ltd.
105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, KOREA.
(IC Recognition No. : 5944A-3)

2. EUT DESCRIPTION

EUT Type	GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 a/b/g/n(2.4/5GHz)/NFC	
FCC Model Name	LG-E989	
Power Supply	DC 3.8 V	
Battery type	Li-ion Battery(Standard)	
Frequency Range	TX: 2412 MHz~2462 MHz, 5745 MHz~5825 MHz_20 MHz, 5755 MHz~5795 MHz_40 MHz RX: 2412 MHz~2462 MHz, 5745 MHz~5825 MHz_20 MHz, 5755 MHz~5795 MHz_40 MHz	
Max. RF Output Power	Peak	Wi-Fi 802.11b (22.46 dBm) / Wi-Fi 802.11g (20.63 dBm)/ Wi-Fi 802.11n (2.4 GHz) (19.36 dBm) / Wi-Fi 802.11a (5.8 GHz) (22.25 dBm)/ Wi-Fi 802.11n_20 MHz BW (5.8 GHz) (17.41 dBm) / Wi-Fi 802.11n_40 MHz BW (5.8 GHz) (16.82 dBm)
	Average	Wi-Fi 802.11b (16.23 dBm) / Wi-Fi 802.11g (11.89 dBm)/ Wi-Fi 802.11n (2.4 GHz) (10.83 dBm) / Wi-Fi 802.11a (5.8 GHz) (13.11 dBm)/ Wi-Fi 802.11n_20 MHz BW (5.8 GHz) (9.30 dBm) / Wi-Fi 802.11n_40 MHz BW (5.8 GHz) (10.61 dBm)
Modulation Type	DSSS/CCK(802.11b), OFDM(802.11a, 802.11g, 802.11n_20 MHz BW, 802.11n_40 MHz BW)	
Antenna Specification	Manufacturer: Komatech Co., Ltd. Antenna type: Internal Antenna Peak Gain : -3.37 dBi (2.4 GHz Band), -1.60 dBi (5.8 GHz Band)	

3. TEST METHODOLOGY

FCC KDB 558074 D01 DTS Meas Guidance v03r01 dated April 09, 2013 entitled "Guidance for Performing Compliance Measurements on Digital Transmission Systems(DTS) and the measurement procedure described in the American National Standard for Testing Unlicensed Wireless Devices(ANSI C63.4-2003) Operating Under §15.247" 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.

FCC CERTIFICATION REPORT			
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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 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, 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 June 21, 2011 (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

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7. SUMMARY TEST OF RESULTS

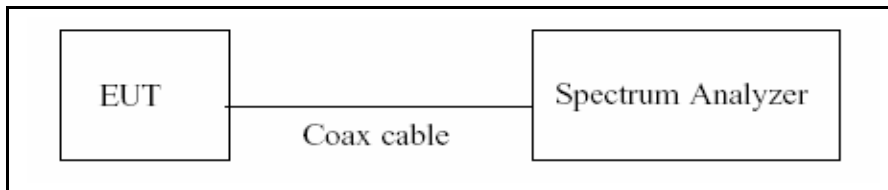
Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	§15.247(a)(2)	> 500 kHz	CONDUCTED	PASS
Conducted Maximum Peak Output Power	§15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	§15.247(e)	< 8 dBm / 3 kHz Band		PASS
Band Edge(Out of Band Emissions)	§15.247(d)	Conducted < 20 dBc		PASS
AC Power line Conducted Emissions	§15.207	cf. Section 8.6		PASS
Radiated Spurious Emissions	§15.205, 15.209	cf. Section 8.5.1	RADIATED	PASS
Radiated Restricted Band Edge	§15.247(d), 15.205, 15.209	cf. Section 8.5.2		PASS

8. TEST RESULT

8.1 DUTY CYCLE

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, 6.0b) in KDB 558074(issued 04/09/2013)

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 = $10 \cdot \log(1/\text{Duty Cycle})$

▣ Duty Cycle Factor

Mode	Data Rate	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11b	1 Mbps	12.420	12.530	0.99122107	0.038
	2 Mbps	6.210	6.315	0.98337292	0.073
	5.5 Mbps	2.315	2.420	0.95661157	0.193
	11 Mbps	1.204	1.308	0.92048930	0.360
802.11g , 5G 802.11a	6 Mbs	2.064	2.166	0.95290859	0.209
	9 Mbs	1.383	1.485	0.93131313	0.309
	12 Mbs	1.044	1.144	0.91258741	0.397
	18 Mbs	0.704	0.804	0.87591786	0.575
	24 Mbs	0.532	0.632	0.84233022	0.745
	36 Mbs	0.364	0.464	0.78448276	1.054
	48 Mbs	0.276	0.375	0.73560768	1.334
	54 Mbs	0.249	0.348	0.71494253	1.457
802.11n , 5G 802.11n_20 MHz BW	6.5 Mbs	1.920	2.019	0.95096582	0.218
	13 Mbs	0.981	1.080	0.90833333	0.418
	19.5 Mbs	0.666	0.764	0.87152960	0.597
	26 Mbs	0.508	0.607	0.83580369	0.779
	39 Mbs	0.352	0.452	0.77876106	1.086
	52 Mbs	0.273	0.372	0.73333333	1.347
	58.5 Mbs	0.249	0.348	0.71551724	1.454
	65 Mbs	0.229	0.329	0.69604863	1.574
802.11n_40 MHz BW 5.8 GHz Band	13.5 Mbps	0.944	1.042	0.90595010	0.429
	27 Mbps	0.493	0.590	0.83559322	0.780
	40.5 Mbps	0.341	0.438	0.77737226	1.094
	54 Mbps	0.264	0.362	0.72928177	1.371
	81 Mbps	0.189	0.287	0.65794066	1.818
	108 Mbps	0.153	0.250	0.61000000	2.147
	121.5 Mbps	0.140	0.238	0.58942065	2.296
	135 Mbps	0.128	0.226	0.56763926	2.459

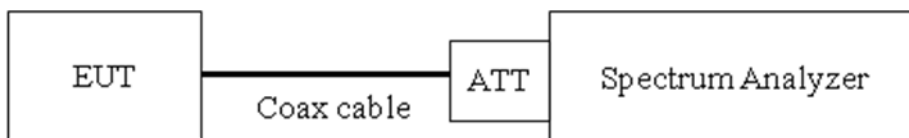
8.2 6dB BANDWIDTH (802.11a/b/g/n)

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 04/09/2013)

RBW = 100 kHz

VBW $\geq 3 \times$ 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.

▣ TEST RESULTS

Conducted 6dB Bandwidth Measurements for 802.11b

802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	8.859	0.500	Pass
2437	6	8.590	0.500	Pass
2462	11	8.866	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	15.110	0.500	Pass
2437	6	15.140	0.500	Pass
2462	11	15.150	0.500	Pass

Conducted 6dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	15.120	0.500	Pass
2437	6	15.140	0.500	Pass
2462	11	15.150	0.500	Pass

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	15.120	0.500	Pass
5785	157	15.140	0.500	Pass
5825	165	15.150	0.500	Pass

Conducted 6 dB Bandwidth Measurements for 802.11n_20 MHz BW (5.8 GHz Band)

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.140	0.500	Pass
5785	157	15.170	0.500	Pass
5825	165	15.160	0.500	Pass

Conducted 6 dB Bandwidth Measurements for 802.11n_40 MHz BW(5.8 GHz Band)

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.914	0.500	Pass
5795	159	35.615	0.500	Pass

RESULT PLOTS

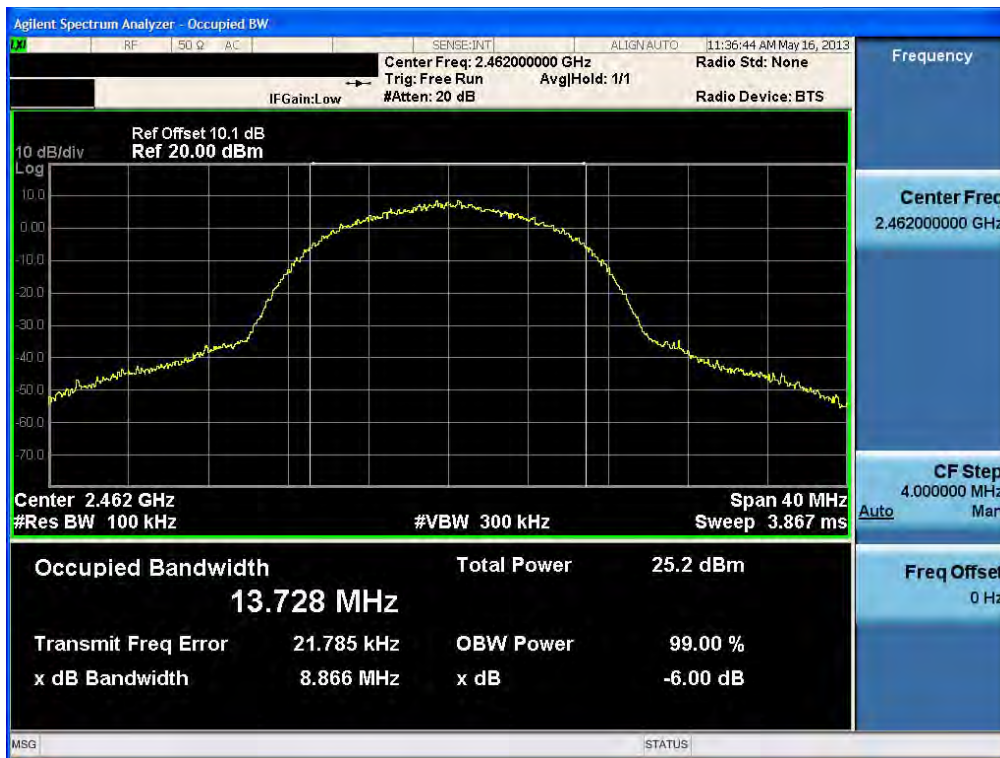
6dB Bandwidth plot (802.11b-CH 1)



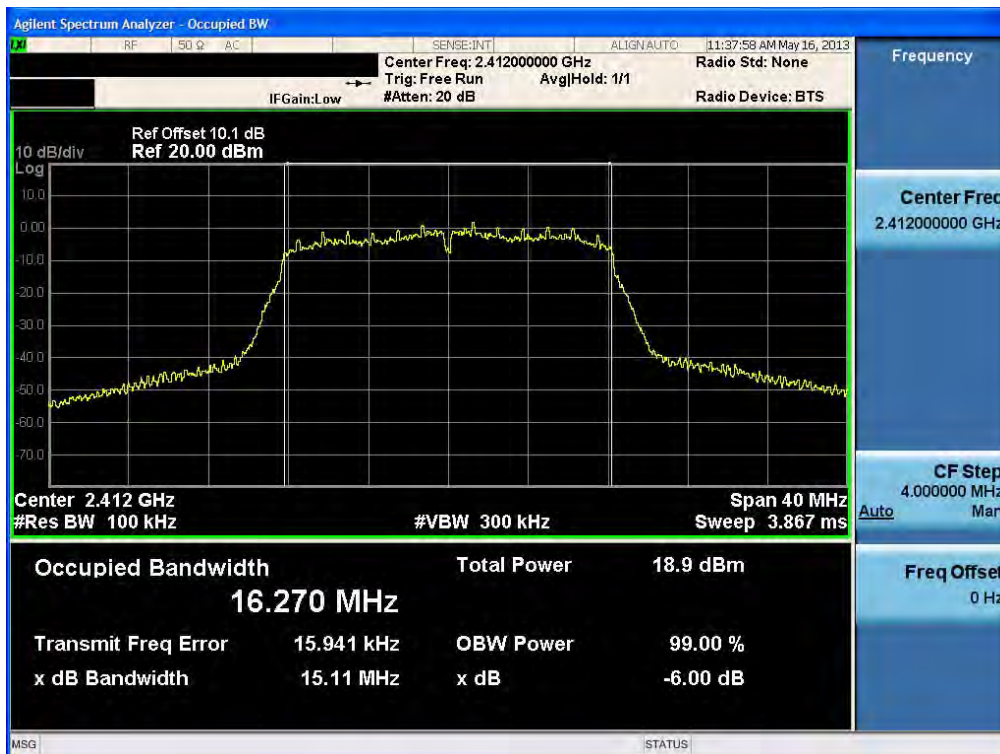
6dB Bandwidth plot (802.11b-CH 6)



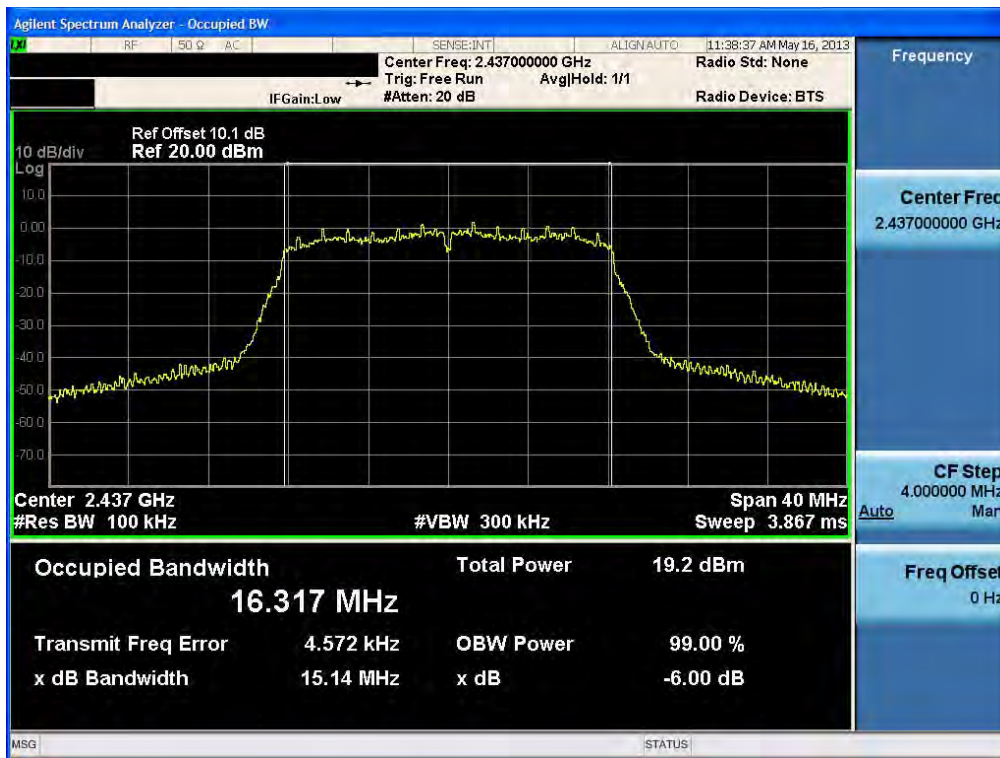
6dB Bandwidth plot (802.11b-CH 11)



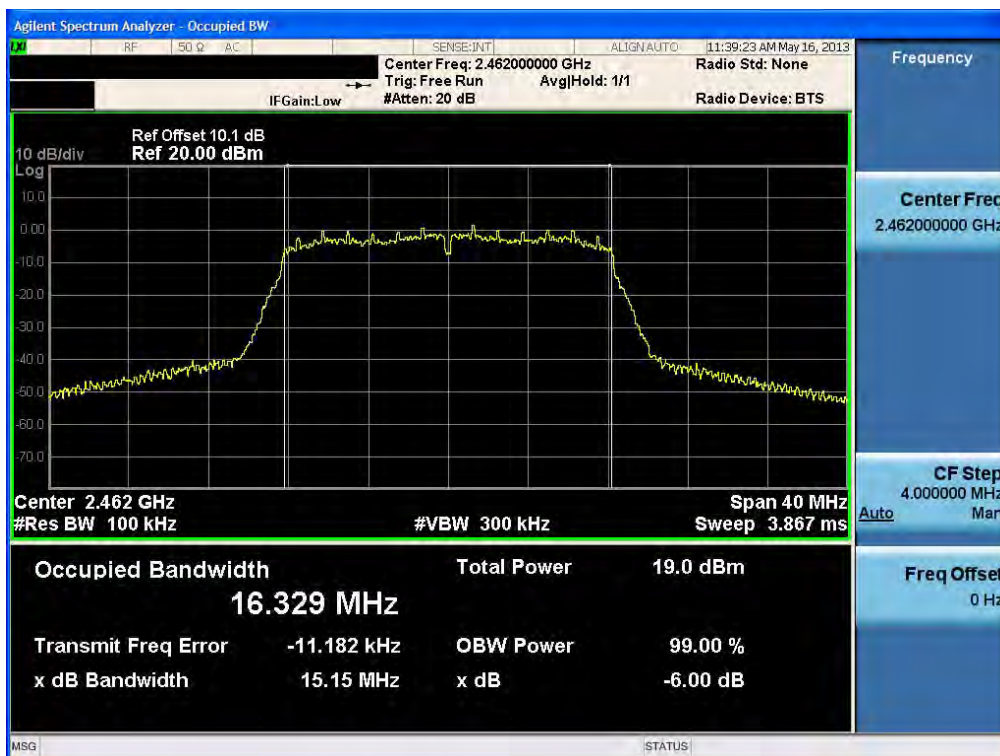
6dB Bandwidth plot (802.11g-CH 1)



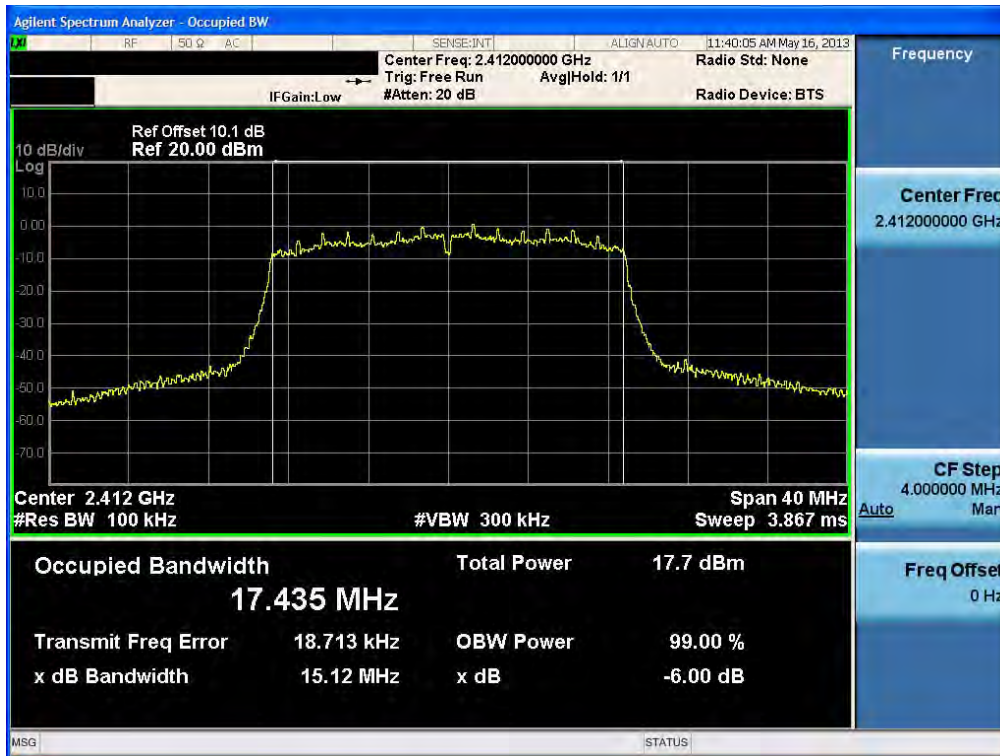
6dB Bandwidth plot (802.11g-CH 6)



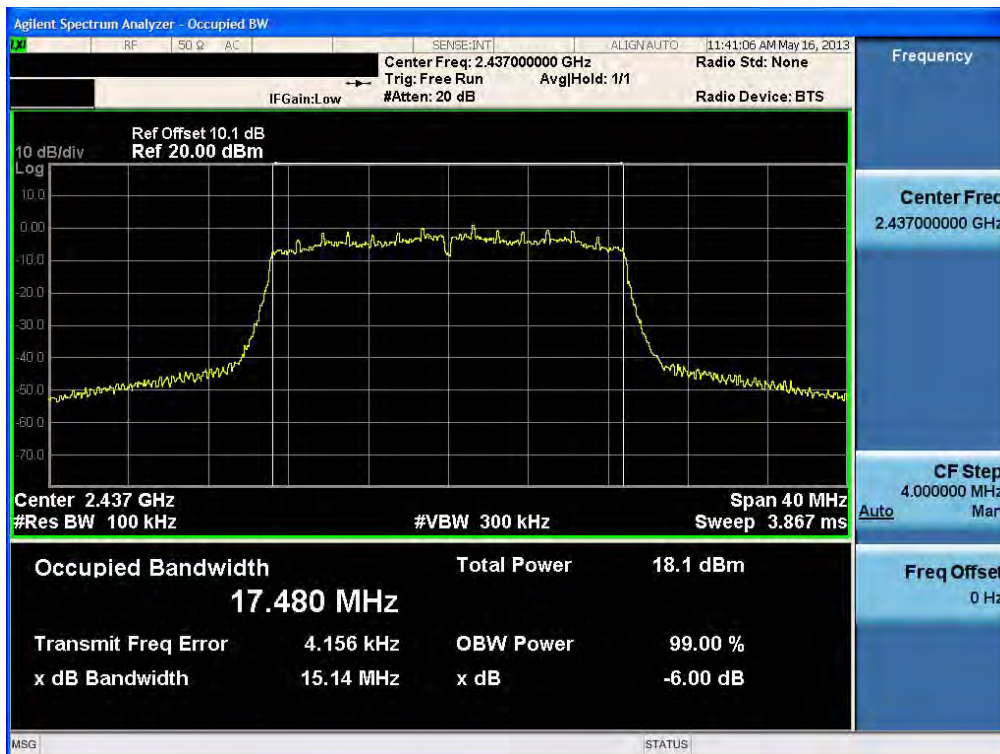
6dB Bandwidth plot (802.11g-CH 11)



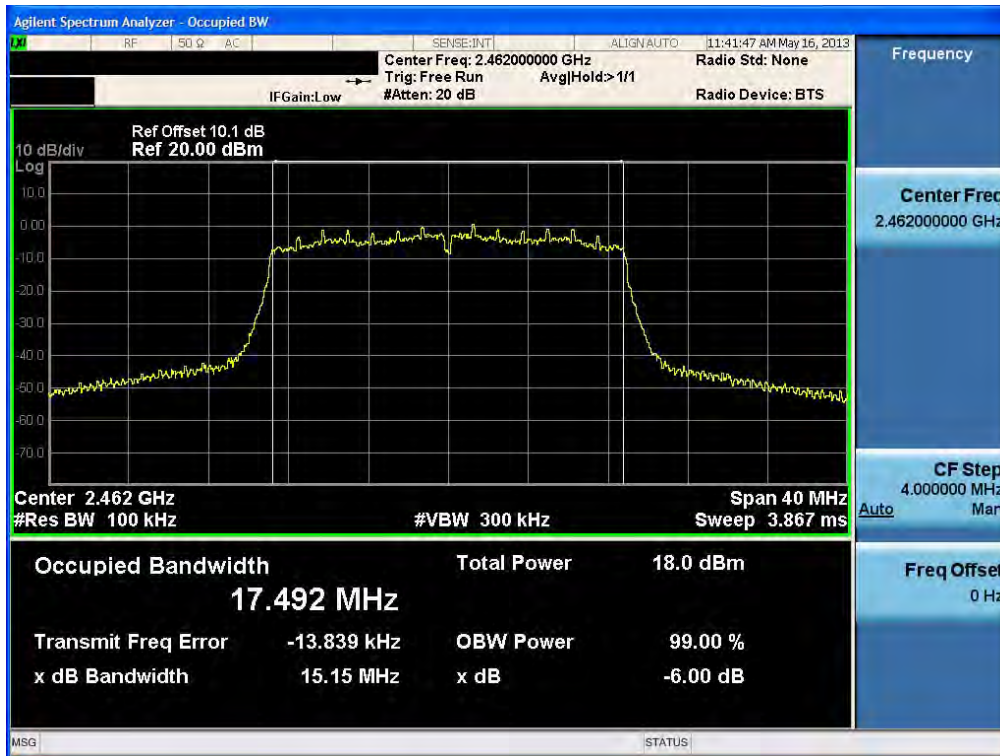
6dB Bandwidth plot (802.11n-CH 1)



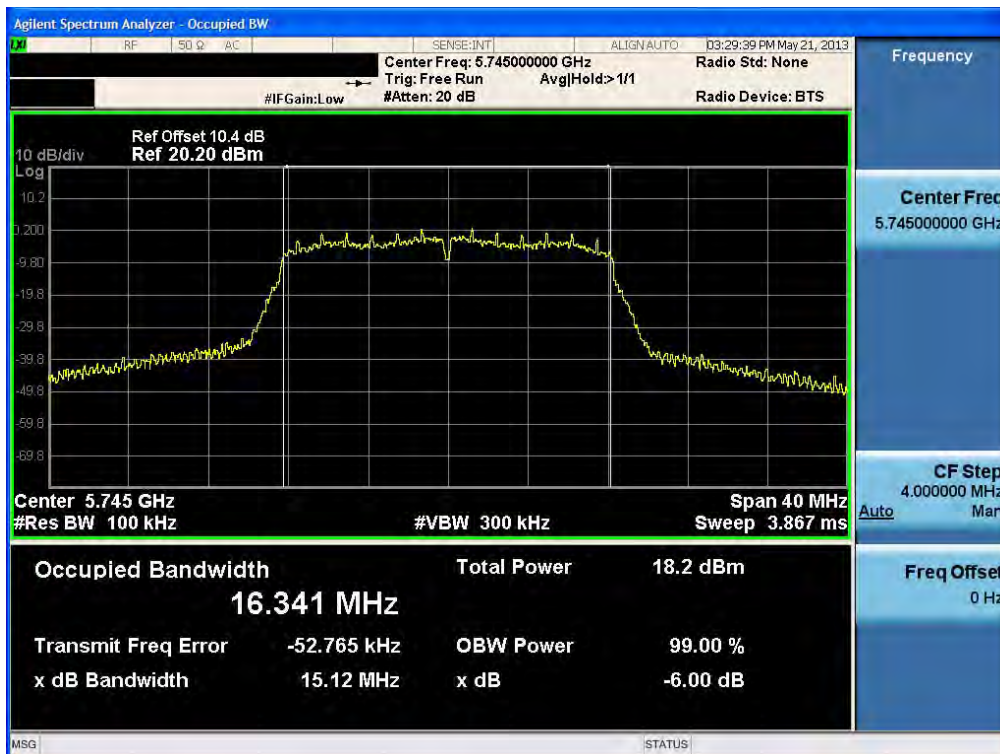
6dB Bandwidth plot (802.11n-CH 6)



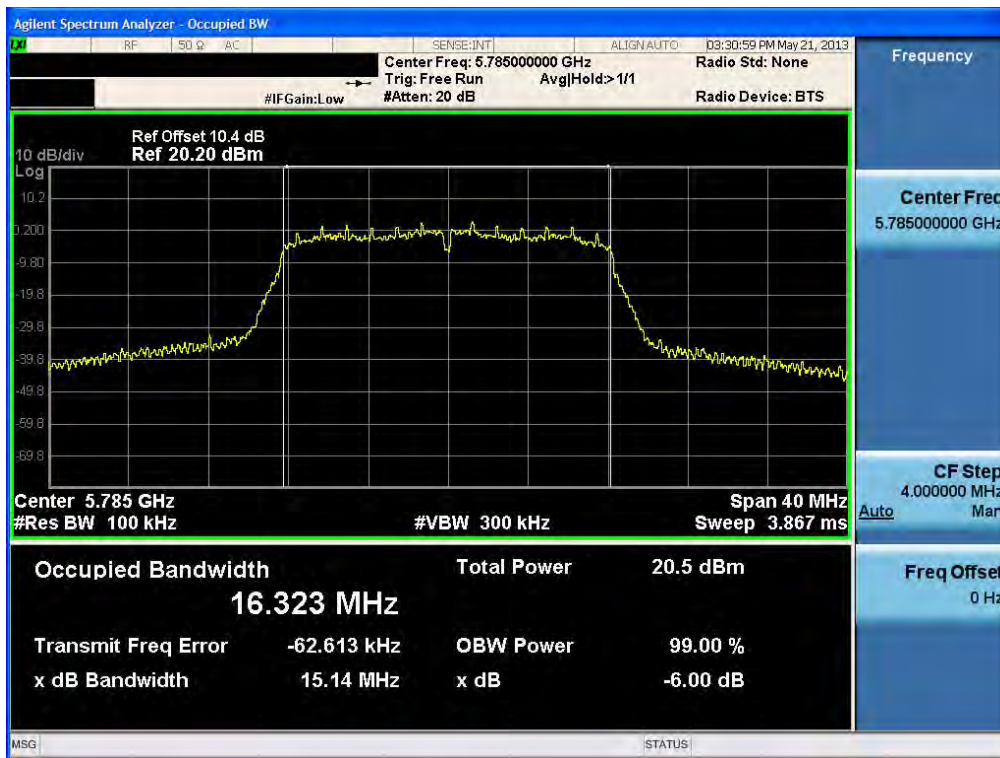
6dB Bandwidth plot (802.11n-CH 11)



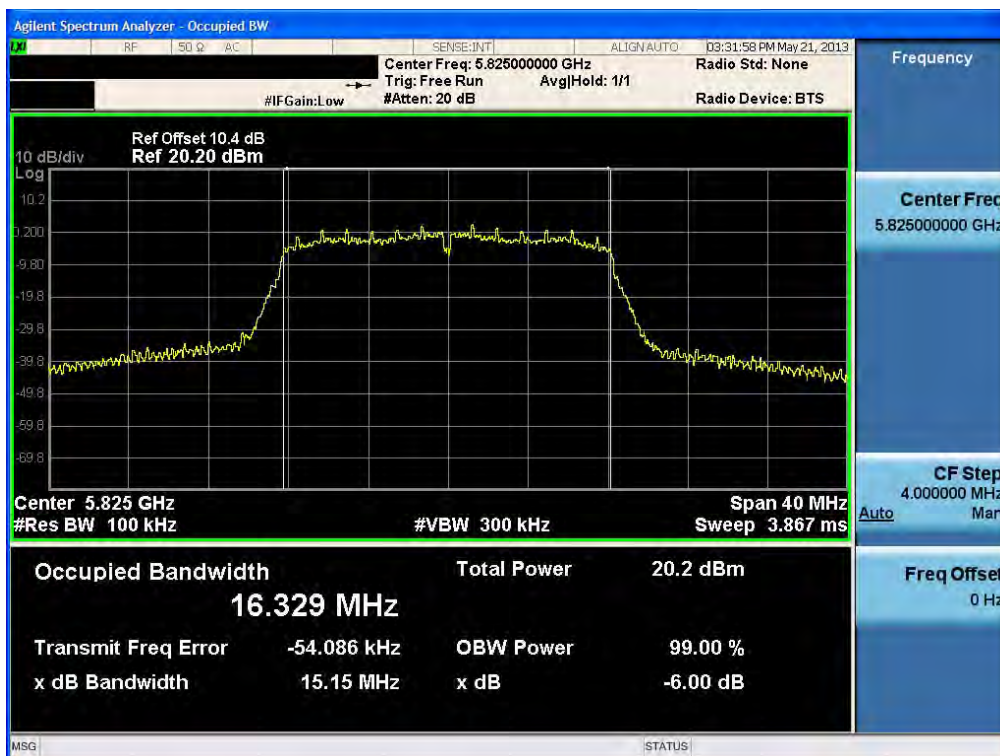
6dB Bandwidth plot (802.11a-CH 149)



6dB Bandwidth plot (802.11a-CH 157)

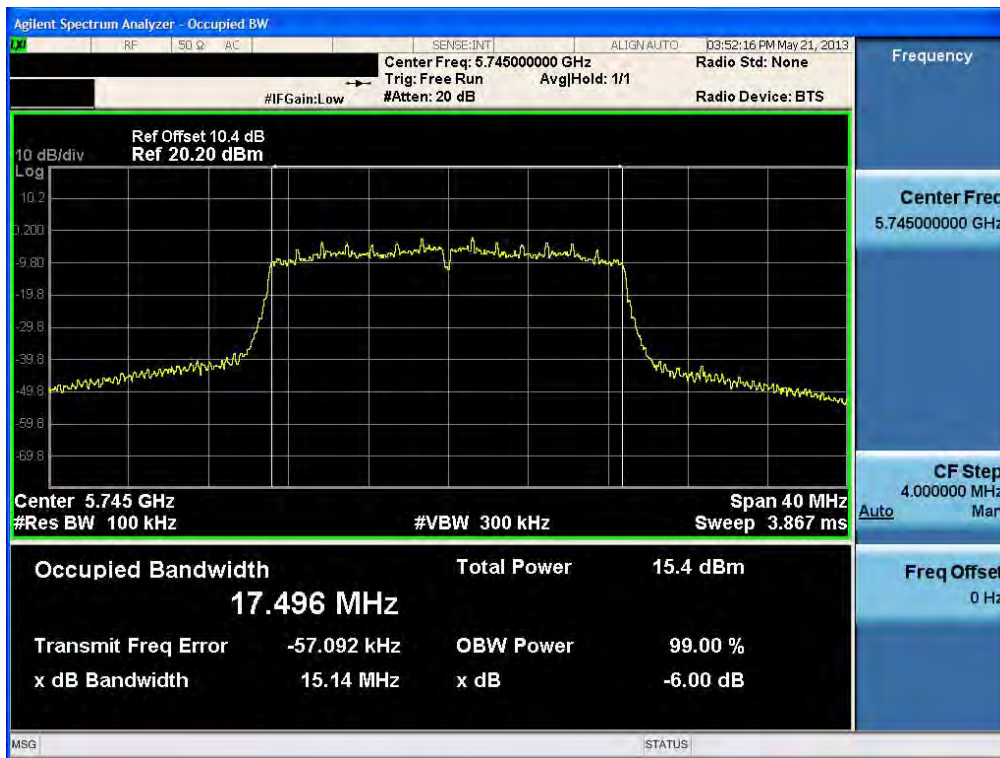


6dB Bandwidth plot (802.11a-CH 165)



20 MHz BW

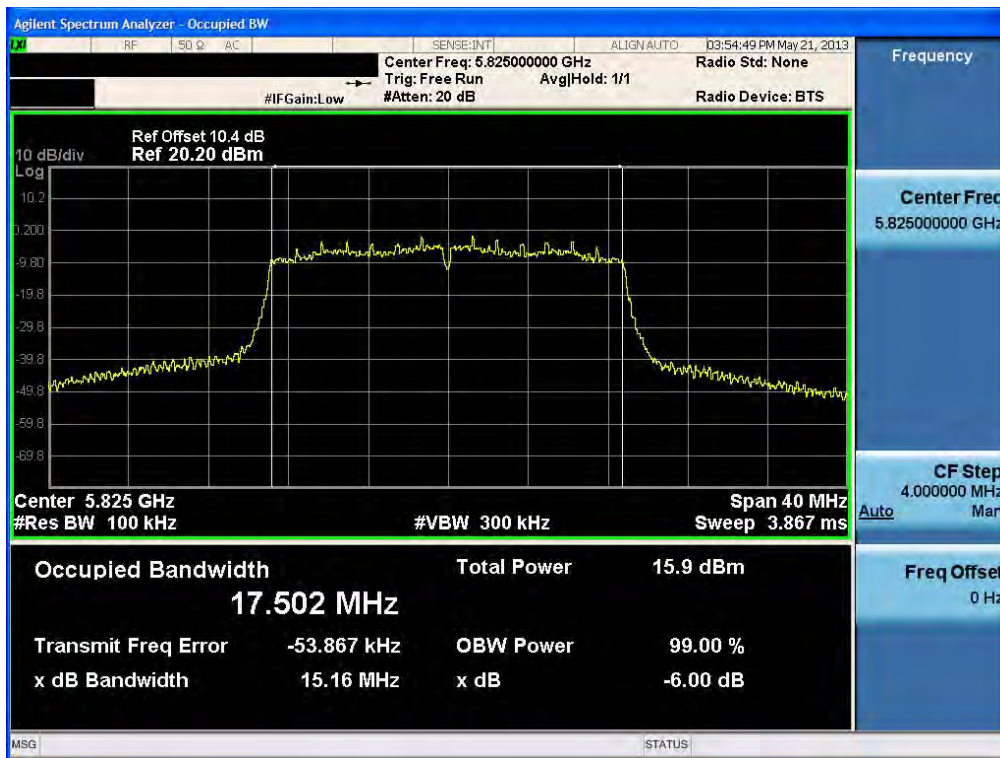
6dB Bandwidth plot (802.11n-CH 149)



6dB Bandwidth plot (802.11n-CH 157)

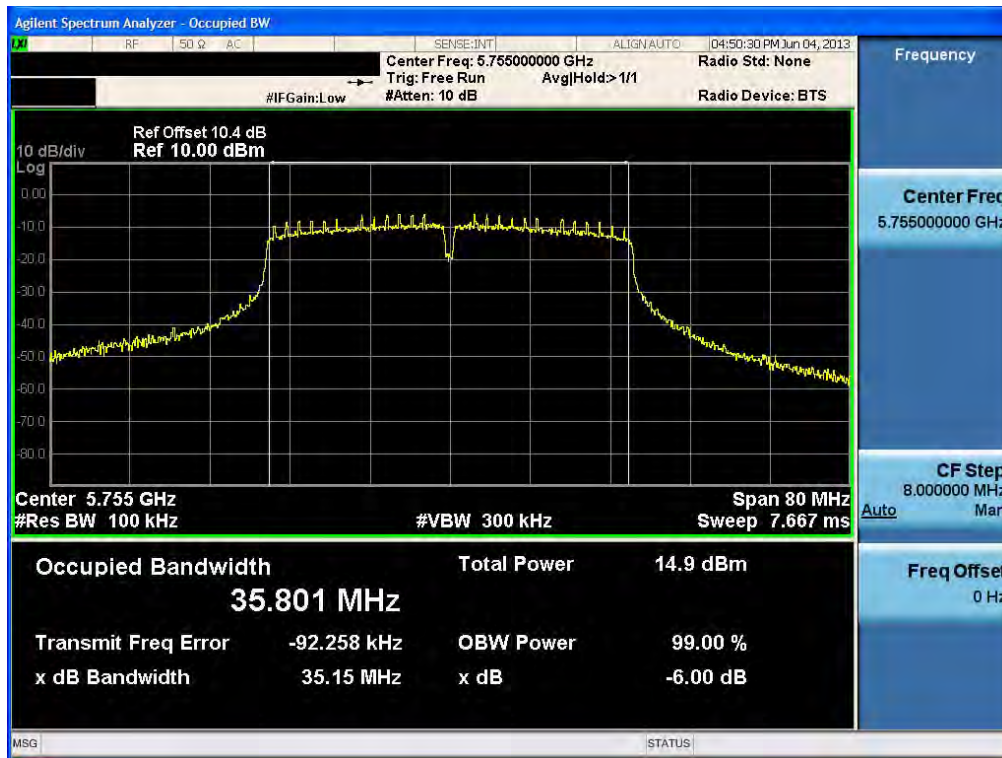


6dB Bandwidth plot (802.11n-CH 165)

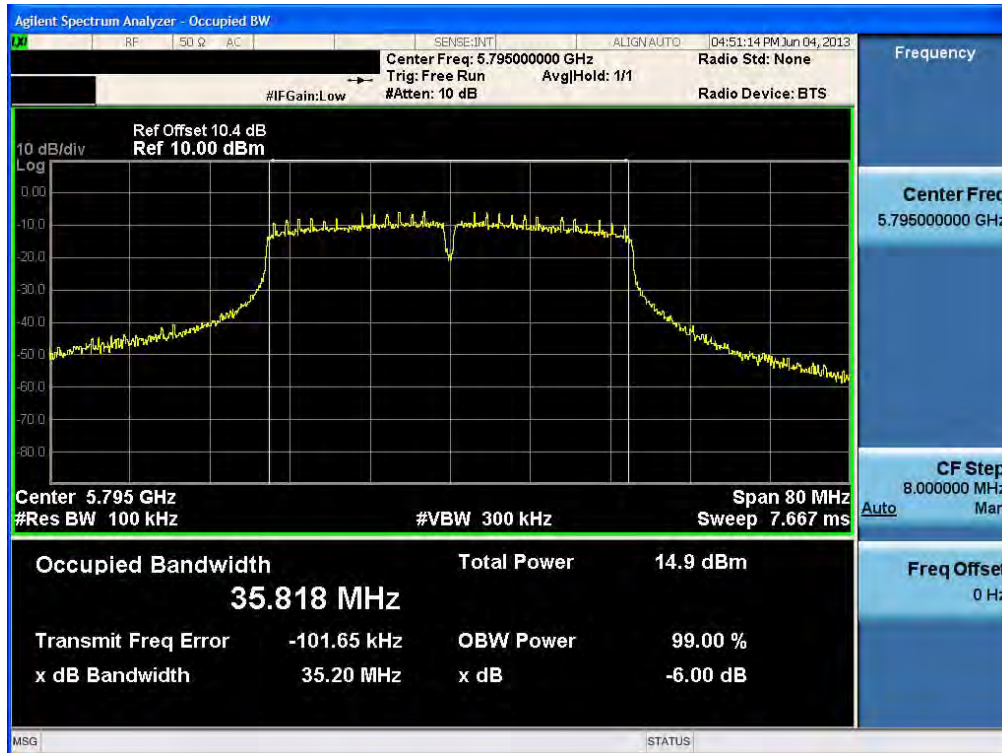


40 MHz BW

6dB Bandwidth plot (802.11n-CH 151)



6dB Bandwidth plot (802.11n-CH 159)



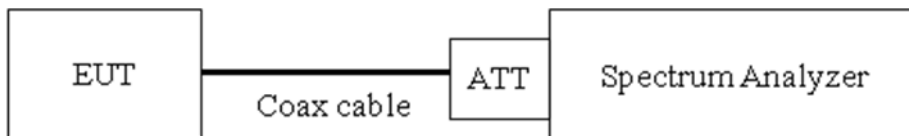
8.3 OUTPUT POWER (802.11a/b/g/n)

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

A transmitter antenna terminal of EUT is connected to the input of a Spectrum Analyzer. Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies.

The maximum permissible conducted output power is 1 Watt.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

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 (Procedure 9.1.2 in KDB 558074, issued 04/09/2013)

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 04/09/2013)

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.

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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.

■ Sample Calculation

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

Output Power = 10 dBm + 10 dB + 0.8 dB + 0.2 dB = 21.0 dBm

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.

So, 10.1 dB is offset. And the offset gap in the 2.4 GHz range do not affect the conducted peak power final result.

Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	10.11
	2437	10.10
	2462	10.12
5.8 GHz	5745	10.37
	5755	10.37
	5785	10.38
	5795	10.38
	5825	10.37

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

▣ TEST RESULTS-Peak

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	18.81	30
		2 Mbps	19.11	30
		5.5 Mbps	20.56	30
		11 Mbps	22.46	30
2437	6	1 Mbps	18.71	30
		2 Mbps	19.10	30
		5.5 Mbps	20.52	30
		11 Mbps	22.42	30
2462	11	1 Mbps	18.38	30
		2 Mbps	18.54	30
		5.5 Mbps	20.02	30
		11 Mbps	21.95	30

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	19.44	30
		9 Mbps	19.57	30
		12 Mbps	19.76	30
		18 Mbps	19.86	30
		24 Mbps	20.16	30
		36 Mbps	20.39	30
		48 Mbps	20.47	30
		54 Mbps	20.56	30
2437	6	6 Mbps	19.38	30
		9 Mbps	19.53	30
		12 Mbps	19.97	30
		18 Mbps	20.05	30
		24 Mbps	20.28	30
		36 Mbps	20.42	30
		48 Mbps	20.51	30
		54 Mbps	20.56	30
2462	11	6 Mbps	19.46	30
		9 Mbps	19.54	30
		12 Mbps	19.79	30
		18 Mbps	19.95	30
		24 Mbps	20.16	30
		36 Mbps	20.36	30
		48 Mbps	20.55	30
		54 Mbps	20.63	30

Conducted Output Power Measurements (802.11n Mode)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6.5 Mbps	17.98	30
		13 Mbps	18.44	30
		19.5 Mbps	18.56	30
		26 Mbps	18.83	30
		39 Mbps	18.88	30
		52 Mbps	18.93	30
		58.5 Mbps	9.02	30
		65 Mbps	19.05	30
2437	6	6.5 Mbps	18.23	30
		13 Mbps	18.58	30
		19.5 Mbps	18.77	30
		26 Mbps	19.14	30
		39 Mbps	19.26	30
		52 Mbps	19.28	30
		58.5 Mbps	19.33	30
		65 Mbps	19.36	30
2462	11	6.5 Mbps	18.14	30
		13 Mbps	18.56	30
		19.5 Mbps	18.67	30
		26 Mbps	18.88	30
		39 Mbps	18.97	30
		52 Mbps	19.02	30
		58.5 Mbps	19.07	30
		65 Mbps	19.12	30

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	19.87	30
		9 Mbps	19.92	30
		12 Mbps	19.76	30
		18 Mbps	19.93	30
		24 Mbps	20.29	30
		36 Mbps	20.29	30
		48 Mbps	20.54	30
		54 Mbps	20.53	30
5785	157	6 Mbps	21.81	30
		9 Mbps	21.69	30
		12 Mbps	21.64	30
		18 Mbps	21.60	30
		24 Mbps	22.01	30
		36 Mbps	22.06	30
		48 Mbps	22.25	30
		54 Mbps	22.20	30
5825	165	6 Mbps	20.70	30
		9 Mbps	20.78	30
		12 Mbps	20.84	30
		18 Mbps	20.87	30
		24 Mbps	21.05	30
		36 Mbps	21.16	30
		48 Mbps	21.24	30
		54 Mbps	21.34	30

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5745~5825)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5745	149	6.5 Mbps	16.22	30
		13 Mbps	16.29	30
		19.5 Mbps	16.27	30
		26 Mbps	16.73	30
		39 Mbps	16.57	30
		52 Mbps	16.37	30
		58.5 Mbps	16.53	30
		65 Mbps	16.36	30
5785	157	6.5 Mbps	17.13	30
		13 Mbps	17.03	30
		19.5 Mbps	16.90	30
		26 Mbps	17.41	30
		39 Mbps	17.32	30
		52 Mbps	17.20	30
		58.5 Mbps	17.25	30
		65 Mbps	17.25	30
5825	165	6.5 Mbps	16.99	30
		13 Mbps	16.95	30
		19.5 Mbps	16.79	30
		26 Mbps	17.39	30
		39 Mbps	17.27	30
		52 Mbps	17.33	30
		58.5 Mbps	17.41	30
		65 Mbps	17.31	30

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5755~5795)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
5755	151	13.5 Mbps	16.57	30
		27 Mbps	16.44	30
		40.5 Mbps	16.33	30
		54 Mbps	16.82	30
		81 Mbps	16.53	30
		108 Mbps	16.47	30
		121.5 Mbps	16.54	30
		135 Mbps	16.52	30
5795	159	13.5 Mbps	16.60	30
		27 Mbps	16.11	30
		40.5 Mbps	16.11	30
		54 Mbps	16.60	30
		81 Mbps	16.48	30
		108 Mbps	16.40	30
		121.5 Mbps	16.47	30
		135 Mbps	16.41	30

▣ TEST RESULTS-Average

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	16.10	0.04	16.14	30
		2 Mbps	16.00	0.07	16.07	30
		5.5 Mbps	15.94	0.19	16.13	30
		11 Mbps	15.87	0.36	16.23	30
2437	6	1 Mbps	16.10	0.04	16.14	30
		2 Mbps	16.05	0.07	16.12	30
		5.5 Mbps	16.00	0.19	16.19	30
		11 Mbps	15.86	0.36	16.22	30
2462	11	1 Mbps	15.86	0.04	15.90	30
		2 Mbps	15.82	0.07	15.89	30
		5.5 Mbps	15.79	0.19	15.98	30
		11 Mbps	15.62	0.36	15.98	30

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	11.36	0.21	11.57	30
		9 Mbps	11.27	0.31	11.58	30
		12 Mbps	11.14	0.40	11.54	30
		18 Mbps	10.70	0.58	11.28	30
		24 Mbps	10.57	0.75	11.32	30
		36 Mbps	10.27	1.05	11.32	30
		48 Mbps	9.93	1.33	11.26	30
		54 Mbps	9.76	1.46	11.22	30
2437	6	6 Mbps	11.68	0.21	11.89	30
		9 Mbps	11.40	0.31	11.71	30
		12 Mbps	11.35	0.40	11.75	30
		18 Mbps	11.20	0.58	11.78	30
		24 Mbps	11.01	0.75	11.76	30
		36 Mbps	10.67	1.05	11.72	30
		48 Mbps	10.44	1.33	11.77	30
		54 Mbps	10.27	1.46	11.73	30
2462	11	6 Mbps	11.57	0.21	11.78	30
		9 Mbps	11.32	0.31	11.63	30
		12 Mbps	11.24	0.40	11.64	30
		18 Mbps	11.10	0.58	11.68	30
		24 Mbps	10.94	0.75	11.69	30
		36 Mbps	10.64	1.05	11.69	30
		48 Mbps	10.32	1.33	11.65	30
		54 Mbps	10.22	1.46	11.68	30

Conducted Output Power Measurements (802.11n Mode)

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	10.18	0.22	10.40	30
		13 Mbps	9.95	0.42	10.37	30
		19.5 Mbps	9.71	0.60	10.31	30
		26 Mbps	9.62	0.78	10.40	30
		39 Mbps	9.33	1.09	10.42	30
		52 Mbps	8.98	1.35	10.33	30
		58.5 Mbps	8.92	1.45	10.37	30
		65 Mbps	8.85	1.57	10.42	30
2437	6	6.5 Mbps	10.52	0.22	10.74	30
		13 Mbps	10.41	0.42	10.83	30
		19.5 Mbps	10.14	0.60	10.74	30
		26 Mbps	9.94	0.78	10.72	30
		39 Mbps	9.63	1.09	10.72	30
		52 Mbps	9.36	1.35	10.71	30
		58.5 Mbps	9.29	1.45	10.74	30
		65 Mbps	9.20	1.57	10.77	30
2462	11	6.5 Mbps	10.39	0.22	10.61	30
		13 Mbps	10.12	0.42	10.54	30
		19.5 Mbps	9.98	0.60	10.58	30
		26 Mbps	9.82	0.78	10.60	30
		39 Mbps	9.53	1.09	10.62	30
		52 Mbps	9.23	1.35	10.58	30
		58.5 Mbps	9.15	1.45	10.60	30
		65 Mbps	9.00	1.57	10.57	30

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	11.03	0.21	11.24	30
		9 Mbps	10.88	0.31	11.19	30
		12 Mbps	10.78	0.40	11.18	30
		18 Mbps	10.57	0.58	11.15	30
		24 Mbps	10.43	0.75	11.18	30
		36 Mbps	10.02	1.05	11.07	30
		48 Mbps	9.74	1.33	11.07	30
		54 Mbps	9.56	1.46	11.02	30
5785	157	6 Mbps	12.89	0.21	13.10	30
		9 Mbps	12.73	0.31	13.04	30
		12 Mbps	12.67	0.40	13.07	30
		18 Mbps	12.53	0.58	13.11	30
		24 Mbps	12.33	0.75	13.08	30
		36 Mbps	12.01	1.05	13.06	30
		48 Mbps	11.71	1.33	13.04	30
		54 Mbps	11.56	1.46	13.02	30
5825	165	6 Mbps	12.77	0.21	12.98	30
		9 Mbps	12.62	0.31	12.93	30
		12 Mbps	12.50	0.40	12.90	30
		18 Mbps	12.39	0.58	12.97	30
		24 Mbps	12.13	0.75	12.88	30
		36 Mbps	11.80	1.05	12.85	30
		48 Mbps	11.51	1.33	12.84	30
		54 Mbps	11.38	1.46	12.84	30

Conducted Output Power Measurements (802.11n_20 MHz BW Mode: 5745~5825)

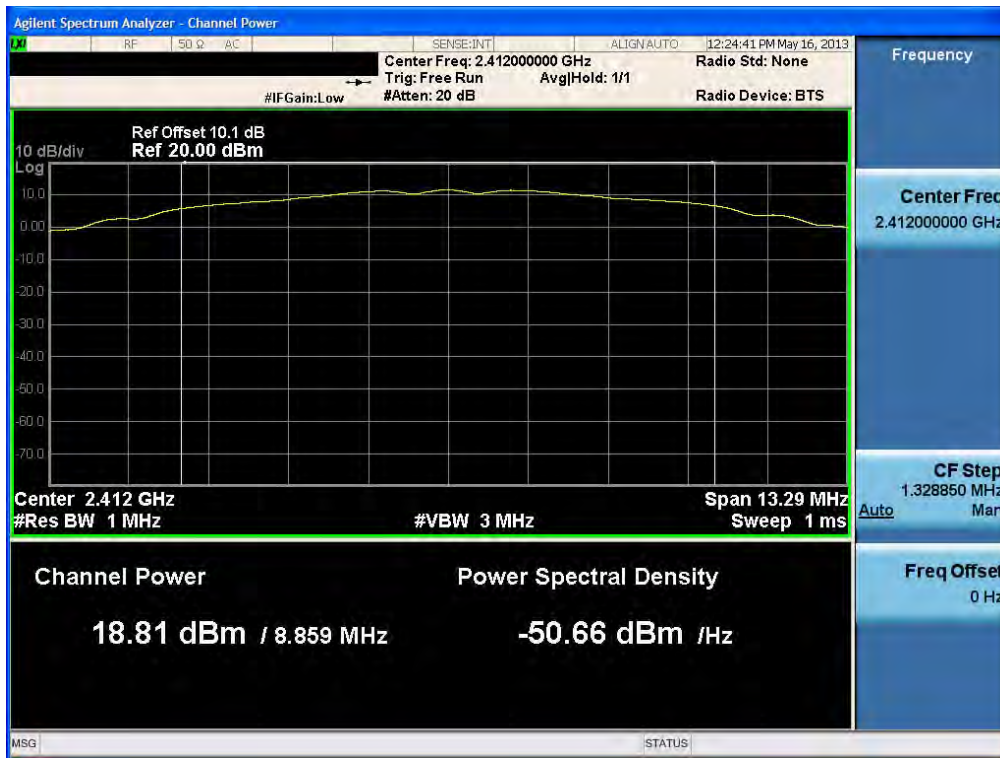
802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	6.5 Mbps	8.15	0.22	8.37	30
		13 Mbps	8.00	0.42	8.42	30
		19.5 Mbps	7.75	0.60	8.35	30
		26 Mbps	7.56	0.78	8.34	30
		39 Mbps	7.27	1.09	8.36	30
		52 Mbps	6.96	1.35	8.31	30
		58.5 Mbps	6.82	1.45	8.27	30
		65 Mbps	6.73	1.57	8.30	30
5785	157	6.5 Mbps	9.07	0.22	9.29	30
		13 Mbps	8.88	0.42	9.30	30
		19.5 Mbps	8.68	0.60	9.28	30
		26 Mbps	8.46	0.78	9.24	30
		39 Mbps	8.20	1.09	9.29	30
		52 Mbps	7.93	1.35	9.28	30
		58.5 Mbps	7.80	1.45	9.25	30
		65 Mbps	7.63	1.57	9.20	30
5825	165	6.5 Mbps	9.00	0.22	9.22	30
		13 Mbps	8.85	0.42	9.27	30
		19.5 Mbps	8.64	0.60	9.24	30
		26 Mbps	8.44	0.78	9.22	30
		39 Mbps	8.08	1.09	9.17	30
		52 Mbps	7.87	1.35	9.22	30
		58.5 Mbps	7.73	1.45	9.18	30
		65 Mbps	7.61	1.57	9.18	30

Conducted Output Power Measurements (802.11n_40 MHz BW Mode: 5755~5795)

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	9.92	0.43	10.35	30
		27 Mbps	9.49	0.78	10.27	30
		40.5 Mbps	9.22	1.09	10.32	30
		54 Mbps	8.87	1.37	10.24	30
		81 Mbps	8.36	1.82	10.18	30
		108 Mbps	7.96	2.15	10.11	30
		121.5 Mbps	7.46	2.30	9.75	30
		135 Mbps	7.29	2.46	9.75	30
5795	159	13.5 Mbps	10.18	0.43	10.61	30
		27 Mbps	9.75	0.78	10.53	30
		40.5 Mbps	9.40	1.09	10.49	30
		54 Mbps	9.06	1.37	10.43	30
		81 Mbps	8.51	1.82	10.33	30
		108 Mbps	8.16	2.15	10.31	30
		121.5 Mbps	8.02	2.30	10.31	30
		135 Mbps	7.85	2.46	10.31	30

▣ RESULT PLOTS-Peak

Conducted Output Power (802.11b-CH 1) 1Mbps



Conducted Output Power (802.11b-CH 1) 2Mbps



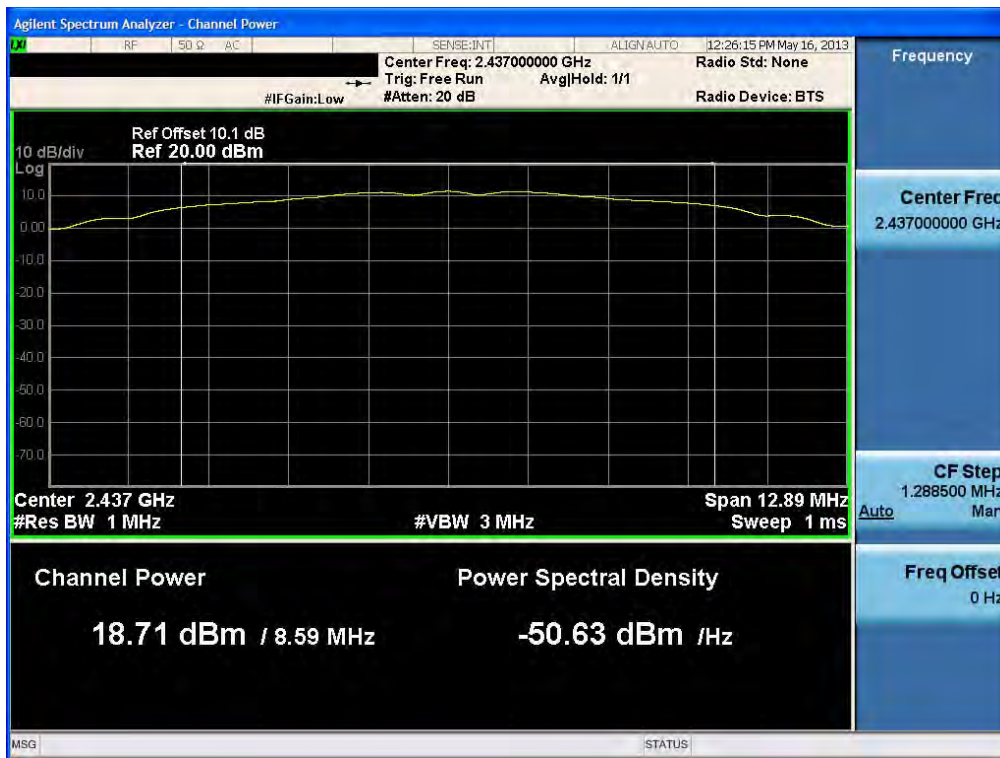
Conducted Output Power (802.11b-CH 1) 5.5Mbps



Conducted Output Power (802.11b-CH 1) 11Mbps



Conducted Output Power (802.11b-CH 6) 1Mbps



Conducted Output Power (802.11b-CH 6) 2Mbps



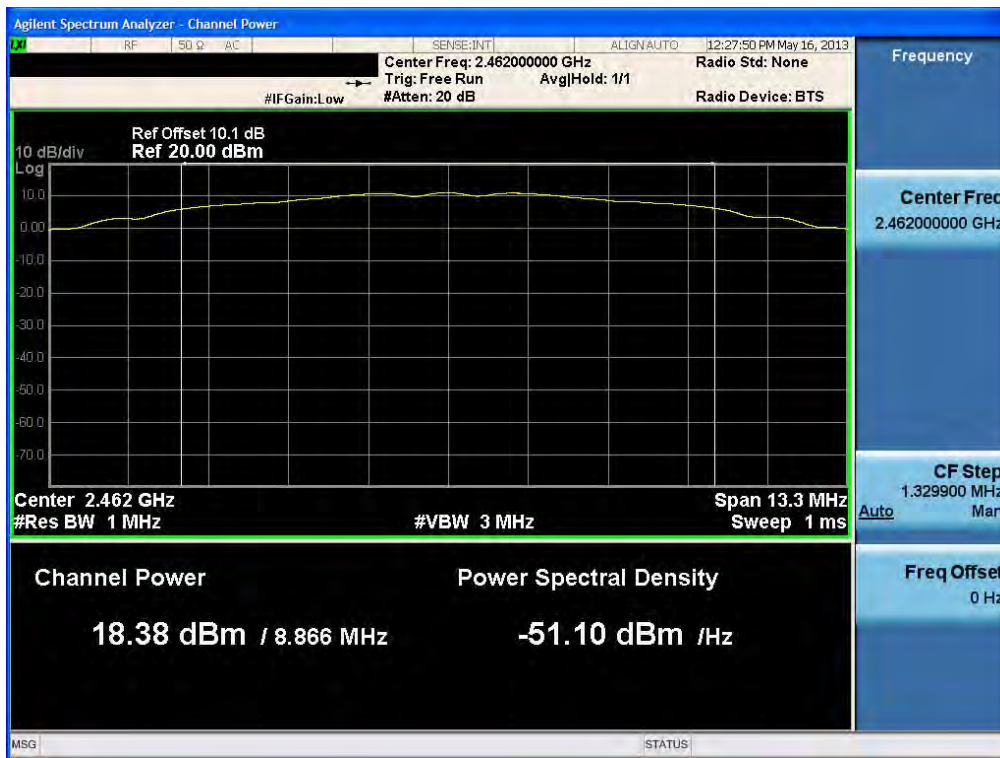
Conducted Output Power (802.11b-CH 6) 5.5Mbps



Conducted Output Power (802.11b-CH 6) 11Mbps



Conducted Output Power (802.11b-CH 11) 1Mbps



Conducted Output Power (802.11b-CH 11) 2Mbps



Conducted Output Power (802.11b-CH 11) 5.5Mbps



Conducted Output Power (802.11b-CH 11) 11Mbps



Conducted Output Power (802.11g-CH 1) 6Mbps



Conducted Output Power (802.11g-CH 1) 9Mbps



Conducted Output Power (802.11g-CH 1) 12Mbps



Conducted Output Power (802.11g-CH 1) 18Mbps



Conducted Output Power (802.11g-CH 1) 24Mbps



Conducted Output Power (802.11g-CH 1) 36Mbps



Conducted Output Power (802.11g-CH 1) 48Mbps



Conducted Output Power (802.11g-CH 1) 54Mbps



Conducted Output Power (802.11g-CH 6) 6Mbps



Conducted Output Power (802.11g-CH 6) 9Mbps



Conducted Output Power (802.11g-CH 6) 12Mbps



Conducted Output Power (802.11g-CH 6) 18Mbps



Conducted Output Power (802.11g-CH 6) 24Mbps



Conducted Output Power (802.11g-CH 6) 36Mbps



Conducted Output Power (802.11g-CH 6) 48Mbps



Conducted Output Power (802.11g-CH 6) 54Mbps



Conducted Output Power (802.11g-CH 11) 6Mbps



Conducted Output Power (802.11g-CH 11) 9Mbps



Conducted Output Power (802.11g-CH 11) 12Mbps



Conducted Output Power (802.11g-CH 11) 18Mbps



Conducted Output Power (802.11g-CH 11) 24Mbps



Conducted Output Power (802.11g-CH 11) 36Mbps



Conducted Output Power (802.11g-CH 11) 48Mbps



Conducted Output Power (802.11g-CH 11) 54Mbps

