

HCT CO., LTD.

CERTIFICATE OF COMPLIANCE

FCC Certification

Applicant Name:
LG Electronics Inc.

Address:
19-1, Cheongho-ri, Jinwi-myeon, Pyeongtaek-Si, Gyeonggi-do, Korea(451-713)

Date of Issue:

November 02, 2011

Test Site/Location:

HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, Korea

Report No.: HCTR1110FR04-2

HCT FRN: 0005866421

IC Recognition No.: 5944A-3

FCC ID:	BEJTWFML302D
IC:	2703H-TW FML302D
APPLICANT:	LG Electronics Inc.

FCC Model(s): TWFM-L302D

IC Model(s): TWFM-L302D

EUT Type: Wi-Fi Module

Max. RF Output Power: Wi-Fi 802.11b(21.89 dBm) / Wi-Fi 802.11g (21.64 dBm)/
Wi-Fi 802.11n_20 MHz BW (21.31 dBm)/ Wi-Fi 802.11n_40 MHz BW (21.43 dBm)

Frequency Range: 2412 MHz -2462 MHz, 2422 MHz ~ 2452 MHz(40 MHz BW)

Modulation type CCK/DSSS/OFDM

FCC Classification: Digital Transmission System(DTS)

FCC Rule Part(s): Part 15.247

IC Rule : RSS-210 , RSS-GEN

IC Registration No. : 5944A-3

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.

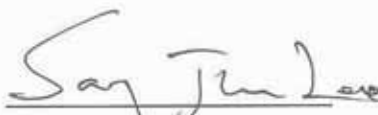
HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998, 21 U.S. C.853(a)



Report prepared by

: Jong Seok Lee

Test engineer of RF Team



Approved by

: Sang Jun Lee

Manager of RF Team

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FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1110FR04	October 21, 2011	- First Approval Report
HCTR1110FR04-1	October 26, 2011	- Conducted Power re-test - Insert OBW test result - Insert Band Edge test result
HCTR1110FR04-2	November 02, 2011	- OBW amendments (Page 16 ~ 23)

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1. GENERAL INFORMATION

Applicant: LG Electronics Inc.
Address: 19-1, Cheongho-ri, Jinwi-myeon, Pyeongtaek-Si, Gyeonggi-do, Korea(451-713)
FCC ID: BEJTWFML302D
EUT Type: Wi-Fi Module
FCC Model Name: TWFM-L302D
IC Model Name: TWFM-L302D
Date(s) of Tests: September 07, 2011 ~ October 25, 2011
Contact person: Name: Min Seok Kim
 Phone #: +82-31-610-5844
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	Wi-Fi Module
FCC Model Name	TWFM-L302D
IC Model Name	TWFM-L302D
Power Supply	DC 5.0 V
Frequency Range	TX: 2412 MHz ~ 2462 MHz, 2422 MHz ~ 2452 MHz(40 MHz BW) RX: 2412 MHz ~ 2462 MHz, 2422 MHz ~ 2452 MHz(40 MHz BW)
Max. RF Output Power:	Wi-Fi 802.11b(21.89 dBm) / Wi-Fi 802.11g (21.64 dBm)/ Wi-Fi 802.11n_20 MHz BW (21.31 dBm)/ Wi-Fi 802.11n_40 MHz BW (21.43 dBm)
Modulation Type	DSSS/CCK(802.11b), OFDM(802.11g, 802.11n_20 MHz BW, 802.11n_40 MHz BW)
Antenna Specification	Manufacturer: LGINNOTEK Antenna type: PIFA Antenna Peak Gain : 2.85 dBi

3. TEST METHODOLOGY

The measurement procedure described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz(ANSI C63.4-2003)

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)

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.

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Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

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 March 02, 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."

FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TWFML302D

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. TEST RESULT

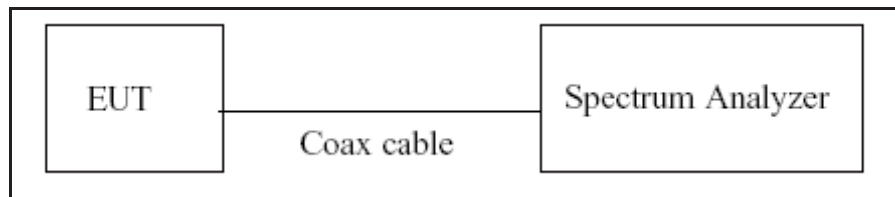
7.1 6dB BANDWIDTH MEASUREMENT (802.11b/g/n)

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

RBW: 100 kHz

VBW: 100 kHz

SPAN: 40 MHz

■ 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	12.13	0.5	Pass
2437	6	12.09	0.5	Pass
2462	11	12.08	0.5	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	16.35	0.5	Pass
2437	6	16.36	0.5	Pass
2462	11	16.46	0.5	Pass

Conducted 6dB Bandwidth Measurements for 802.11n_20 MHz BW

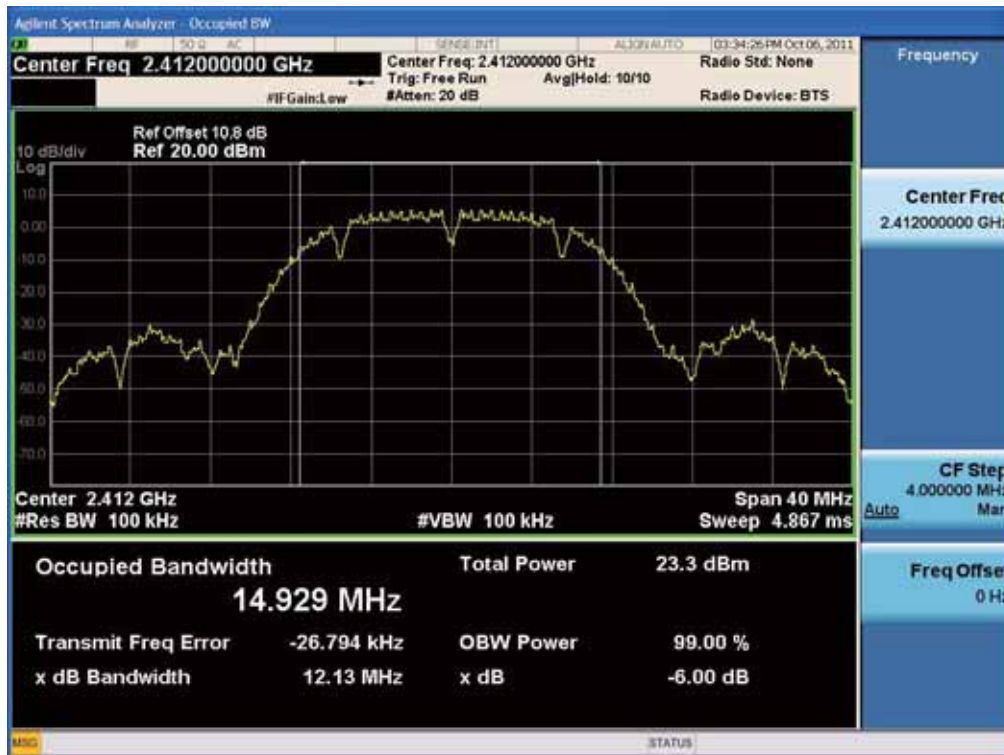
802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	16.97	0.5	Pass
2437	6	17.39	0.5	Pass
2462	11	17.06	0.5	Pass

Conducted 6dB Bandwidth Measurements for 802.11n_40 MHz BW

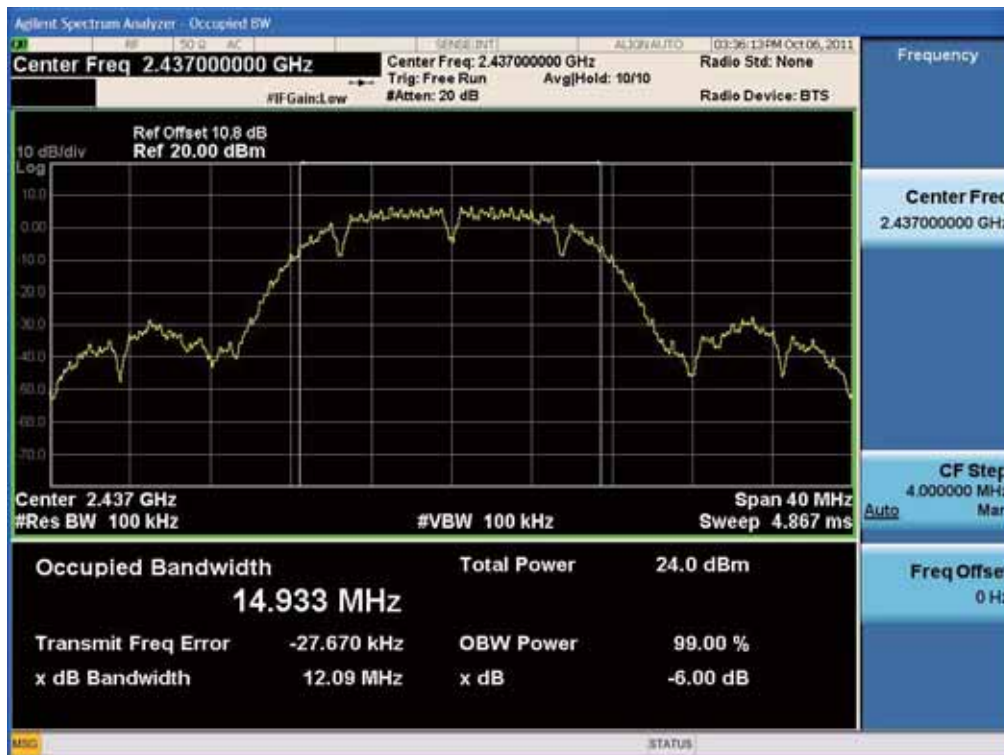
802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2422	3	35.43	0.5	Pass
2437	6	35.23	0.5	Pass
2452	9	35.29	0.5	Pass

■ RESULT PLOTS

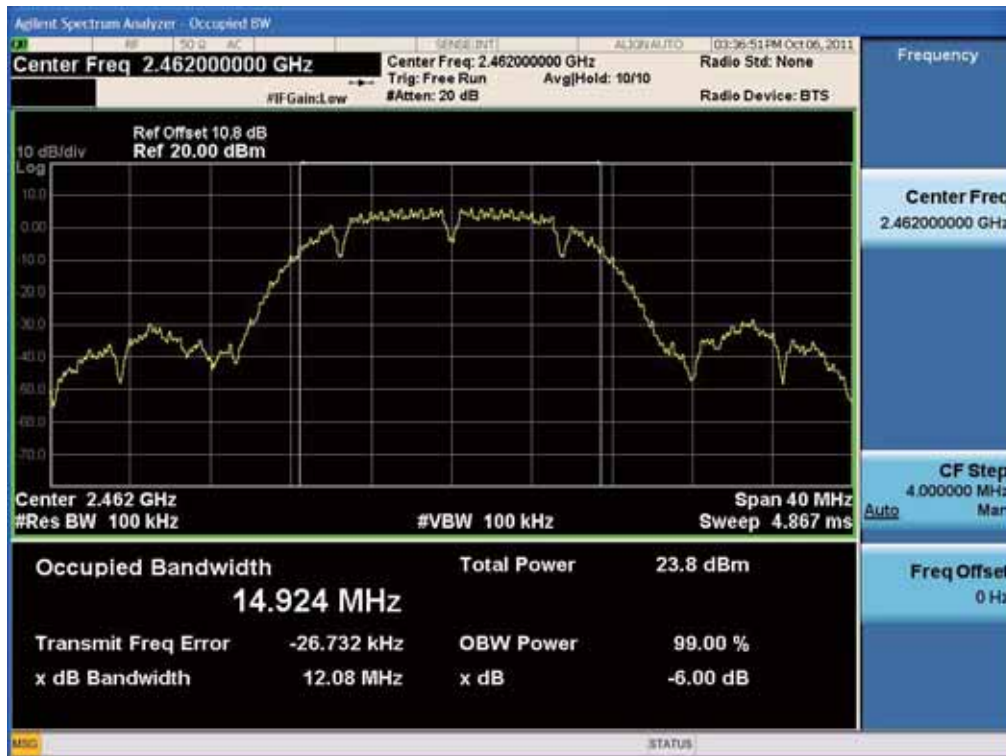
6dB Bandwidth plot (802.11b-CH 1)



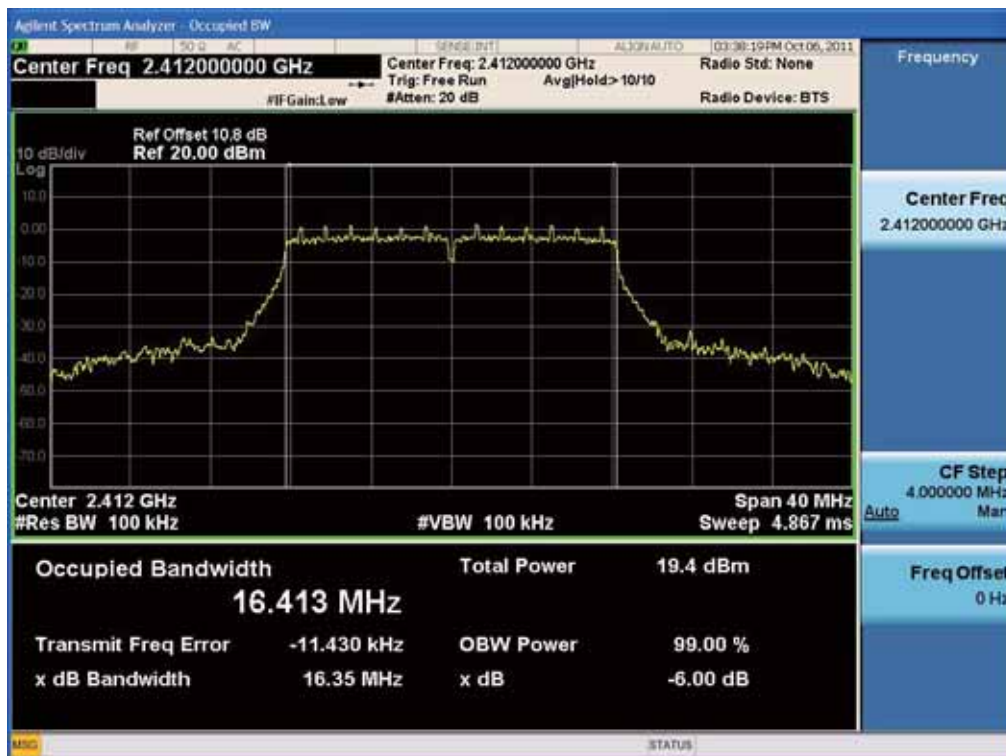
6dB Bandwidth plot (802.11b-CH 6)



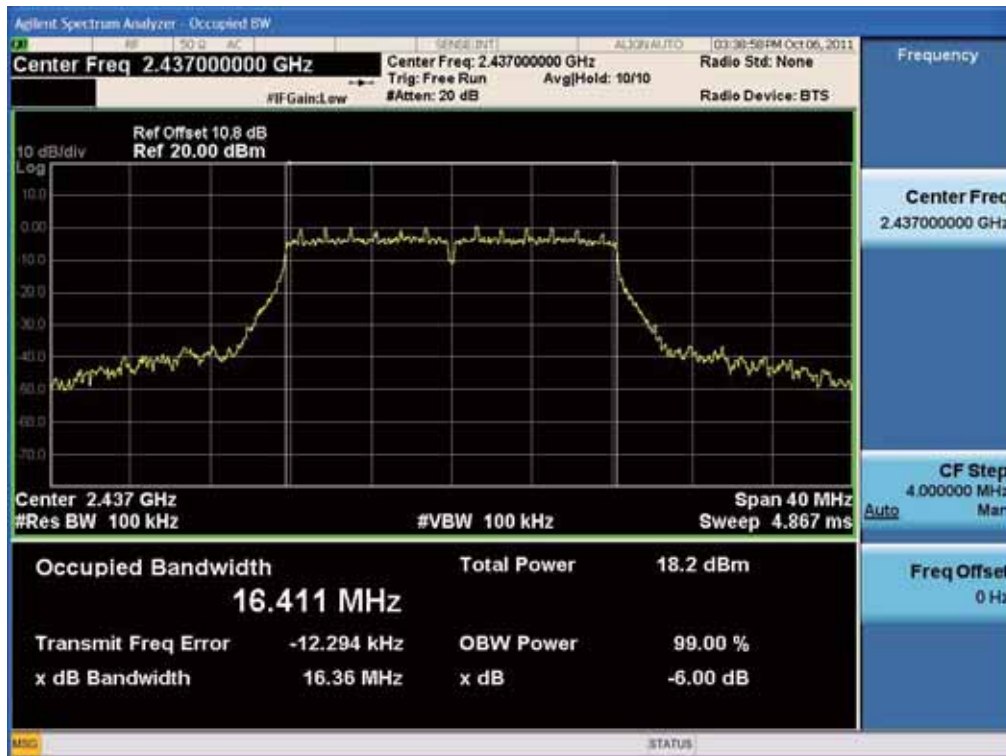
6dB Bandwidth plot (802.11b-CH 11)



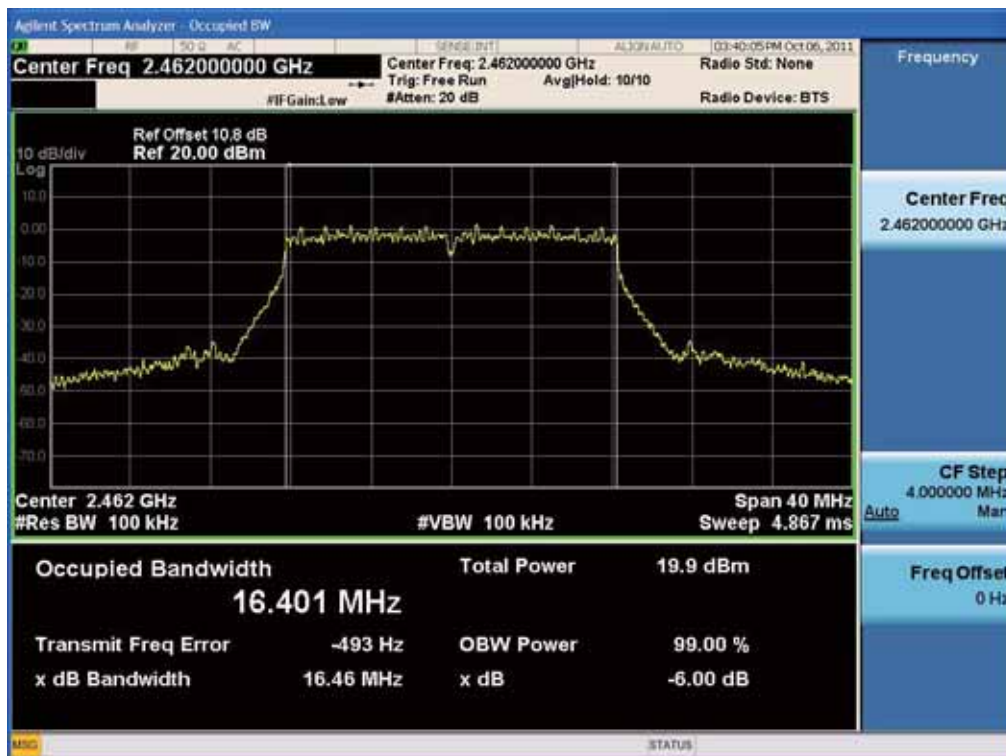
6dB Bandwidth plot (802.11g-CH 1)



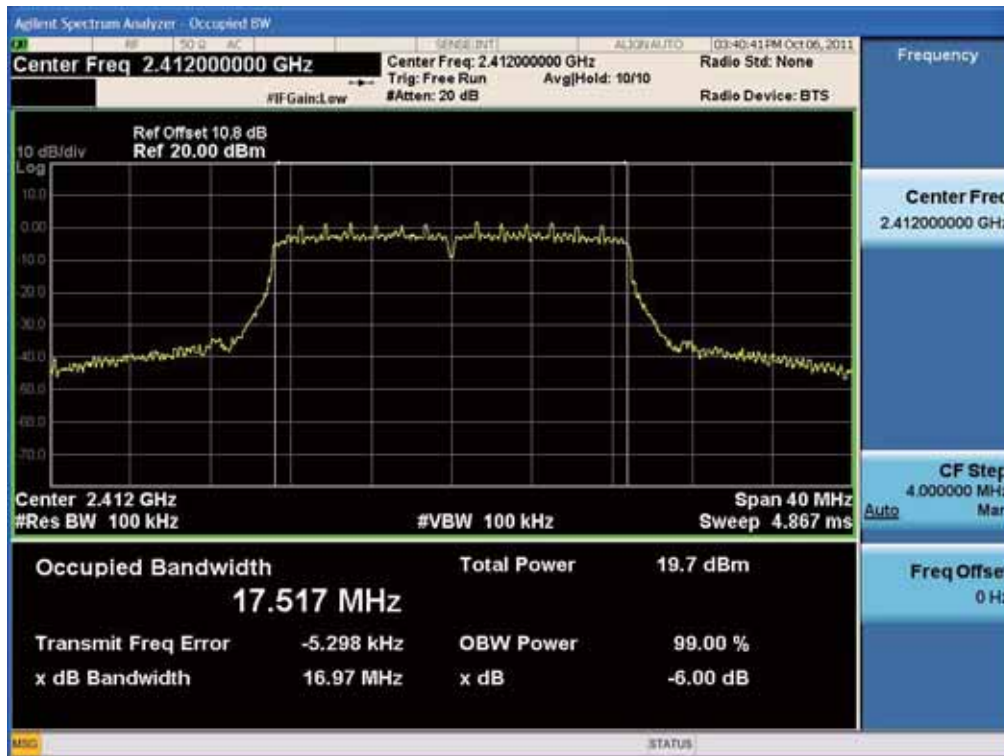
6dB Bandwidth plot (802.11g-CH 6)



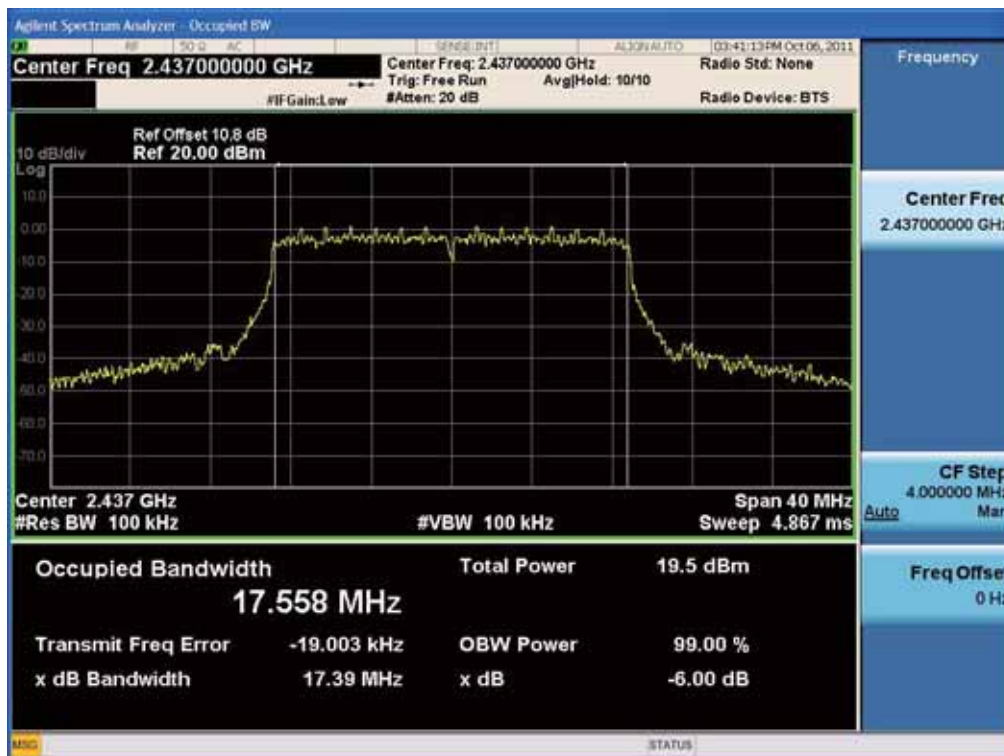
6dB Bandwidth plot (802.11g-CH 11)



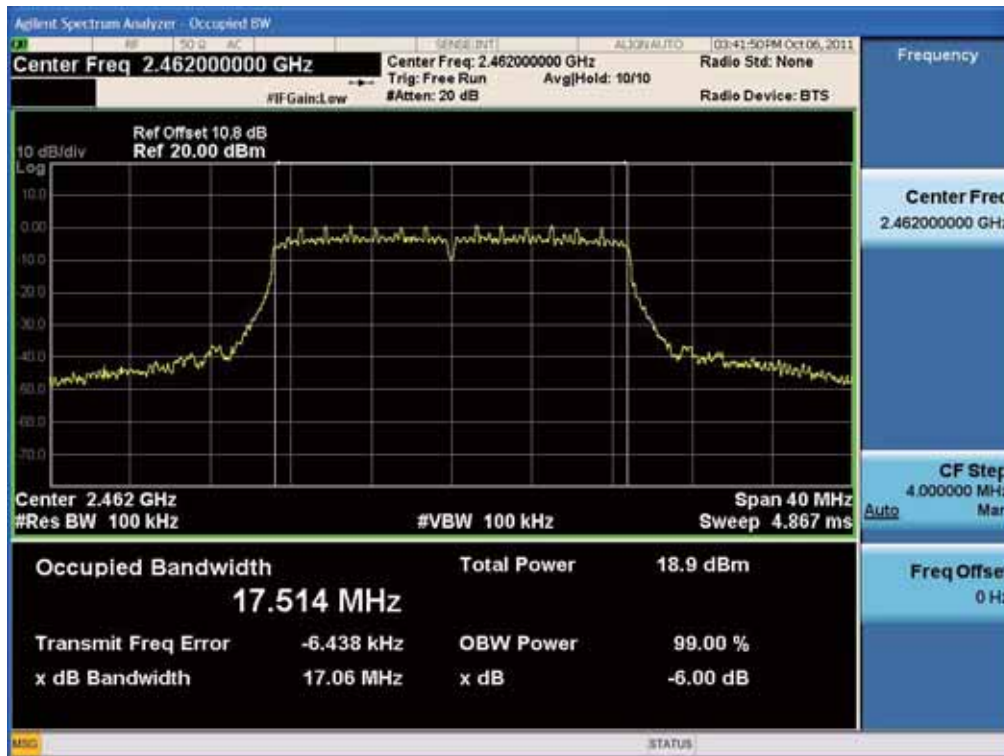
6dB Bandwidth plot (802.11n-CH 1)_20 MHz BW



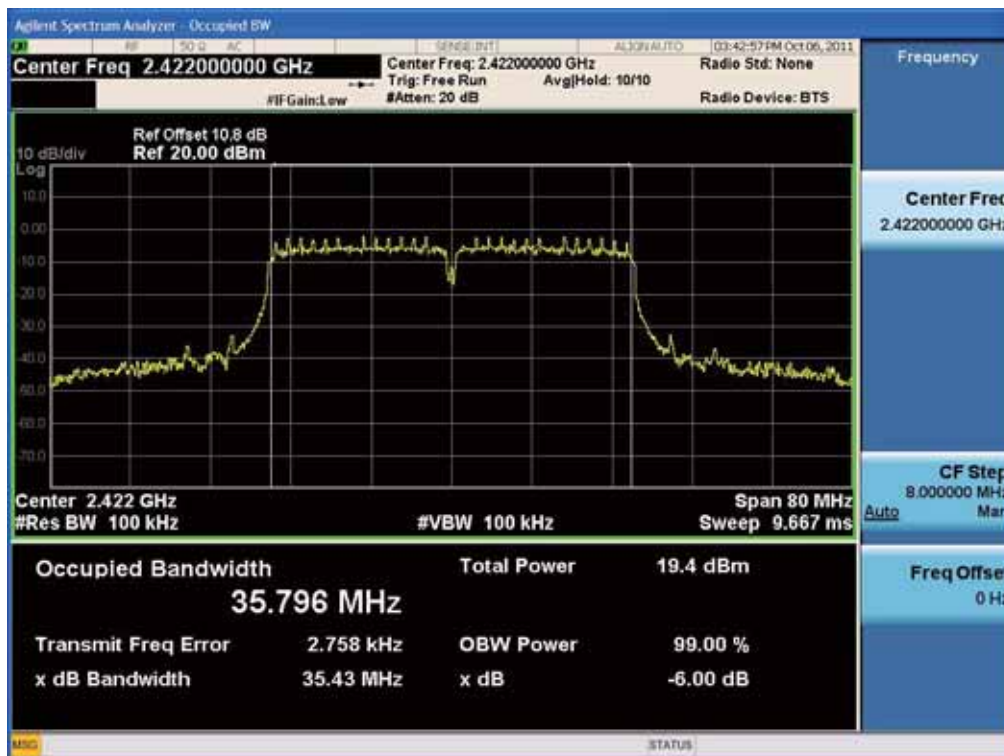
6dB Bandwidth plot (802.11n-CH 6)_20 MHz BW



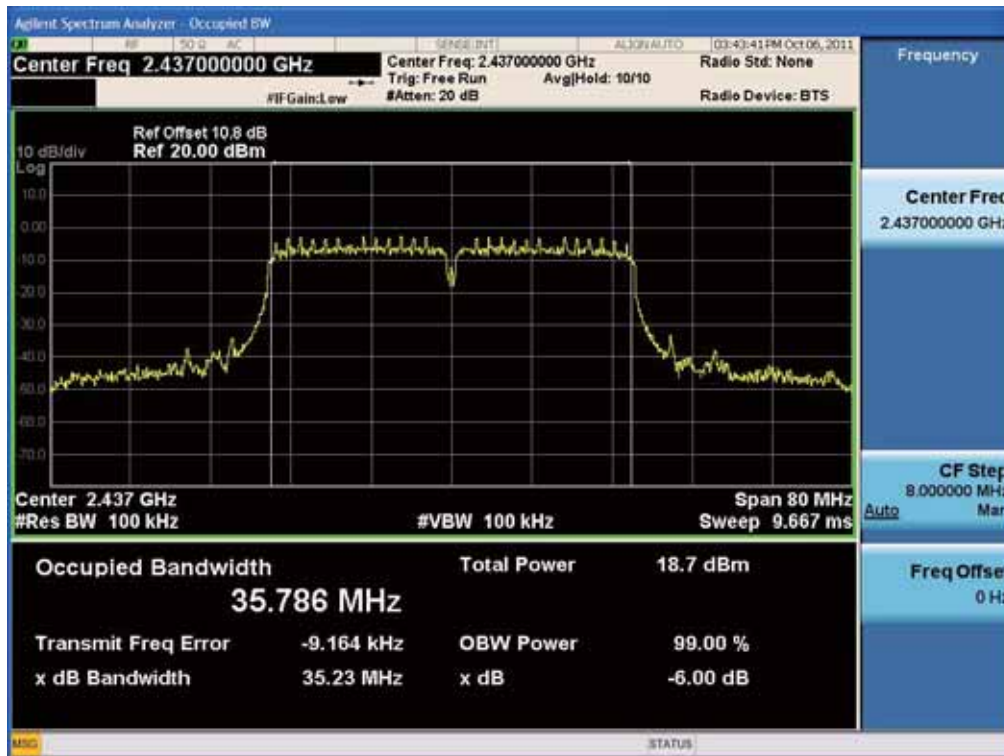
6dB Bandwidth plot (802.11n-CH 11) _20 MHz BW



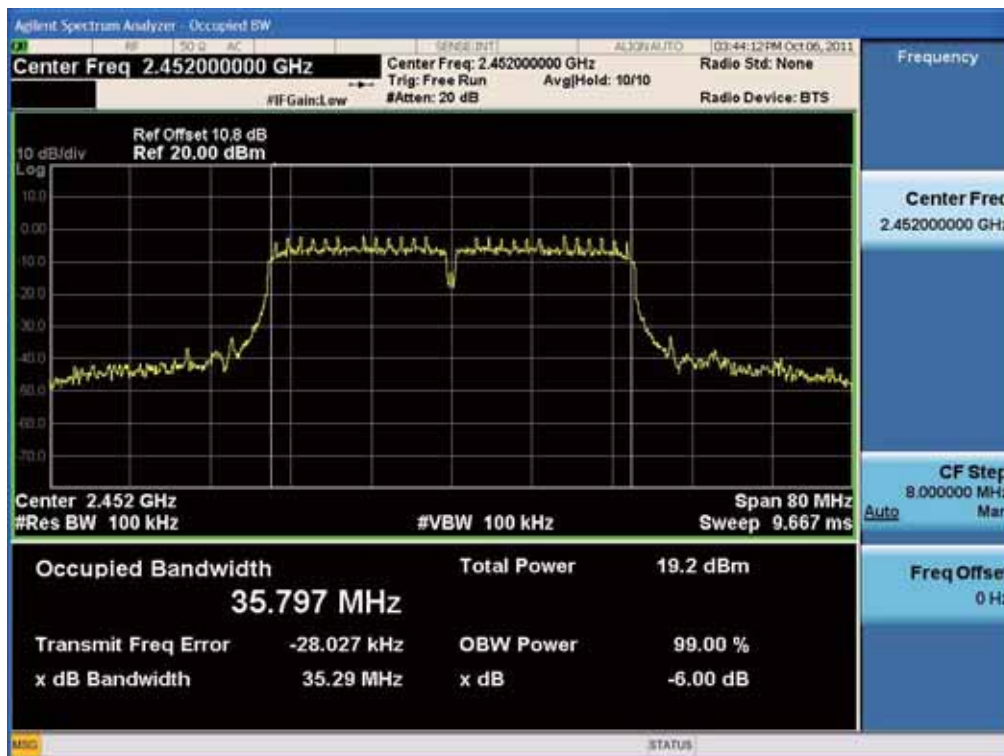
6dB Bandwidth plot (802.11n-CH 3) _ 40 MHz BW



6dB Bandwidth plot (802.11n-CH 6) _ 40 MHz BW

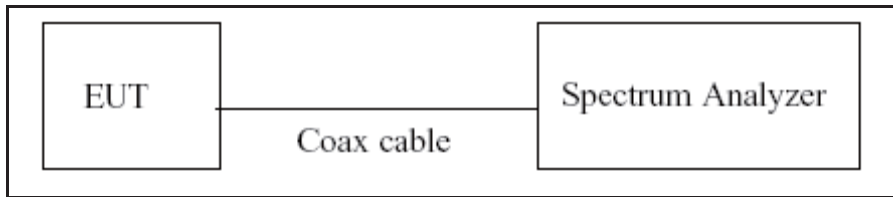


6dB Bandwidth plot (802.11n-CH 9) _ 40 MHz BW



7.2 OBW (99 % BW) MEASUREMENT (802.11b/g/n)

■ TEST CONFIGURATION



■ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to

RBW: RSS GEN required the RBW used for measuring 99 % must be at least 1 % of the SPAN.

VBW: 3 times of RBW

SPAN: 40 MHz

■ TEST RESULTS

Conducted OBW Measurements for 802.11b

802.11b Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
2412	1	14.6163
2437	6	14.5845
2462	11	14.5995

Conducted OBW Measurements for 802.11g

802.11g Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
2412	1	16.8183
2437	6	16.8673
2462	11	16.8554

Conducted OBW Measurements for 802.11n_20 MHz BW

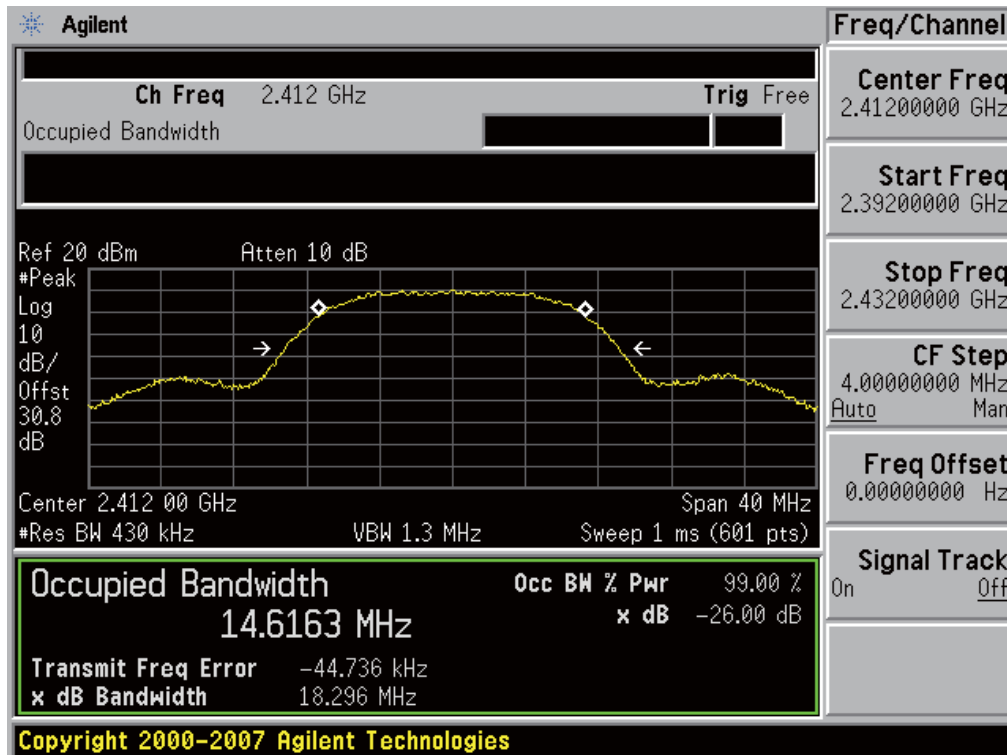
802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
2412	1	17.6963
2437	6	17.7145
2462	11	17.6625

Conducted OBW Measurements for 802.11n_40 MHz BW

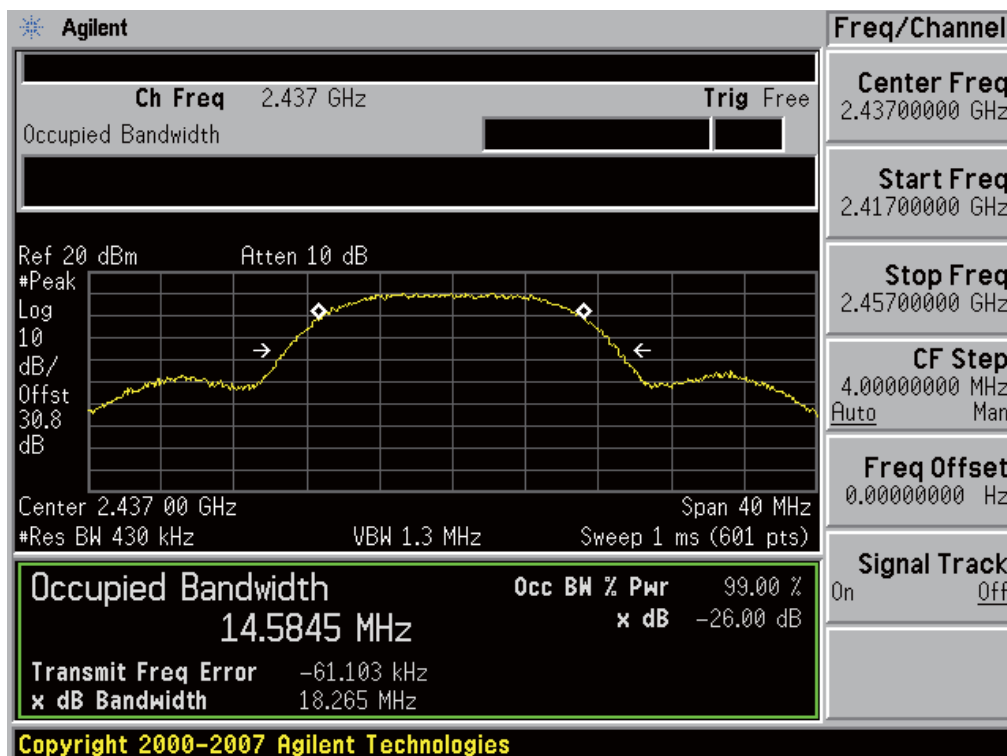
802.11n Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
2422	3	35.8628
2437	6	35.9200
2452	9	35.8958

■ RESULT PLOTS

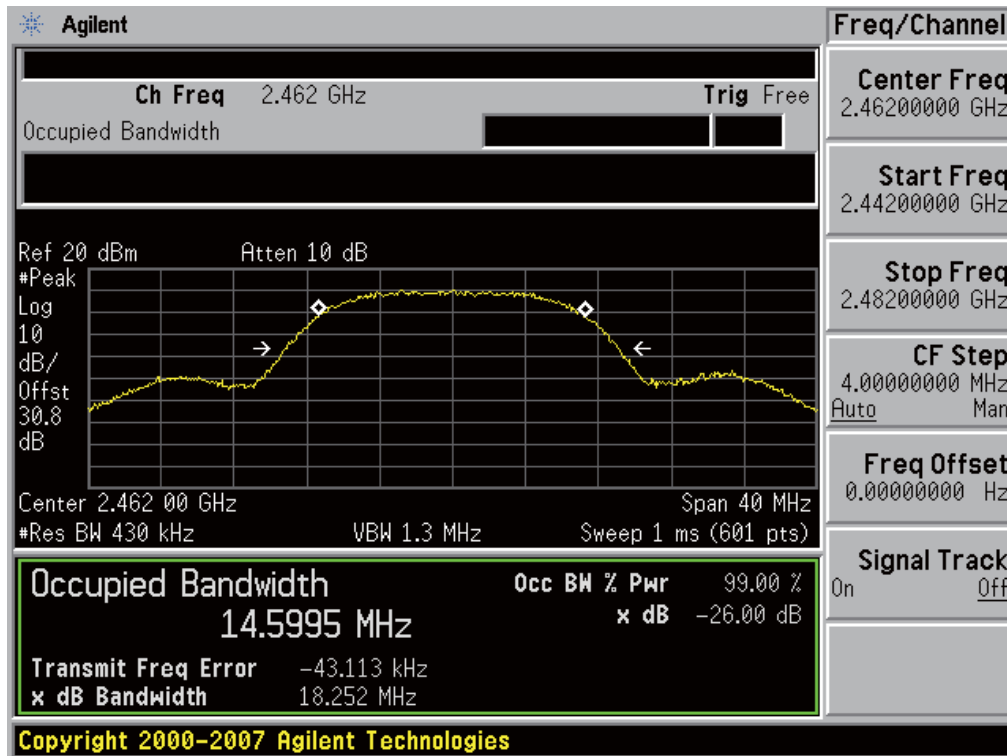
OBW plot (802.11b-CH 1)



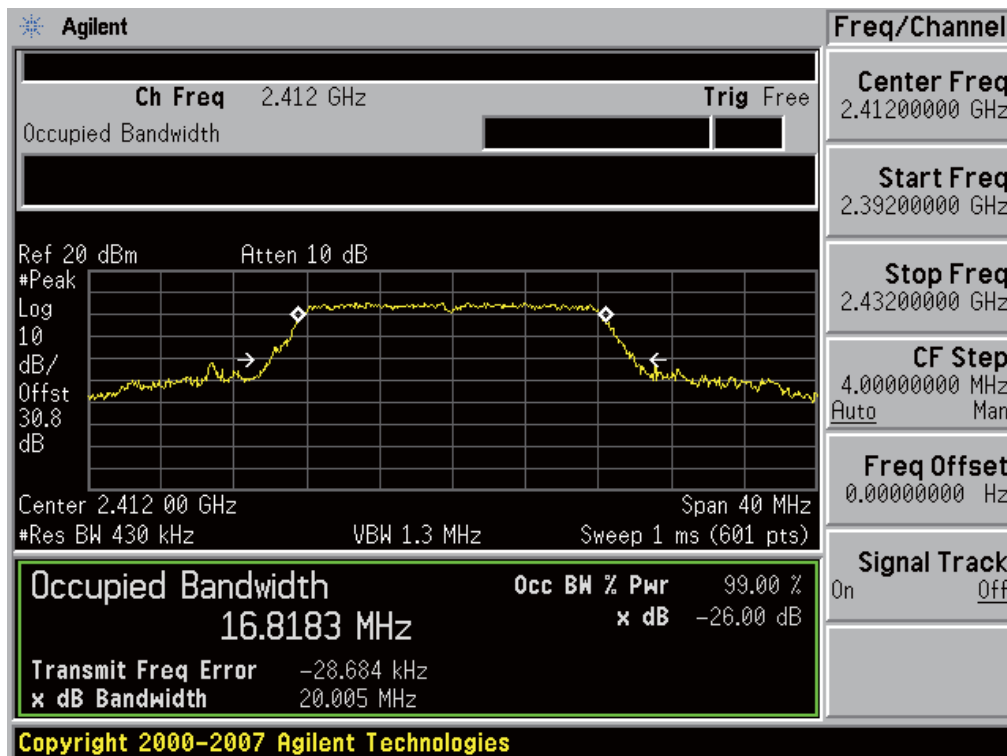
OBW plot (802.11b-CH 6)



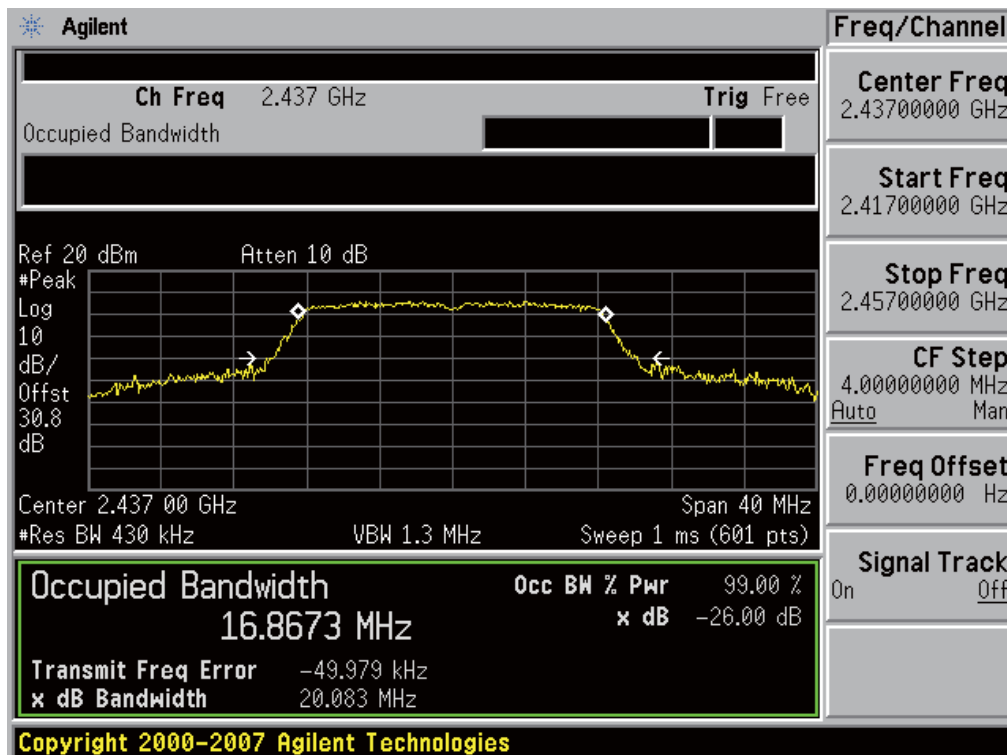
OBW plot (802.11b-CH 11)



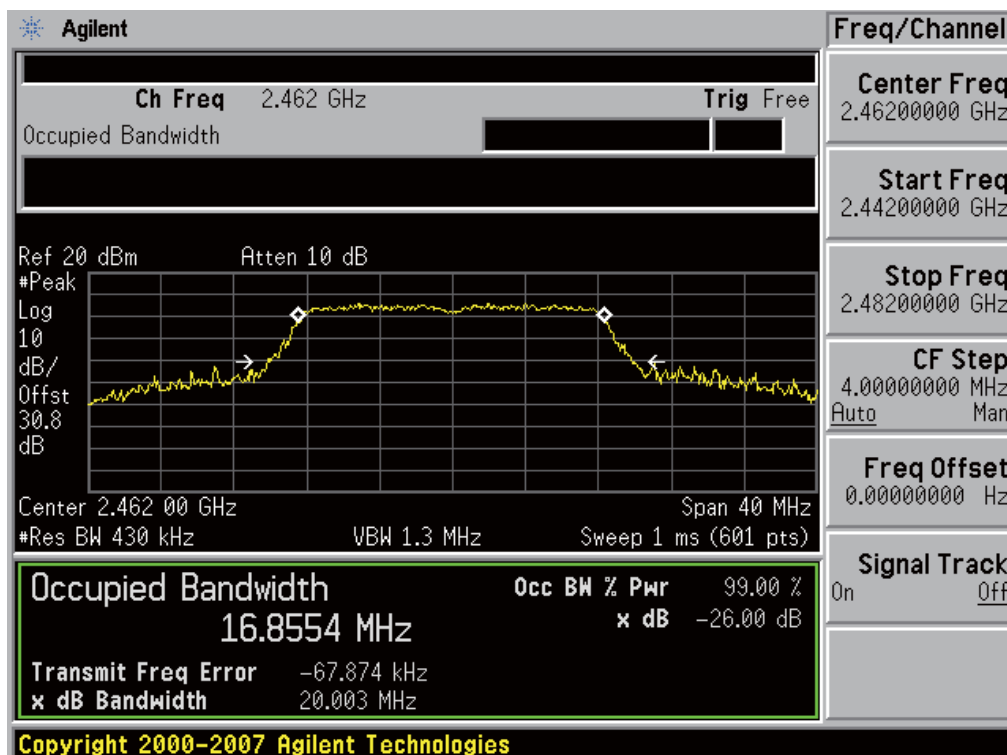
OBW plot (802.11g-CH 1)



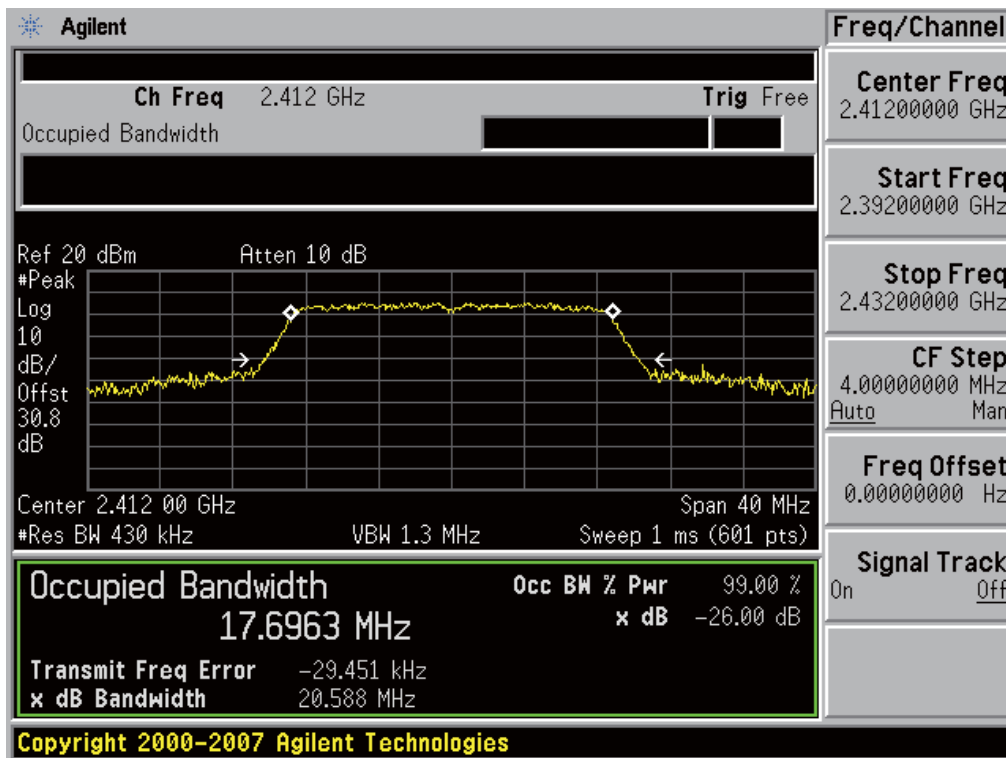
OBW plot (802.11g-CH 6)



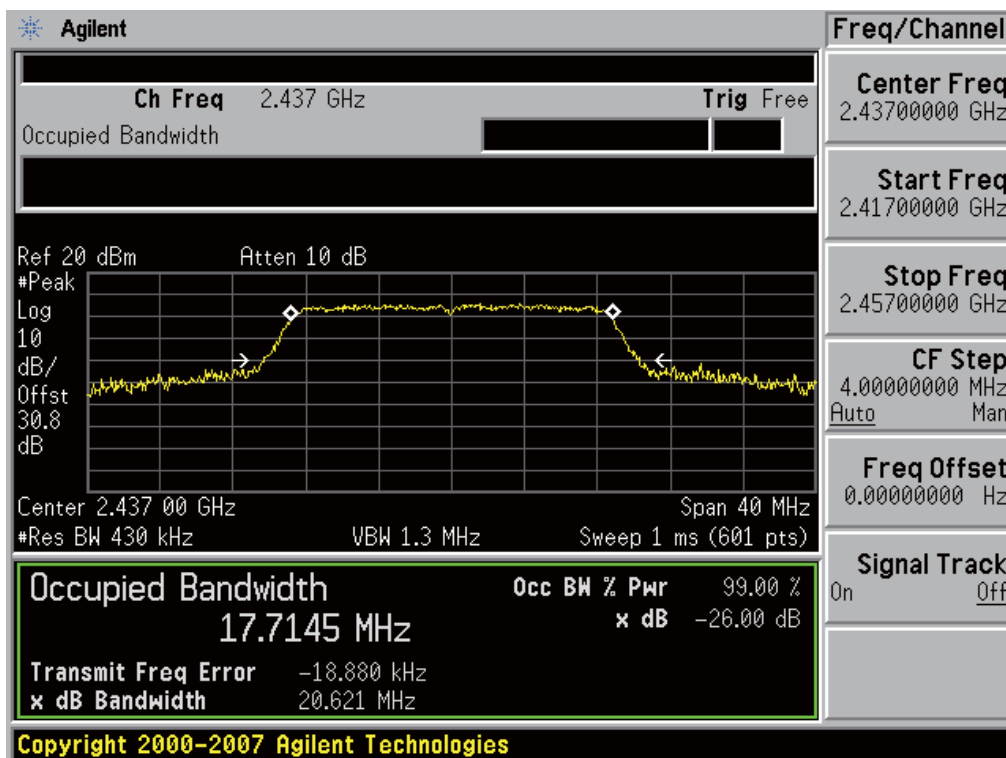
OBW plot (802.11g-CH 11)



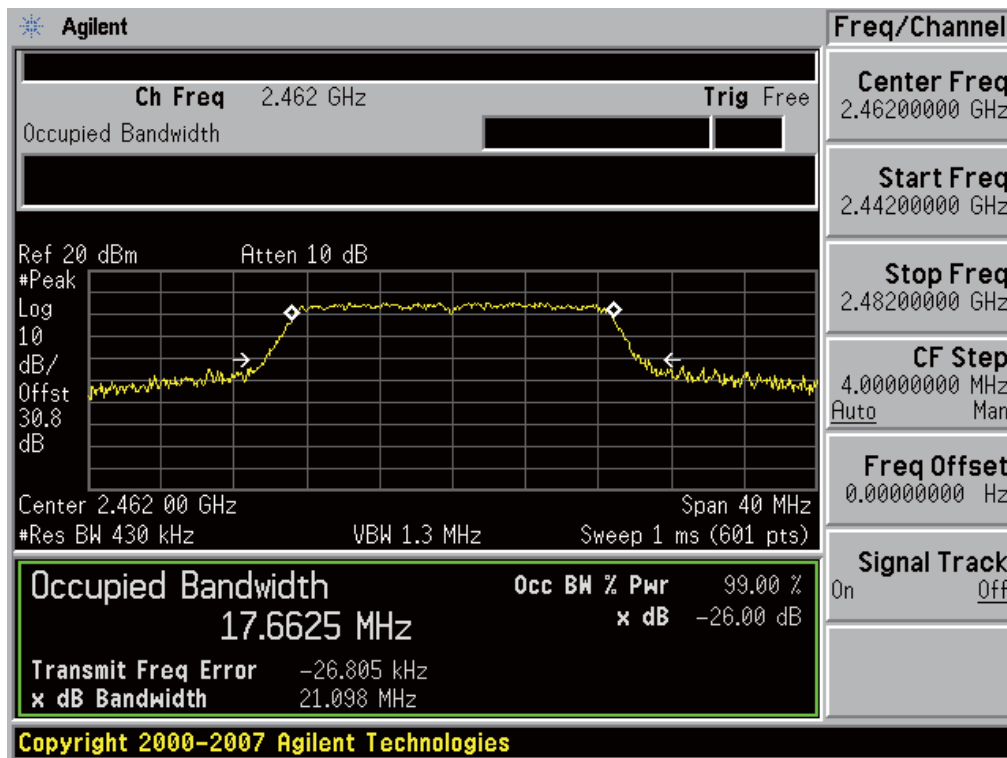
OBW plot (802.11n-CH 1)_20 MHz BW



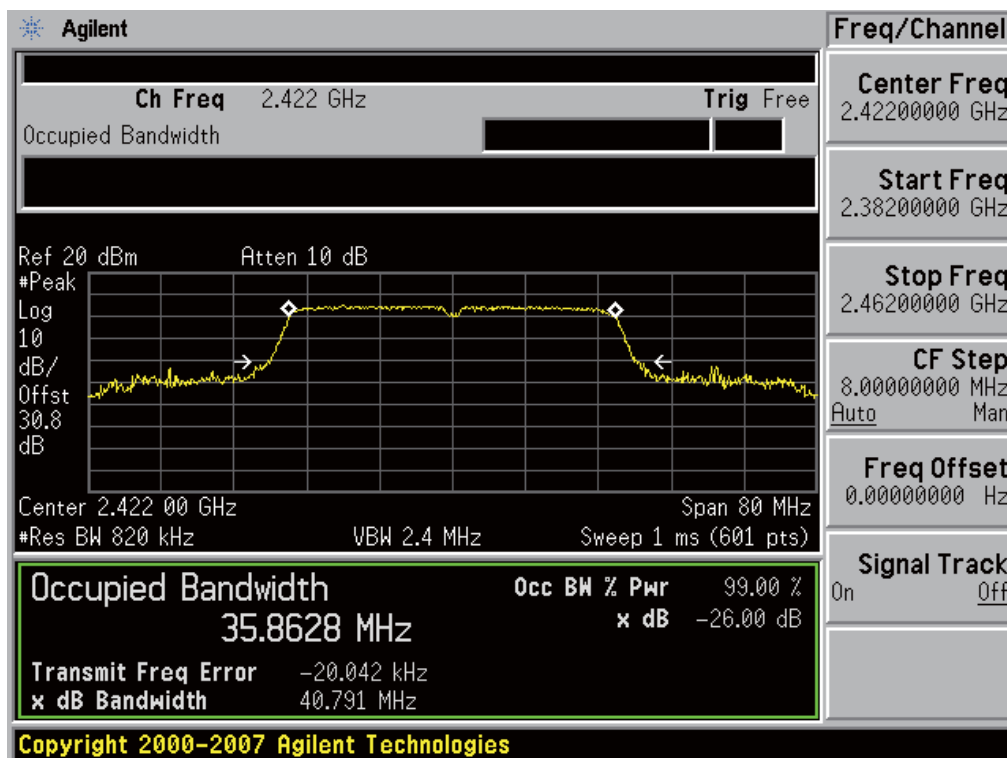
OBW plot (802.11n-CH 6)_20 MHz BW



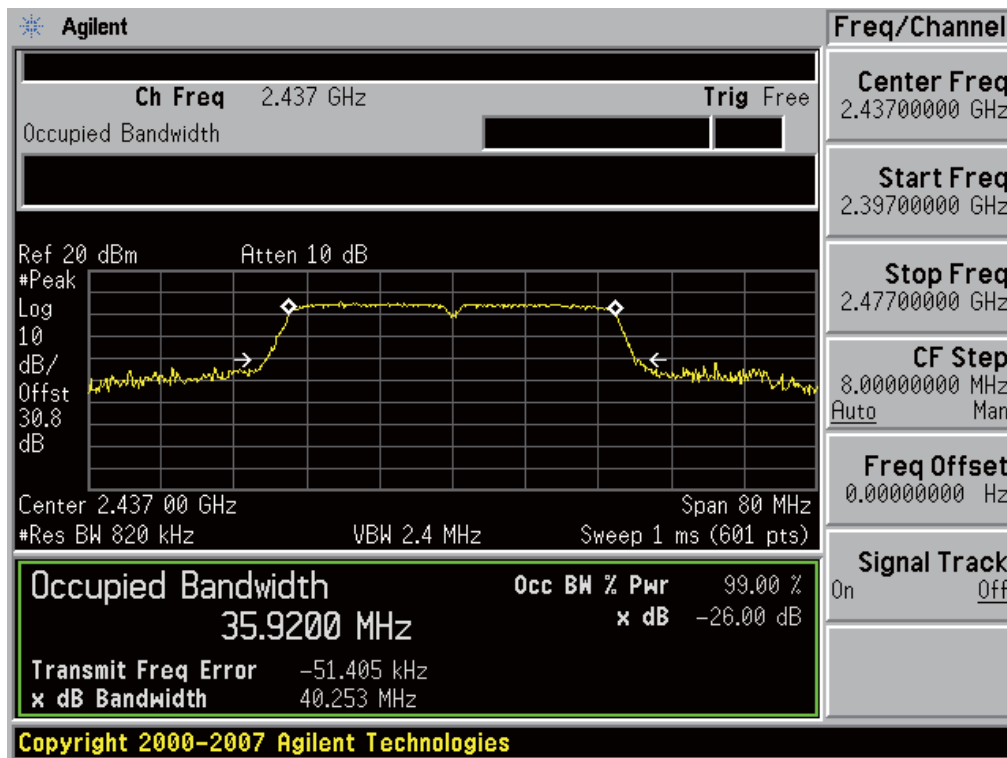
OBW plot (802.11n-CH 11) _20 MHz BW



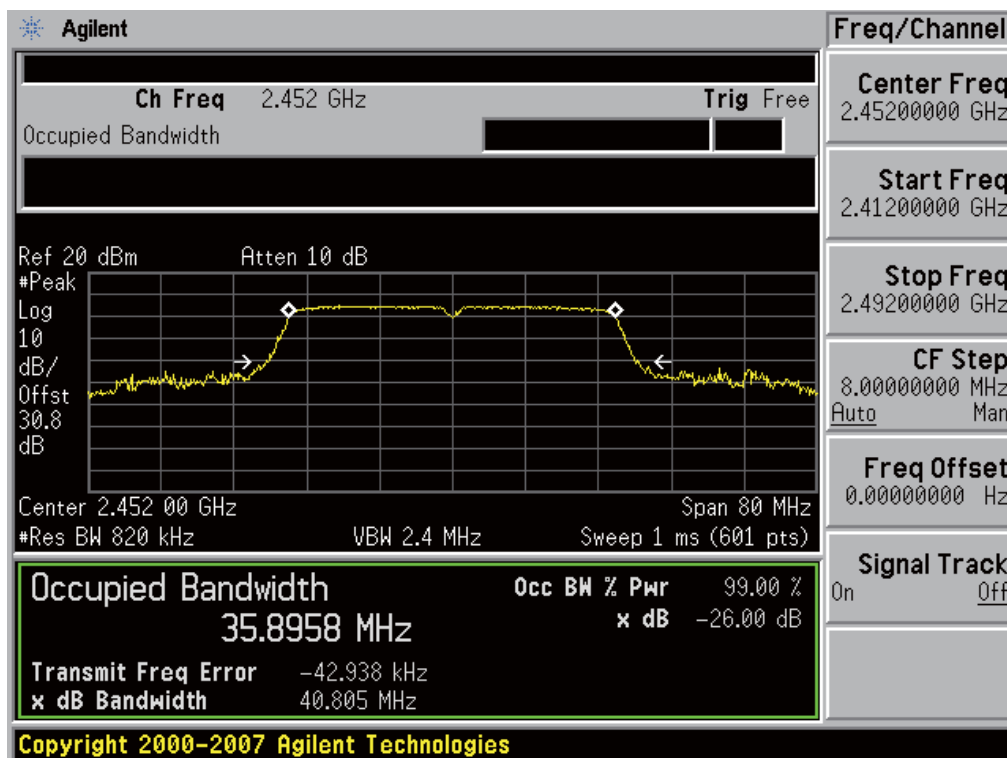
OBW plot (802.11n-CH 3) _ 40 MHz BW



OBW plot (802.11n-CH 6) _ 40 MHz BW



OBW plot (802.11n-CH 9) _ 40 MHz BW



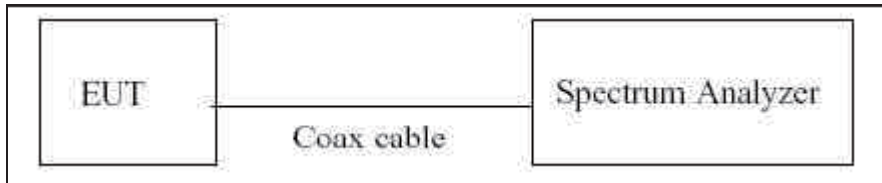
7.3 OUTPUT POWER MEASUREMENT (802.11b/g/n)

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.

The Spectrum Analyzer is set to

RBW: 1 MHz

VBW: 1 MHz

SPAN: 40 MHz

Detector Mode = Peak

■ TEST RESULTS

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	17.83	30
		2 Mbps	18.62	30
		5.5 Mbps	20.33	30
		11 Mbps	21.89	30
2437	6	1 Mbps	17.23	30
		2 Mbps	18.83	30
		5.5 Mbps	19.14	30
		11 Mbps	21.46	30
2462	11	1 Mbps	18.43	30
		2 Mbps	18.79	30
		5.5 Mbps	19.59	30
		11 Mbps	20.93	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	19.71	30
		9 Mbps	18.92	30
		12 Mbps	20.08	30
		18 Mbps	20.07	30
		24 Mbps	20.56	30
		36 Mbps	20.15	30
		48 Mbps	20.55	30
		54 Mbps	20.88	30
2437	6	6 Mbps	19.88	30
		9 Mbps	20.74	30
		12 Mbps	21.16	30
		18 Mbps	20.03	30
		24 Mbps	21.11	30
		36 Mbps	21.25	30
		48 Mbps	21.35	30
		54 Mbps	21.64	30
2462	11	6 Mbps	19.34	30
		9 Mbps	19.00	30
		12 Mbps	18.72	30
		18 Mbps	18.84	30
		24 Mbps	19.57	30
		36 Mbps	19.53	30
		48 Mbps	20.02	30
		54 Mbps	20.38	30

Conducted Output Power Measurements (802.11n Mode) _ 20 MHz BW

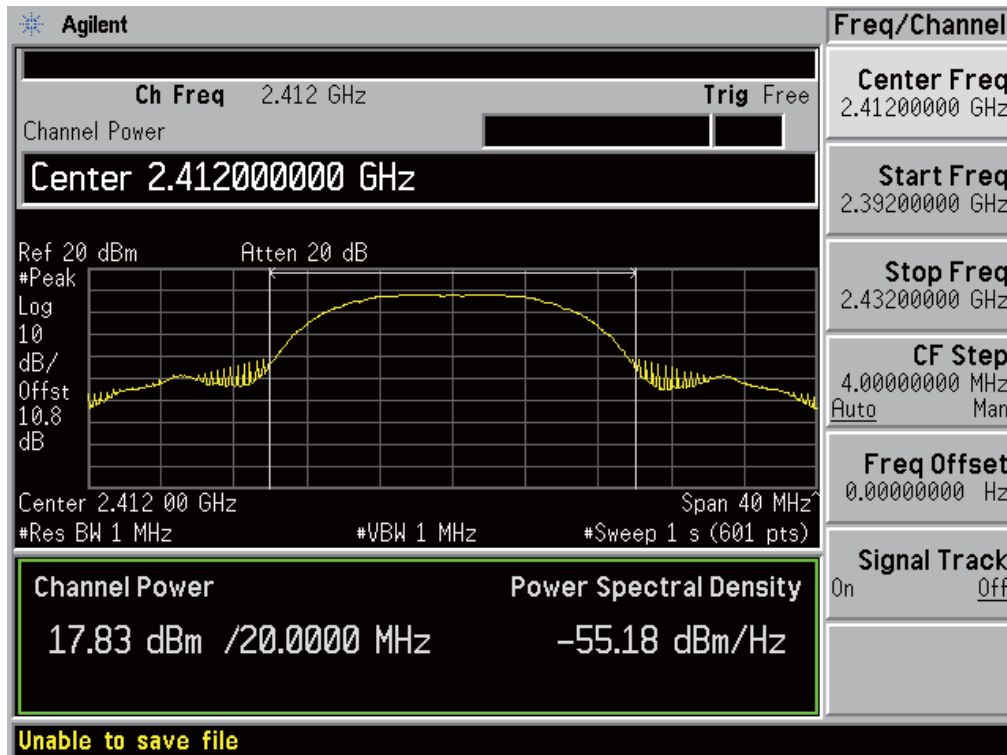
802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6.5 Mbps	19.98	30
		13 Mbps	20.06	30
		19.5 Mbps	20.07	30
		26 Mbps	20.47	30
		39 Mbps	20.45	30
		52 Mbps	20.54	30
		58.5 Mbps	20.86	30
		65 Mbps	20.23	30
2437	6	6.5 Mbps	20.61	30
		13 Mbps	21.05	30
		19.5 Mbps	21.18	30
		26 Mbps	21.23	30
		39 Mbps	21.16	30
		52 Mbps	20.97	30
		58.5 Mbps	21.31	30
		65 Mbps	21.26	30
2462	11	6.5 Mbps	19.12	30
		13 Mbps	19.14	30
		19.5 Mbps	19.11	30
		26 Mbps	19.75	30
		39 Mbps	19.88	30
		52 Mbps	19.91	30
		58.5 Mbps	20.29	30
		65 Mbps	20.27	30

Conducted Output Power Measurements (802.11n Mode) _ 40 MHz BW

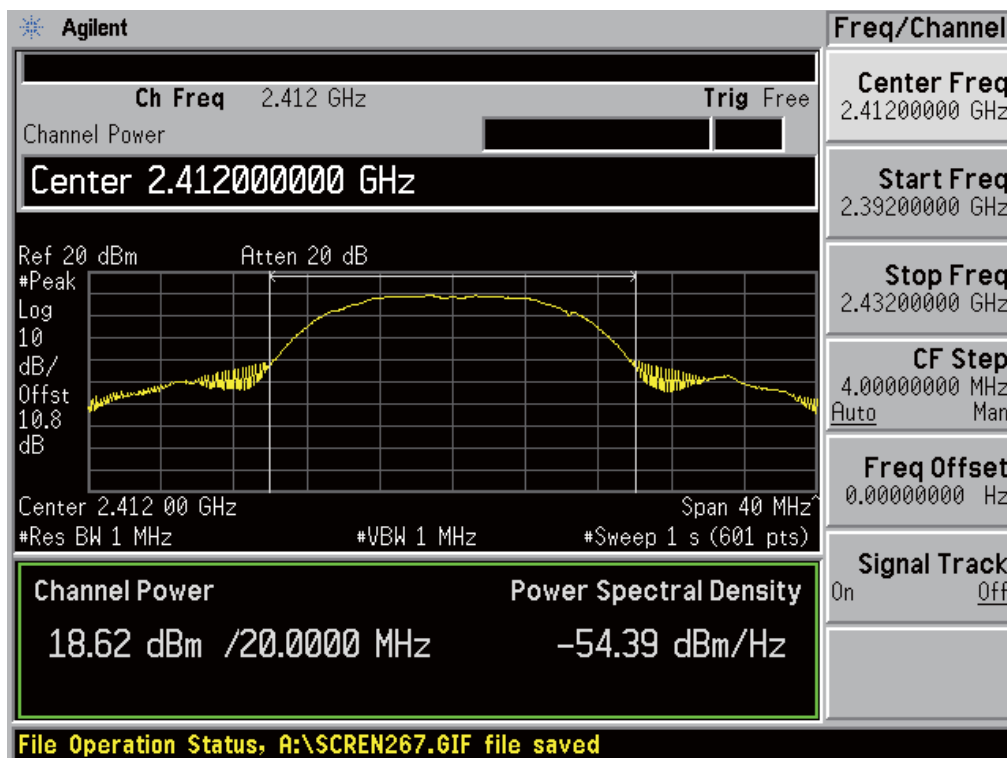
802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2422	3	13.5 Mbps	20.47	30
		27 Mbps	20.36	30
		40.5 Mbps	20.29	30
		54 Mbps	20.48	30
		81 Mbps	20.86	30
		108 Mbps	19.51	30
		121.5 Mbps	19.55	30
		135 Mbps	19.44	30
2437	6	13.5 Mbps	20.92	30
		27 Mbps	21.01	30
		40.5 Mbps	20.53	30
		54 Mbps	20.99	30
		81 Mbps	21.05	30
		108 Mbps	20.72	30
		121.5 Mbps	20.80	30
		135 Mbps	20.59	30
2452	9	13.5 Mbps	20.41	30
		27 Mbps	20.26	30
		40.5 Mbps	20.49	30
		54 Mbps	21.03	30
		81 Mbps	21.36	30
		108 Mbps	21.43	30
		121.5 Mbps	21.37	30
		135 Mbps	21.33	30

■ RESULT PLOTS

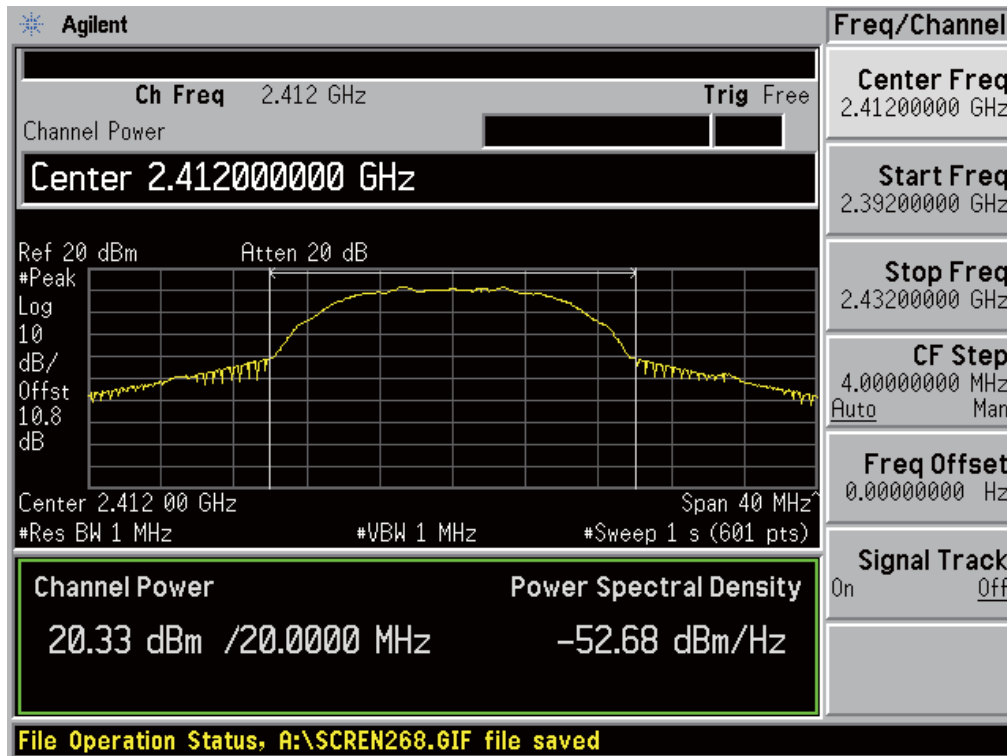
Conducted Output Power (802.11b-CH 1) 1Mbps



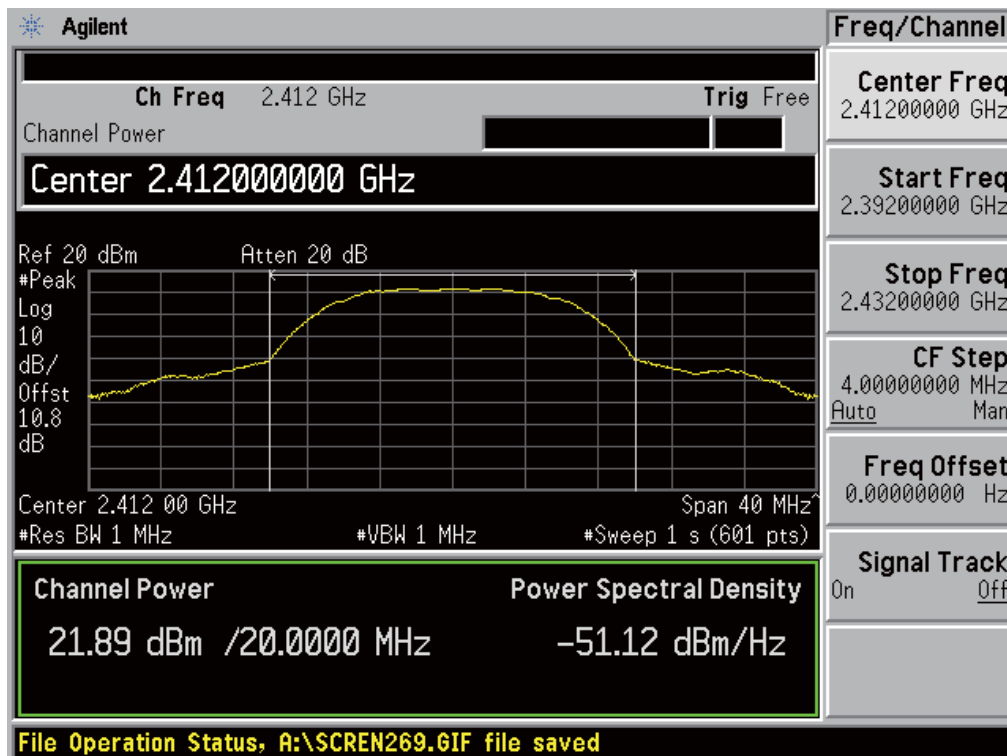
Conducted Output Power (802.11b-CH 1) 2Mbps



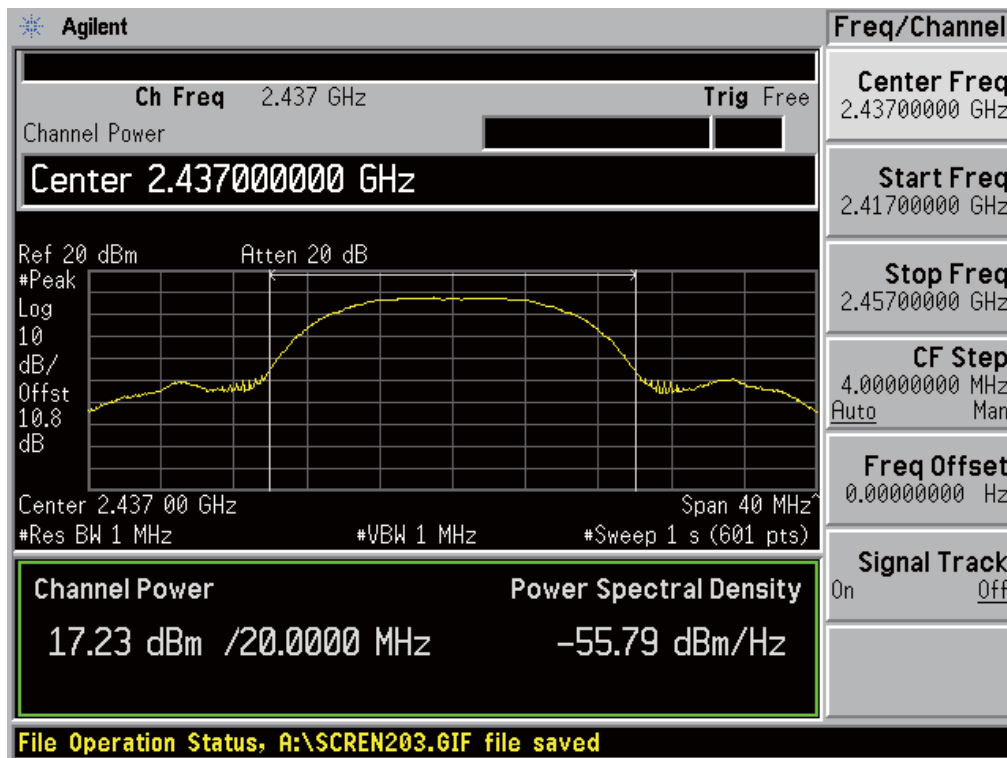
Conducted Output Power (802.11b-CH 1) 5.5Mbps



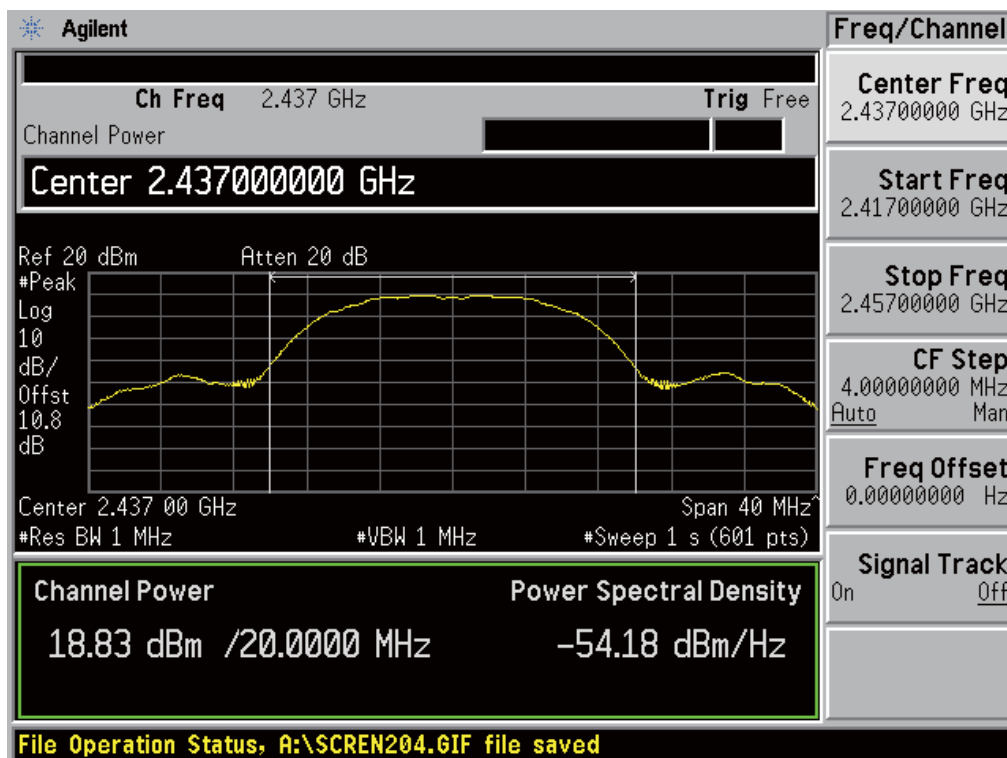
Conducted Output Power (802.11b-CH 1) 11Mbps



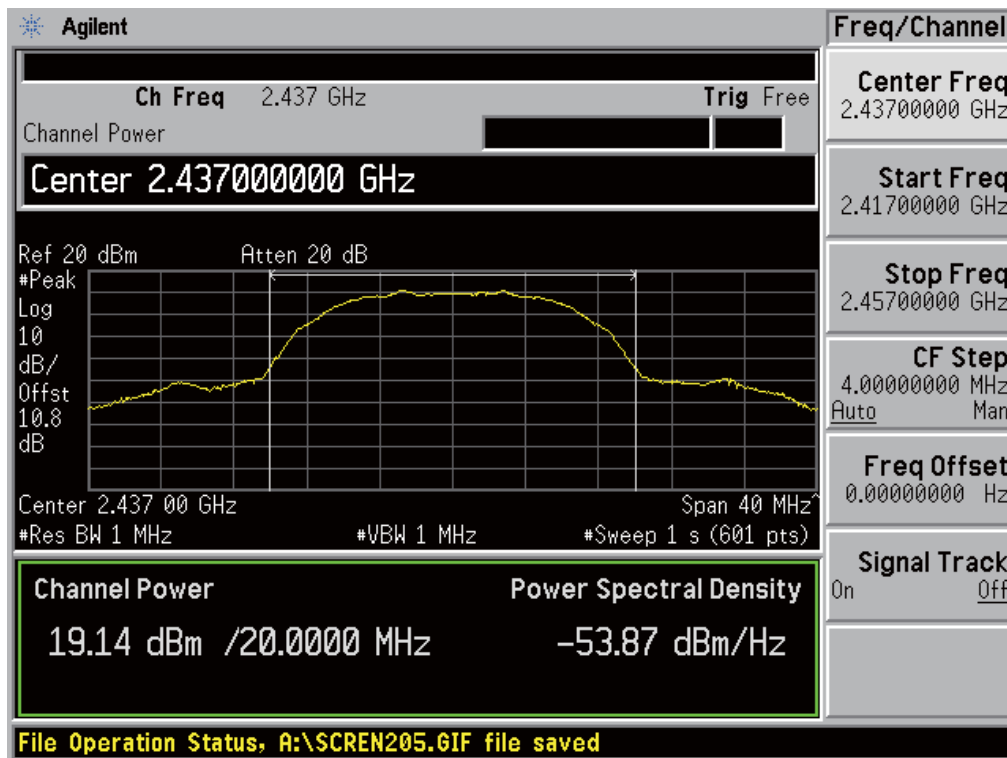
Conducted Output Power (802.11b-CH 6) 1Mbps



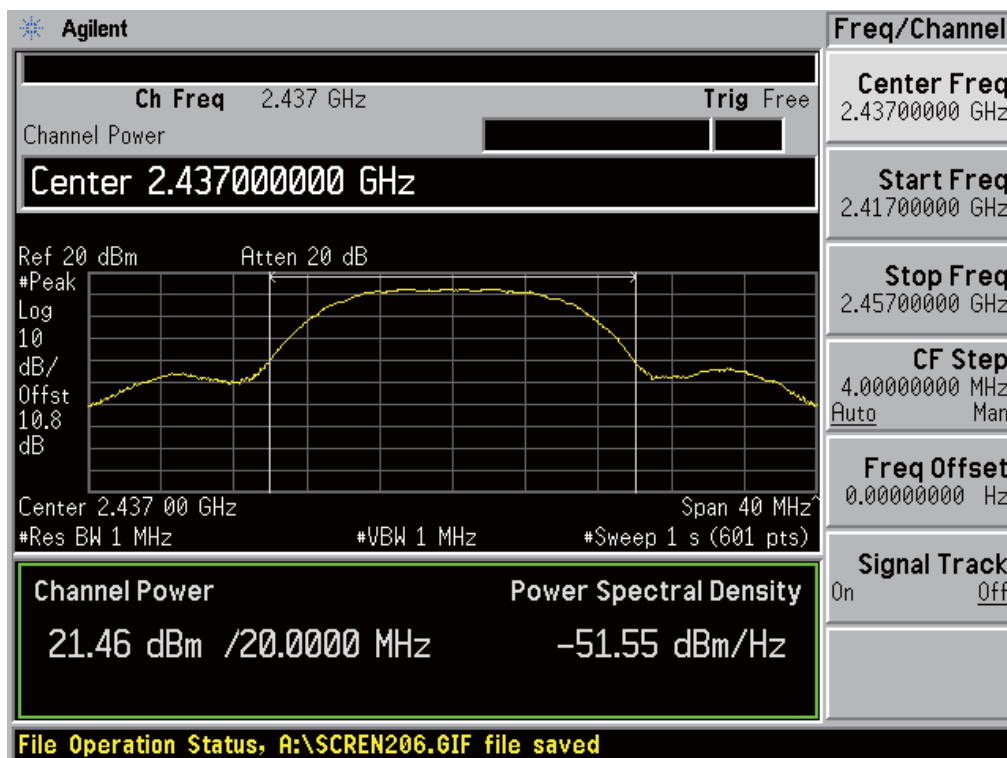
Conducted Output Power (802.11b-CH 6) 2Mbps



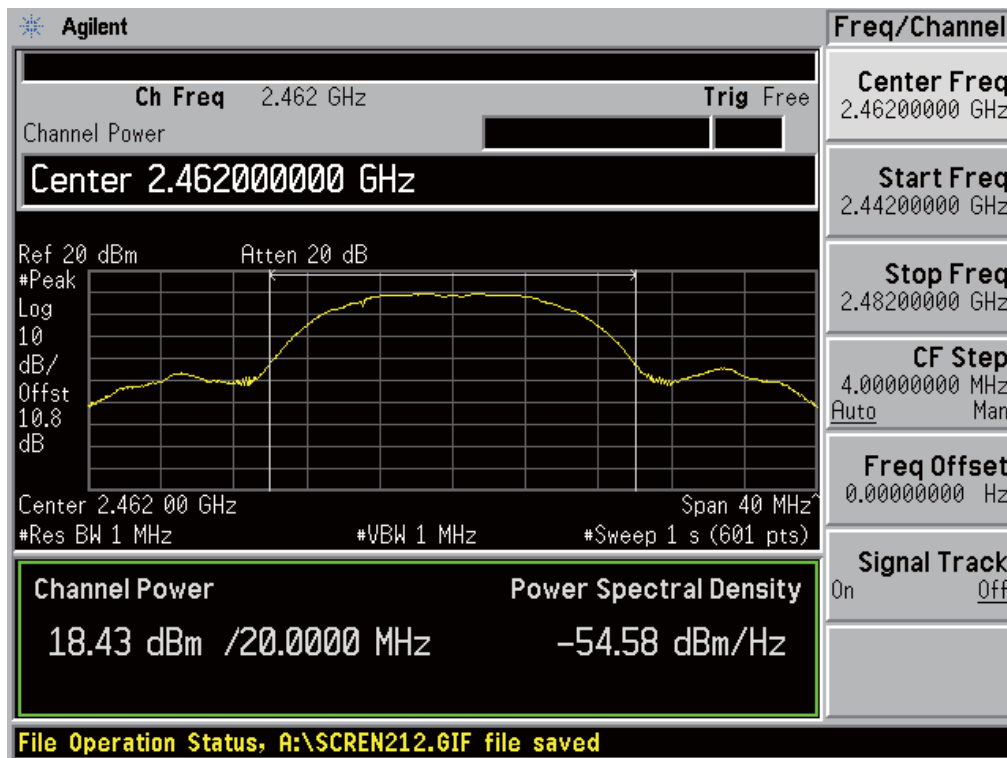
Conducted Output Power (802.11b-CH 6) 5.5Mbps



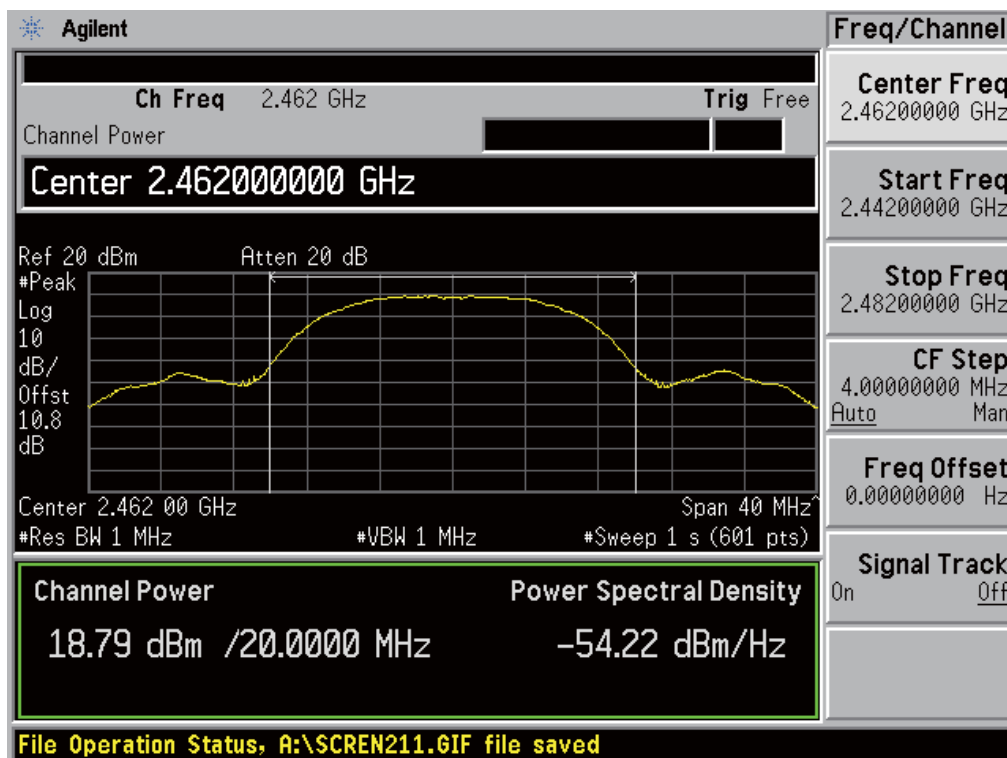
Conducted Output Power (802.11b-CH 6) 11Mbps



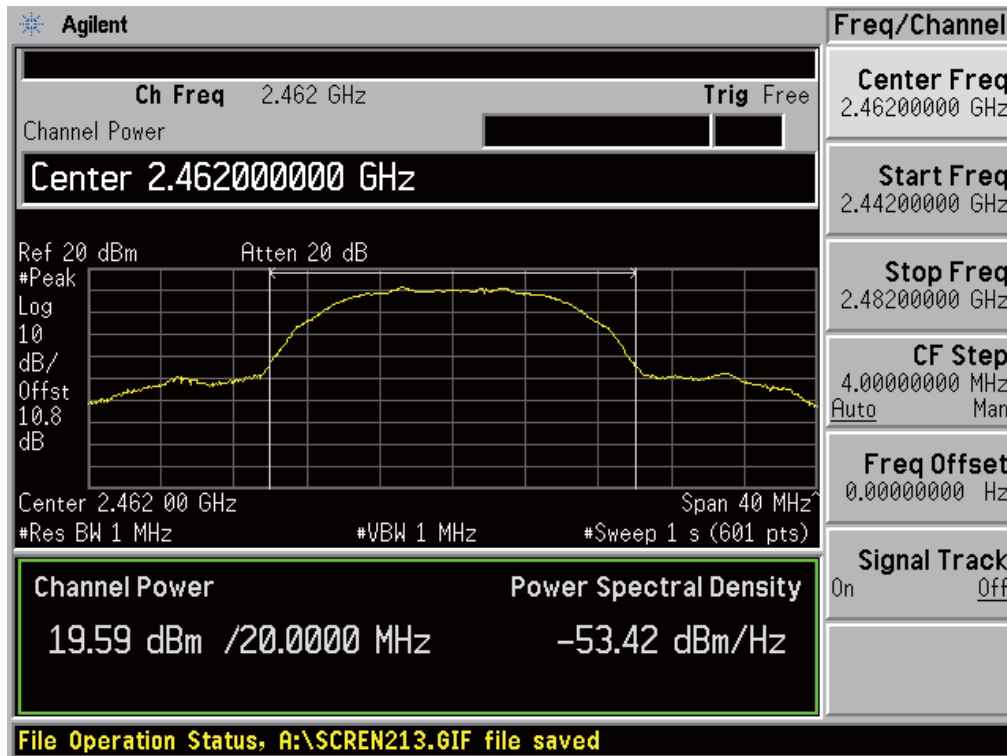
Conducted Output Power (802.11b-CH 11) 1Mbps



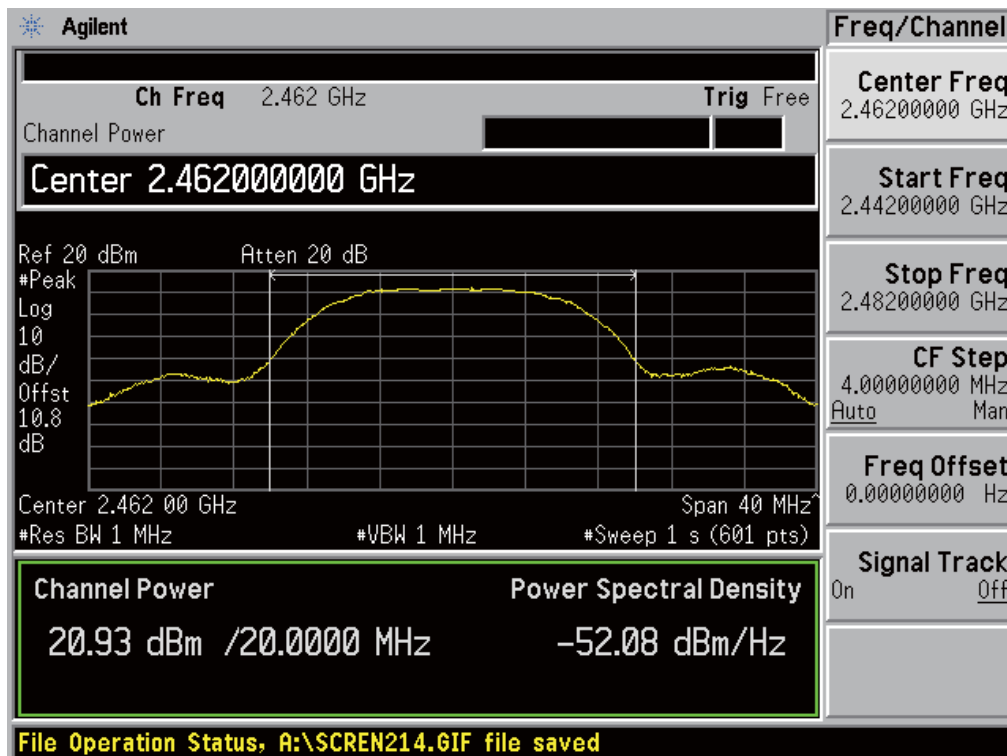
Conducted Output Power (802.11b-CH 11) 2Mbps



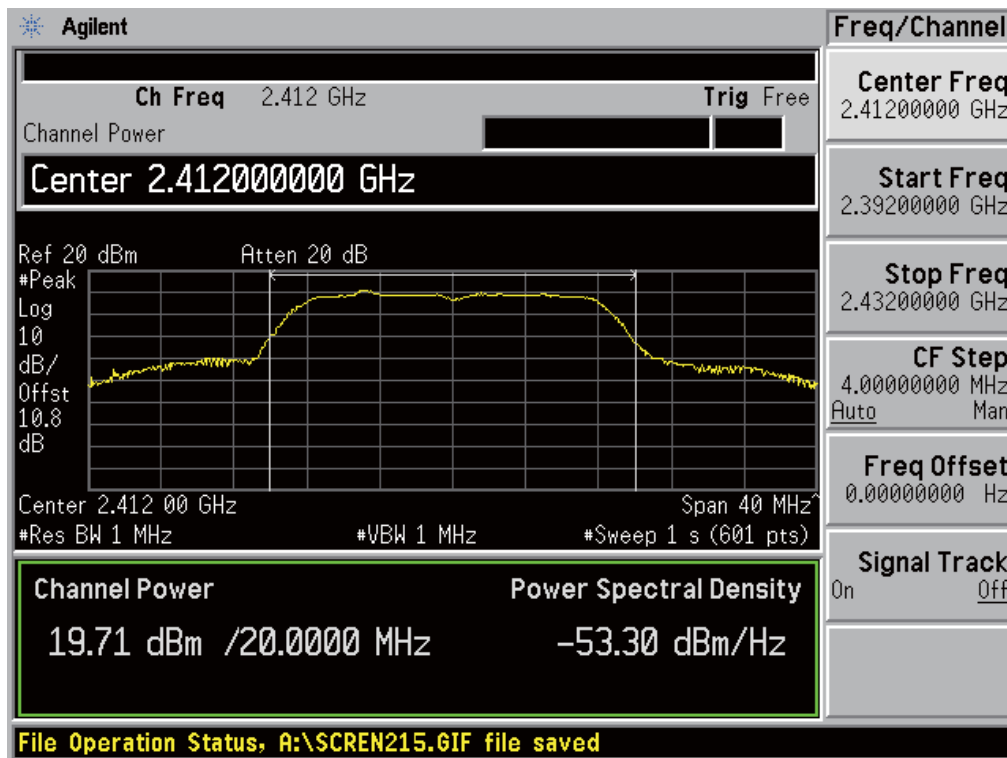
Conducted Output Power (802.11b-CH 11) 5.5Mbps



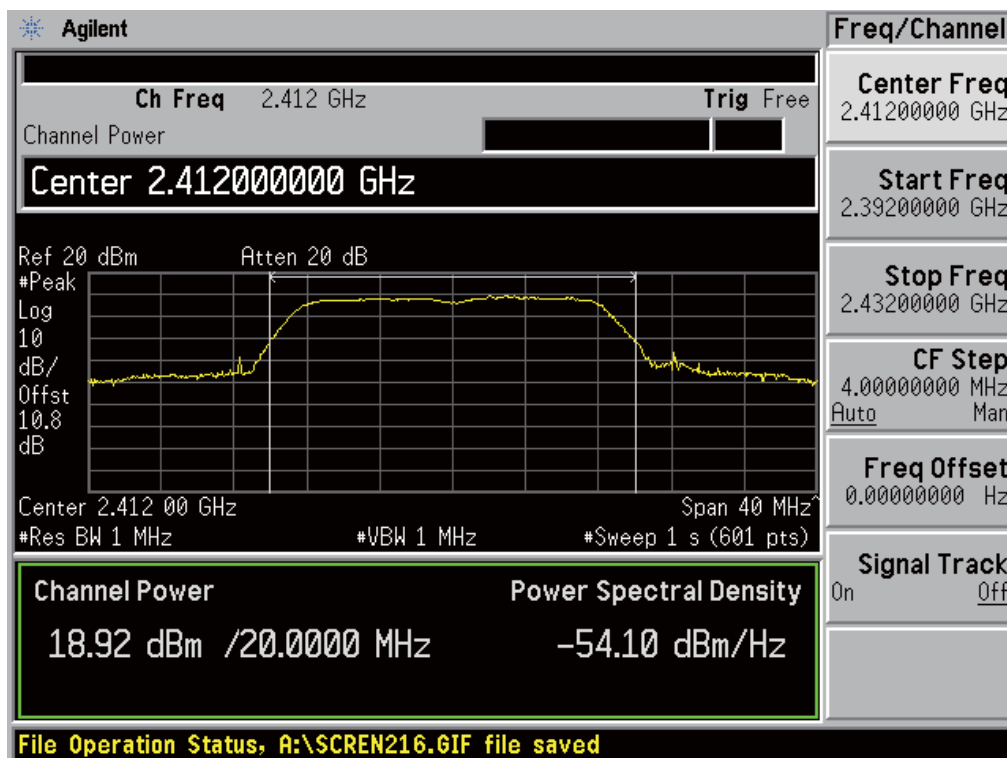
Conducted Output Power (802.11b-CH 11) 11Mbps



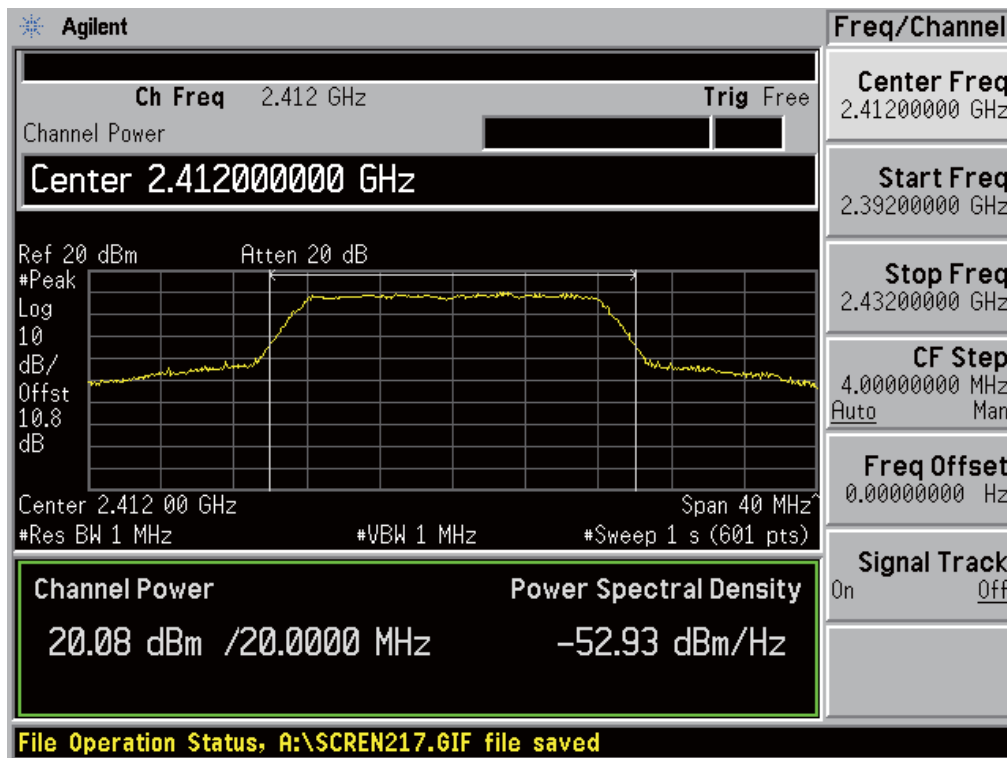
Conducted Output Power (802.11g-CH 1) 6Mbps



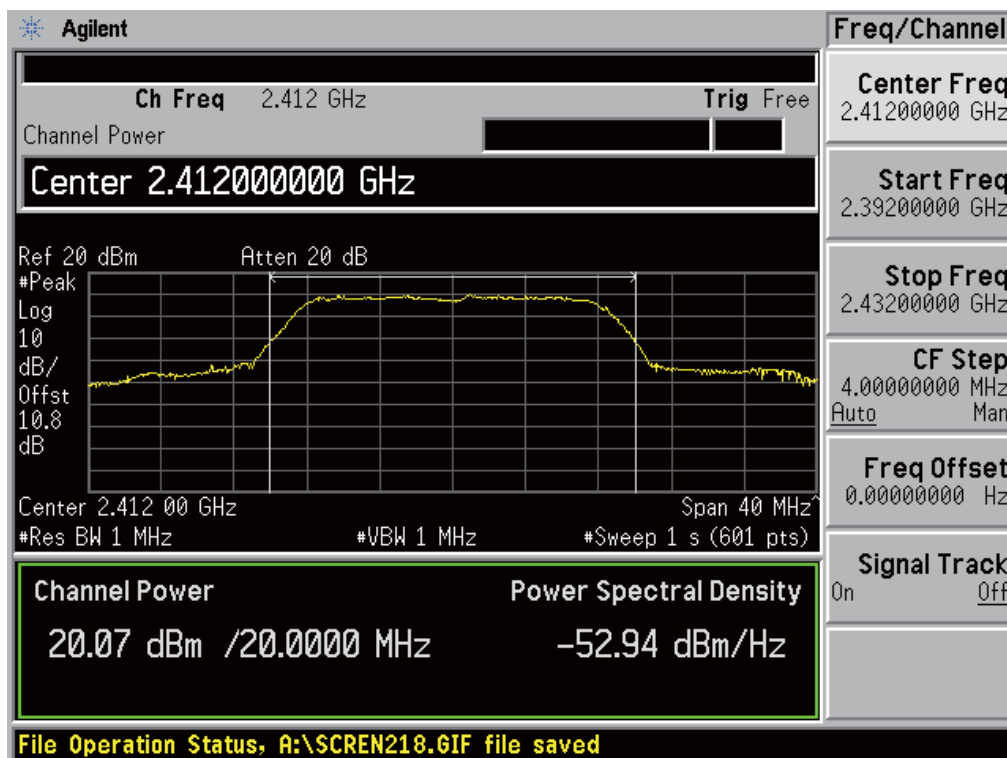
Conducted Output Power (802.11g-CH 1) 9Mbps



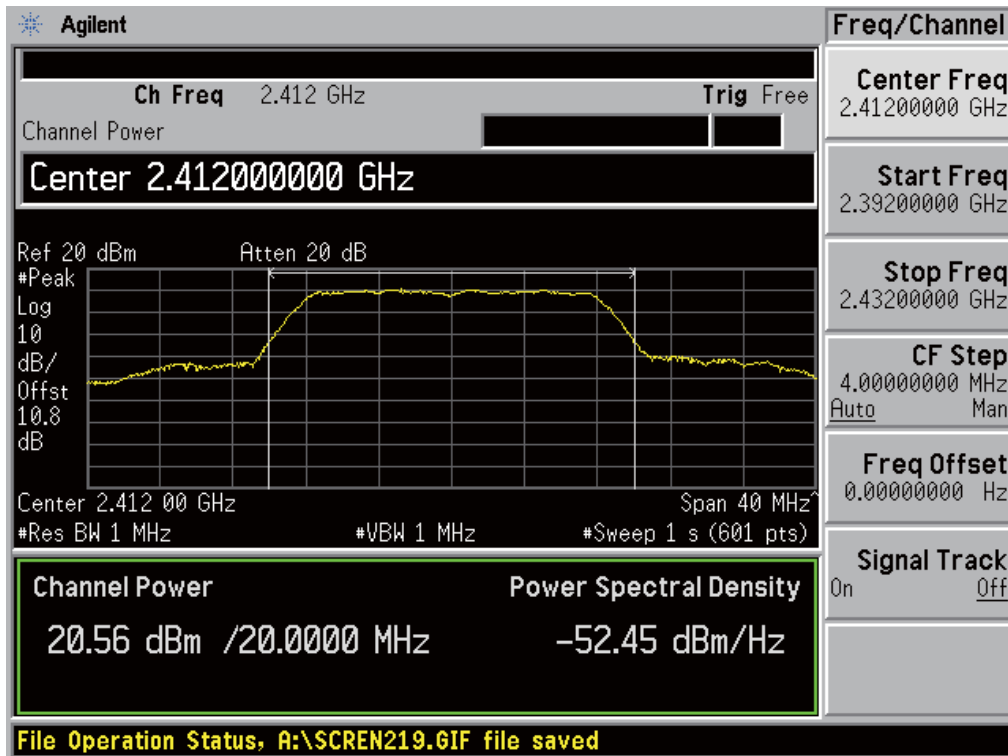
Conducted Output Power (802.11g-CH 1) 12Mbps



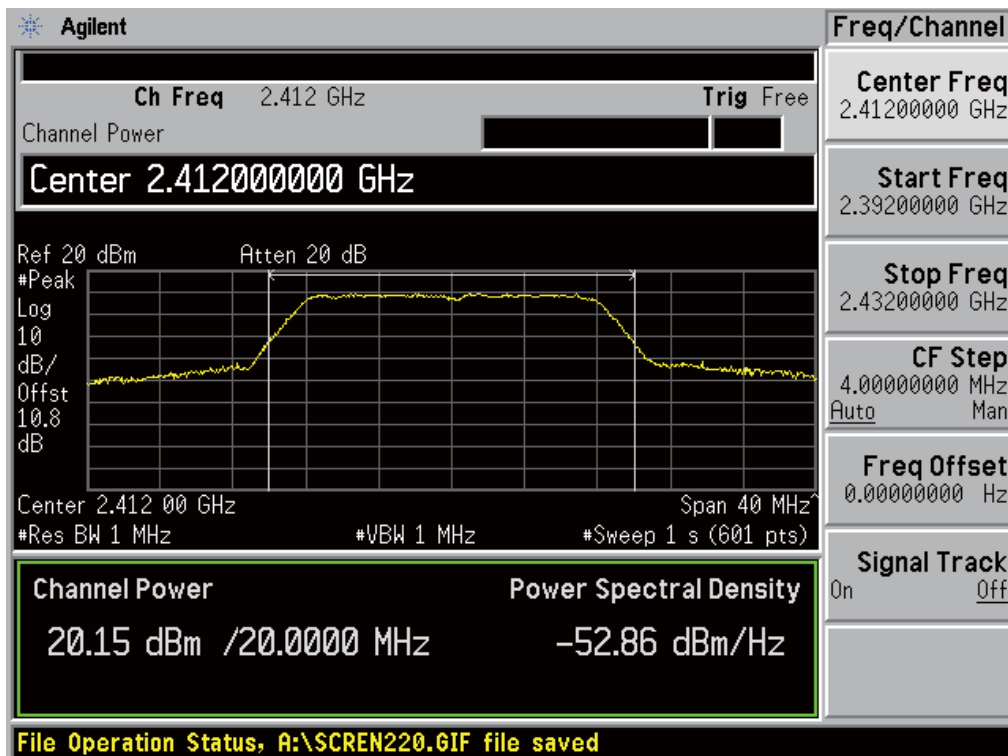
Conducted Output Power (802.11g-CH 1) 18Mbps



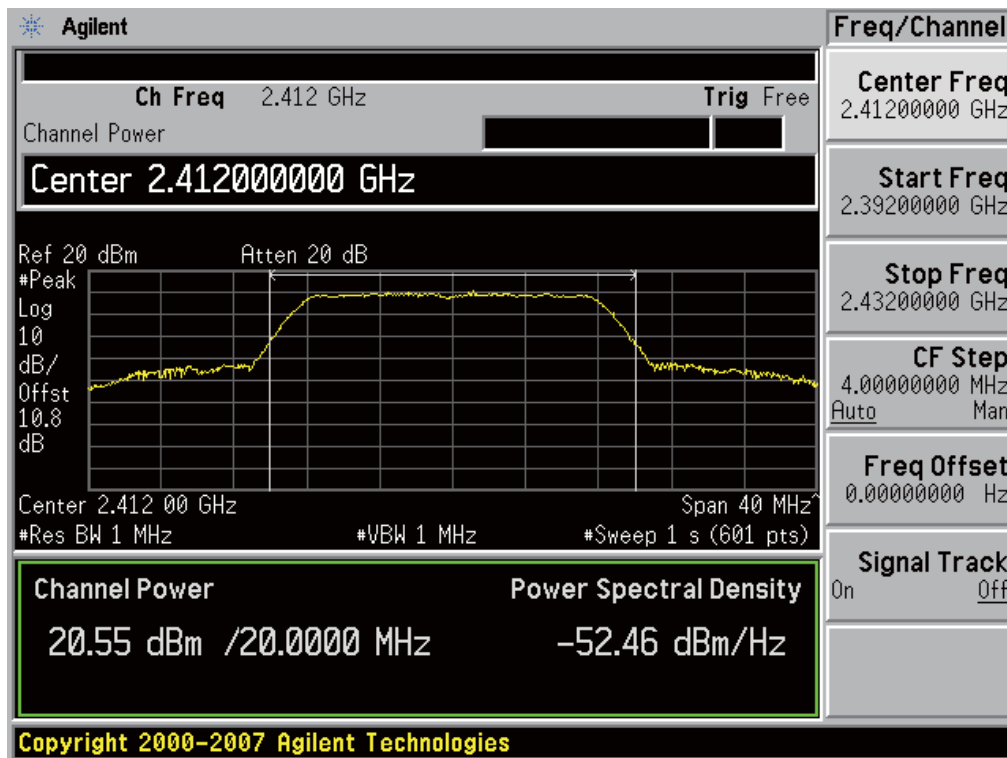
Conducted Output Power (802.11g-CH 1) 24Mbps



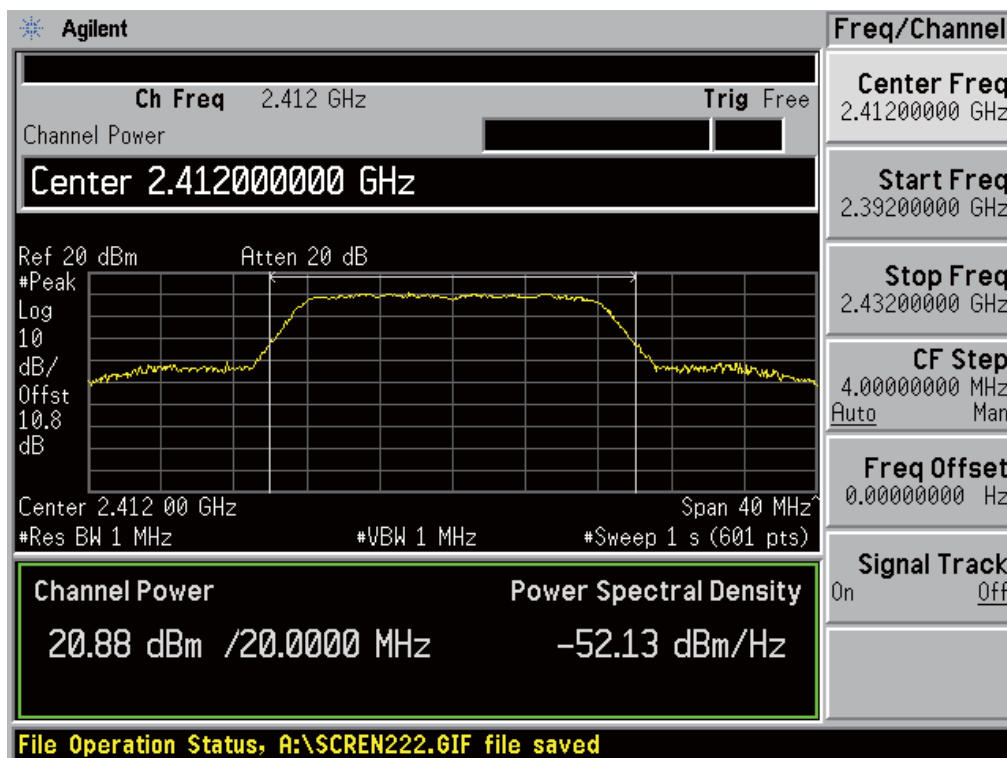
Conducted Output Power (802.11g-CH 1) 36Mbps



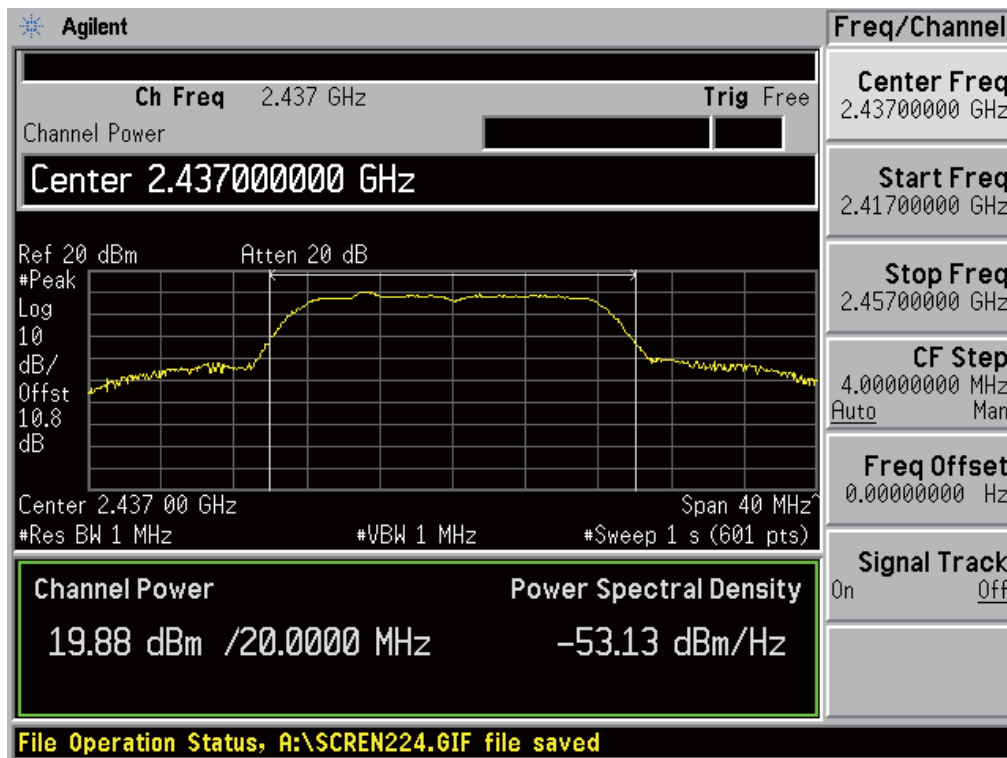
Conducted Output Power (802.11g-CH 1) 48Mbps



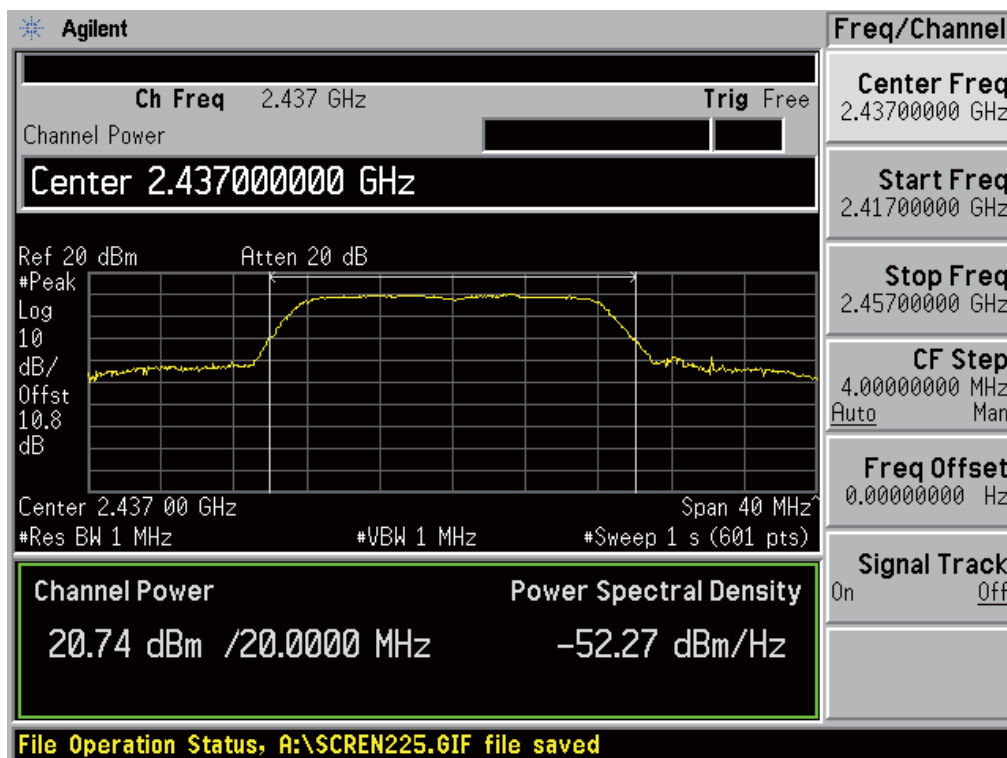
Conducted Output Power (802.11g-CH 1) 54Mbps



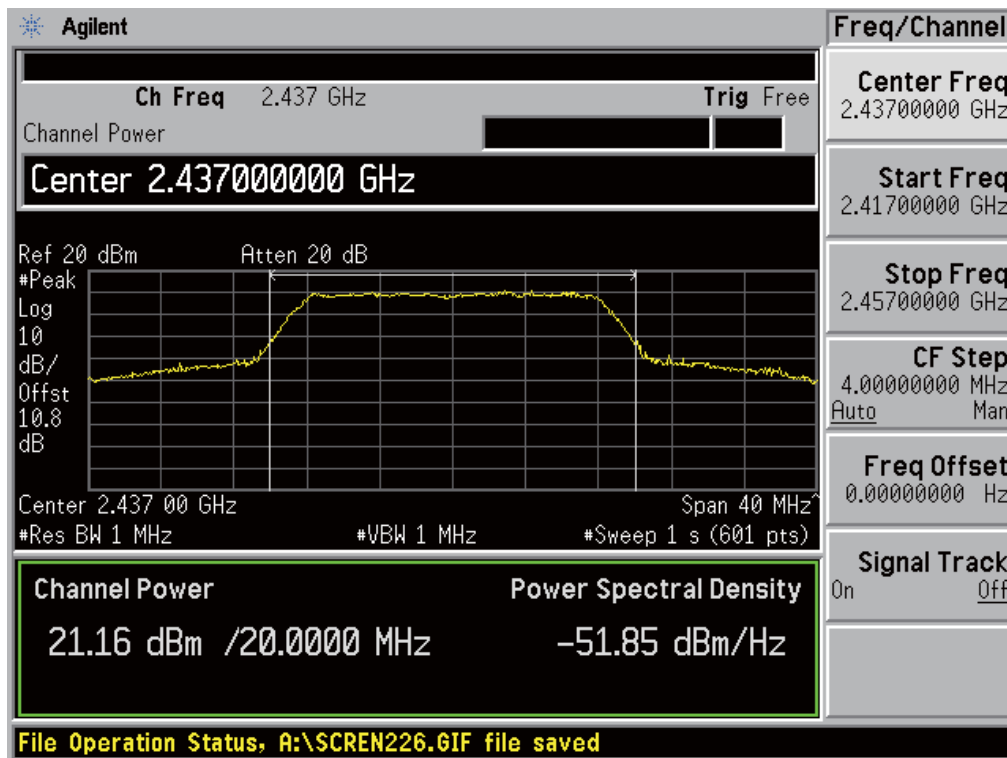
Conducted Output Power (802.11g-CH 6) 6Mbps



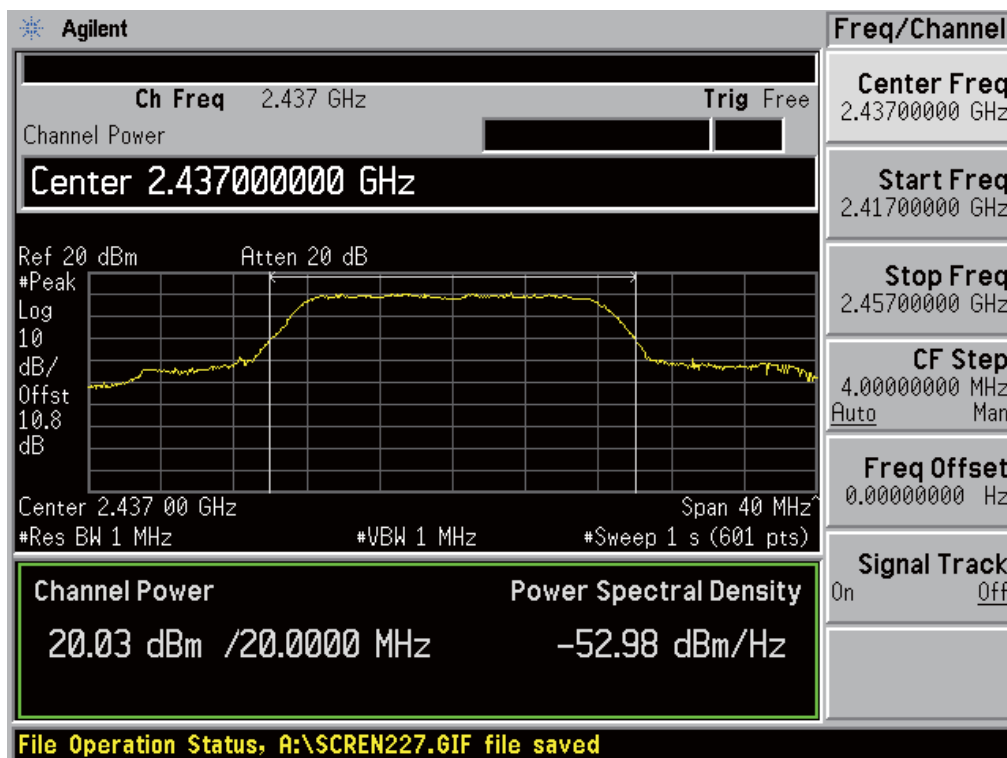
Conducted Output Power (802.11g-CH 6) 9Mbps



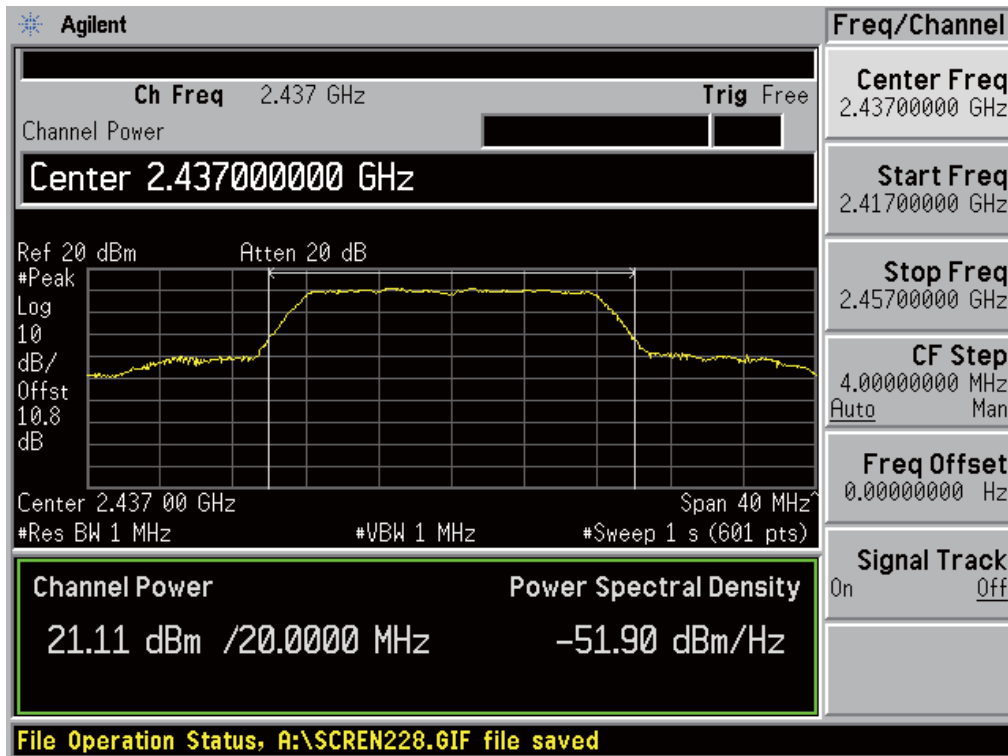
Conducted Output Power (802.11g-CH 6) 12Mbps



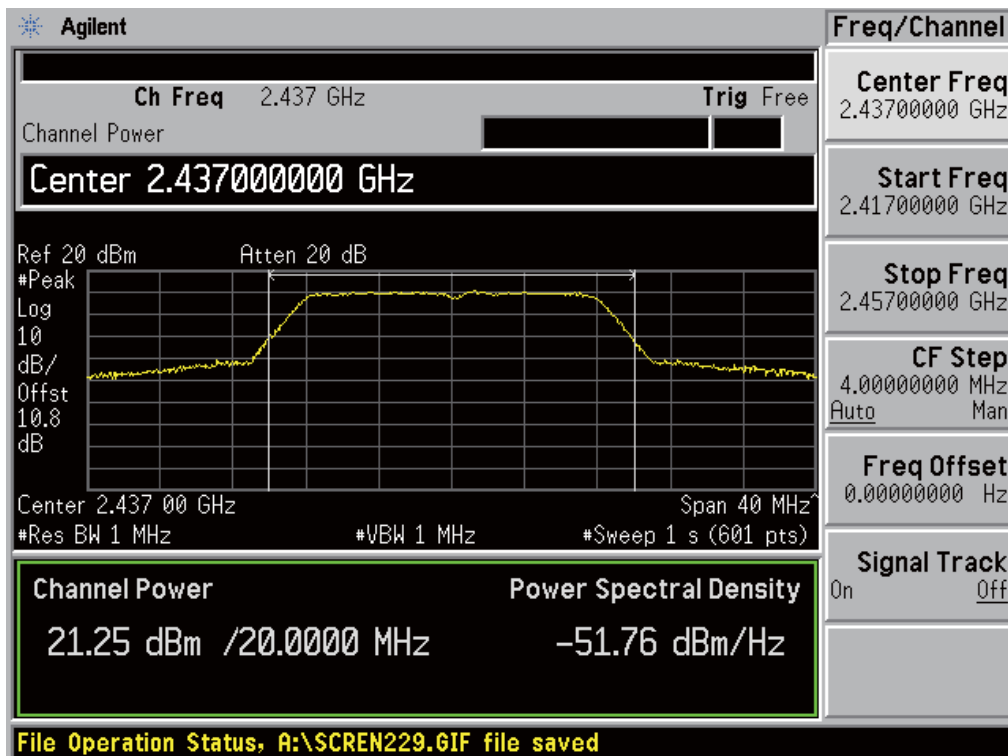
Conducted Output Power (802.11g-CH 6) 18Mbps



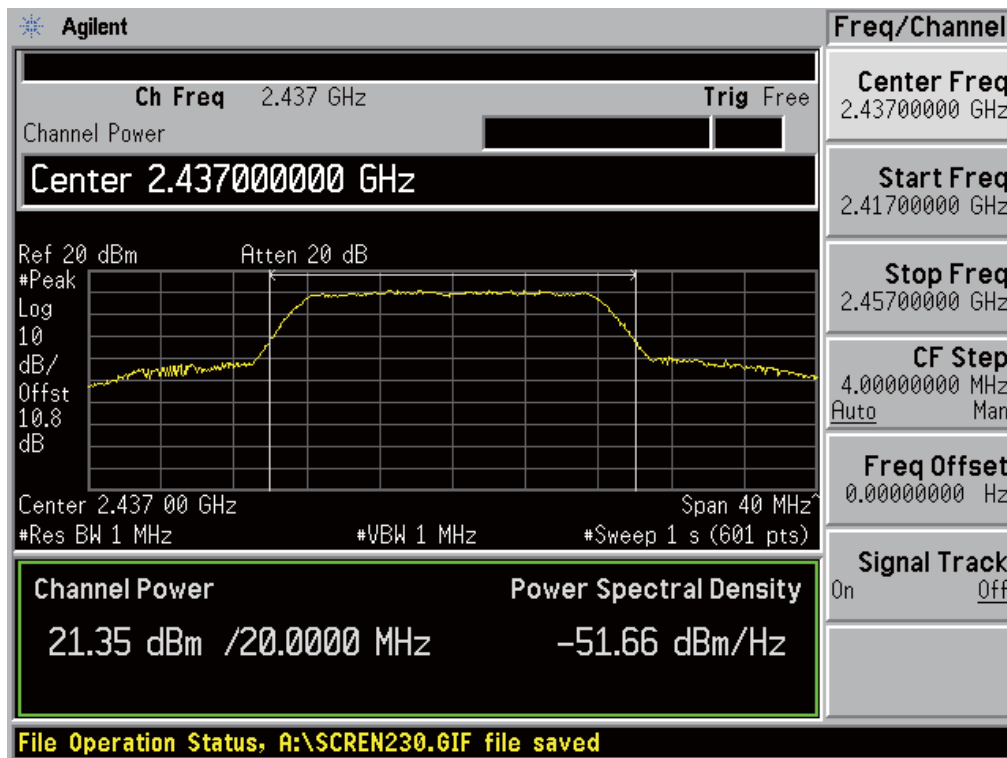
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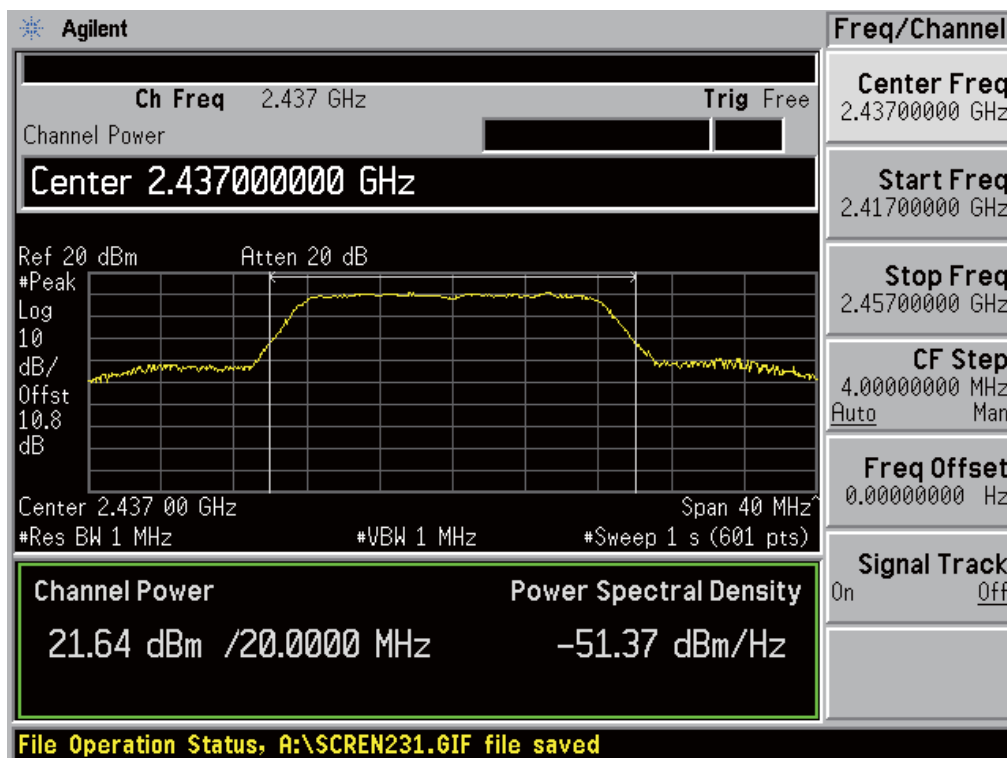
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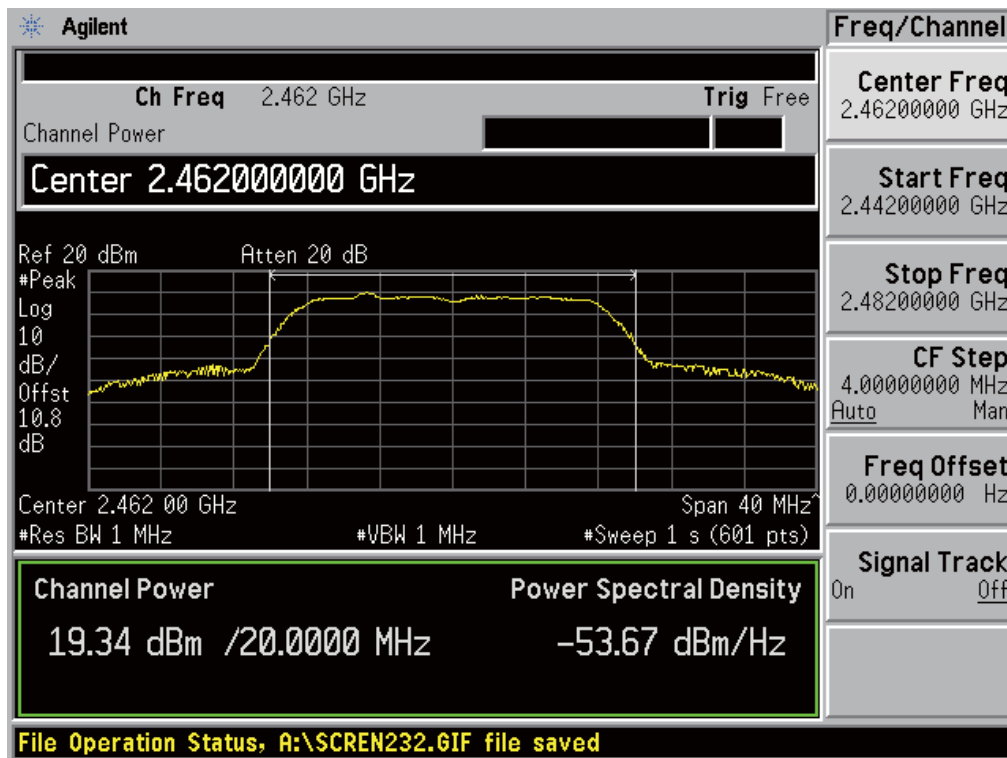
Conducted Output Power (802.11g-CH 6) 48Mbps



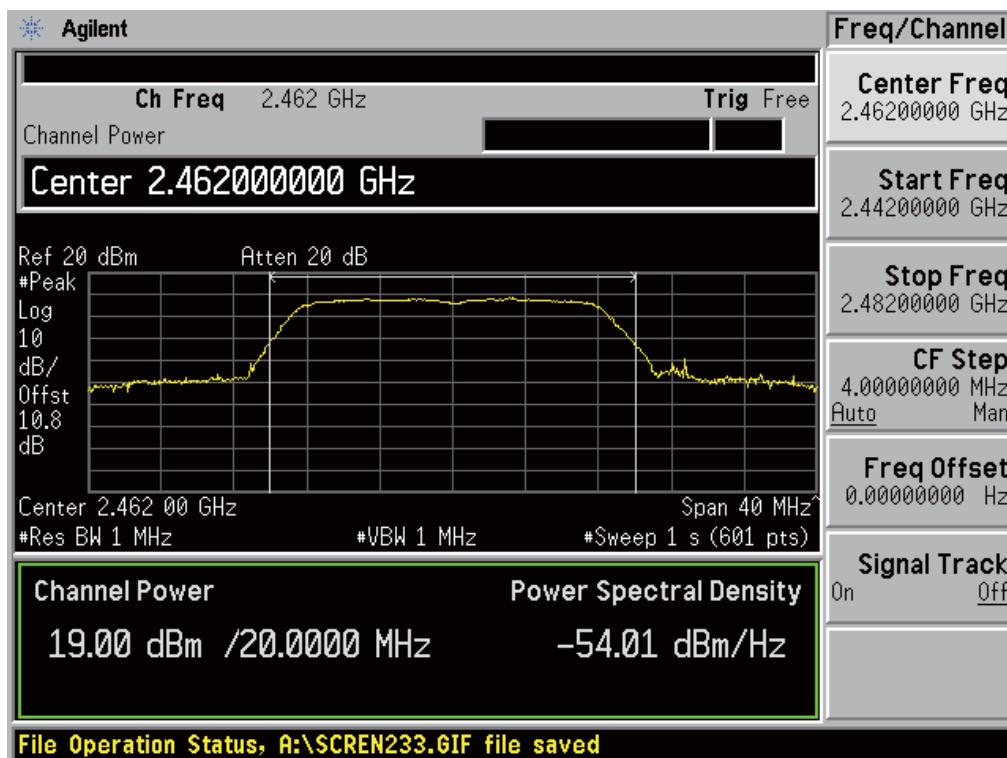
Conducted Output Power (802.11g-CH 6) 54Mbps



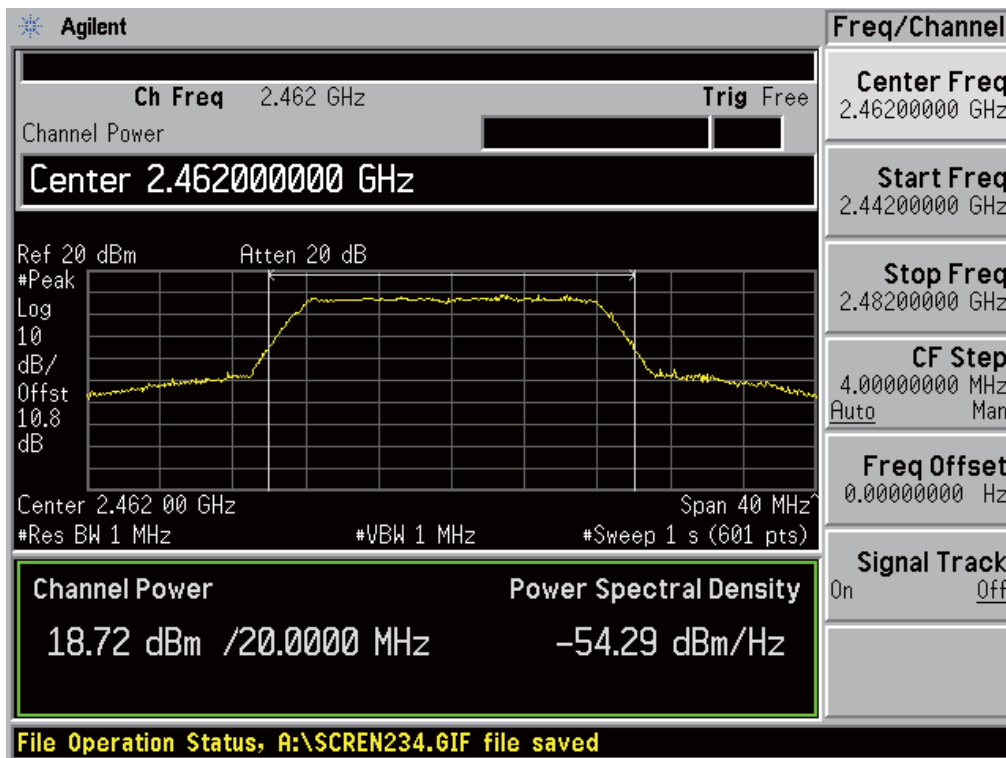
Conducted Output Power (802.11g-CH 11) 6Mbps



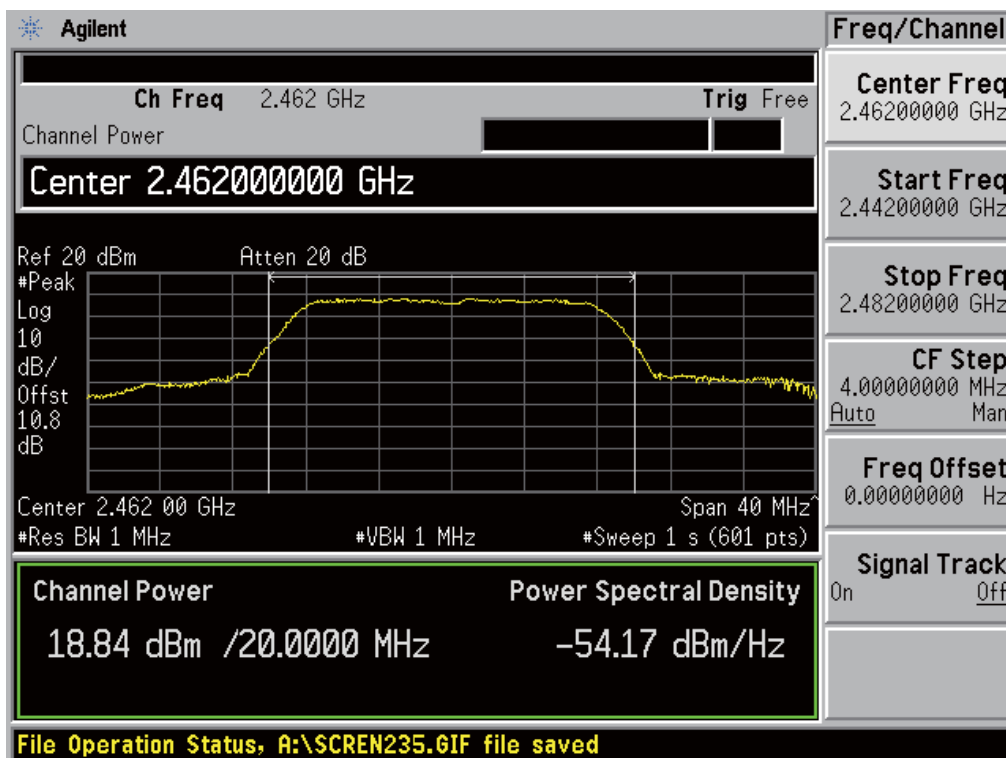
Conducted Output Power (802.11g-CH 11) 9Mbps



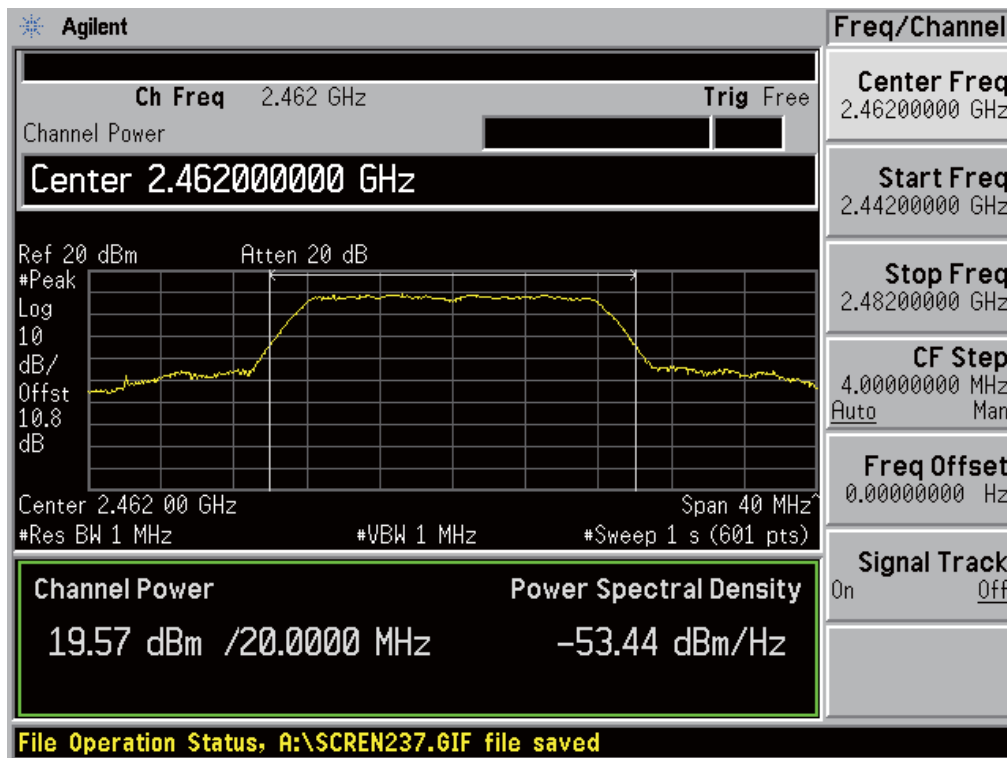
Conducted Output Power (802.11g-CH 11) 12Mbps



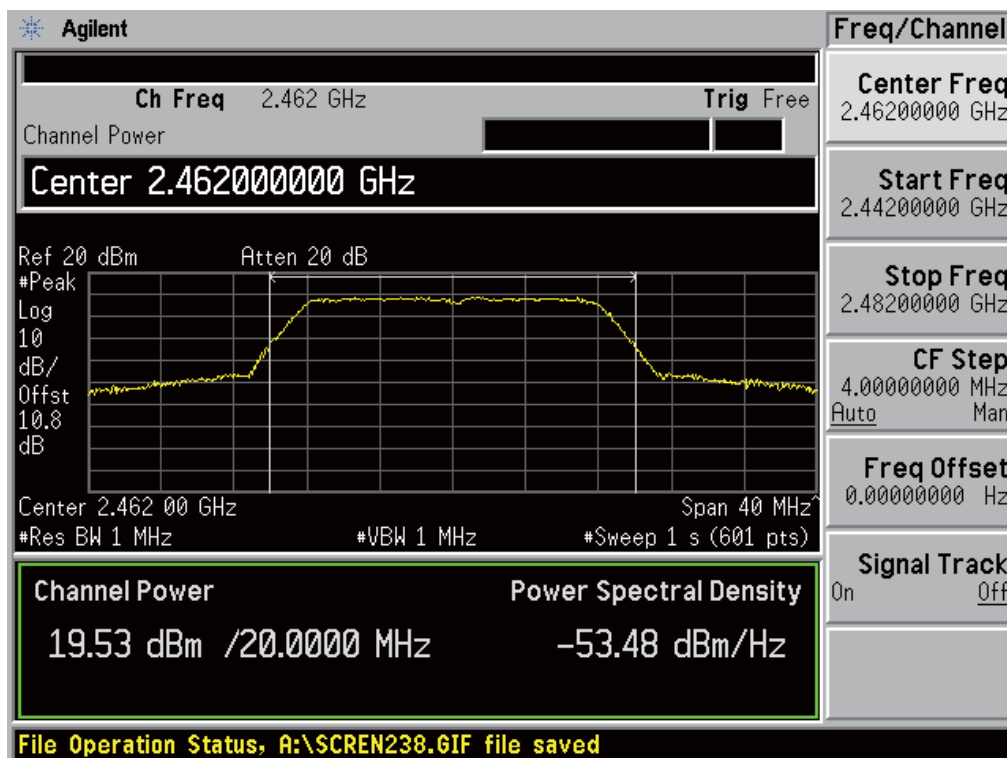
Conducted Output Power (802.11g-CH 11) 18Mbps



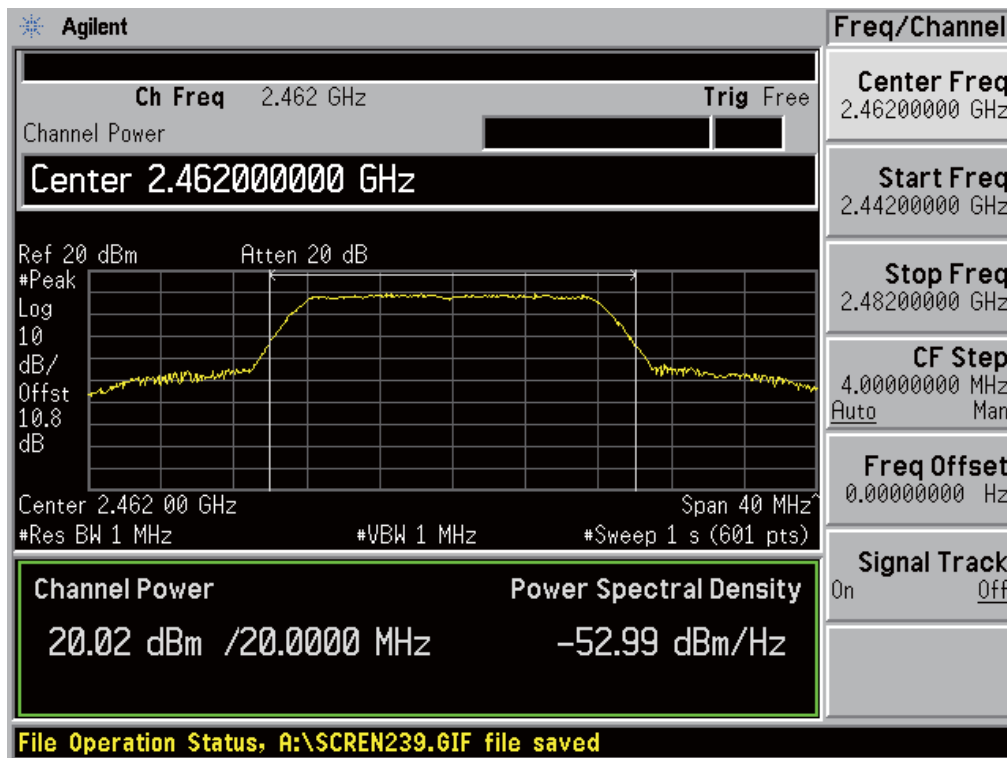
Conducted Output Power (802.11g-CH 11) 24Mbps



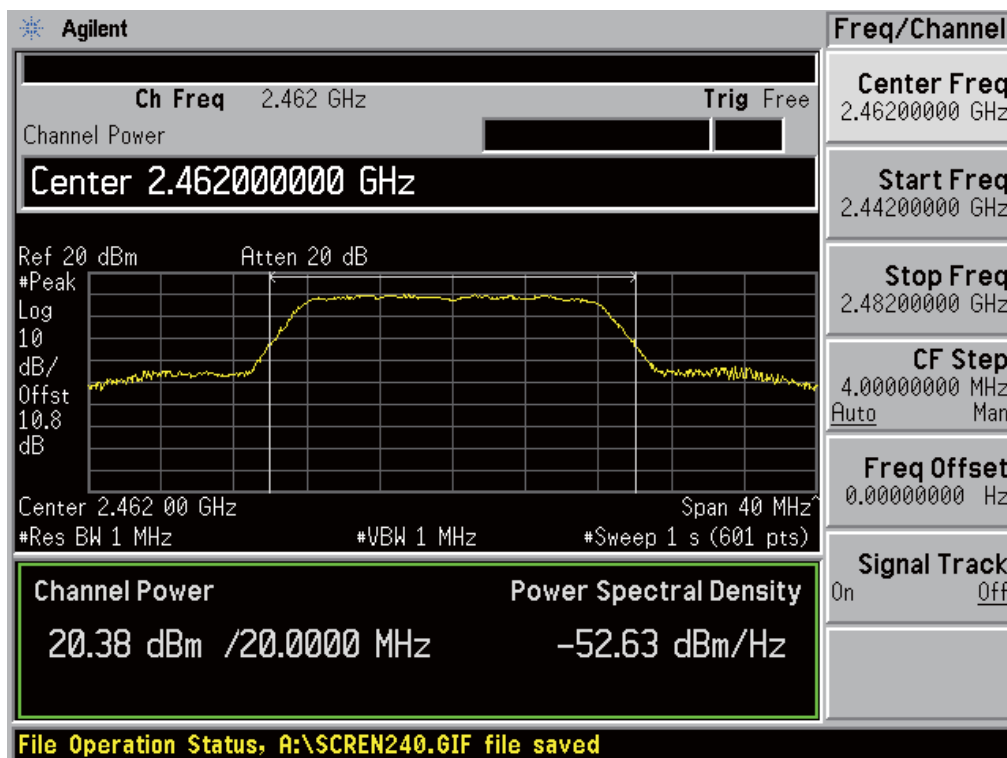
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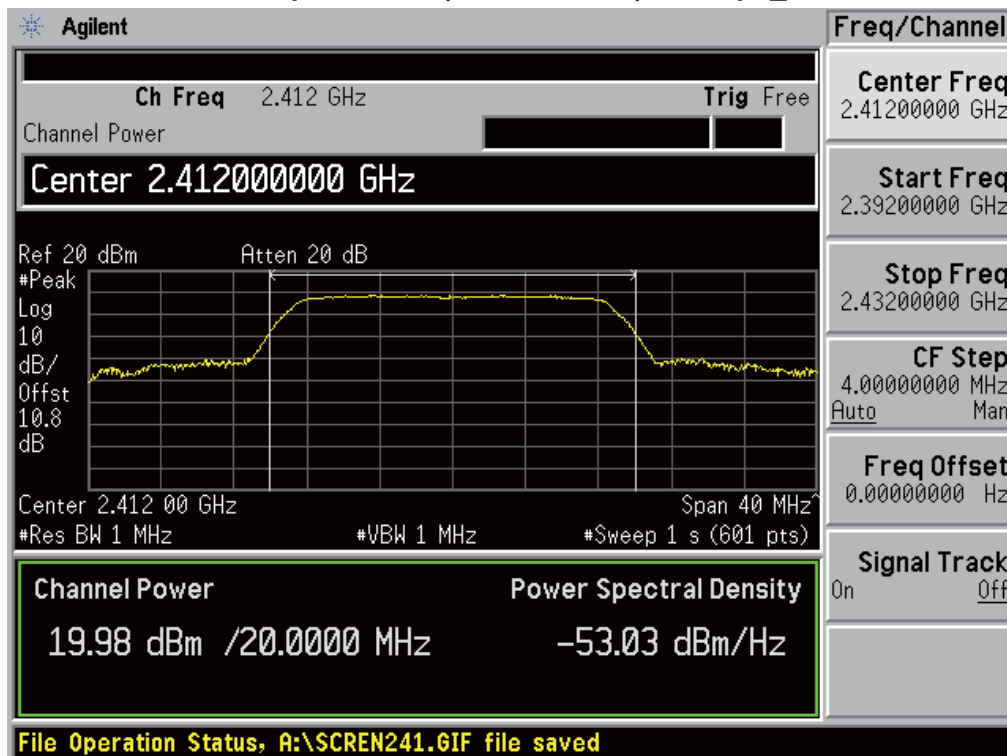
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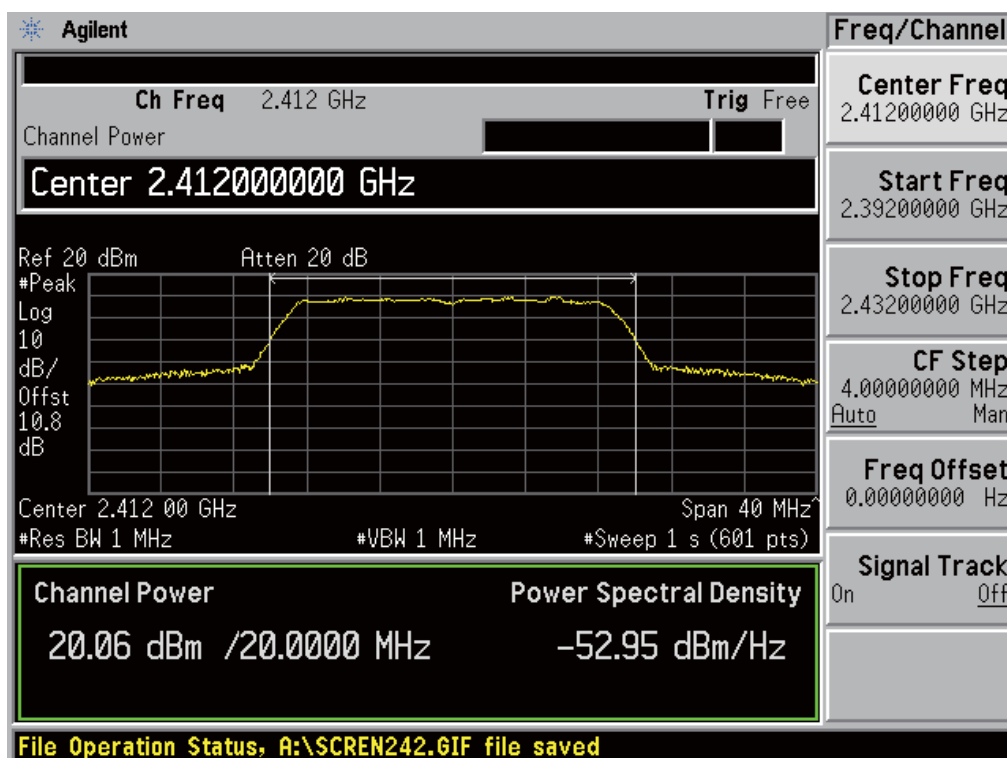
Conducted Output Power (802.11g-CH 11) 54Mbps



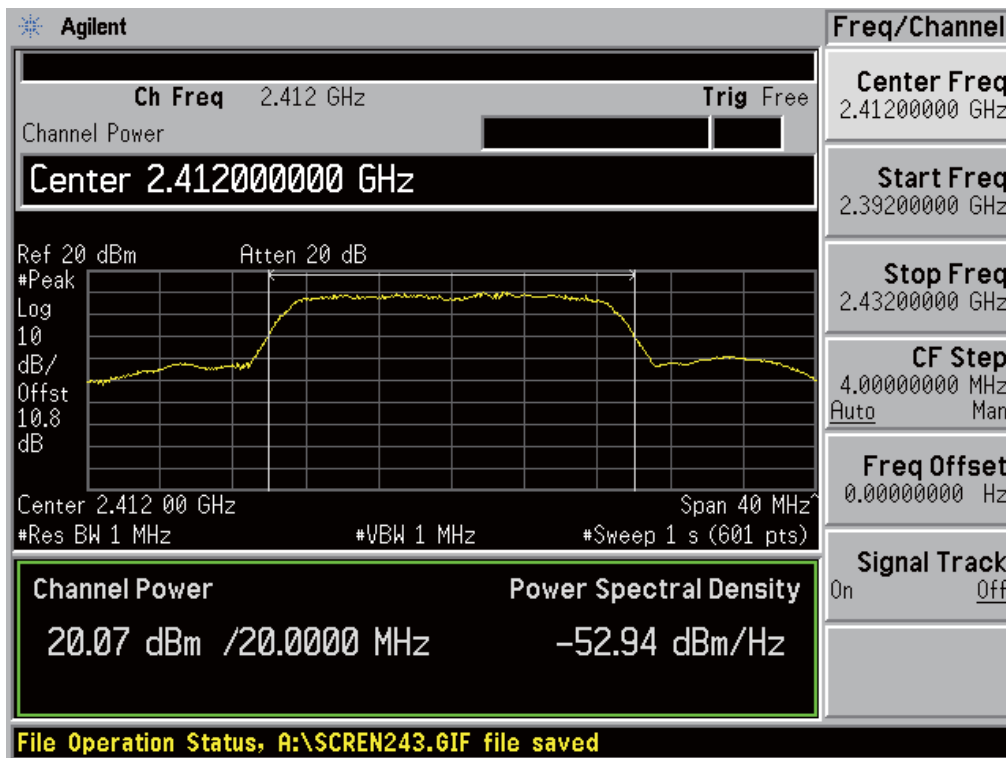
Conducted Output Power (802.11n-CH 1) 6.5Mbps_20 MHz BW



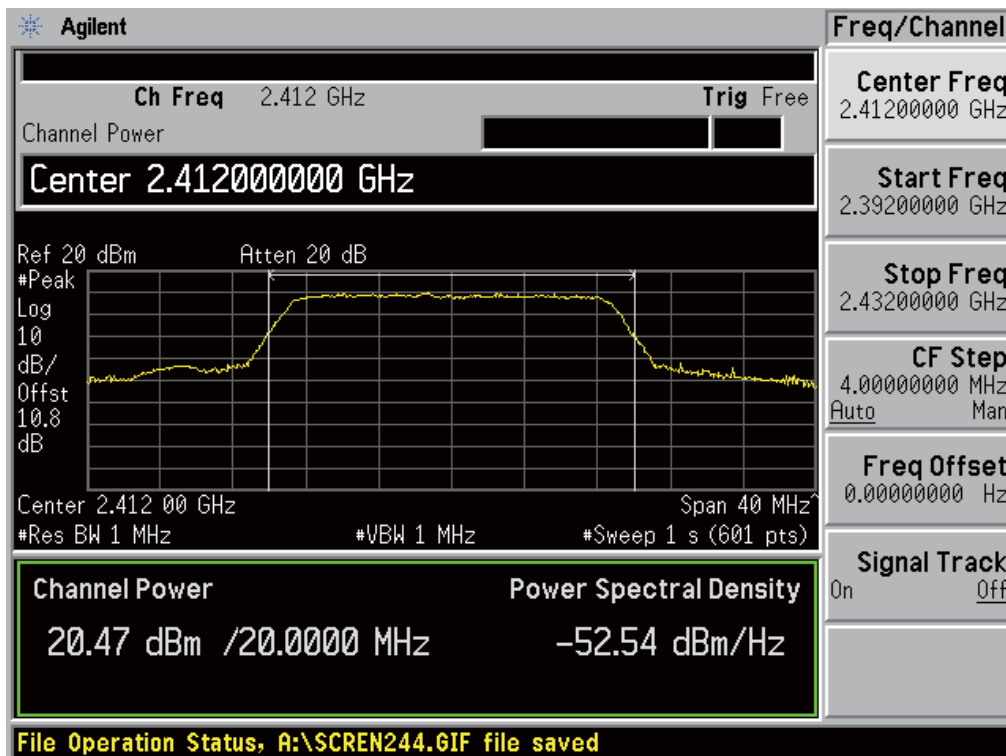
Conducted Output Power (802.11n-CH 1) 13Mbps_20 MHz BW



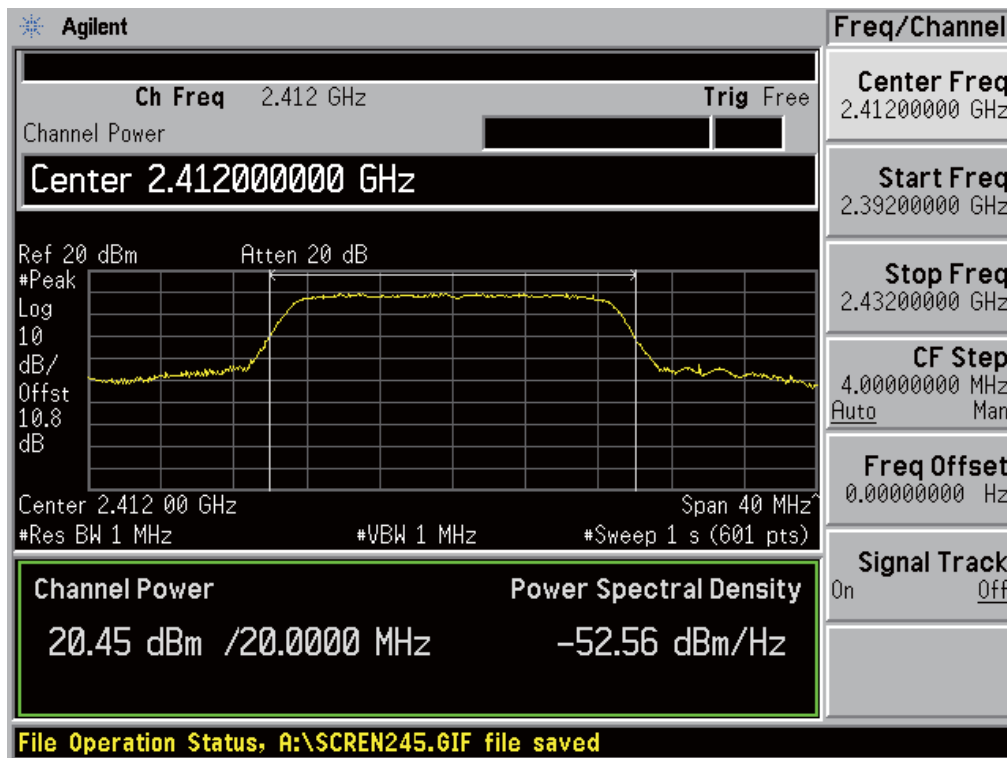
Conducted Output Power (802.11n-CH 1) 19.5Mbps_20 MHz BW



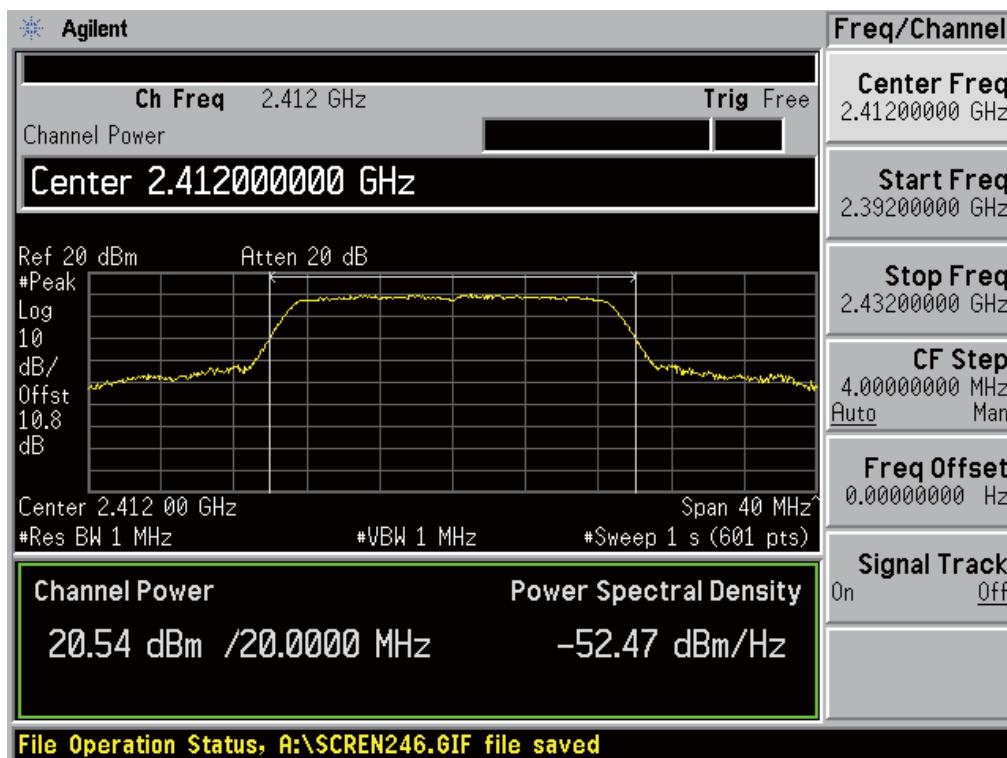
Conducted Output Power (802.11n-CH 1) 26Mbps_20 MHz BW



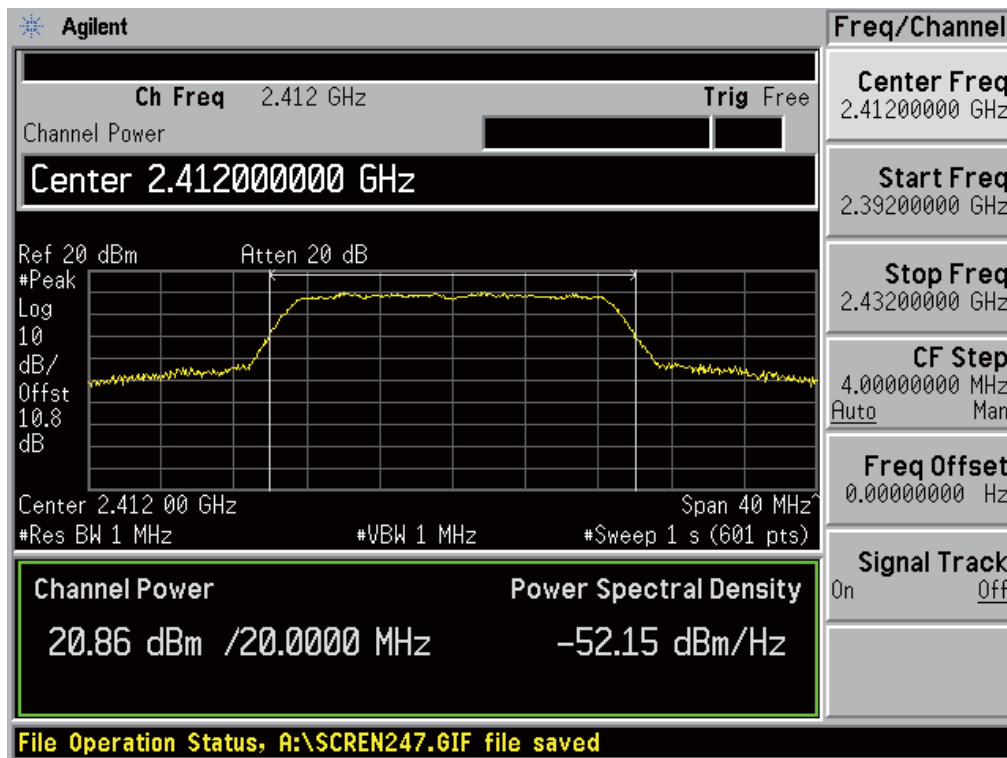
Conducted Output Power (802.11n-CH 1) 39Mbps_20 MHz BW



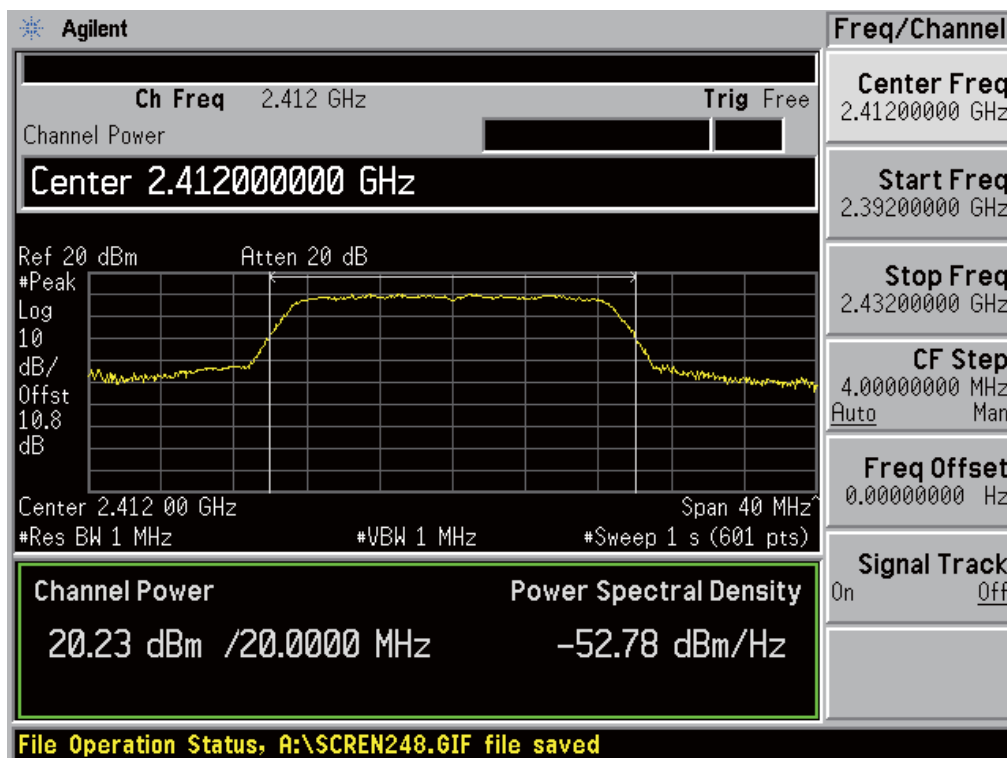
Conducted Output Power (802.11n-CH 1) 52Mbps_20 MHz BW



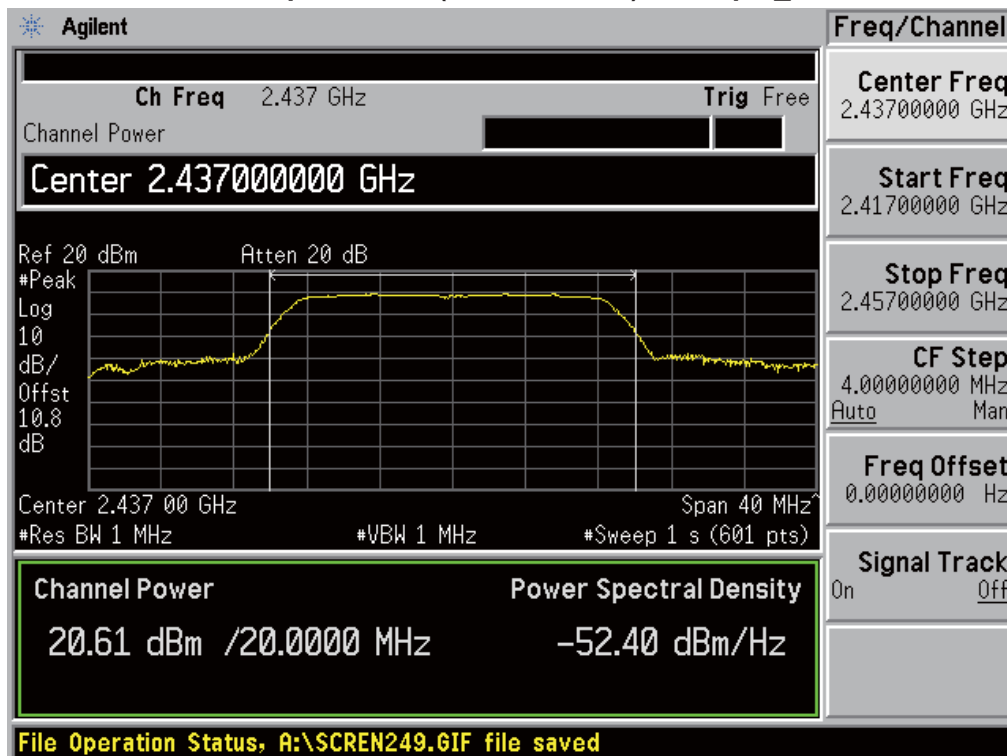
Conducted Output Power (802.11n-CH 1) 58.5Mbps_20 MHz BW



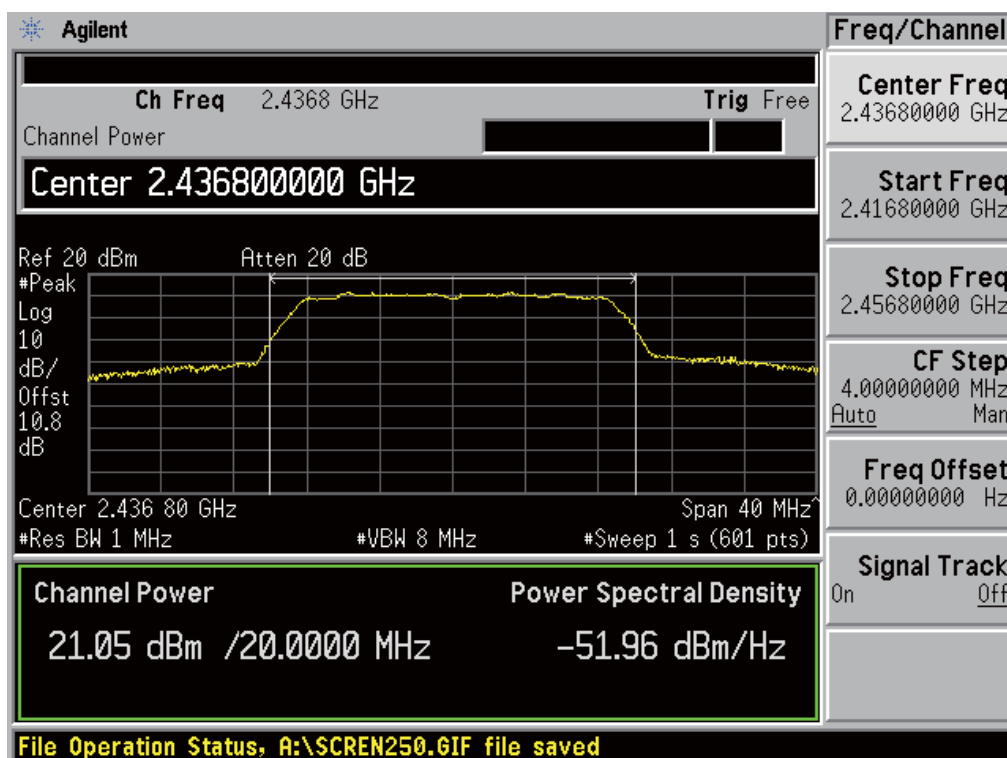
Conducted Output Power (802.11n-CH 1) 65Mbps_20 MHz BW



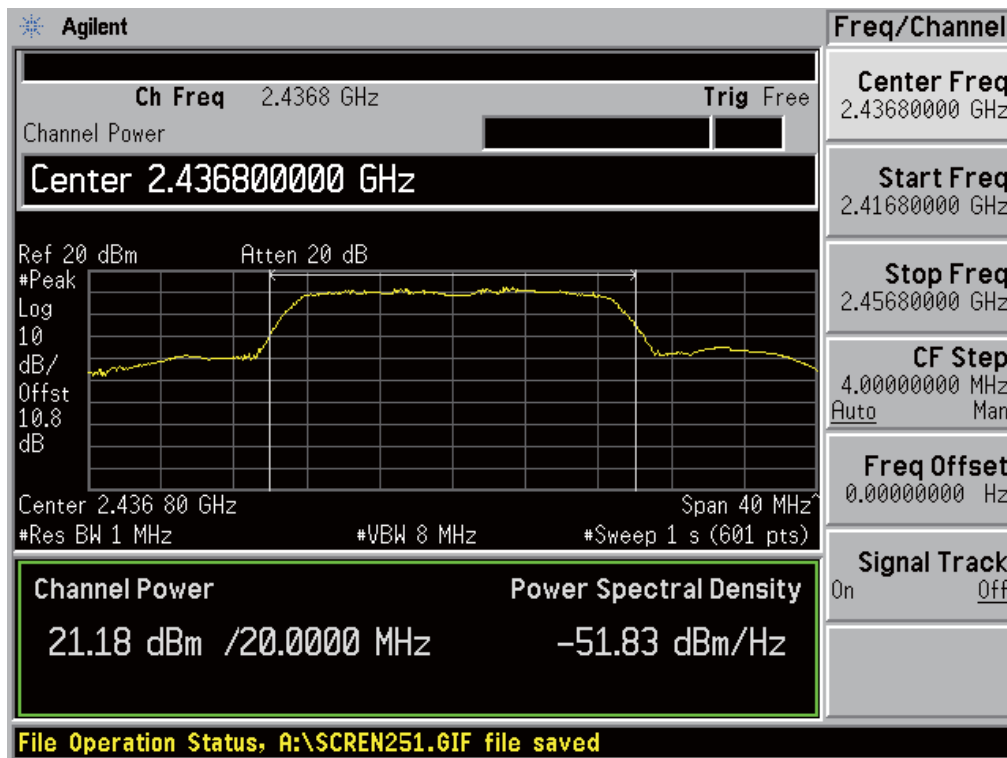
Conducted Output Power (802.11n-CH 6) 6.5Mbps _20 MHz BW



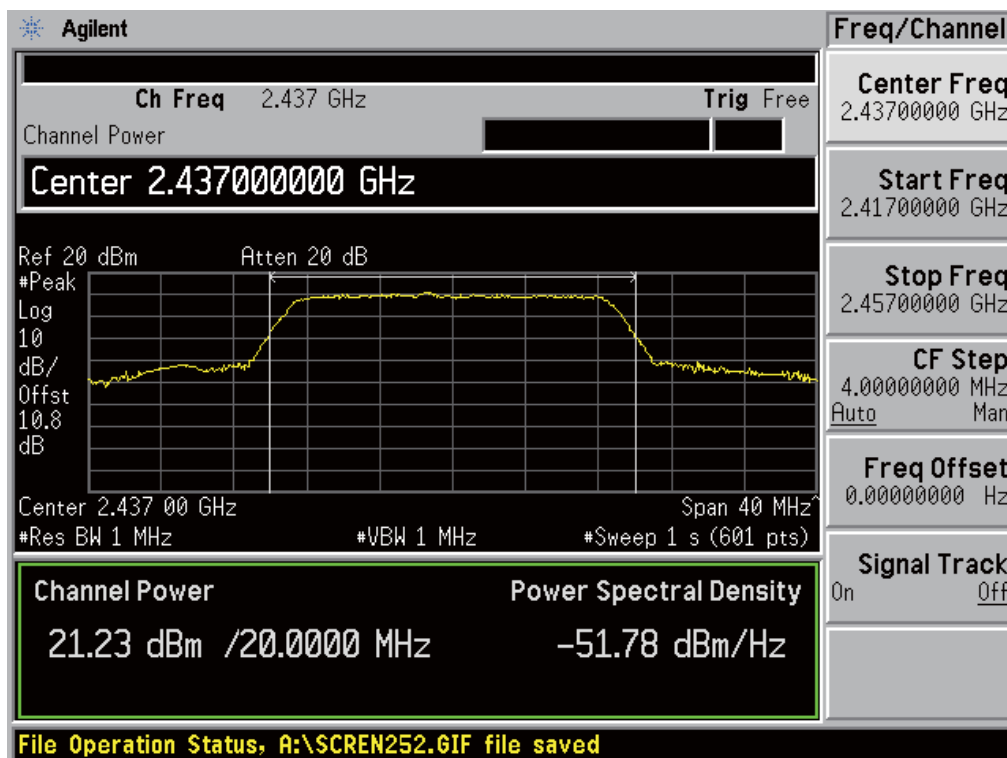
Conducted Output Power (802.11n-CH 6) 13Mbps _20 MHz BW



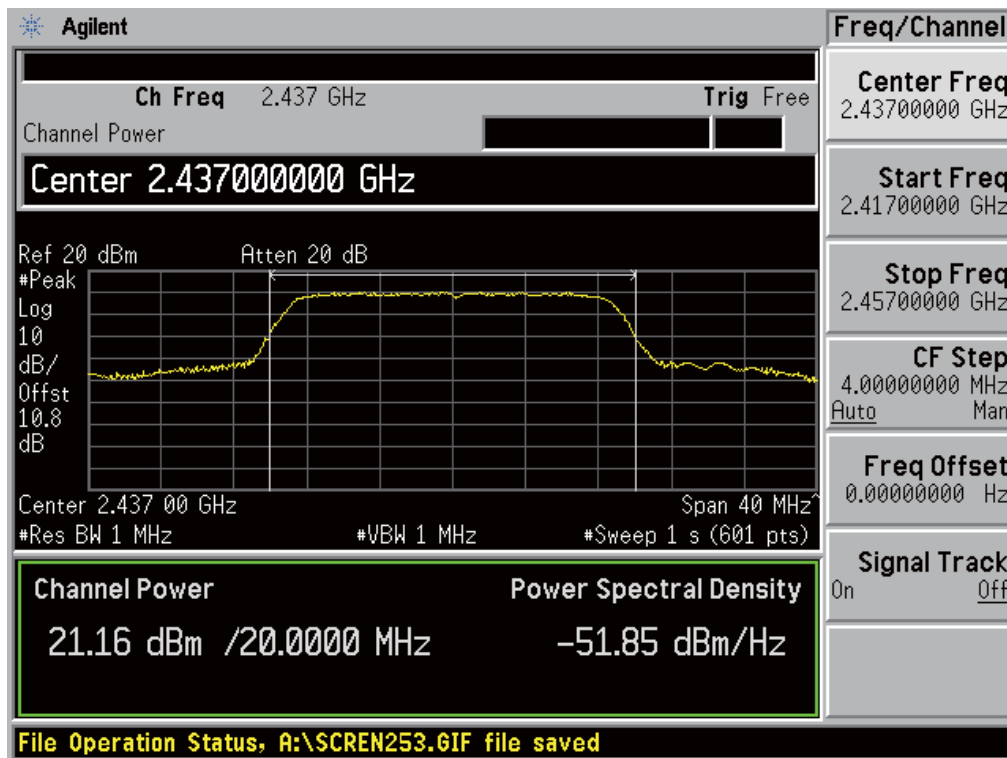
Conducted Output Power (802.11n-CH 6) 19.5Mbps_20 MHz BW



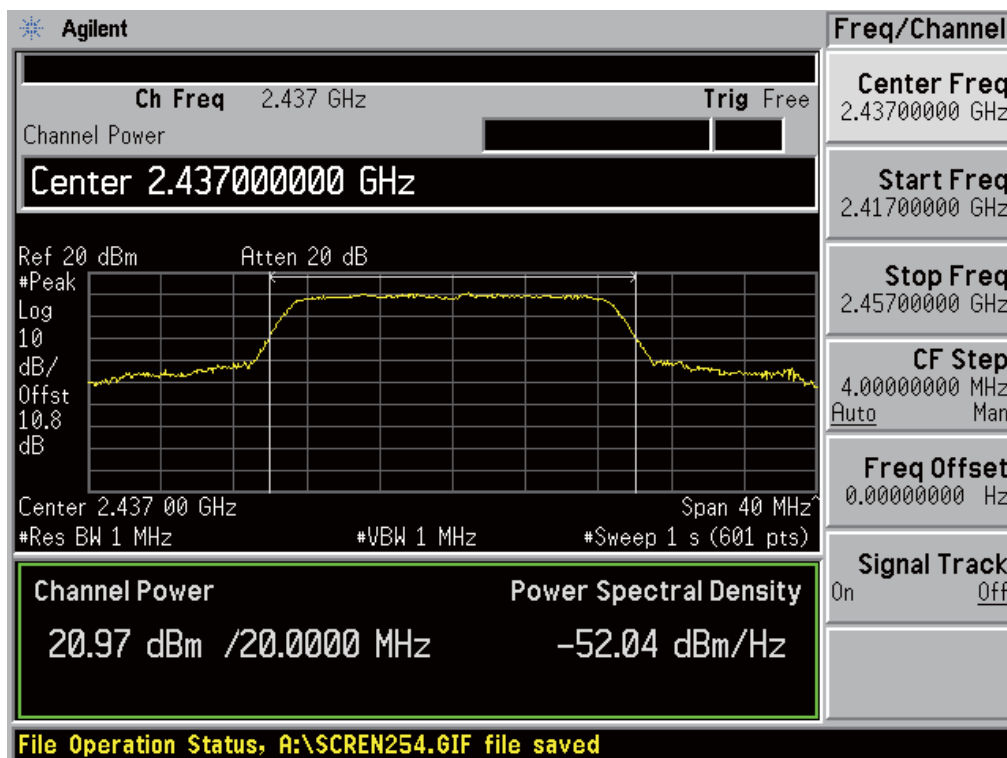
Conducted Output Power (802.11n-CH 6) 26Mbps_20 MHz BW



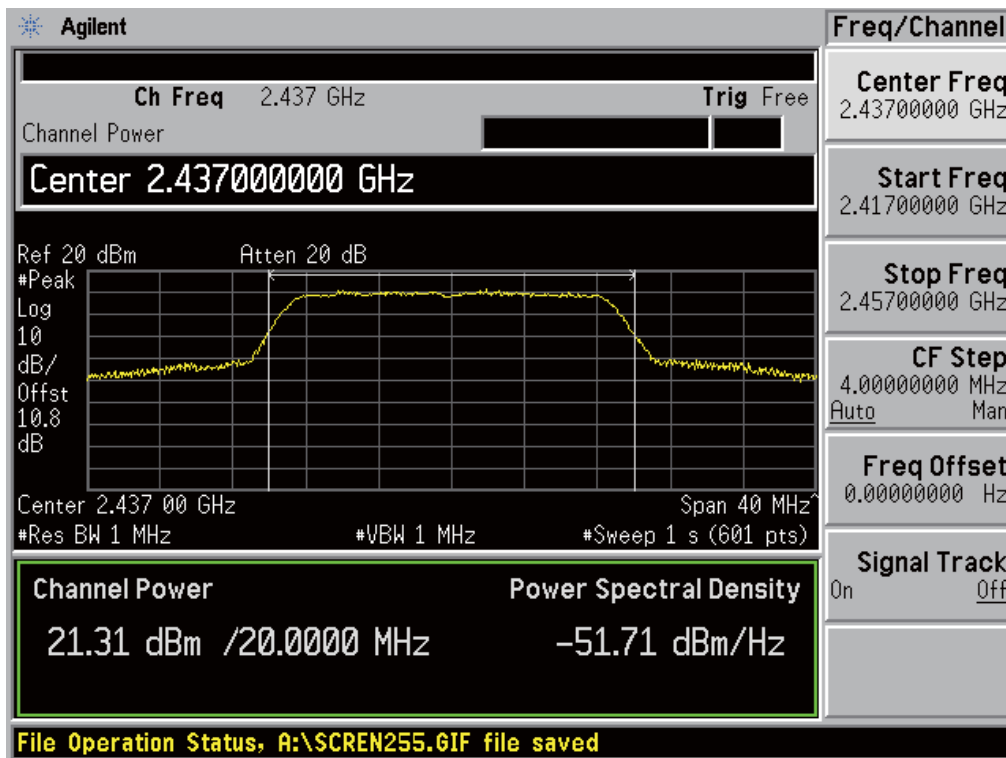
Conducted Output Power (802.11n-CH 6) 39Mbps_20 MHz BW



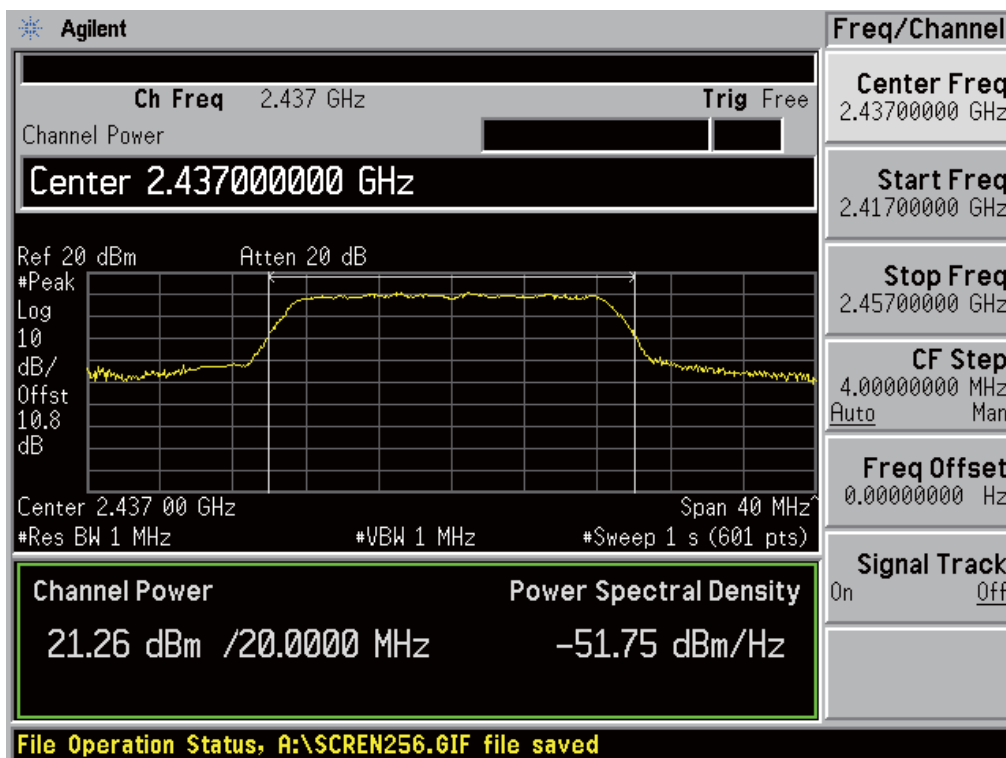
Conducted Output Power (802.11n-CH 6) 52Mbps_20 MHz BW



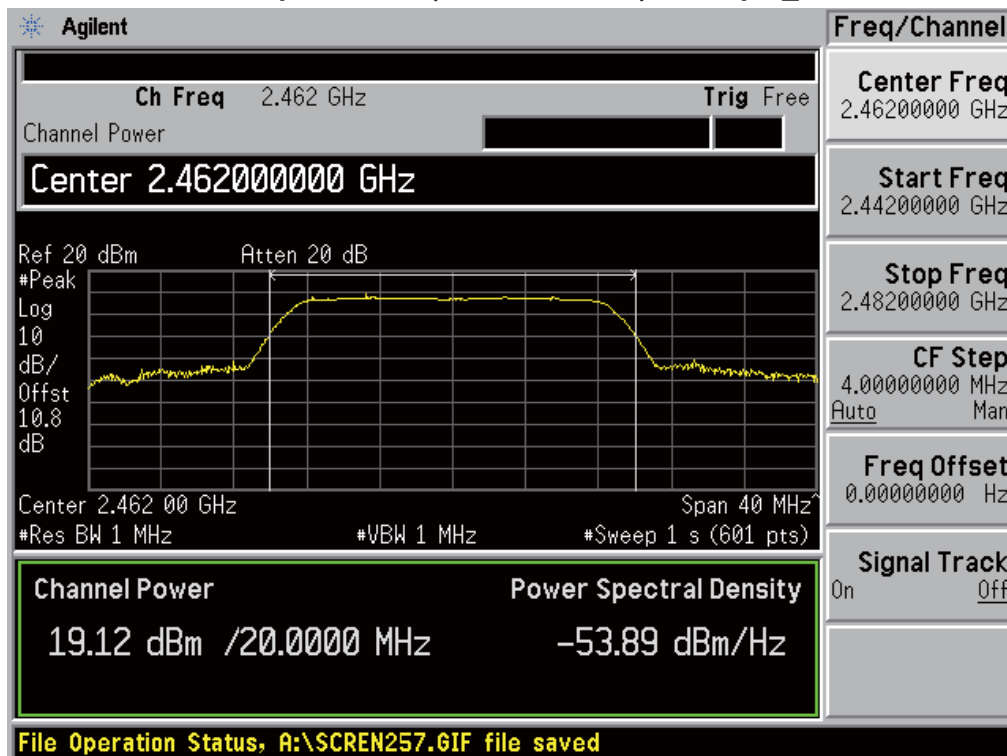
Conducted Output Power (802.11n-CH 6) 58.5Mbps_20 MHz BW



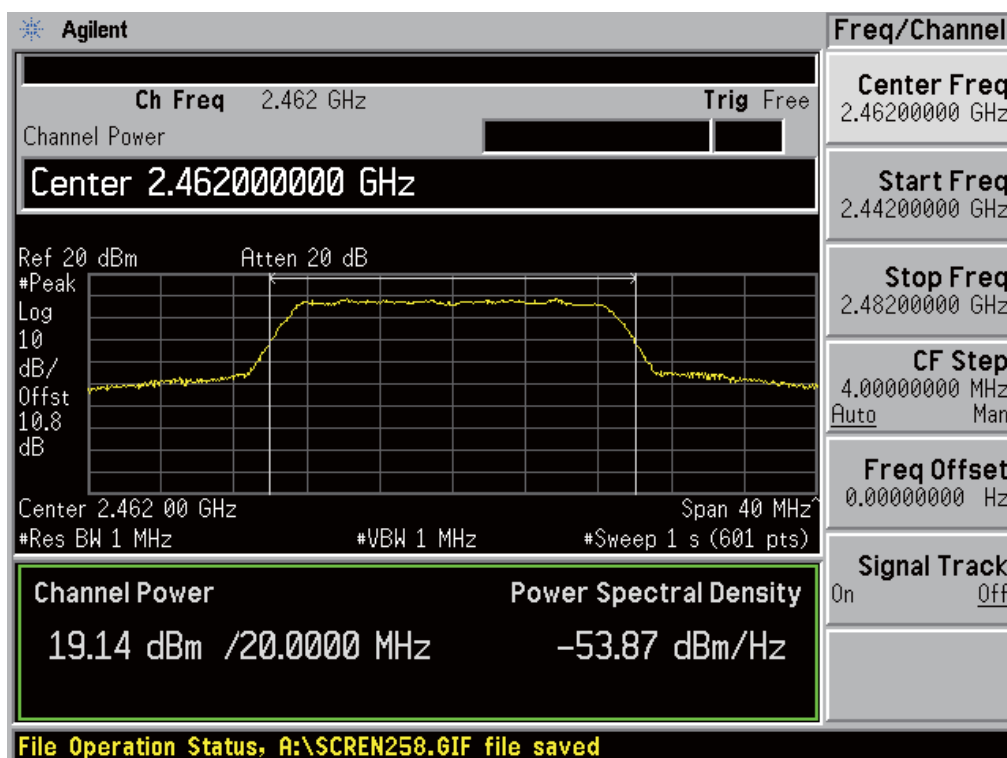
Conducted Output Power (802.11n-CH 6) 65Mbps_20 MHz BW



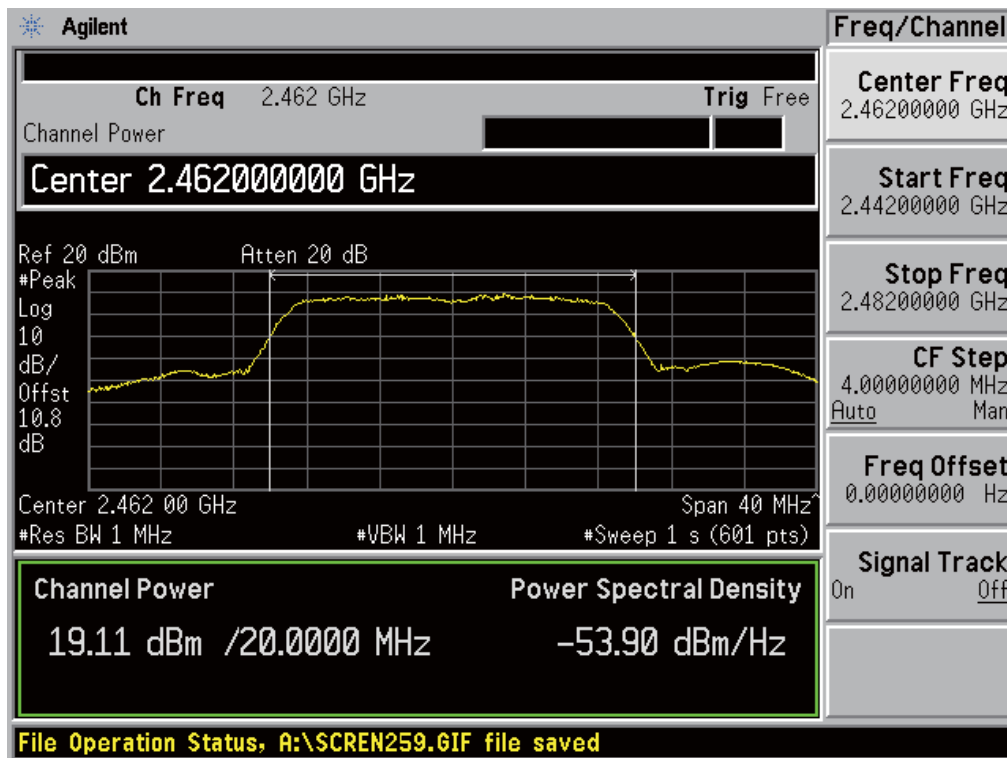
Conducted Output Power (802.11n-CH 11) 6.5Mbps _20 MHz BW



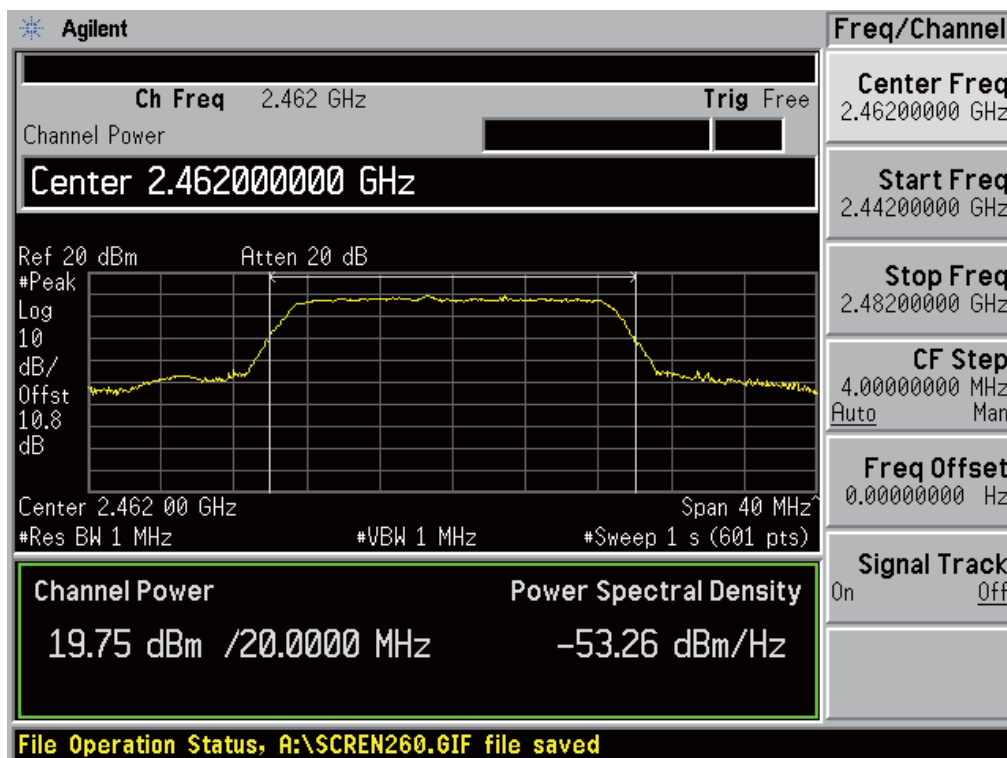
Conducted Output Power (802.11n-CH 11) 13Mbps _20 MHz BW



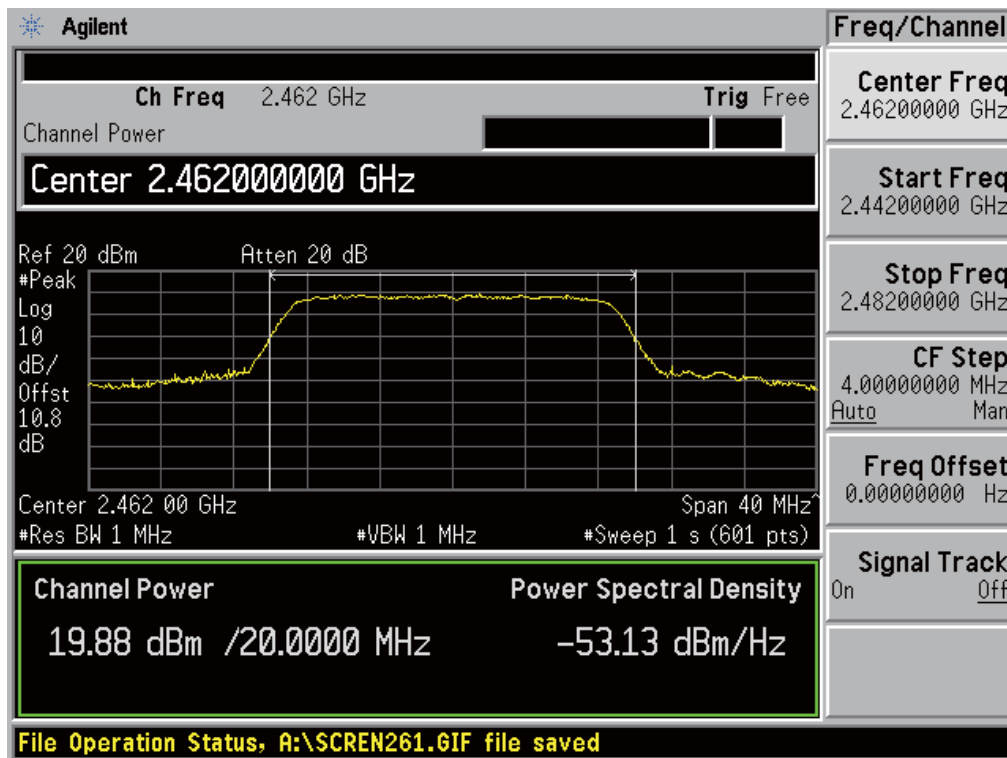
Conducted Output Power (802.11n-CH 11) 19.5Mbps_20 MHz BW



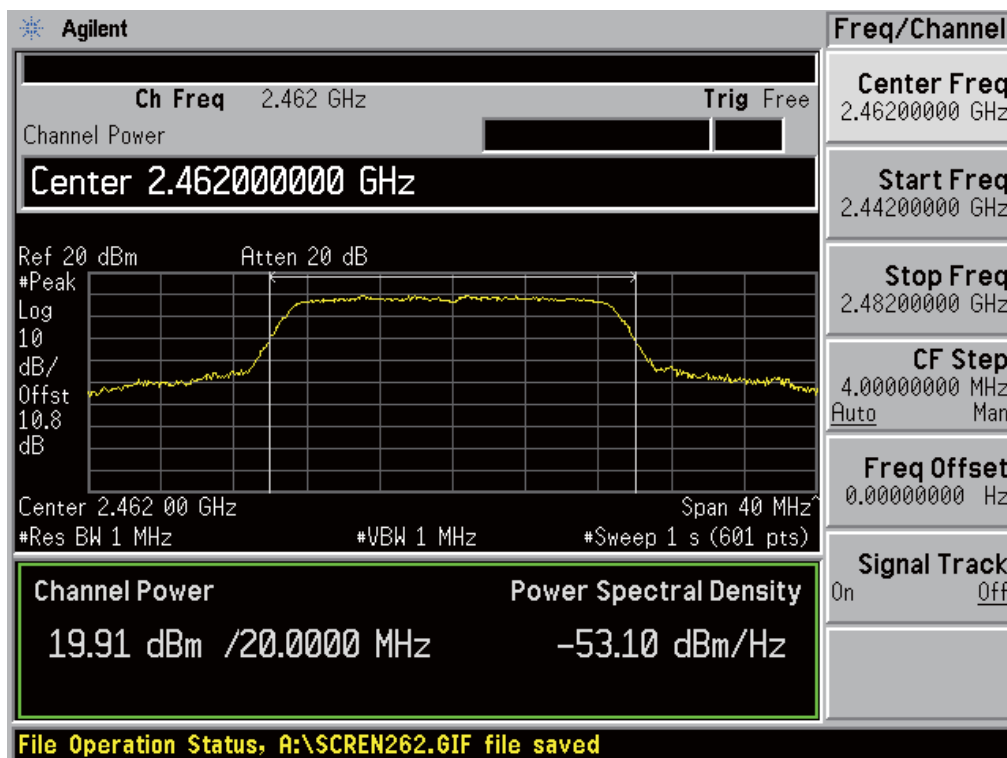
Conducted Output Power (802.11n-CH 11) 26Mbps_20 MHz BW



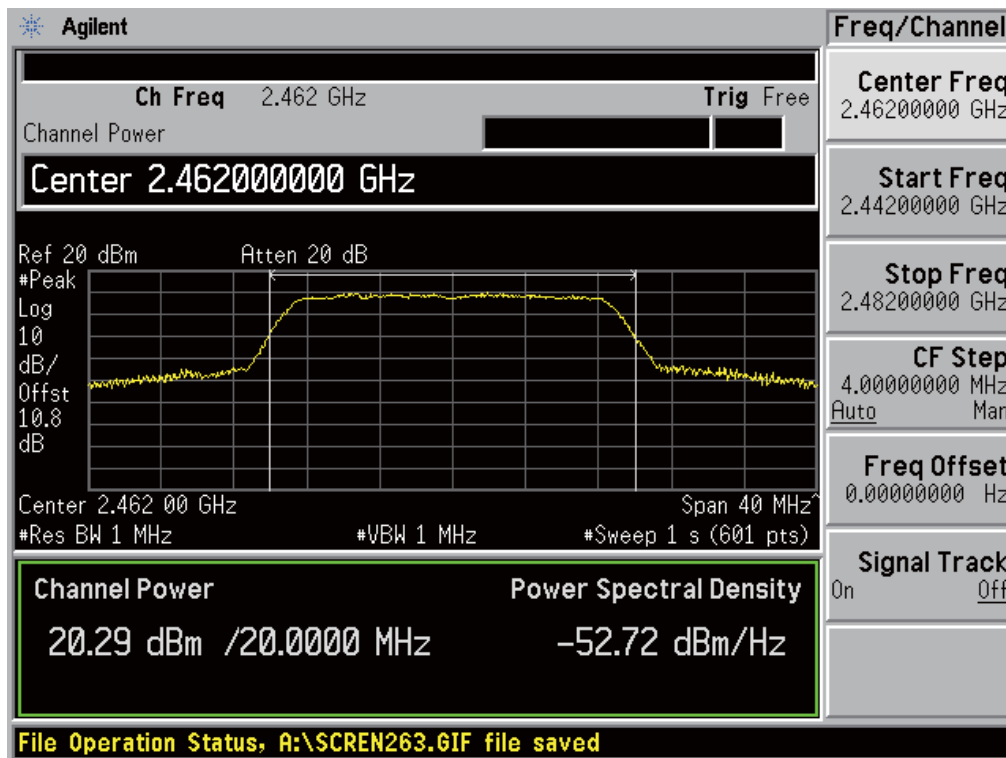
Conducted Output Power (802.11n-CH 11) 39Mbps_20 MHz BW



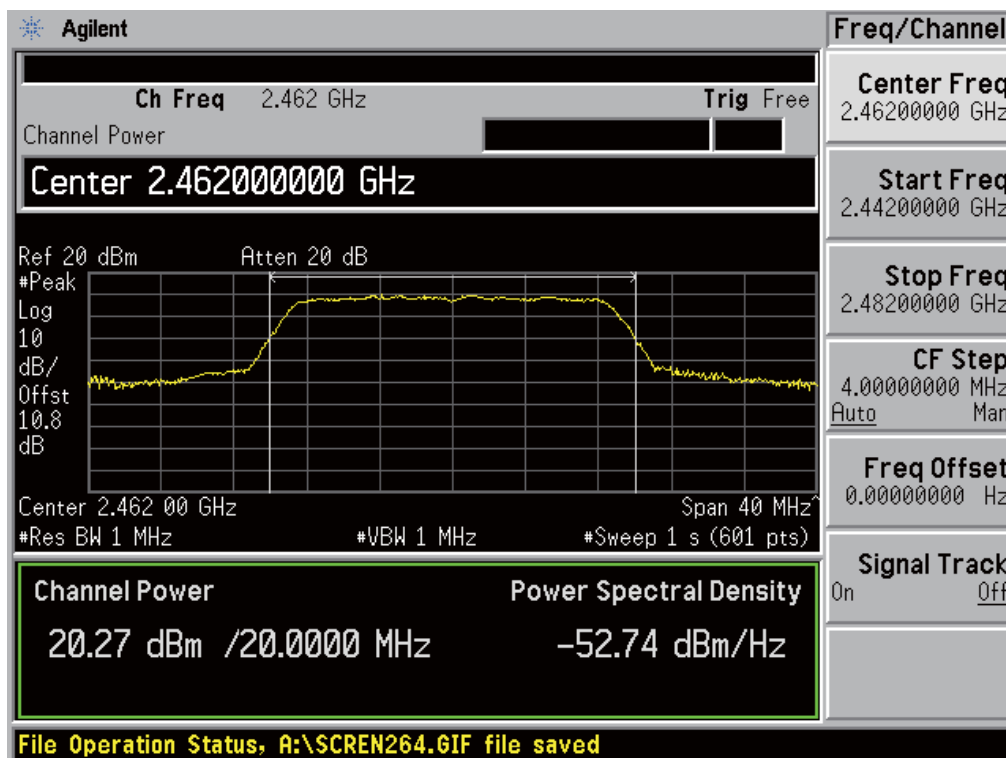
Conducted Output Power (802.11n-CH 11) 52Mbps_20 MHz BW



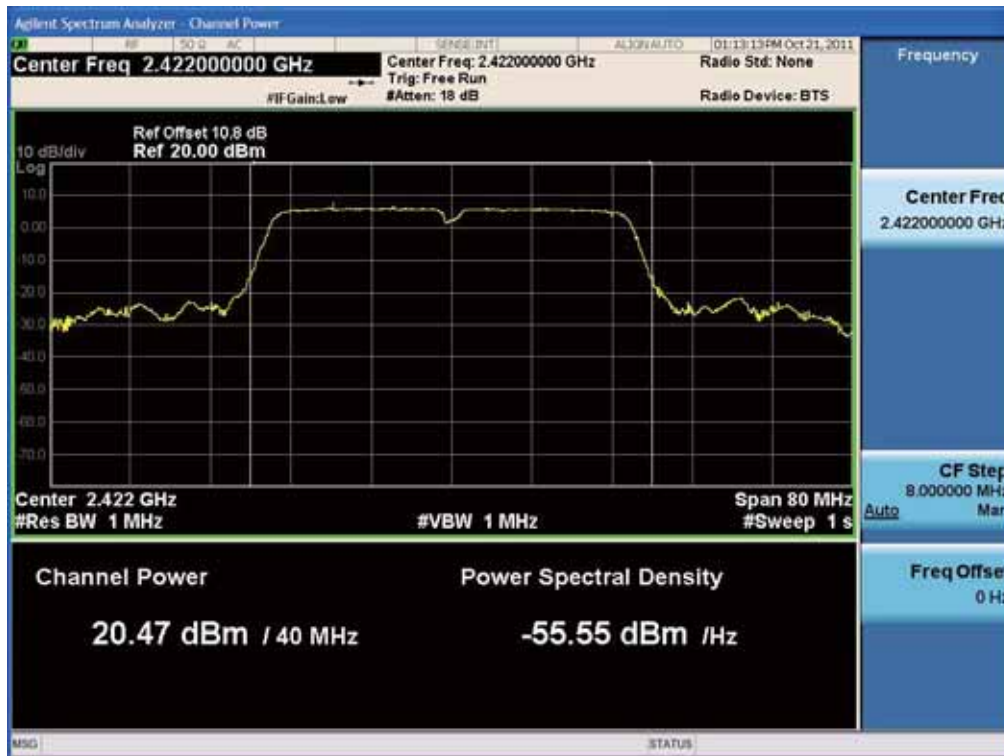
Conducted Output Power (802.11n-CH 11) 58.5Mbps_20 MHz BW



Conducted Output Power (802.11n-CH 11) 65Mbps_20 MHz BW



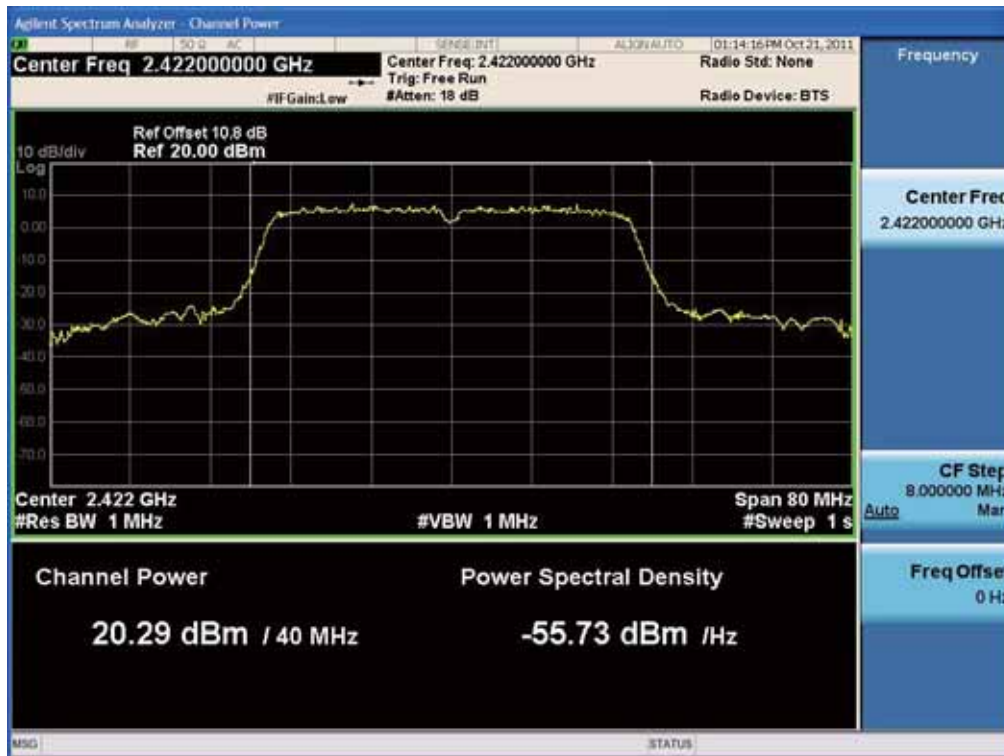
Conducted Output Power (802.11n-CH 3) 13.5Mbps _ 40 MHz BW



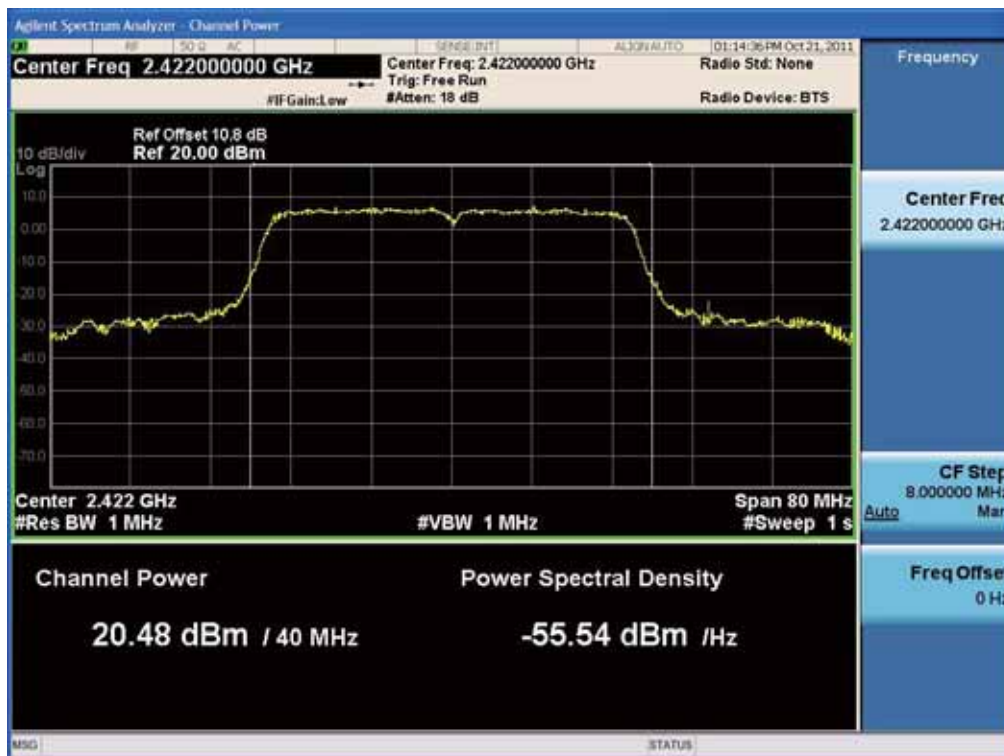
Conducted Output Power (802.11n-CH 3) 27Mbps _ 40 MHz BW



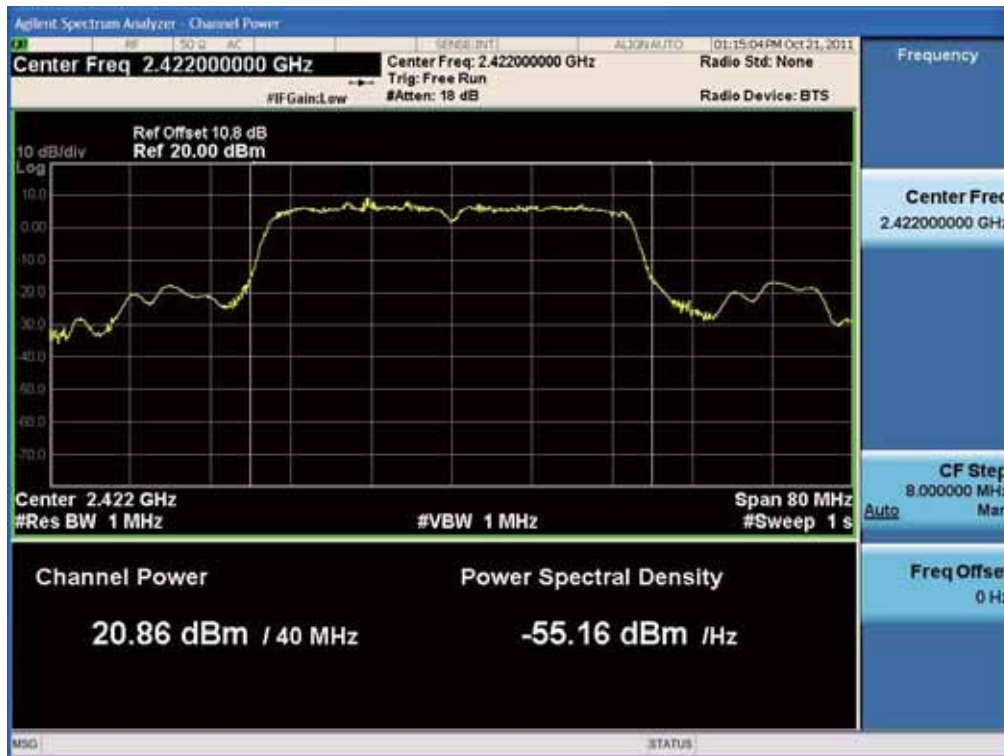
Conducted Output Power (802.11n-CH 3) 40.5 Mbps _ 40 MHz BW



Conducted Output Power (802.11n-CH 3) 54 Mbps _ 40 MHz BW



Conducted Output Power (802.11n-CH 3) 81 Mbps _ 40 MHz BW



Conducted Output Power (802.11n-CH 3) 108 Mbps _ 40 MHz BW



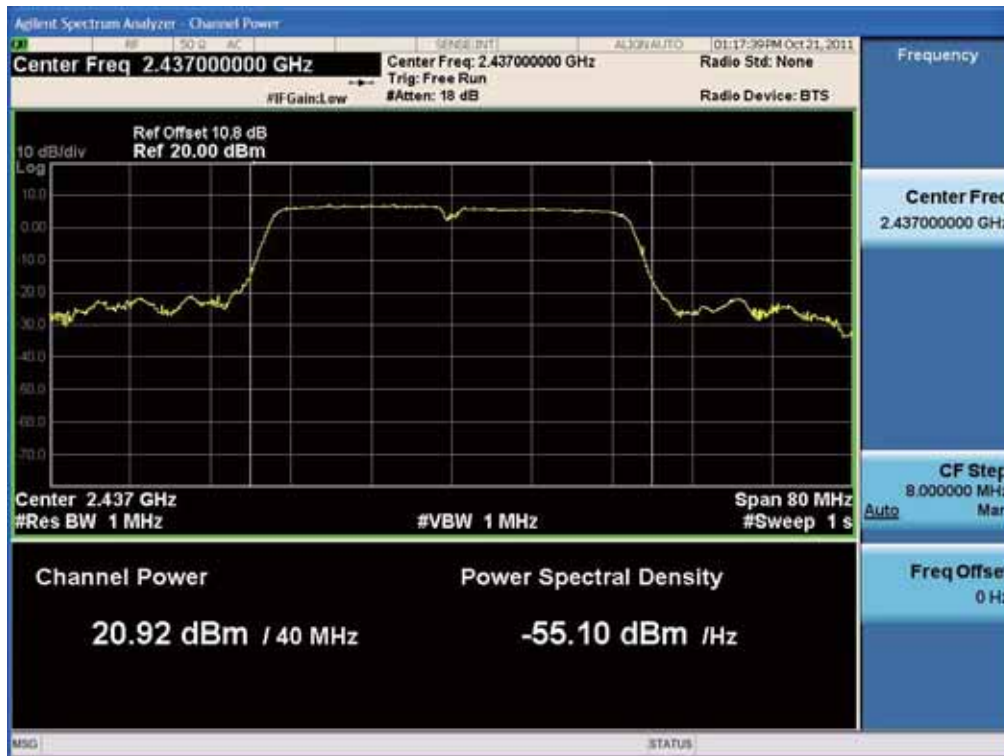
Conducted Output Power (802.11n-CH 3) 121.5 Mbps _ 40 MHz BW



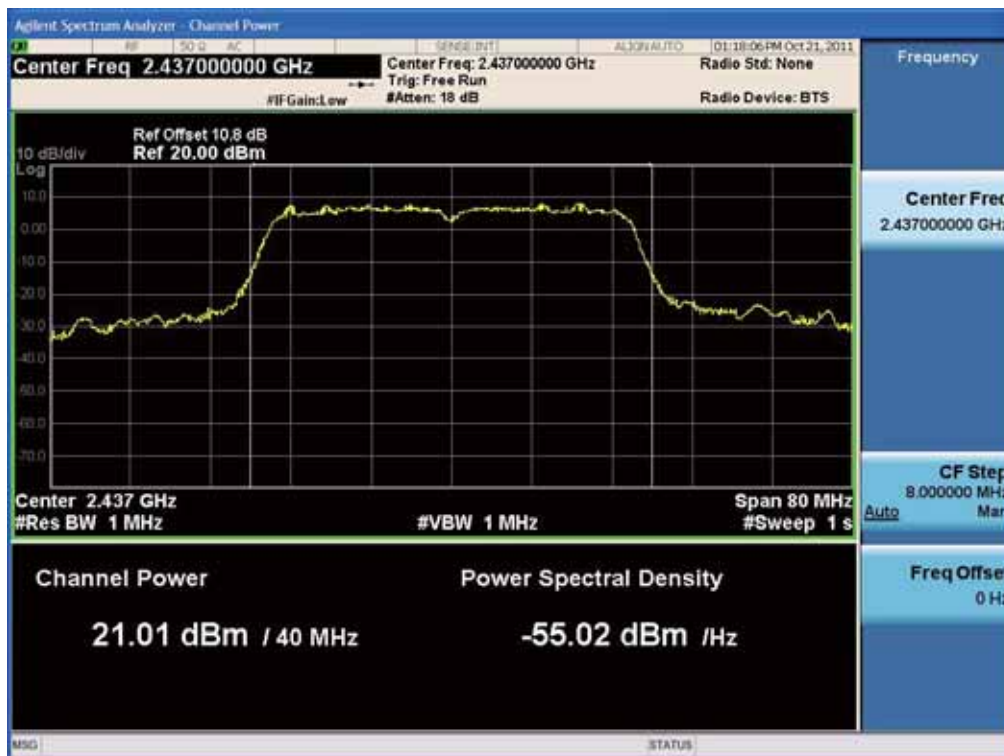
Conducted Output Power (802.11n-CH 3) 135 Mbps _ 40 MHz BW



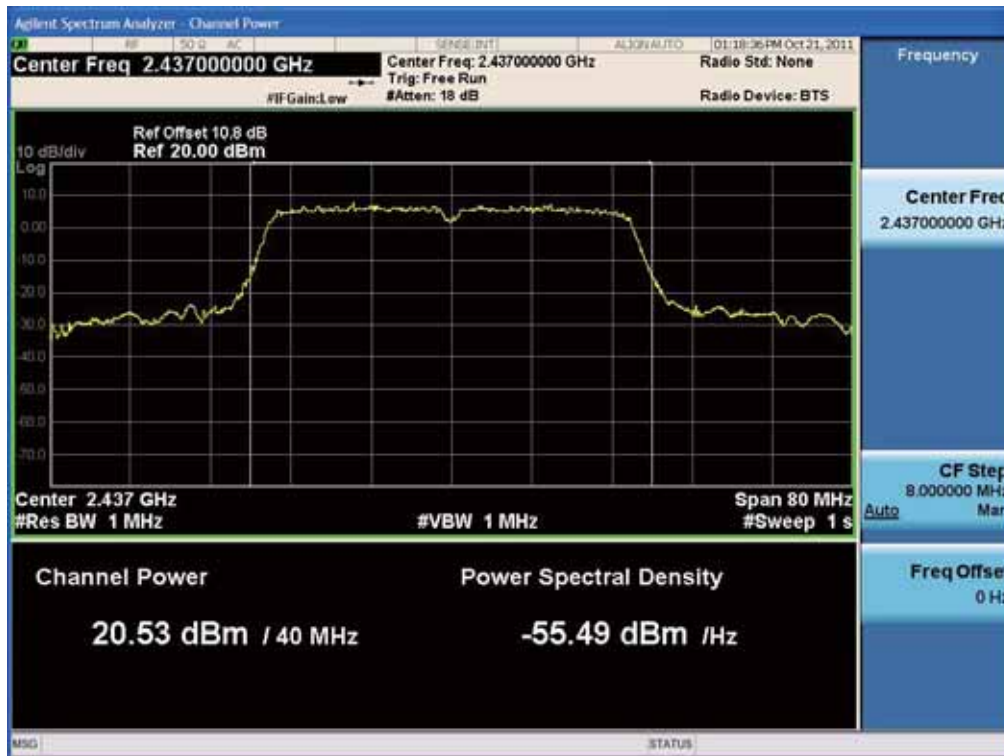
Conducted Output Power (802.11n-CH 6) 13.5Mbps _ 40 MHz BW



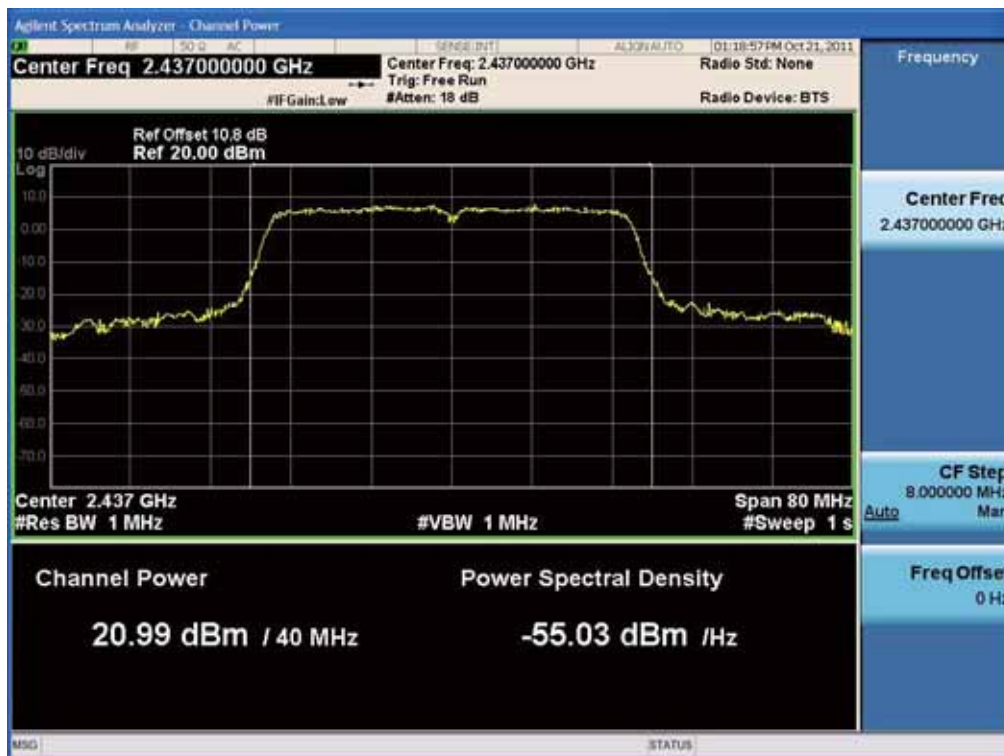
Conducted Output Power (802.11n-CH 6) 27Mbps _ 40 MHz BW



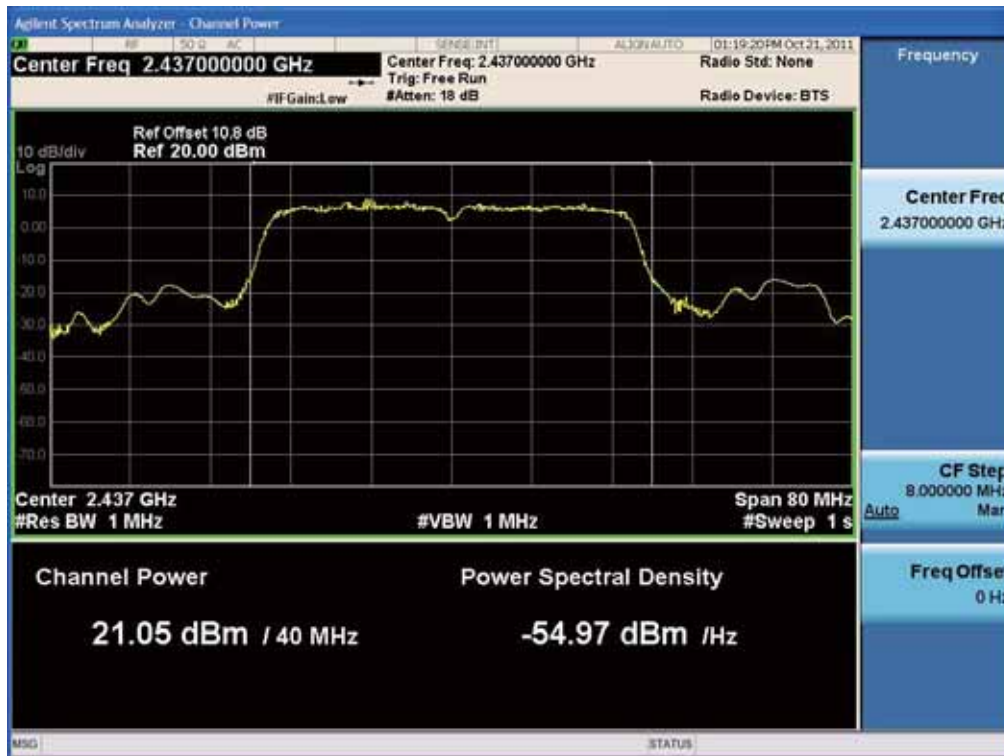
Conducted Output Power (802.11n-CH 6) 40.5 Mbps _ 40 MHz BW



Conducted Output Power (802.11n-CH 6) 54 Mbps _ 40 MHz BW



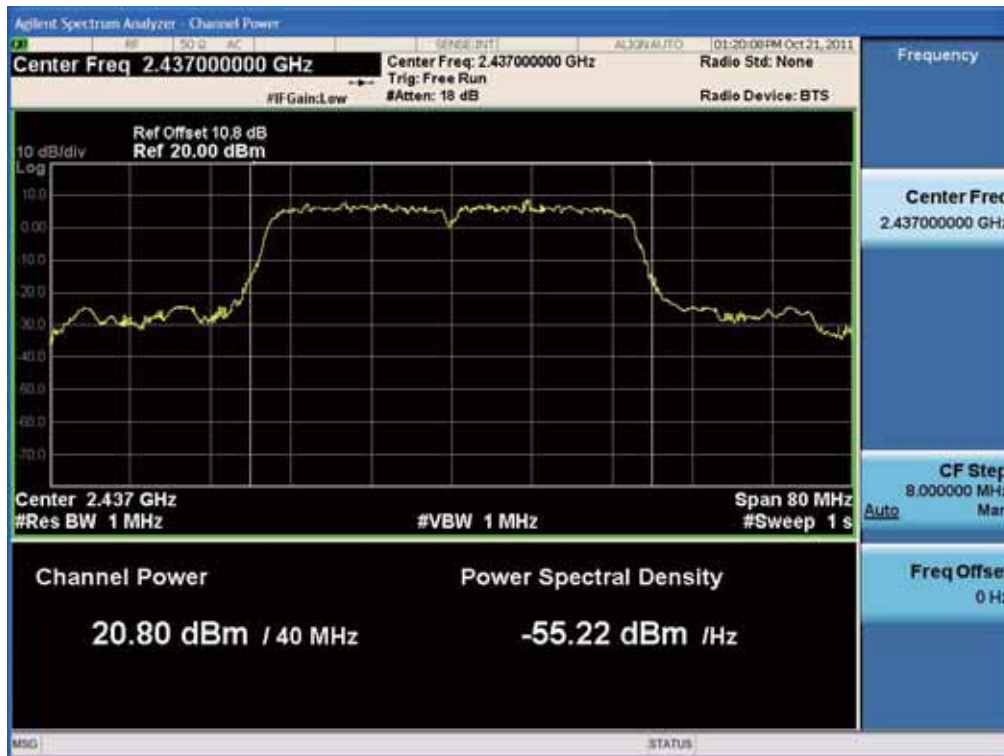
Conducted Output Power (802.11n-CH 6) 81 Mbps _ 40 MHz BW



Conducted Output Power (802.11n-CH 6) 108 Mbps _ 40 MHz BW



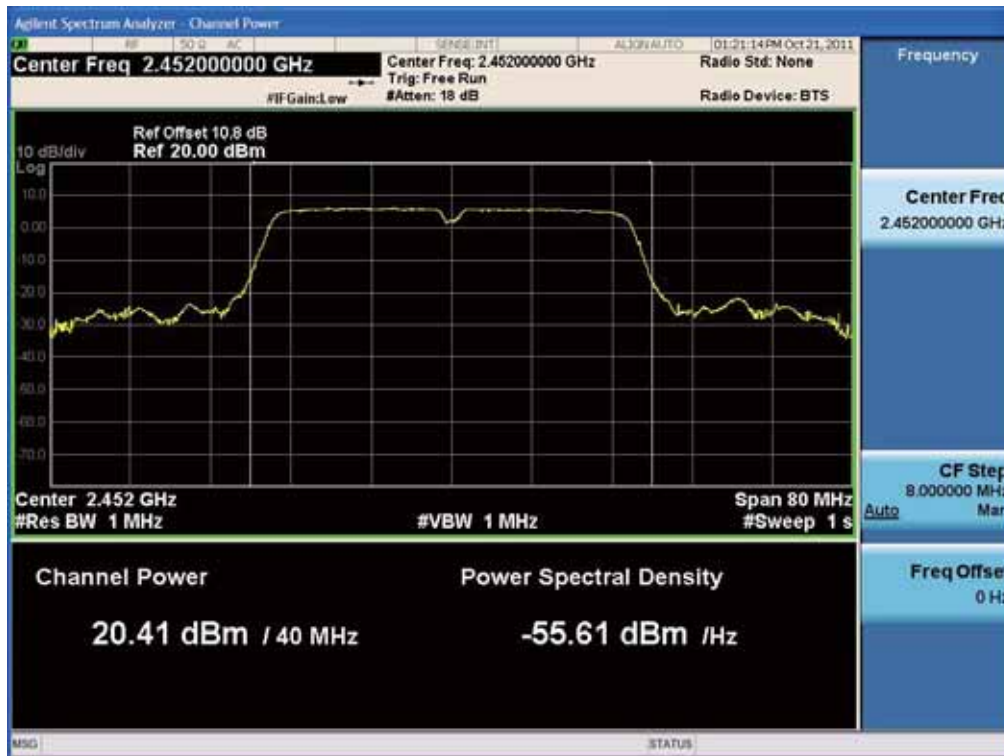
Conducted Output Power (802.11n-CH 6) 121.5 Mbps _ 40 MHz BW



Conducted Output Power (802.11n-CH 6) 135 Mbps _ 40 MHz BW



Conducted Output Power (802.11n-CH 9) 13.5Mbps _ 40 MHz BW



Conducted Output Power (802.11n-CH 9) 27Mbps _ 40 MHz BW



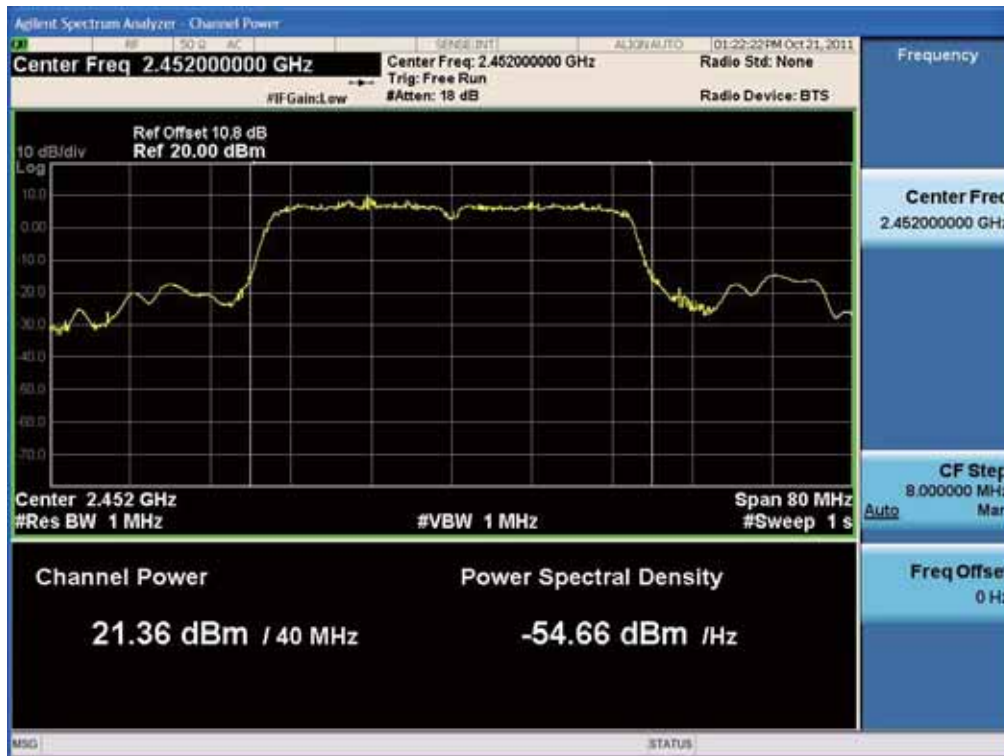
Conducted Output Power (802.11n-CH 9) 40.5 Mbps _ 40 MHz BW



Conducted Output Power (802.11n-CH 9) 54 Mbps _ 40 MHz BW



Conducted Output Power (802.11n-CH 9) 81 Mbps _ 40 MHz BW



Conducted Output Power (802.11n-CH 9) 108 Mbps _ 40 MHz BW



Conducted Output Power (802.11n-CH 9) 121.5 Mbps _ 40 MHz BW



Conducted Output Power (802.11n-CH 9) 135 Mbps _ 40 MHz BW



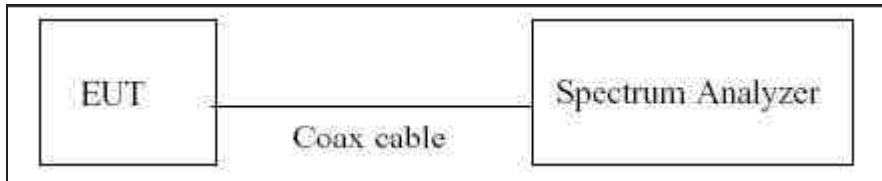
7.4 POWER SPECTRAL DENSITY (802.11b/g/n)

Test Requirements and limit, §15.247(e)

The peak power 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 transmitter power density average over 1-second interval shall not be greater than 8dBm in any 3kHz BW.

■ TEST CONFIGURATION



■ TEST PROCEDURE

The spectrum analyzer is set to :

1. Span = 300 kHz
2. RBW = 3 kHz
3. VBW = 3 kHz
4. Sweep = 100 sec
5. Detector Mode = Peak

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result	
			Power Density (dBm)	Pass/Fail
2412	1	802.11b	-10.206	Pass
2437	6		-8.852	Pass
2462	11		-10.013	Pass

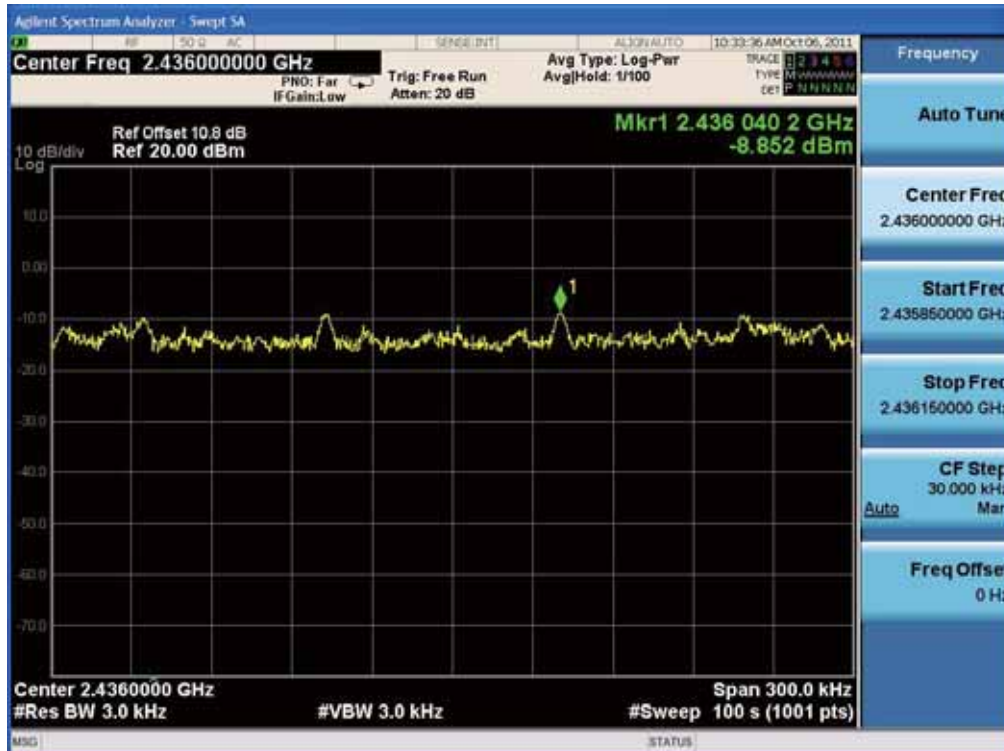
Frequency (MHz)	Channel No.	Mode	Test Result	
			Power Density (dBm)	Pass/Fail
2412	1	802.11g	-14.901	Pass
2437	6		-15.342	Pass
2462	11		-14.575	Pass
2412	1	802.11n (20 MHz BW)	-14.644	Pass
2437	6		-15.486	Pass
2462	11		-16.043	Pass
2422	3	802.11n (40 MHz BW)	-20.277	Pass
2437	6		-20.362	Pass
2452	9		-18.947	Pass

RESULT PLOTS

Power Spectral Density (802.11b-CH 1)



Power Spectral Density (802.11b-CH 6)



FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

Power Spectral Density (802.11b-CH 11)



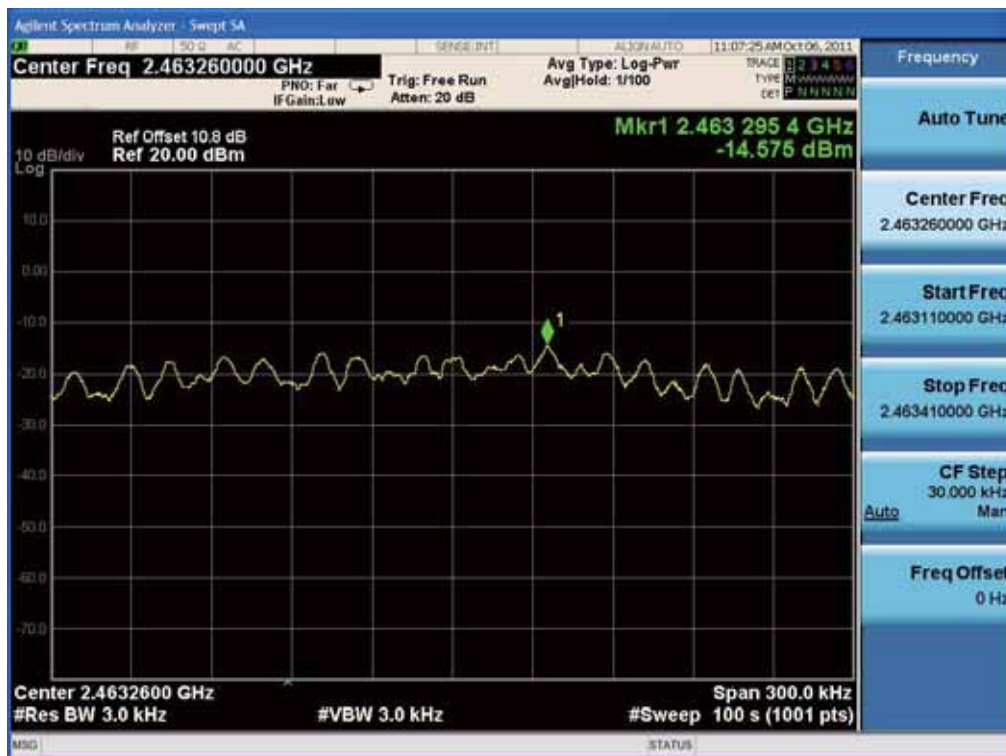
Power Spectral Density (802.11g-CH 1)



Power Spectral Density (802.11g-CH 6)



Power Spectral Density (802.11g-CH11)

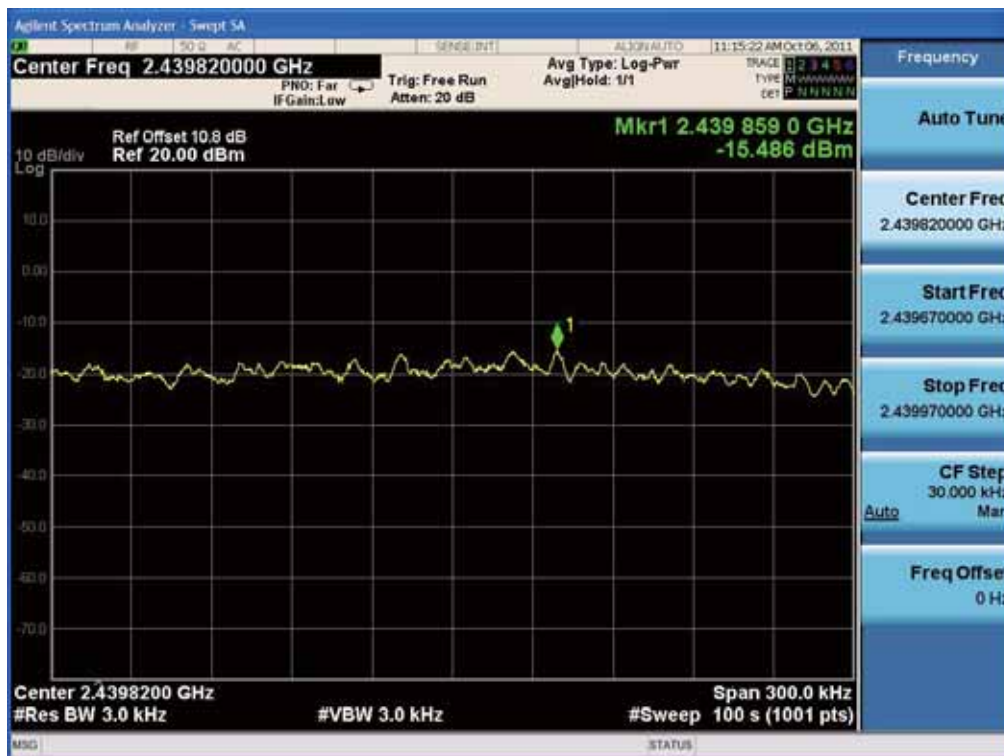


FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

Power Spectral Density (802.11n-CH 1)_20 MHz BW



Power Spectral Density (802.11n-CH 6)_20 MHz BW

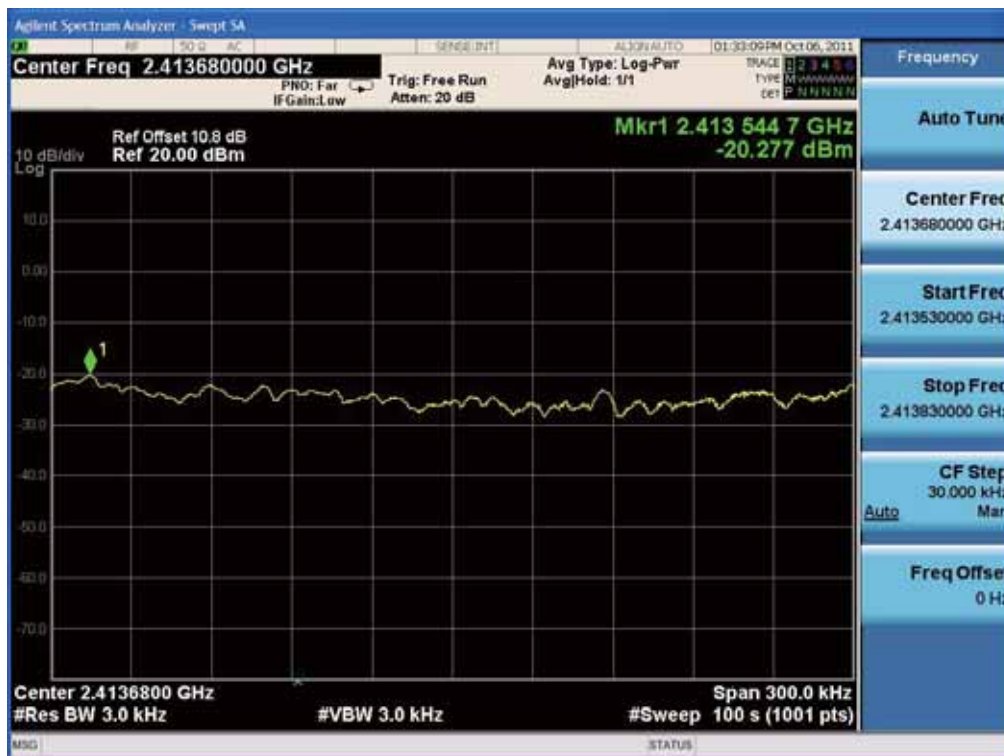


FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

Power Spectral Density (802.11n-CH11) _20 MHz BW

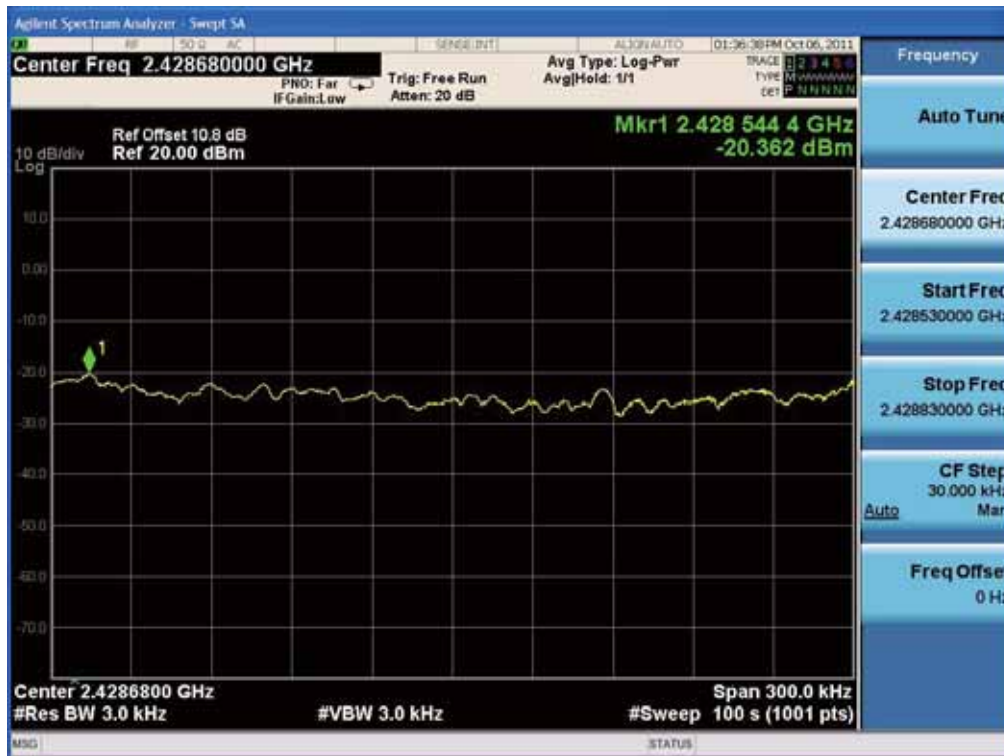


Power Spectral Density (802.11n-CH 3)_40 MHz_20 MHz BW

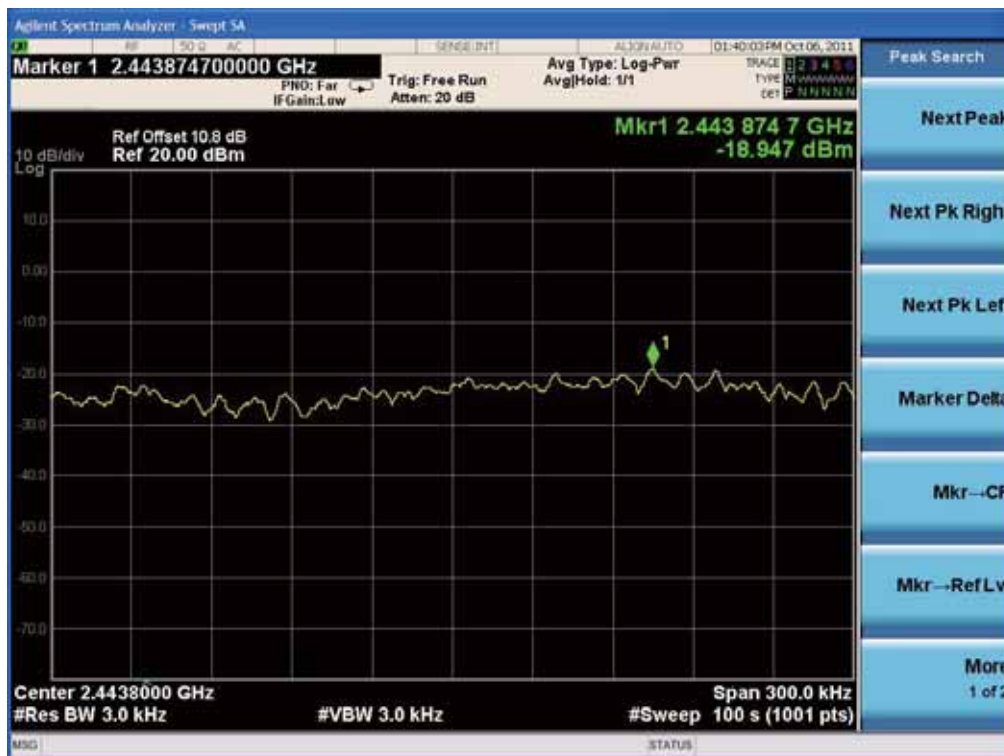


FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

Power Spectral Density (802.11n-CH 6) _40 MHz BW



Power Spectral Density (802.11n-CH9) _40 MHz BW



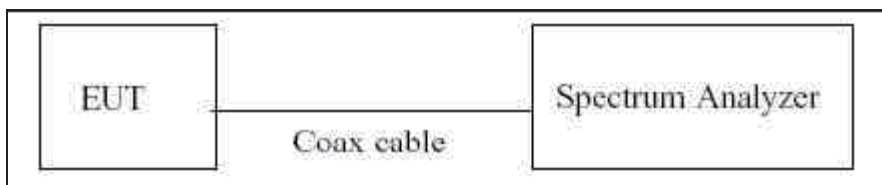
FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

7.5 OUT OF BAND EMISSIONS AT THE BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

Test Requirements and limit, §15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

■ TEST CONFIGURATION



■ TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

Detector Mode is set to a peak detector Mode.

Measurements are made over the 30 MHz to 26 GHz range with the transmitter set to the lowest, middle, and highest channels.

FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

■ RESULT PLOTS

BandEdge (802.11b-CH1)

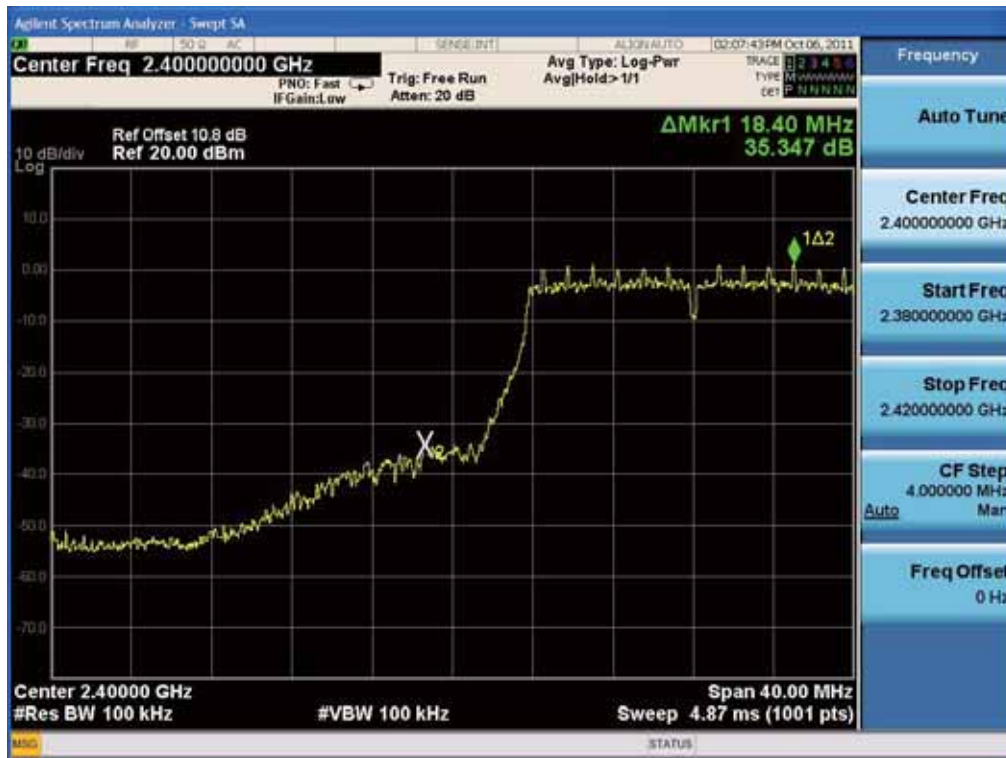


BandEdge (802.11b-CH11)



FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

BandEdge (802.11g-CH1)



BandEdge (802.11g-CH11)

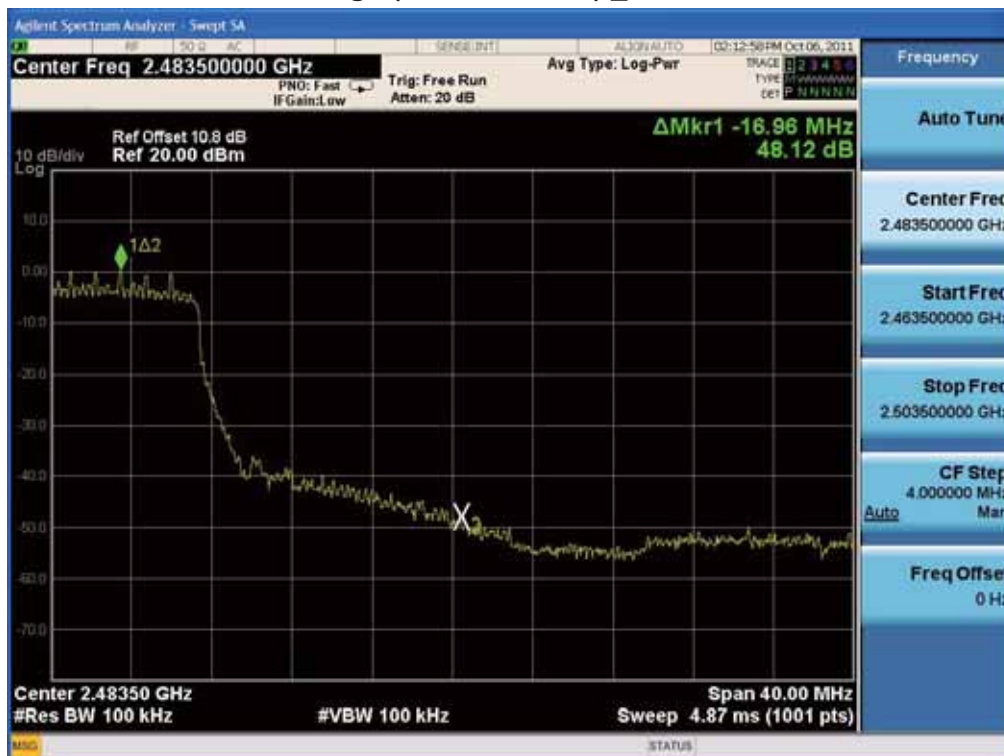


FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

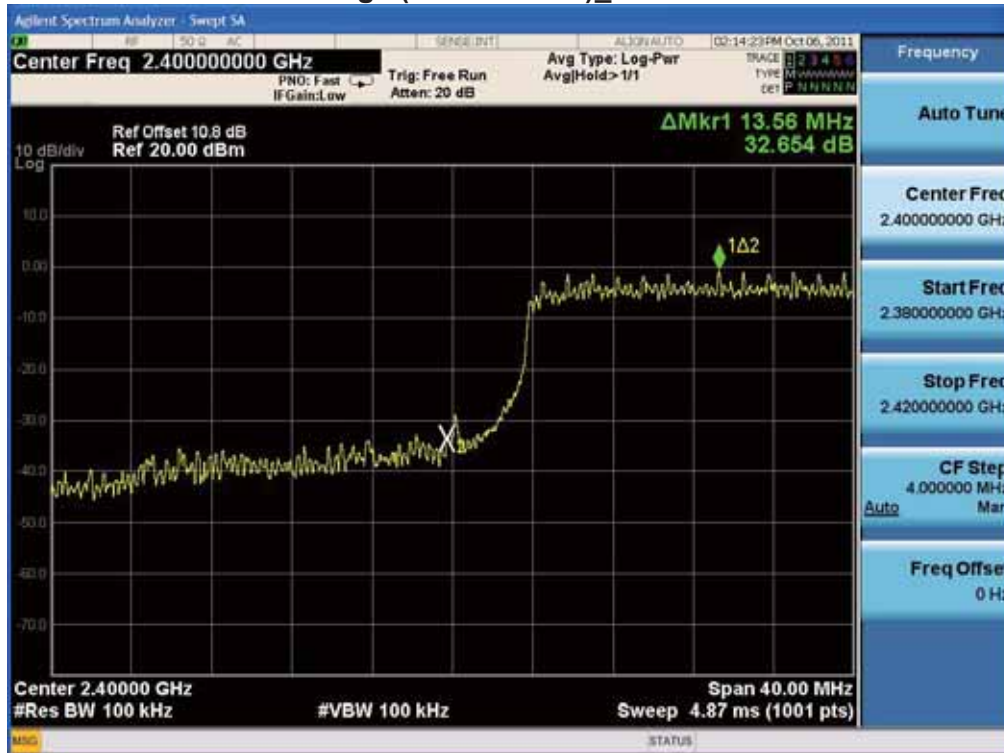
BandEdge (802.11n-CH1) _20 MHz BW



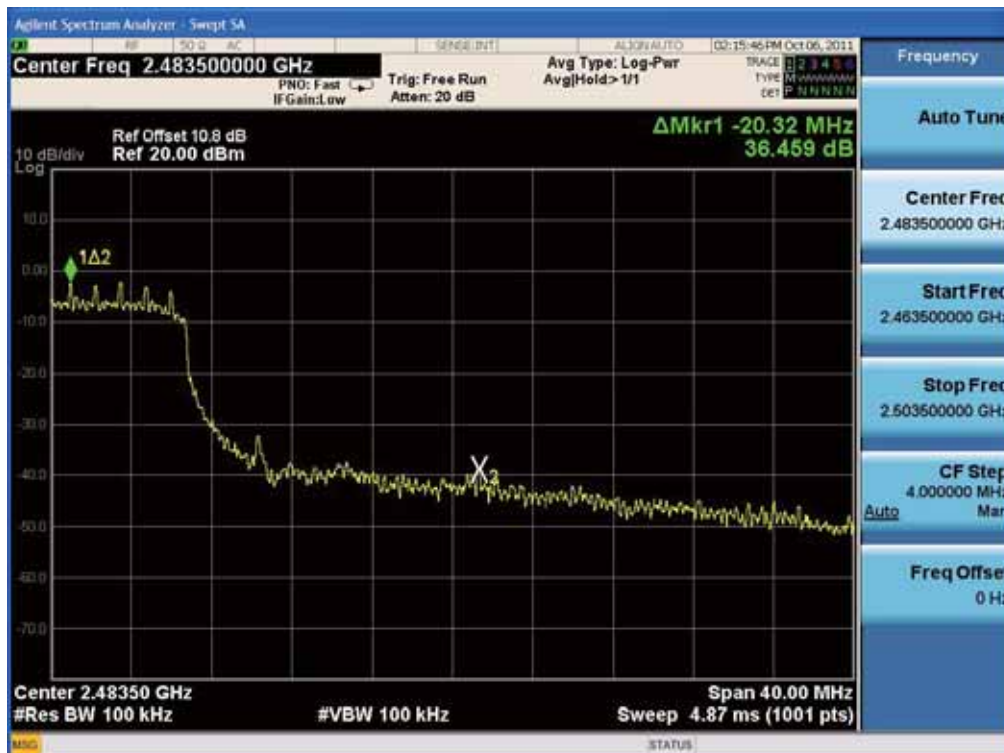
BandEdge (802.11n-CH11) _20 MHz BW



BandEdge (802.11n-CH3)_ 40 MHz BW

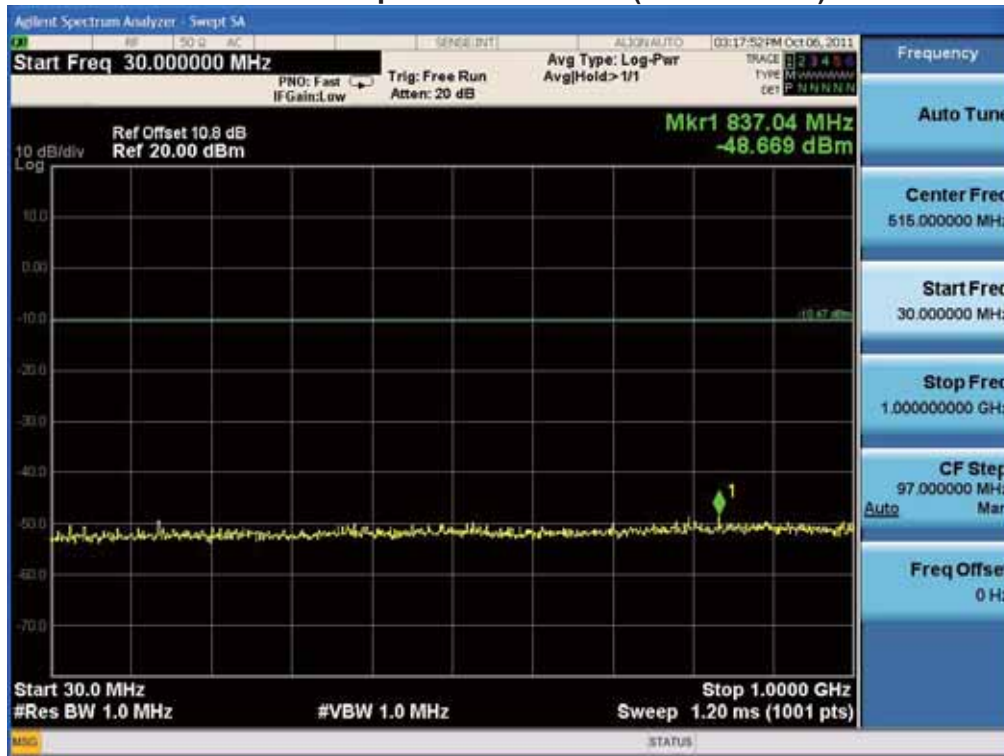


BandEdge (802.11n-CH9)_ 40 MHz BW

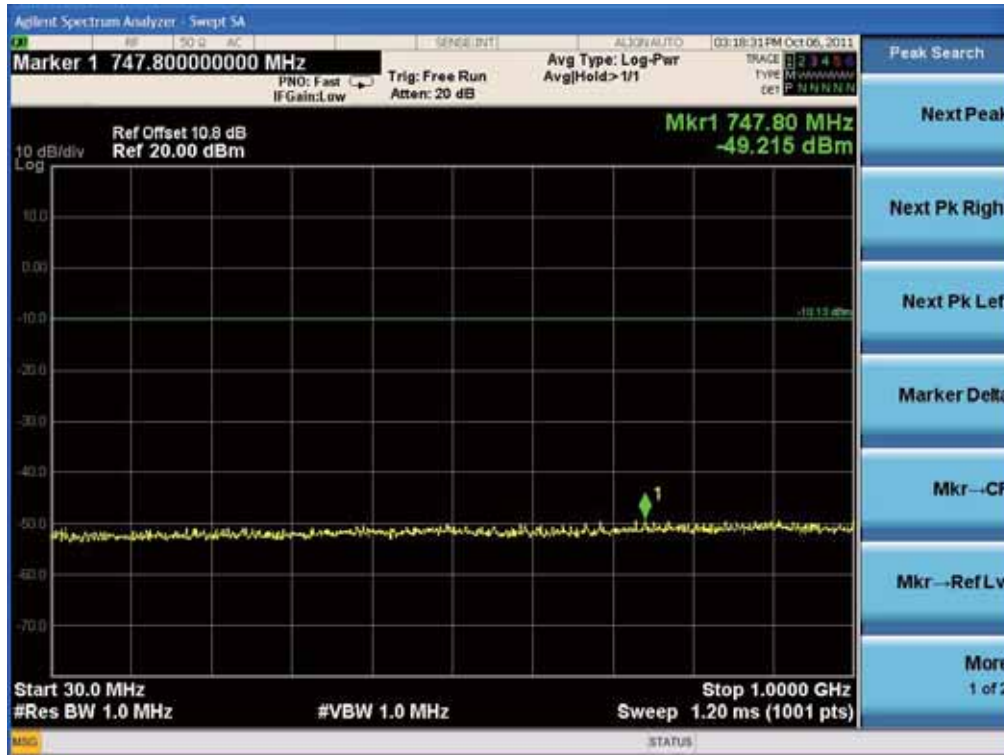


30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11b-CH1)

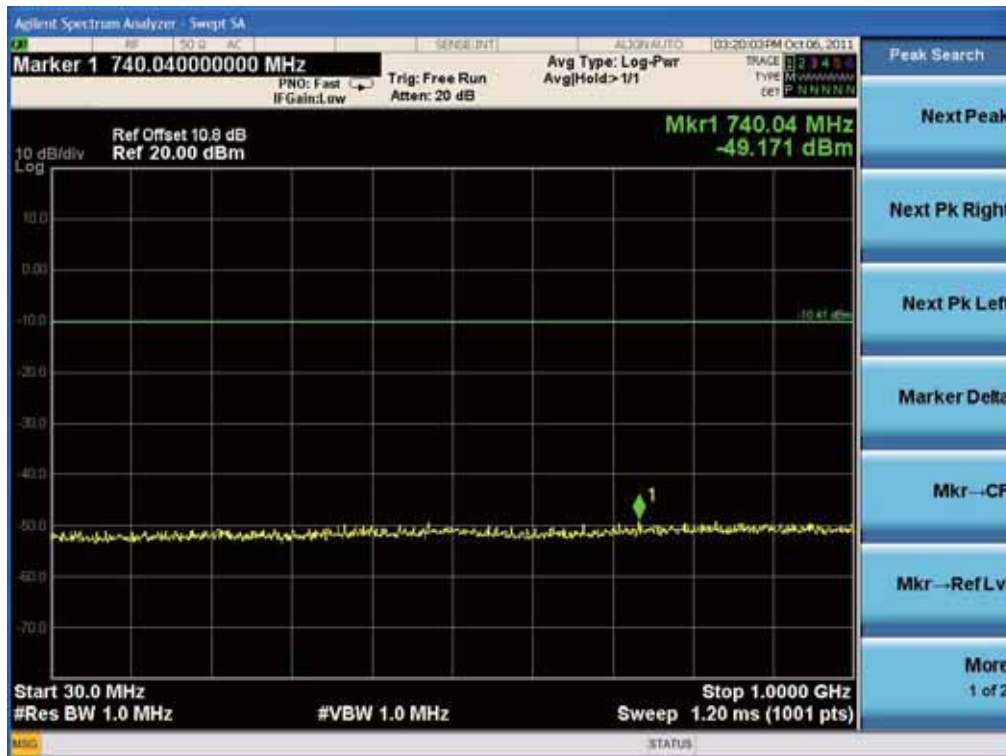


Conducted Spurious Emission (802.11b-CH6)

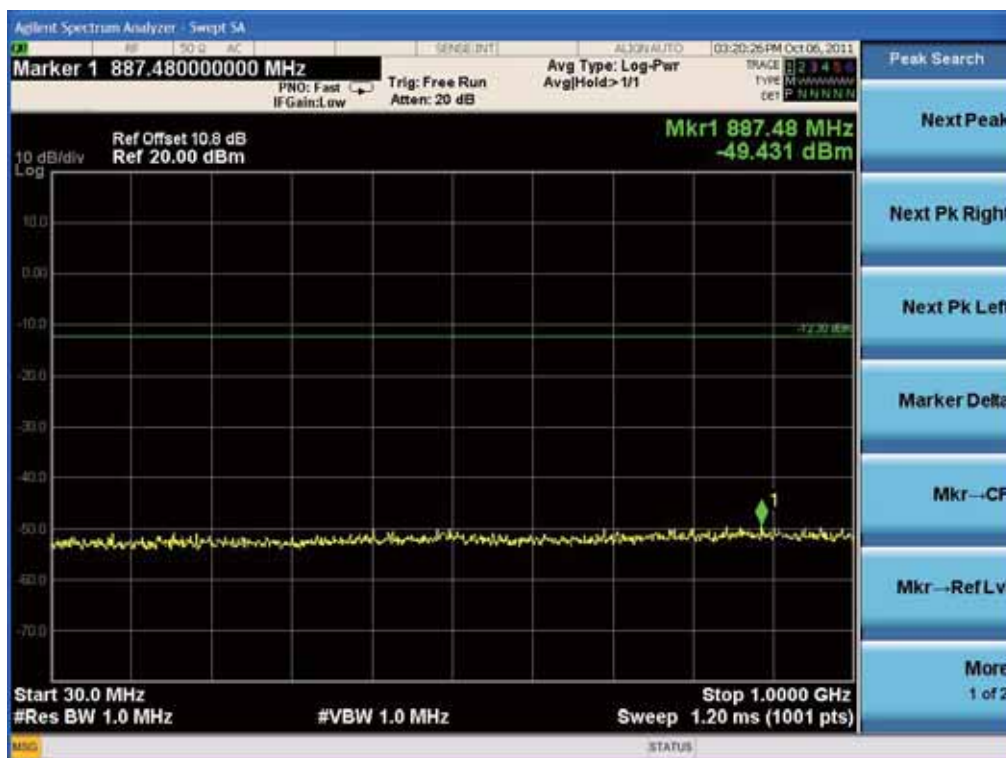


FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

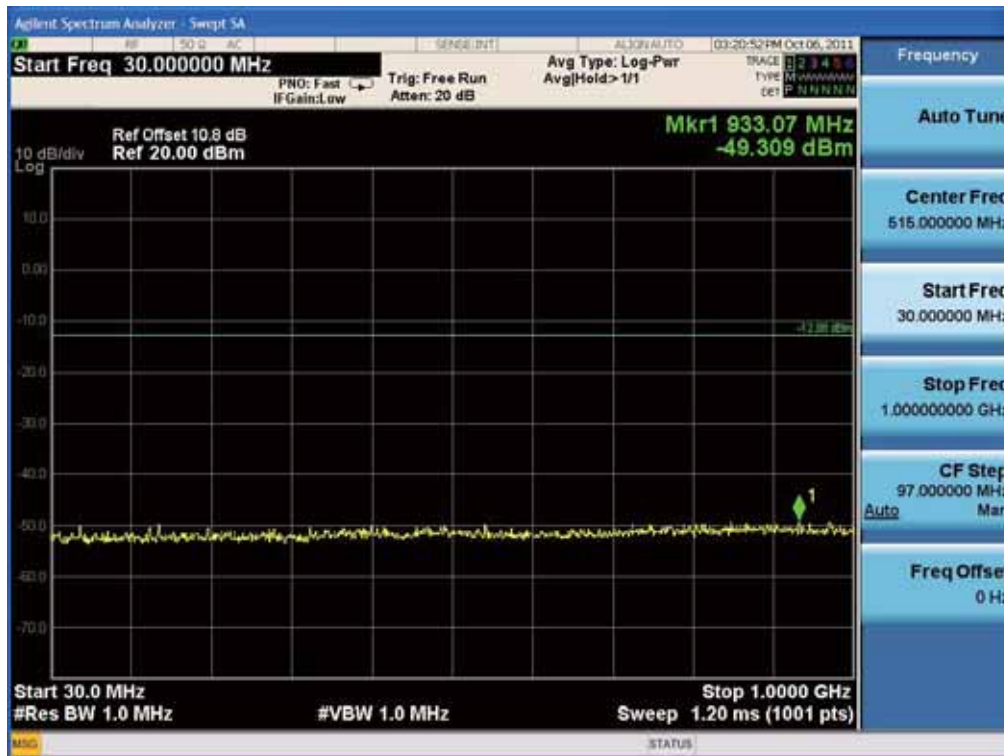
Conducted Spurious Emission (802.11b-CH11)



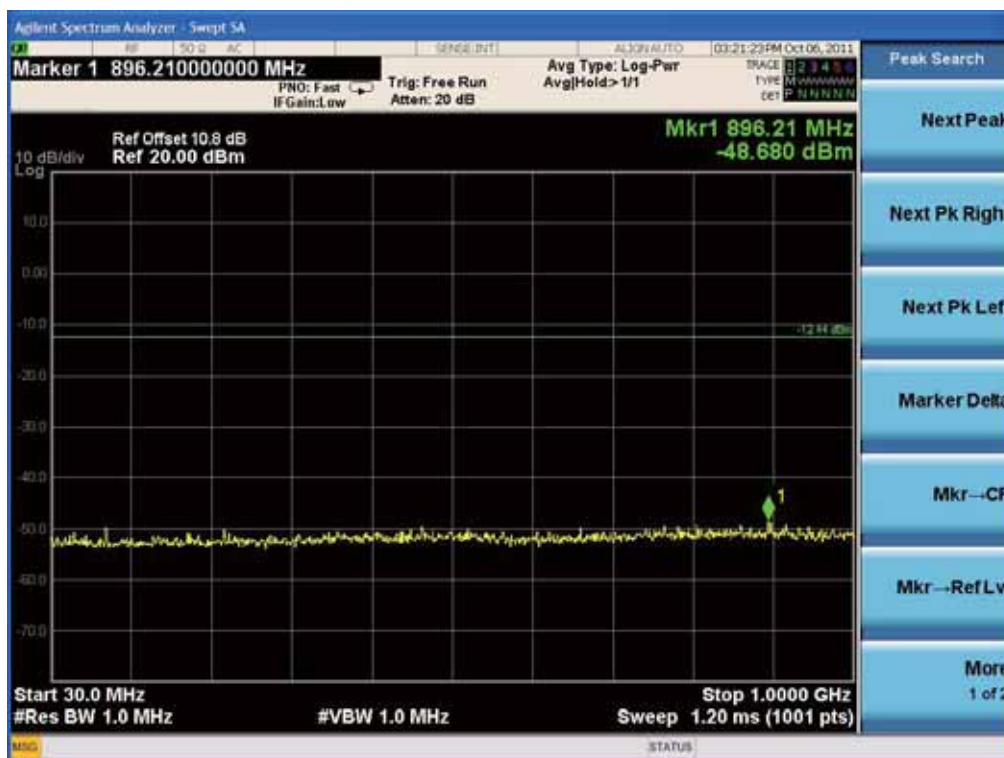
Conducted Spurious Emission (802.11g-CH1)



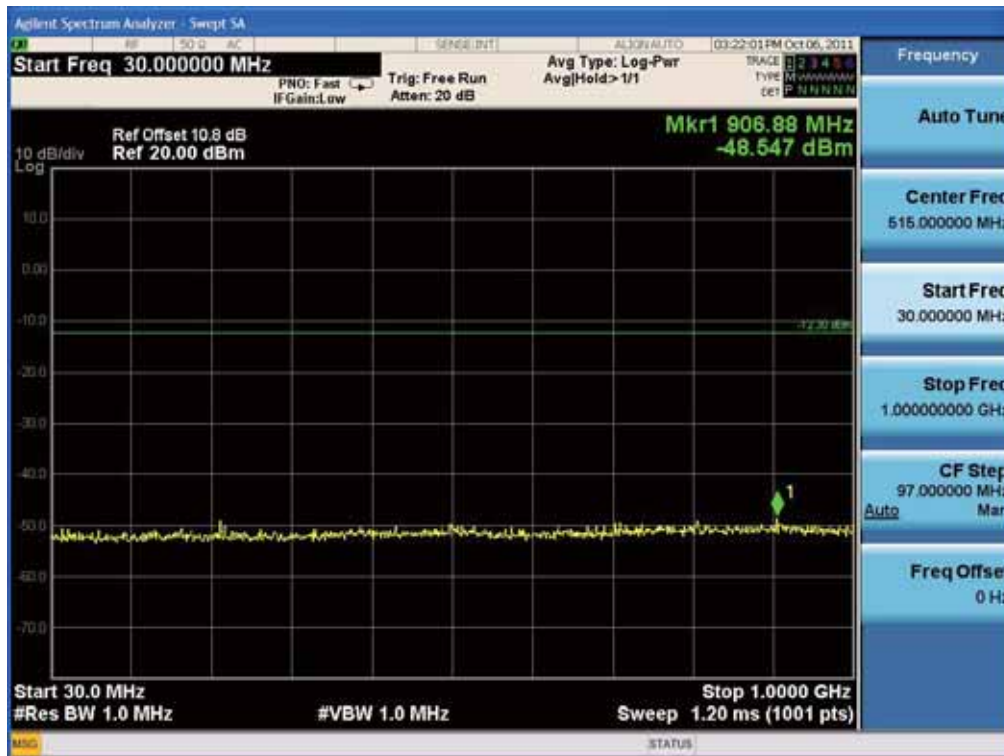
Conducted Spurious Emission (802.11g-CH6)



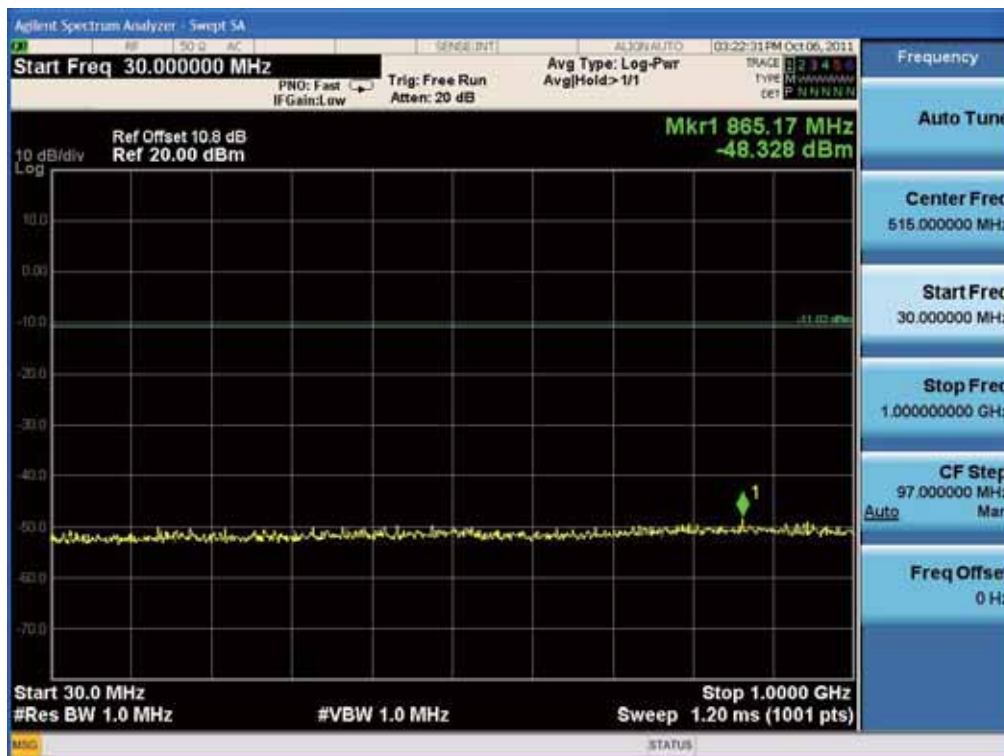
Conducted Spurious Emission (802.11g-CH11)



Conducted Spurious Emission (802.11n-CH1)_20 MHz BW

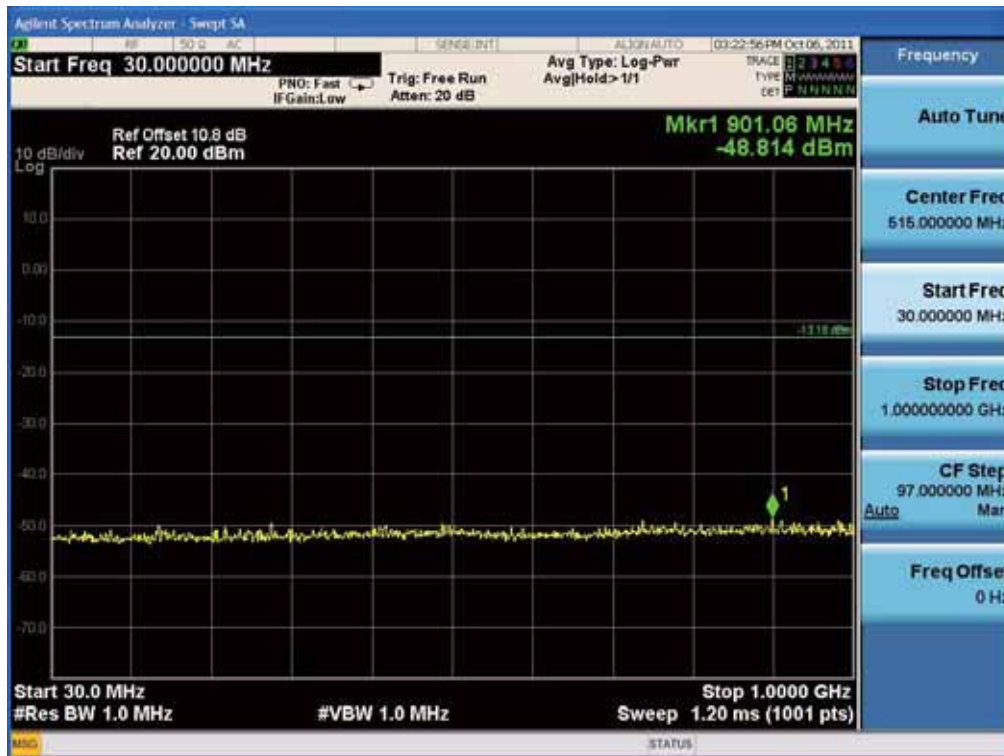


Conducted Spurious Emission (802.11n-CH6)_20 MHz BW

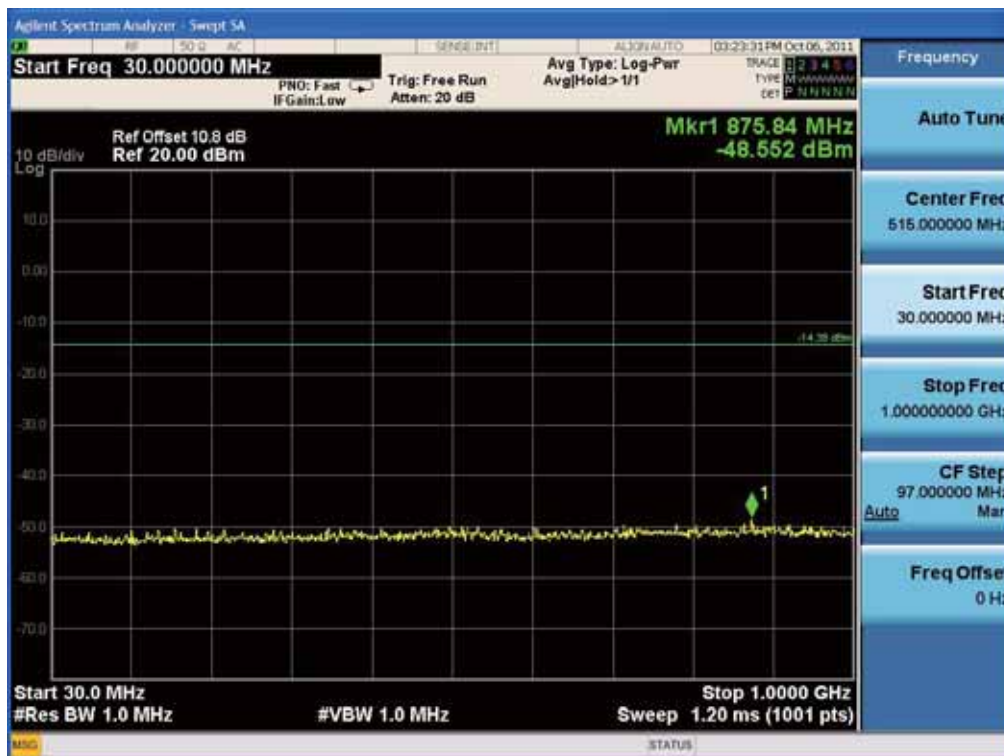


FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

Conducted Spurious Emission (802.11n-CH11) _20 MHz BW

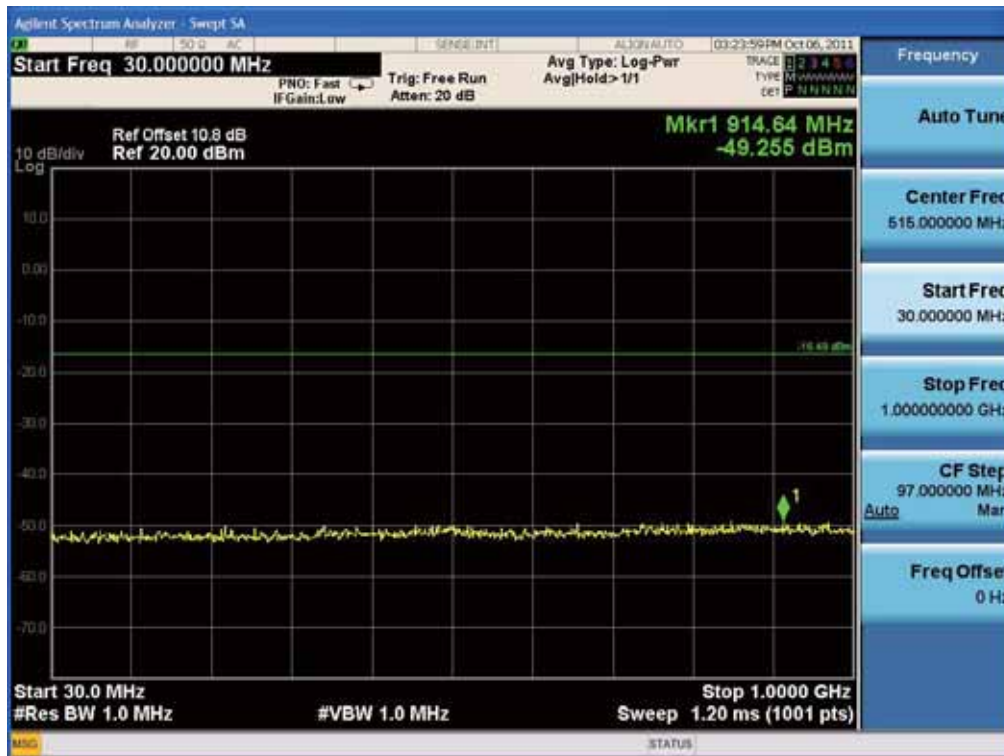


Conducted Spurious Emission(802.11n-CH3)_ 40 MHz BW

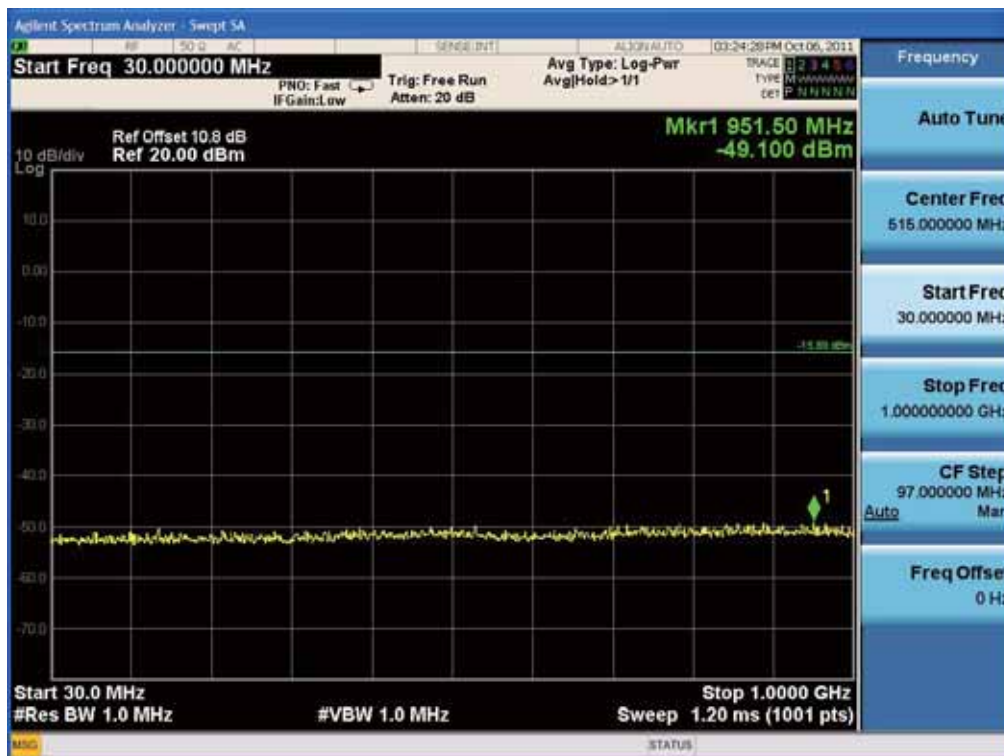


FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

Conducted Spurious Emission(802.11n-CH6)_ 40 MHz BW



Conducted Spurious Emission(802.11n-CH9)_ 40 MHz BW



FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

1 GHz ~ 26 GHz

Conducted Spurious Emission (802.11b-CH1)



Conducted Spurious Emission (802.11b-CH6)



FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

Conducted Spurious Emission (802.11b-CH11)



Conducted Spurious Emission (802.11g-CH1)



FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

Conducted Spurious Emission (802.11g-CH6)



Conducted Spurious Emission (802.11g-CH11)



FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

Conducted Spurious Emission (802.11n-CH1)_20 MHz BW



Conducted Spurious Emission (802.11n-CH6)_20 MHz BW



Conducted Spurious Emission (802.11n-CH11) _20 MHz BW



Conducted Spurious Emission(802.11n-CH3)_ 40 MHz BW



FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

Conducted Spurious Emission(802.11n-CH6)_ 40 MHz BW



Conducted Spurious Emission(802.11n-CH9) _ 40 MHz BW



FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TW FML302D

7.6 RADIATED MEASUREMENT.

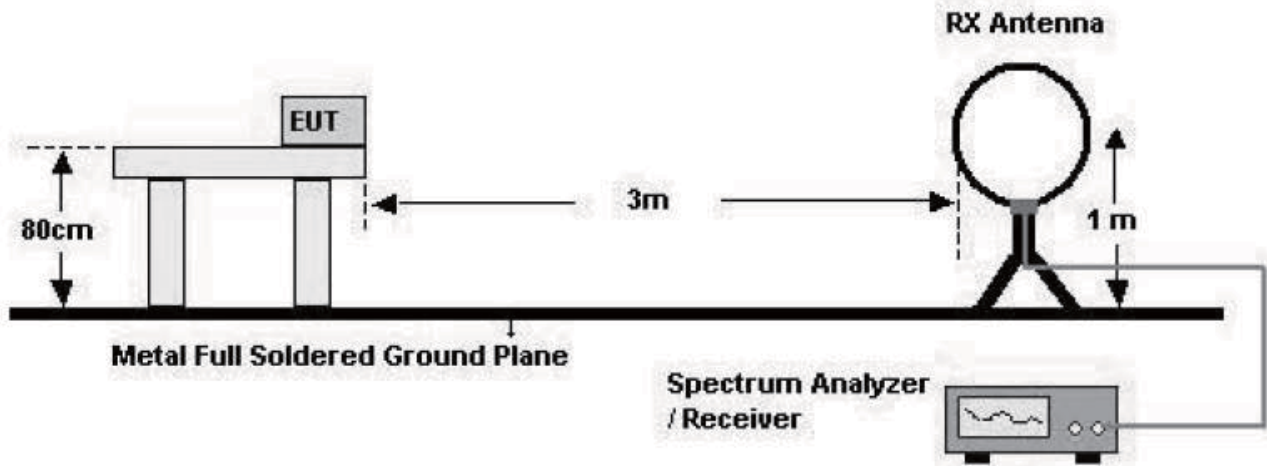
7.6.1 RADIATED SPURIOUS EMISSIONS.

Test Requirements and limit, §15.205, §15.209

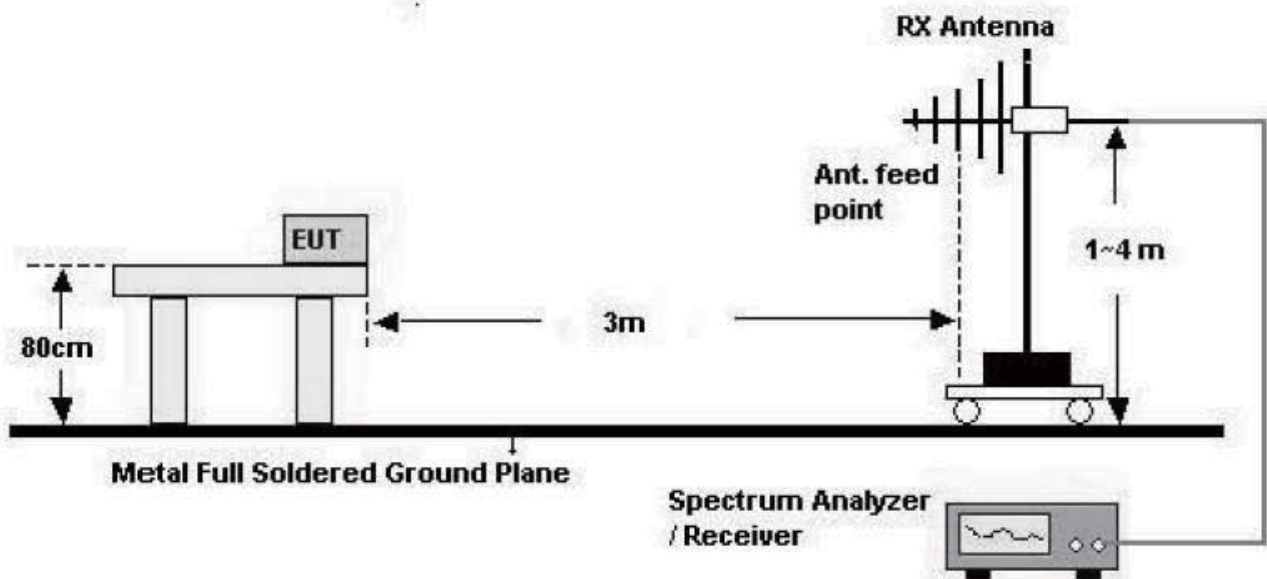
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

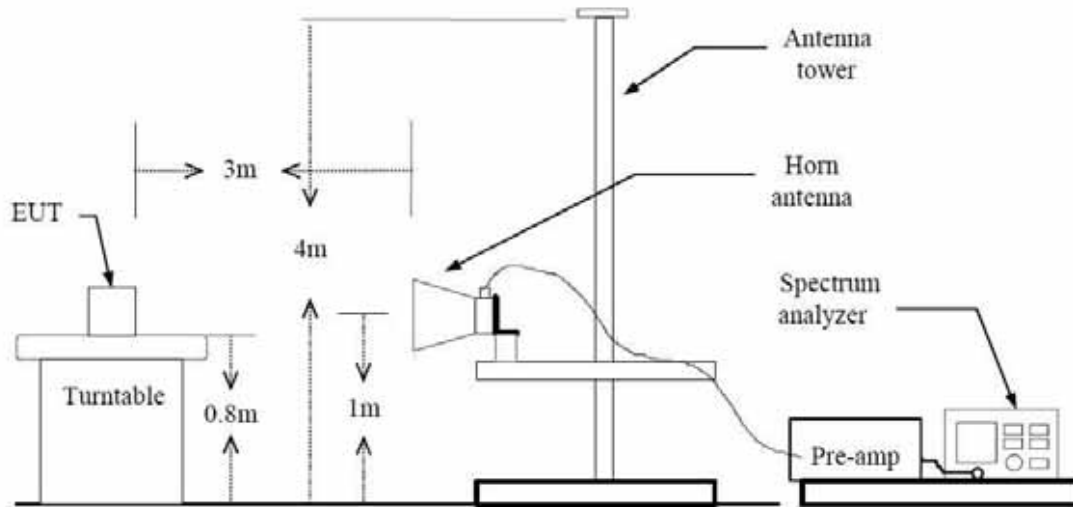
Test Configuration

Below 30 MHz



30 MHz - 1 GHz





TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

FCC PT.15.247 TEST REPORT	FCC & IC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1110FR04-2	Date of Issue: November 02, 2011	EUT Type: Wi-Fi Module	FCC ID: BEJTWFML302D	IC: 2703H-TWFML302D

TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB)
4. Limit line = specific Limits (dB μ V) + Distance extrapolation factor

TEST RESULTS

Below 1 GHz

Operation Mode: 802.11b Mode (Channel : 11 , Data rate : 11 Mbps)

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
82.11	20.60	9.16	0.86	H	30.62	40.0	9.38
164.20	19.67	13.08	1.33	V	34.08	43.5	9.42
347.15	18.50	14.40	2.03	H	34.93	46.0	11.07

Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
3. We have done 802.11b, 802.11g, 802.11n_20 MHz BW and 802.11n_40 MHz BW mode test. Worst case of EUT is 802.11b Mode.

Above 1 GHz

Operation Mode:	802.11 b
Transfer Rate:	1 Mbps
Operating Frequency	2412
Channel No.	01 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4824	52.10	-0.61	V	51.49	74	22.51	PK
4824	41.95	-0.61	V	41.34	54	12.66	AV
4824	52.47	-0.61	H	51.86	74	22.14	PK
4824	43.48	-0.61	H	42.87	54	11.13	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
5. We have done 802.11b, 802.11g, 802.11n_20 MHz BW and 802.11n_40 MHz BW test. Worst case of EUT is 1 Mbps in 802.11b.

Operation Mode:	802.11 b
Transfer Rate:	1 Mbps
Operating Frequency	2437
Channel No.	06 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4874	52.17	-0.42	V	51.75	74	22.25	PK
4874	42.34	-0.42	V	41.92	54	12.08	AV
4874	52.11	-0.42	H	51.69	74	22.31	PK
4874	42.75	-0.42	H	42.33	54	11.67	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
5. We have done 802.11b, 802.11g, 802.11n_20 MHz BW and 802.11n_40 MHz BW test. Worst case of EUT is 1 Mbps in 802.11b.

Operation Mode:	802.11 b
Transfer Rate:	1 Mbps
Operating Frequency	2462
Channel No.	11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4924	51.79	-0.39	V	51.40	74	22.60	PK
4924	43.04	-0.39	V	42.65	54	11.35	AV
4924	51.99	-0.39	H	51.60	74	22.40	PK
4924	42.33	-0.39	H	41.94	54	12.06	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MH.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
5. We have done 802.11b, 802.11g, 802.11n_20 MHz BW and 802.11n_40 MHz BW test. Worst case of EUT is 1 Mbps in 802.11b.

7.6.2 RECEIVER SPURIOUS EMISSIONS

FCC Rule(s)	§15.109 (see Table Below)
Test Requirements:	Emission Level shall not exceed §15.109 limits
Operating conditions:	Under normal test conditions
Method of testing:	Radiated

S/A. Settings:	F < 1 GHz: RBW: 120 kHz, VBW: 300 kHz (Quasi Peak)
	F > 1 GHz: RBW: 1 MHz, VBW: 1 MHz (Peak)
Mode of operation:	Receive

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
30 – 88	100 (40 dBuV)	3
88 - 216	150 (43.5 dBuV)	3
216 – 960	200 (46 dBuV)	3
Above 960	500 (54 dBuV)	3

Operation Mode: Receive:

30 MHz ~ 1 GHz

Frequency MHz	Reading dBuV	Ant. Factor dB/m	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
82.11	24.60	9.16	0.86	H	34.62	40.0	5.38
164.20	17.67	13.08	1.33	V	32.08	43.5	11.42
347.15	18.00	14.40	2.03	H	34.43	46.0	11.57

Above 1 GHz

Frequency MHz	Reading dBuV	Ant. Factor dB/m	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
No Critical peaks found							

7.6.3 RADIATED RESTRICTED BAND EDGE MEASUREMENTS

Test Requirements and limit, §15.247(d) §15.205, §15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	26.77	33.25	H	60.02	74	13.98	PK
2390.0	11.27	33.25	H	44.52	54	9.48	AV
2390.0	26.51	33.25	V	59.76	74	14.24	PK
2390.0	11.09	33.25	V	44.34	54	9.66	AV
2483.5	29.81	33.73	H	63.54	74	10.46	PK
2483.5	12.55	33.73	H	46.28	54	7.72	AV
2483.5	27.15	33.73	V	60.88	74	13.12	PK
2483.5	11.59	33.73	V	45.32	54	8.68	AV

Operation Mode: 802.11g

Transfer Rate: 6 Mbps

Operating Frequency: 2412 MHz, 2462 MHz

Channel No. 01 Ch, 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	25.45	33.25	H	58.70	74	15.30	PK
2390.0	12.60	33.25	H	45.85	54	8.15	AV
2390.0	27.39	33.25	V	60.64	74	13.36	PK
2390.0	12.86	33.25	V	46.11	54	7.89	AV
2483.5	35.50	33.73	H	69.23	74	4.77	PK
2483.5	13.73	33.73	H	47.46	54	6.54	AV
2483.5	29.86	33.73	V	63.59	74	10.41	PK
2483.5	12.57	33.73	V	46.30	54	7.70	AV

Operation Mode: 802.11n_20 MHz BW

Transfer Rate: 6.5 Mbps

Operating Frequency: 2412 MHz, 2462 MHz

Channel No. 01 Ch, 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	26.62	33.25	H	59.87	74	14.13	PK
2390.0	12.63	33.25	H	45.88	54	8.12	AV
2390.0	27.35	33.25	V	60.60	74	13.40	PK
2390.0	12.92	33.25	V	46.17	54	7.83	AV
2483.5	36.77	33.73	H	70.50	74	3.50	PK
2483.5	14.10	33.73	H	47.83	54	6.17	AV
2483.5	32.38	33.73	V	66.11	74	7.89	PK
2483.5	13.10	33.73	V	46.83	54	7.17	AV

Operation Mode:	802.11n_40 MHz
Transfer Rate:	13.5 Mbps
Operating Frequency	2422 MHz, 2452 MHz
Channel No.	03 Ch, 09 Ch

Frequency [MHz]	Reading dBuV	AN.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	35.71	33.25	H	68.96	74	5.04	PK
2390.0	16.66	33.25	H	49.91	54	4.09	AV
2390.0	35.79	33.25	V	69.04	74	4.96	PK
2390.0	15.51	33.25	V	48.76	54	5.24	AV
2483.5	37.23	33.73	H	70.96	74	3.04	PK
2483.5	15.90	33.73	H	49.63	54	4.37	AV
2483.5	35.33	33.73	V	69.06	74	4.94	PK
2483.5	14.34	33.73	V	48.07	54	5.93	AV

Notes:

- Spectrum setting:
 - Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
- We have done 802.11b, 802.11g, 802.11n_20 BW MHz BW and 802.11n_40 MHz mode.

7.7 POWERLINE CONDUCTED EMISSIONS

Test Requirements and limit, §15.207

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference groundplane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

■ RESULT PLOTS

Conducted Emissions (Line 1)

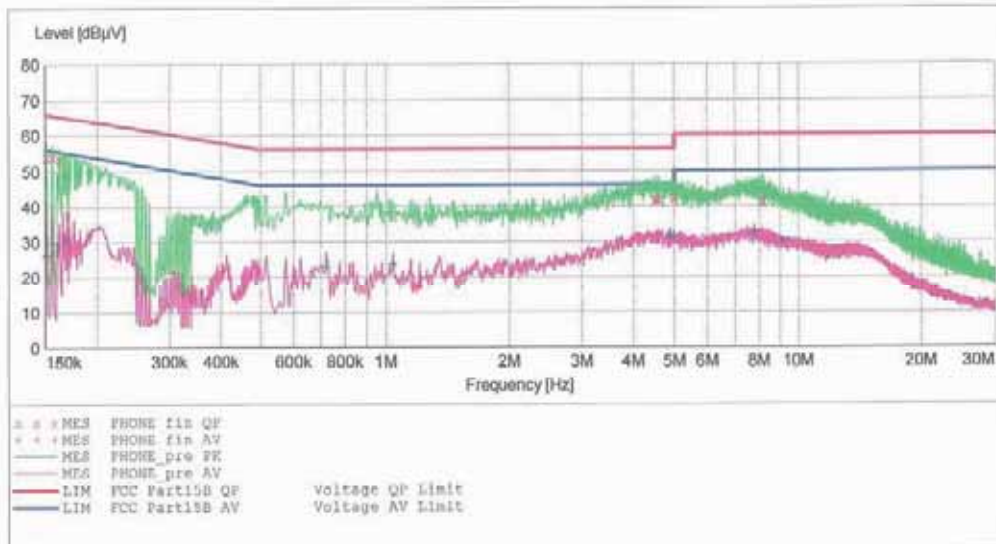
HCT

EMC

EUT: TWFM-L302D
Manufacturer: LGINNOTEK
Operating Condition: WLAN MODE
Test Site: SHIELD ROOM
Operator: JS LEE
Test Specification: FCC PART15 CLASS C
Comment: H

SCAN TABLE: "FCC PART 15 B(H)"

Short Description:			FCC PART 15 CLASS B				
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer	
Frequency	Frequency	Width					
150.0 kHz	500.0 kHz	1.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				



MEASUREMENT RESULT: "PHONE_fin QP"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.151010	54.00	10.1	66	12.0	---	---
0.156010	54.10	10.1	66	11.6	---	---
0.162010	53.40	10.1	65	11.9	---	---
4.500000	41.40	10.5	56	14.6	---	---
4.544000	41.90	10.5	56	14.1	---	---
4.616000	41.90	10.5	56	14.1	---	---
5.000000	42.10	10.5	56	13.9	---	---
8.148000	41.40	10.8	60	18.6	---	---
8.216000	41.00	10.8	60	19.0	---	---

MEASUREMENT RESULT: "PHONE_fin AV"

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Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.151010	26.40	10.1	56	29.5	---	---
0.156010	29.70	10.1	56	26.0	---	---
0.169010	30.50	10.1	55	24.5	---	---
0.720000	23.10	10.1	46	22.9	---	---
1.044000	23.70	10.1	46	22.3	---	---
4.884000	31.20	10.5	46	14.8	---	---
5.000000	31.40	10.5	46	14.6	---	---
7.792000	32.10	10.0	50	17.9	---	---
9.132000	29.60	10.9	50	20.4	---	---

Conducted Emissions (Line 2)

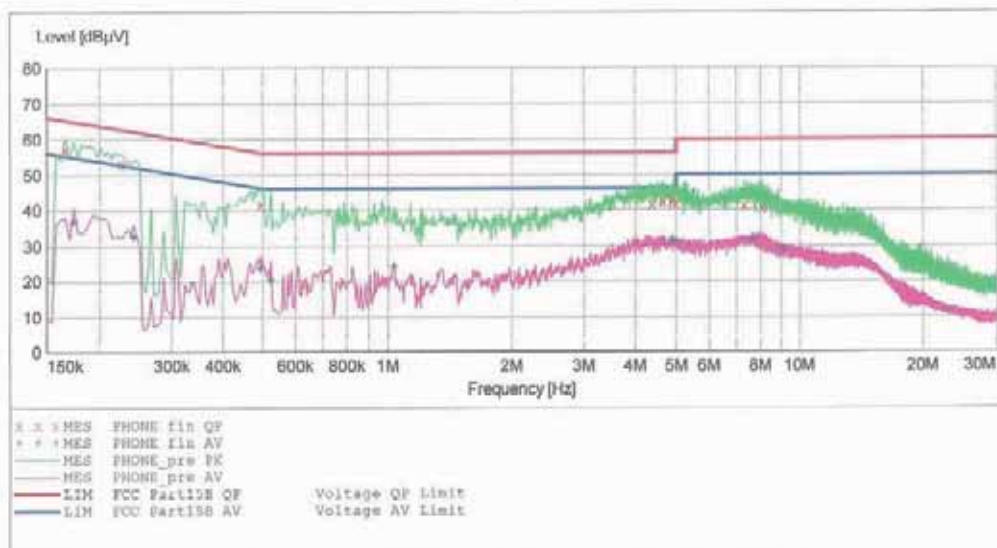
HCT

EMC

EUT: TWFM-L302D
 Manufacturer: LGINNOTEK
 Operating Condition: WLAN MODE
 Test Site: SHIELD ROOM
 Operator: JS LEE
 Test Specification: FCC PART15 CLASS C
 Comment: N

SCAN TABLE: "FCC PART 15 B(N)"

Short Description:			FCC PART 15 CLASS B			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "PHONE_fin_QP"

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Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.166010	57.10	10.3	63	8.1	---	---
0.226010	53.00	10.3	63	9.6	---	---
0.494010	41.60	10.3	56	14.5	---	---
4.392000	41.70	10.7	56	14.3	---	---
4.660000	42.30	10.7	56	13.7	---	---
4.896000	42.40	10.7	56	13.6	---	---
5.000000	41.90	10.7	56	14.1	---	---
7.316000	41.20	11.0	60	18.8	---	---
8.092000	40.60	11.0	60	19.4	---	---

MEASUREMENT RESULT: "PHONE_fin AV"

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Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.174010	36.70	10.3	55	18.0	---	---
0.242010	32.60	10.3	52	19.4	---	---
0.494010	23.70	10.3	46	22.4	---	---
0.524000	20.50	10.3	46	25.5	---	---
1.040000	24.30	10.4	46	21.7	---	---
4.892000	31.50	10.7	46	14.5	---	---
5.000000	31.20	10.7	46	14.6	---	---
7.688000	31.70	11.0	50	18.3	---	---
9.148000	28.90	11.0	50	21.1	---	---

8. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Interval	Calibration Due	Serial No.
Rohde & Schwarz	ESH2-Z5/ LISN	Annual	02/01/2012	861741/013
Schwarzbeck	VULB 9168/ TRILOG Antenna	Biennial	02/09/2013	200
Rohde & Schwarz	ESI 40 / EMI TEST RECEIVER	Annual	05/26/2012	831564103
Agilent	E4440A/ Spectrum Analyzer	Annual	05/02/2012	US45303008
Agilent	N9020A/ SIGNAL ANALYZER	Annual	09/23/2012	MY51110020
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12
Rohde & Schwarz	ESH3-Z2/ PULSE LIMITER	Annual	08/01/2012	375.8810.352
Rohde & Schwarz	SCU-18/ Signal Conditioning Unit	Annual	09/19/2012	10094
MITEQ	AMF-6B-180265-35-10P/POWER AMP	Annual	11/02/2011	667624
MITEQ	AFS44-00102650-42-10P-44-PS/ POWER AMP	Annual	09/23/2012	1532439
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	04/13/2012	147
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	Biennial	10/26/2012	BBHA9170342
Rohde & Schwarz	FSP / Spectrum Analyzer	Annual	03/23/2012	839117/011
Agilent	E4440A / Spectrum Analyzer	Annual	05/02/2012	US45303008
Agilent	E4416A /Power Meter	Annual	01/04/2012	GB41291412
Agilent	E9327A /POWER SENSOR	Annual	05/02/2012	MY4442009
Wainwright Instrument	WHF3.3/18G-10EF / High Pass Filter	Annual	05/02/2012	1
Wainwright Instrument	WRCJ2400/2483.5-2370/2520-60/14SS / Band Reject Filter	Annual	05/02/2012	1
Hewlett Packard	11636B/Power Divider	Annual	12/29/2011	11377
Hewlett Packard	11667B / Power Splitter	Annual	11/08/2011	10126
DIGITAL	EP-3010 /DC POWER SUPPLY	Annual	01/04/2012	3110117
ITECH	IT6720 / DC POWER SUPPLY	Annual	12/01/2011	010002156287001199
TESCOM	TC-3000C / BLUETOOTH TESTER	Annual	04/01/2012	3000C000276
Rohde & Schwarz	CBT / BLUETOOTH TESTER	Annual	05/02/2012	100422
EMCO	6502.LOOP ANTENNA	Biennial	01/13/2012	9009-2536