

HCT CO., LTD.

CERTIFICATE OF COMPLIANCE FCC Certification

Applicant Name: LG Electronics MobileComm U.S.A., Inc.	Date of Issue: August 16, 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.: HCTR1308FR24
	HCT FRN: 0005866421

FCC ID : ZNFD680

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

FCC Model(s):	LG-D680
Additional FCC Model(s):	LGD680, D680
EUT Type:	GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n(2.4GHz), VoIP, Hotspot support
Max. RF Output Power:	Wi-Fi 802.11b(20.97 dBm) / Wi-Fi 802.11g (19.88 dBm) / Wi-Fi 802.11n_20 MHz (18.38 dBm) / Wi-Fi 802.11n_40 MHz (18.80 dBm)
Frequency Range:	2412 MHz - 2462 MHz (2.4 GHz Band) 2422 MHz - 2452 MHz (2.4 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
: Jong Seok Lee
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. HCTR1308FR24	Date of Issue: August 16, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n(2.4GHz), VoIP, Hotspot support	FCC ID: ZNFD680



Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1308FR24	August 16, 2013	- First Approval Report

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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: ZNFD680
EUT Type: GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n(2.4GHz), VoIP, Hotspot support
Model name(s): LG-D680
Additional Model name(s): LGD680, D680
Date(s) of Tests: August 01, 2013 ~ August 08, 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 Bluetooth3.0, WIFI802.11 b/g/n(2.4GHz), VoIP, Hotspot support	
FCC Model Name	LG-D680	
Additional FCC Model Name	LGD680, D680	
Power Supply	DC 3.8 V	
Battery type	Li-ion Battery(Standard)	
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	Peak	Wi-Fi 802.11b(20.97 dBm) / Wi-Fi 802.11g (19.88 dBm) / Wi-Fi 802.11n_20 MHz (18.38 dBm) / Wi-Fi 802.11n_40 MHz (18.80 dBm)
	Average	Wi-Fi 802.11b(15.17 dBm) / Wi-Fi 802.11g (11.21 dBm) / Wi-Fi 802.11n_20 MHz (9.87 dBm) / Wi-Fi 802.11n_40 MHz (11.26 dBm)
Modulation Type	DSSS/CCK(802.11b), OFDM(802.11g, 802.11n)	
Antenna Specification	Manufacturer: LS Mtron Co. Ltd. Antenna type: PIFA Antenna Peak Gain : -0.90 dBi	

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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.

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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."

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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

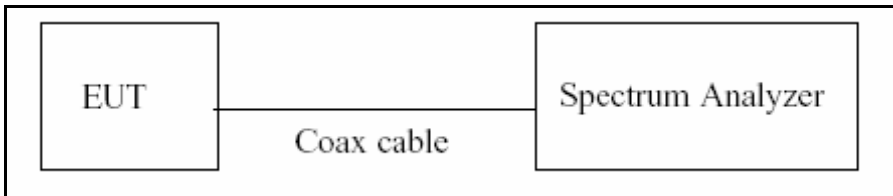
8.1 DUTY CYCLE

TEST PROCEDURE

According to KDB 558074)6)b), issued 04/09/2013)

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

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We tested according to the zero-span measurement method, 6.0)b) in KDB 558074(issued 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 = $10 \cdot \log(1/\text{Duty Cycle})$

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Duty Cycle Factor

Mode	Data Rate	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11b	1 Mbps	12.190	12.300	0.99105691	0.039
	2 Mbps	6.185	6.295	0.98252581	0.077
	5.5 Mbps	2.378	2.476	0.96042003	0.175
	11 Mbps	1.284	1.388	0.92507205	0.338
802.11g	6 Mbs	2.020	2.136	0.94569288	0.242
	9 Mbs	1.351	1.468	0.92029973	0.361
	12 Mbs	1.018	1.133	0.89849956	0.465
	18 Mbs	0.682	0.798	0.85390302	0.686
	24 Mbs	0.516	0.634	0.81409650	0.893
	36 Mbs	0.348	0.464	0.74940746	1.253
	48 Mbs	0.265	0.381	0.69540079	1.578
	54 Mbs	0.236	0.352	0.67045778	1.736
802.11n_20 MHz BW	6.5 Mbs	1.881	1.998	0.94144144	0.262
	13 Mbs	0.959	1.075	0.89200000	0.496
	19.5 Mbs	0.647	0.764	0.84576138	0.728
	26 Mbs	0.492	0.610	0.80771124	0.927
	39 Mbs	0.341	0.457	0.74584427	1.274
	52 Mbs	0.261	0.377	0.69216467	1.598
	58.5 Mbs	0.237	0.353	0.66997167	1.739
	65 Mbs	0.215	0.333	0.64414414	1.910
802.11n_40 MHz BW	13.5 Mbps	0.896	1.036	0.86496139	0.630
	27 Mbps	0.452	0.593	0.76231444	1.179
	40.5 Mbps	0.305	0.443	0.68779607	1.625
	54 Mbps	0.229	0.358	0.64149888	1.928
	81 Mbps	0.157	0.296	0.52992898	2.758
	108 Mbps	0.117	0.256	0.45596869	3.411
	121.5 Mbps	0.104	0.243	0.42798354	3.686
	135 Mbps	0.095	0.235	0.40507463	3.925

Note : Duty Cycle Factor = $10 \cdot \log(1/\text{Duty Cycle})$. where, Duty Cycle = T_{on} / T_{total}

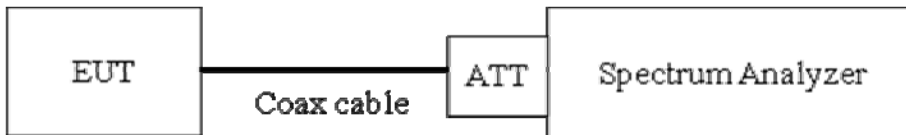
8.2 6dB BANDWIDTH (802.11b/g/n)

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 (Page 5 in KDB 558074, issued 04/09/2013)

RBW = 100 kHz

VBW \geq 3 x RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

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

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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	9.070	0.500	Pass
2437	6	9.045	0.500	Pass
2462	11	9.086	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	16.51	0.500	Pass
2437	6	16.47	0.500	Pass
2462	11	16.49	0.500	Pass

Conducted 6dB Bandwidth Measurements for 802.11n_20 MHz BW

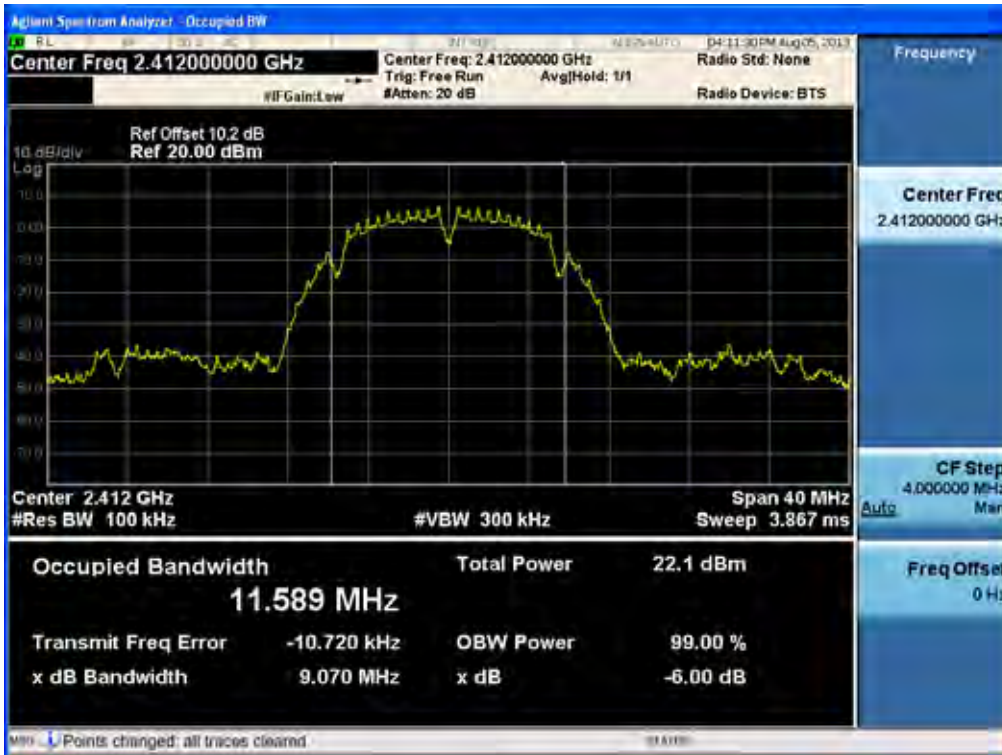
802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	17.64	0.500	Pass
2437	6	17.64	0.500	Pass
2462	11	17.65	0.500	Pass

Conducted 6dB Bandwidth Measurements for 802.11n_40 MHz BW

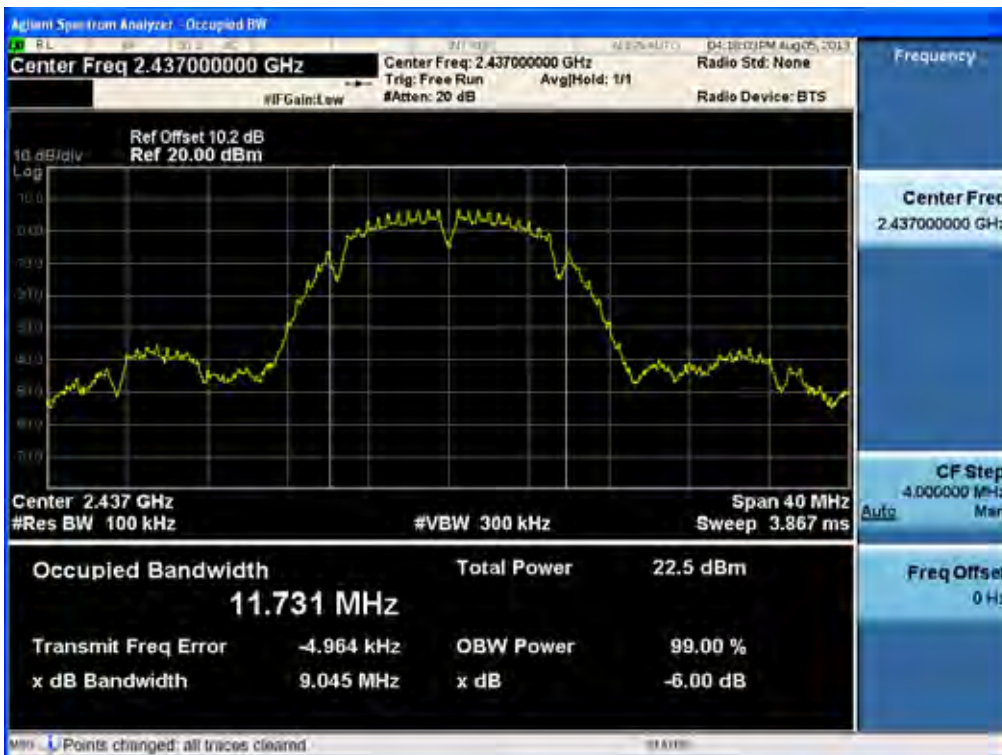
802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2422	3	35.20	0.500	Pass
2437	6	35.23	0.500	Pass
2452	9	35.20	0.500	Pass

RESULT PLOTS

6dB Bandwidth plot (802.11b-CH 1)

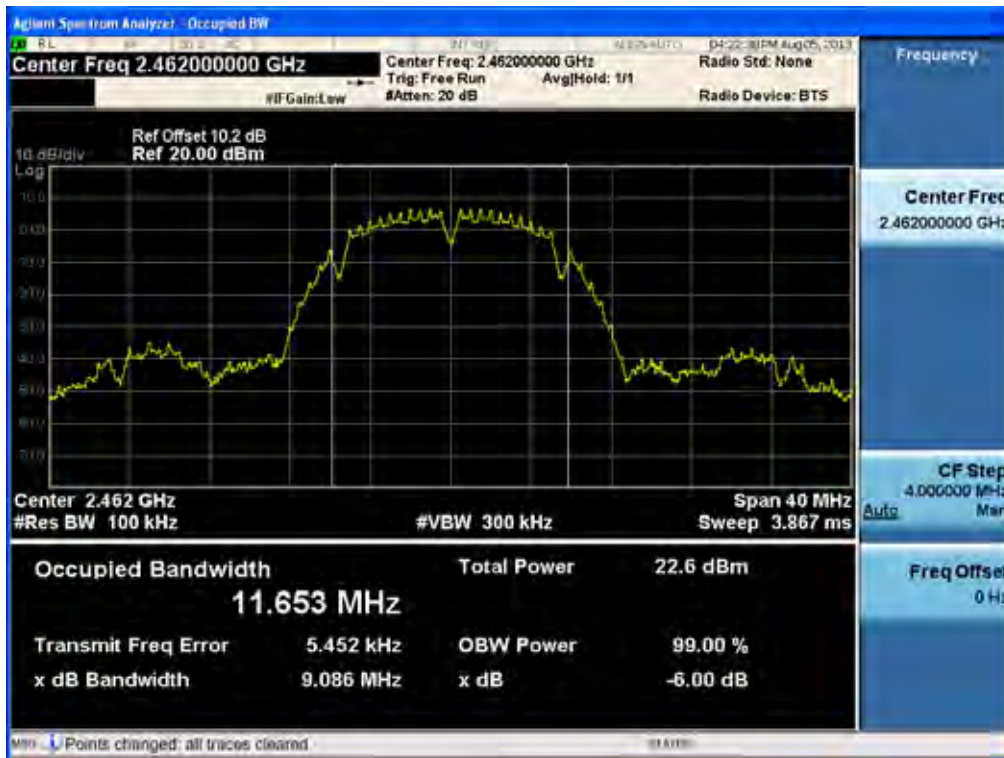


6dB Bandwidth plot (802.11b-CH 6)

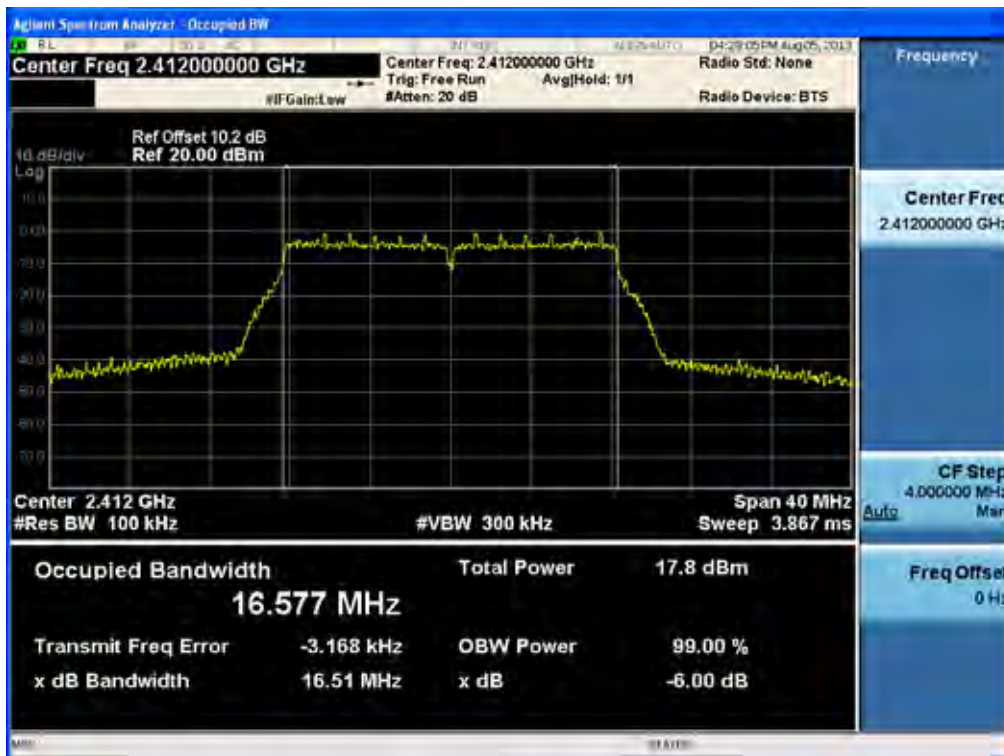


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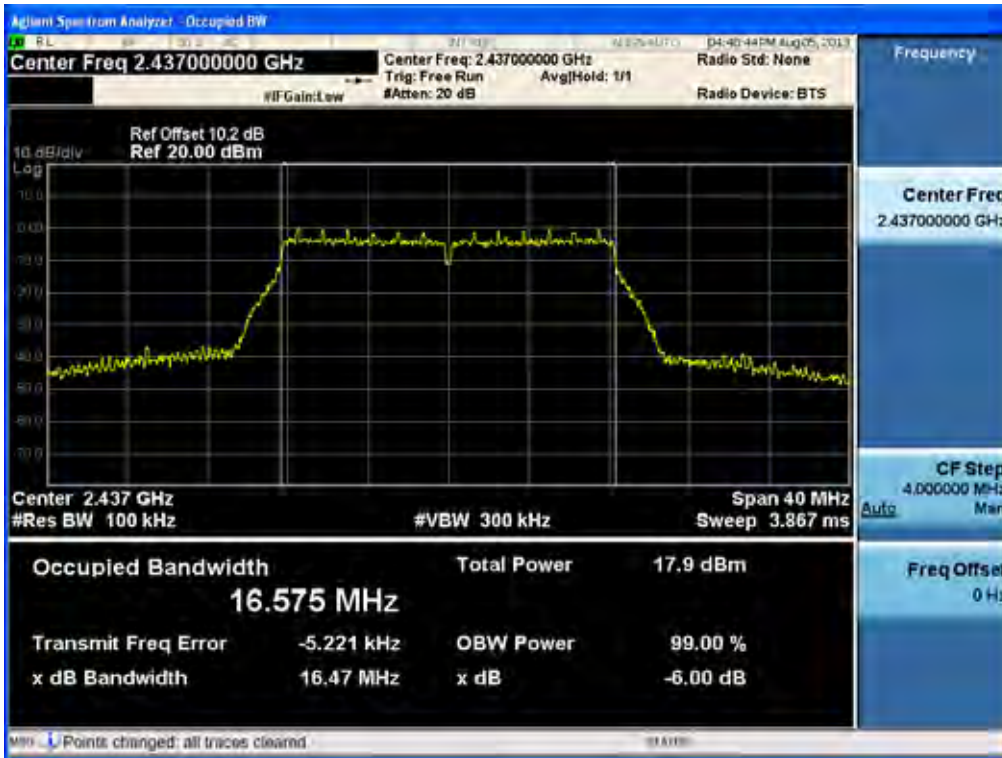
6dB Bandwidth plot (802.11b-CH 11)



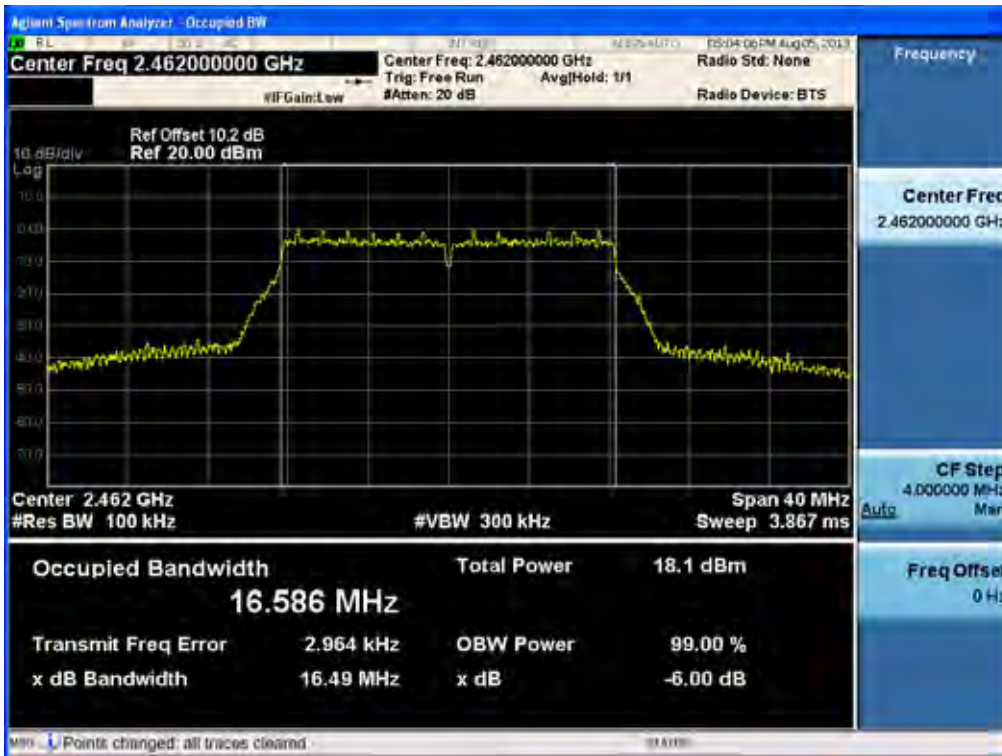
6dB Bandwidth plot (802.11g-CH 1)



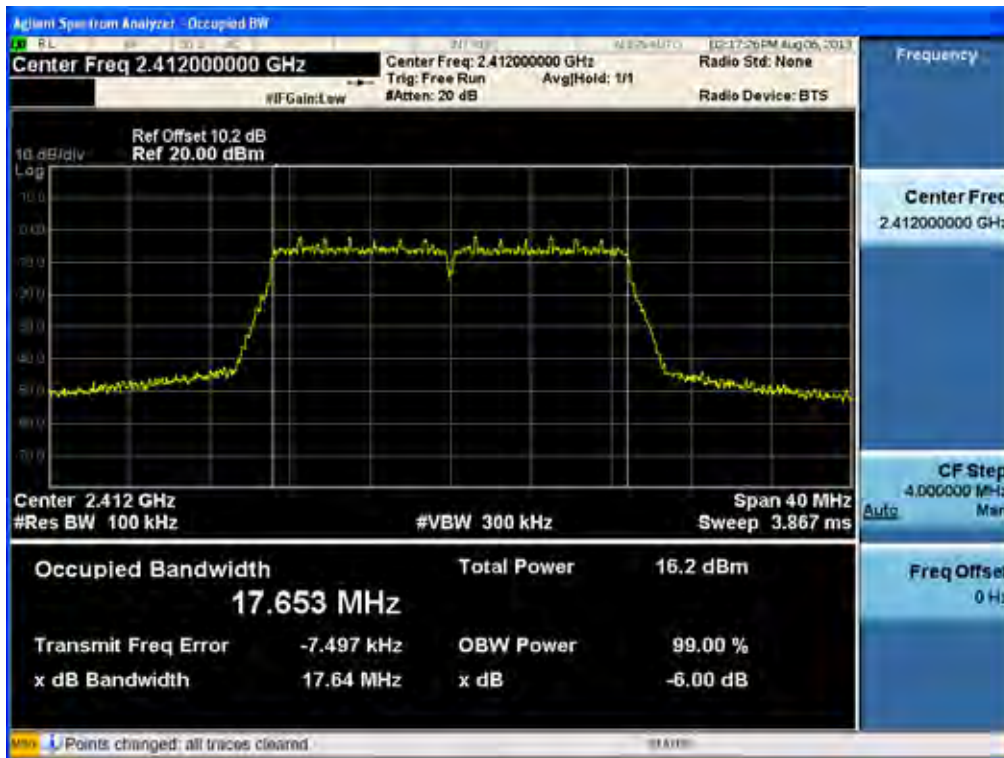
6dB Bandwidth plot (802.11g-CH 6)



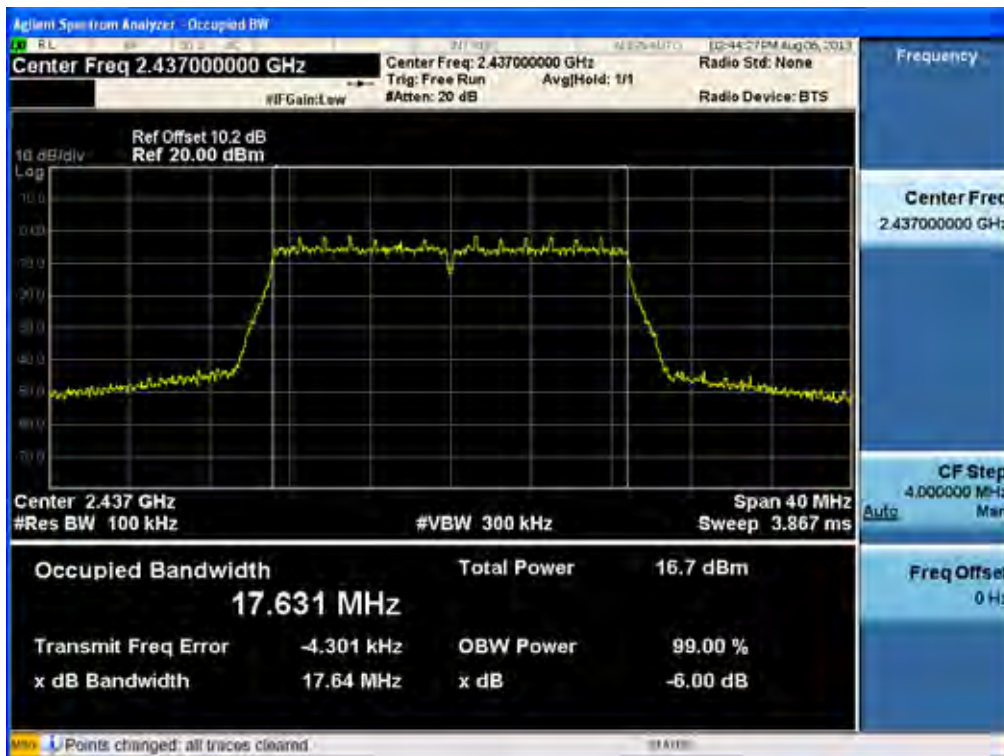
6dB Bandwidth plot (802.11g-CH 11)



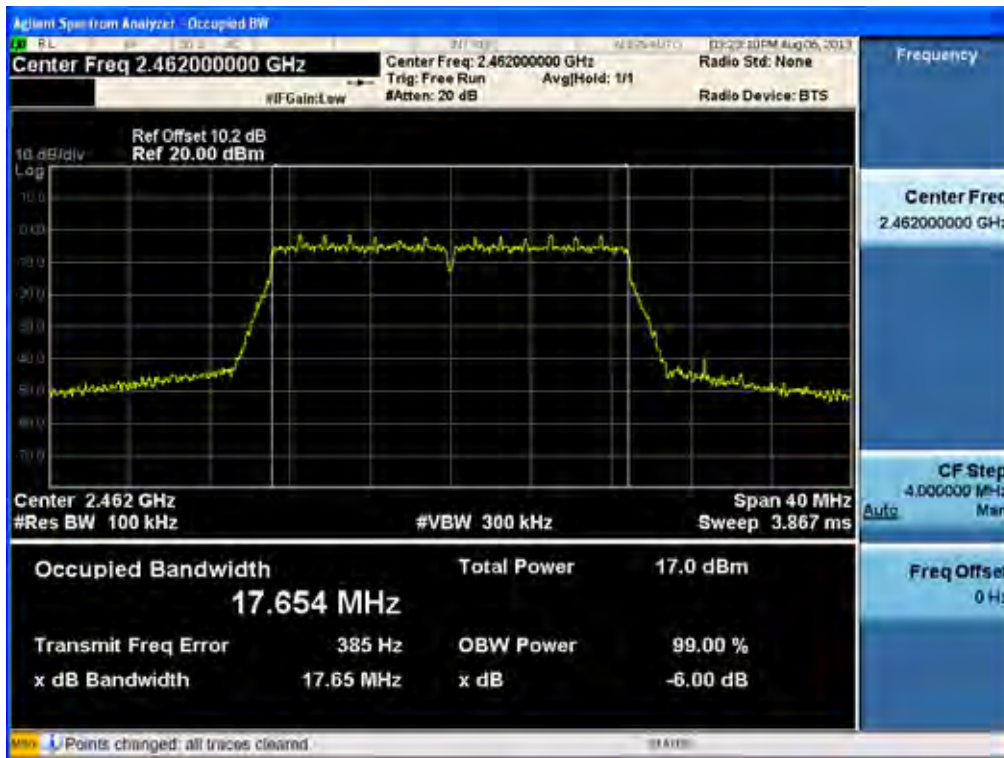
6dB Bandwidth plot (802.11n-CH 1) _20 MHz BW



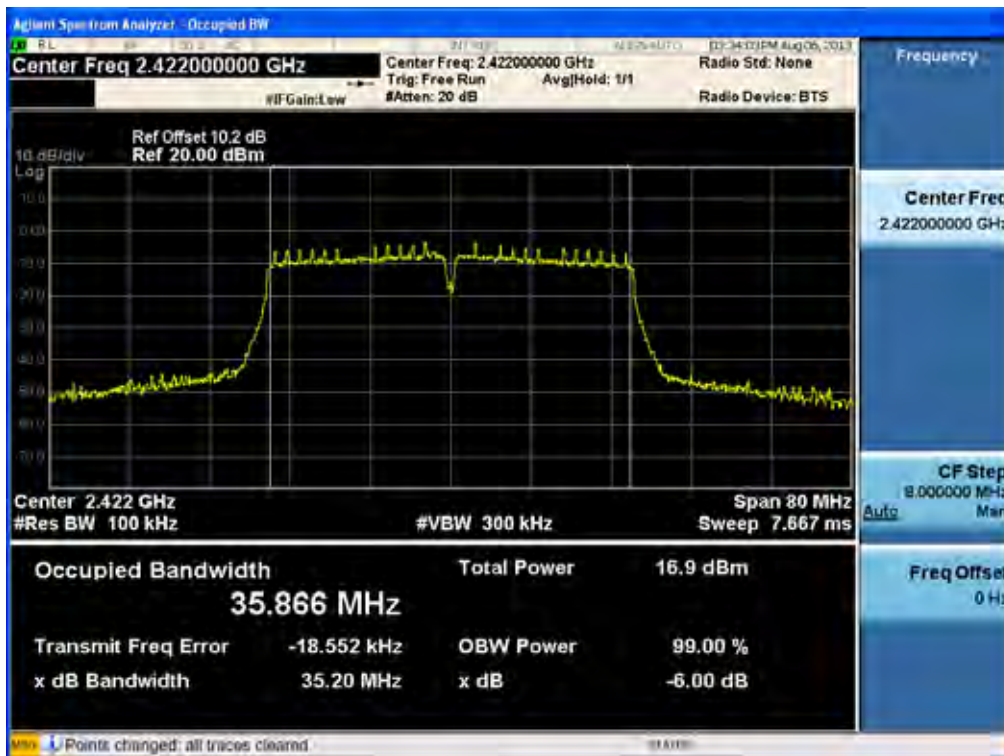
6dB Bandwidth plot (802.11n-CH 6) _20 MHz BW



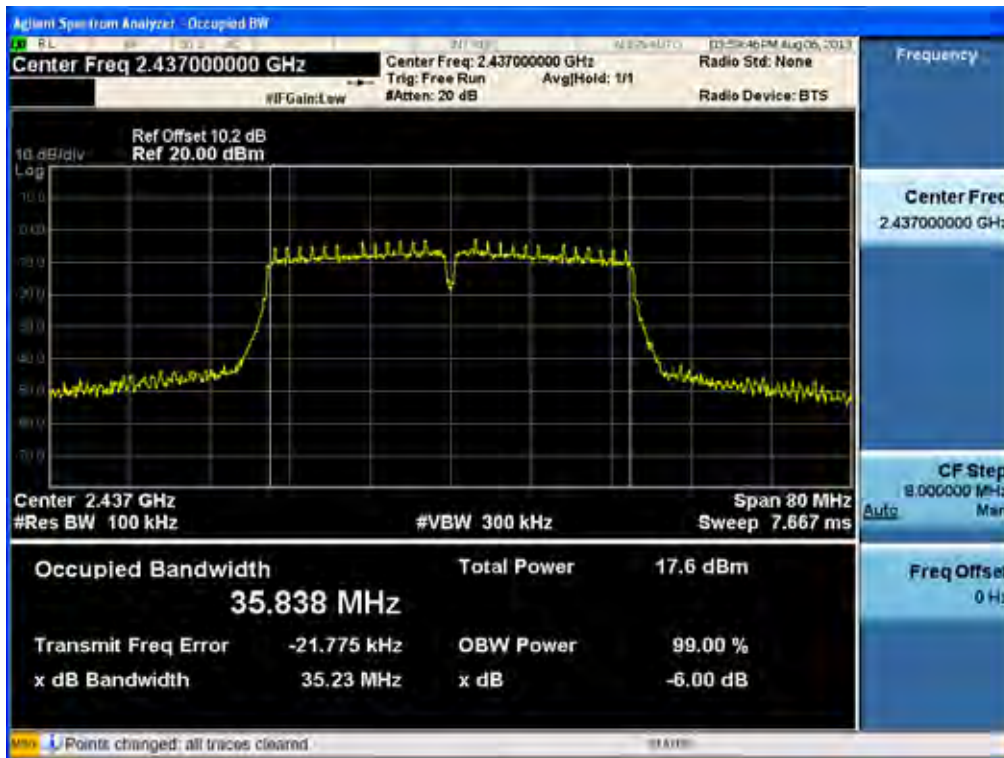
6dB Bandwidth plot (802.11n-CH 11) _20 MHz BW



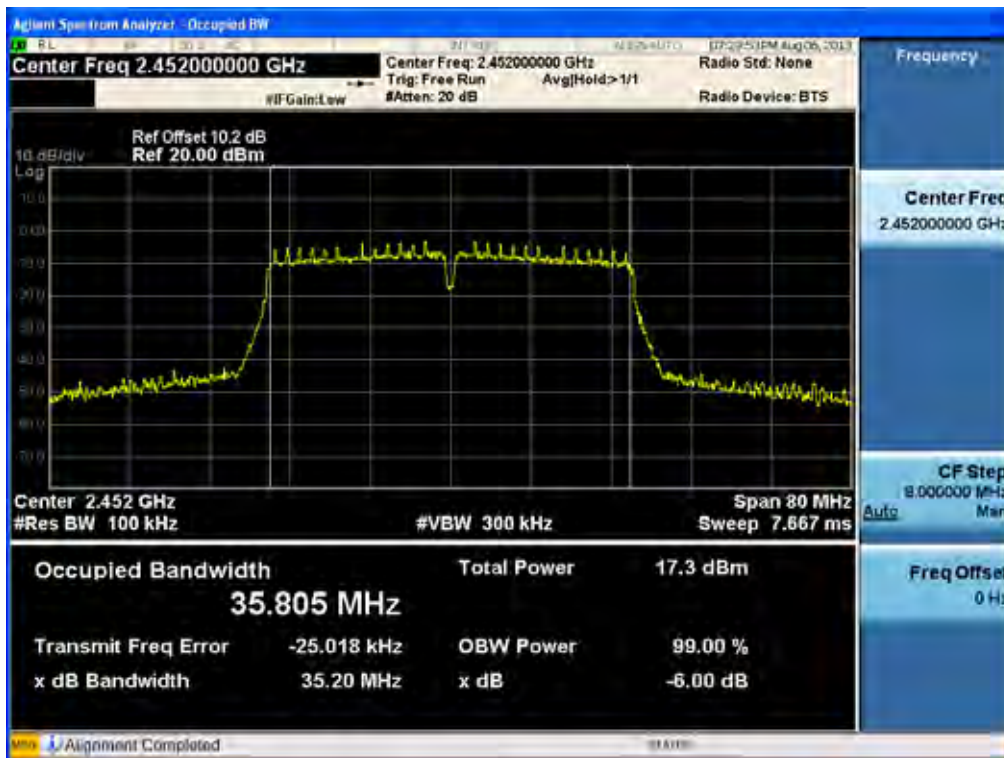
6dB Bandwidth plot (802.11n-CH 3) _40 MHz BW



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



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



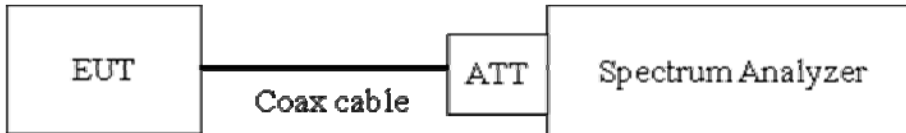
8.3 OUTPUT POWER (802.11b/g/n)

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. 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 x RBW

SPAN \geq 1.5 x 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 x RBW.

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

Sweep time = auto.

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

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

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

Compute power by integrating the spectrum across the OBW of the signal using the instrument's band

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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

$$\begin{aligned} \text{Output Power} &= \text{Reading Value} + \text{ATT loss} + \text{Cable loss}(1 \text{ ea}) + \text{Duty Cycle Factor} \\ &= 10 \text{ dBm} + 10 \text{ dB} + 0.8 \text{ dB} + 0.2 \text{ dB} = 21.0 \text{ dBm} \end{aligned}$$

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 range that was rounded off to the closest tenth dB. So, 10.2 dB is offset for 2.4 GHz Band. Actual value of loss for the attenuator and cable combination is below table.

Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	10.21
	2437	10.24
	2462	10.24

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

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1308FR24	Date of Issue: August 16, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n(2.4GHz), VoIP, Hotspot support		FCC ID: ZNFD680



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	17.41	30
		2 Mbps	17.64	30
		5.5 Mbps	18.78	30
		11 Mbps	20.55	30
2437	6	1 Mbps	17.66	30
		2 Mbps	17.94	30
		5.5 Mbps	19.24	30
		11 Mbps	20.97	30
2462	11	1 Mbps	17.87	30
		2 Mbps	18.15	30
		5.5 Mbps	19.42	30
		11 Mbps	20.74	30

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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	18.60	30
		9 Mbps	18.64	30
		12 Mbps	18.44	30
		18 Mbps	18.47	30
		24 Mbps	19.07	30
		36 Mbps	19.10	30
		48 Mbps	19.32	30
		54 Mbps	19.26	30
2437	6	6 Mbps	18.75	30
		9 Mbps	18.83	30
		12 Mbps	18.70	30
		18 Mbps	18.73	30
		24 Mbps	19.27	30
		36 Mbps	19.36	30
		48 Mbps	19.49	30
		54 Mbps	19.49	30
2462	11	6 Mbps	18.83	30
		9 Mbps	18.86	30
		12 Mbps	18.65	30
		18 Mbps	18.68	30
		24 Mbps	19.20	30
		36 Mbps	19.26	30
		48 Mbps	19.41	30
		54 Mbps	19.88	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	16.96	30
		13 Mbps	17.33	30
		19.5 Mbps	17.46	30
		26 Mbps	17.95	30
		39 Mbps	17.90	30
		52 Mbps	18.01	30
		58.5 Mbps	17.99	30
		65 Mbps	17.98	30
2437	6	6.5 Mbps	17.36	30
		13 Mbps	17.20	30
		19.5 Mbps	17.13	30
		26 Mbps	17.74	30
		39 Mbps	18.31	30
		52 Mbps	18.36	30
		58.5 Mbps	18.38	30
		65 Mbps	17.82	30
2462	11	6.5 Mbps	17.67	30
		13 Mbps	17.52	30
		19.5 Mbps	17.47	30
		26 Mbps	18.04	30
		39 Mbps	17.92	30
		52 Mbps	18.06	30
		58.5 Mbps	18.05	30
		65 Mbps	18.06	30



TEST RESULTS

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	17.39	30
		27 Mbps	17.75	30
		40.5 Mbps	17.73	30
		54 Mbps	18.12	30
		81 Mbps	17.91	30
		108 Mbps	18.37	30
		121.5 Mbps	18.29	30
		135 Mbps	18.29	30
2437	6	13.5 Mbps	18.11	30
		27 Mbps	17.97	30
		40.5 Mbps	17.99	30
		54 Mbps	18.49	30
		81 Mbps	18.49	30
		108 Mbps	18.52	30
		121.5 Mbps	18.62	30
		135 Mbps	18.53	30
2452	9	13.5 Mbps	17.92	30
		27 Mbps	17.89	30
		40.5 Mbps	17.85	30
		54 Mbps	18.31	30
		81 Mbps	18.80	30
		108 Mbps	18.34	30
		121.5 Mbps	18.32	30
		135 Mbps	18.31	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	14.66	0.039	14.70	30
		2 Mbps	14.54	0.077	14.62	30
		5.5 Mbps	14.30	0.175	14.48	30
		11 Mbps	14.09	0.338	14.43	30
2437	6	1 Mbps	14.95	0.039	14.99	30
		2 Mbps	14.87	0.077	14.95	30
		5.5 Mbps	14.79	0.175	14.97	30
		11 Mbps	14.65	0.338	14.99	30
2462	11	1 Mbps	15.11	0.039	15.15	30
		2 Mbps	15.03	0.077	15.11	30
		5.5 Mbps	14.95	0.175	15.13	30
		11 Mbps	14.83	0.338	15.17	30

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
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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	10.41	0.242	10.65	30
		9 Mbps	10.24	0.361	10.60	30
		12 Mbps	10.08	0.465	10.54	30
		18 Mbps	9.99	0.686	10.67	30
		24 Mbps	9.68	0.893	10.58	30
		36 Mbps	9.33	1.253	10.58	30
		48 Mbps	9.04	1.578	10.62	30
		54 Mbps	8.94	1.736	10.68	30
2437	6	6 Mbps	10.55	0.242	10.79	30
		9 Mbps	10.38	0.361	10.74	30
		12 Mbps	10.26	0.465	10.73	30
		18 Mbps	10.07	0.686	10.75	30
		24 Mbps	9.89	0.893	10.78	30
		36 Mbps	9.55	1.253	10.80	30
		48 Mbps	9.26	1.578	10.84	30
		54 Mbps	9.19	1.736	10.93	30
2462	11	6 Mbps	10.56	0.242	10.80	30
		9 Mbps	10.46	0.361	10.82	30
		12 Mbps	10.27	0.465	10.74	30
		18 Mbps	10.05	0.686	10.73	30
		24 Mbps	9.85	0.893	10.74	30
		36 Mbps	9.52	1.253	10.77	30
		48 Mbps	9.15	1.578	10.72	30
		54 Mbps	9.48	1.736	11.21	30

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

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	6.5 Mbps	8.66	0.262	8.92	30
		13 Mbps	8.92	0.496	9.41	30
		19.5 Mbps	8.77	0.728	9.50	30
		26 Mbps	8.53	0.927	9.46	30
		39 Mbps	8.18	1.274	9.45	30
		52 Mbps	7.82	1.598	9.42	30
		58.5 Mbps	7.72	1.739	9.46	30
		65 Mbps	7.63	1.910	9.54	30
2437	6	6.5 Mbps	9.11	0.262	9.37	30
		13 Mbps	8.80	0.496	9.29	30
		19.5 Mbps	8.55	0.728	9.27	30
		26 Mbps	8.32	0.927	9.25	30
		39 Mbps	8.54	1.274	9.81	30
		52 Mbps	8.28	1.598	9.87	30
		58.5 Mbps	8.13	1.739	9.86	30
		65 Mbps	7.47	1.910	9.38	30
2462	11	6.5 Mbps	9.39	0.262	9.65	30
		13 Mbps	9.12	0.496	9.61	30
		19.5 Mbps	8.86	0.728	9.58	30
		26 Mbps	8.64	0.927	9.57	30
		39 Mbps	8.21	1.274	9.48	30
		52 Mbps	7.90	1.598	9.50	30
		58.5 Mbps	7.81	1.739	9.55	30
		65 Mbps	7.73	1.910	9.64	30



TEST RESULTS

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

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2422	3	13.5 Mbps	8.82	0.630	9.45	30
		27 Mbps	8.78	1.179	9.96	30
		40.5 Mbps	8.37	1.625	10.00	30
		54 Mbps	8.09	1.928	10.02	30
		81 Mbps	7.29	2.758	10.05	30
		108 Mbps	7.40	3.411	10.81	30
		121.5 Mbps	7.22	3.686	10.90	30
		135 Mbps	7.07	3.925	11.00	30
2437	6	13.5 Mbps	9.52	0.630	10.15	30
		27 Mbps	9.05	1.179	10.23	30
		40.5 Mbps	8.70	1.625	10.32	30
		54 Mbps	8.41	1.928	10.34	30
		81 Mbps	7.96	2.758	10.71	30
		108 Mbps	7.59	3.411	11.00	30
		121.5 Mbps	7.41	3.686	11.10	30
		135 Mbps	7.34	3.925	11.26	30
2452	9	13.5 Mbps	9.36	0.630	9.99	30
		27 Mbps	8.93	1.179	10.11	30
		40.5 Mbps	8.54	1.625	10.17	30
		54 Mbps	8.27	1.928	10.19	30
		81 Mbps	8.20	2.758	10.96	30
		108 Mbps	7.38	3.411	10.79	30
		121.5 Mbps	7.17	3.686	10.86	30
		135 Mbps	7.10	3.925	11.03	30

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

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Test Report No. HCTR1308FR24	Date of Issue: August 16, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n(2.4GHz), VoIP, Hotspot support	FCC ID: ZNF680



RESULT PLOTS-Peak

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

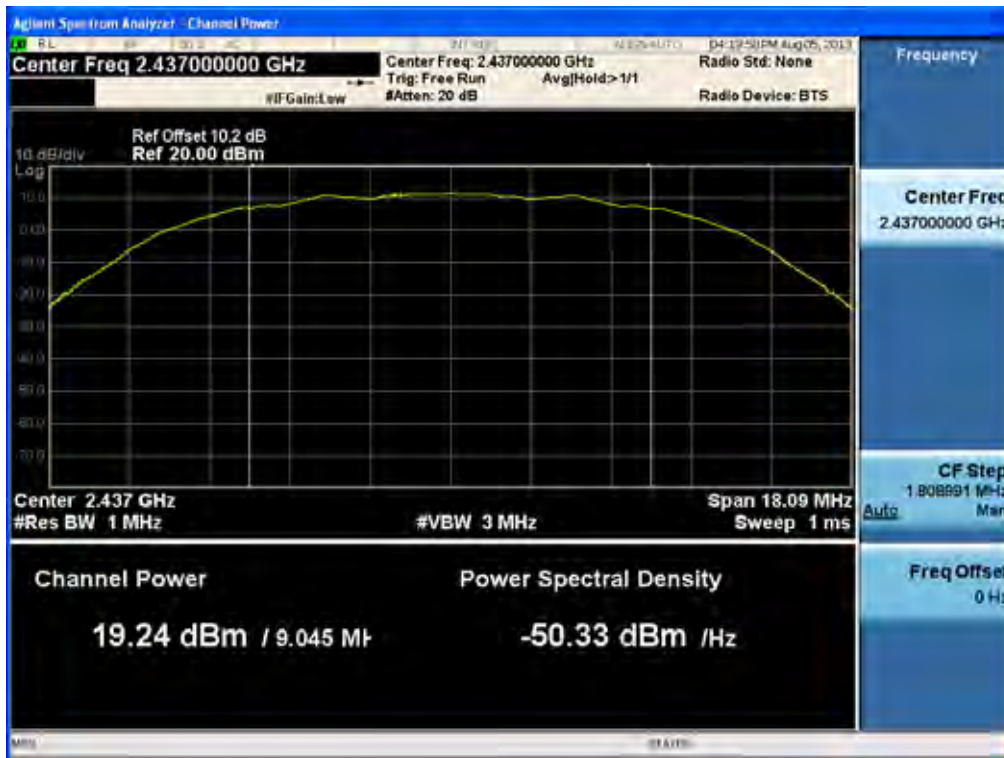


Conducted Output Power (802.11b-CH 6) 2Mbps



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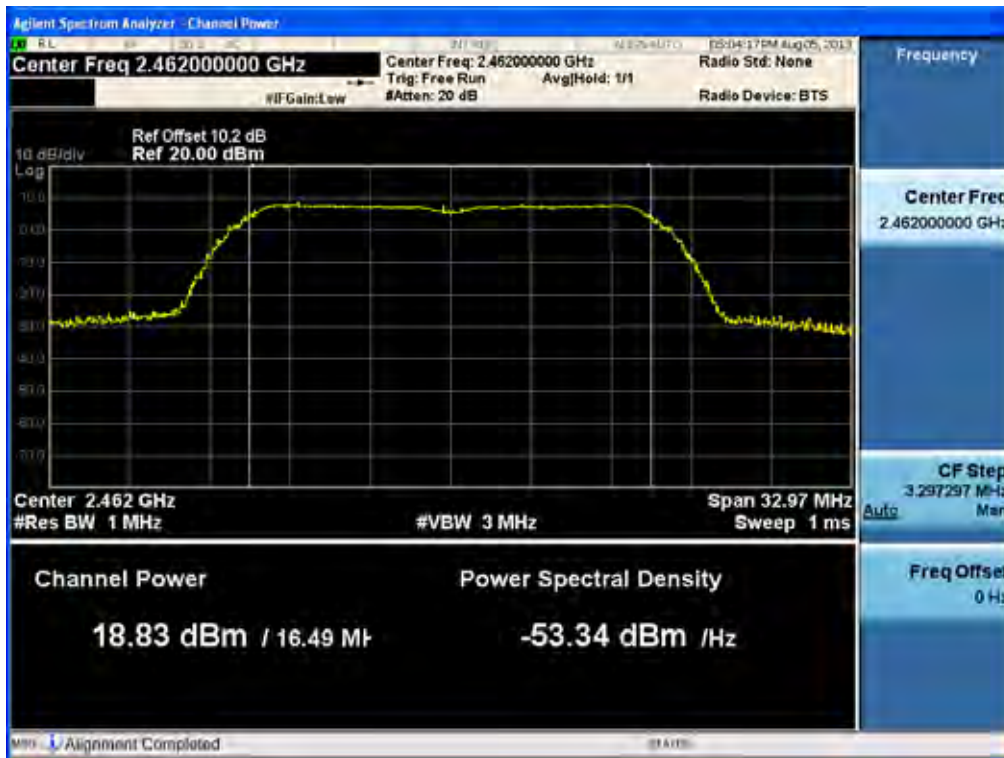
Conducted Output Power (802.11b-CH 6) 5.5Mbps



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



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



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



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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

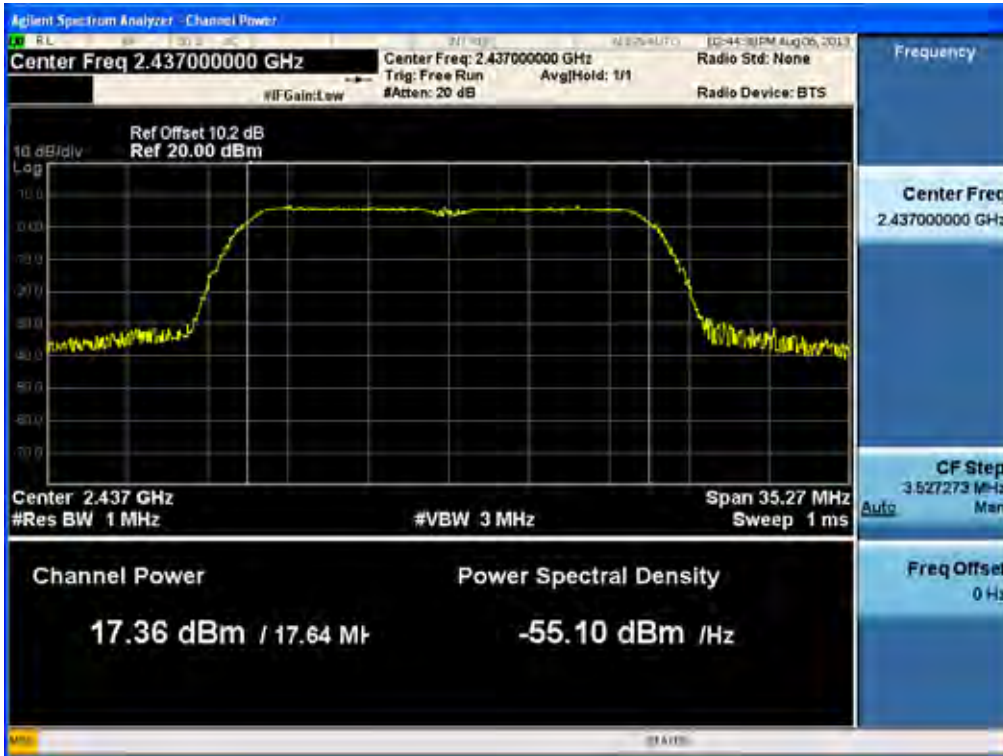


Conducted Output Power (802.11g-CH 11) 54Mbps



RESULT PLOTS: _20 MHz BW

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



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



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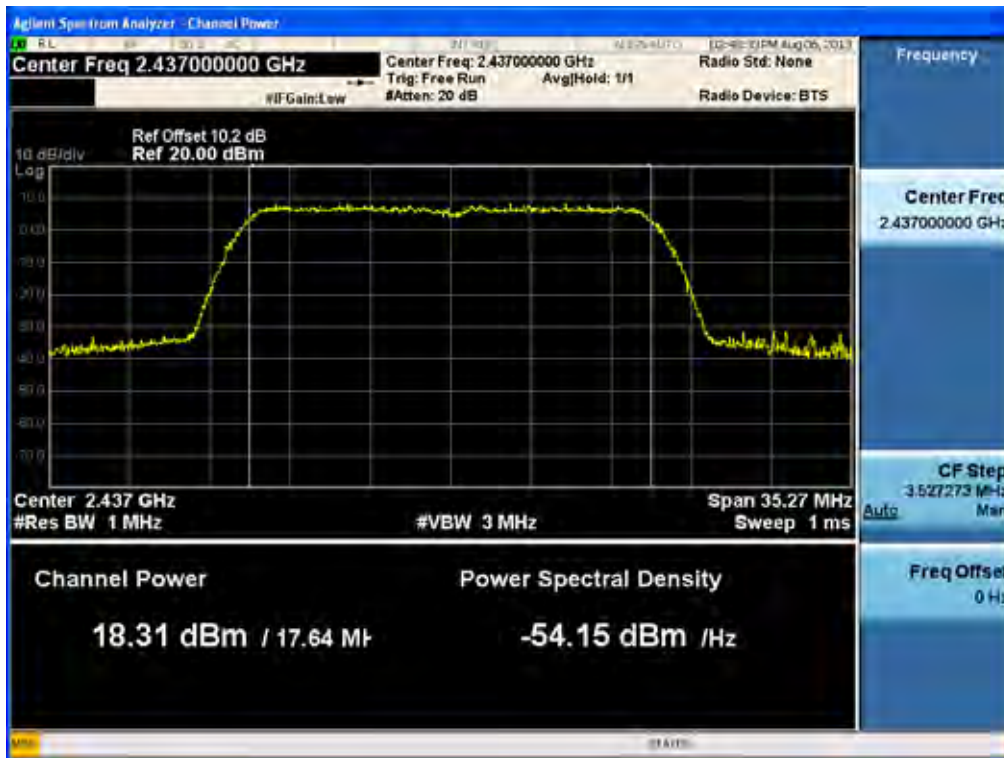
Conducted Output Power (802.11n-CH 6) 19.5Mbps



Conducted Output Power (802.11n-CH 6) 26Mbps



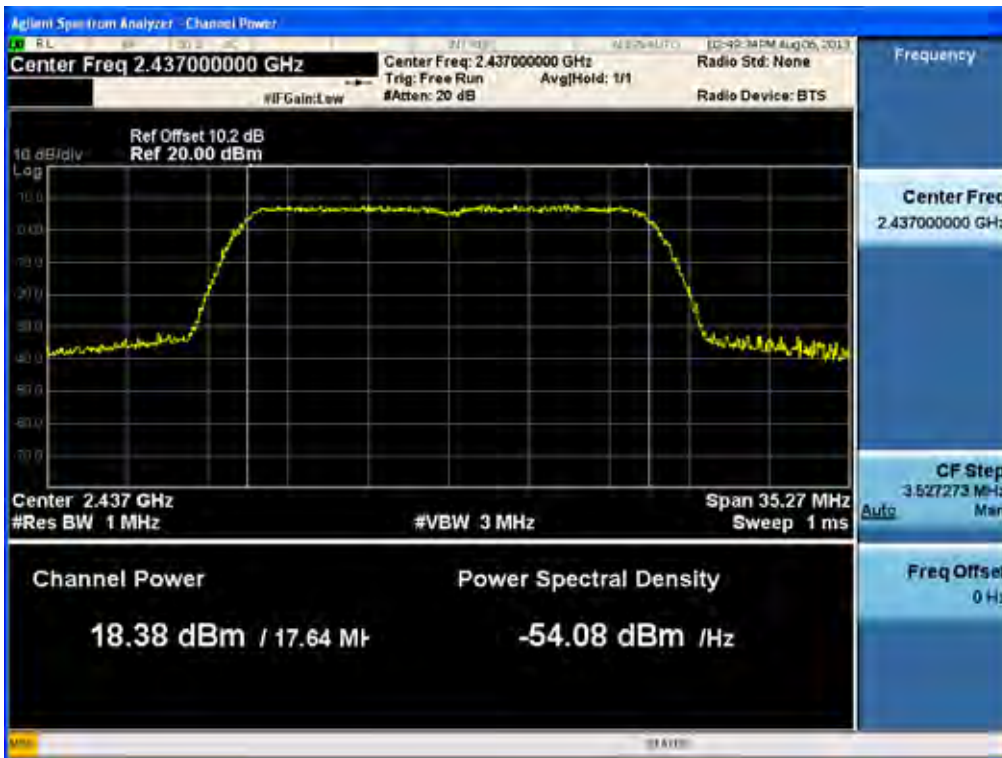
Conducted Output Power (802.11n-CH 6) 39Mbps



Conducted Output Power (802.11n-CH 6) 52Mbps



Conducted Output Power (802.11n-CH 6) 58.5Mbps



Conducted Output Power (802.11n-CH 6) 65Mbps



RESULT PLOTS: _40 MHz BW

Conducted Output Power (802.11n-CH 9) 13.5Mbps



Conducted Output Power (802.11n-CH 9) 27 Mbps



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Conducted Output Power (802.11n-CH 9) 40.5 Mbps



Conducted Output Power (802.11n-CH 9) 54 Mbps



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1308FR24	Date of Issue: August 16, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n(2.4GHz), VoIP, Hotspot support	FCC ID: ZNFD680

Conducted Output Power (802.11n-CH 9) 81 Mbps



Conducted Output Power (802.11n-CH 9) 108 Mbps



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Conducted Output Power (802.11n-CH 9) 121.5 Mbps



Conducted Output Power (802.11n-CH 9) 135 Mbps



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RESULT PLOTS-Average

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



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

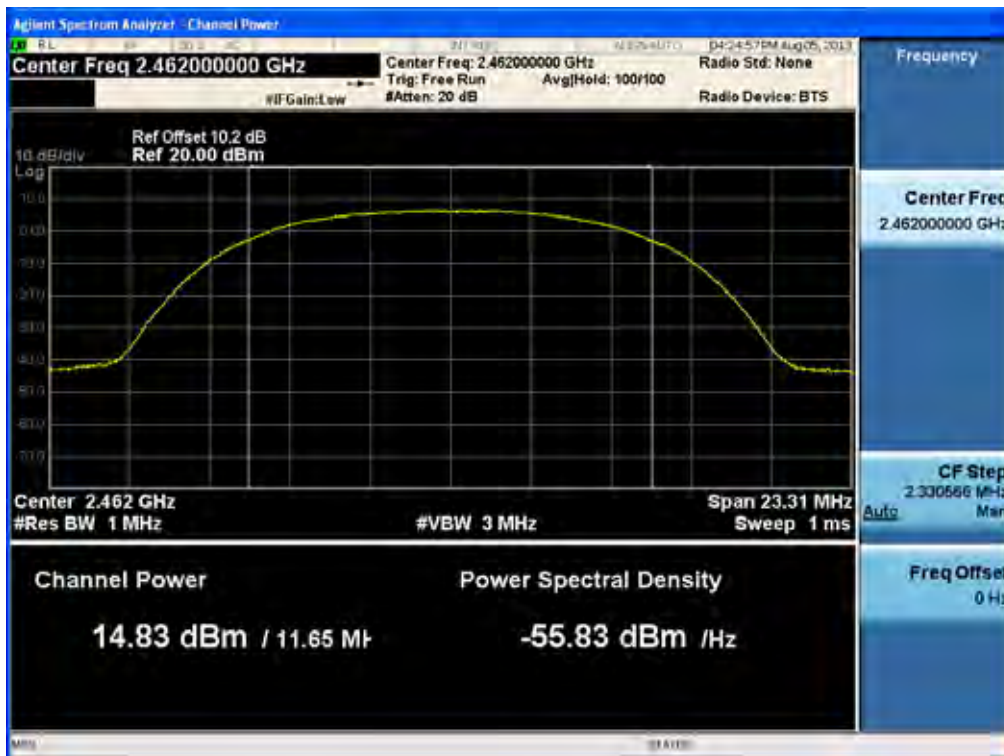


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
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Conducted Output Power (802.11b-CH 11) 5.5Mbps

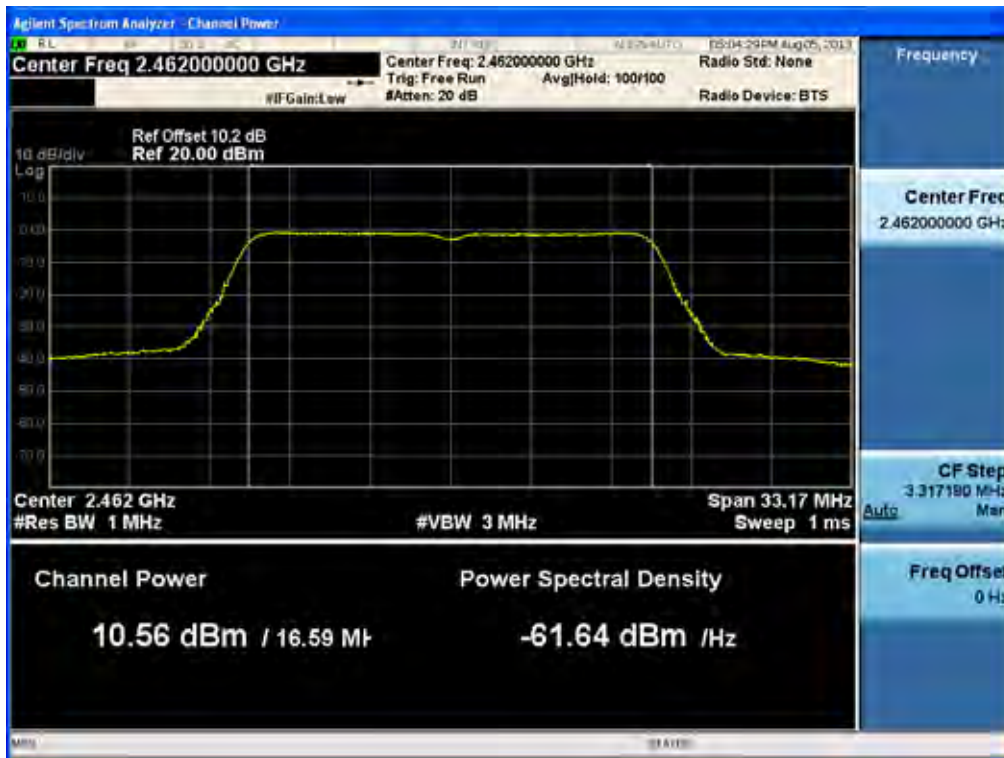


Conducted Output Power (802.11b-CH 11) 11Mbps



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
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Conducted Output Power (802.11g-CH 11) 6Mbps



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



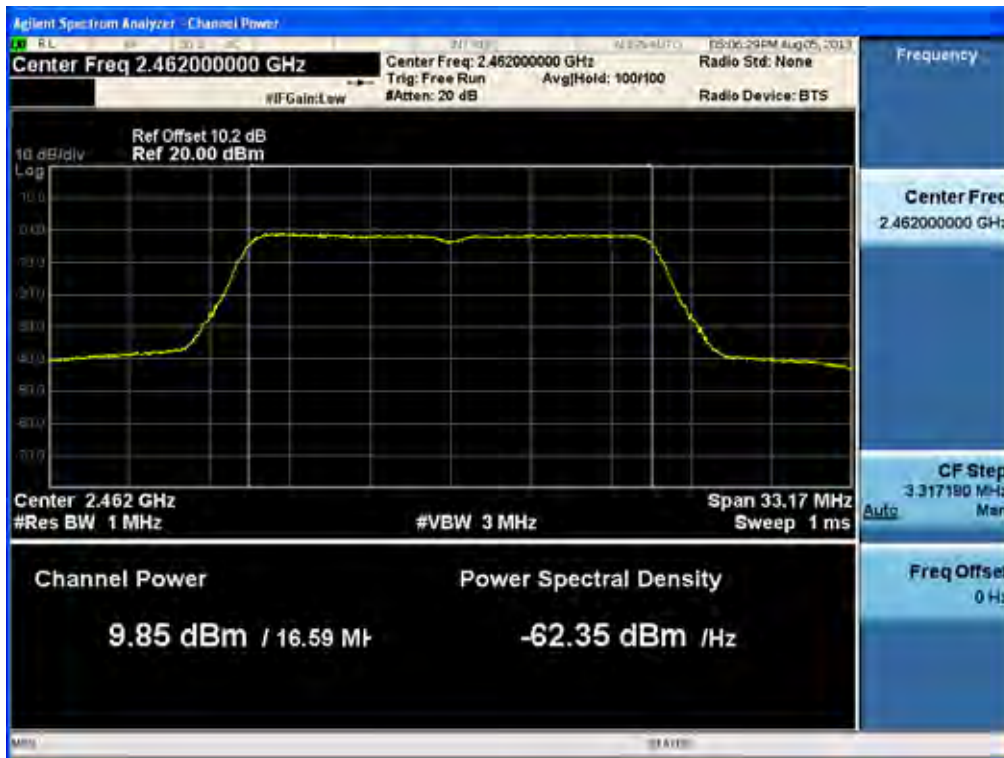
Conducted Output Power (802.11g-CH 11) 12Mbps



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



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

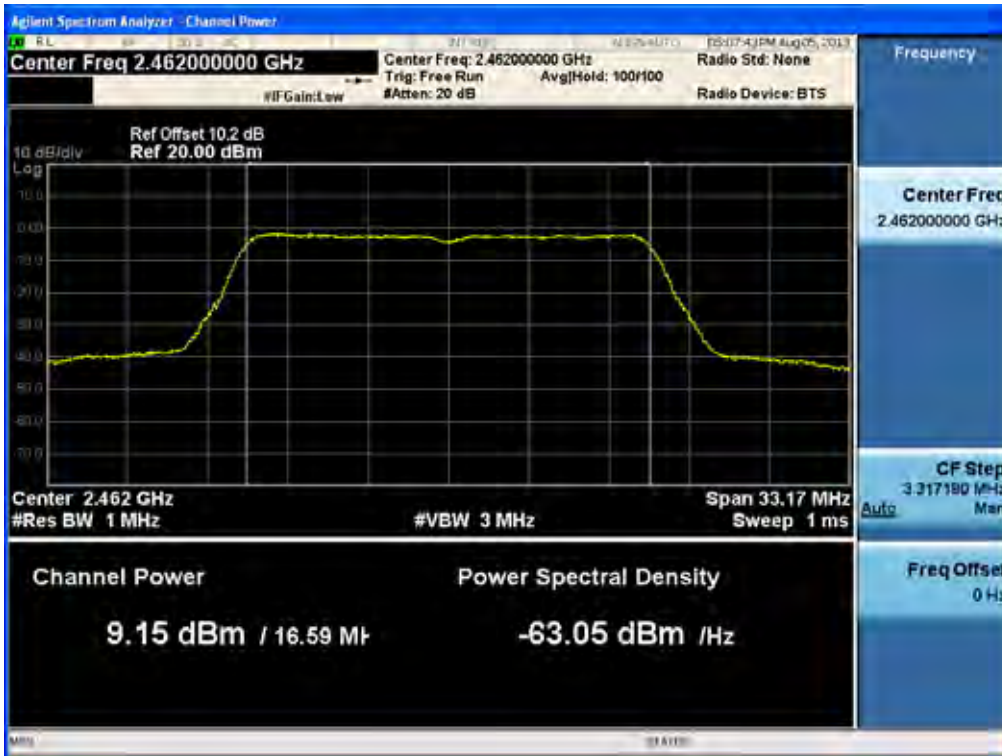


Conducted Output Power (802.11g-CH 11) 36Mbps



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



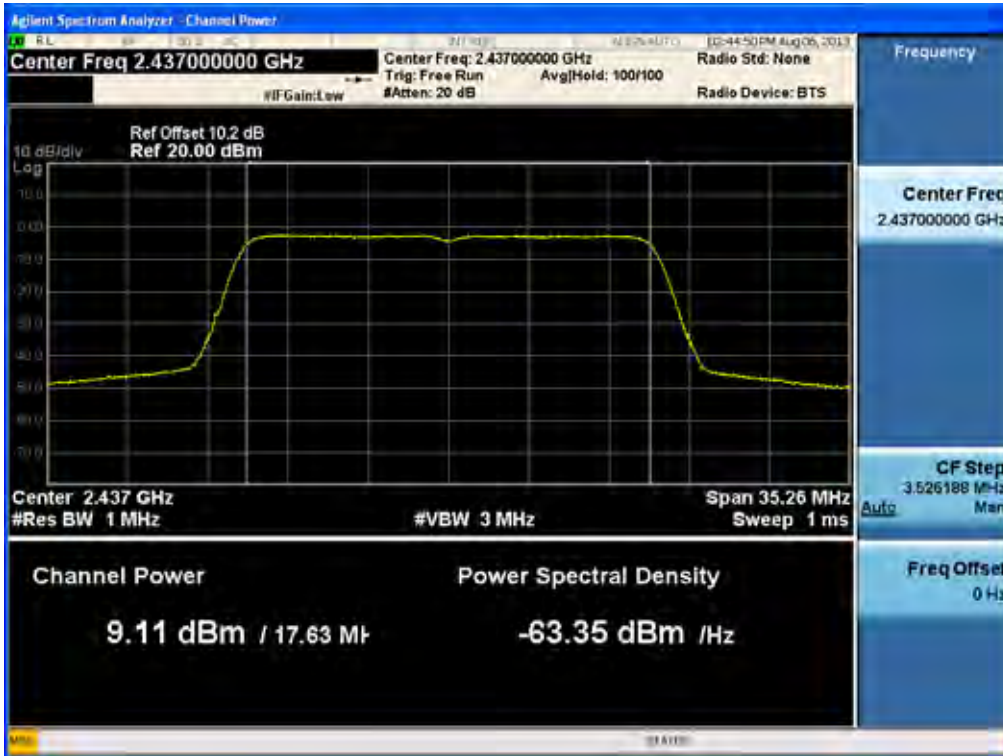
Conducted Output Power (802.11g-CH 11) 54Mbps



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
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RESULT PLOTS: _20 MHz BW

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

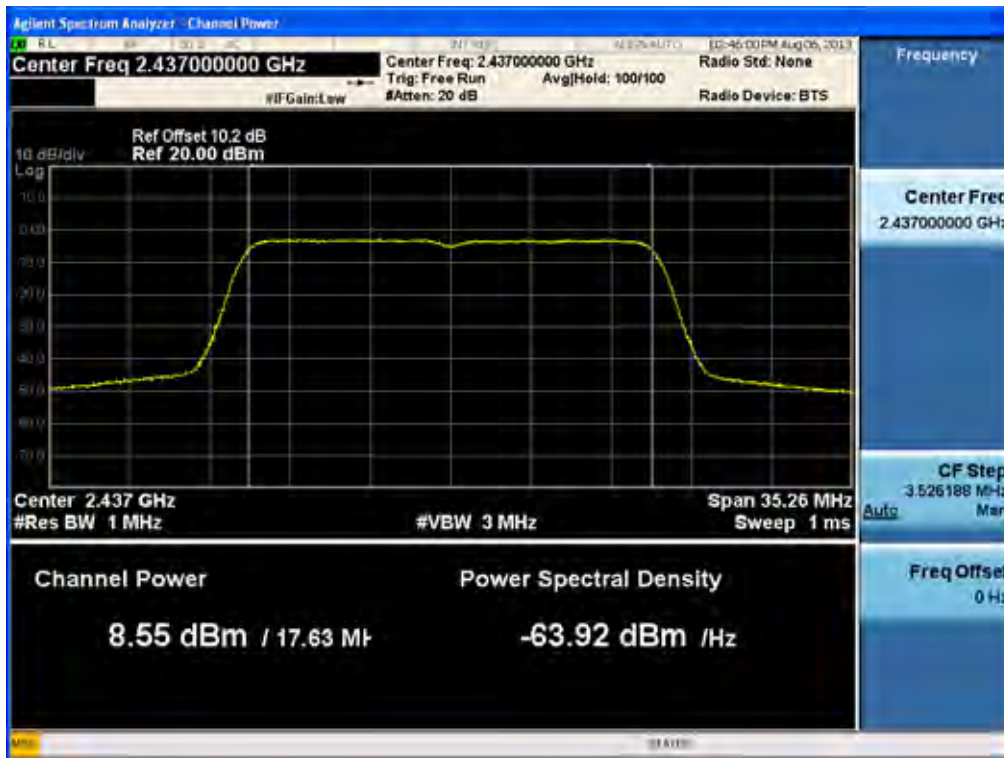


Conducted Output Power (802.11n-CH 6) 13Mbps

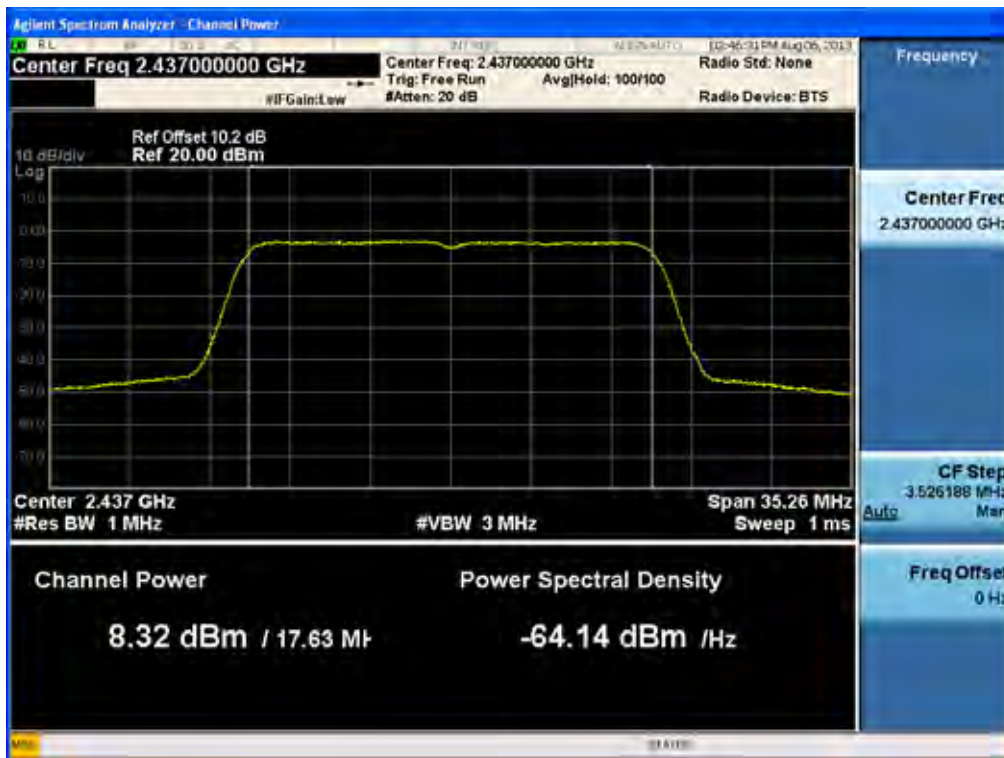


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Conducted Output Power (802.11n-CH 6) 19.5Mbps



Conducted Output Power (802.11n-CH 6) 26Mbps



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