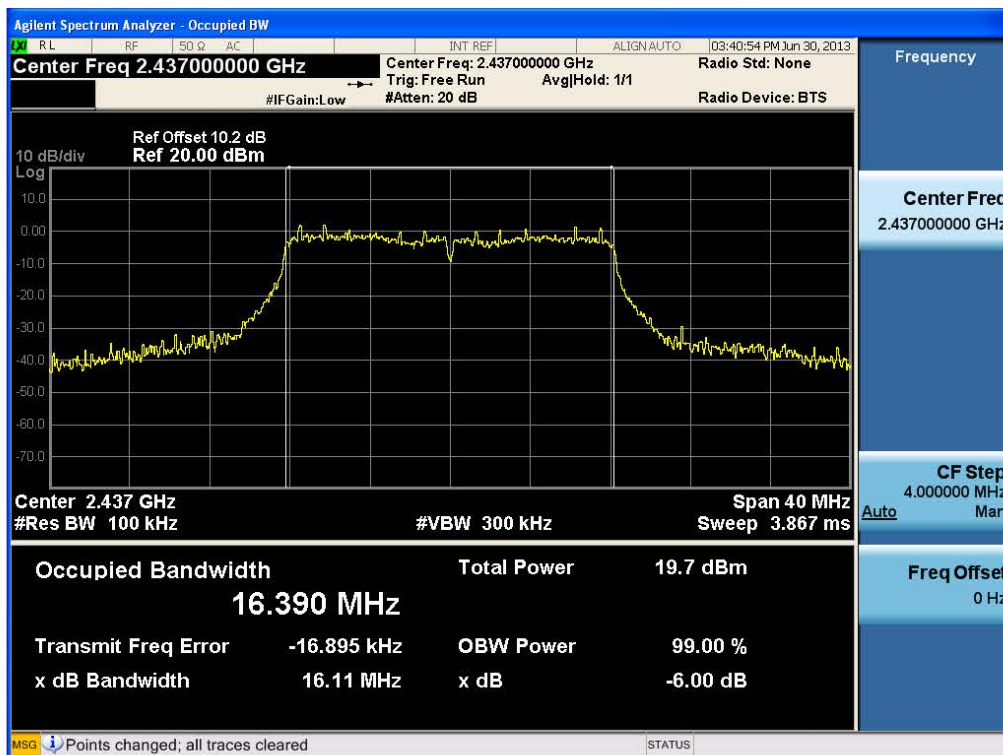
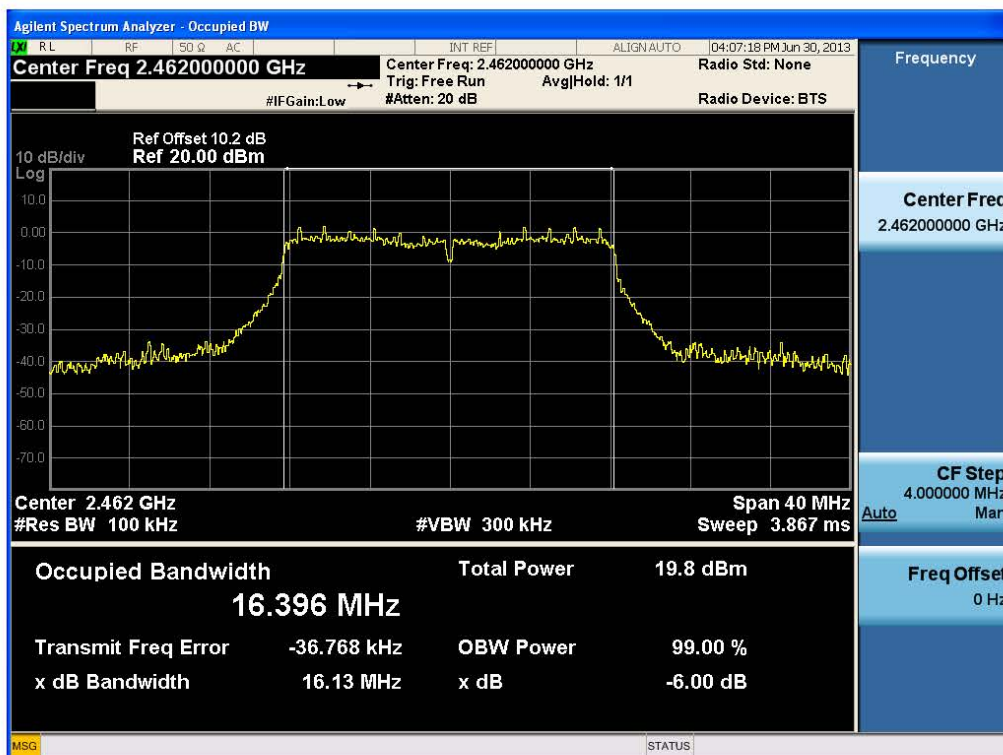


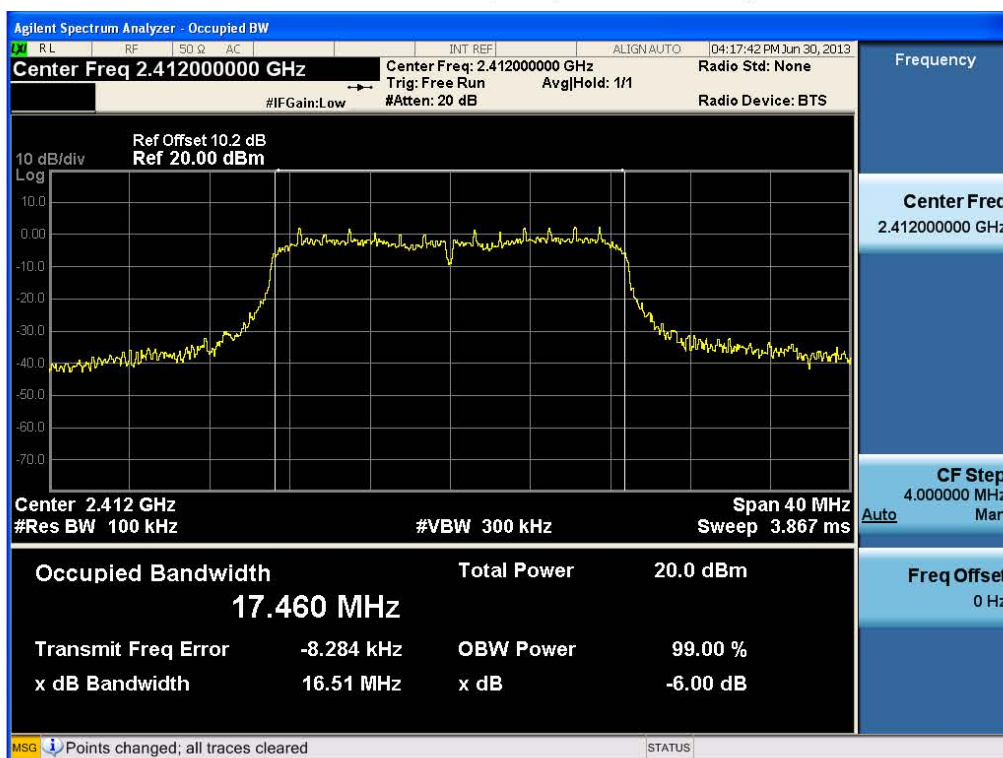
6dB Bandwidth plot (802.11g-CH 6)



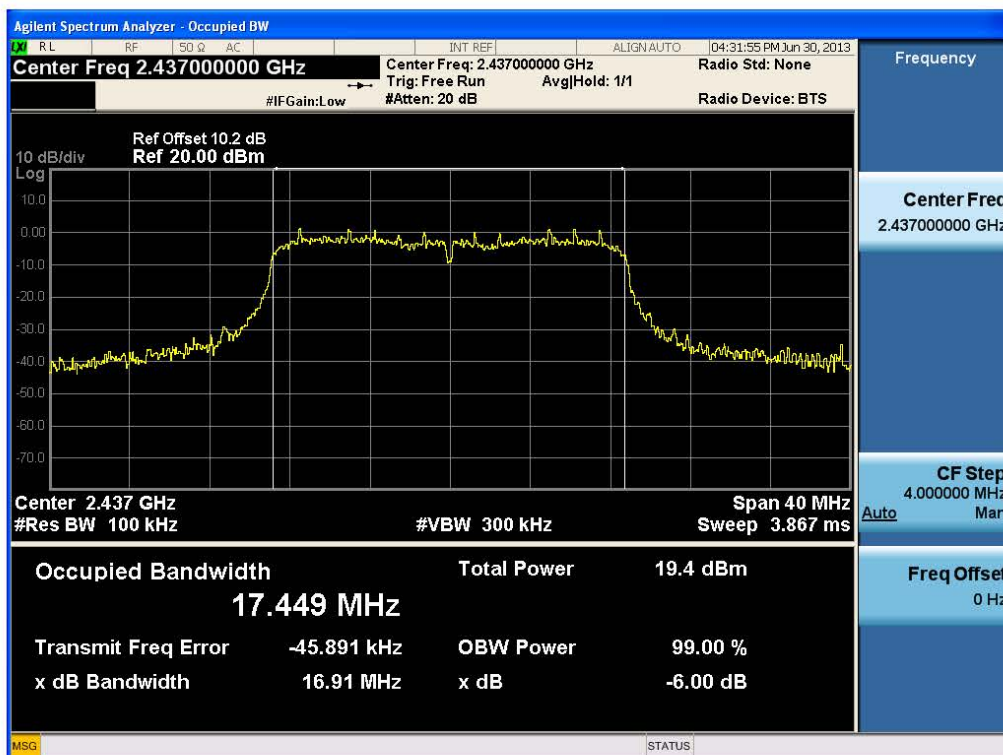
6dB Bandwidth plot (802.11g-CH 11)



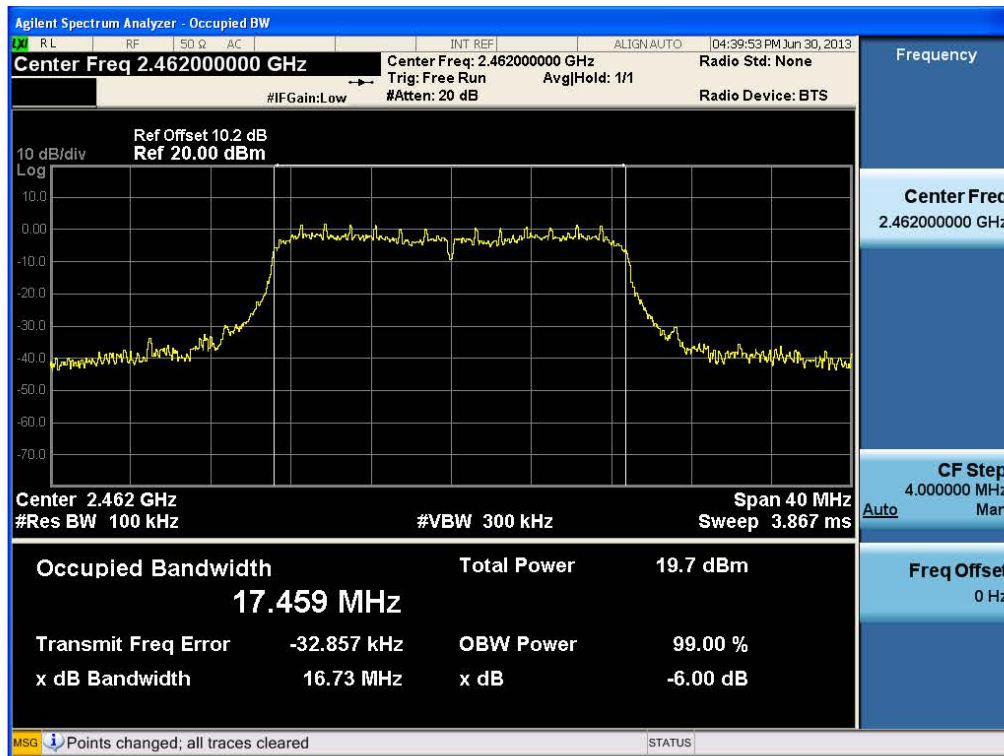
6dB Bandwidth plot (802.11n-CH 1)



6dB Bandwidth plot (802.11n-CH 6)



6dB Bandwidth plot (802.11n-CH 11)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1307FR19	Date of Issue: July 16, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n		FCC ID: ZNFE410J

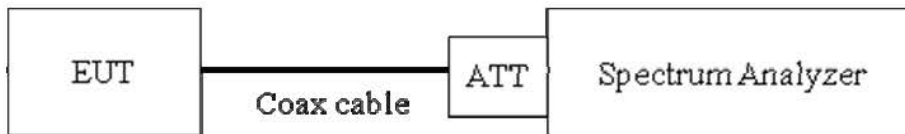
8.3 OUTPUT POWER (802.11b/g/n)

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

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1307FR19	Date of Issue: July 16, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth3.0, WiFi802.11 b/g/n	FCC ID: ZNFE410J

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

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

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. 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)

■ 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	19.10	30
		2 Mbps	19.12	30
		5.5 Mbps	20.53	30
		11 Mbps	22.18	30
2437	6	1 Mbps	18.24	30
		2 Mbps	18.33	30
		5.5 Mbps	19.79	30
		11 Mbps	21.12	30
2462	11	1 Mbps	18.93	30
		2 Mbps	19.22	30
		5.5 Mbps	20.73	30
		11 Mbps	22.15	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	20.65	30
		9 Mbps	20.62	30
		12 Mbps	20.63	30
		18 Mbps	20.42	30
		24 Mbps	20.91	30
		36 Mbps	20.55	30
		48 Mbps	20.91	30
		54 Mbps	20.75	30
2437	6	6 Mbps	20.53	30
		9 Mbps	20.36	30
		12 Mbps	20.21	30
		18 Mbps	20.10	30
		24 Mbps	20.64	30
		36 Mbps	20.45	30
		48 Mbps	20.43	30
		54 Mbps	20.42	30
2462	11	6 Mbps	20.52	30
		9 Mbps	20.41	30
		12 Mbps	20.33	30
		18 Mbps	20.32	30
		24 Mbps	20.75	30
		36 Mbps	20.57	30
		48 Mbps	20.73	30
		54 Mbps	20.59	30

Conducted Output Power Measurements (802.11n Mode)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6.5 Mbps	20.73	30
		13 Mbps	20.31	30
		19.5 Mbps	20.39	30
		26 Mbps	20.30	30
		39 Mbps	20.66	30
		52 Mbps	20.79	30
		58.5 Mbps	20.56	30
		65 Mbps	20.59	30
2437	6	6.5 Mbps	20.21	30
		13 Mbps	20.30	30
		19.5 Mbps	20.24	30
		26 Mbps	20.06	30
		39 Mbps	20.70	30
		52 Mbps	20.58	30
		58.5 Mbps	20.32	30
		65 Mbps	20.46	30
2462	11	6.5 Mbps	20.41	30
		13 Mbps	20.45	30
		19.5 Mbps	20.25	30
		26 Mbps	20.29	30
		39 Mbps	20.74	30
		52 Mbps	20.67	30
		58.5 Mbps	20.50	30
		65 Mbps	20.46	30

■ TEST RESULTS-Average

Conducted Output Power Measurements (802.11b Mode)

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	1 Mbps	16.14	0.035	16.17	30
		2 Mbps	15.96	0.068	16.03	30
		5.5 Mbps	15.96	0.173	16.13	30
		11 Mbps	15.82	0.322	16.14	30
2437	6	1 Mbps	15.43	0.035	15.46	30
		2 Mbps	15.40	0.068	15.47	30
		5.5 Mbps	15.31	0.173	15.48	30
		11 Mbps	15.12	0.322	15.44	30
2462	11	1 Mbps	16.09	0.035	16.12	30
		2 Mbps	16.04	0.068	16.11	30
		5.5 Mbps	16.18	0.173	16.35	30
		11 Mbps	15.87	0.322	16.19	30

Conducted Output Power Measurements (802.11g Mode)

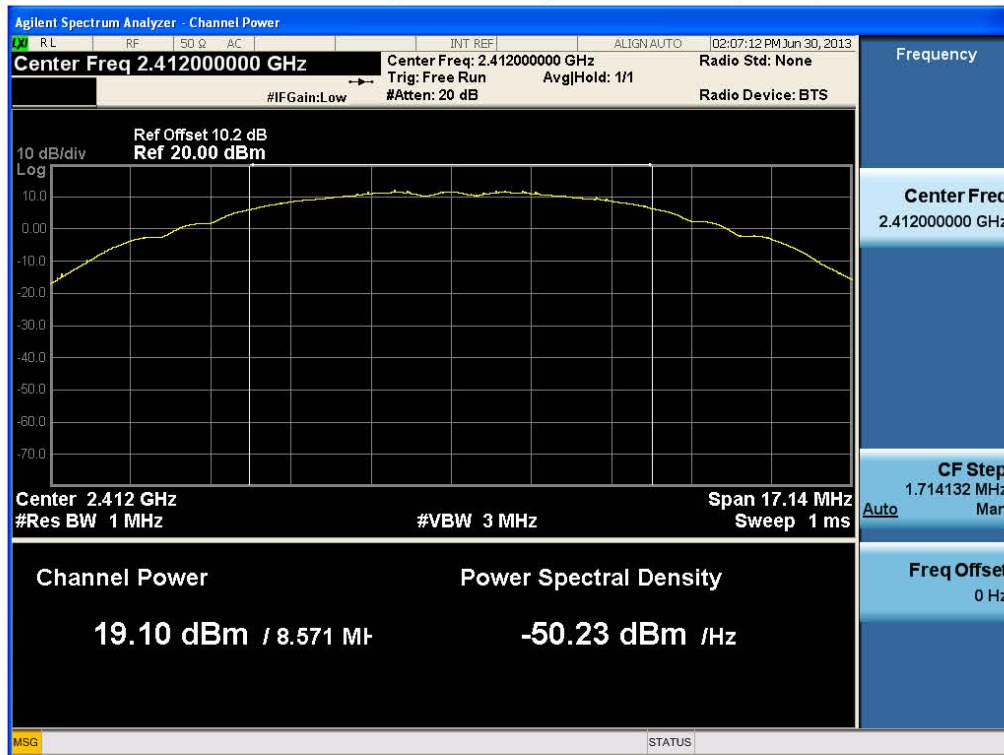
802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	6 Mbps	12.44	0.218	12.66	30
		9 Mbps	12.34	0.303	12.65	30
		12 Mbps	12.24	0.405	12.64	30
		18 Mbps	12.13	0.577	12.71	30
		24 Mbps	11.80	0.745	12.55	30
		36 Mbps	11.35	1.054	12.40	30
		48 Mbps	11.25	1.359	12.61	30
		54 Mbps	11.03	1.471	12.50	30
2437	6	6 Mbps	12.44	0.218	12.66	30
		9 Mbps	12.20	0.303	12.50	30
		12 Mbps	12.23	0.405	12.64	30
		18 Mbps	11.82	0.577	12.39	30
		24 Mbps	11.60	0.745	12.34	30
		36 Mbps	11.23	1.054	12.28	30
		48 Mbps	10.88	1.359	12.24	30
		54 Mbps	10.67	1.471	12.14	30
2462	11	6 Mbps	12.40	0.218	12.62	30
		9 Mbps	12.23	0.303	12.54	30
		12 Mbps	12.27	0.405	12.68	30
		18 Mbps	12.07	0.577	12.65	30
		24 Mbps	11.75	0.745	12.49	30
		36 Mbps	11.30	1.054	12.35	30
		48 Mbps	11.03	1.359	12.39	30
		54 Mbps	10.96	1.471	12.43	30

Conducted Output Power Measurements (802.11n Mode)

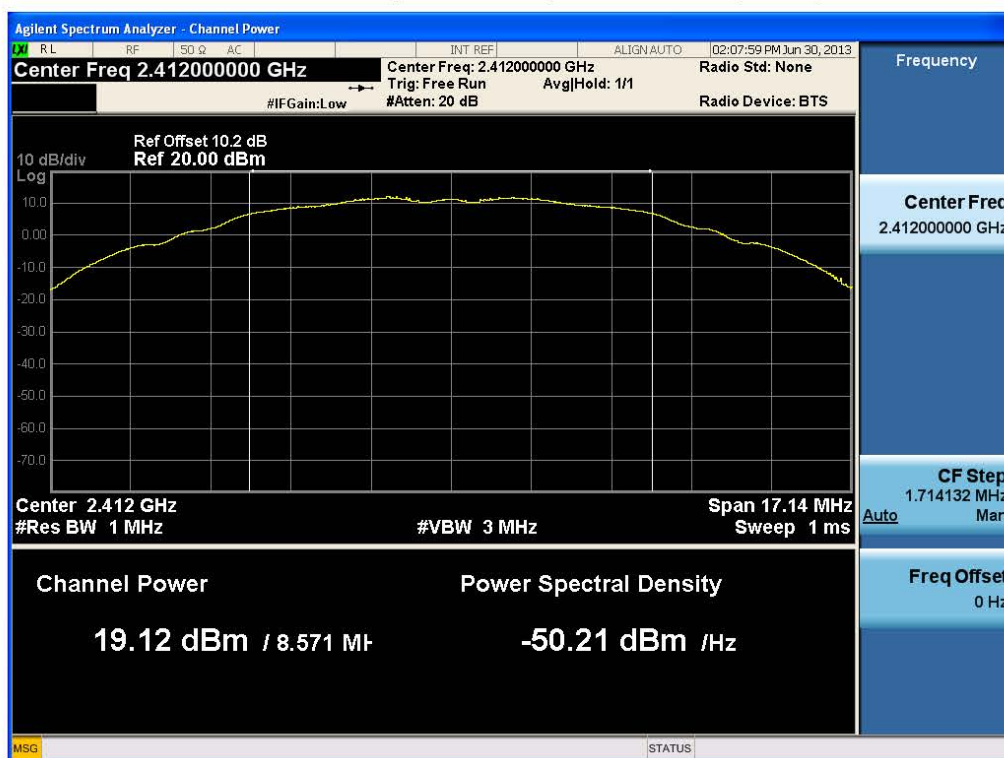
802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	6.5 Mbps	12.07	0.221	12.29	30
		13 Mbps	12.05	0.221	12.27	30
		19.5 Mbps	11.89	0.431	12.33	30
		26 Mbps	11.71	0.596	12.31	30
		39 Mbps	11.48	0.790	12.27	30
		52 Mbps	10.79	1.086	11.87	30
		58.5 Mbps	10.90	1.376	12.27	30
		65 Mbps	10.64	1.471	12.11	30
2437	6	6.5 Mbps	12.12	0.221	12.34	30
		13 Mbps	12.21	0.221	12.43	30
		19.5 Mbps	11.94	0.431	12.37	30
		26 Mbps	11.79	0.596	12.39	30
		39 Mbps	11.60	0.790	12.39	30
		52 Mbps	11.23	1.086	12.32	30
		58.5 Mbps	10.80	1.376	12.17	30
		65 Mbps	10.81	1.471	12.28	30
2462	11	6.5 Mbps	12.00	0.221	12.22	30
		13 Mbps	12.14	0.221	12.36	30
		19.5 Mbps	11.63	0.431	12.06	30
		26 Mbps	11.59	0.596	12.19	30
		39 Mbps	11.23	0.790	12.02	30
		52 Mbps	10.94	1.086	12.03	30
		58.5 Mbps	10.49	1.376	11.87	30
		65 Mbps	10.43	1.471	11.90	30

■ RESULT PLOTS-Peak

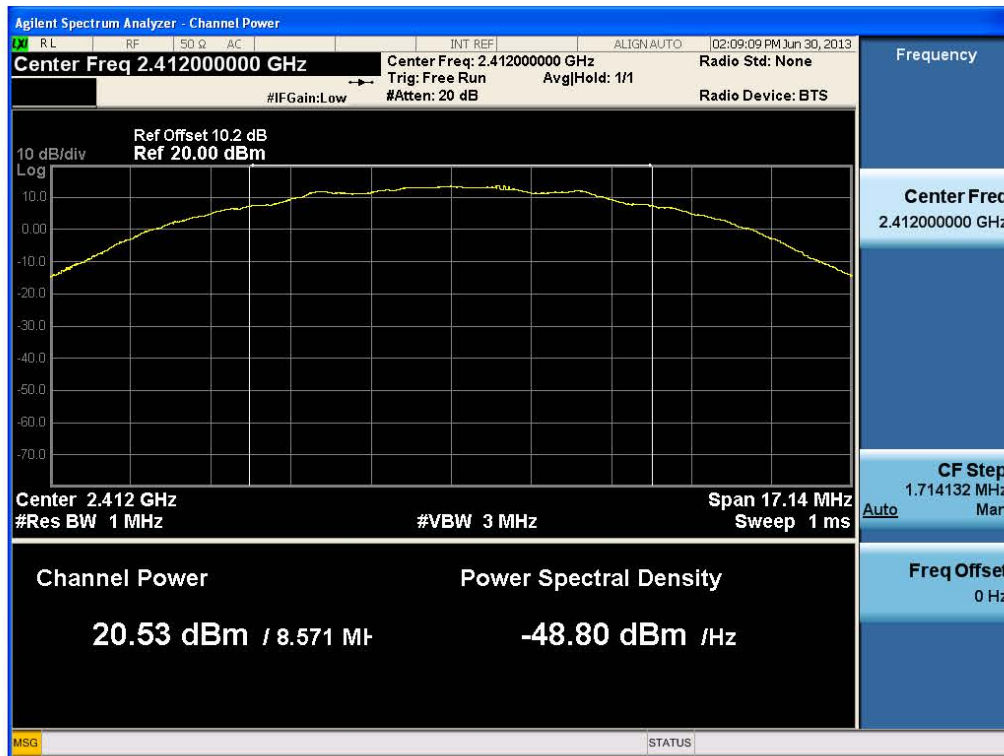
Conducted Output Power (802.11b-CH 1) 1Mbps



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



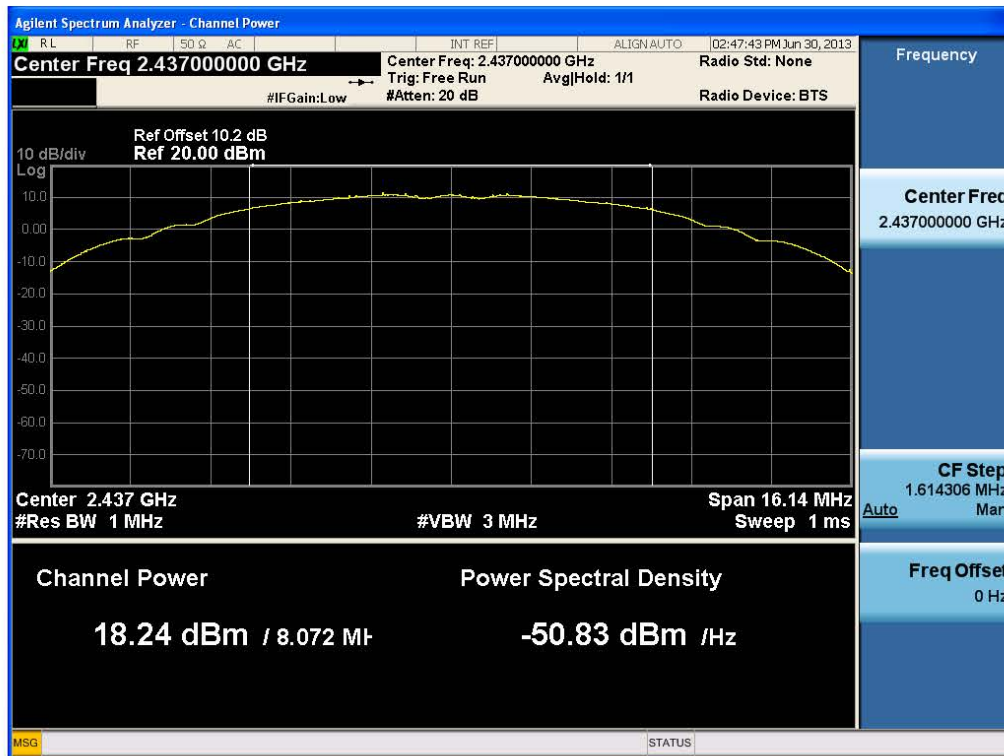
Conducted Output Power (802.11b-CH 1) 5.5Mbps



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



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



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

