

7. 6dB Bandwidth Test

7.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9030A	MY51380221	Oct.31, 12	1 Year
2.	Amp	HP	8449B	3008A08495	May.08, 13	1 Year
3.	Antenna	EMCO	3115	9510-4580	May.08, 13	1 Year
4.	HF Cable	Hubersuhner	Sucoflex104	-	May.08, 13	1 Year

7.2. Limit

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

7.3. Test Procedure

The transmitter output was connected to a spectrum analyzer, The bandwidth of the fundamental frequency was measured by spectrum analyzer with 300KHz RBW and 1MHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

7.4. Test Results

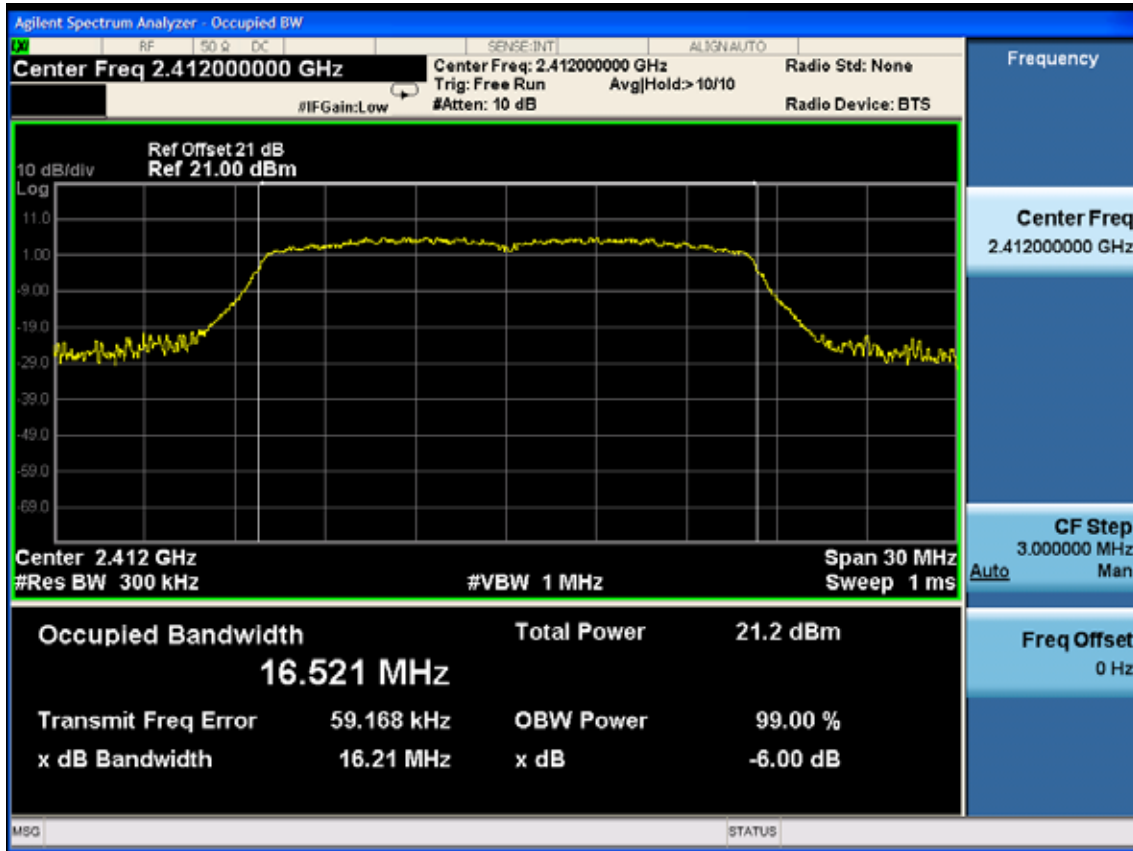
EUT:300Mbps Wireless N ADSL2+ Modem Router		
M/N:TD-W8960N		
Test date: 2013-11-05	Pressure: 101.3±1.0 kpa	Humidity: 49.4±3.0%
Tested by: Kevin_Hu	Test site: RF site	Temperature:21.7±0.6 °C

Cable loss: 1 dB		Attenuator loss: 20 dB		
Test Mode	CH	6dB bandwidth (MHz)		Limit (KHz)
		Chain 0	Chain 1	
11b	CH1	N/A	8.240	>500
	CH6	N/A	8.239	>500
	CH11	N/A	8.233	>500
11g	CH1	16.21	16.22	>500
	CH6	16.16	16.13	>500
	CH11	16.15	16.19	>500
11n HT20	CH1	17.26	16.70	>500
	CH6	17.22	16.73	>500
	CH11	17.15	17.01	>500
11n HT40	CH3	36.48	36.51	>500
	CH6	36.51	36.48	>500
	CH9	36.39	35.49	>500
Conclusion: PASS				

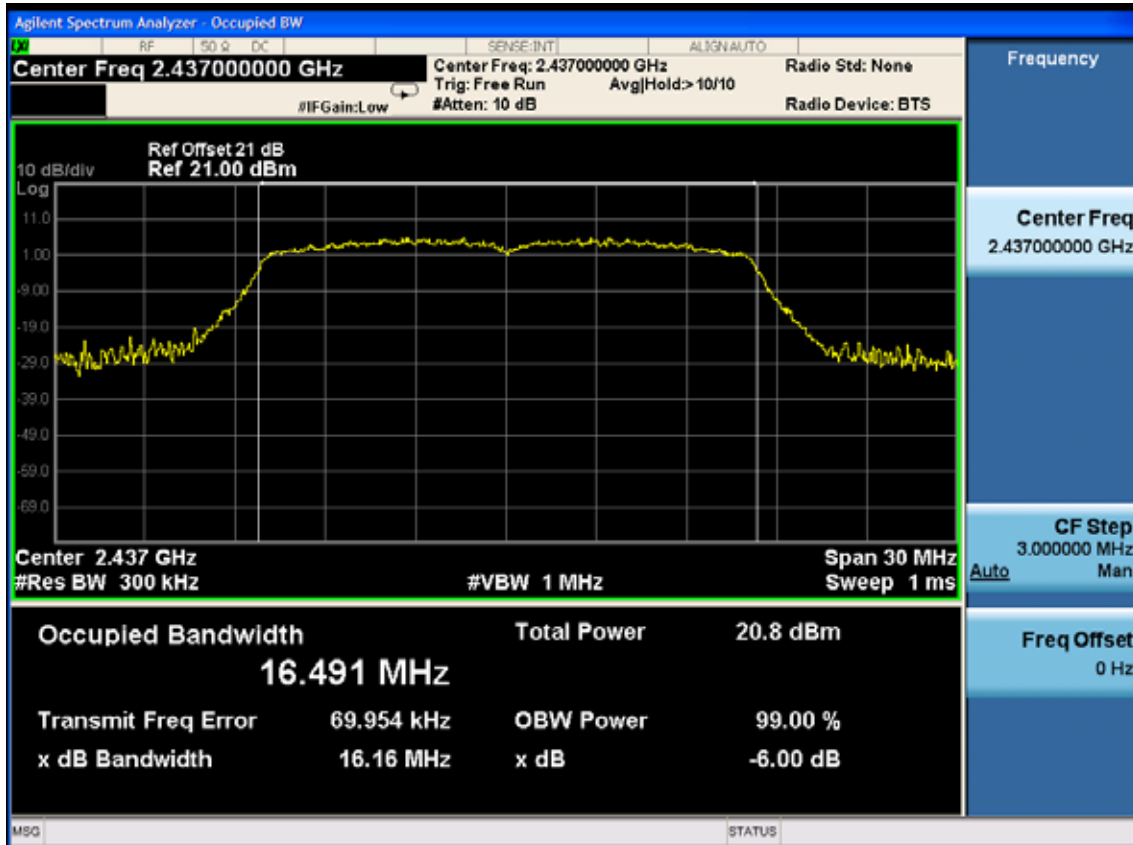
ANT 0

Test Mode: IEEE 802.11g TX

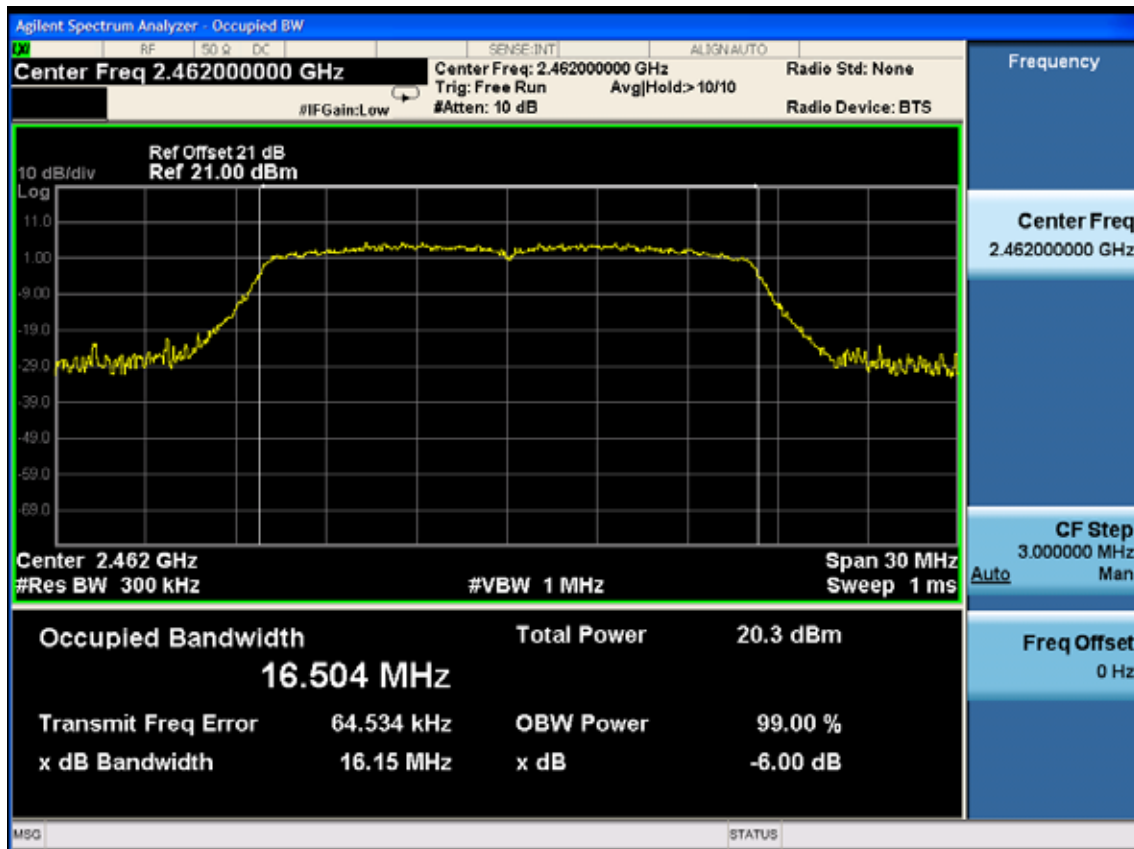
Test CH1: 2412MHz



Test CH6: 2437MHz

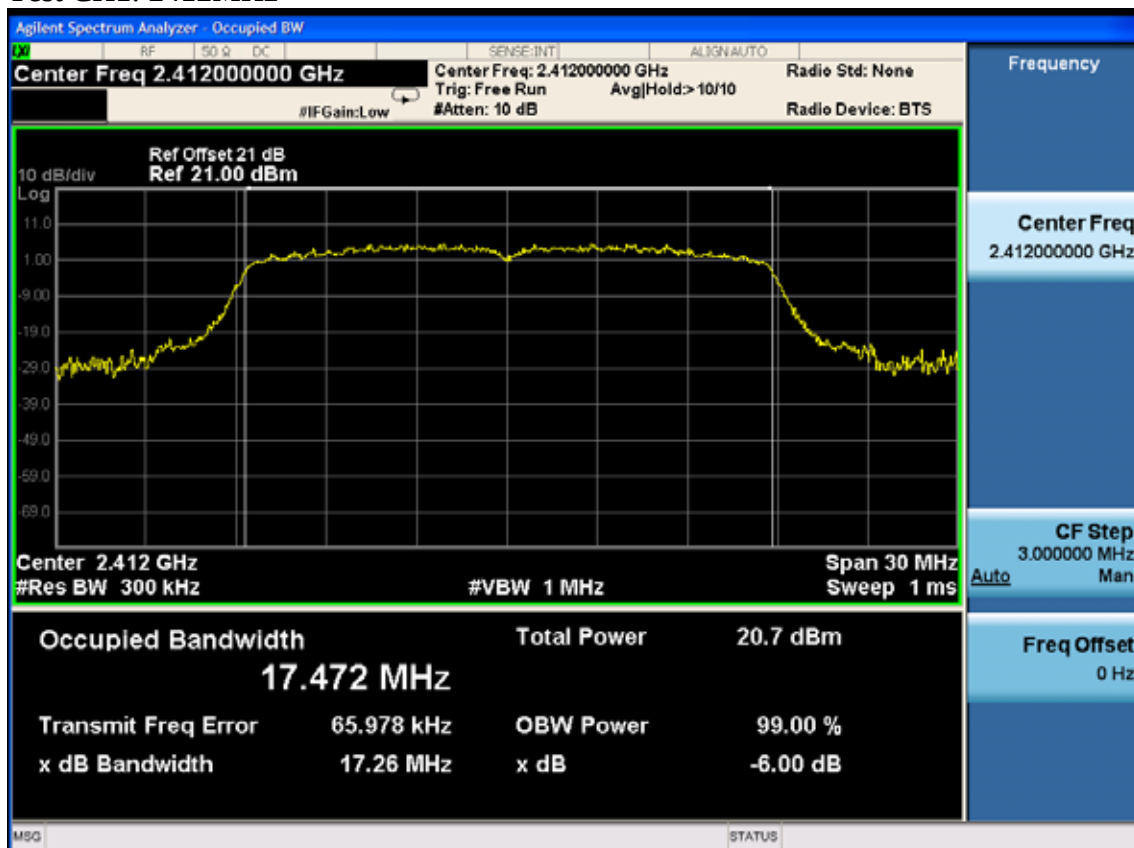


Test CH11: 2462MHz

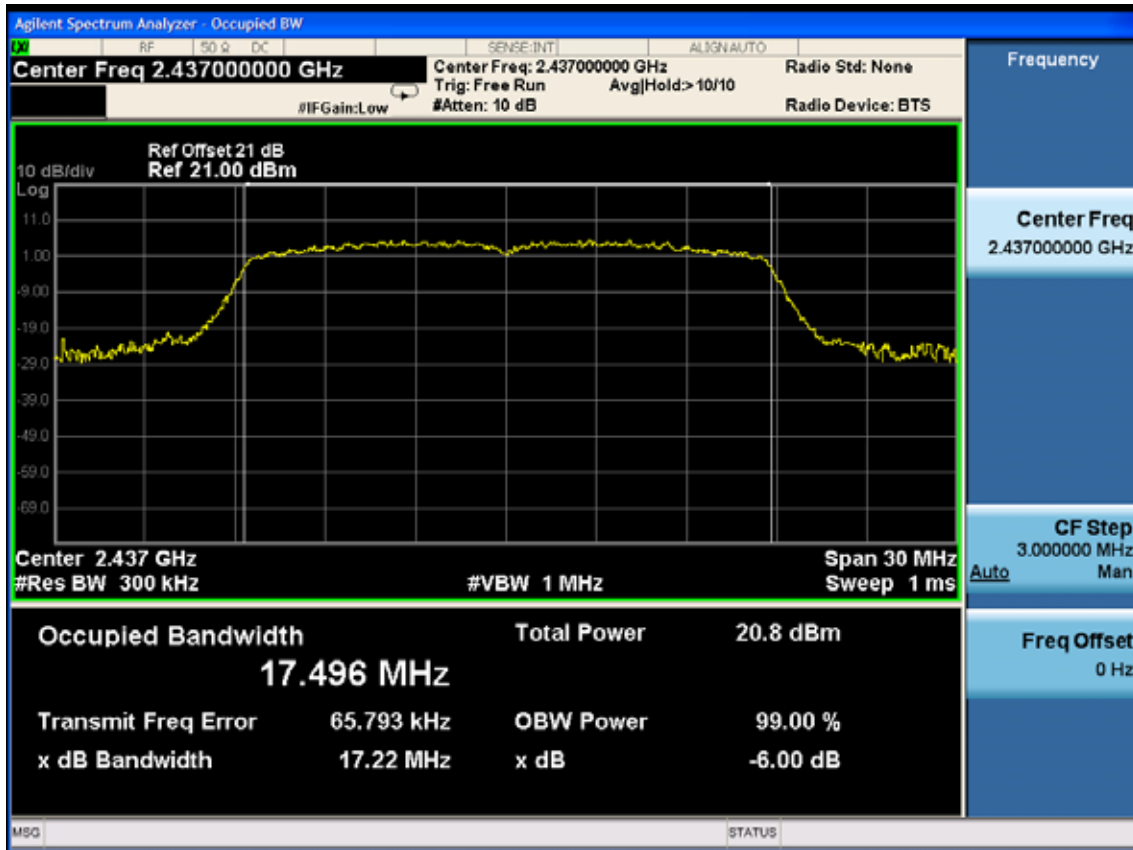


Test Mode: IEEE 802.11n HT20 TX

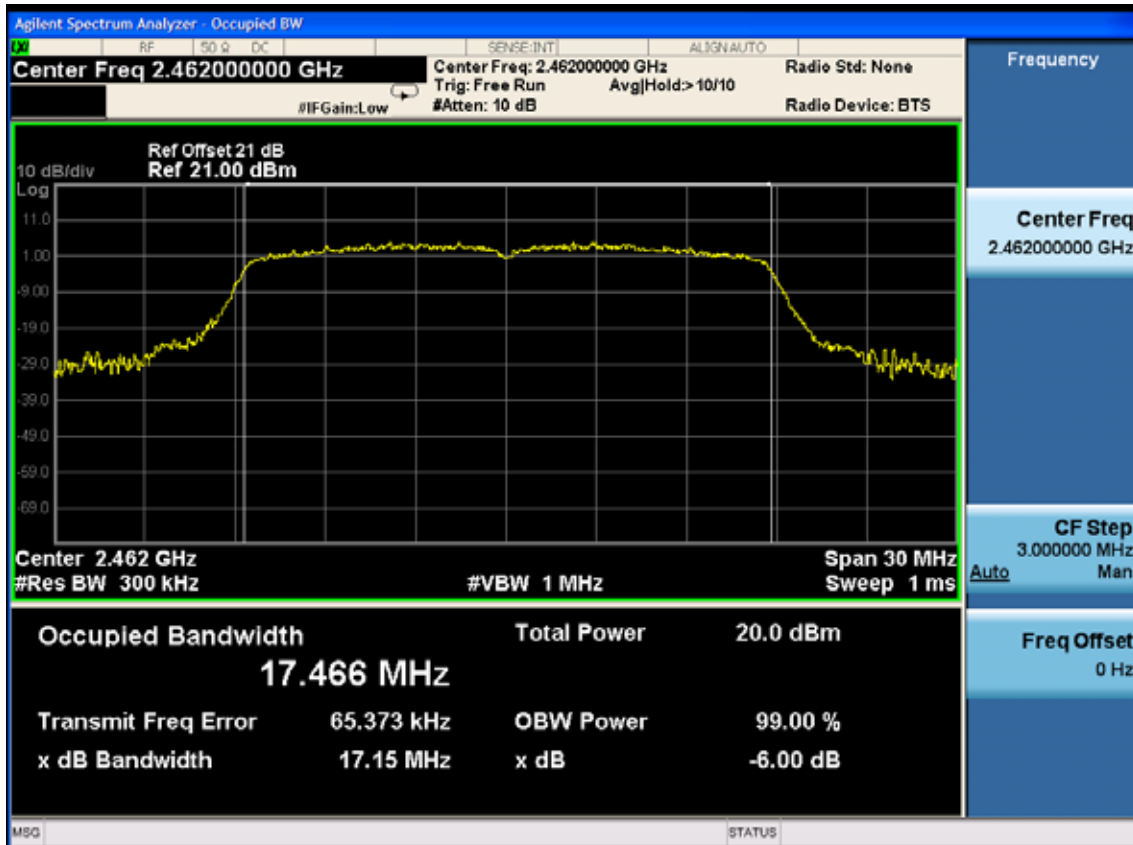
Test CH1: 2412MHz



Test CH6: 2437MHz

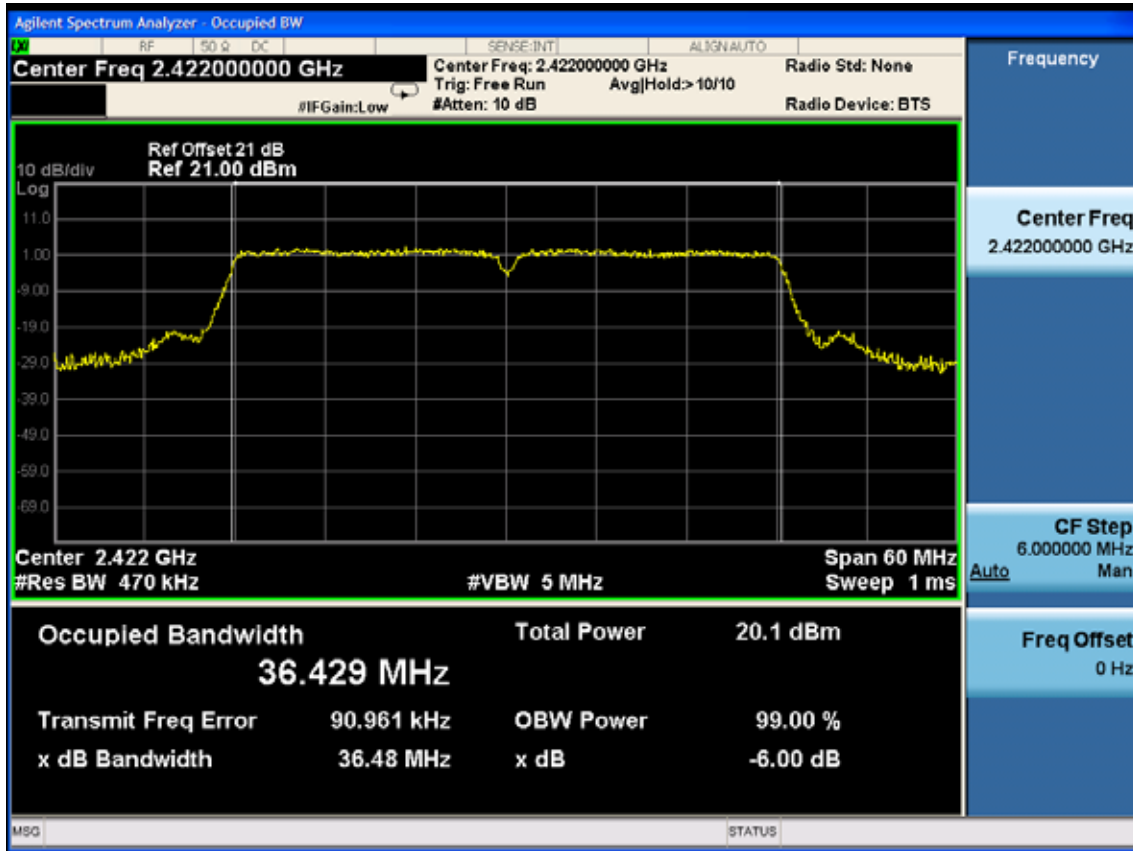


Test CH11: 2462MHz

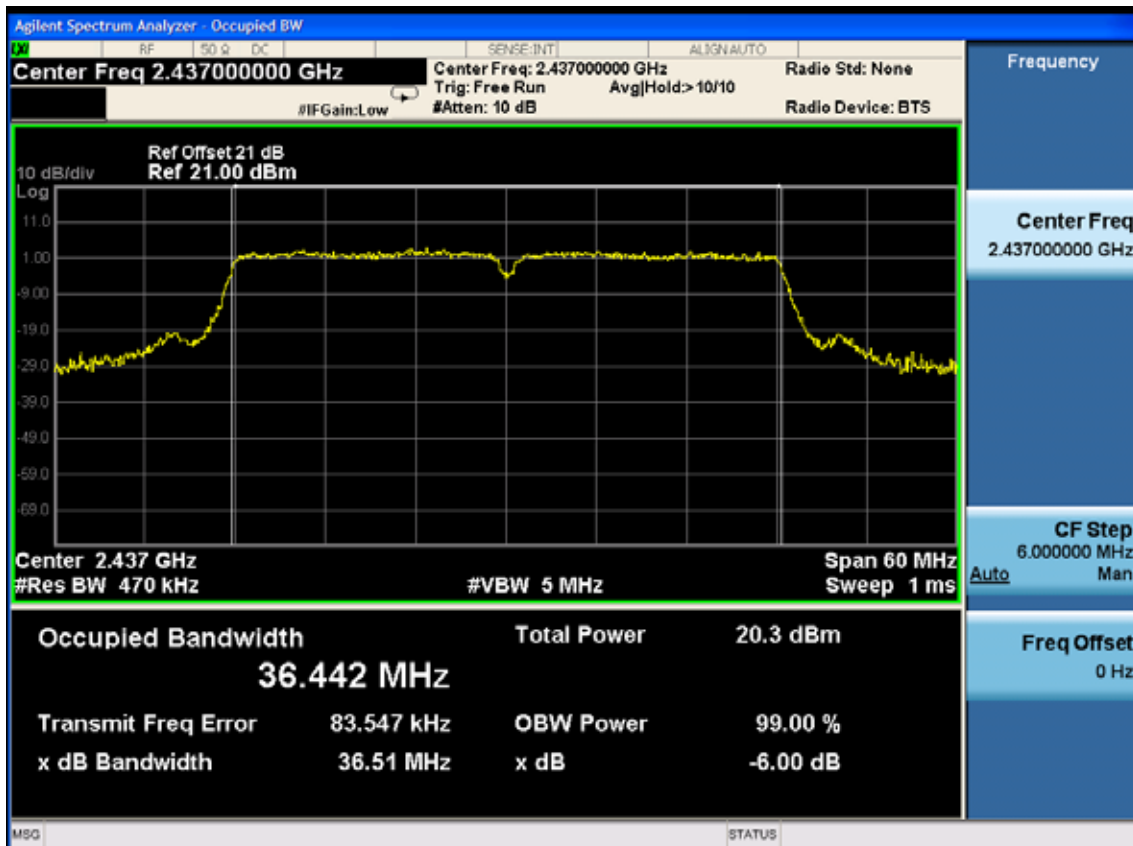


Test Mode: IEEE 802.11n HT40 TX

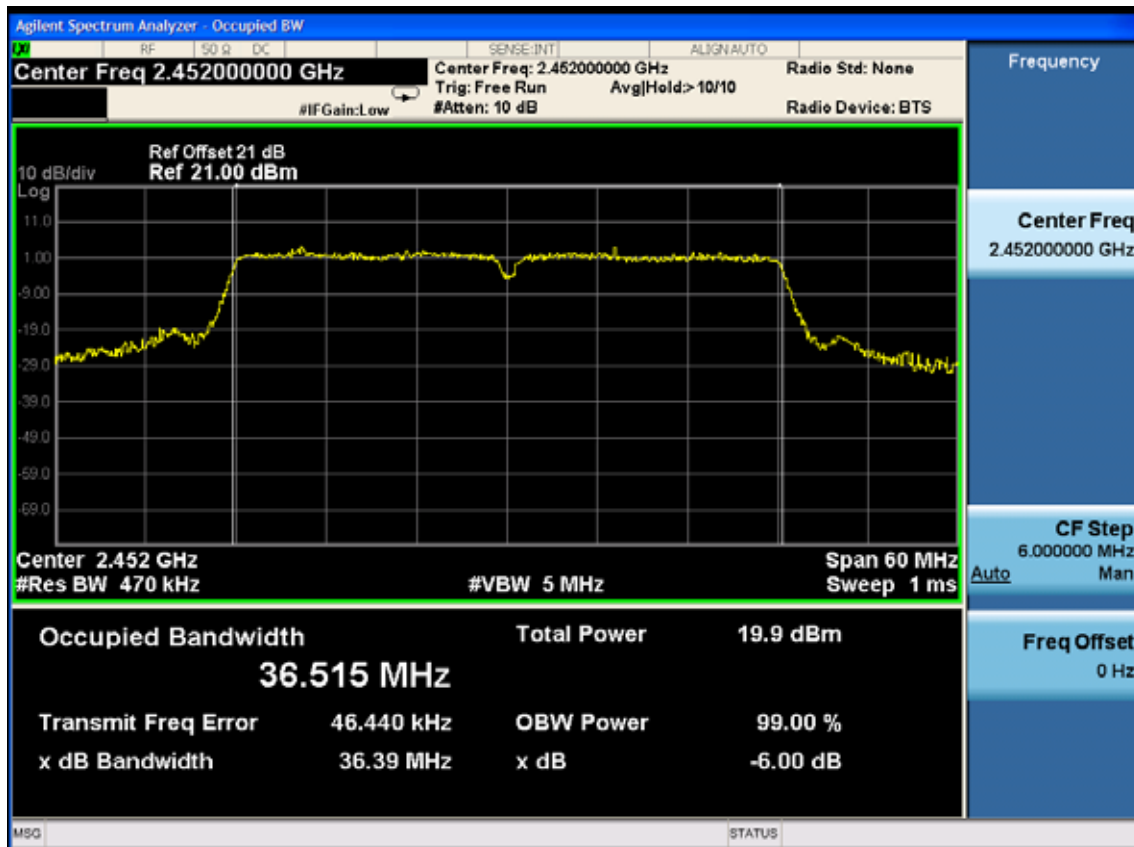
Test CH3: 2422MHz



Test CH6: 2437MHz



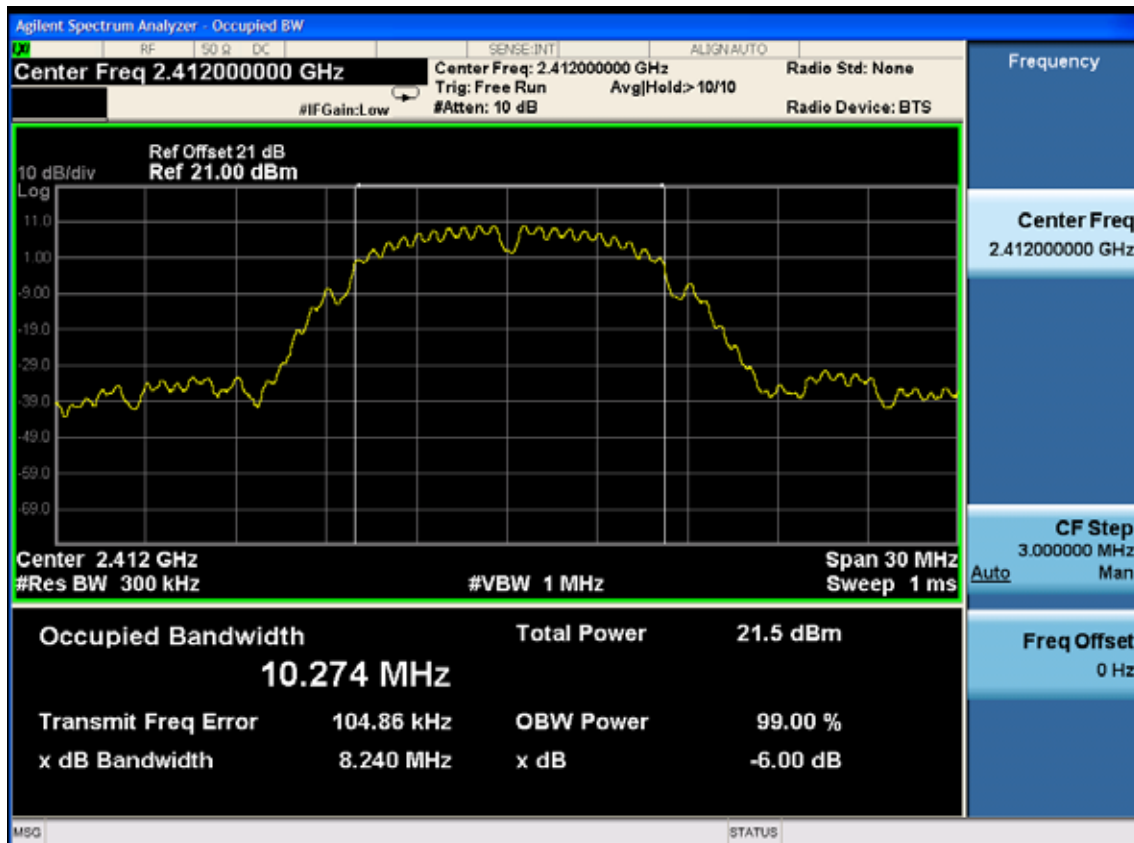
Test CH9: 2452MHz



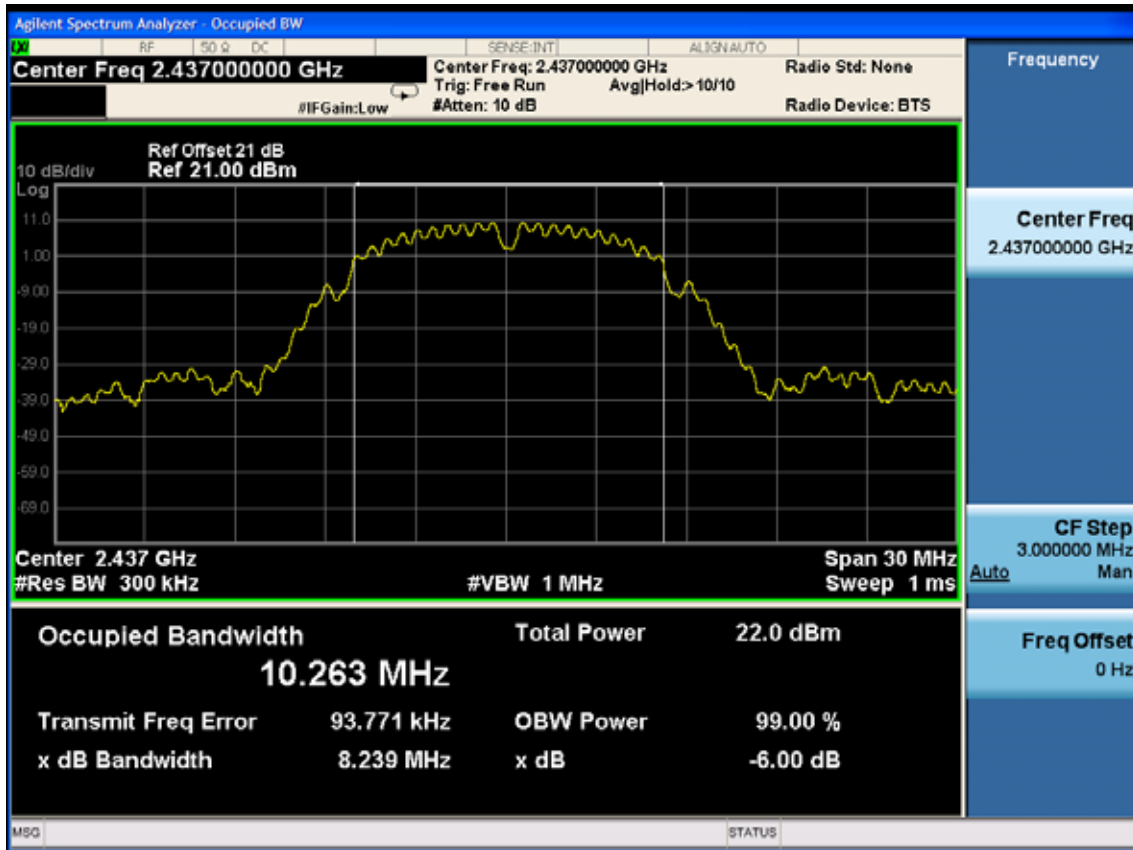
ANT 1

Test Mode: IEEE 802.11b TX

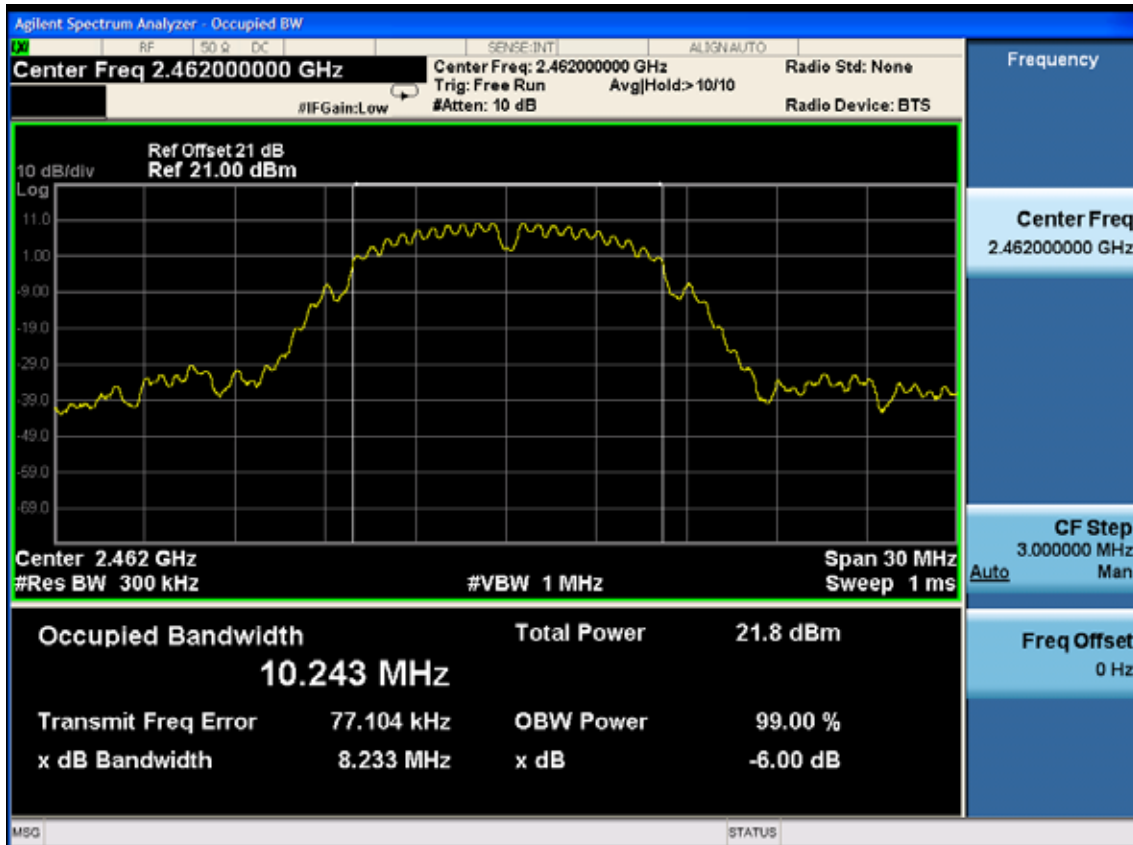
Test CH1: 2412MHz



Test CH6: 2437MHz

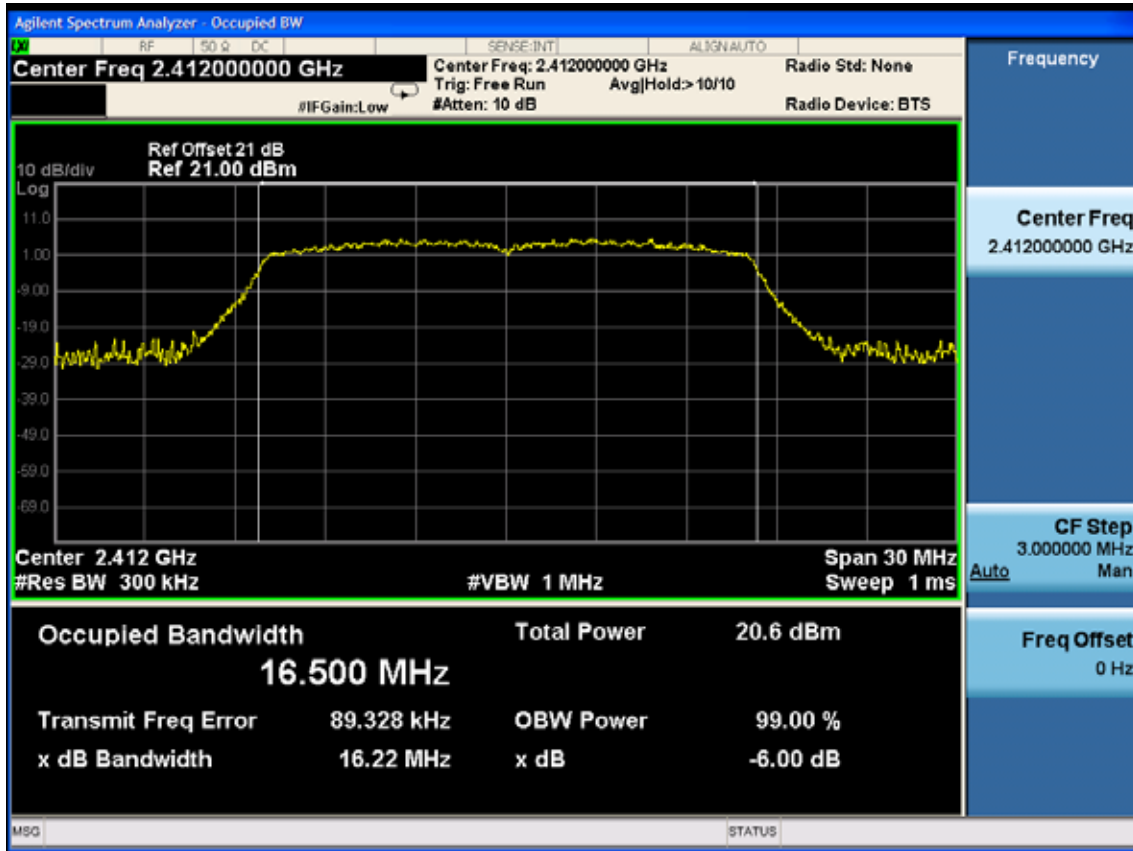


Test CH11: 2462MHz

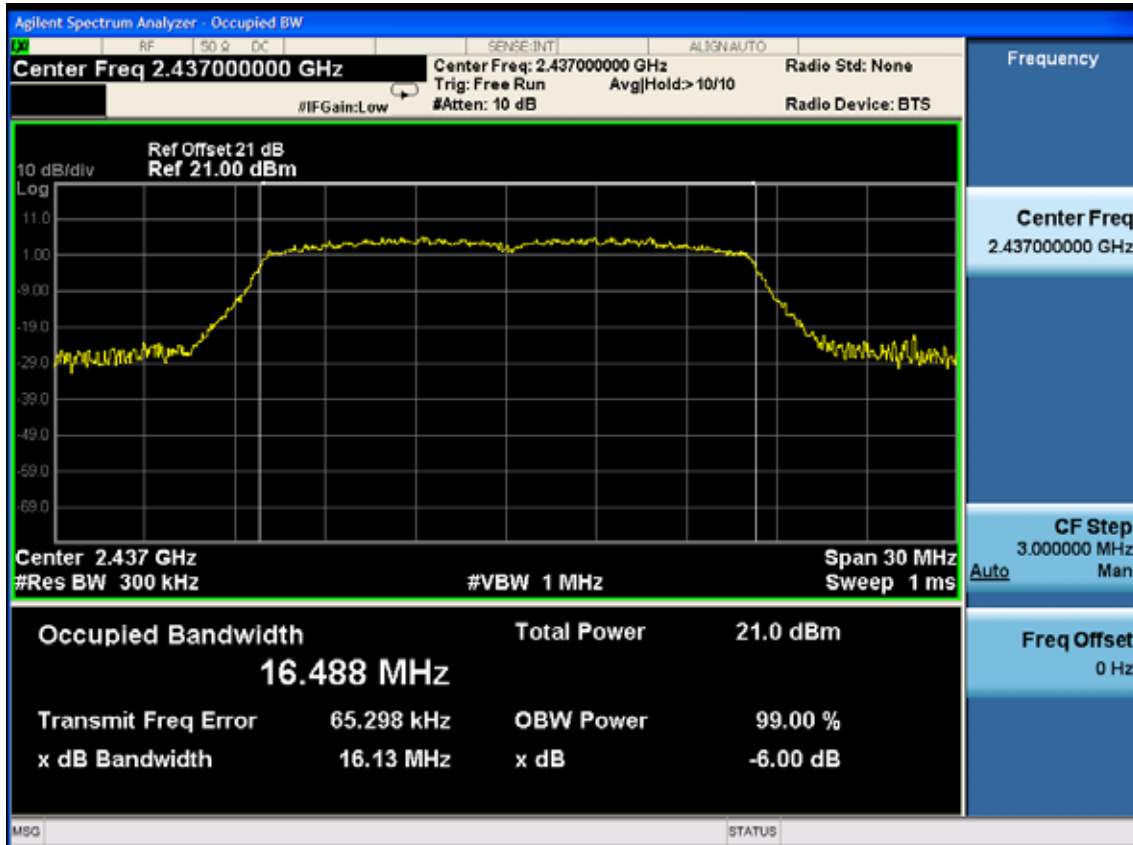


Test Mode: IEEE 802.11g TX

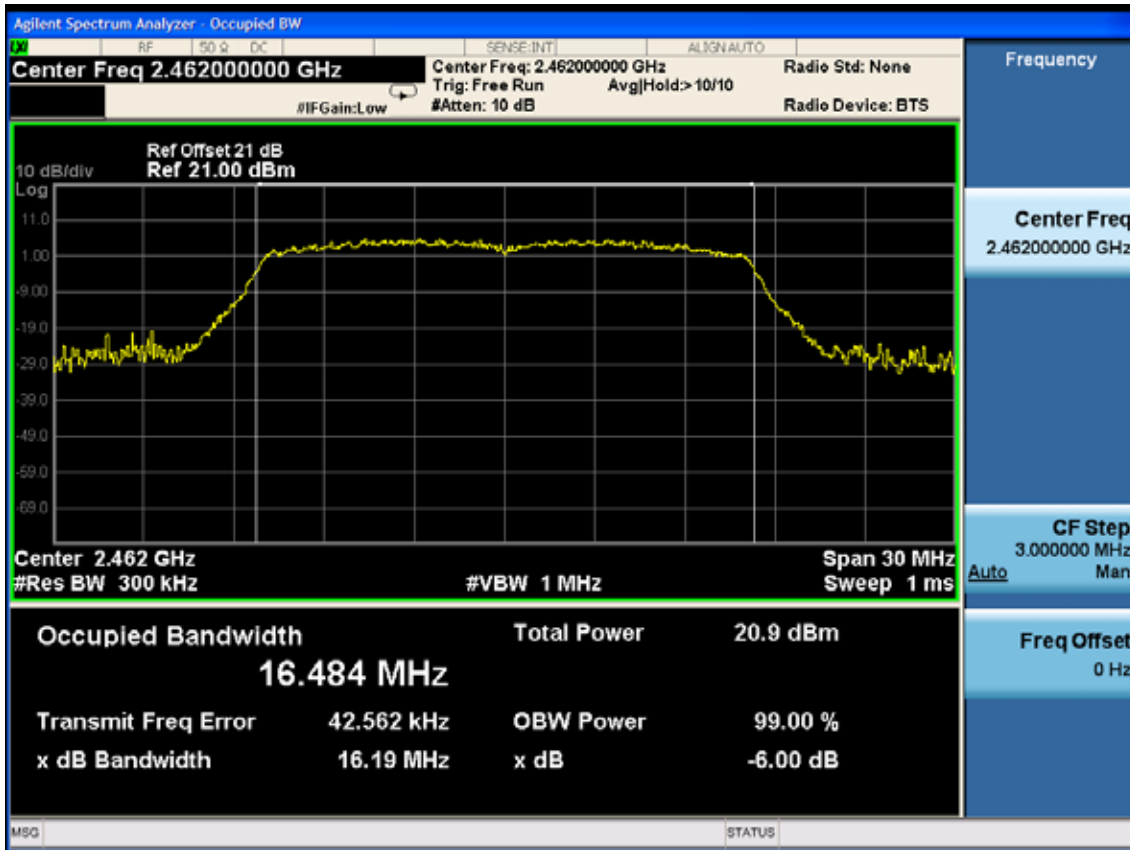
Test CH1: 2412MHz



Test CH6: 2437MHz

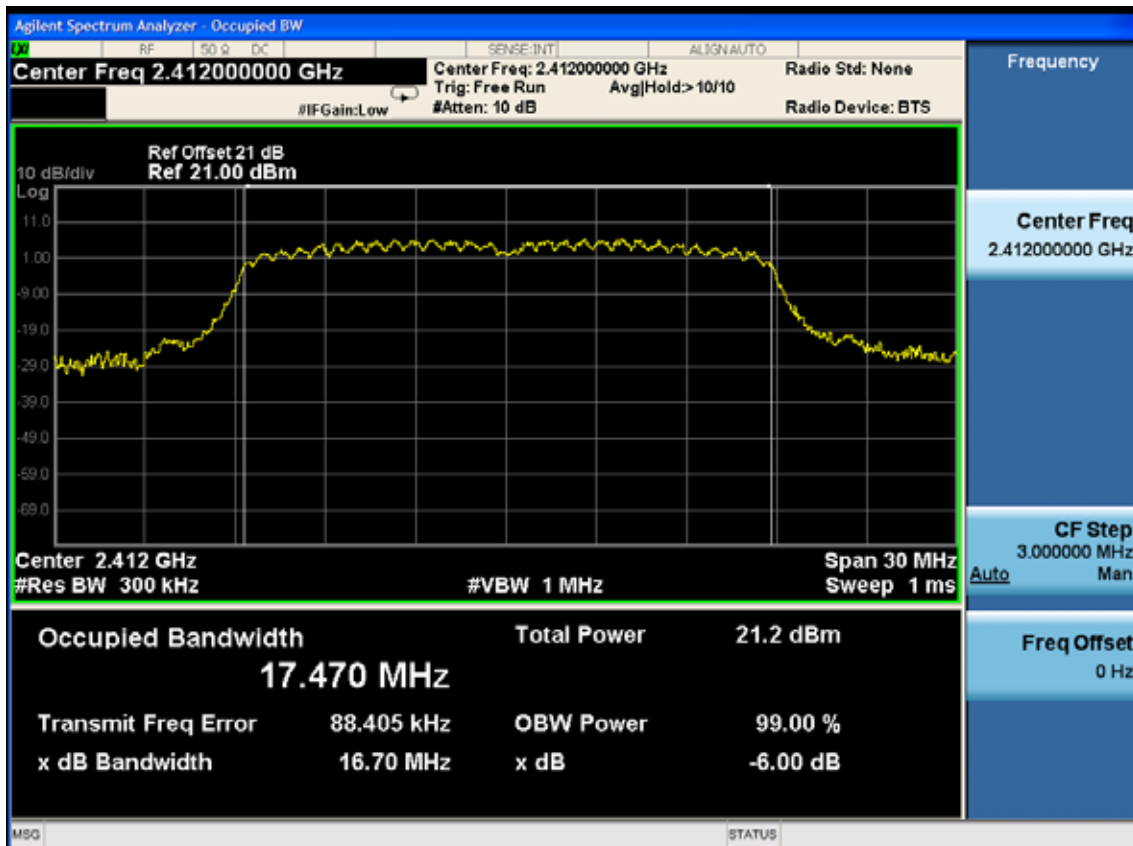


Test CH11: 2462MHz

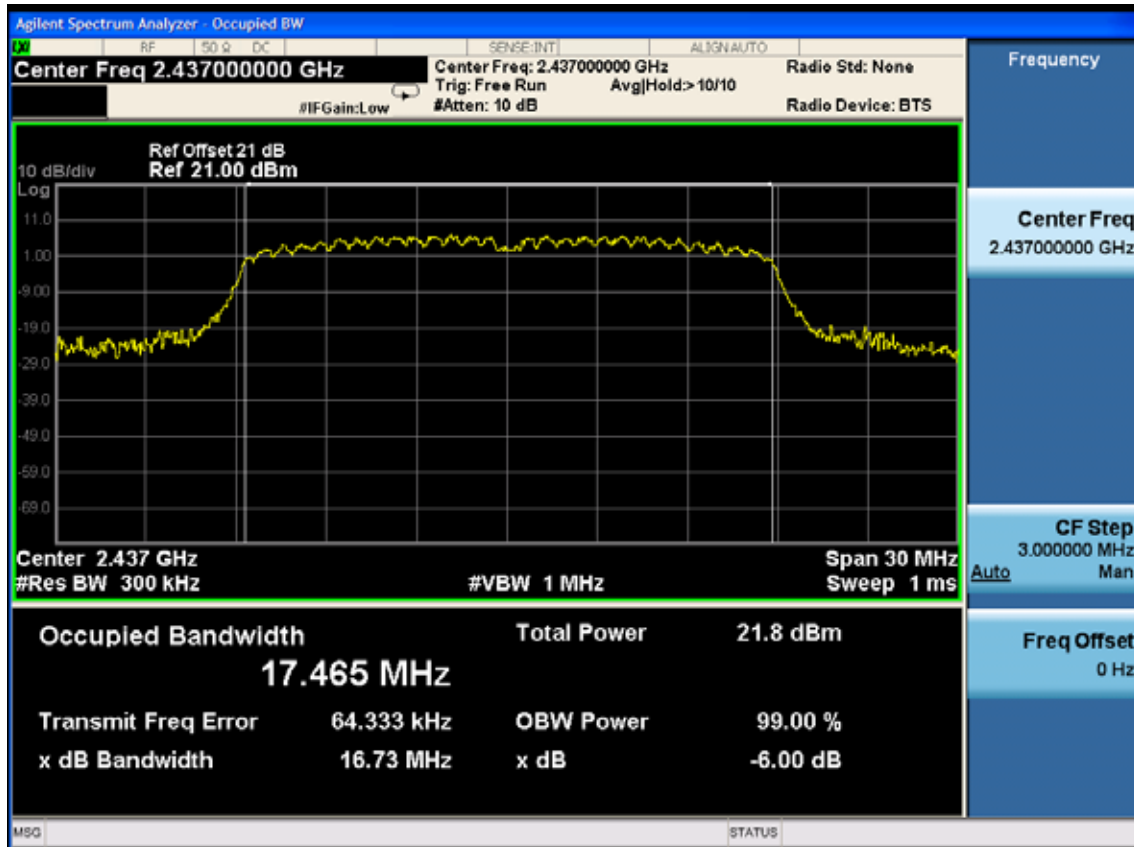


Test Mode: IEEE 802.11n HT20 TX

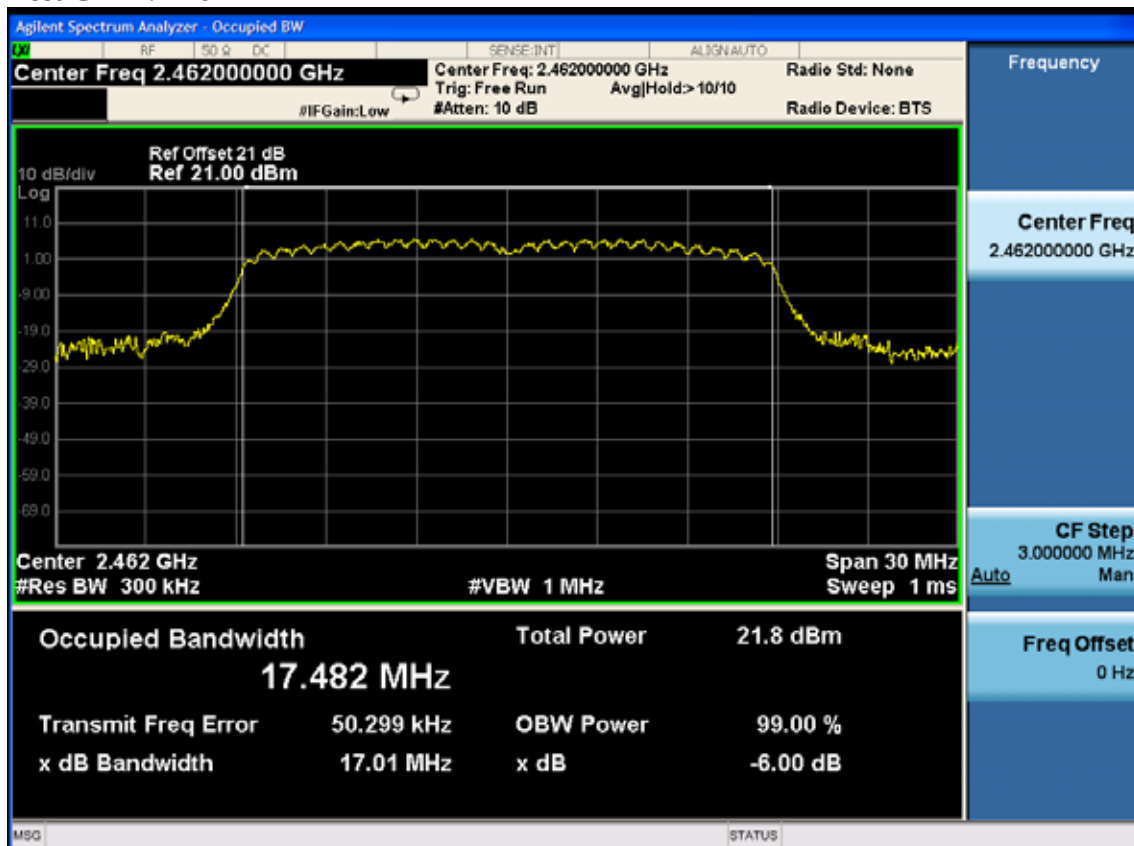
Test CH1: 2412MHz



Test CH6: 2437MHz

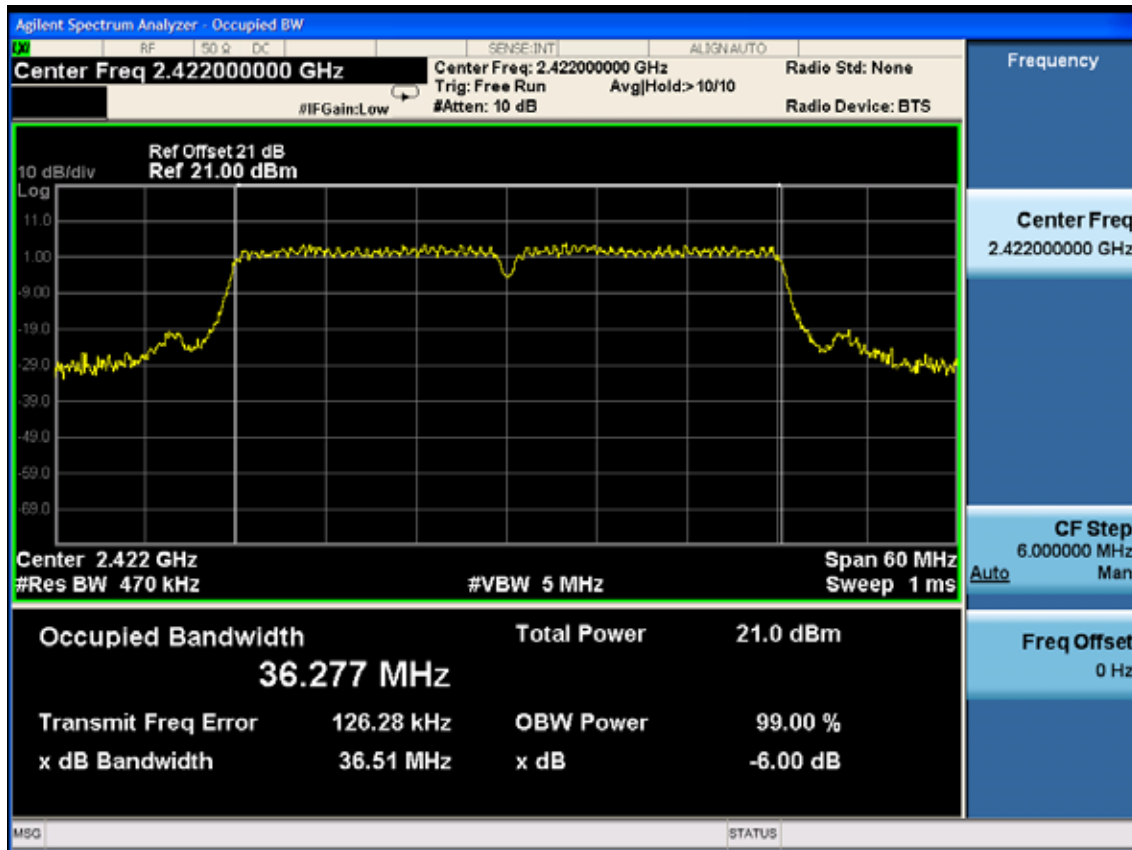


Test CH11: 2462MHz

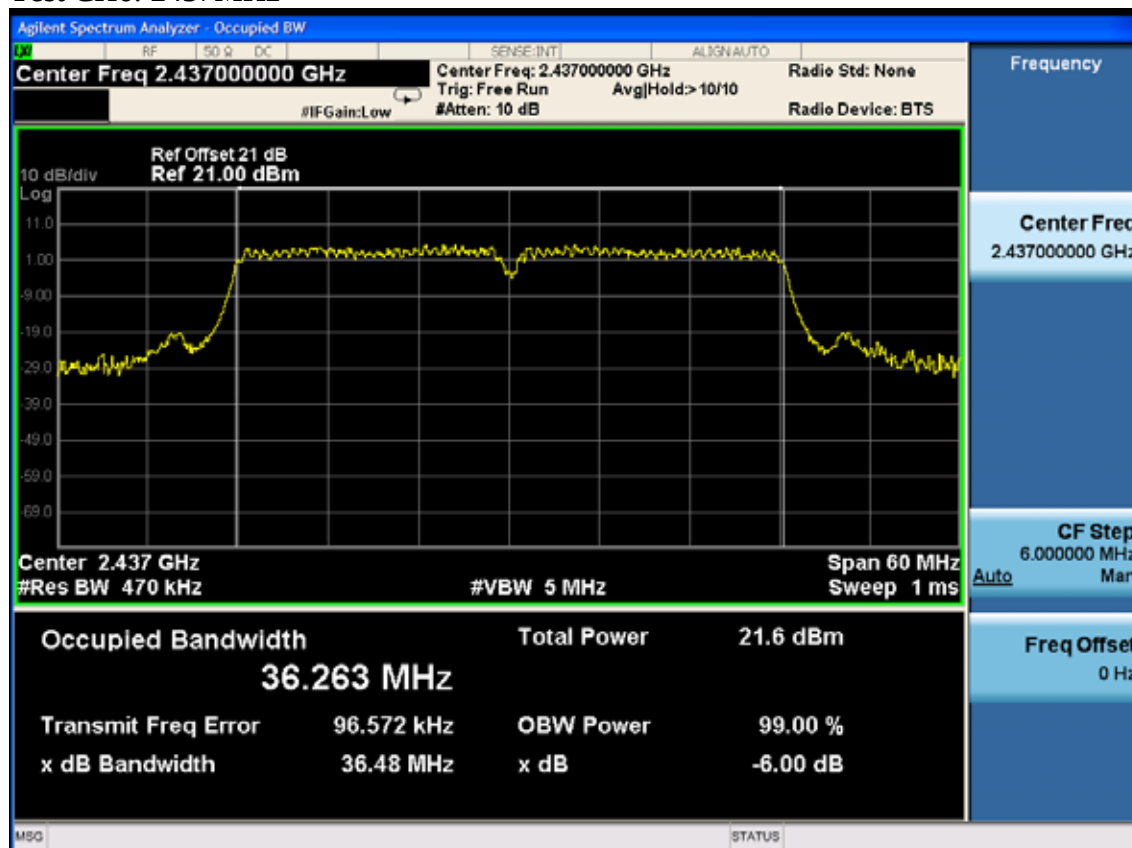


Test Mode: IEEE 802.11n HT40 TX

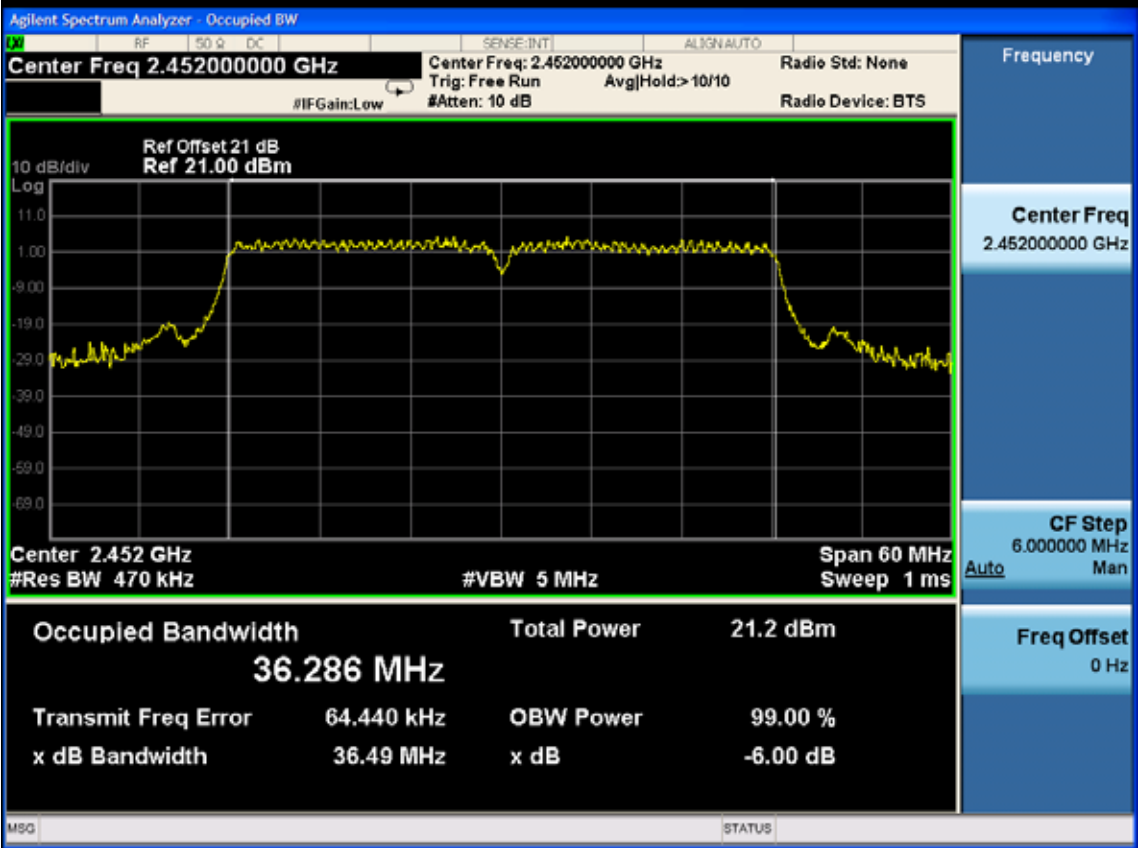
Test CH3: 2422MHz



Test CH6: 2437MHz



Test CH9: 2452MHz



8. OUTPUT POWER TEST

8.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	May.08, 13	1 Year
2.	Amp	HP	8449B	3008A08495	May.08, 13	1 Year
3.	Antenna	EMCO	3115	9510-4580	May.08, 13	1Year
4.	HF Cable	Hubersuhne	Sucoflex104	-	May.08, 13	1 Year
5.	Power Meter	Anritsu	ML2487A	6K00002472	May.08, 13	1Year
6.	Power Sensor	Anritsu	MA2491A	033005	May.08, 13	1Year
7.	Spectrum Analyzer	Agilent	N9030A	MY5138022	May.08, 13	1 Year

8.2. Limit (FCC Part 15C 15.247 b(3))

For systems using digital modulation in the 2400—2483.5MHz, The Peak out put Power shall not exceed 1W(30dBm)

8.3. Test Procedure

- 1, Connected the EUT's antenna port to measure device by 26dB attenuator.
- 2, For IEEE 802.11b/g and IEEE802.11n HT20 mode, use a PK power meter which's bandwidth is 20MHz and above 26dB bandwidth of signal to measure out each test modes' PK output power.
- 3, For IEEE802.11n HT40 mode, because the signal's bandwidth is about 40MHz and above 20MHz bandwidth of power sensor ML2491A.
 - 1) Set the RBW = 1MHz.
 - 2) Set the VBW = 3MHz.
 - 3) Set the span to a value that is 5-30% greater than the EBW.
 - 4) Detector = peak.
 - 5) Sweep time = auto couple.
 - 6) Trace mode = max hold.
 - 7) Allow trace to fully stabilize.
 - 8) Use the spectrum analyzer's integrated band power measurement function with band limits set equal to the EBW band edges (for some analyzers, this may require a manual override to ensure use of peak detector). If the spectrum analyzer does not have a band power function, sum the spectrum levels (in linear power units) at 1MHz intervals extending across the EBW of the spectrum.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

8.4. Test Results

EUT:300Mbps Wireless N ADSL2+ Modem Router					
M/N:TD-W8960N					
Test date: 2013-11-05		Pressure: 101.2±1.0 kpa		Humidity: 51.4±3.0%	
Tested by: Kevin_Hu		Test site: RF site		Temperature: 22.9±0.6 °C	
Cable loss: 1 dB			Attenuator loss: 20 dB		
Test Mode	CH	Peak output Power (dBm)			Limit (dBm)
		Chain 0	Chain 1	Total	
11b	CH1	N/A	21.72	N/A	30
	CH6	N/A	22.94	N/A	30
	CH11	N/A	21.50	N/A	30
11g	CH1	20.36	19.93	N/A	30
	CH6	28.21	27.65	N/A	30
	CH11	21.71	20.38	N/A	30
11n HT20	CH1	19.30	18.87	22.10	30
	CH6	25.31	24.90	28.12	30
	CH11	20.38	19.84	23.13	30
11n HT40	CH3	20.04	20.58	23.33	30
	CH6	26.29	25.55	28.95	30
	CH9	19.92	19.28	22.62	30
Conclusion: PASS					

ANT 0

Test Mode: IEEE 802.11n HT40 TX

Test CH3: 2422MHz



Test CH6: 2437MHz



Test CH9: 2452MHz



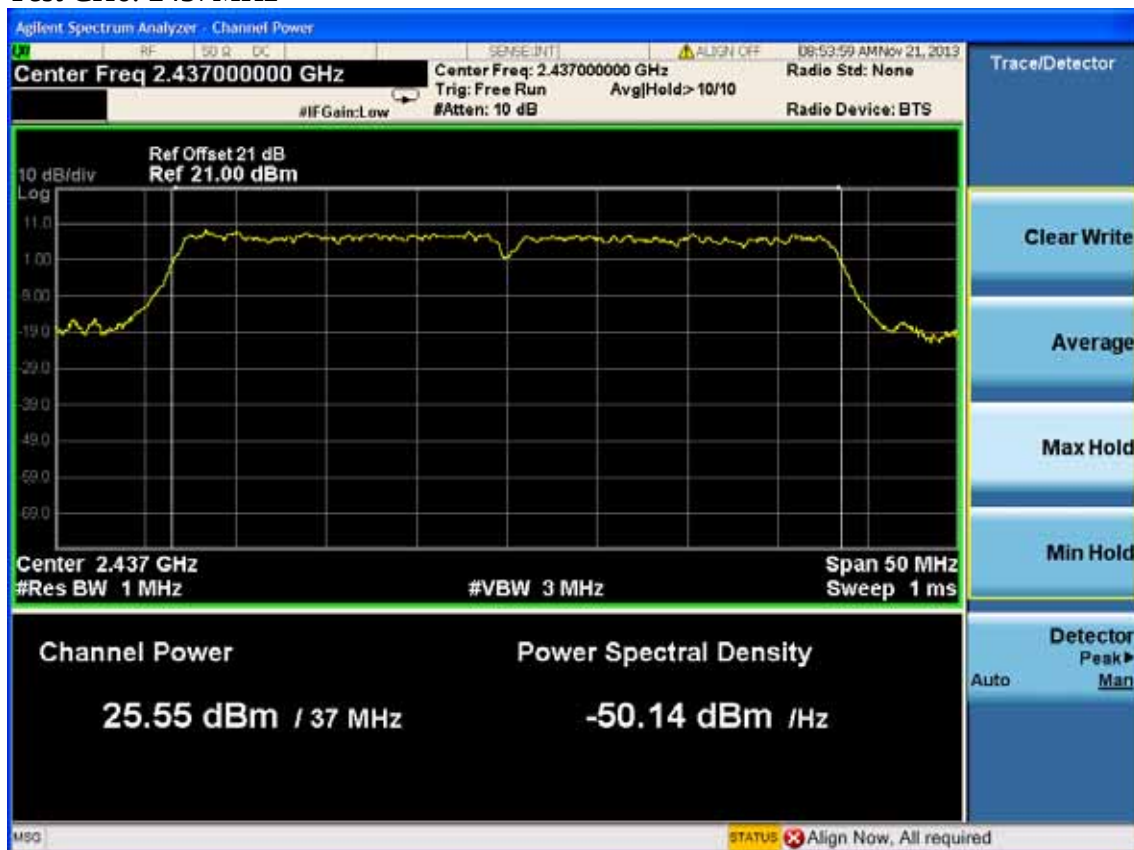
ANT 1

Test Mode: IEEE 802.11n HT40 TX

Test CH3: 2422MHz



Test CH6: 2437MHz



Test CH9: 2452MHz



9. POWER SPECTRAL DENSITY TEST

9.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9030A	MY51380221	Oct.31, 12	1Year
2.	Amp	HP	8449B	3008A08495	May.08, 13	1 Year
3.	Antenna	EMCO	3115	9607-4580	Aug.28, 13	1Year
4.	HF Cable	Hubersuhne	Sucoflex104	-	May.08, 13	1 Year

9.2. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

9.3. Test Procedure

1. Connected the EUT's antenna port to spectrum analyzer device by 20dB attenuator.
2. Set the test frequency as center frequency, Set RBW=3KHz, VBW=10KHz, Span large enough capture the entire frequency, Read out maximum peak level frequency
3. Set the frequency read from produce 2 as center frequency, then set the span= 300KHz, Sweep time=Span/RBW, Then Max hold, read out each mode and each chain's Power density.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude.

9.4.Test Results

EUT:300Mbps Wireless N ADSL2+ Modem Router		
M/N:TD-W8960N		
Test date: 2013-11-05	Pressure: 101.4±1.0 kpa	Humidity: 51.8±3.0%
Tested by: Kevin_Hu	Test site: RF Site	Temperature: 21.6±0.6℃

Cable loss: 1 dB		Attenuator loss: 20 dB			
Test Mode	CH	Power density (dBm/3KHz)			Limit (dBm/3KHz)
		ANT 0	ANT 1	Total	
11b	CH1	N/A	-1.714	N/A	8
	CH6	N/A	-0.780	N/A	8
	CH11	N/A	-0.165	N/A	8
11g	CH1	-5.879	-7.962	N/A	8
	CH6	-6.063	-8.145	N/A	8
	CH11	-7.038	-7.727	N/A	8
11n Mode					
Test Mode	CH	Power density (dBm/3KHz)			Limit (dBm/3KHz)
		ANT 0	ANT 1	Total	
11n HT20	CH1	-7.200	-6.686	-3.93	8
	CH6	-7.419	-5.471	-3.33	8
	CH11	-4.962	-5.331	-2.13	8
11n HT40	CH3	-11.756	-10.102	-7.84	8
	CH6	-10.812	-9.046	-6.83	8
	CH9	-10.553	-8.256	-6.24	8
Conclusion : PASS					

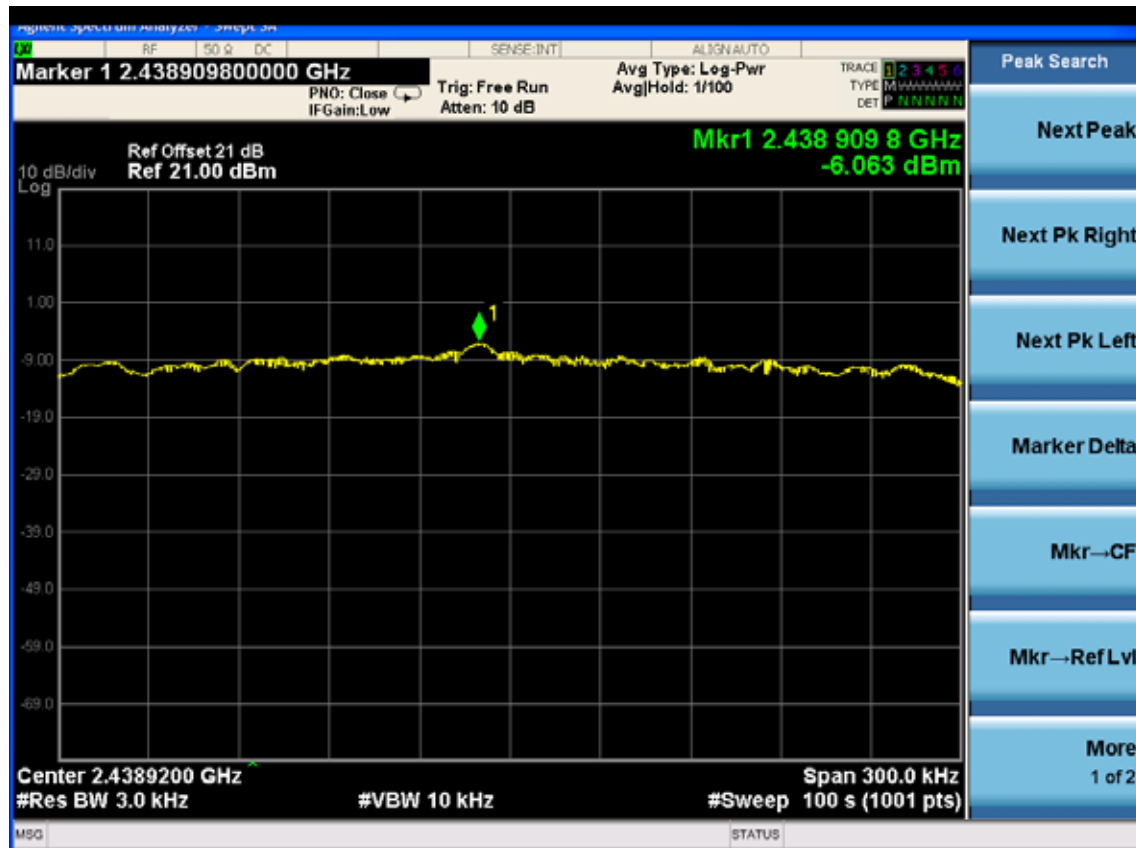
ANT 0

Test Mode: IEEE 802.11g TX

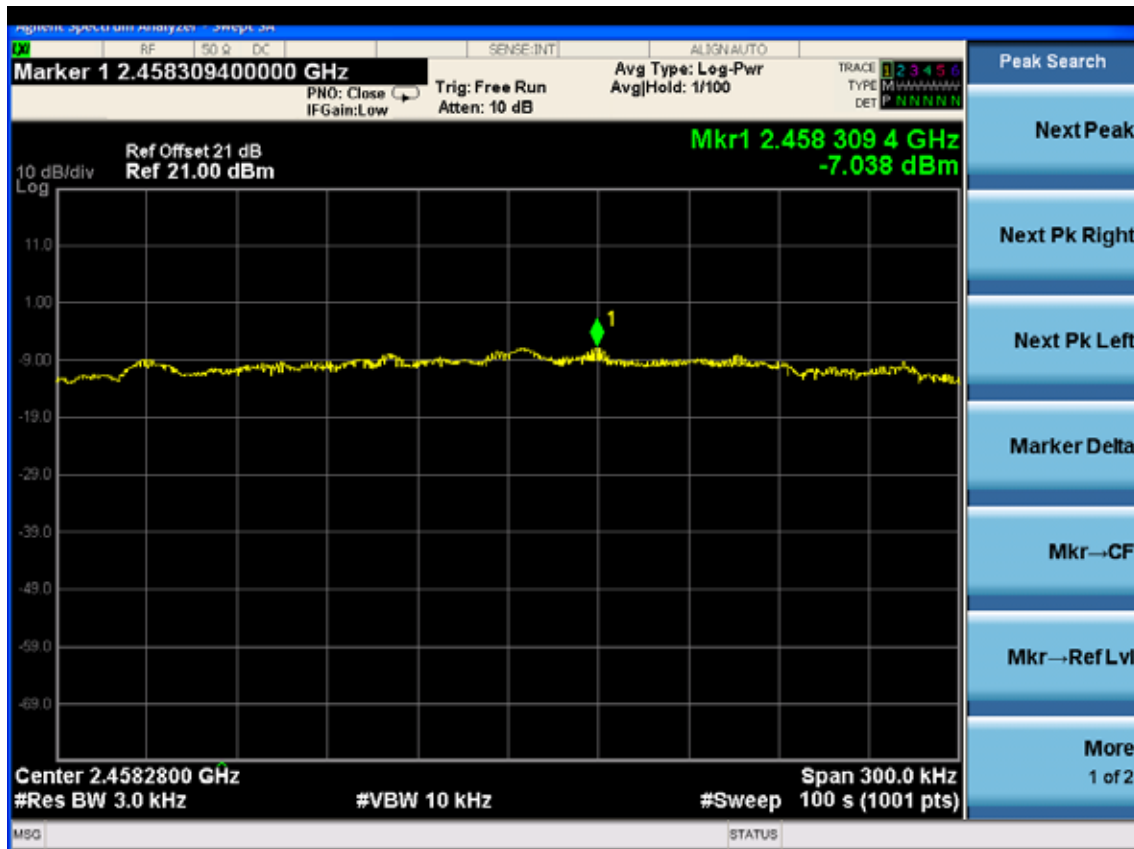
Test CH1: 2412MHz



Test CH6: 2437MHz

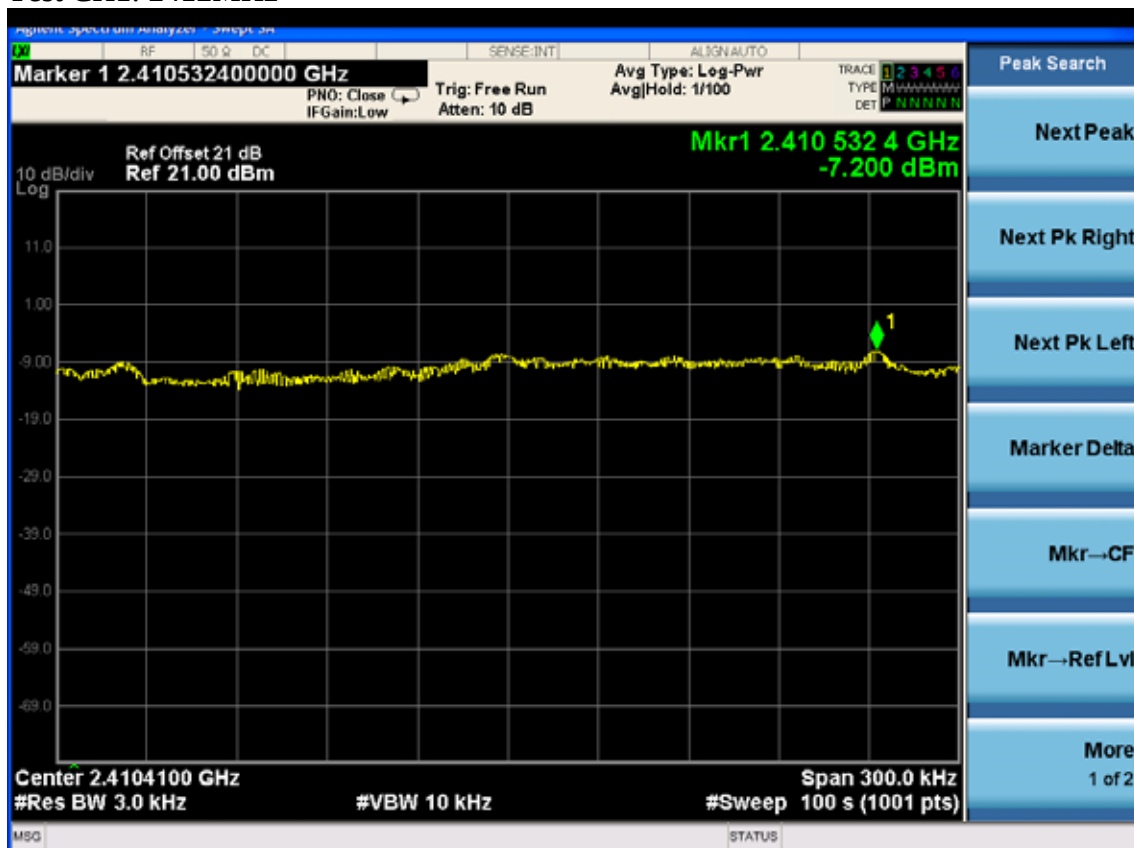


Test CH11: 2462MHz

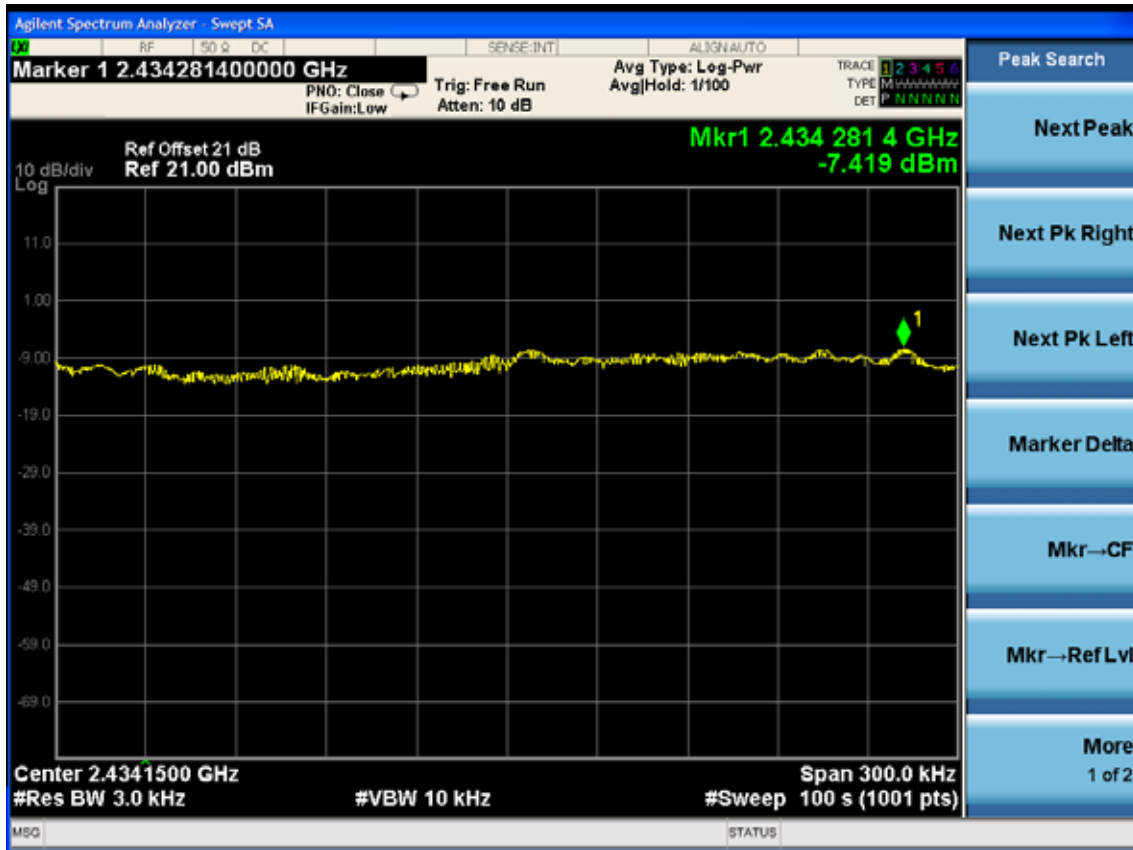


Test Mode: IEEE 802.11n HT20 TX

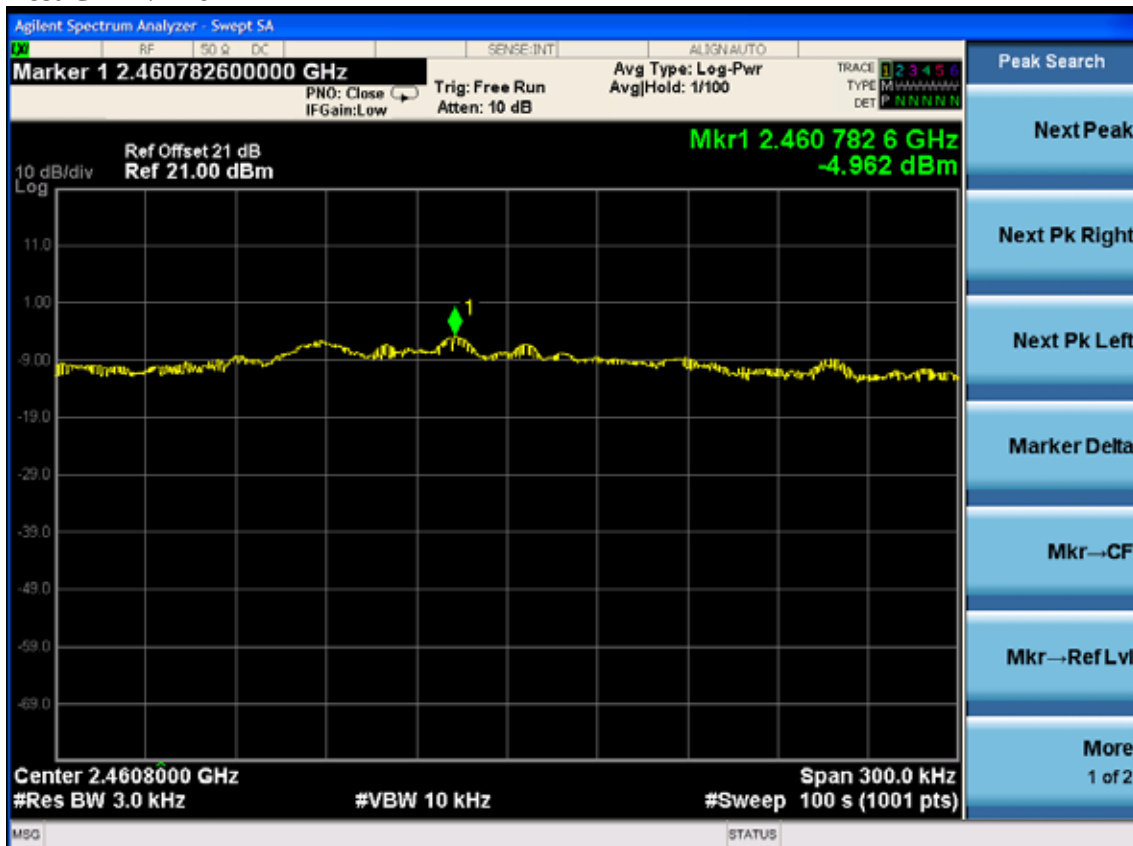
Test CH1: 2412MHz



Test CH6: 2437MHz

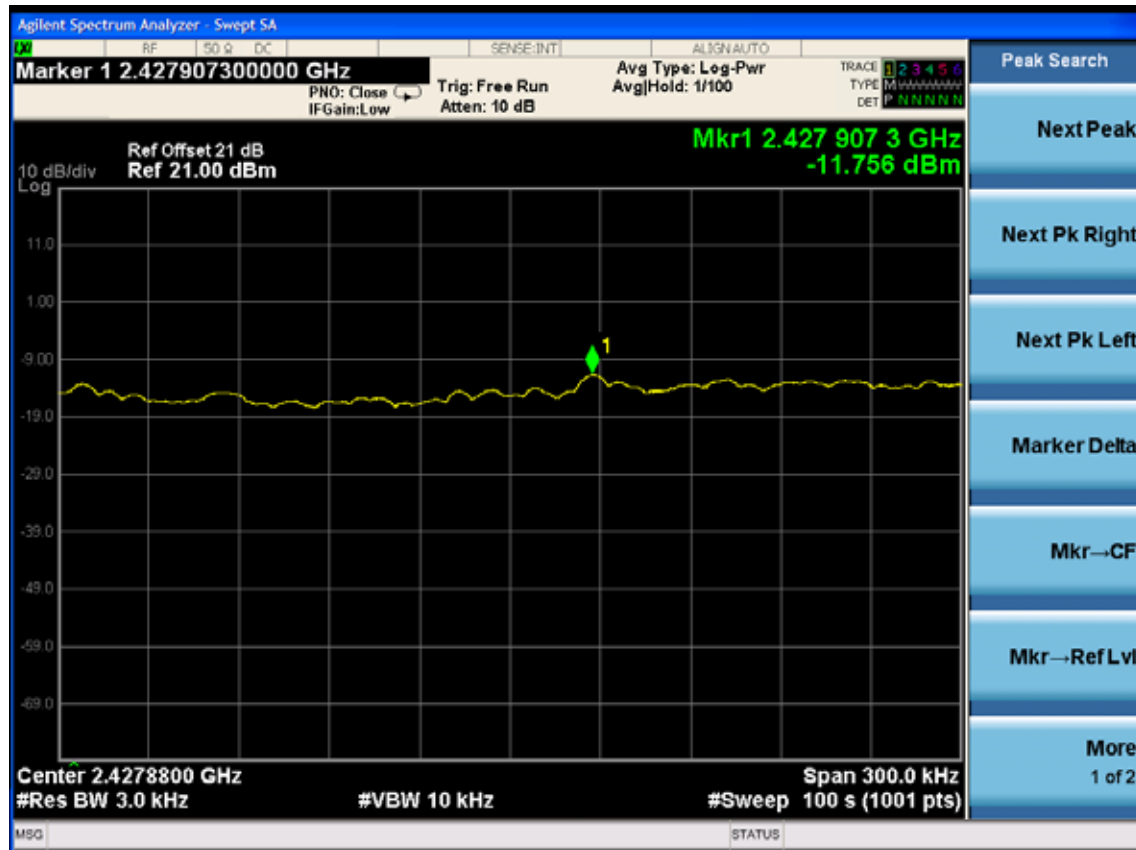


Test CH11: 2462MHz

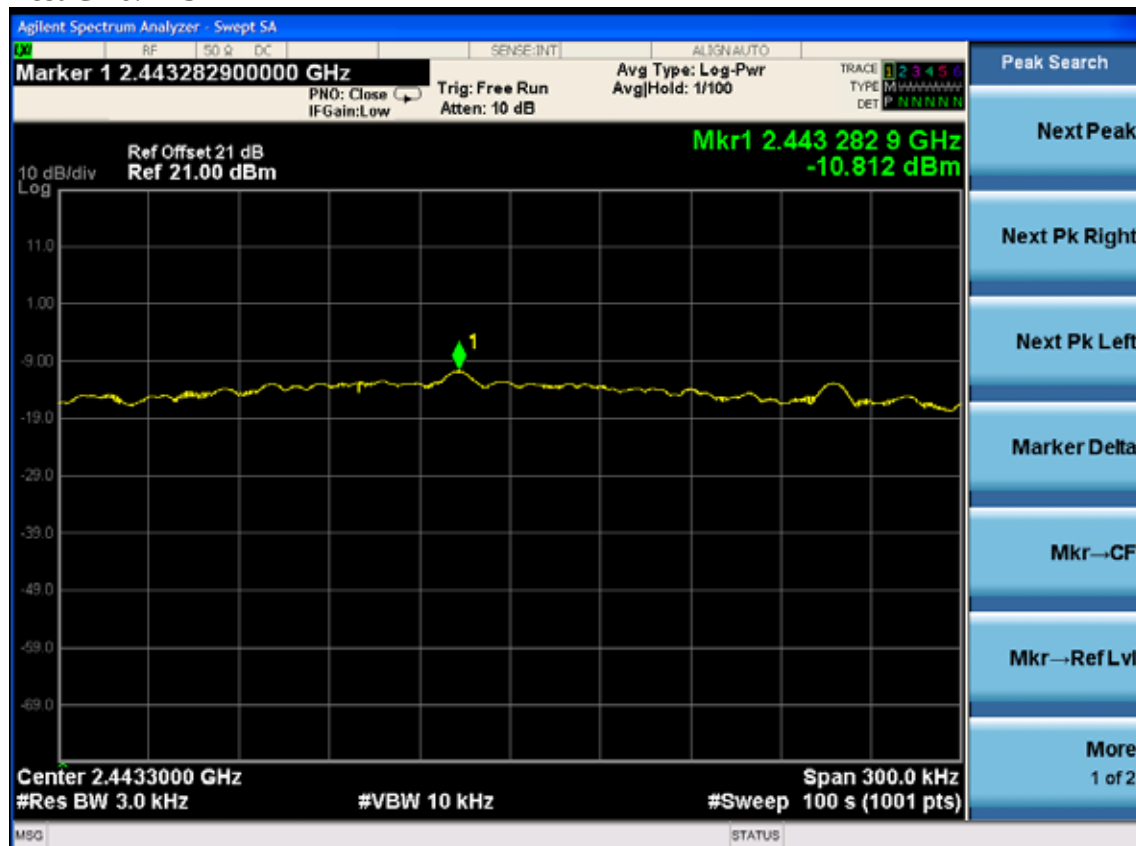


Test Mode: IEEE 802.11n HT40 TX

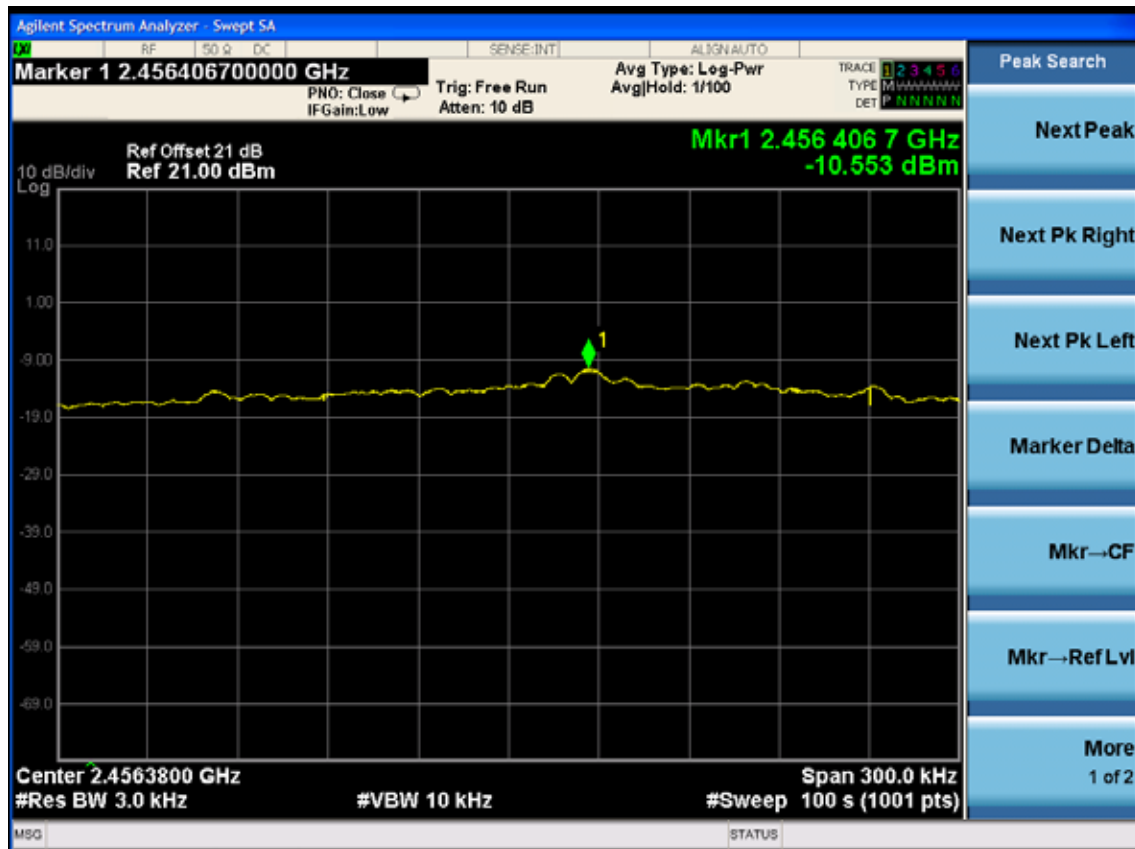
Test CH3: 2422MHz



Test CH6: 2437MHz



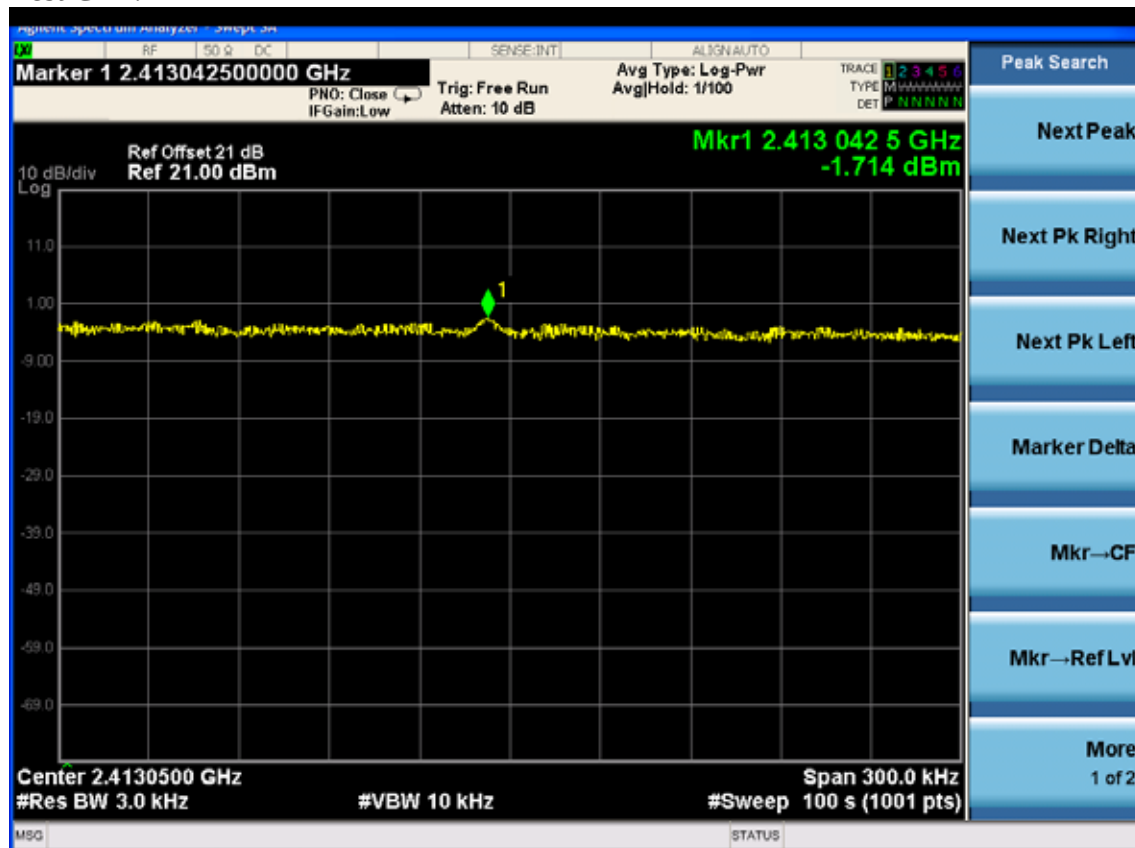
Test CH9: 2452MHz



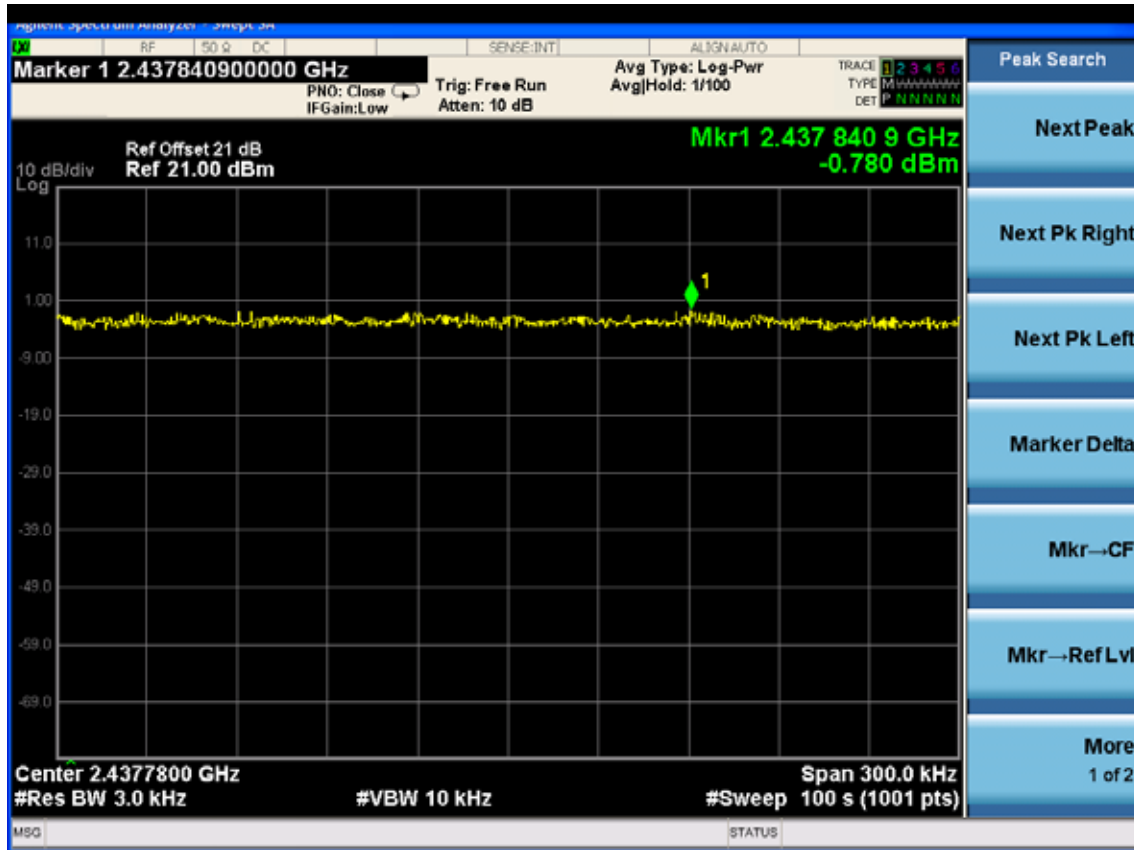
ANT 1

Test Mode: IEEE 802.11b TX

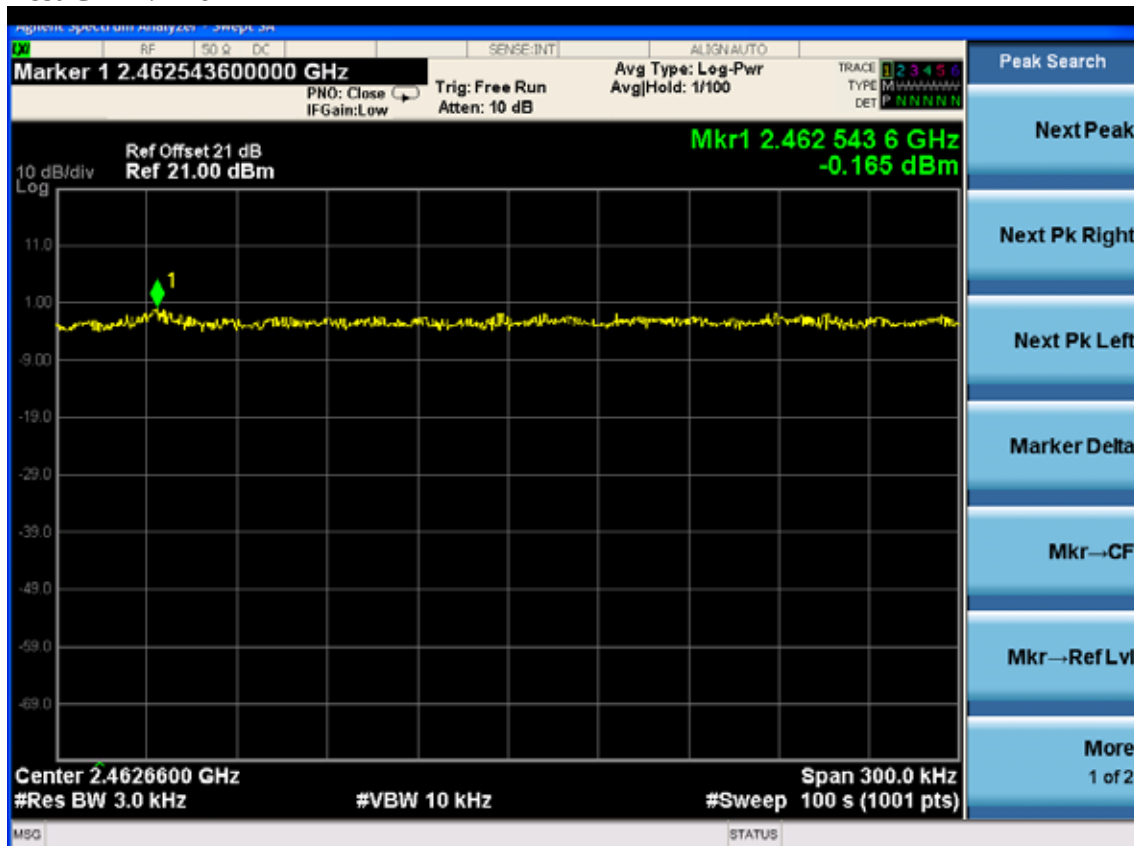
Test CH1: 2412MHz



Test CH6: 2437MHz

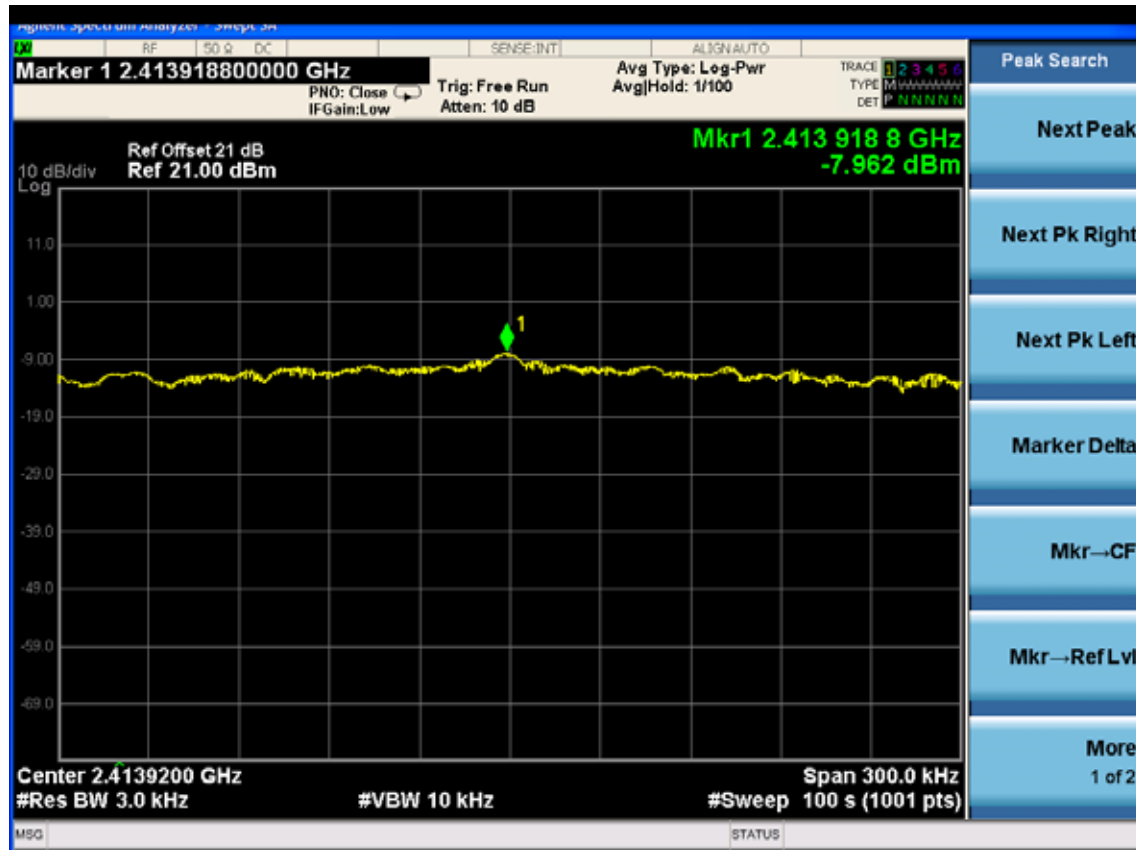


Test CH11: 2462MHz

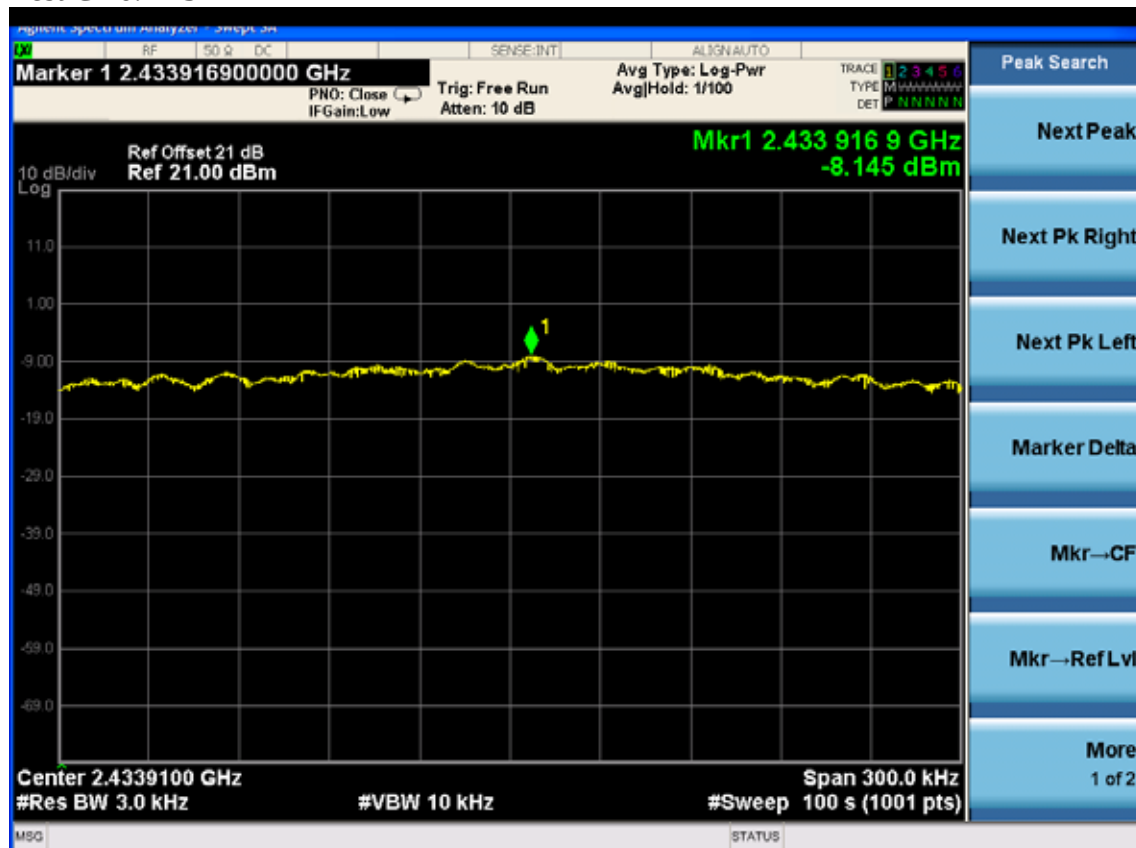


Test Mode: IEEE 802.11g TX

Test CH1: 2412MHz



Test CH6: 2437MHz

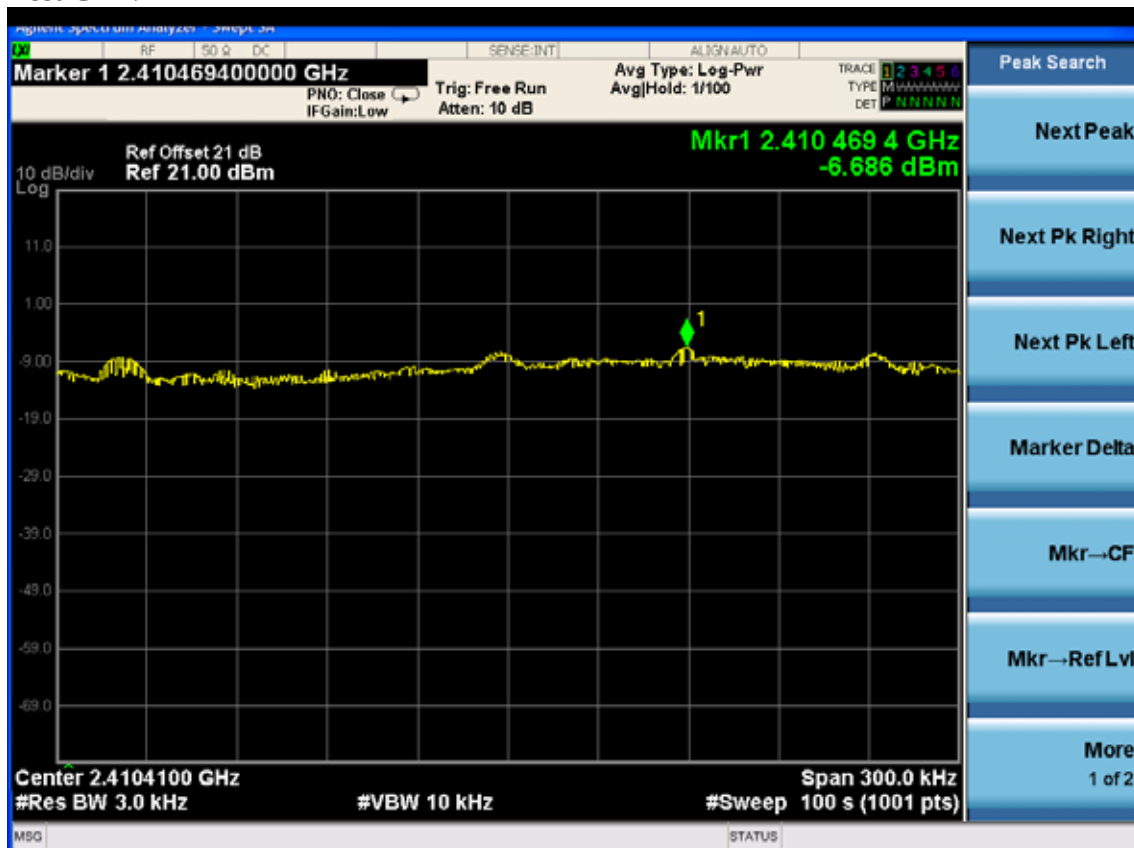


Test CH11: 2462MHz



Test Mode: IEEE 802.11n HT20 TX

Test CH1: 2412MHz



Test CH6: 2437MHz

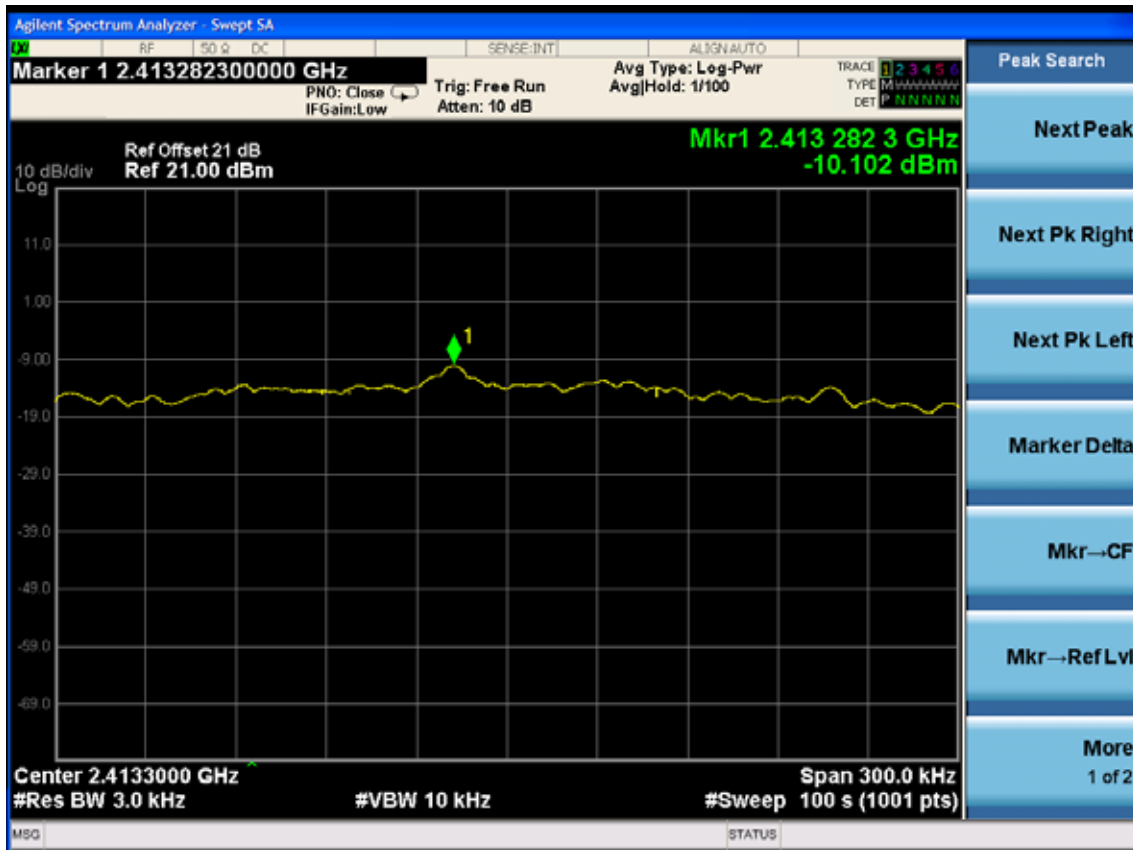


Test CH11: 2462MHz

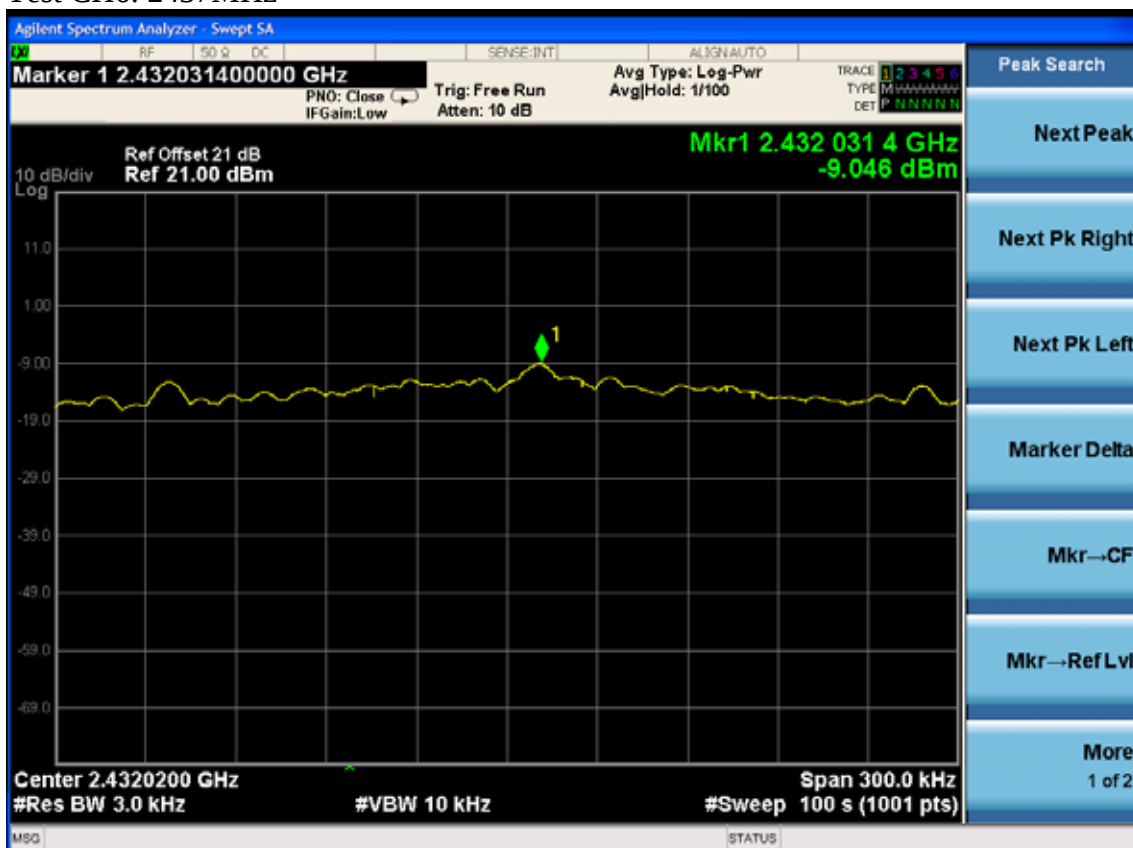


Test Mode: IEEE 802.11n HT40 TX

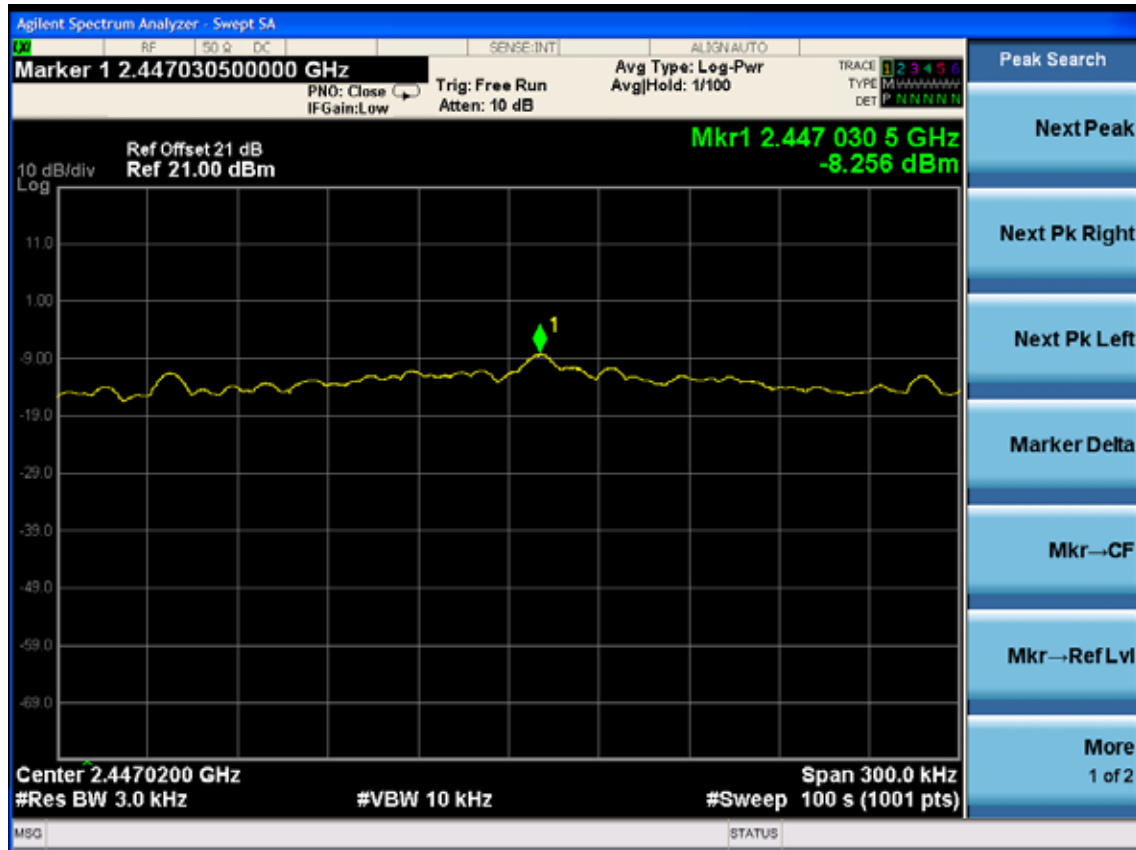
Test CH3: 2422MHz



Test CH6: 2437MHz



Test CH9: 2452MHz



10.MPE ESTIMATION

10.1.Limit for General Population/ Uncontrolled Exposures

Frequency	Power density (mW/ cm ²)	Averaging time(minutes)
300MHz----1.5GHz	F/1500	30
1.5GHz---100GHz	1.0	30

Frequency(MHz)	Power density (mW/ cm ²)	Averaging time(minutes)
2412	1	30
2437	1	30
2462	1	30

Note: F= Frequency in MHz

10.2. Estimation Result

EUT: 300Mbps Wireless N ADSL2+ Modem Router		
M/N: TD-W8960N		
Test date: 2013-11-05	Pressure: 101.3±1.0 kpa	Humidity: 49.4±3.0%
Tested by: Leo-Li	Test site: RF site	Temperature: 21.7±0.6 °C

Cable loss: 1 dB		Attenuator loss: 20 dB				Antenna Gain: 5dBi	
Test Mode	CH	Frequency (MHz)	Peak Output Power (dBm)	Output Power (mW)	Antenna Gain (dBi)	Antenna Gain (Linear)	MPE
11b	CH1	2412	21.72	148.59	5	3.16	0.0935
	CH6	2437	22.94	196.79	5	3.16	0.1239
	CH11	2462	21.50	141.25	5	3.16	0.0889
11g	CH1	2412	20.36	108.64	5	3.16	0.0684
	CH6	2437	28.21	662.22	5	3.16	0.4168
	CH11	2462	21.71	148.25	5	3.16	0.0933
11n HT20	CH1	2412	22.10	162.18	5	3.16	0.1021
	CH6	2437	28.12	648.63	5	3.16	0.4083
	CH11	2462	23.13	205.59	5	3.16	0.1294
11n HT40	CH3	2422	23.33	215.28	5	3.16	0.1355
	CH6	2437	28.95	785.24	5	3.16	0.4943
	CH9	2452	22.62	182.81	5	3.16	0.1151

11. ANTENNA REQUIREMENT

11.1. STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2. ANTENNA CONNECTED CONSTRUCTION

The antennas used for this product are Dipole antenna that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 5dBi.

12.DEVIATION TO TEST SPECIFICATIONS

[NONE]