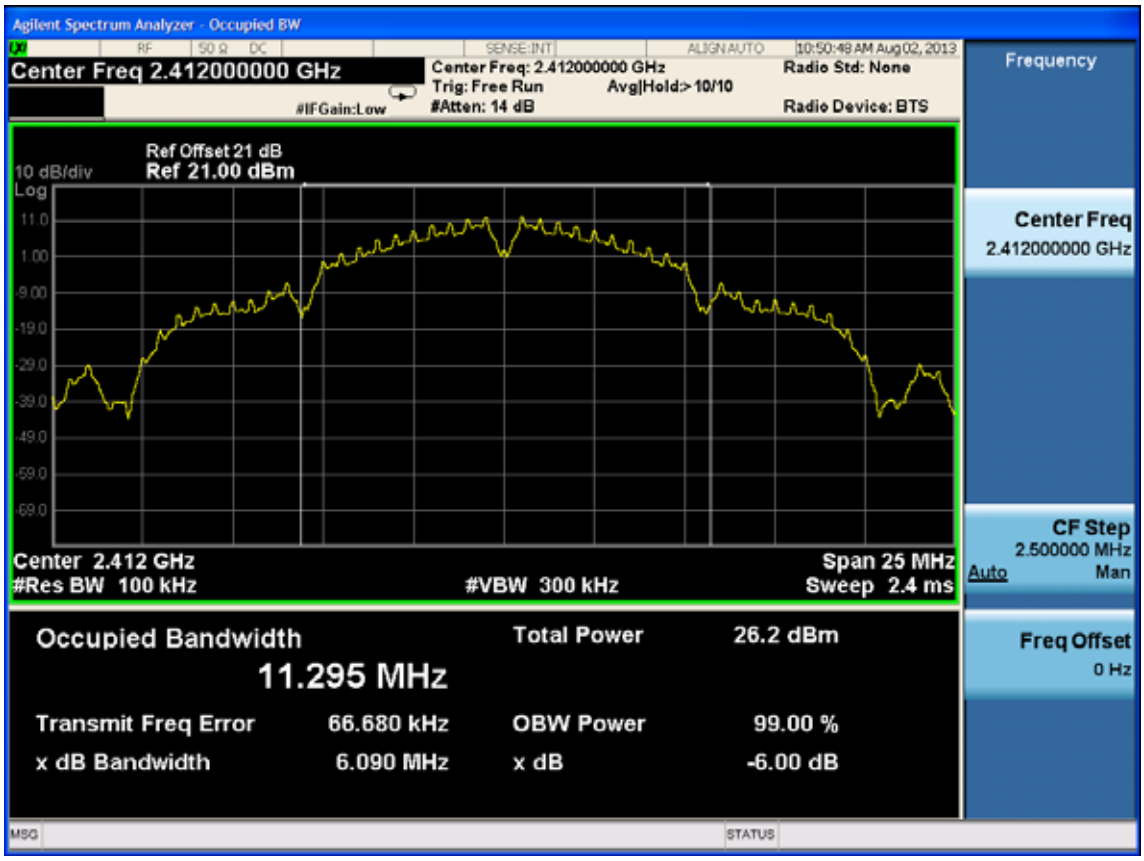
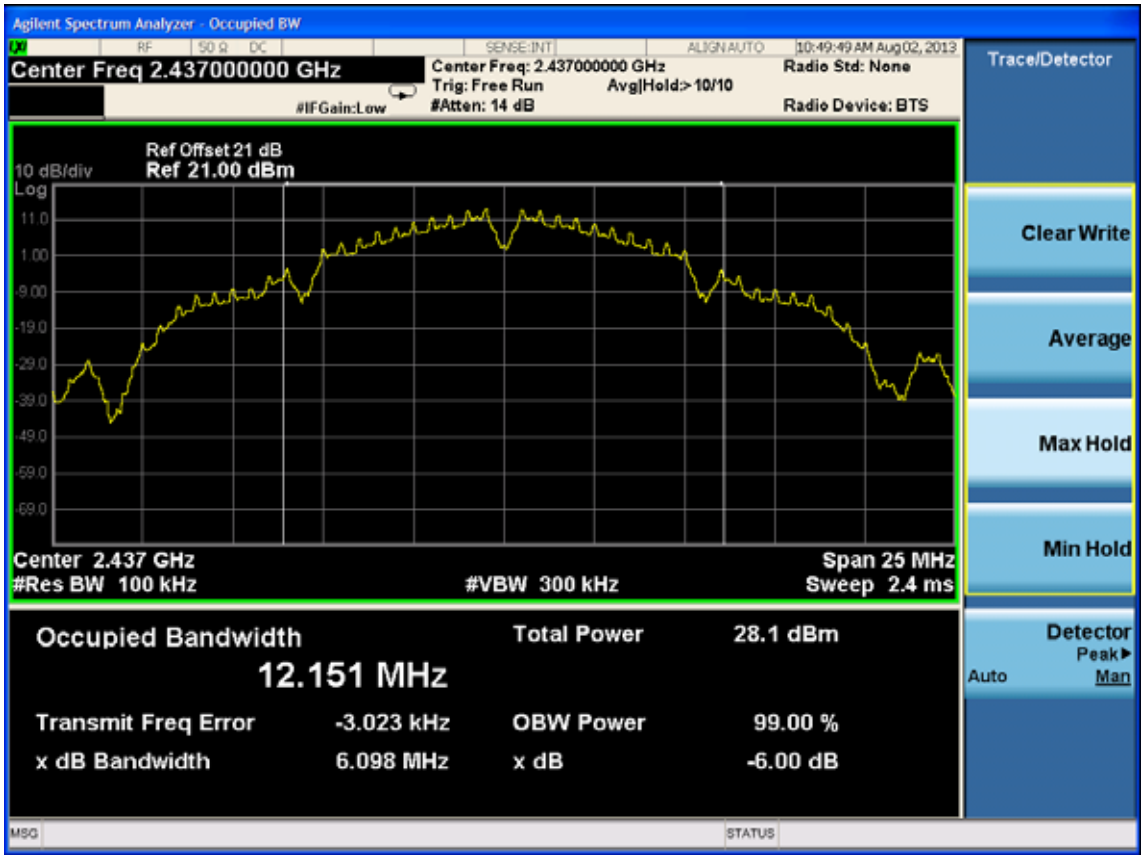
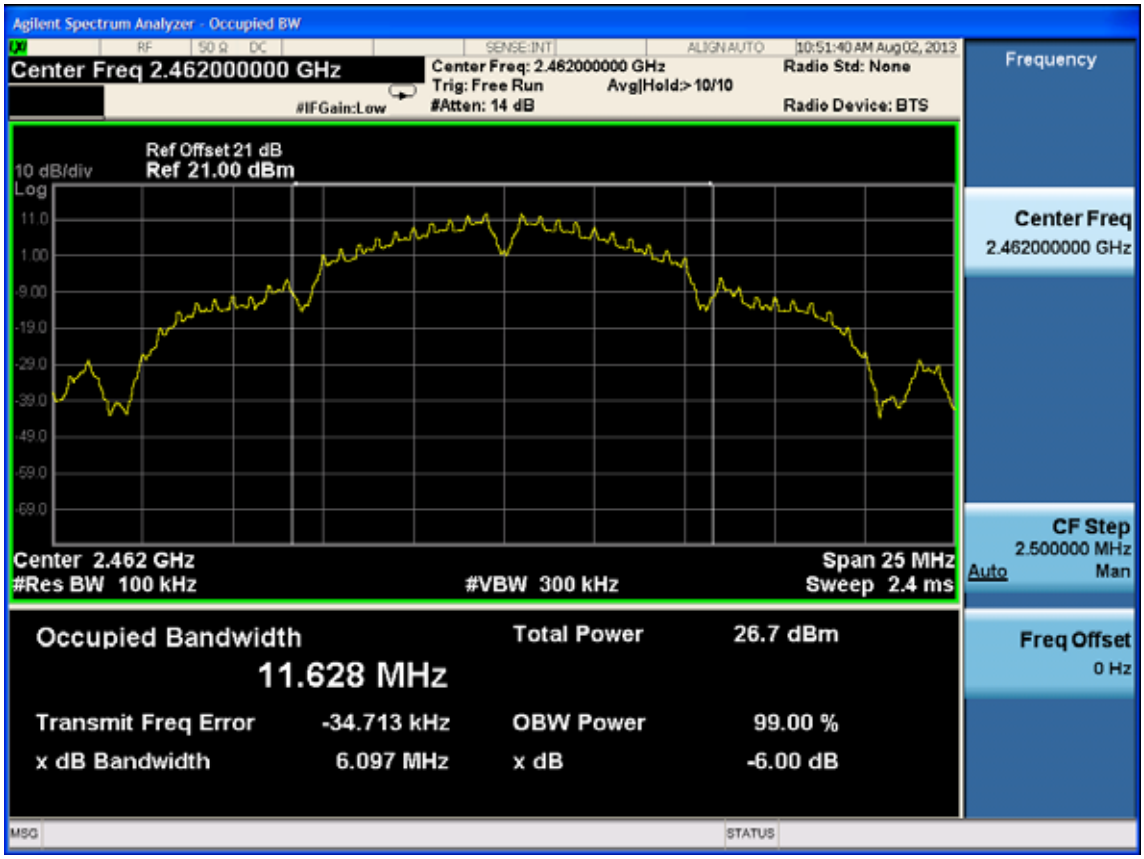
ANT 2
Test Mode: IEEE 802.11b TX
Test CH1: 2412MHz



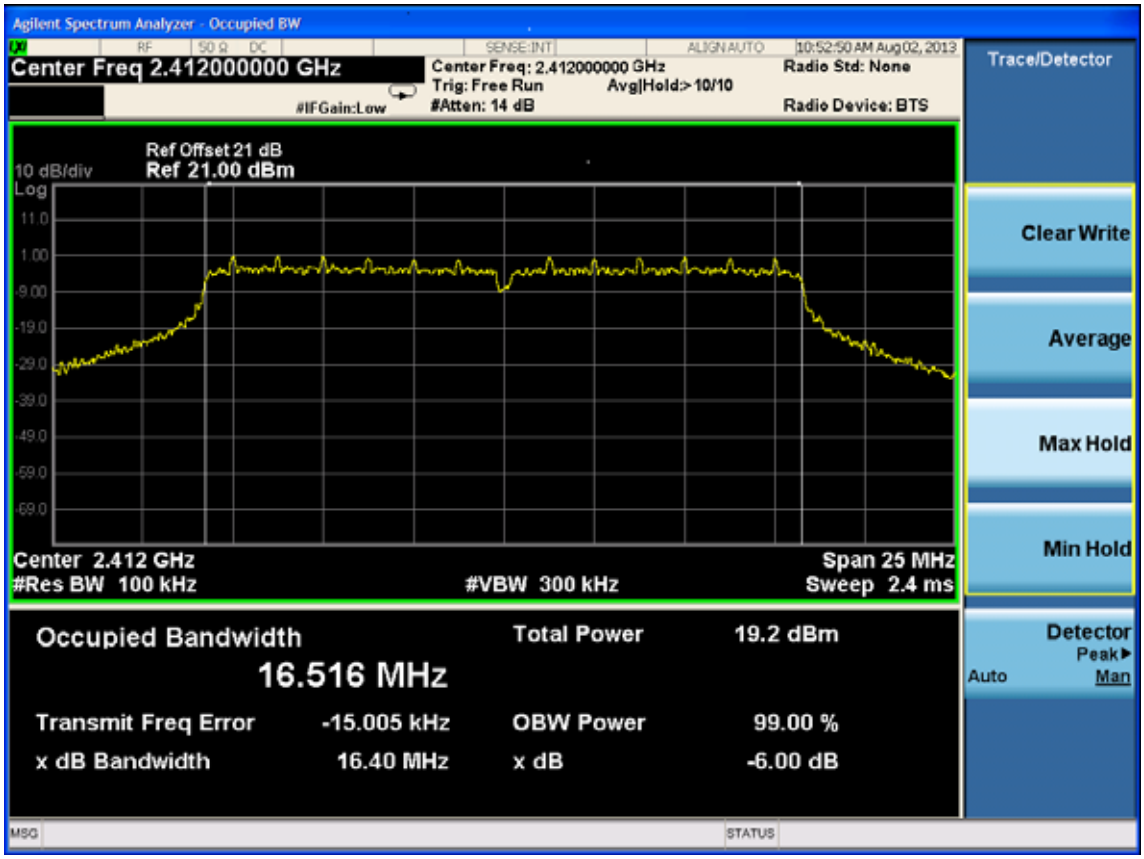
Test CH6: 2437MHz



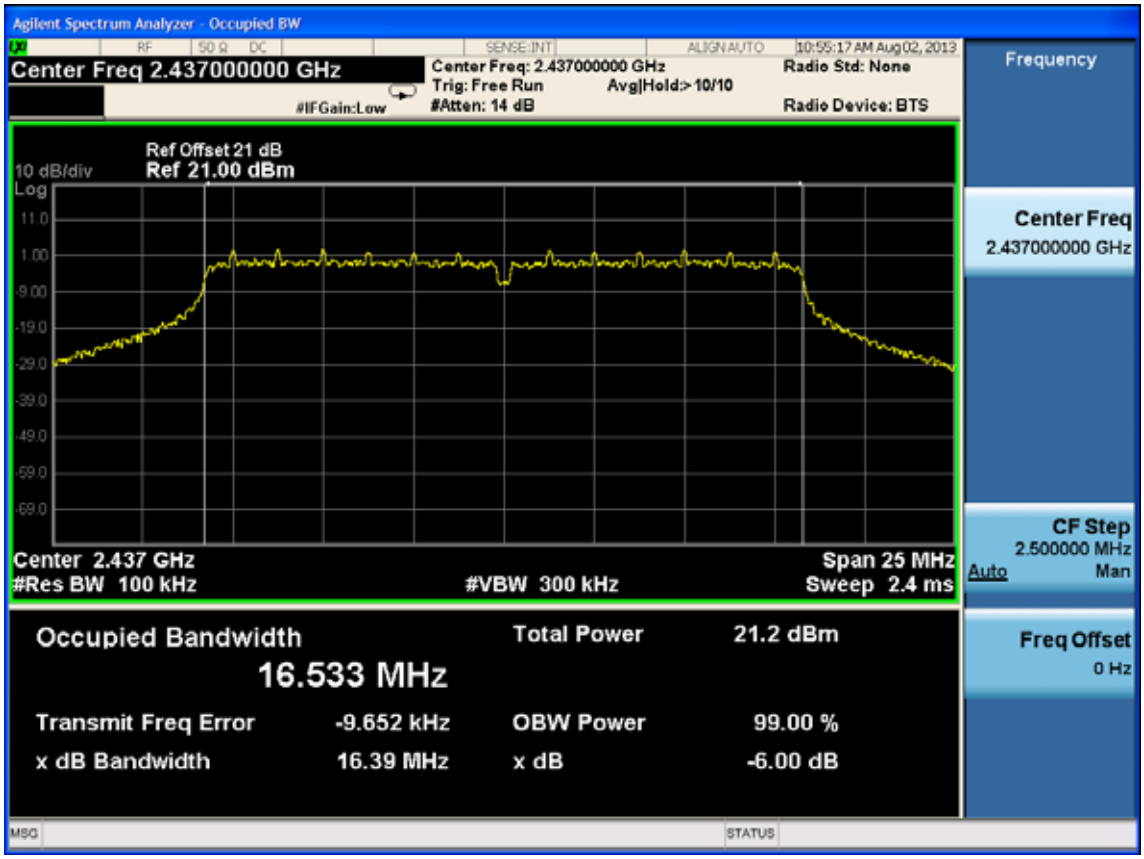
Test CH11: 2462MHz



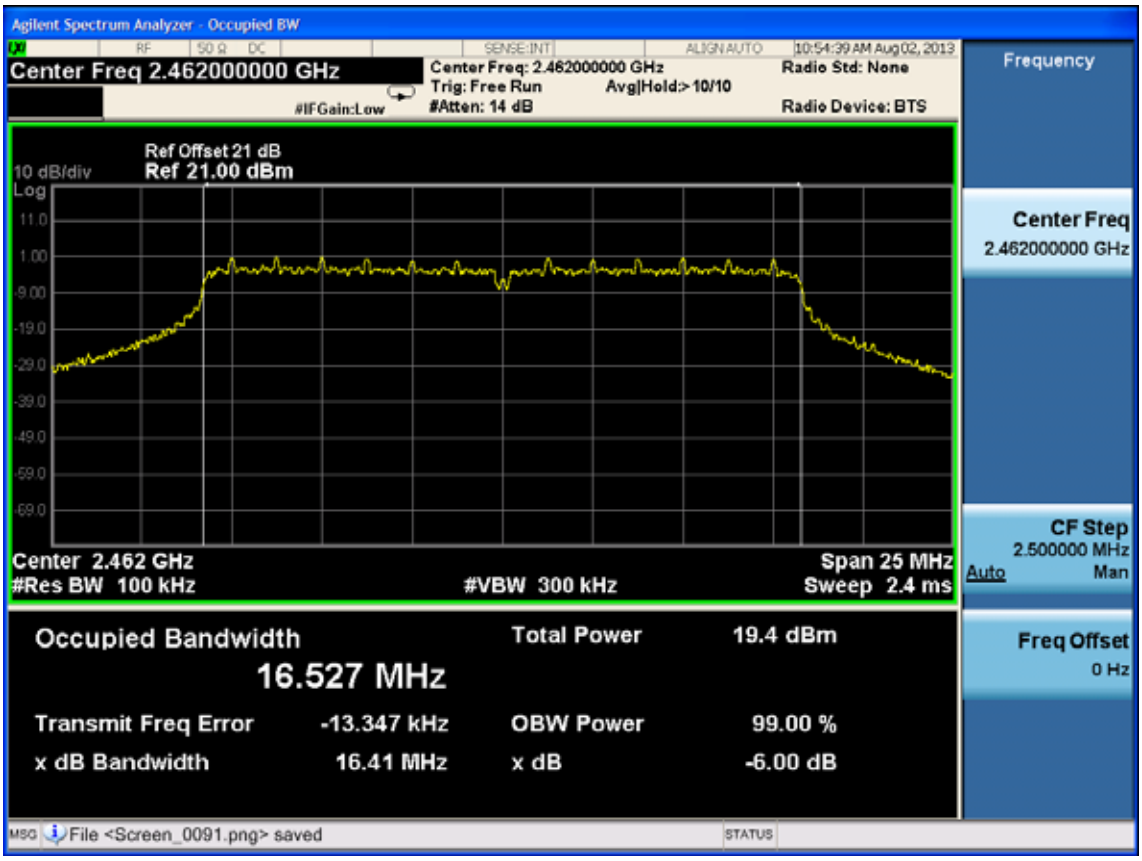
Test Mode: IEEE 802.11g TX
Test CH1: 2412MHz



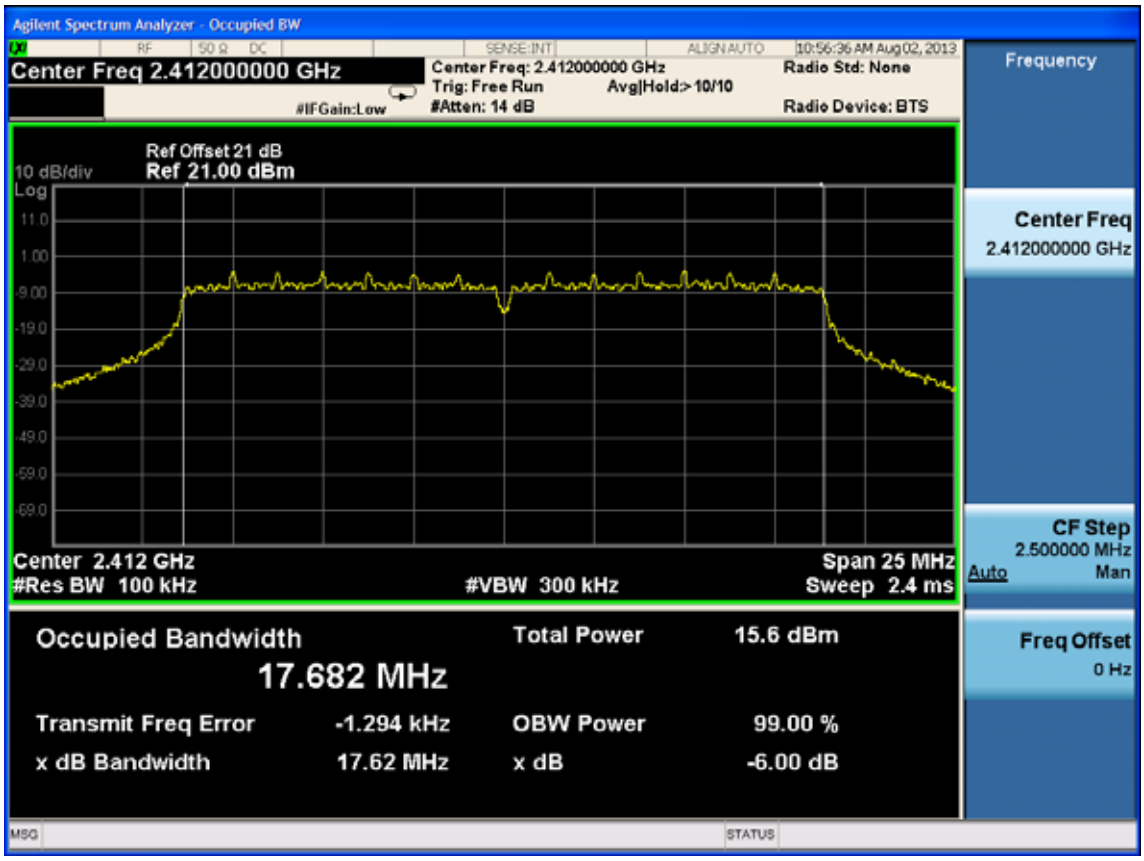
Test CH6: 2437MHz



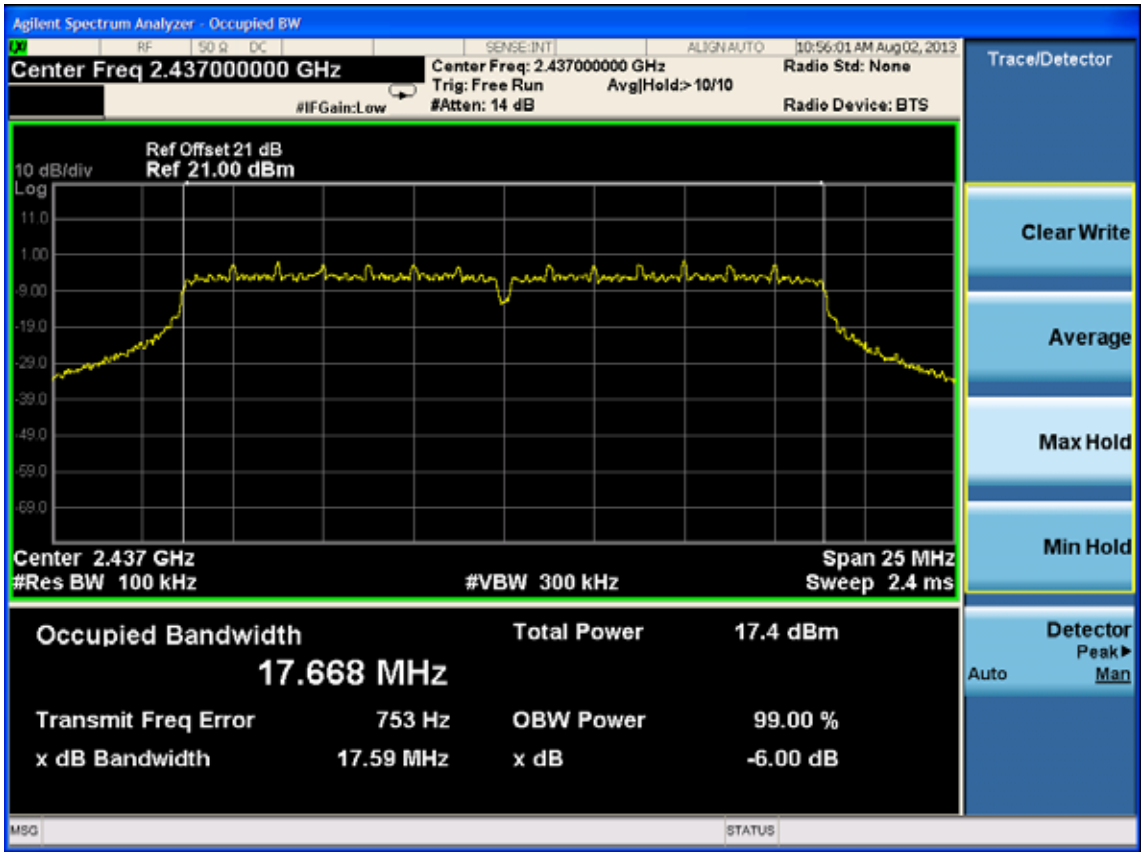
Test CH11: 2462MHz



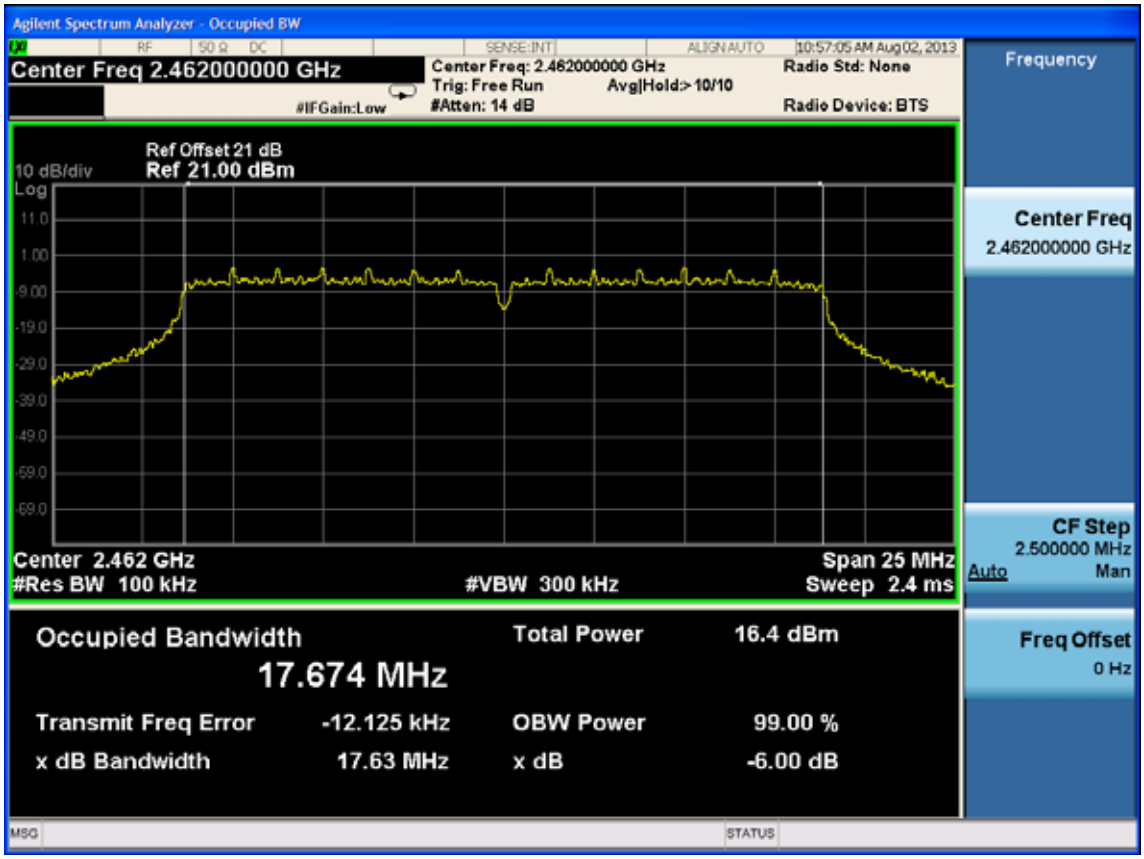
Test Mode: IEEE 802.11n HT20 TX
Test CH1: 2412MHz



Test CH6: 2437MHz

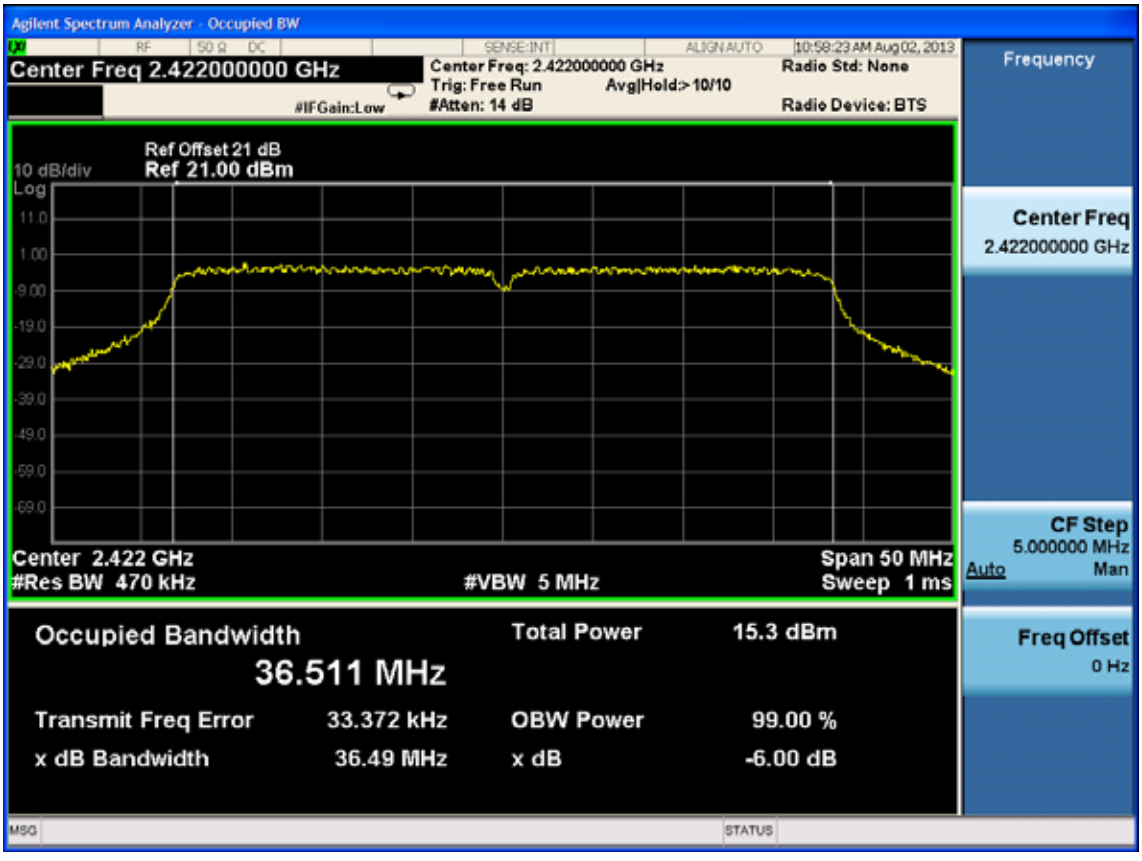


Test CH11: 2462MHz

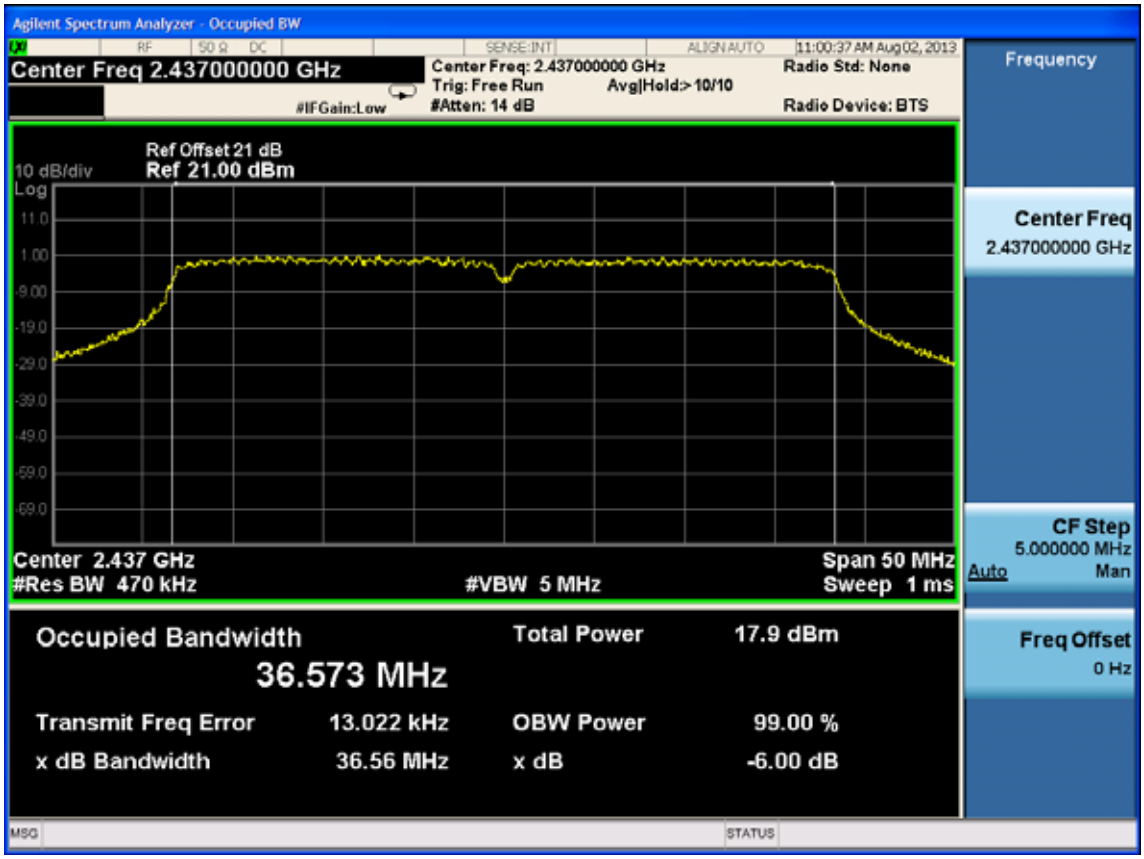


Test Mode: IEEE 802.11n HT40 TX

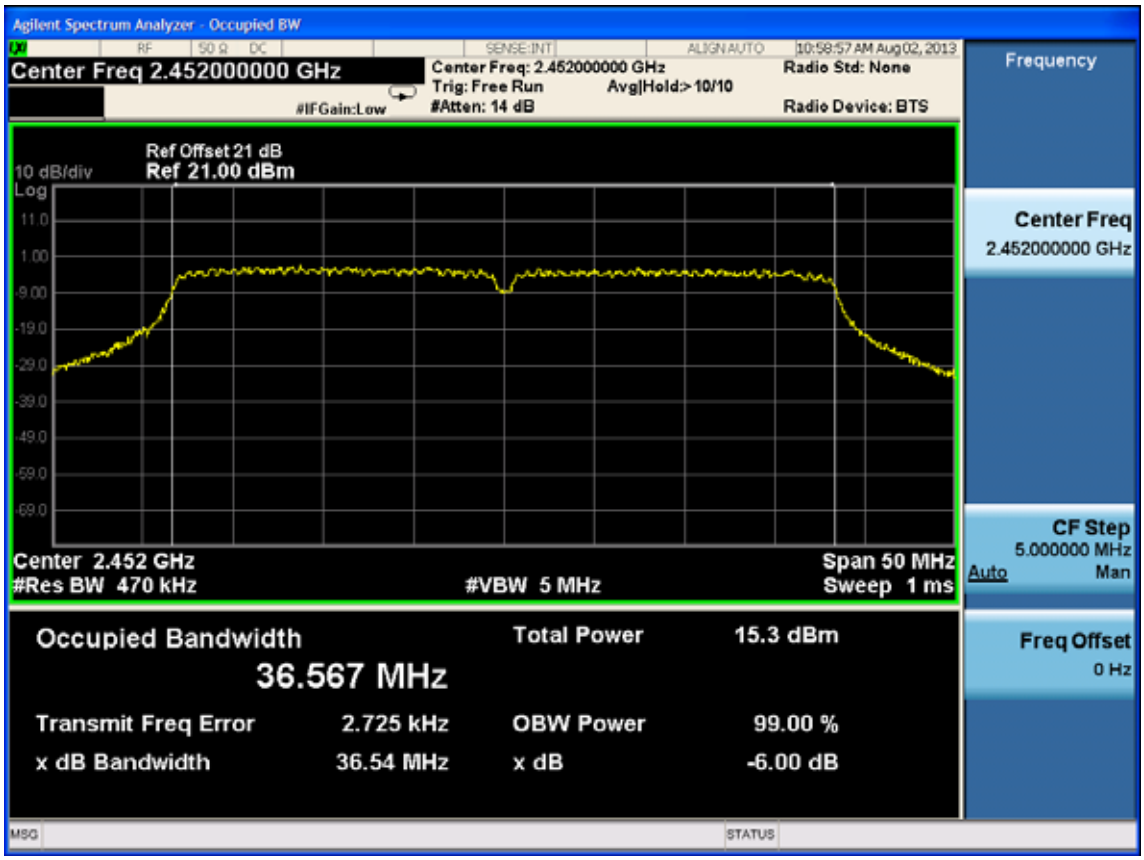
Test CH1: 2422MHz



Test CH4: 2437MHz



Test CH7: 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. So Bandwidth correction method according to ANSI C63.10 clause 6.10.2.1 part (c) was used:

1) Set the RBW=3MHz and VBW =8MHz
2) Turn averaging off
3) Set sweep to automatic
4) Set the span just large enough to capture the emission
5) Use a peak detector on max hold
6) Record the measured power
7) Calculate Output power of EUT use the formula:

Peak output power =measured power+ 10log[(26dB bandwidth of emission)/(analyzer RBW)]

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.
11b/g working at CDD mode which described in KDB662911.

8.4.Test Results

EUT: 300Mbps Wireless N Gigabit Router		
M/N: TL-WR1043ND		
Test date: 2013-08-06	Pressure: 101.2±1.0 kpa	Humidity: 49.4±3.0%
Tested by: Leo-Li	Test site: RF Site	Temperature: 21.7±0.6℃

Cable loss: 1 dB		Attenuator loss: 20 dB				
Test Mode	CH (MHz)	Peak output Power（dBm）				Limit (dBm)
		ANT0	ANT1	ANT2	Total	
11b	CH1	22.58	22.72	21.44	27.05	30
	CH6	24.43	24.26	23.86	28.96	30
	CH11	23.37	22.96	21.99	27.58	30
11g	CH1	20.75	20.52	19.55	25.07	30
	CH6	22.87	22.79	22.11	27.37	30
	CH11	21.33	20.93	19.89	25.53	30
11n HT20	CH1	18.21	16.33	17.41	22.16	30
	CH6	21.11	19.76	19.75	25.03	30
	CH11	18.46	16.8	17.3	22.35	30

Test Mode	CH	Result							Limit
		Measured power(dBm)/3MHz			PK Output power (dBm)				(dBm)
		ANT0	ANT1	ANT2	ANT0	ANT1	ANT2	Total	
11n HT40	CH3	5.29	3.84	4.83	17.37	15.97	16.76	21.51	30
	CH6	8.92	7.51	7.66	21	19.64	19.59	24.9	30
	CH9	5.33	3.91	4.23	17.41	16.04	16.16	21.35	30

Chain 0 26dB Bandwidth for 11n HT40:48.38MHz
Chain 1 26dB Bandwidth for 11n HT40:49.03MHz
Chain 2 26dB Bandwidth for 11n HT40:46.83MHz

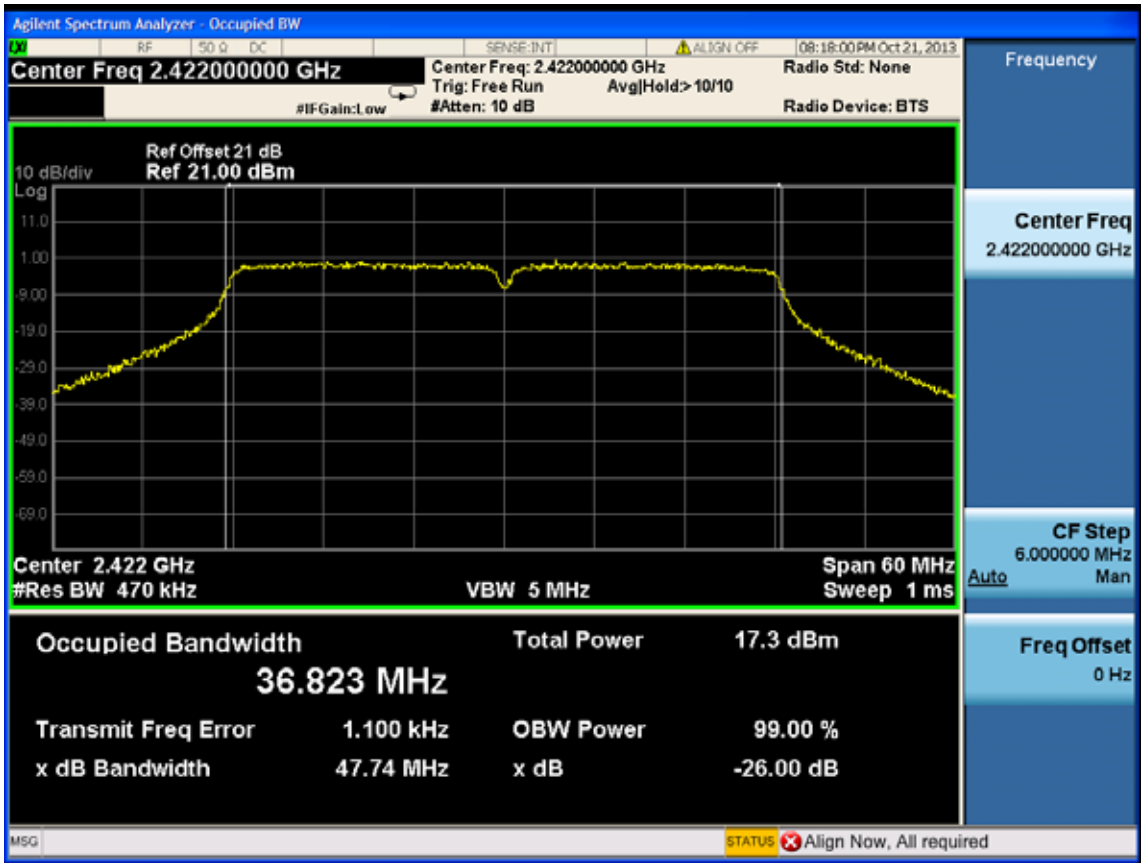
Chain 0 BW correction factor = 10log[(50.00MHz)/(3MHz)] = 12.08dB
Chain 1 BW correction factor = 10log[(49.159MHz)/(3MHz)] = 12.13dB
Chain 2 BW correction factor = 10log[(48.963MHz)/(3MHz)] = 11.93dB

Conclusion: PASS

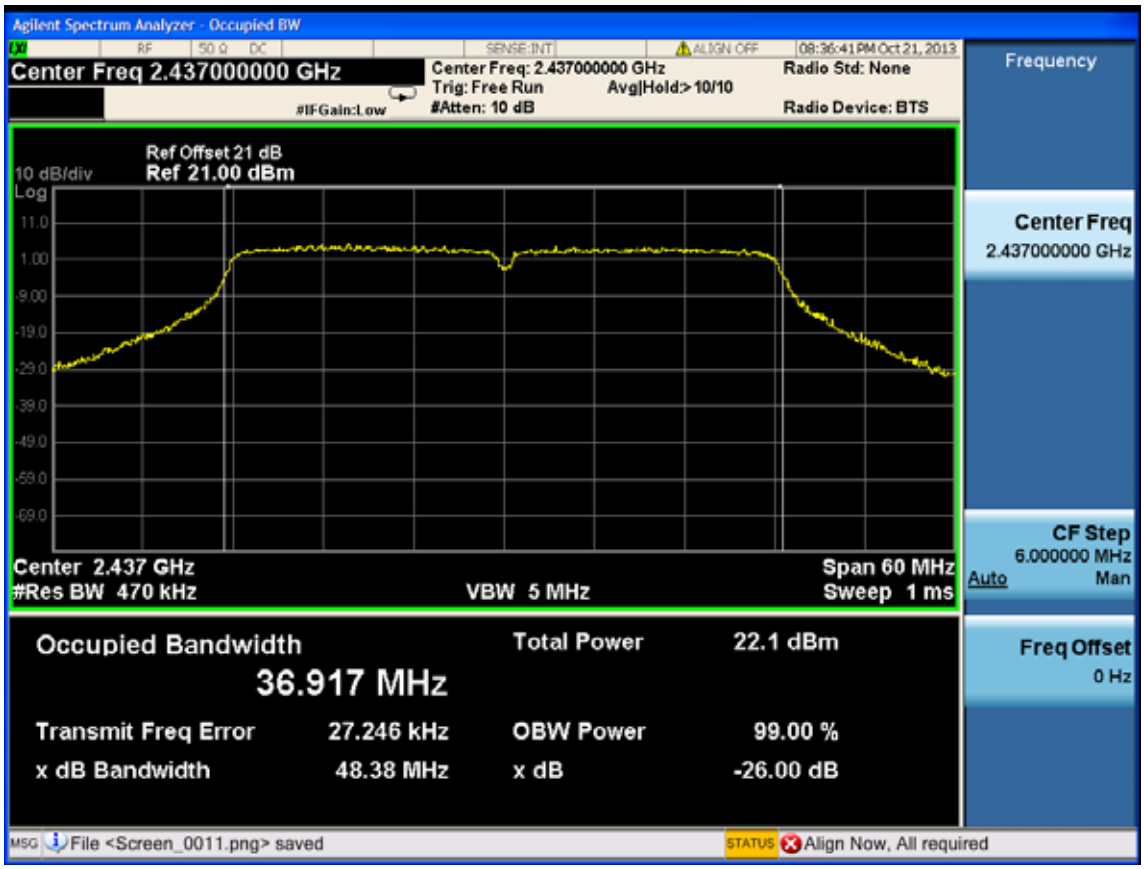
26dB Bandwidth

ANT 0

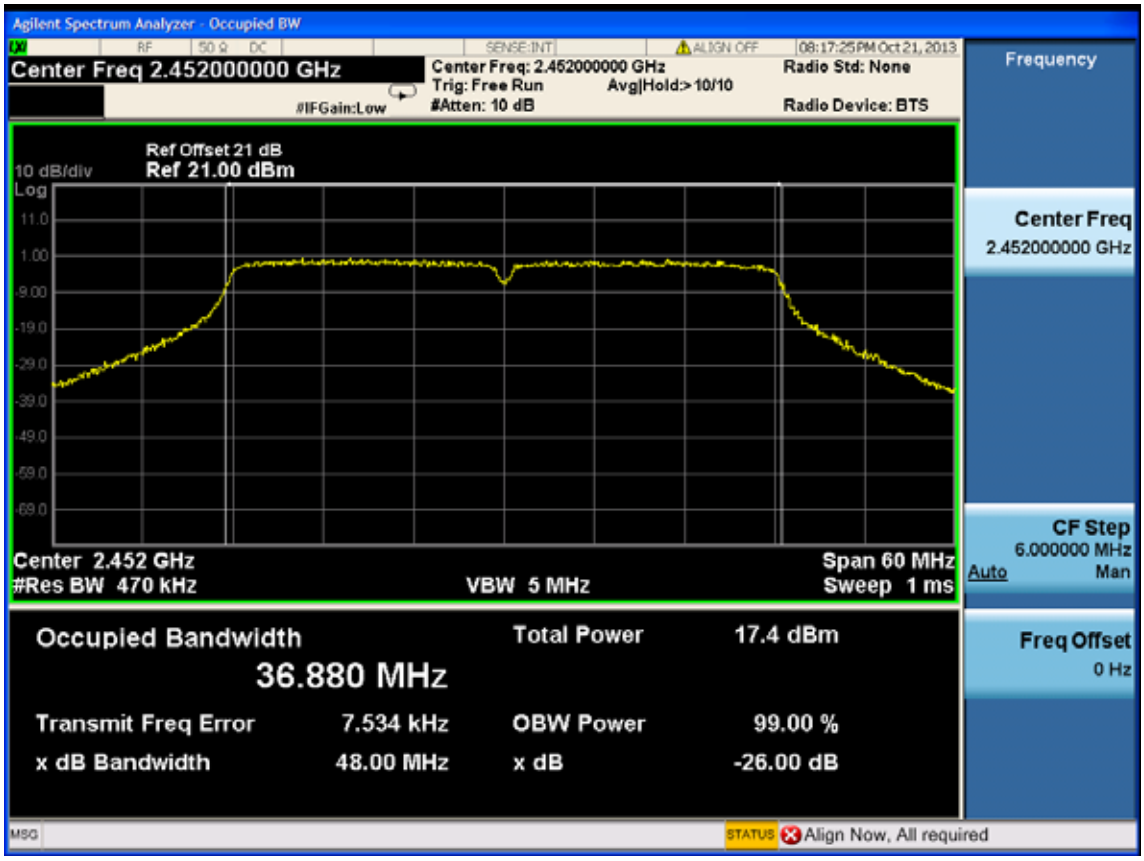
Test CH1: 2422MHz



Test CH6: 2437MHz

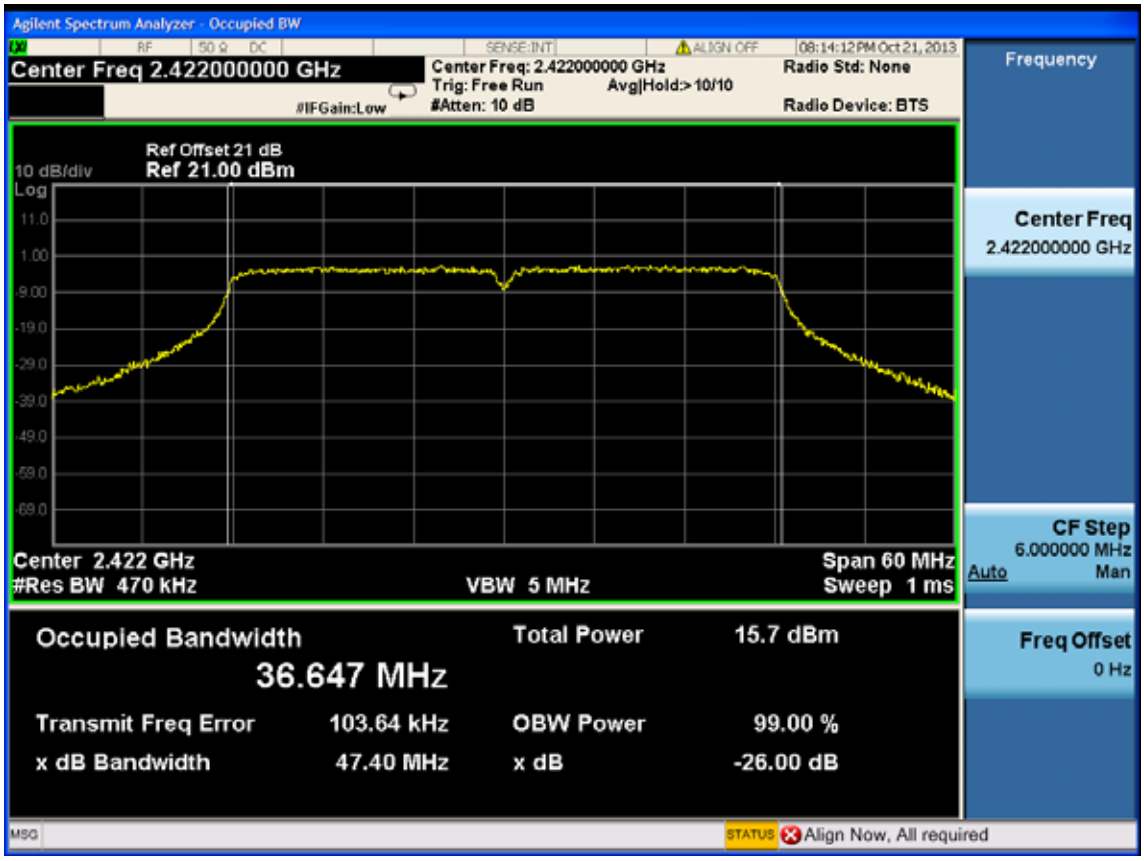


Test CH11: 2462MHz

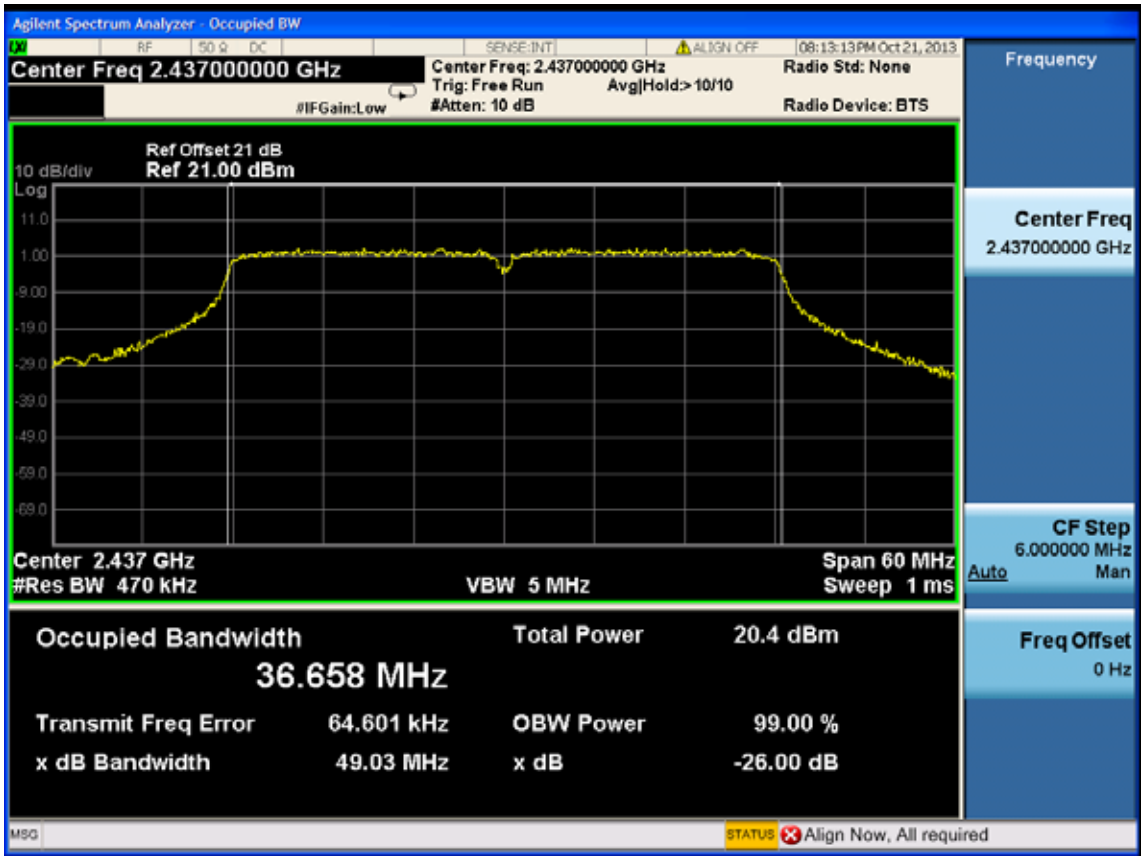


ANT 1

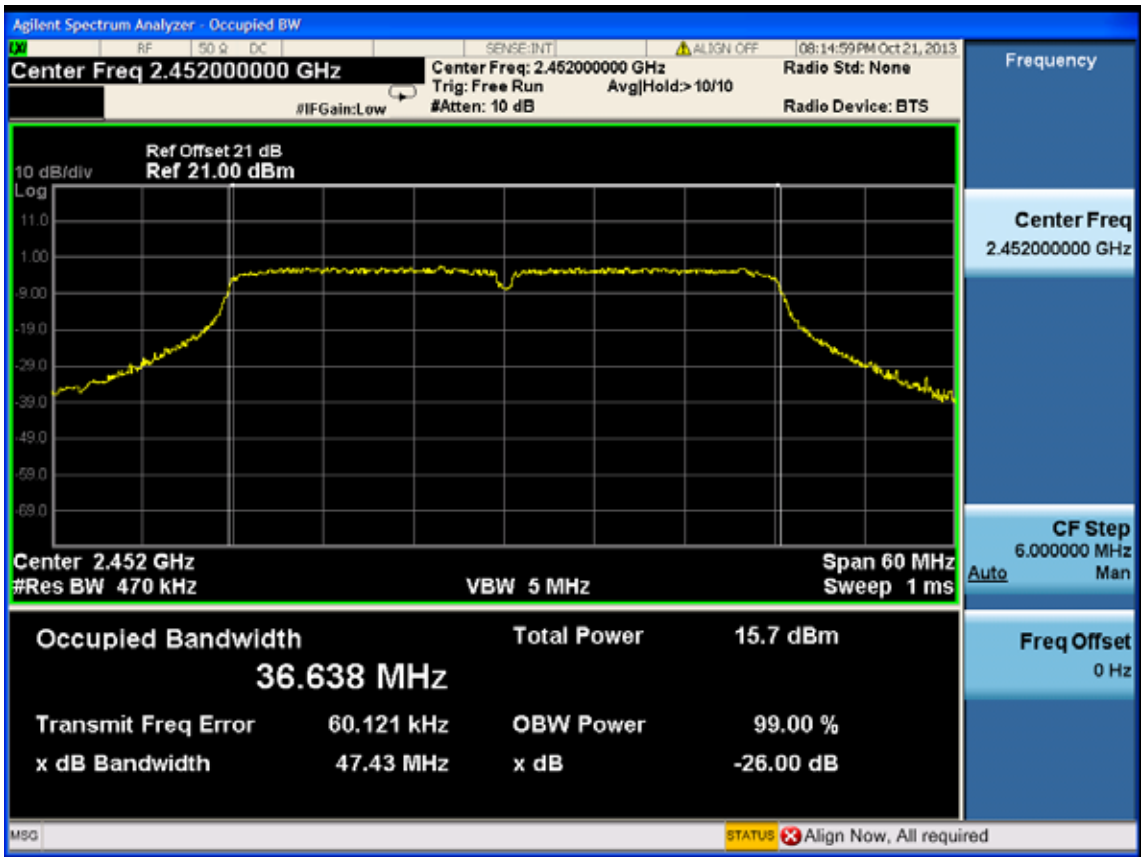
Test CH1: 2422MHz



Test CH6: 2437MHz

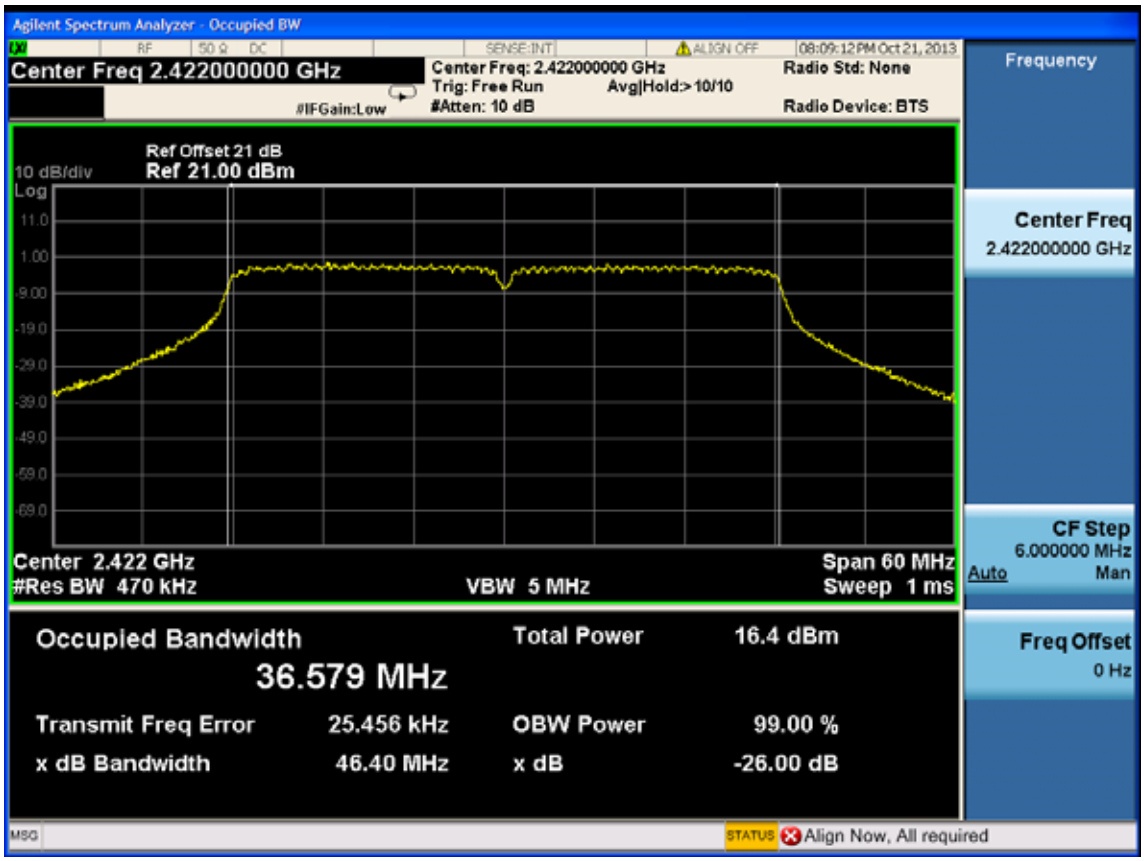


Test CH11: 2452MHz

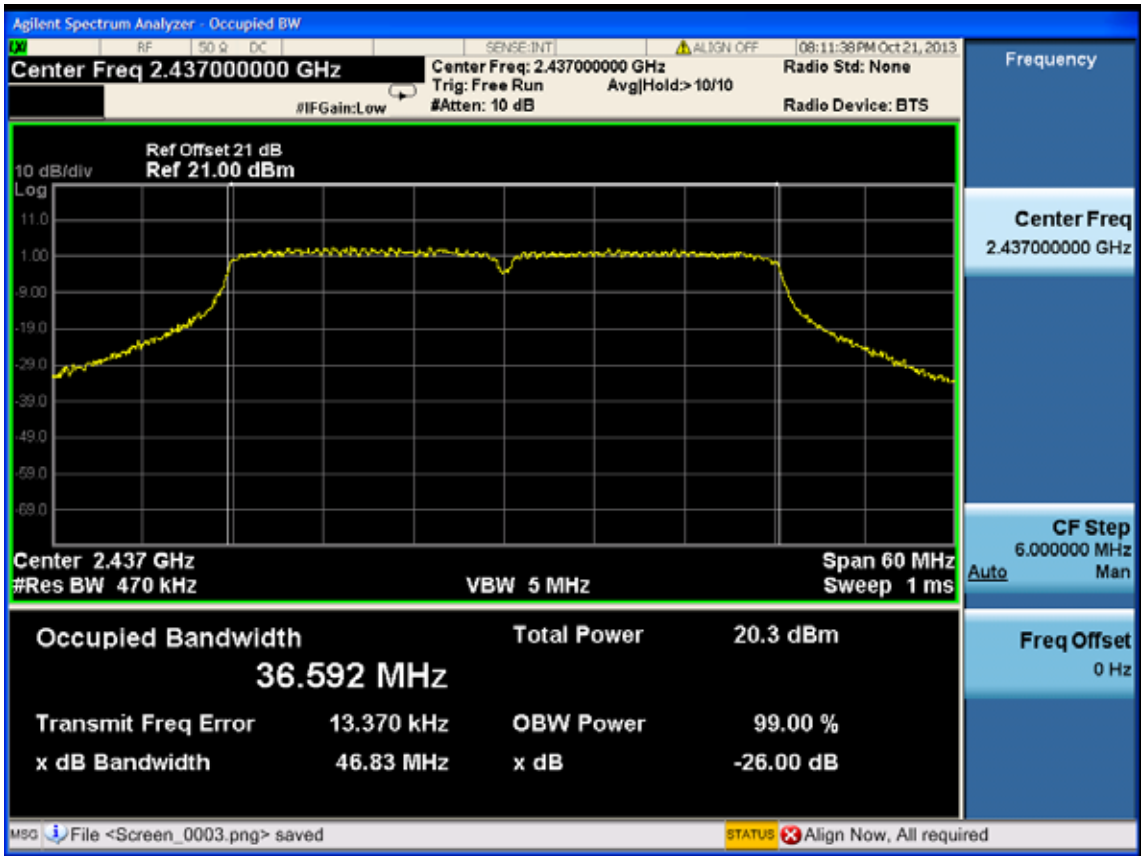


ANT 2

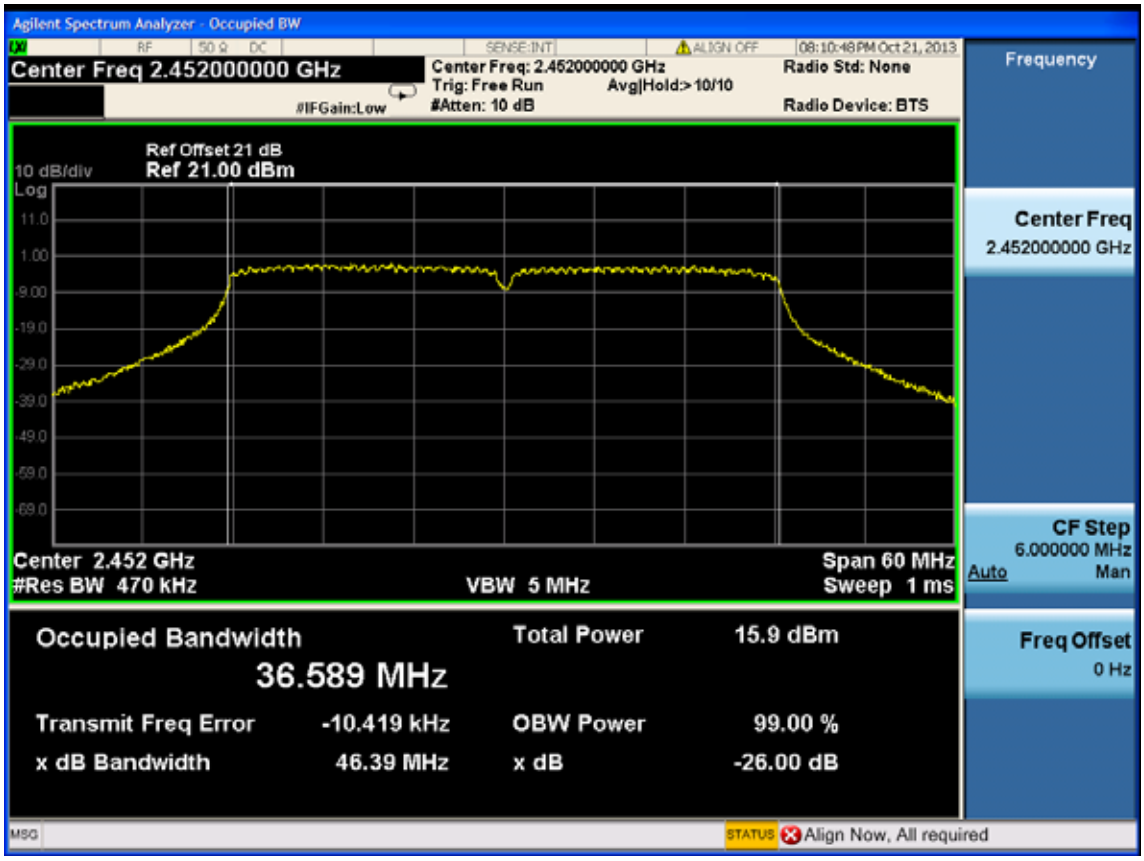
Test CH1: 2422MHz



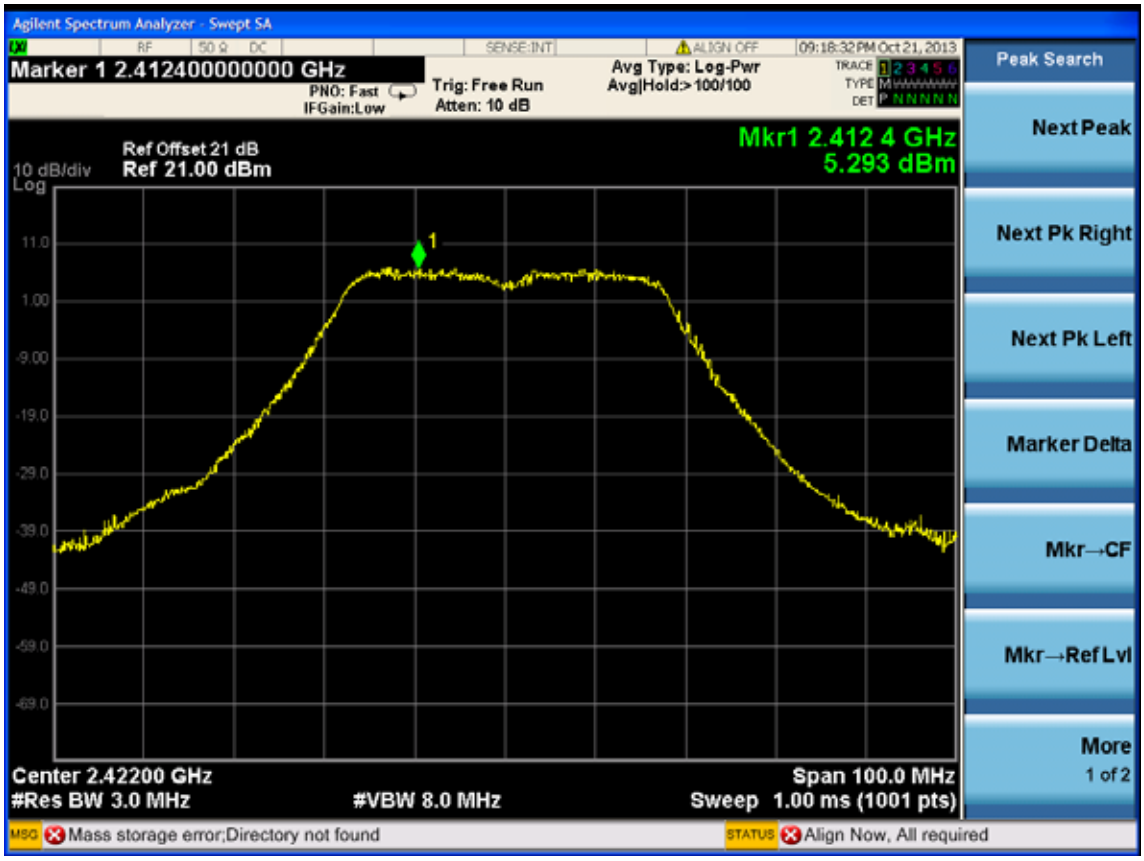
Test CH6: 2437MHz



Test CH11: 2452MHz

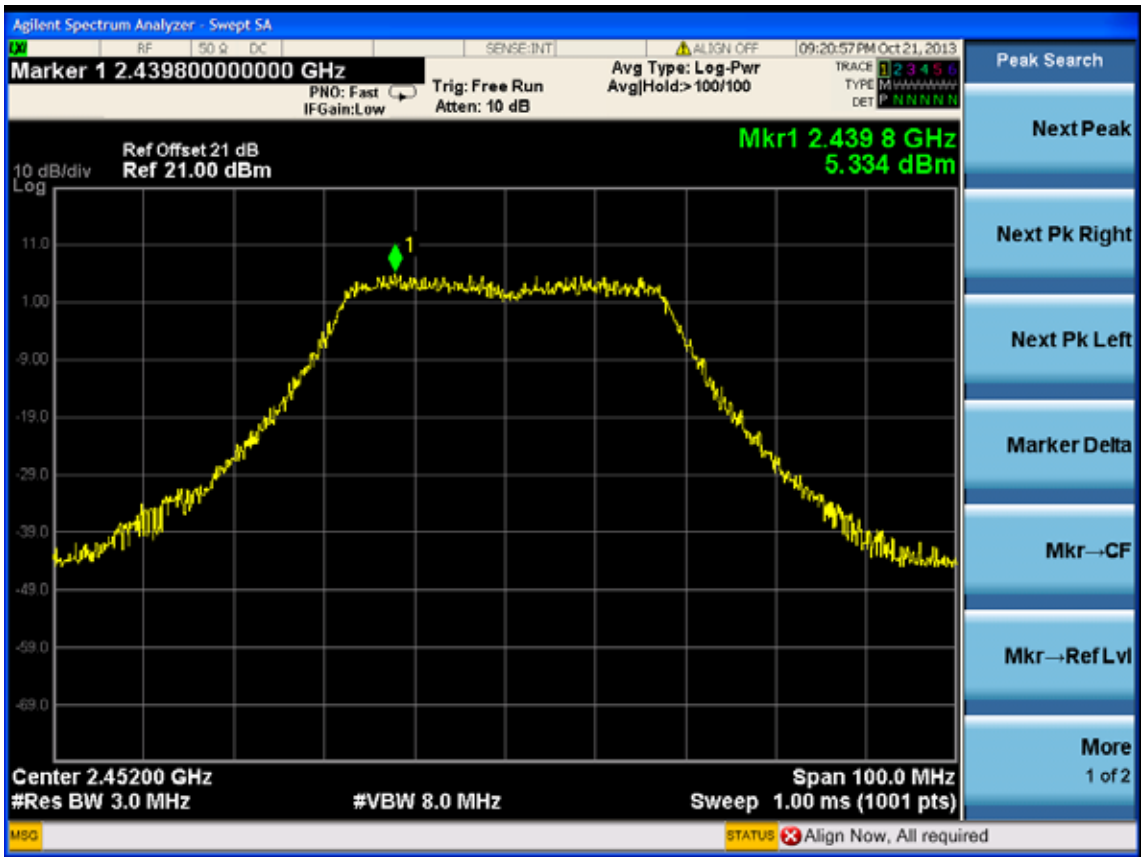


HT 40
ANT 0
Test CH1: 2422MHz



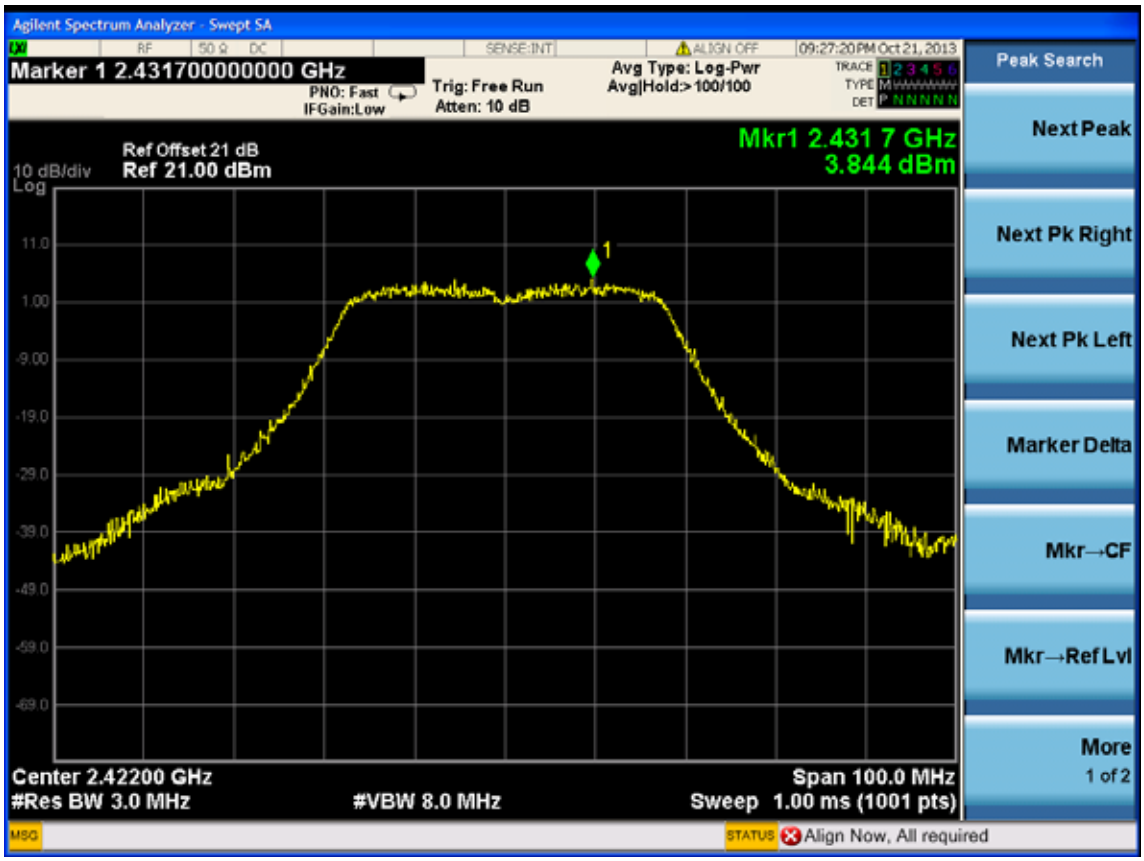
Test CH6: 2437MHz

Test CH11: 2452MHz



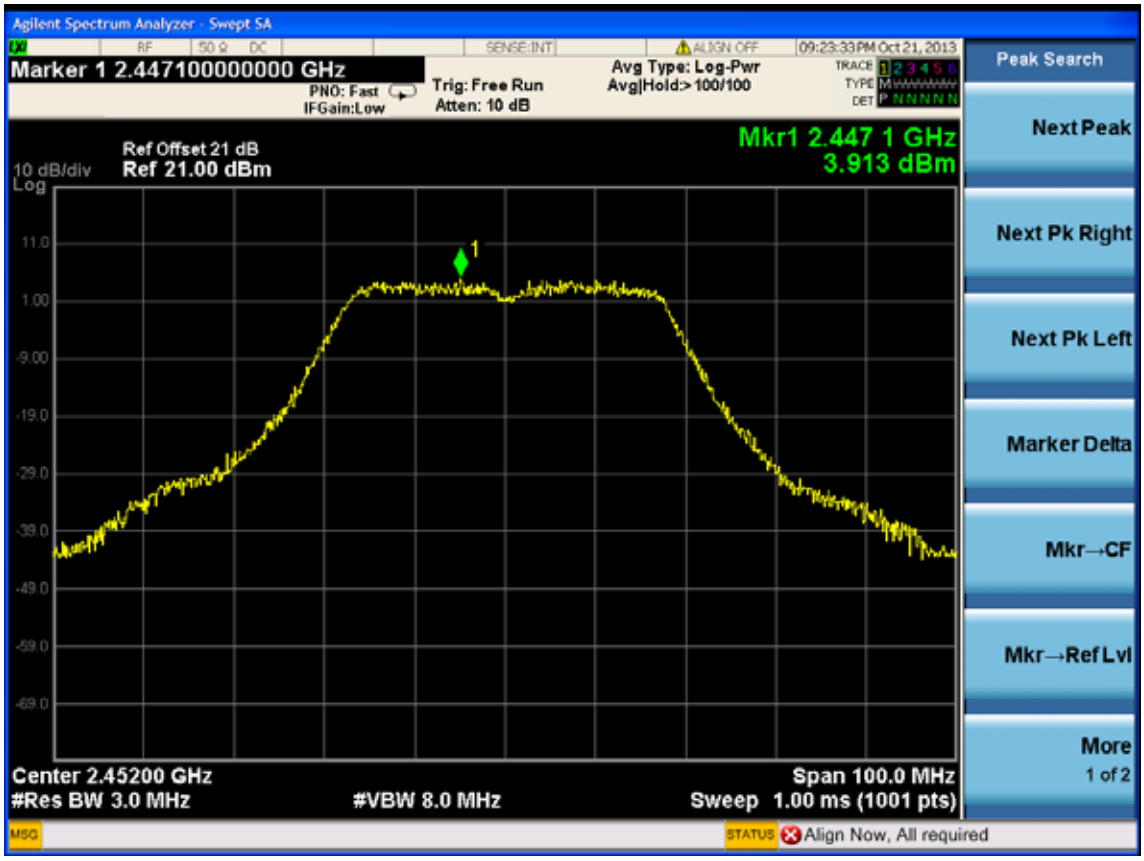
ANT 1

Test CH1: 2422MHz



Test CH6: 2437MHz

Test CH11: 2462MHz

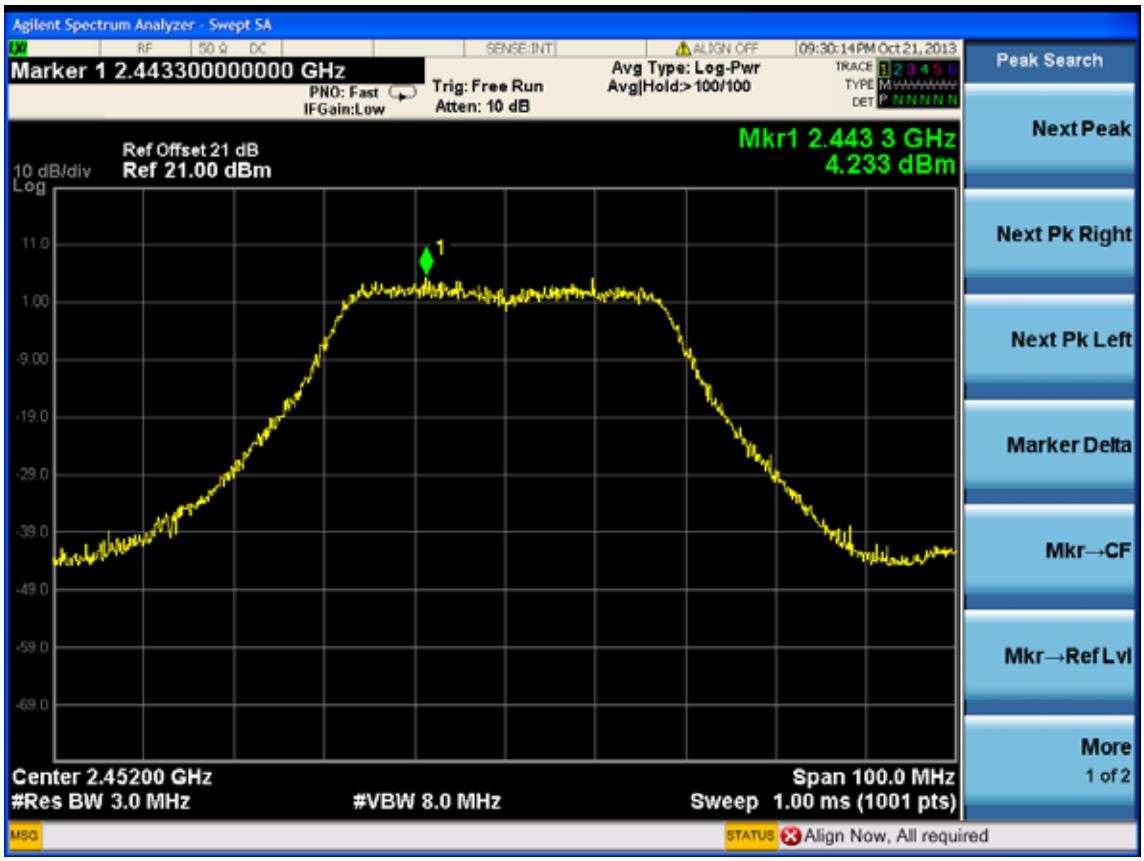


ANT 2

Test CH1: 2422MHz

Test CH6: 2437MHz

Test CH11: 2462MHz



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	9607-4877	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 Gigabit Router		
M/N: TL-WR1043ND		
Test date: 2013-08-06	Pressure: 101.2±1.0 kpa	Humidity: 52.4±3.0%
Tested by: Leo-Li	Test site: RF Site	Temperature: 21.4±0.6℃

Cable loss: 1 dB		Attenuator loss: 20 dB				
Test Mode	CH	Power density（dBm/3KHz）				Limit (dBm/3KHz)
		AN0	ANT1	ANT2	Total	
11b	CH1	-5.367	-6.349	-7.583	-1.57	4.23
	CH6	-4.754	-7.702	-8.169	-1.83	4.23
	CH11	-5.744	-7.252	-8.151	-2.16	4.23
11g	CH1	-11.131	-12.727	-13.009	-7.44	4.23
	CH6	-9.226	-10.777	-10.531	-5.35	4.23
	CH11	-11.569	-12.943	-12.747	-7.60	4.23
11n Mode						
Test Mode	CH	Power density（dBm/3KHz）				Limit (dBm/3KHz)
		ANT0	ANT1	ANT2	Total	
11n HT20	CH1	-16.743	-23.346	-11.529	-10.17	4.23
	CH6	-11.464	-12.303	-13.479	-7.57	4.23
	CH11	-15.286	-19.367	-16.266	-11.88	4.23
11n HT40	CH1	-18.950	-25.134	-24.026	-17.04	4.23
	CH4	-10.961	-14.686	-16.182	-8.59	4.23
	CH7	-18.768	-23.532	-26.474	-17.00	4.23

Conclusion：PASS

Note: 11b/g working at CDD mode which described in KDB662911.

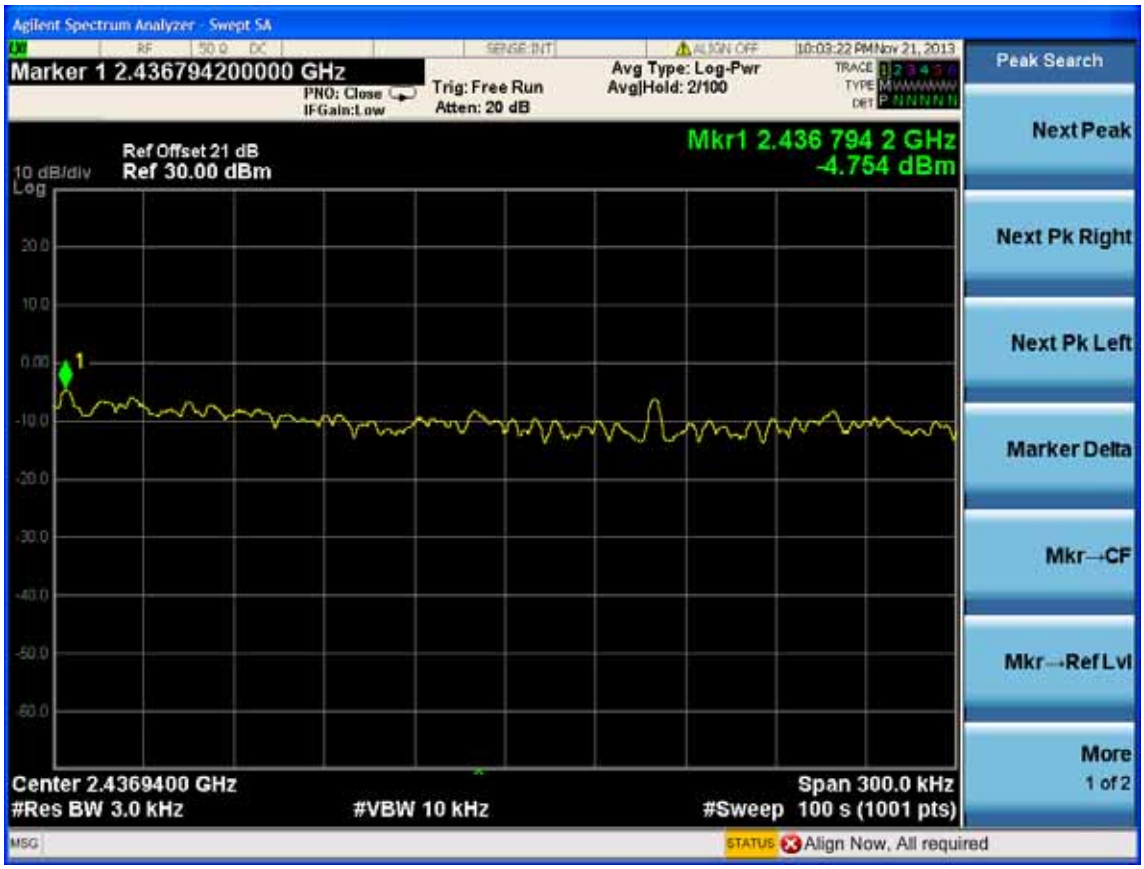
Directional gain=10log[$(10^{G1/20}+10^{G2/20}+10^{G3/20})^2/3$]=9.77dBi>6dBi,so the power density limit shall be reduced to 8-(9.77-6)=4.23

ANT 0

Test Mode: IEEE 802.11b TX

Test CH1: 2412MHz

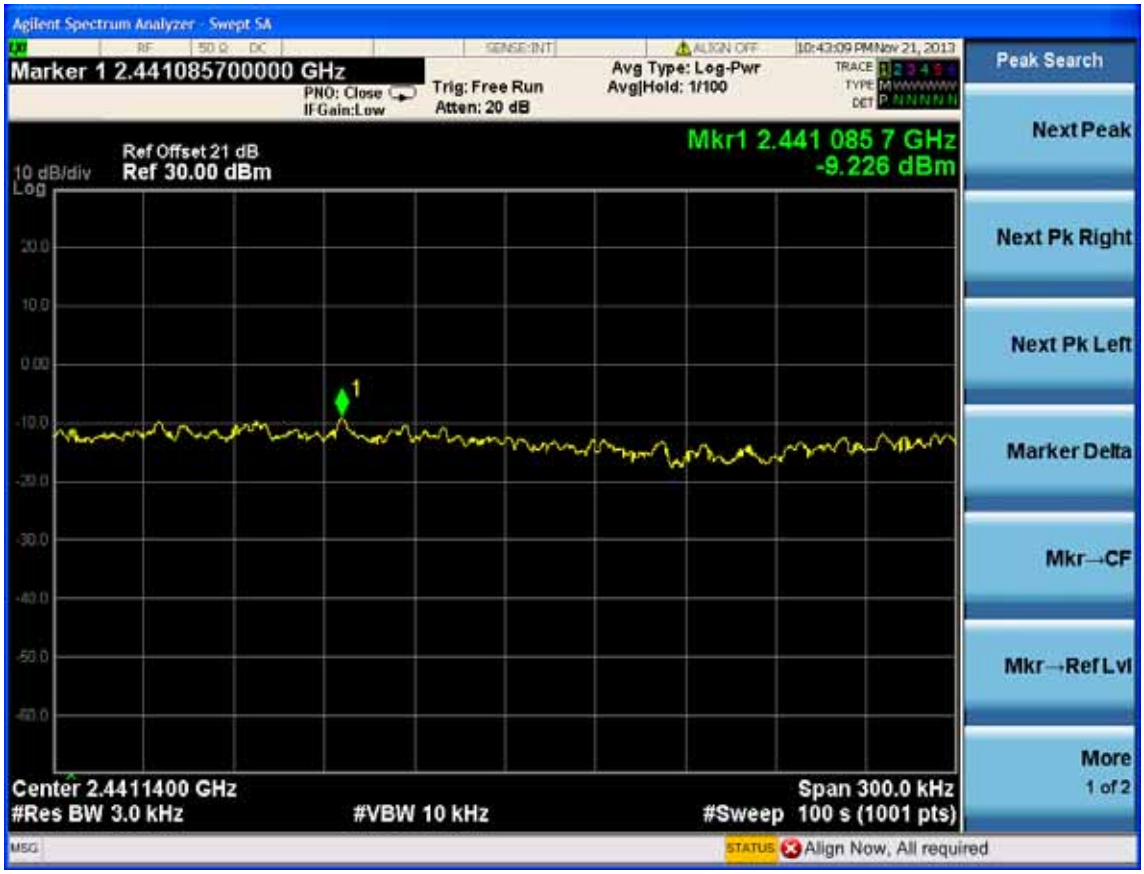
Test CH6: 2437MHz



Test CH11: 2462MHz

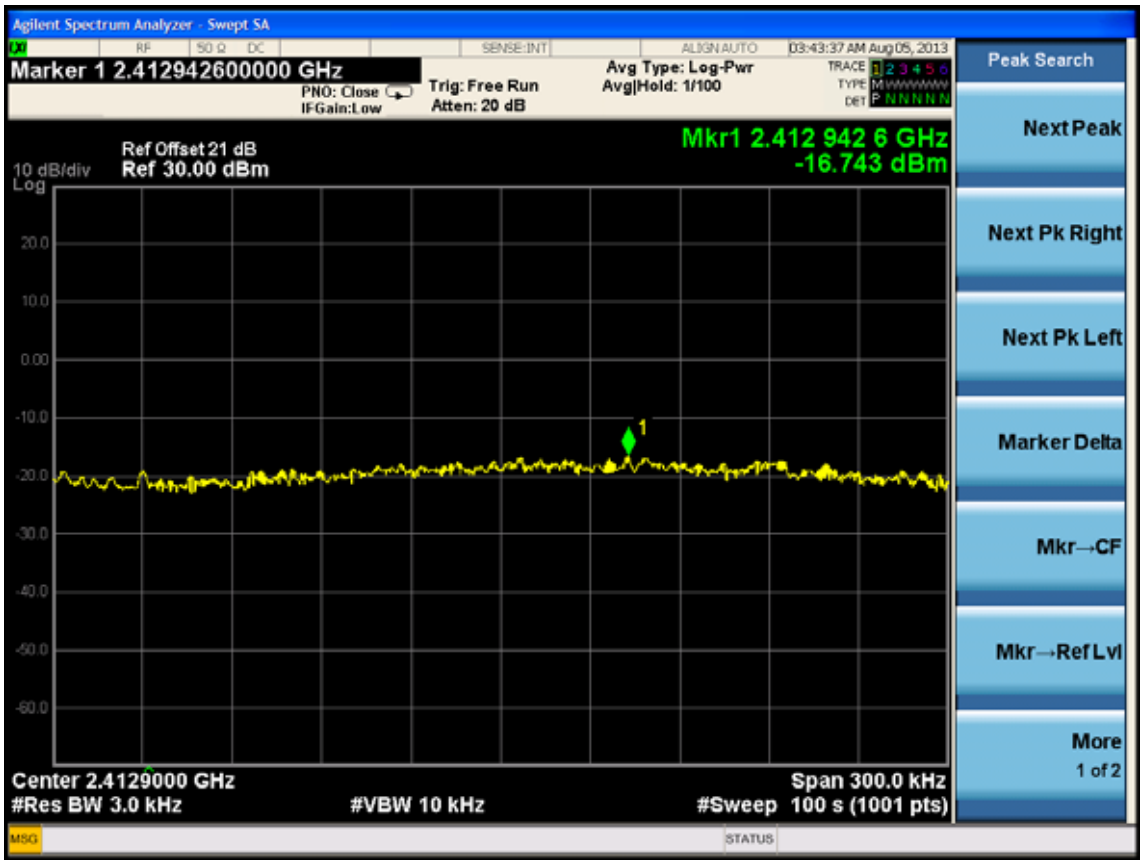
Test Mode: IEEE 802.11g TX
Test CH1: 2412MHz

Test CH6: 2437MHz

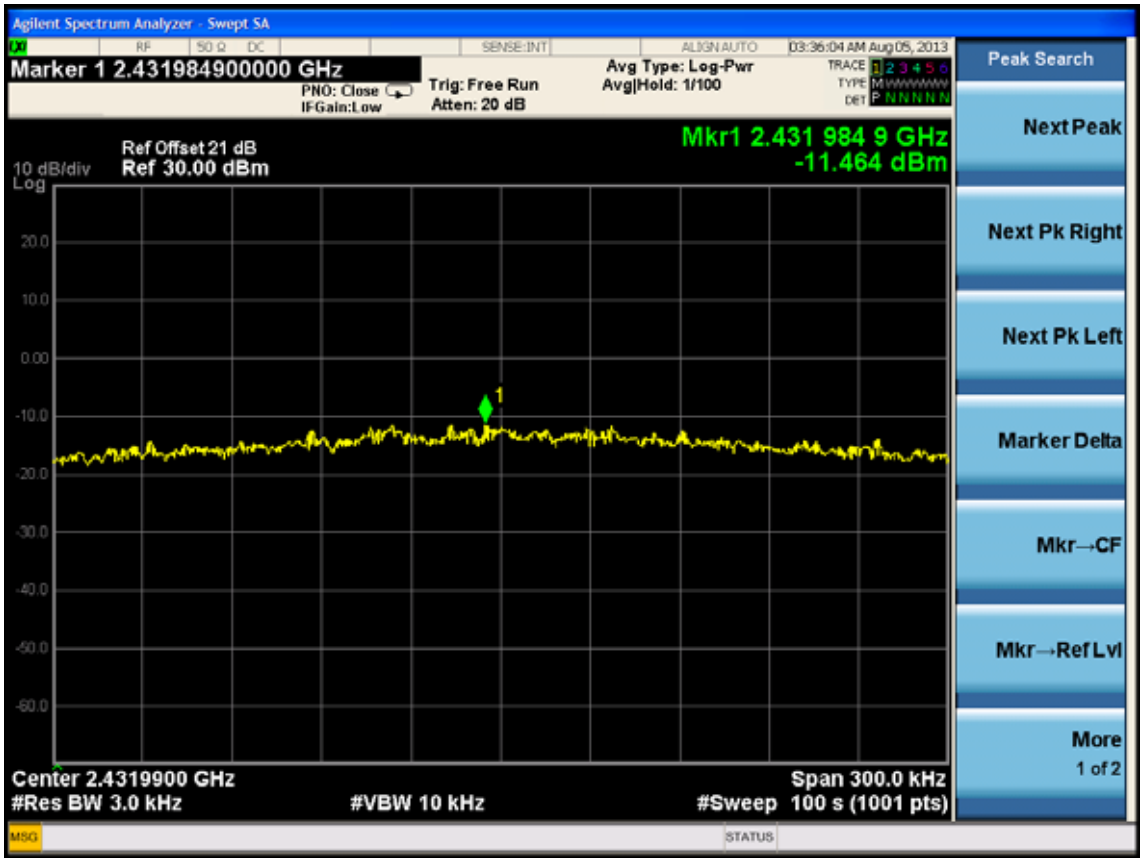


Test CH11: 2462MHz

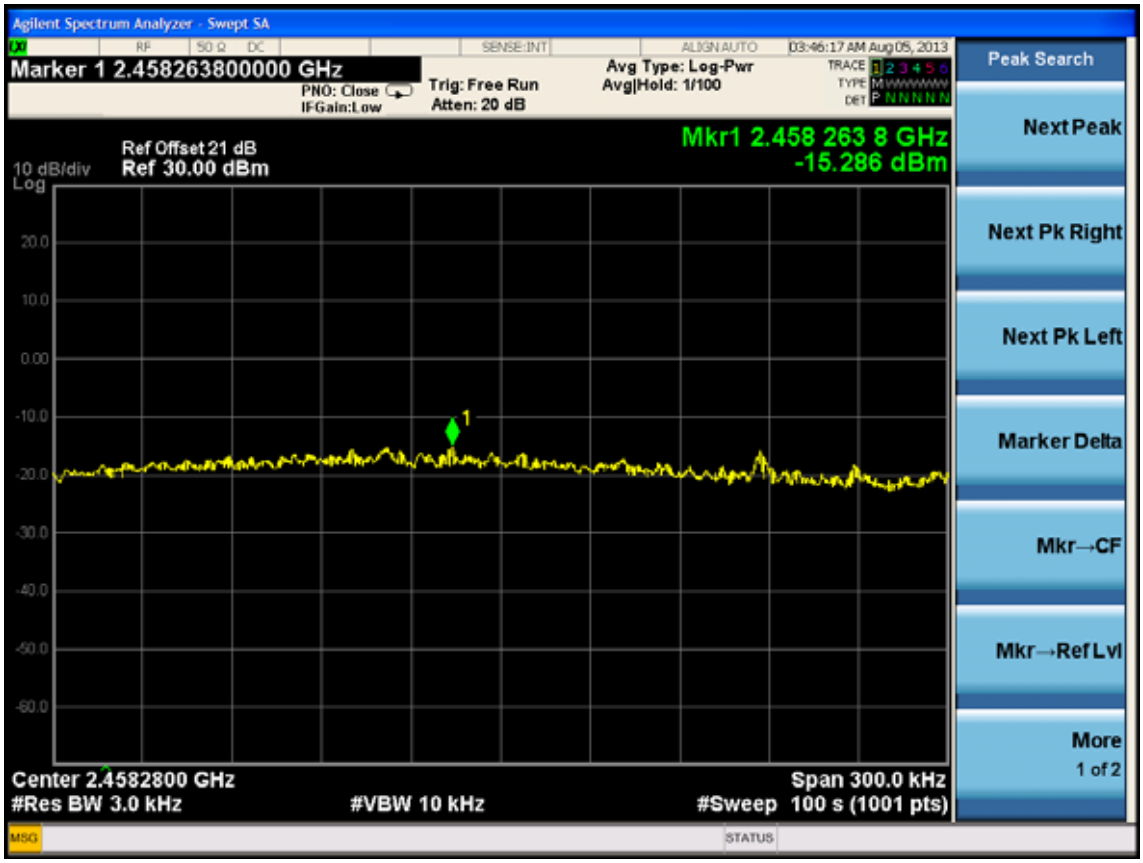
Test Mode: IEEE 802.11n HT20 TX
Test CH1: 2412MHz



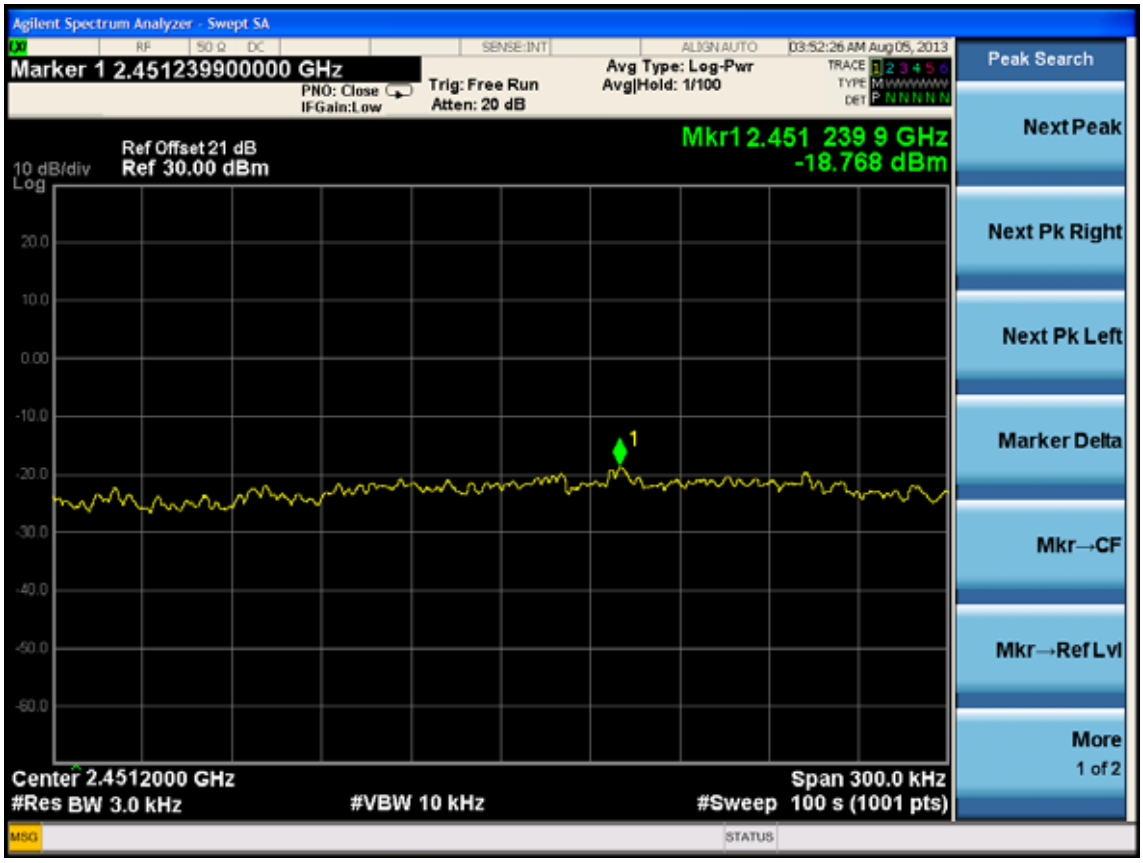
Test CH6: 2437MHz



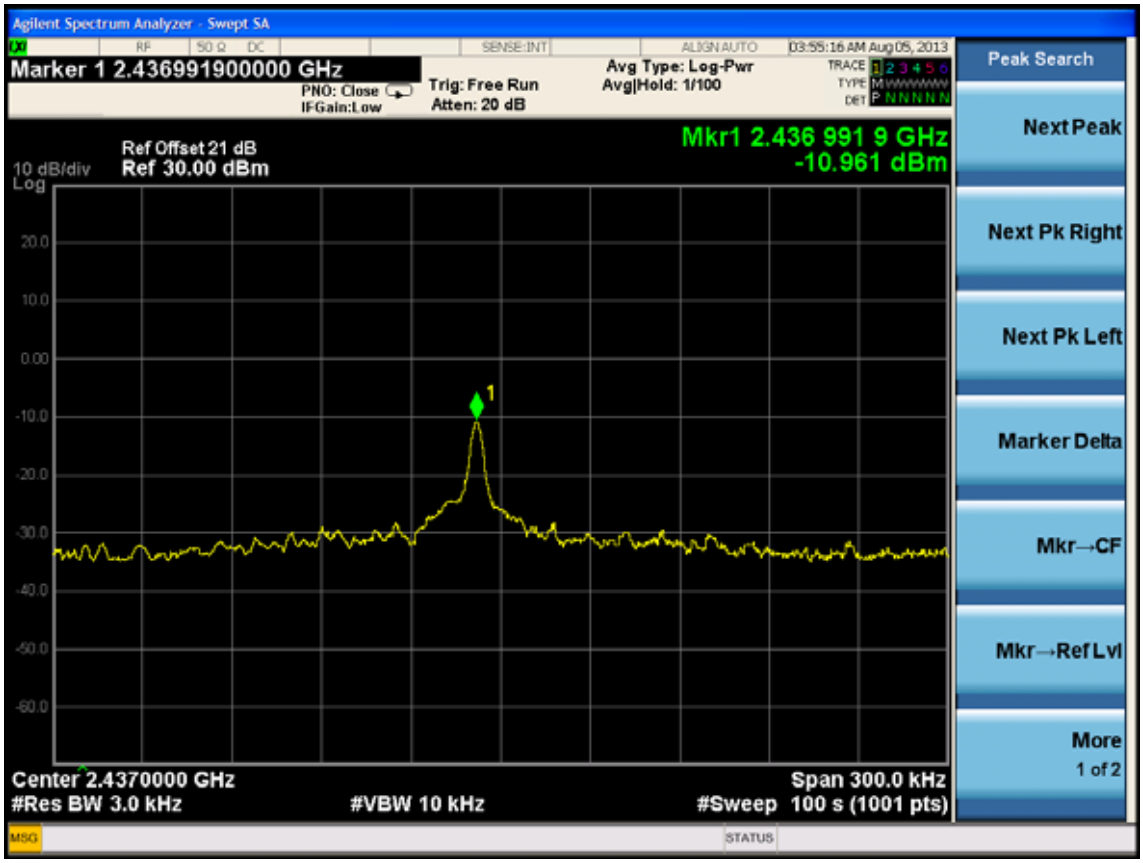
Test CH11: 2462MHz



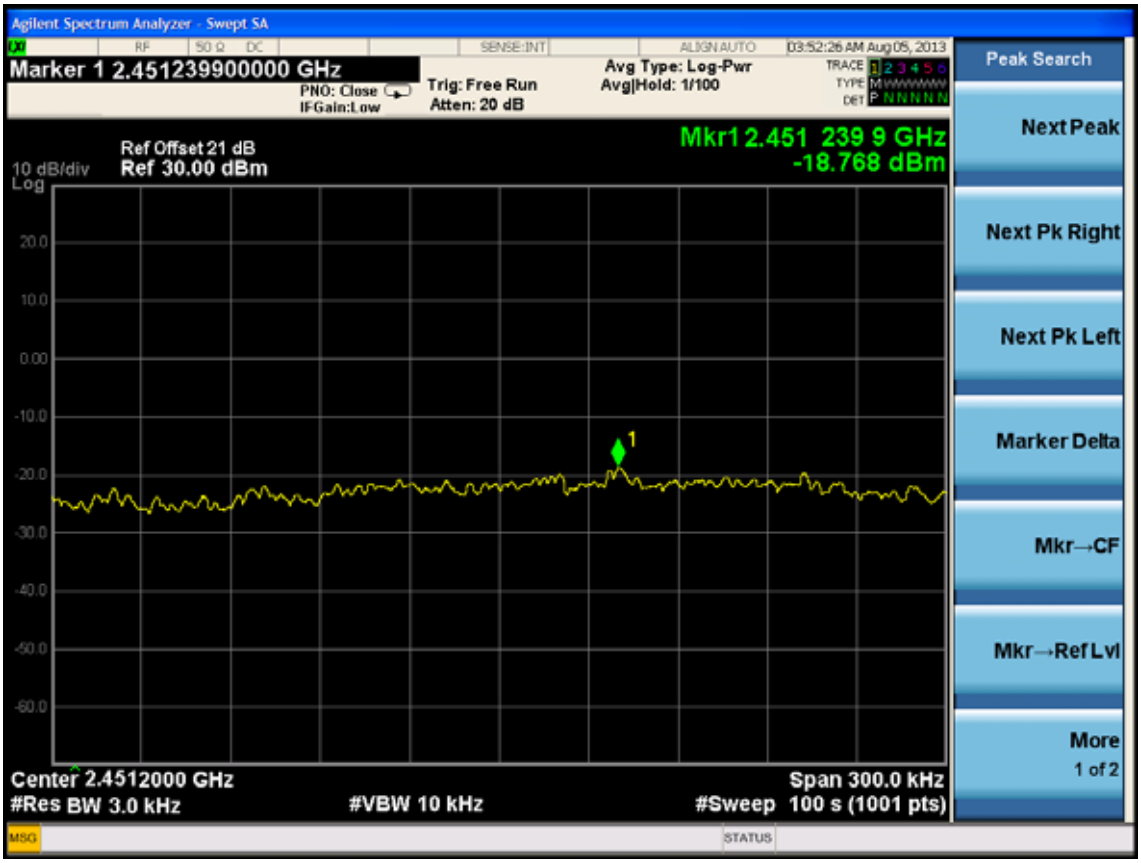
Test Mode: IEEE 802.11n HT40 TX
Test CH1: 2422MHz



Test CH4: 2437MHz



Test CH7: 2452MHz

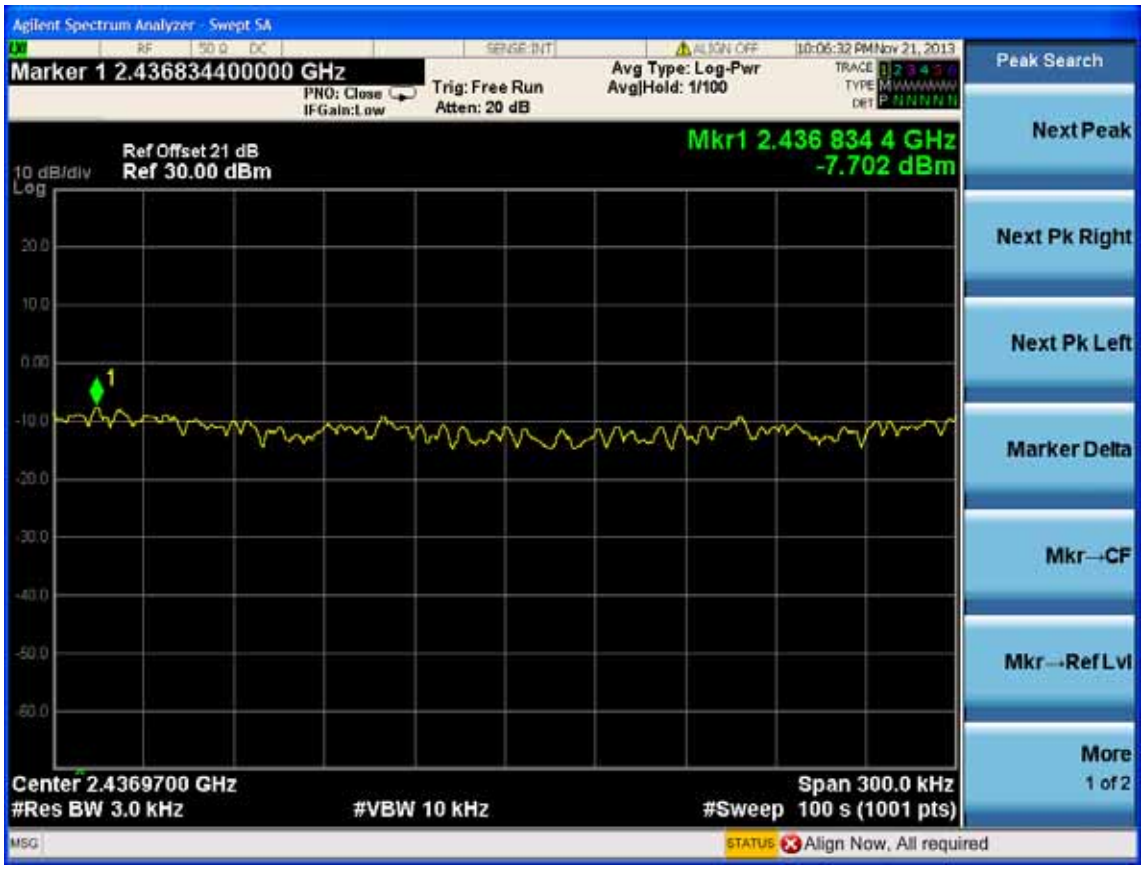


ANT 1

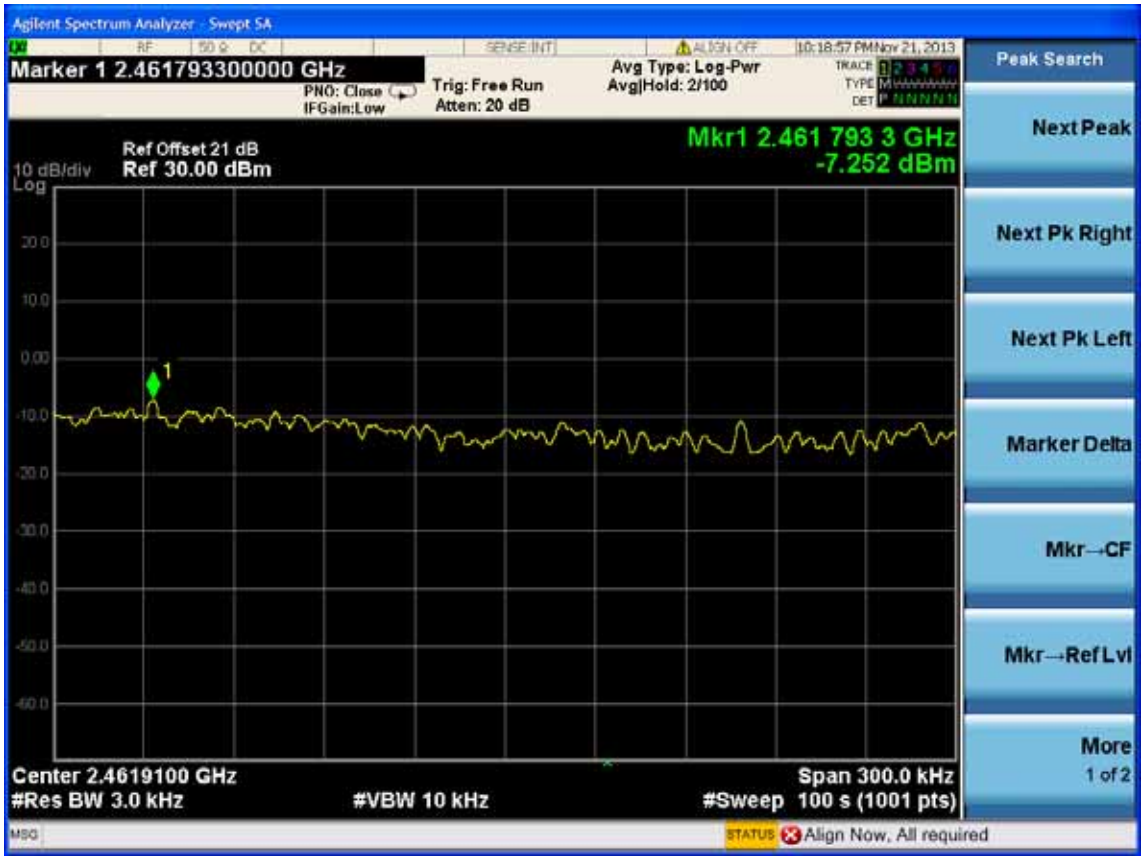
Test Mode: IEEE 802.11b TX

Test CH1: 2412MHz

Test CH6: 2437MHz



Test CH11: 2462MHz

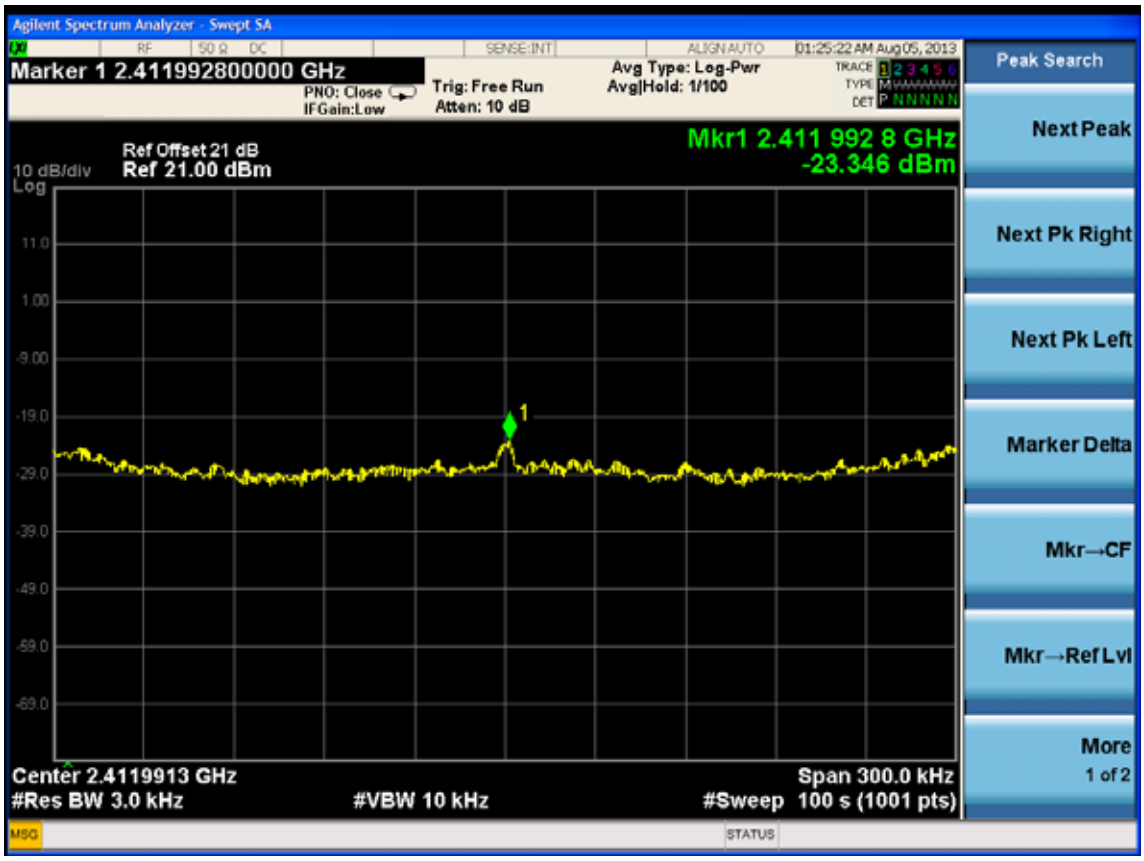


Test Mode: IEEE 802.11g TX
Test CH1: 2412MHz

Test CH6: 2437MHz

Test CH11: 2462MHz

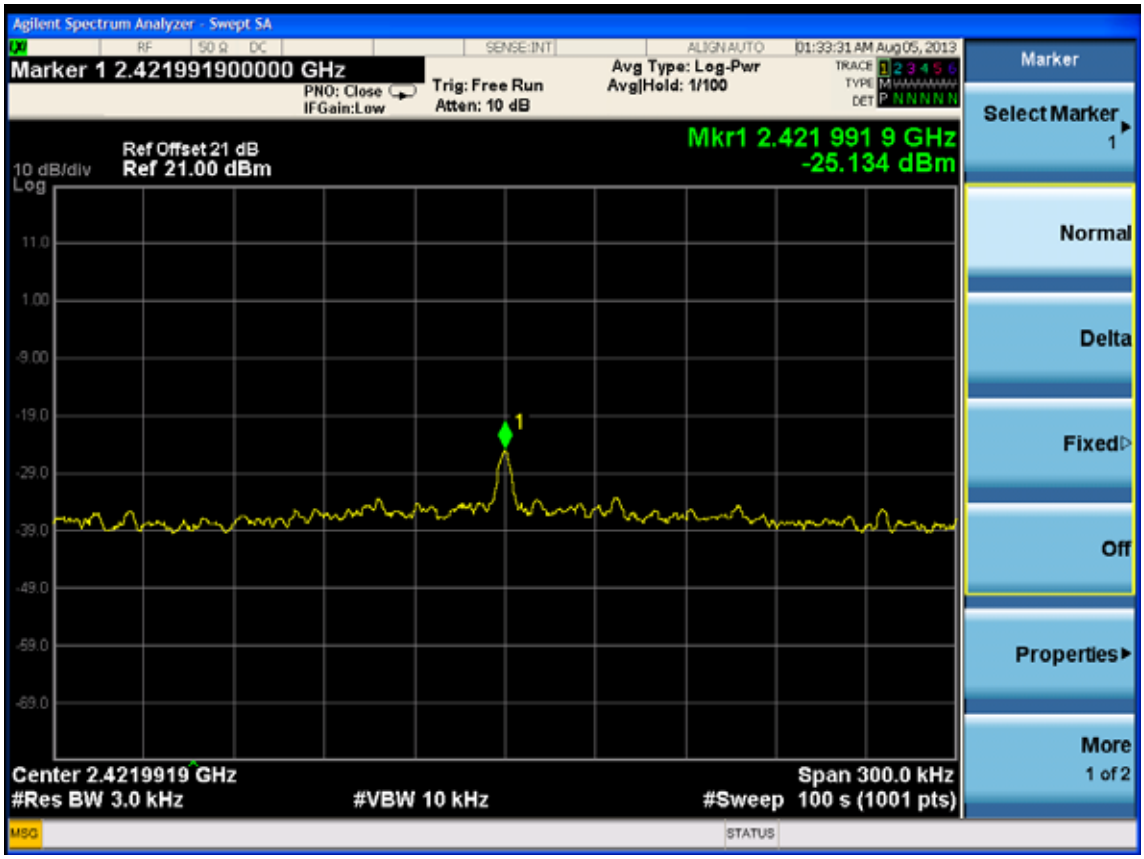
Test Mode: IEEE 802.11n HT20 TX
Test CH1: 2412MHz



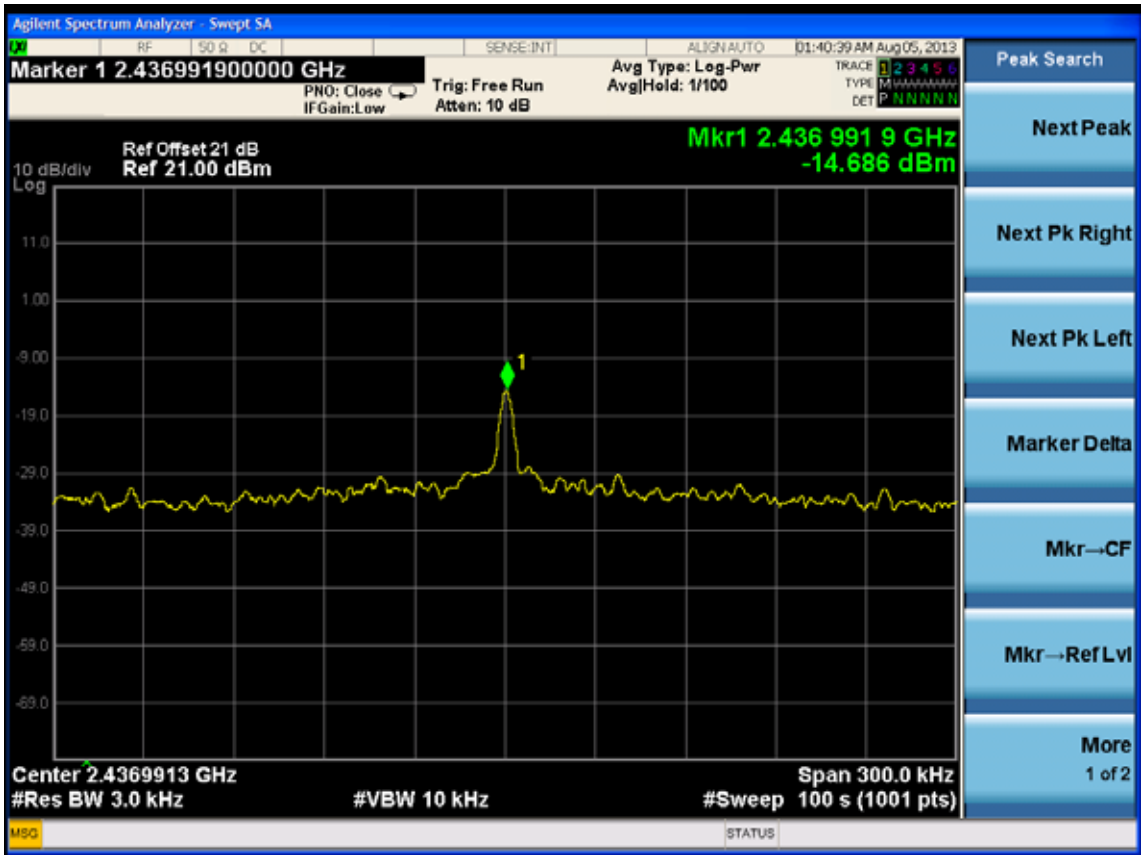
Test CH6: 2437MHz

Test CH11: 2462MHz

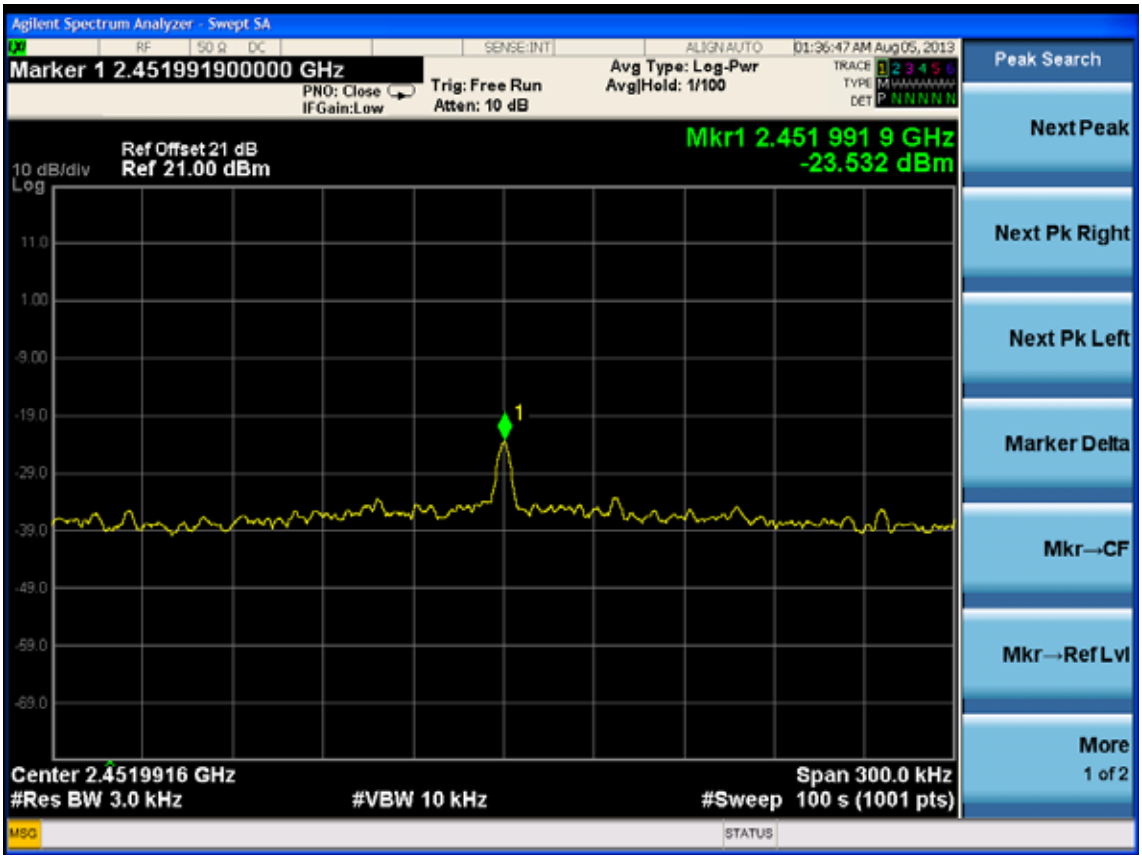
Test Mode: IEEE 802.11n HT40 TX
Test CH1: 2422MHz



Test CH4: 2437MHz



Test CH7: 2452MHz



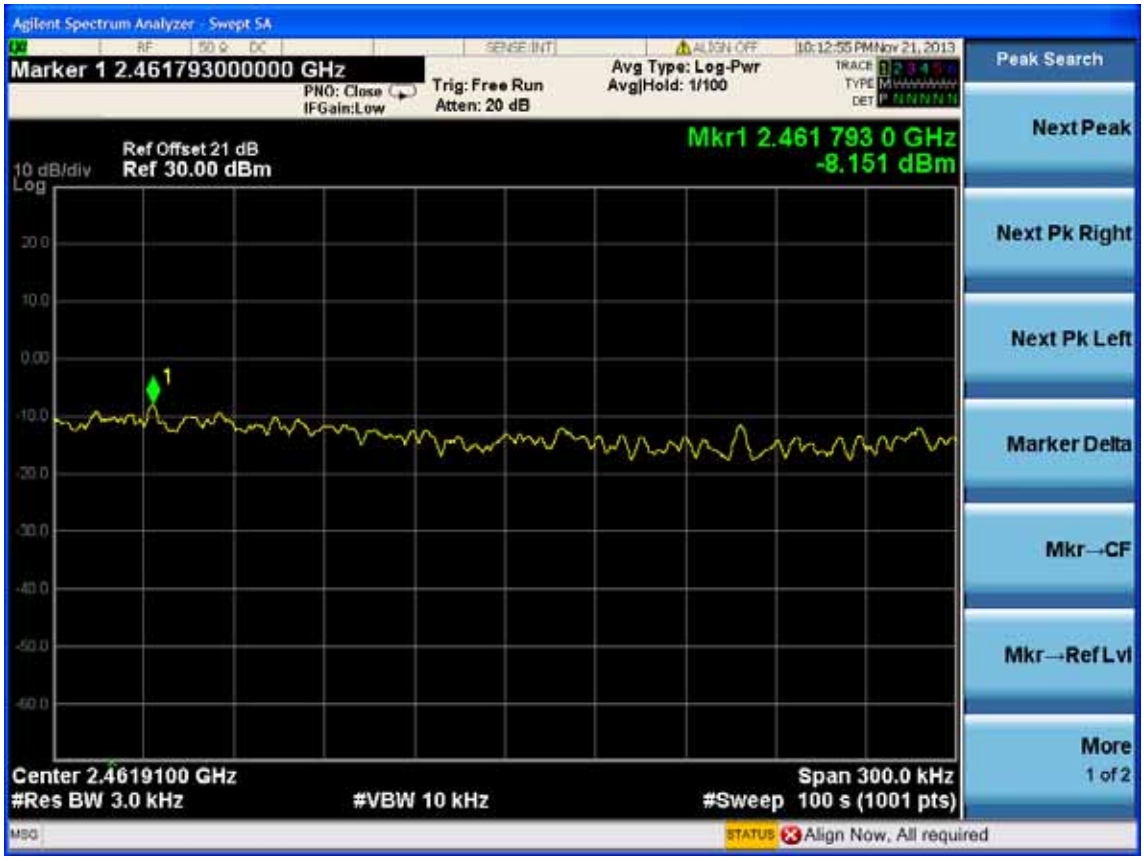
ANT 2

Test Mode: IEEE 802.11b TX

Test CH1: 2412MHz

Test CH6: 2437MHz

Test CH11: 2462MHz

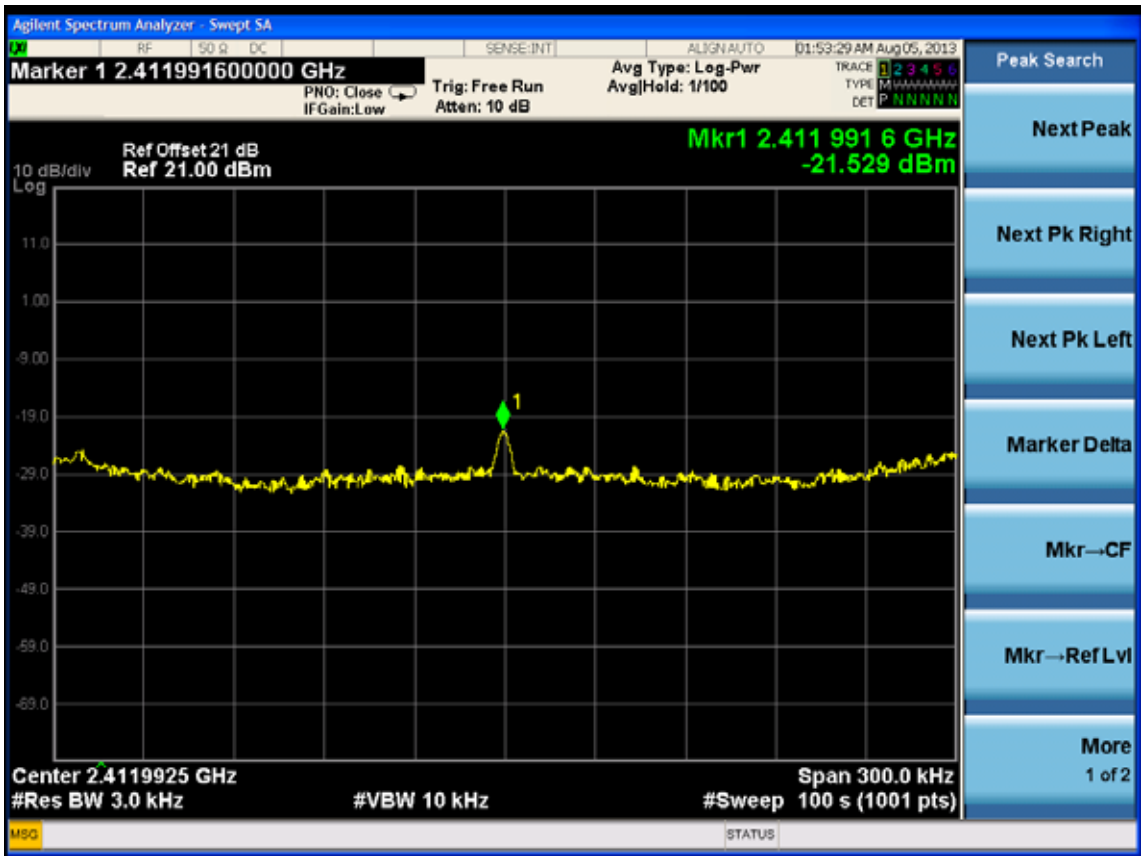


Test Mode: IEEE 802.11g TX
Test CH1: 2412MHz

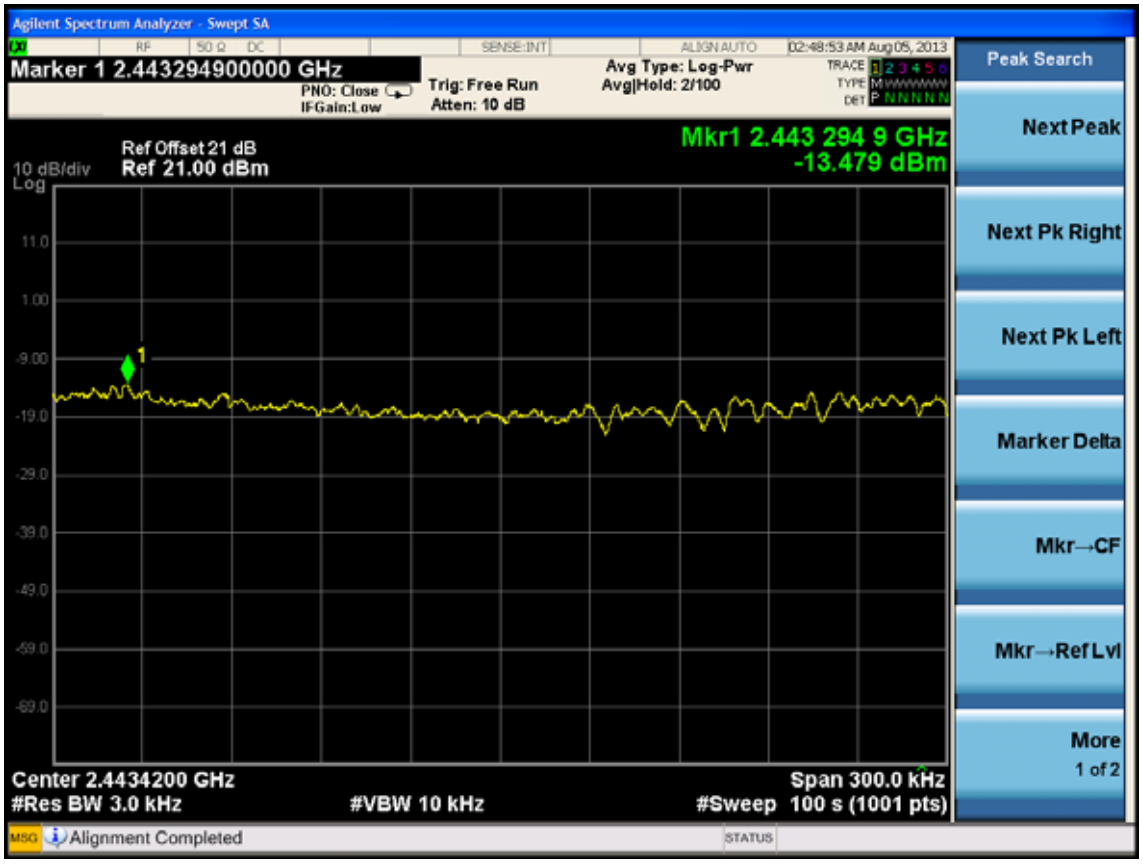
Test CH6: 2437MHz

Test CH11: 2462MHz

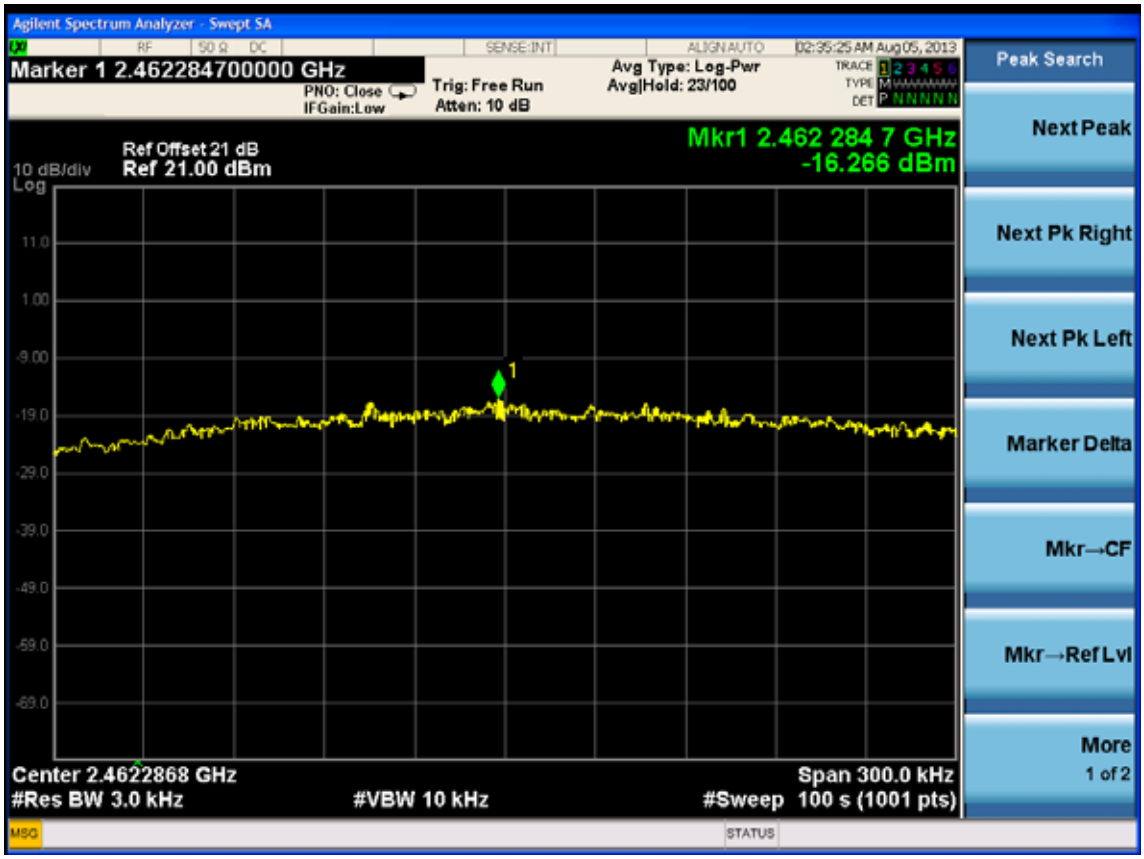
Test Mode: IEEE 802.11n HT20 TX
Test CH1: 2412MHz



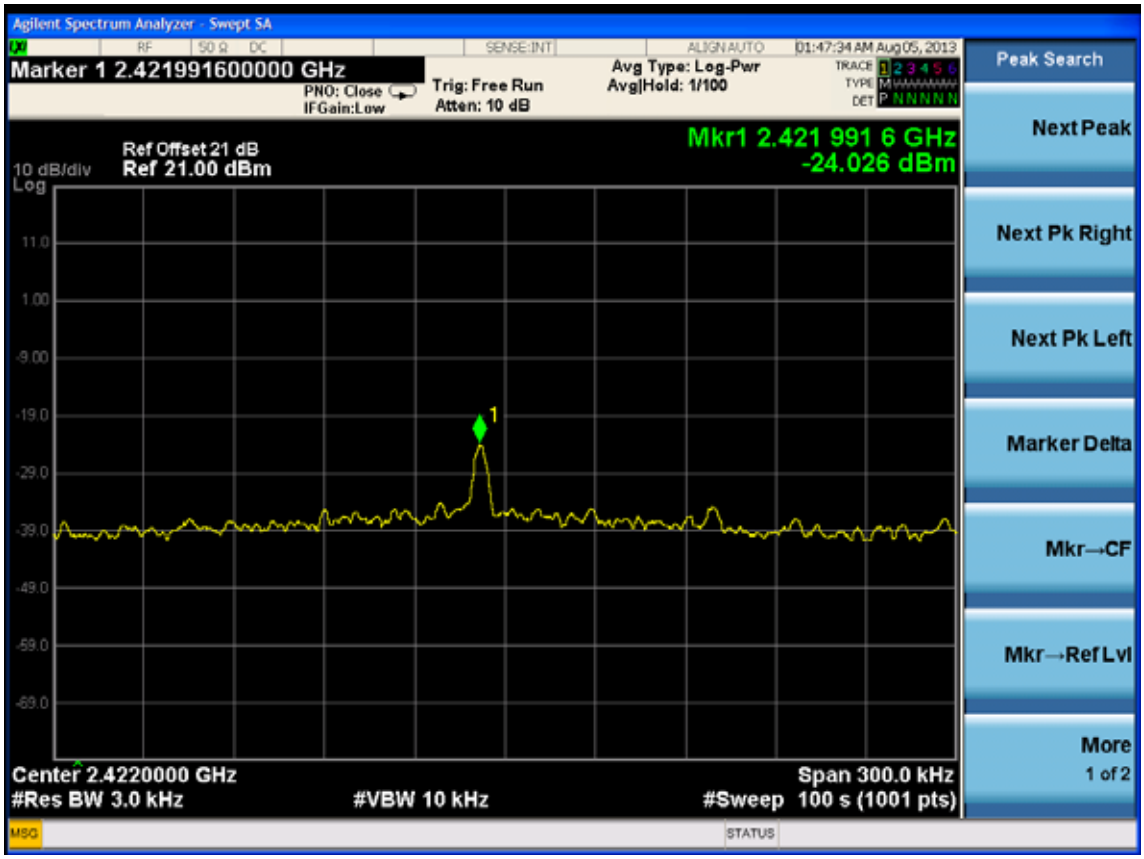
Test CH6: 2437MHz



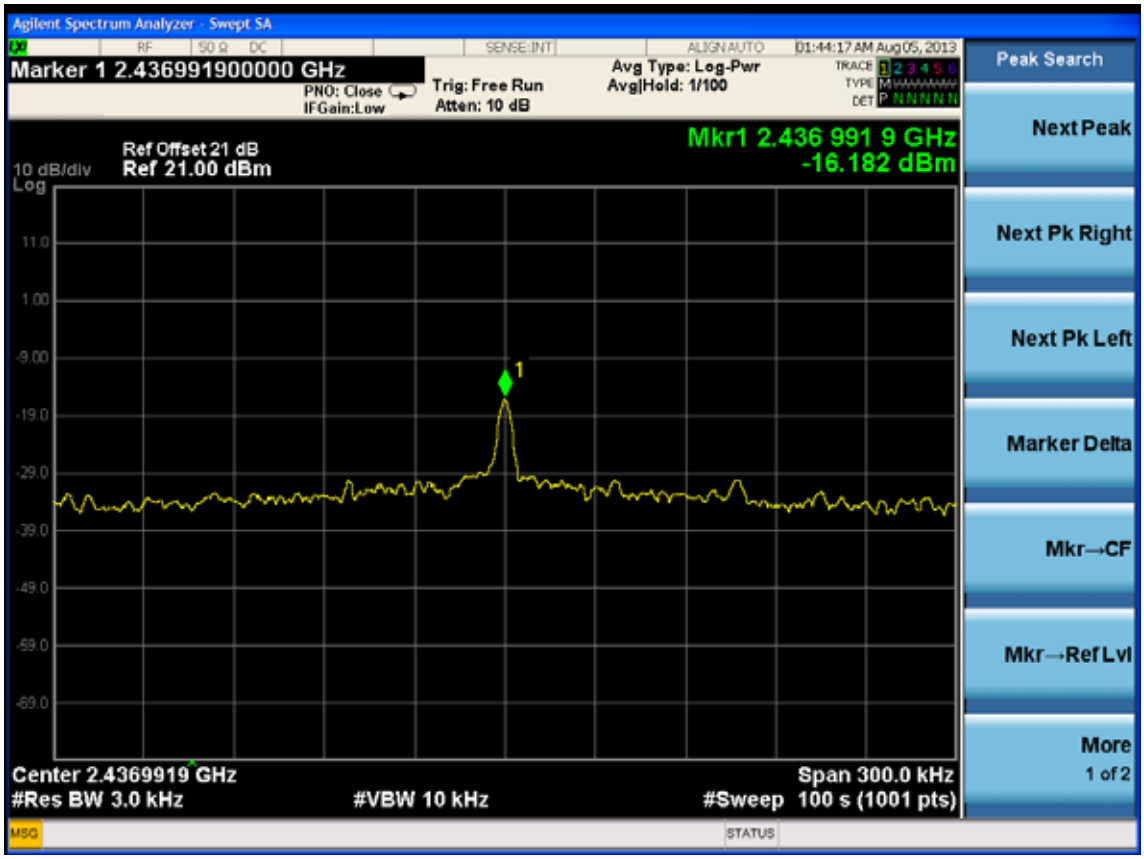
Test CH11: 2462MHz



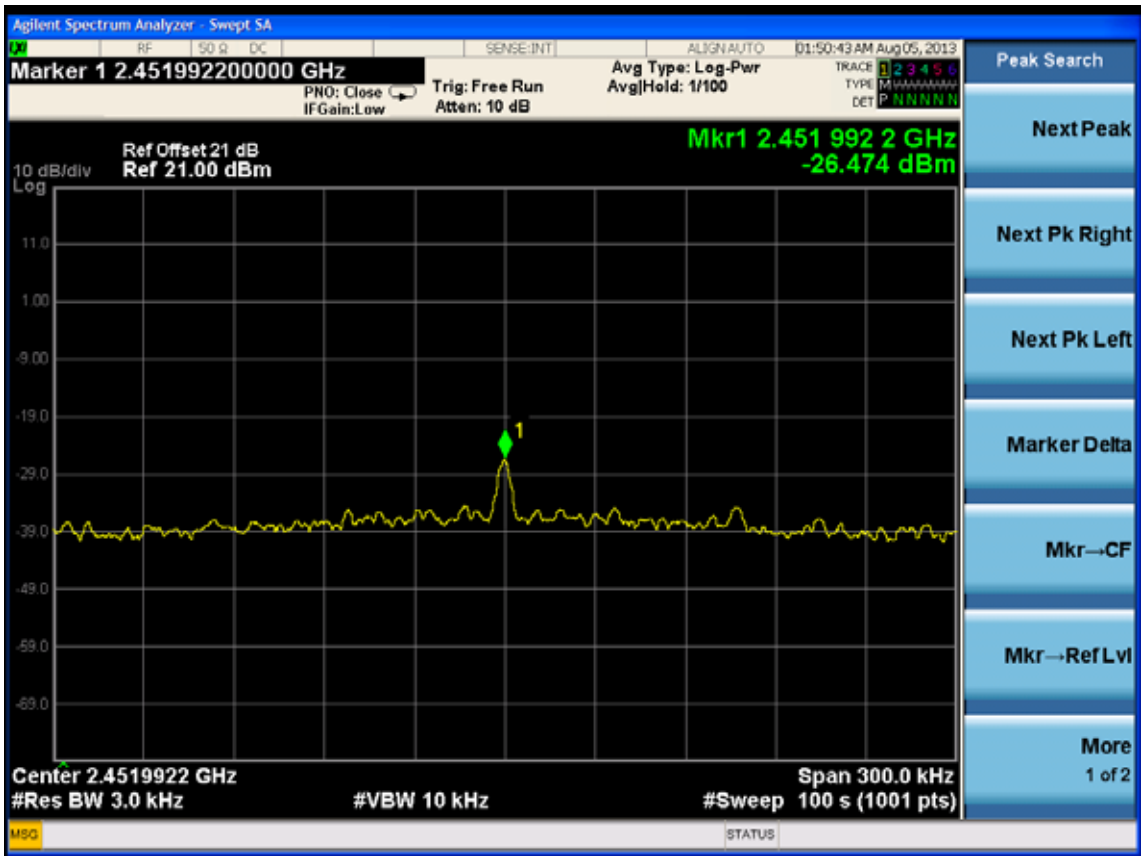
Test Mode: IEEE 802.11n HT40 TX
Test CH1: 2422MHz



Test CH4: 2437MHz



Test CH7: 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 Estimation Result

EUT: 300Mbps Wireless N Gigabit Router		
M/N: TL-WR1043ND		
Test date: 2013-08-06	Pressure: 101.2±1.0 kpa	Humidity: 48.4±3.0%
Tested by: Leo-Li	Test site: RF site	Temperature: 20.7±0.6 ℃

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	27.05	506.99	5.0	3.16	0.3191
	CH6	2437	28.96	787.05	5.0	3.16	0.4954
	CH11	2462	27.58	572.80	5.0	3.16	0.3605
11g	CH1	2412	25.07	321.37	5.0	3.16	0.2023
	CH6	2437	27.37	545.76	5.0	3.16	0.3435
	CH11	2462	27.05	357.27	5.0	3.16	0.2249
11n HT20	CH1	2412	22.16	164.44	5.0	3.16	0.1035
	CH6	2437	25.03	318.42	5.0	3.16	0.2004
	CH11	2462	22.35	171.79	5.0	3.16	0.1081
11n HT40	CH1	2422	21.51	141.58	5.0	3.16	0.0891
	CH4	2437	24.90	309.03	5.0	3.16	0.1945
	CH7	2452	21.35	136.46	5.0	3.16	0.0859

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]