

8. OUTPUT POWER TEST

8.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	Apr.28,15	1 Year
2.	Spectrum	Agilent	N9030A	MY51380221	Oct.18,15	1 Year
3.	Power meter	Anritsu	ML2487A	6K00002472	Aug.21,15	1 Year
4.	Power sensor	Anritsu	MA2491A	0033005	Aug.21,15	1 Year
5.	Attenuator (20dB)	Agilent	8491B	MY39262165	Apr.28,15	1 Year
6.	RF Cable	Marvelous Microwave Inc	SFL402105FLEX	NO.1	Oct.17,15	1 Year

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

For systems using digital modulation in the 2400—2483.5MHz, The Peak output Power shall not exceed 1W(30dBm), As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level.

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 modes, use a power meter which bandwidth is 20MHz, above the bandwidth of signals, to measure out output power in each mode.
- 3, For IEEE802.11n HT40 mode, since the signal bandwidth is nearly 40MHz, which is above 20MHz bandwidth of power sensor of ML2491A. use the test method descried in KDB558074 clause 9.2.2.
 - 1) Set the RBW=1MHz and VBW =3MHz
 - 2) Set the span at least 1.5 times the OBW
 - 3) Detector = RMS
 - 4) Sweep time = auto couple
 - 5) allow trace to fully stabilize
 - 6) use the spectrum analyser's integrated band power measurement function with band limits set equal to the EBW band edges.

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

8.4. Test Results

EUT: Altai A3c Indoor Dual-band 3X3 802.11ac WiFi AP						
M/N: WA3311NAC-C						
Test date: 2016-01-11		Pressure: 101.3±1.0 kpa			Humidity: 52.3±3.0%	
Tested by: Leo-Li		Test site: RF site			Temperature: 23.6±0.6	
Test Mode	CH	Output Power (dBm)				Limit (dBm)
		ANT 1	ANT 2	ANT 3	Total	
11b	CH1	18.49	18.41	18.42	23.21	27.2
	CH6	18.12	17.93	18.08	22.82	27.2
	CH11	17.86	17.79	17.76	22.57	27.2
11g	CH1	20.20	19.63	20.15	24.77	27.2
	CH6	19.08	19.09	20.50	24.38	27.2
	CH11	19.84	20.30	20.04	24.84	27.2
11n HT20	CH1	20.17	20.01	19.83	24.78	27.2
	CH6	19.86	19.08	19.34	24.21	27.2
	CH11	19.56	19.96	19.75	24.53	27.2
11n HT40	CH3	20.75	20.16	20.63	25.29	27.2
	CH6	20.32	20.04	20.34	25.01	27.2
	CH9	19.44	19.26	20.10	24.39	27.2
Conclusion: PASS						

Note: 11b/g/n

Use MIMO Mode:

$$\begin{aligned}
 \text{Directional Gain} &= G_{\text{ANT}} + \text{Array Gain} \\
 &= 4\text{dBi} + 10\log 3(\text{dBi}) \\
 &= 8.8\text{dBi} > 6\text{dBi}
 \end{aligned}$$

ANT1:

Test Mode: IEEE 802.11n HT40
Test CH3: 2422MHz


ANT2:

Test Mode: IEEE 802.11n HT40
Test CH3: 2422MHz


Test CH6: 2437MHz

Test CH6: 2437MHz

Test CH9: 2452MHz

Test CH9: 2452MHz


ANT3:

Test Mode: IEEE 802.11n HT40

Test CH3: 2422MHz

Test CH9: 2452MHz



Test CH6: 2437MHz



9. POWER SPECTRAL DENSITY TEST

9.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	Apr.28,15	1 Year
2.	Spectrum	Agilent	N9030A	MY51380221	Oct.18,15	1 Year
3.	Attenuator (20dB)	Agilent	8491B	MY39262165	Apr.28,15	1 Year
4.	RF Cable	Marvelous Microwave Inc	SFL402105FLEX	NO.1	Oct.17,15	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 span to 1.5 times the DTS Bandwidth.
3. Set the RBW=3KHz, VBW=10KHz.
4. Detector=peak, Sweep time=Auto, Trace mode=max Hold
5. All the trace to fully stabilize.
6. Use the peak marker function to determine the maximum amplitude level with in the RBW.

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

9.4. Test Results

EUT: Altai A3c Indoor Dual-band 3X3 802.11ac WiFi AP						
M/N: WA3311NAC-C						
Test date: 2016-01-11		Pressure: 101.1±1.0 kpa		Humidity: 50.8±3.0%		
Tested by: Leo-Li		Test site: RF site		Temperature: 22.9±0.6		
Test Mode	CH	Power Density (dBm/3KHz)				Limit (dBm/3KHz)
		ANT 1	ANT 2	ANT 3	Total	
11b	CH1	-6.319	-6.614	-6.919	-1.84	5.2
	CH6	-8.757	-7.198	-7.389	-2.96	5.2
	CH11	-8.671	-6.976	-7.136	-2.76	5.2
11g	CH1	-10.700	-10.330	-11.283	-5.98	5.2
	CH6	-10.339	-11.110	-11.976	-6.32	5.2
	CH11	-9.145	-9.020	-11.012	-4.86	5.2
11n HT20	CH1	-10.595	-10.890	-10.356	-5.84	5.2
	CH6	-9.979	-11.912	-11.192	-6.18	5.2
	CH11	-10.415	-10.482	-9.891	-5.48	5.2
11n HT40	CH3	-10.381	-11.891	-13.287	-6.92	5.2
	CH6	-11.095	-13.836	-12.168	-7.45	5.2
	CH9	-12.773	-14.199	-12.686	-8.39	5.2
Conclusion: PASS						

Note: 11b/g/n

Use MIMO Mode:

Directional Gain = $G_{ANT} + \text{Array Gain}$

= 4dBi + 10log3(dBi)

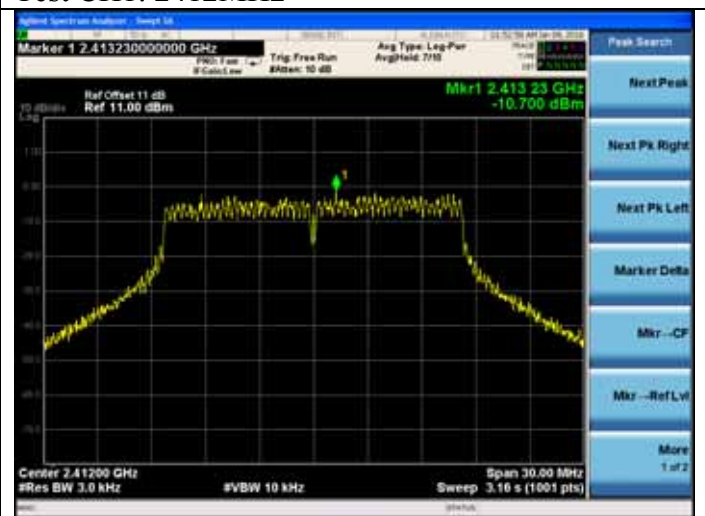
= 8.8dBi > 6dBi

ANT1:

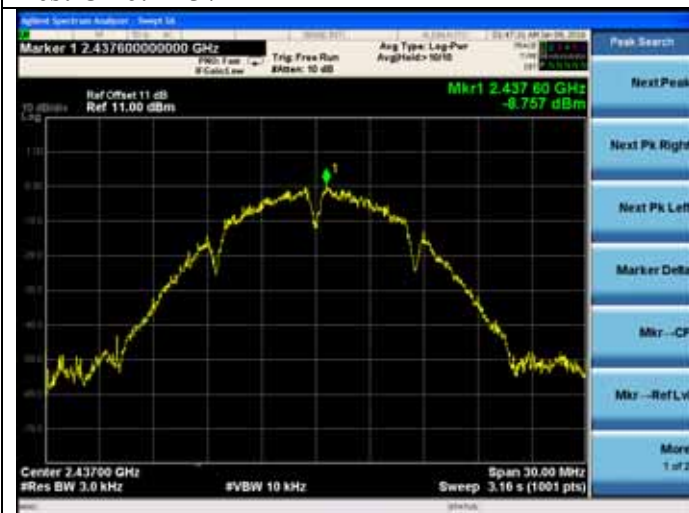
Test Mode: IEEE 802.11b
Test CH1: 2412MHz



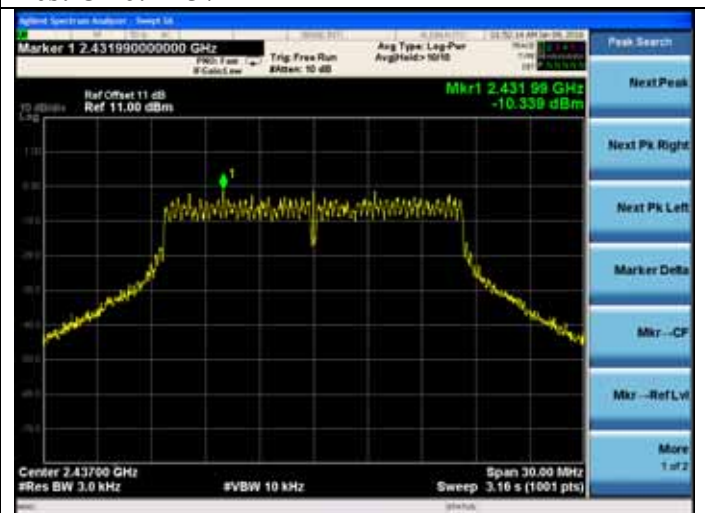
Test Mode: IEEE 802.11g
Test CH1: 2412MHz



Test CH6: 2437MHz



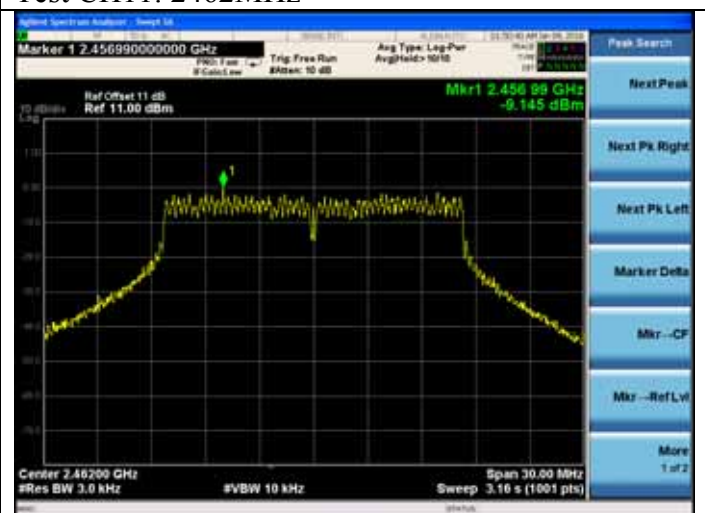
Test CH6: 2437MHz



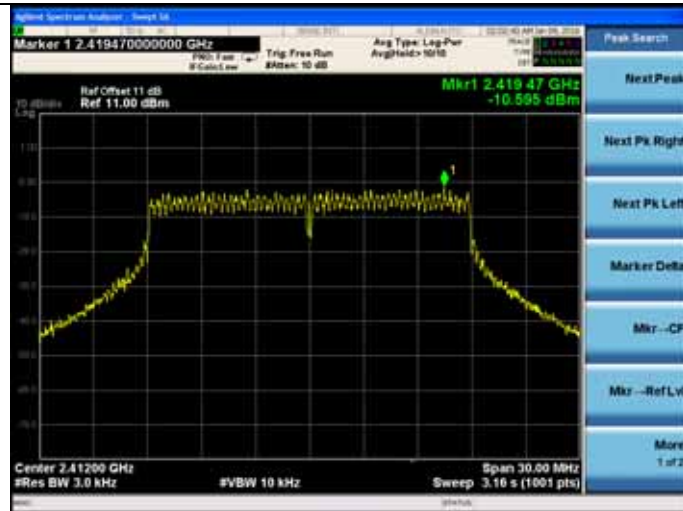
Test CH11: 2462MHz



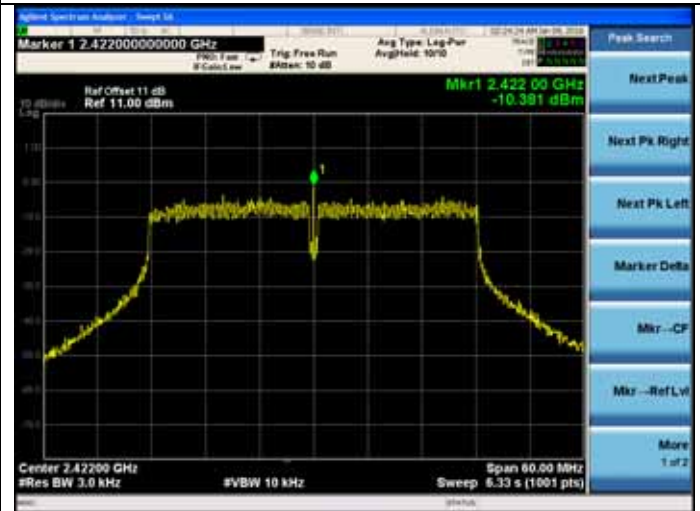
Test CH11: 2462MHz



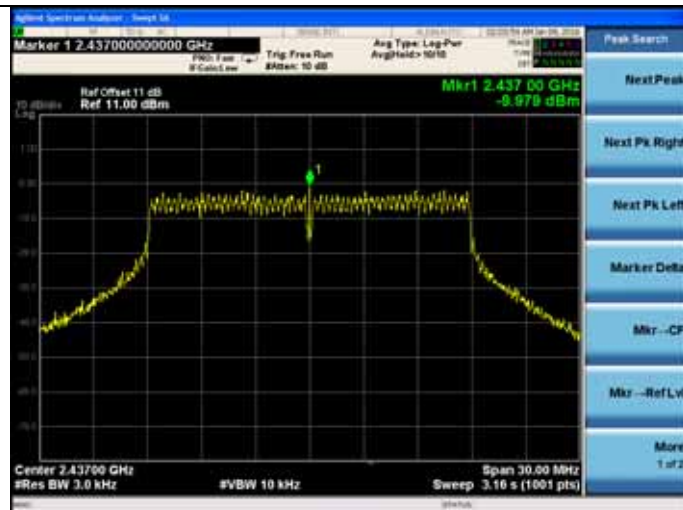
Test Mode: IEEE 802.11n HT20
Test CH1: 2412MHz



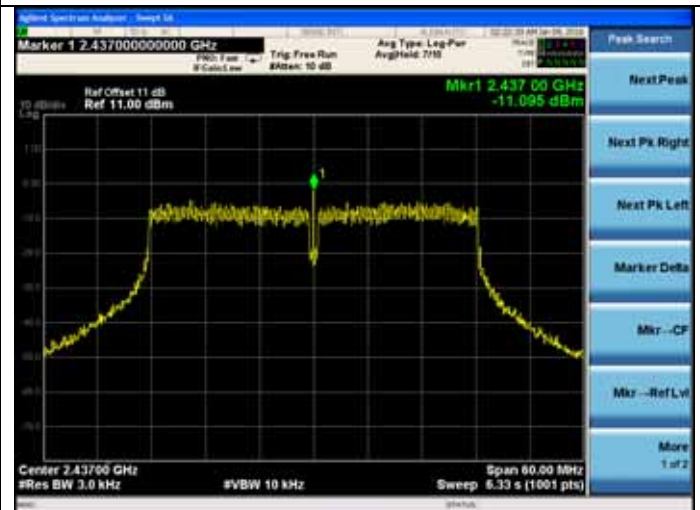
Test Mode: IEEE 802.11n HT40
Test CH3: 2422MHz



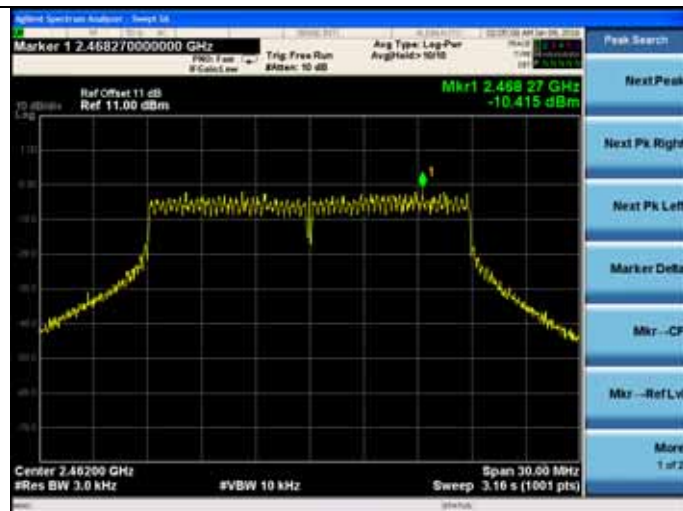
Test CH6: 2437MHz



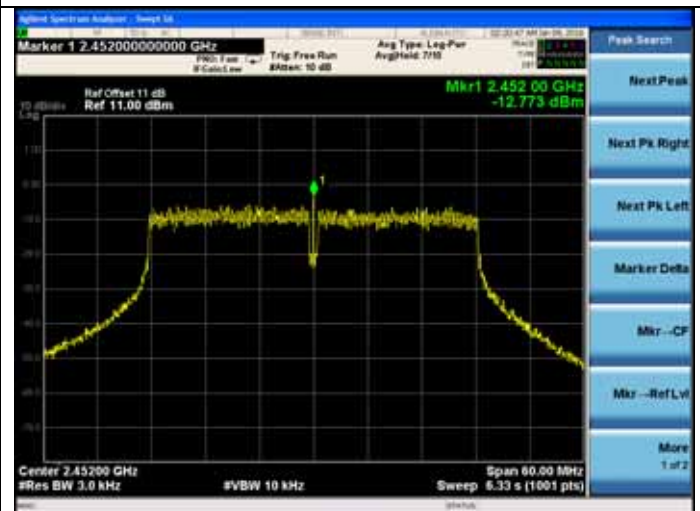
Test CH6: 2437MHz



Test CH11: 2462MHz



Test CH9: 2452MHz

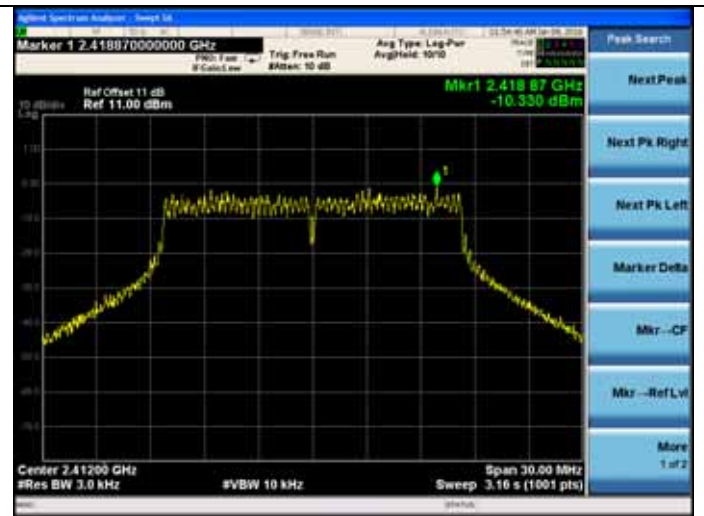


ANT2:

Test Mode: IEEE 802.11b
Test CH1: 2412MHz



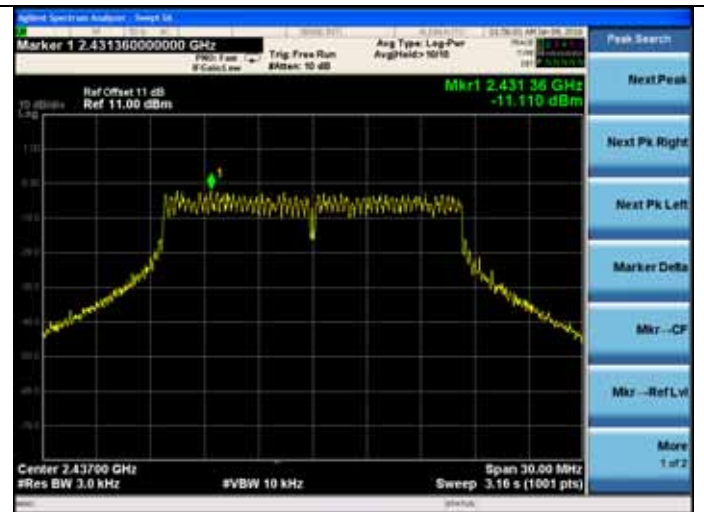
Test Mode: IEEE 802.11g
Test CH1: 2412MHz



Test CH6: 2437MHz



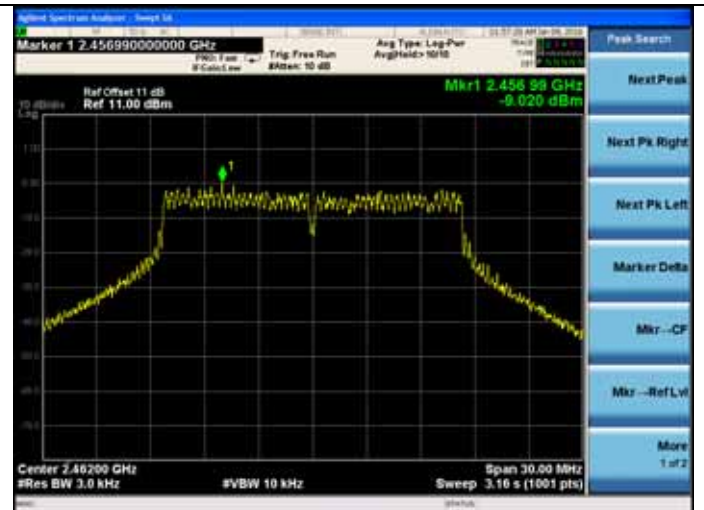
Test CH6: 2437MHz



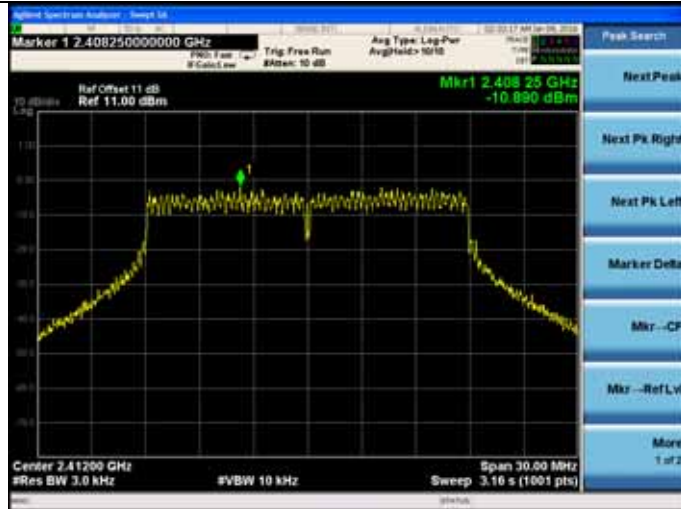
Test CH11: 2462MHz



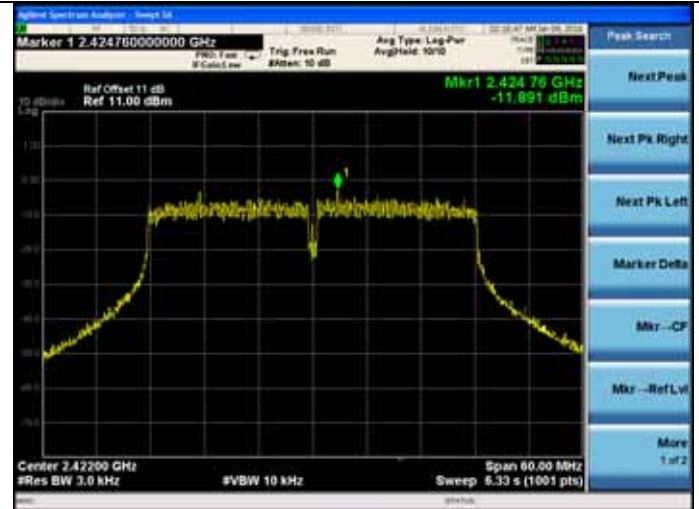
Test CH11: 2462MHz



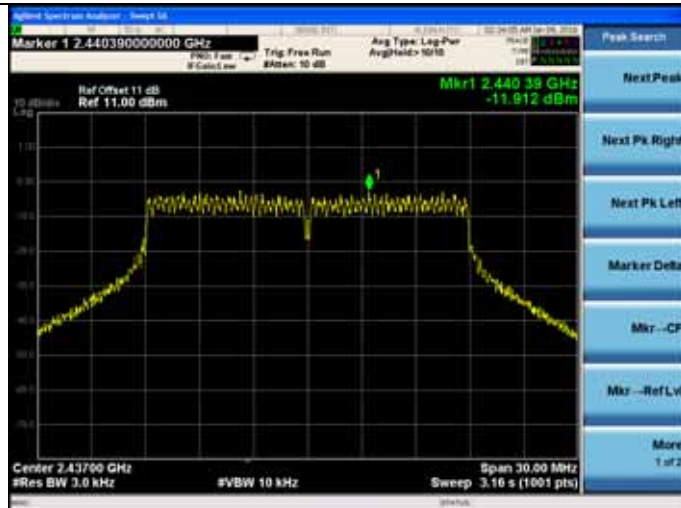
Test Mode: IEEE 802.11n HT20
Test CH1: 2412MHz



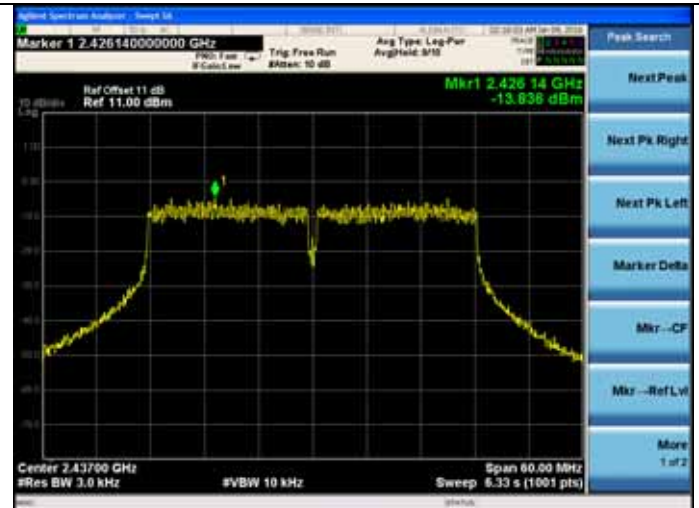
Test Mode: IEEE 802.11n HT40
Test CH3: 2422MHz



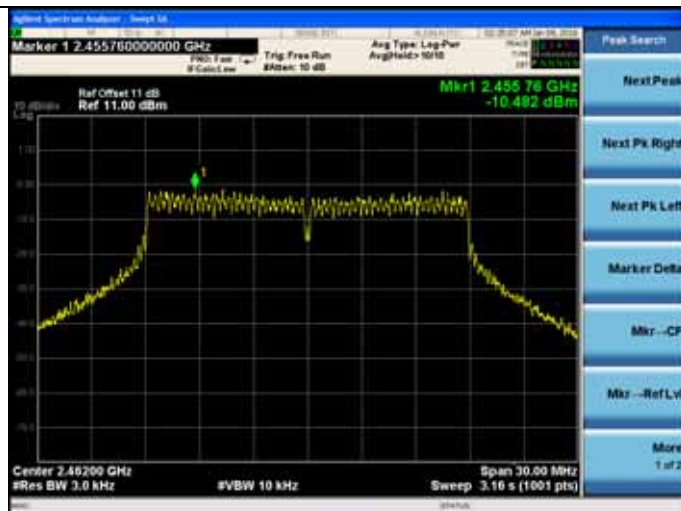
Test CH6: 2437MHz



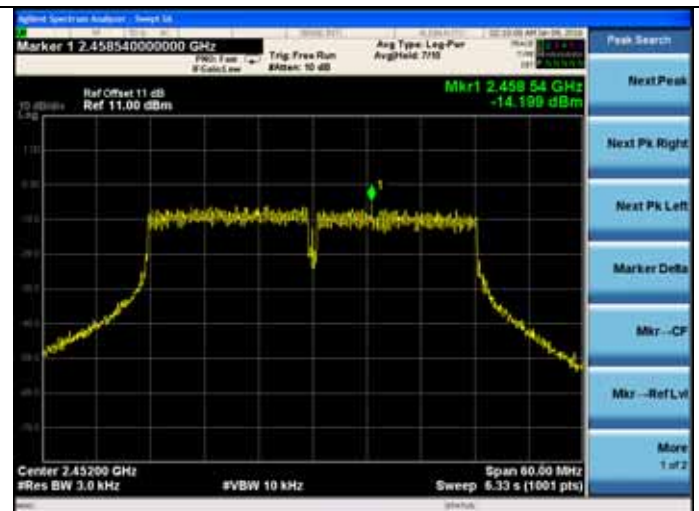
Test CH6: 2437MHz



Test CH11: 2462MHz



Test CH9: 2452MHz

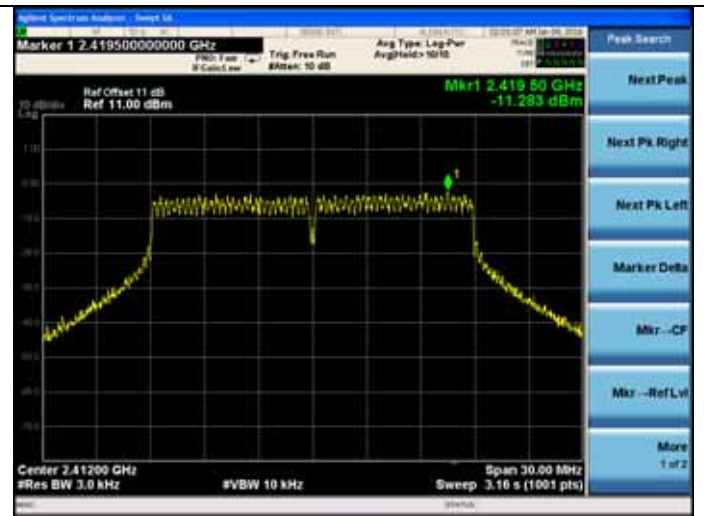


ANT3:

Test Mode: IEEE 802.11b
Test CH1: 2412MHz



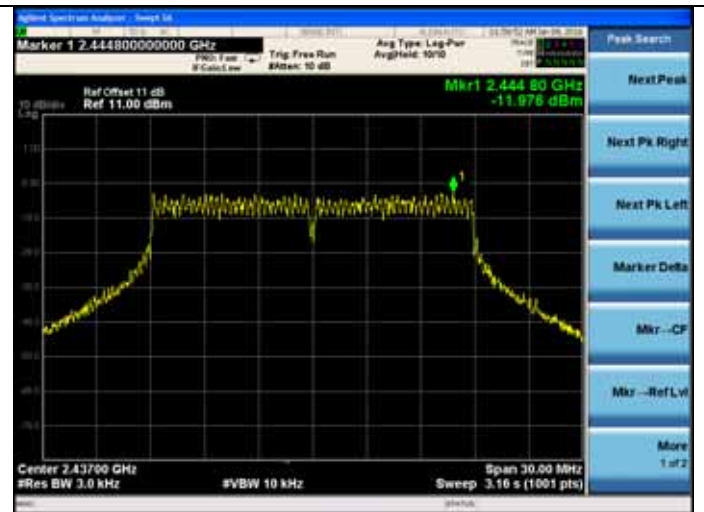
Test Mode: IEEE 802.11g
Test CH1: 2412MHz



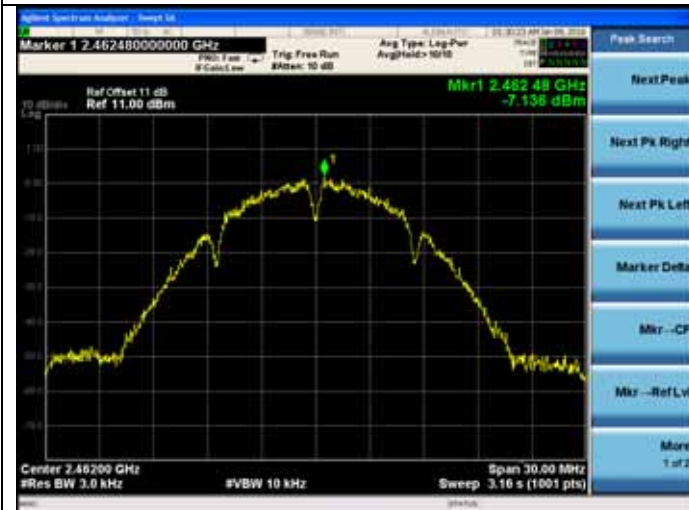
Test CH6: 2437MHz



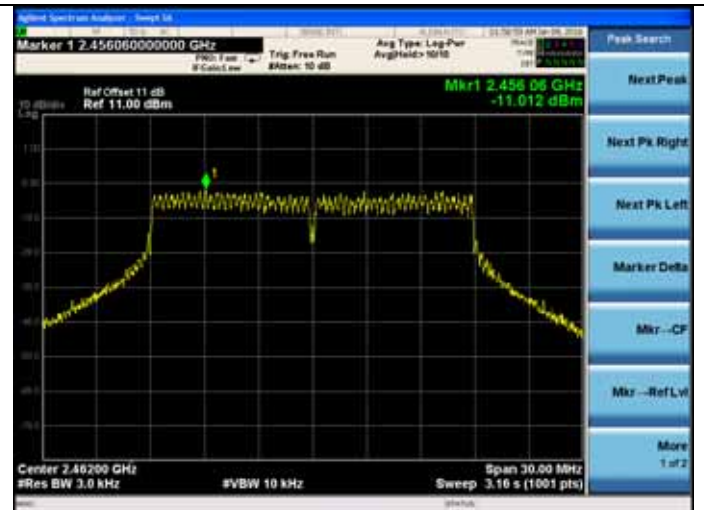
Test CH6: 2437MHz



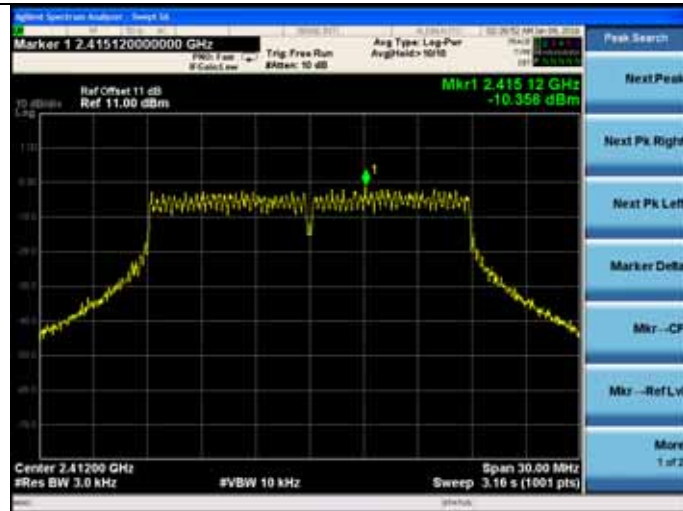
Test CH11: 2462MHz



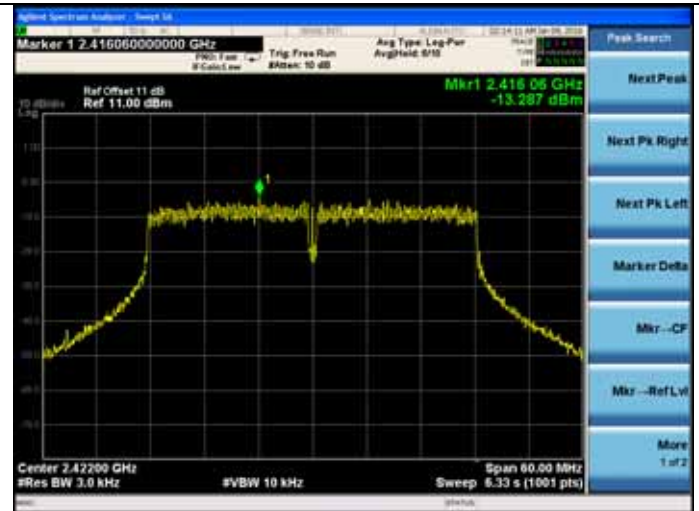
Test CH11: 2462MHz



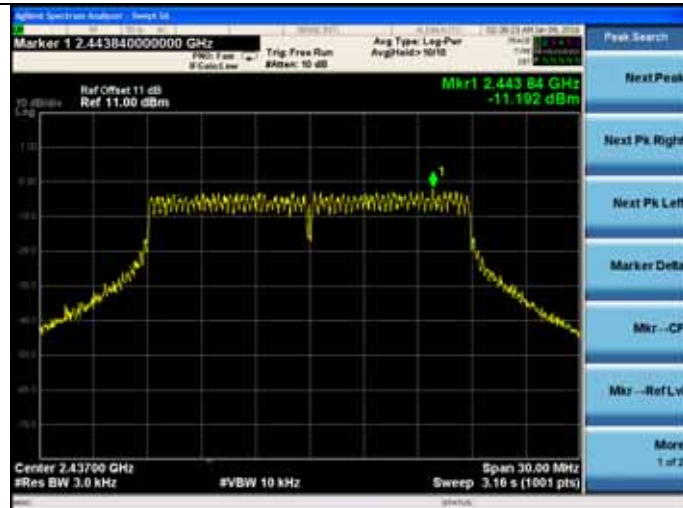
Test Mode: IEEE 802.11n HT20
Test CH1: 2412MHz



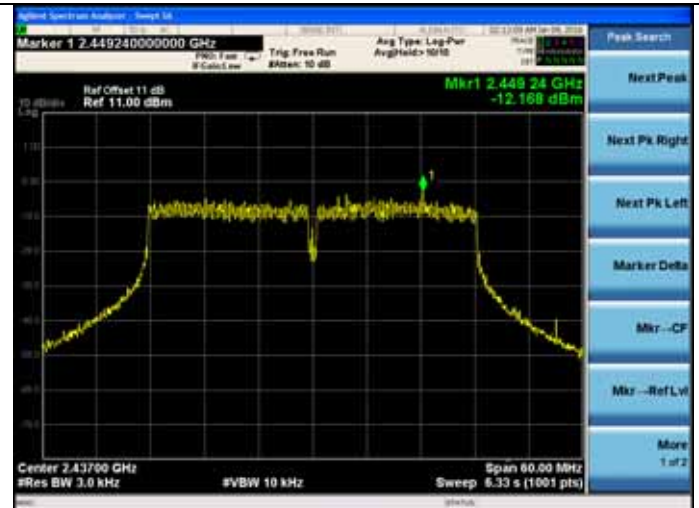
Test Mode: IEEE 802.11n HT40
Test CH3: 2422MHz



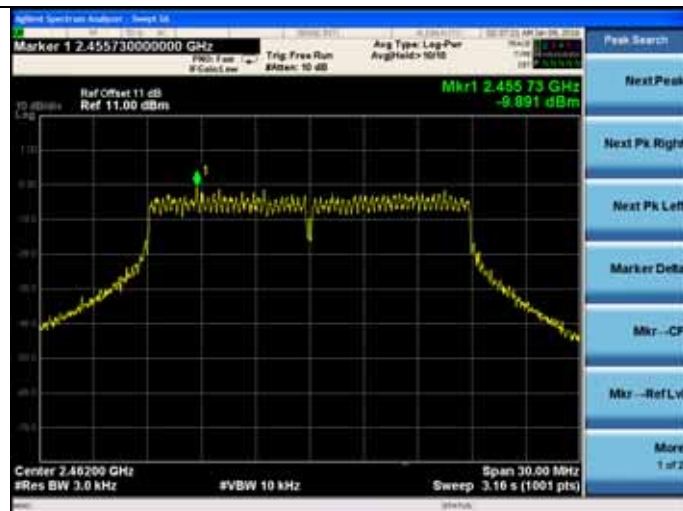
Test CH6: 2437MHz



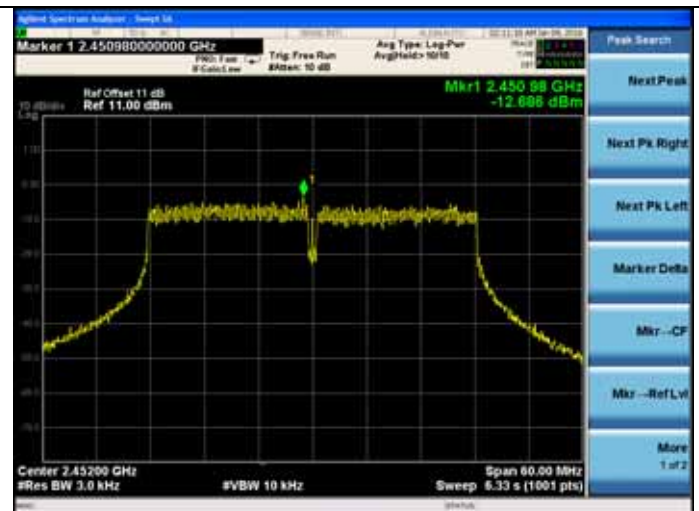
Test CH6: 2437MHz



Test CH11: 2462MHz



Test CH9: 2452MHz



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 Built-in Omni 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 4dBi.

12.DEVIATION TO TEST SPECIFICATIONS

[NONE]