



### 7.3. 6dB BANDWIDTH MEASUREMENT

#### 7.3.1. LIMITS

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz. The minimum 6 dB bandwidth shall be at least 500 kHz.

#### 7.3.2. TEST INSTRUMENTS

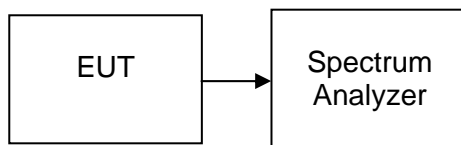
Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2016	02/20/2017

#### 7.3.3. TEST PROCEDURES (please refer to measurement standard)

##### 8.1 Option 2:

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW  $\geq$  3 RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be  $\geq$  6 dB.

#### 7.3.4. TEST SETUP



**7.3.5. TEST RESULTS***No non-compliance noted***Test Data****Test mode: IEEE 802.11b (Antenna 0)**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	8119	>500	PASS
Mid	2437	8118		PASS
High	2462	8115		PASS

**Test mode: IEEE 802.11g (Antenna 0)**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	15120	>500	PASS
Mid	2437	15110		PASS
High	2462	15150		PASS

**Test mode: IEEE 802.11g (Antenna 1)**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	15120	>500	PASS
Mid	2437	15130		PASS
High	2462	15130		PASS

**Test mode: IEEE 802.11n HT20 MHz (Antenna 0)**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	15110	>500	PASS
Mid	2437	15100		PASS
High	2462	15100		PASS

**Test mode: IEEE 802.11n HT20 MHz (Antenna 1)**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	15120	>500	PASS
Mid	2437	15110		PASS
High	2462	15120		PASS

**Test mode: IEEE 802.11n HT40 MHz (Antenna 0)**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2422	35170	>500	PASS
Mid	2437	35150		PASS
High	2452	35180		PASS

**Test mode: IEEE 802.11n HT40 MHz (Antenna 1)**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2422	35720	>500	PASS
Mid	2437	36330		PASS
High	2452	35780		PASS



## Test Plot

### IEEE 802.11b mode (Antenna 0)

#### 6dB Bandwidth (CH Low)



#### 6dB Bandwidth (CH Mid)





### 6dB Bandwidth (CH High)





## IEEE 802.11g mode (Antenna 0)

## 6dB Bandwidth (CH Low)



## 6dB Bandwidth (CH Mid)





### 6dB Bandwidth (CH High)



### IEEE 802.11g mode (Antenna 1)

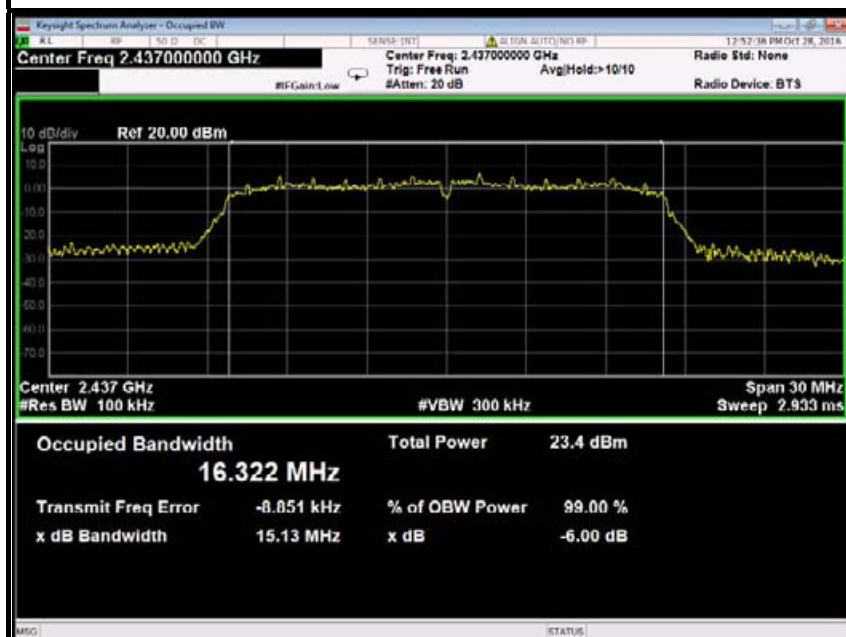
### 6dB Bandwidth (CH Low)







### 6dB Bandwidth (CH Mid)



### 6dB Bandwidth (CH High)





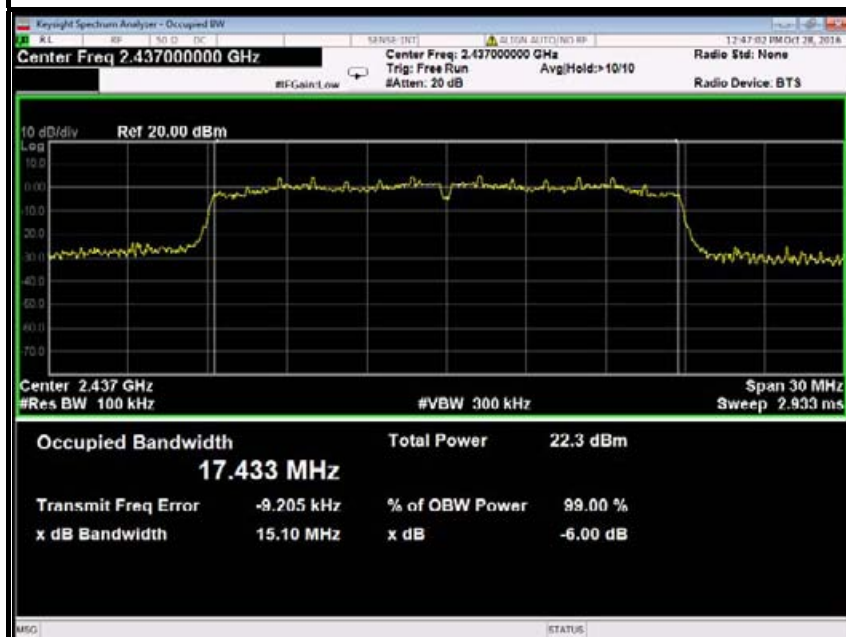


## IEEE 802.11n HT20 MHz mode (Antenna 0)

## 6dB Bandwidth (CH Low)



## 6dB Bandwidth (CH Mid)





### 6dB Bandwidth (CH High)



### IEEE 802.11n HT20 MHz mode (Antenna 1)

### 6dB Bandwidth (CH Low)





### 6dB Bandwidth (CH Mid)



### 6dB Bandwidth (CH High)



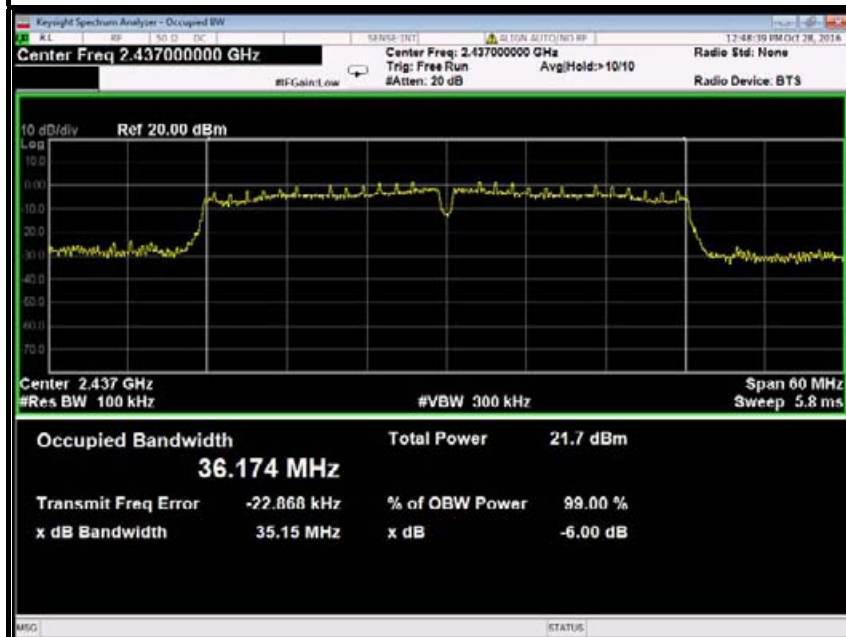


## IEEE 802.11n HT40 MHz mode (Antenna 0)

## 6dB Bandwidth (CH Low)



## 6dB Bandwidth (CH Mid)





### 6dB Bandwidth (CH High)



### IEEE 802.11n HT40 MHz mode (Antenna 1)

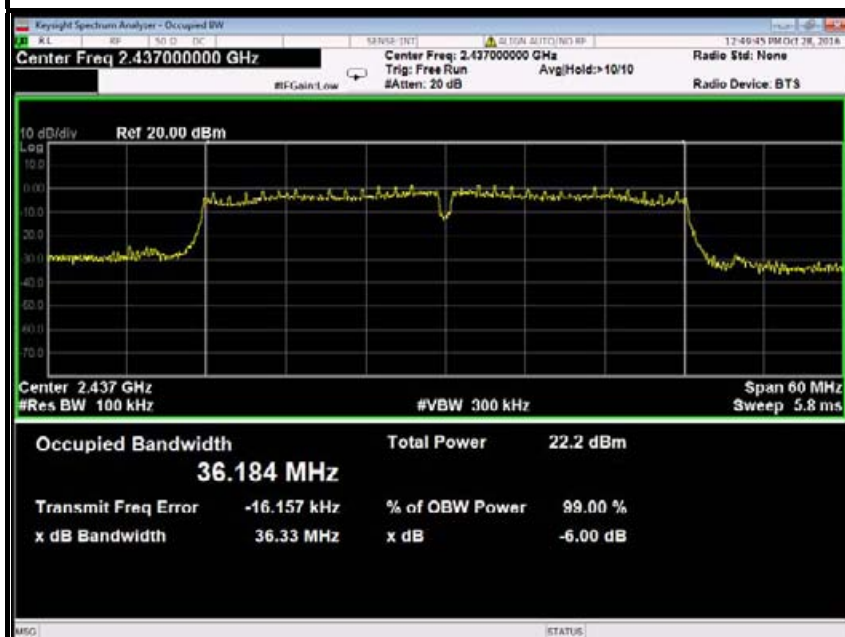
### 6dB Bandwidth (CH Low)







### 6dB Bandwidth (CH Mid)



### 6dB Bandwidth (CH High)





## 7.4. ANTENNA GAIN

### **MEASUREMENT**

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For normal WLAN devices, the DSSS mode is used.

### **MEASUREMENT PARAMETERS**

Measurement parameter	
Detector	Peak
Sweep time	Auto
Resolution bandwidth	3 MHz
Video bandwidth	3 MHz
Trace-Mode	Max hold

### **LIMITS**

FCC	IC
Antenna Gain	
6dBi	





## **TEST RESULTS**

### **IEEE 802.11g mode (Antenna 0)**

<b>T<sub>nom</sub></b>	<b>V<sub>nom</sub></b>	<b>Lowest channel 2412MHz</b>	<b>Middle channel 2437MHz</b>	<b>Highest channel 2462MHz</b>
Conducted power [dBm/MHz] Measured with DSSS modulation		9.95	10.02	10.18
Radiated power [dBm/MHz] Measured with DSSS modulation		14.41	14.38	14.48
Gain [dBi] Calculated		4.46	4.36	4.30
Measurement uncertainty		$\pm 1.5$ dB (cond.) / $\pm 3$ dB (rad.)		

### **IEEE 802.11g mode (Antenna 1)**

<b>T<sub>nom</sub></b>	<b>V<sub>nom</sub></b>	<b>Lowest channel 2412MHz</b>	<b>Middle channel 2437MHz</b>	<b>Highest channel 2462MHz</b>
Conducted power [dBm/MHz] Measured with DSSS modulation		9.14	10.12	10.42
Radiated power [dBm/MHz] Measured with DSSS modulation		13.48	14.28	14.42
Gain [dBi] Calculated		4.34	4.16	4.00
Measurement uncertainty		$\pm 1.5$ dB (cond.) / $\pm 3$ dB (rad.)		



## 7.5. PEAK OUTPUT POWER

### 7.5.1. LIMITS

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 7.5.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Power Meter	Anritsu	ML2495A	1204003	02/21/2016	02/20/2017
Power Sensor	Anritsu	MA2411B	1126150	02/21/2016	02/20/2017

### 7.5.3. TEST PROCEDURES (please refer to measurement standard)

#### 9.1.1 RBW $\geq$ DTS bandwidth

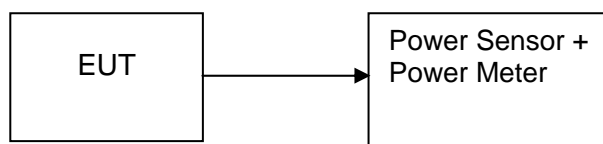
This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the *DTS bandwidth*.

- a) Set the RBW  $\geq$  DTS bandwidth.
- b) Set VBW  $\geq$  3 RBW.
- c) Set span  $\geq$  3 x RBW
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

#### 9.1.2 PKPM1 Peak power meter method

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

### 7.5.4. TEST SETUP



**7.5.5. TEST RESULTS***No non-compliance noted***Test Data****Test mode: IEEE 802.11b (Antenna 0)**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Peak / AVG	Result
Low	2412	20.30	0.10715	1	Peak	PASS
Mid	2437	20.20	0.10471			PASS
High	2462	20.07	0.10162			PASS
Low	2412	17.35	0.05433	1	AVG	PASS
Mid	2437	16.95	0.04955			PASS
High	2462	16.82	0.04808			PASS

**Test mode: IEEE 802.11g (Antenna 0)**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Peak / AVG	Result
Low	2412	22.08	0.16144	1	Peak	PASS
Mid	2437	25.02	0.31769			PASS
High	2462	22.21	0.16634			PASS
Low	2412	13.38	0.02178	1	AVG	PASS
Mid	2437	16.88	0.04875			PASS
High	2462	13.54	0.02259			PASS

**Test mode: IEEE 802.11g (Antenna 1)**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Peak / AVG	Result
Low	2412	23.27	0.21232	1	Peak	PASS
Mid	2437	25.07	0.32137			PASS
High	2462	22.55	0.17989			PASS
Low	2412	12.80	0.01905	1	AVG	PASS
Mid	2437	17.89	0.06152			PASS
High	2462	13.38	0.02178			PASS

**Test mode: IEEE 802.11n HT20 MHz(Combine with Antenna 0 and Antenna 1)**

Channel	Frequency (MHz)	Output Power (dBm)			Output Power (W)	Limit (W)	Peak / AVG	Result
		Antenna 0	Antenna 1	Total				
Low	2412	20.03	21.59	23.89	0.24490	1	Peak	PASS
Mid	2437	24.14	24.66	27.42	0.55183			PASS
High	2462	19.83	22.24	24.21	0.26366			PASS
Low	2412	11.09	11.40	14.26	0.02666	1	AVG	PASS
Mid	2437	14.83	15.23	18.04	0.06375			PASS
High	2462	11.27	12.01	14.67	0.02928			PASS

**Test mode: IEEE 802.11n HT40 MHz(Combine with Antenna 0 and Antenna 1)**

Channel	Frequency (MHz)	Output Power (dBm)			Output Power (W)	Limit (W)	Peak / AVG	Result
		Antenna 0	Antenna 1	Total				
Low	2422	16.65	16.65	19.66	0.09248	1	Peak	PASS
Mid	2437	23.39	23.24	26.33	0.42914			PASS
High	2452	17.47	18.07	20.79	0.11997			PASS
Low	2422	7.37	6.89	10.15	0.01034	1	AVG	PASS
Mid	2437	15.02	15.03	18.04	0.06361			PASS
High	2452	8.55	8.27	11.42	0.01388			PASS



## 7.6. BAND EDGES MEASUREMENT

### 7.6.1. LIMITS

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

### 7.6.2. TEST INSTRUMENTS

Radiated Emission Test Site 966(2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	02/21/2016	02/20/2017
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/21/2016	02/20/2017
Amplifier	MITEQ	AM-1604-3000	1123808	02/21/2016	02/20/2017
High Noise Amplifier	Agilent	8449B	3008A01838	02/21/2016	02/20/2017
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	02/21/2016	02/20/2017
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/21/2016	02/20/2017
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/21/2016	02/20/2017
Loop Antenna	COM-POWER	AL-130	121044	02/21/2016	02/20/2017
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/21/2016	02/20/2017
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

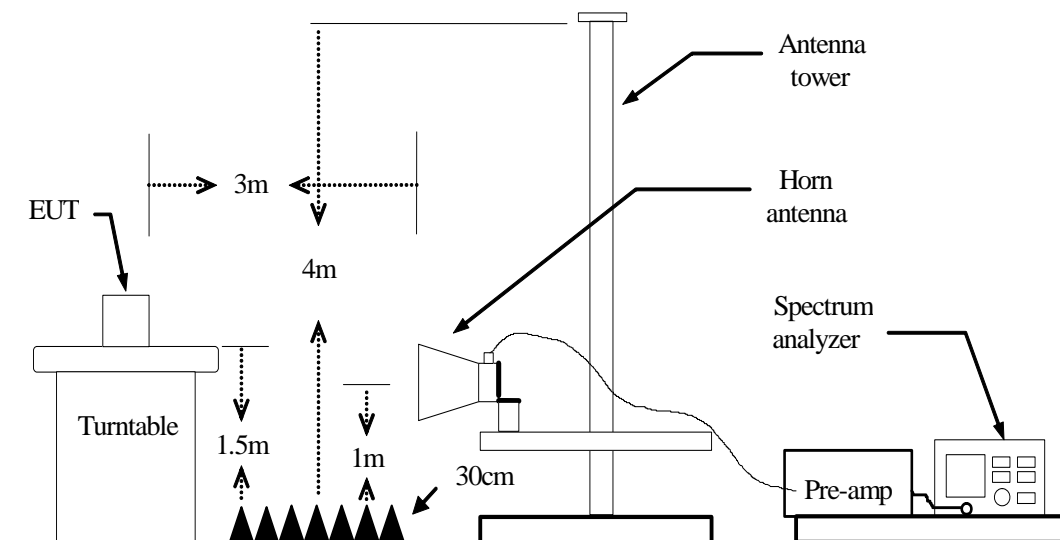
- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. The FCC Site Registration number is 101879.  
3. N.C.R = No Calibration Required.



### 7.6.3. TEST PROCEDURES (please refer to measurement standard)

1. The EUT is placed on a turntable, which is 1.5m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO / Detector=Peak
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

### 7.6.4. TEST SETUP

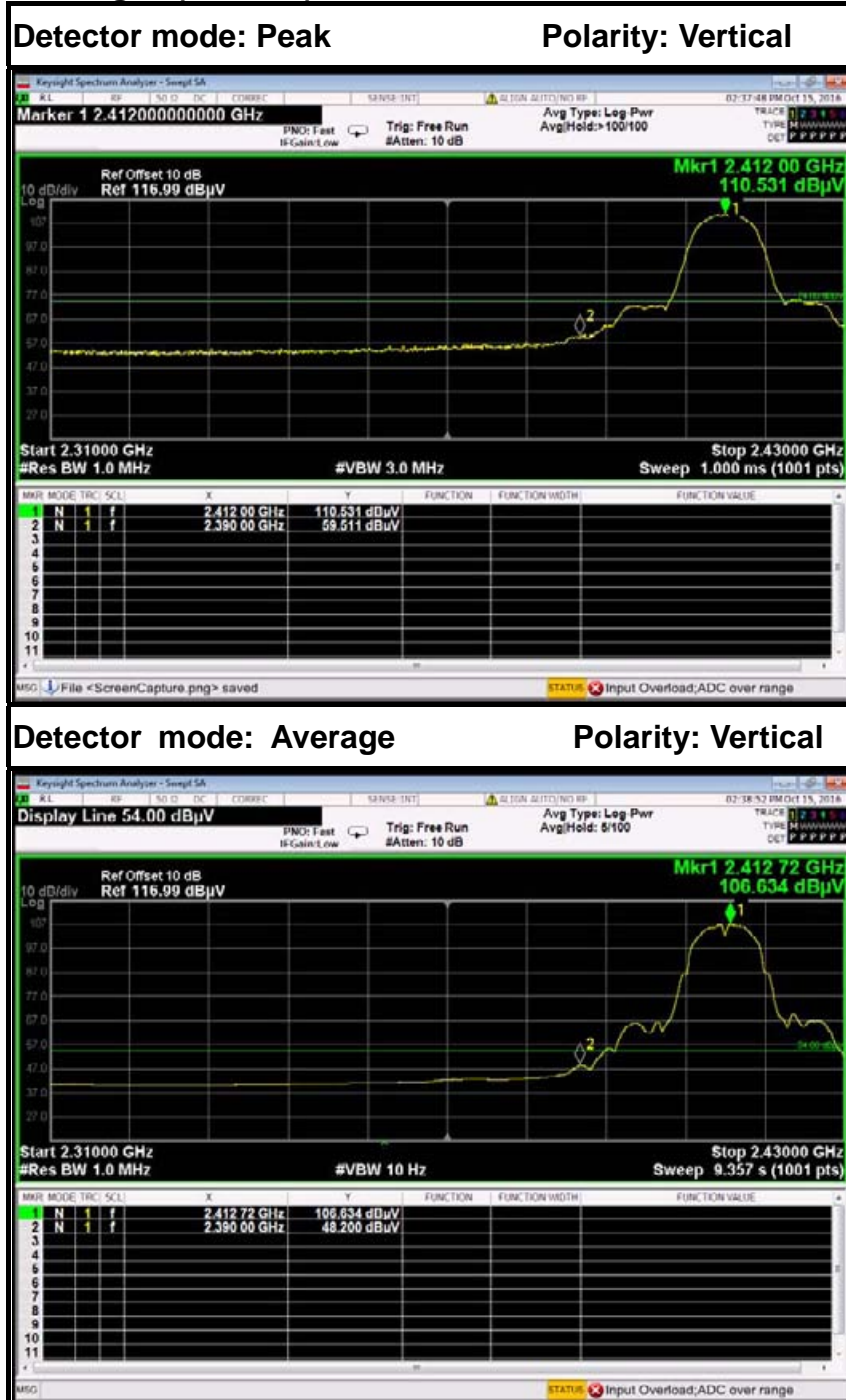




## 7.6.5. TEST RESULTS

Test Plot

IEEE 802.11b mode (Antenna 0)  
Band Edges (CH Low)



No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBu V/m)	Limit (dBu V/m)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	52.91	-6.60	59.51	74.00	-14.49	Peak	Vertical
2	2390.0000	41.60	-6.60	48.20	54.00	-5.80	Average	Vertical





Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	54.67	-6.60	61.27	74.00	-12.73	Peak	Horizontal
2	2390.0000	43.68	-6.60	50.28	54.00	-3.72	Average	Horizontal



## Band Edges (CH High)

Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

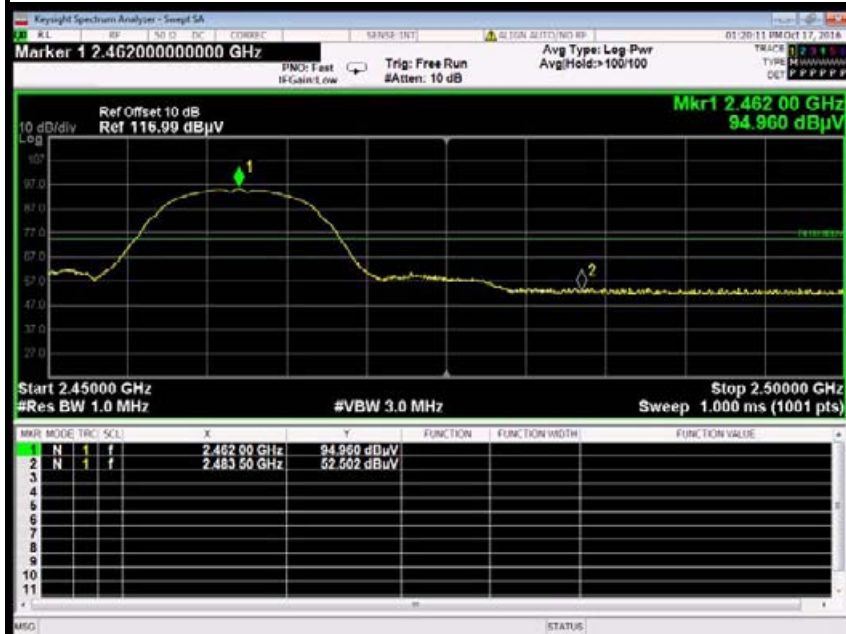


No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBu V/m)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	58.09	-6.24	64.33	74.00	-9.67	Peak	Vertical
2	2483.5000	44.44	-6.24	50.68	54.00	-3.32	Average	Vertical



Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBu V/m)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	46.26	-6.24	52.50	74.00	-21.50	Peak	Horizontal
2	2483.5000	34.56	-6.24	40.80	54.00	-13.20	Average	Horizontal

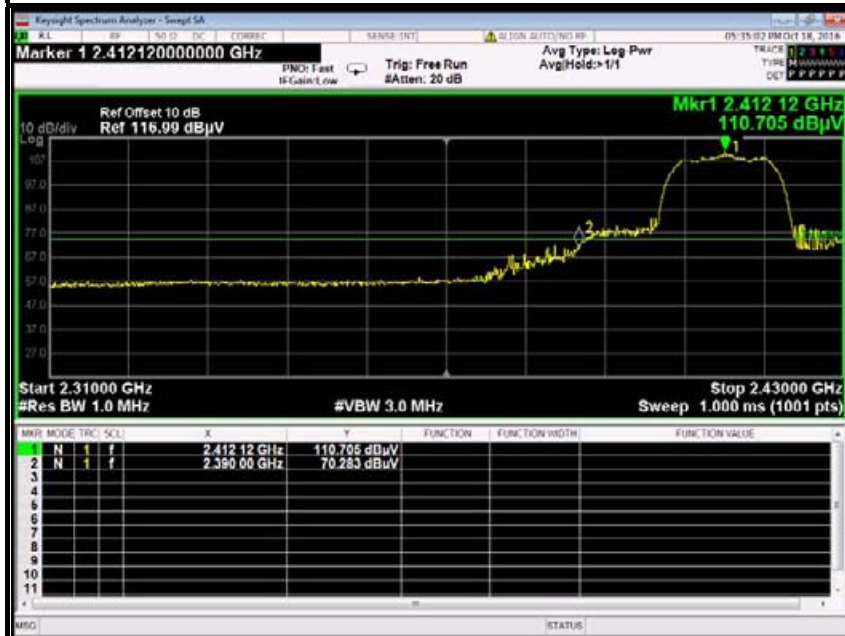


## IEEE 802.11g mode (Antenna 0)

## Band Edges (CH Low)

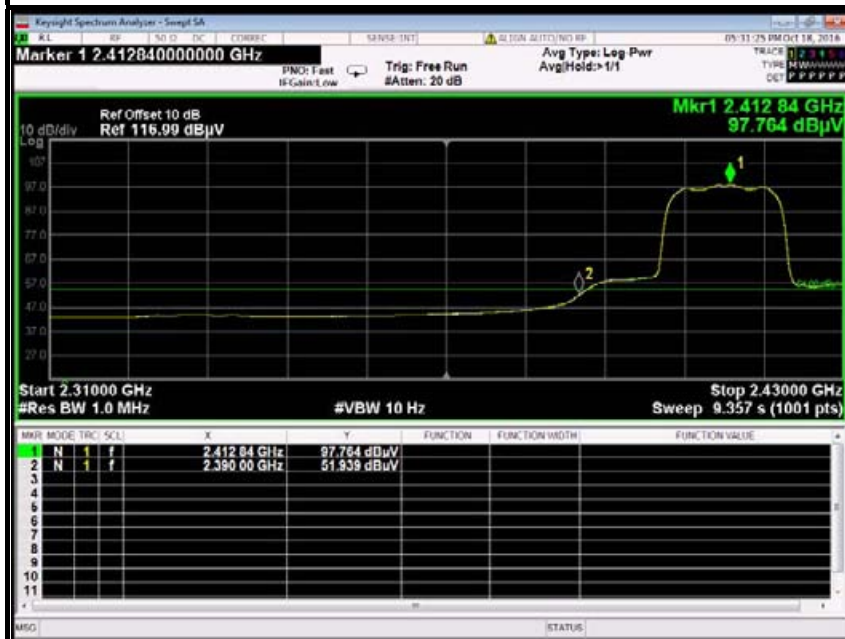
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

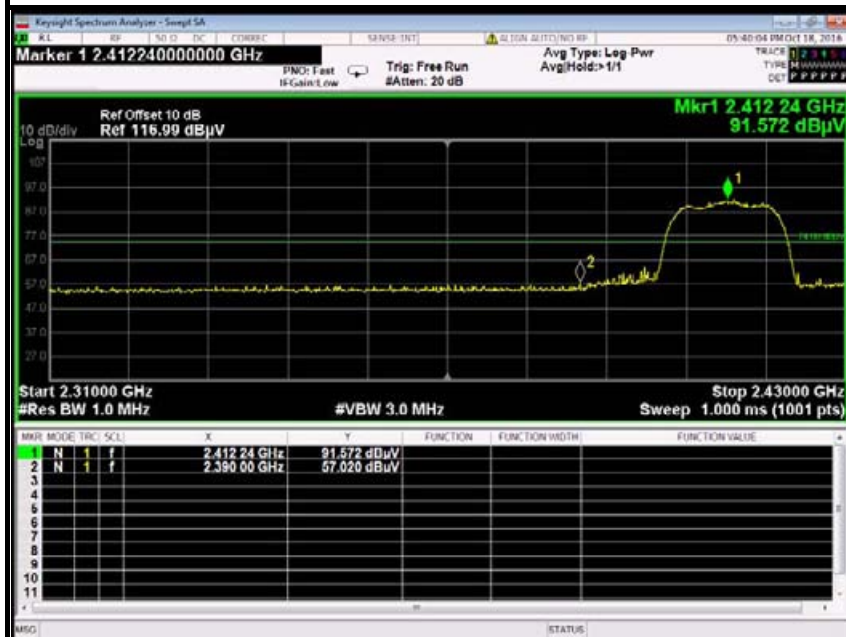


No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	63.68	-6.60	70.28	74.00	-3.72	Peak	Vertical
2	2390.0000	45.34	-6.60	51.94	54.00	-2.06	Average	Vertical



Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBu V/m)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	50.42	-6.60	57.02	74.00	-16.98	Peak	Horizontal
2	2390.0000	36.29	-6.60	42.89	54.00	-11.11	Average	Horizontal





## Band Edges (CH High)

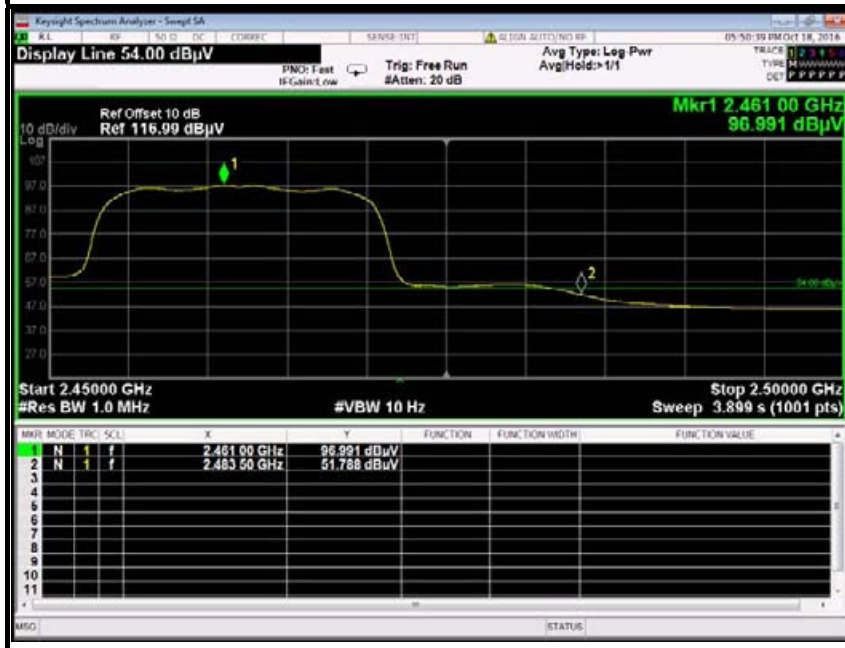
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical



No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBu V/m)	Limit (dBu V/m)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	61.92	-6.24	68.16	74.00	-5.84	Peak	Vertical
2	2483.5000	45.55	-6.24	51.79	54.00	-2.21	Average	Vertical



Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	51.38	-6.24	57.62	74.00	-16.38	Peak	Horizontal
2	2483.5000	37.62	-6.24	43.86	54.00	-10.14	Average	Horizontal





## IEEE 802.11g mode (Antenna 1)

## Band Edges (CH Low)

Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

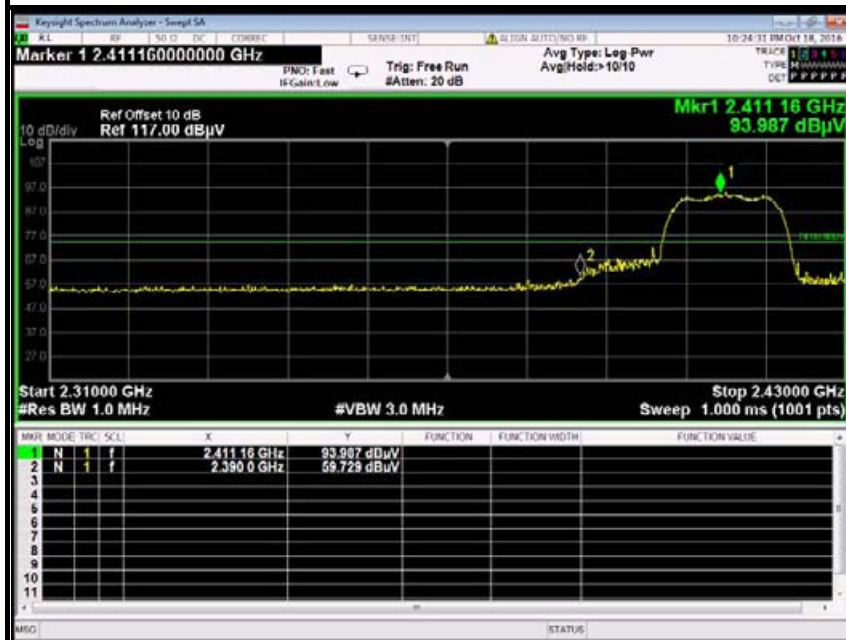


No.	Frequency (MHz)	Reading (dBu V)	Co rrected (dB/m)	Result (dBuV/m)	Limit (dBu V/m)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	64.24	-6.60	70.84	74.00	-3.16	Peak	Vertical
2	2390.0000	46.34	-6.60	52.94	54.00	-1.06	Average	Vertical



Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBu V/m)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	53.13	-6.60	59.73	74.00	-14.27	Peak	Horizontal
2	2390.0000	37.79	-6.60	44.39	54.00	-9.61	Average	Horizontal



## Band Edges (CH High)

Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical



No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBu V/m)	Limit (dBu V/m)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	66.56	-6.24	72.80	74.00	-1.20	Peak	Vertical
2	2483.5000	46.41	-6.24	52.65	54.00	-1.35	Average	Vertical



## Detector mode: Peak

## Polarity: Horizontal



## Detector mode: Average

## Polarity: Horizontal



No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBu V/m)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	55.94	-6.24	62.18	74.00	-11.82	Peak	Horizontal
2	2483.5000	39.78	-6.24	46.02	54.00	-7.98	Average	Horizontal

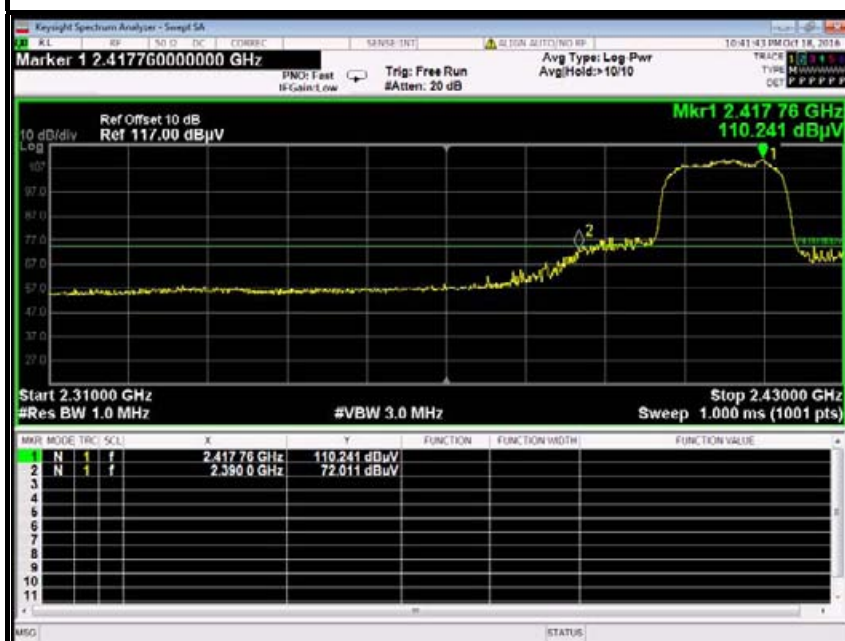


## IEEE 802.11n HT20 MHz mode (Combine with Antenna 0 and Antenna 1)

## Band Edges (CH Low)

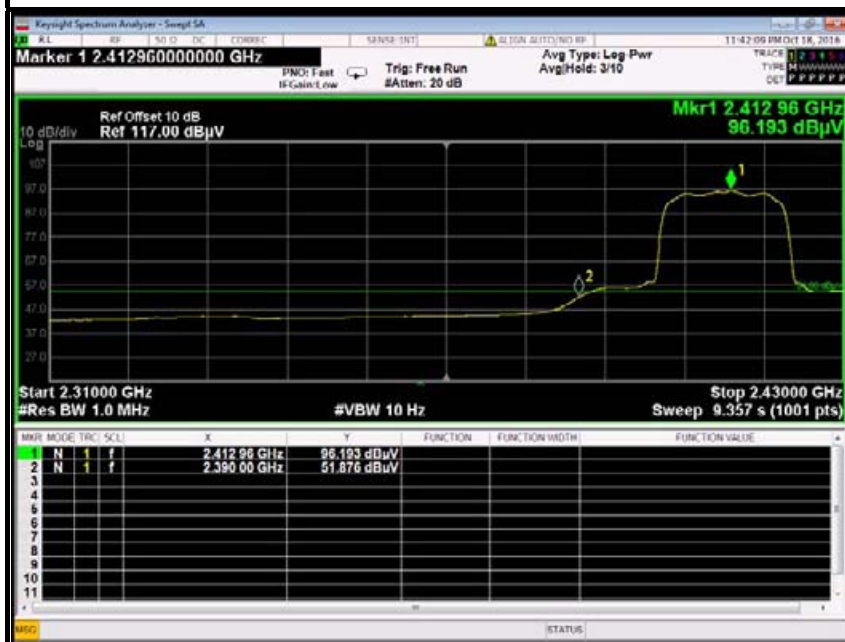
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical



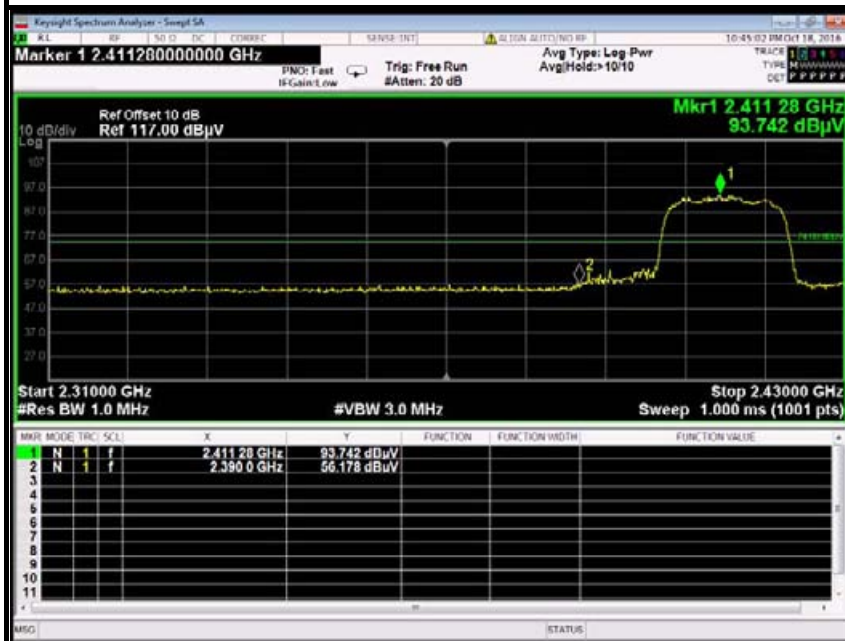
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	65.41	-6.60	72.01	74.00	-1.99	Peak	Vertical
2	2390.0000	45.28	-6.60	51.88	54.00	-2.12	Average	Vertical





Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	49.58	-6.60	56.18	74.00	-17.82	Peak	Horizontal
2	2390.0000	37.11	-6.60	43.71	54.00	-10.29	Average	Horizontal



## Band Edges (CH High)

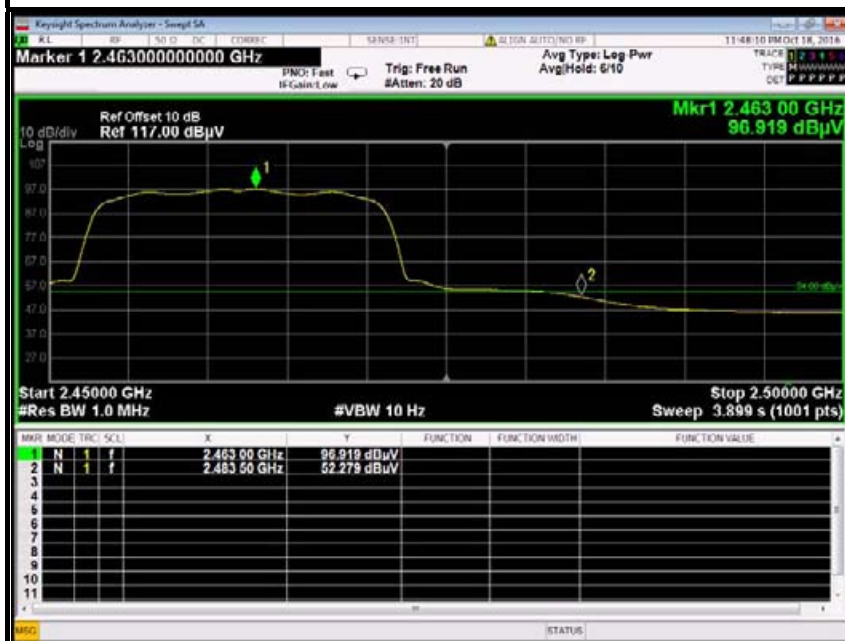
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical



No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBu V/m)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	60.97	-6.24	67.21	74.00	-6.80	Peak	Vertical
2	2483.5000	46.04	-6.24	52.28	54.00	-1.72	Average	Vertical





Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal

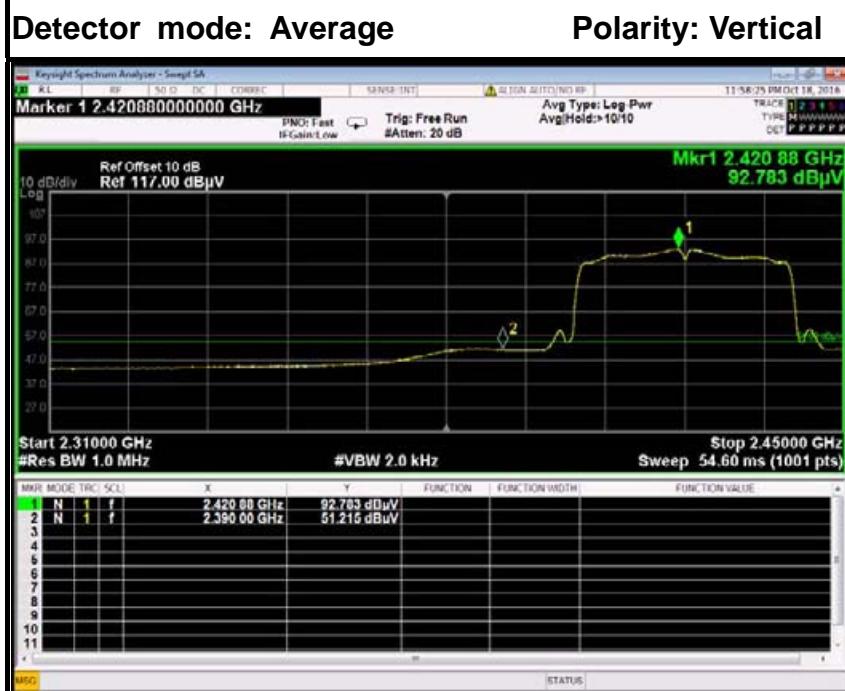
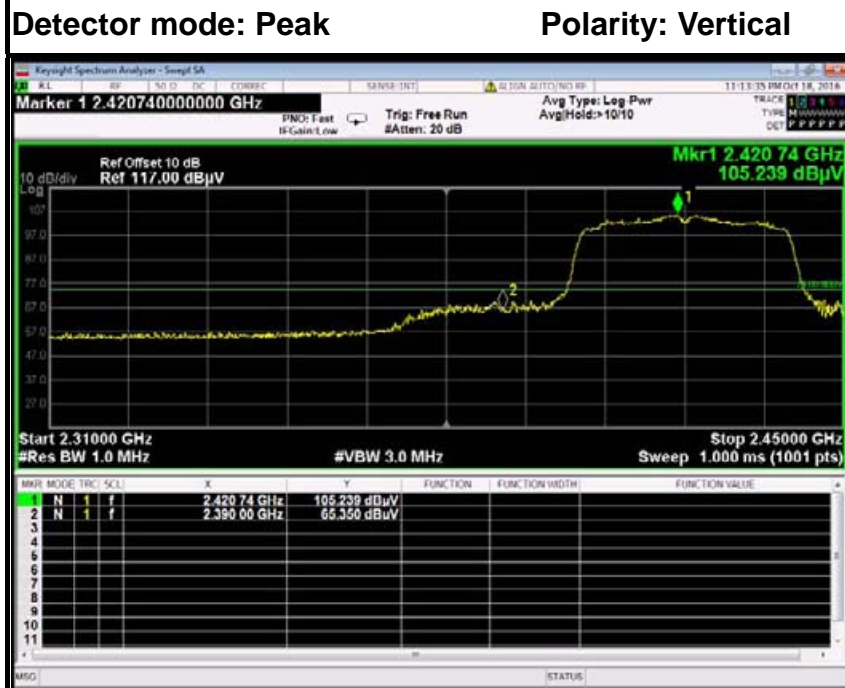


No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	50.28	-6.24	56.52	74.00	-17.48	Peak	Horizontal
2	2483.5000	37.43	-6.24	43.67	54.00	-10.33	Average	Horizontal



## IEEE 802.11n HT40 MHz mode (Combine with Antenna 0 and Antenna 1)

## Band Edges (CH Low)

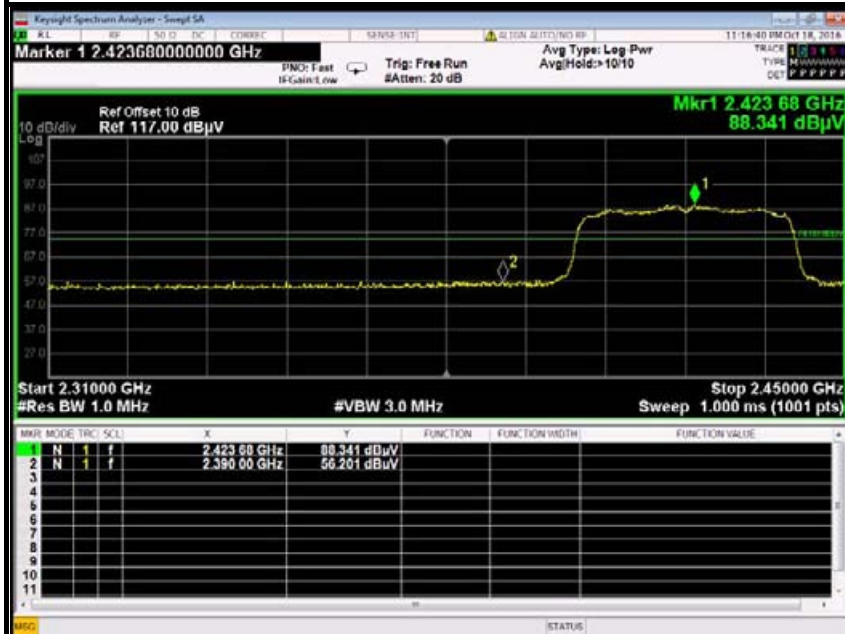


No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBu V/m)	Limit (dBu V/m)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	58.75	-6.60	65.35	74.00	-8.65	Peak	Vertical
2	2390.0000	44.62	-6.60	51.22	54.00	-2.79	Average	Vertical



Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

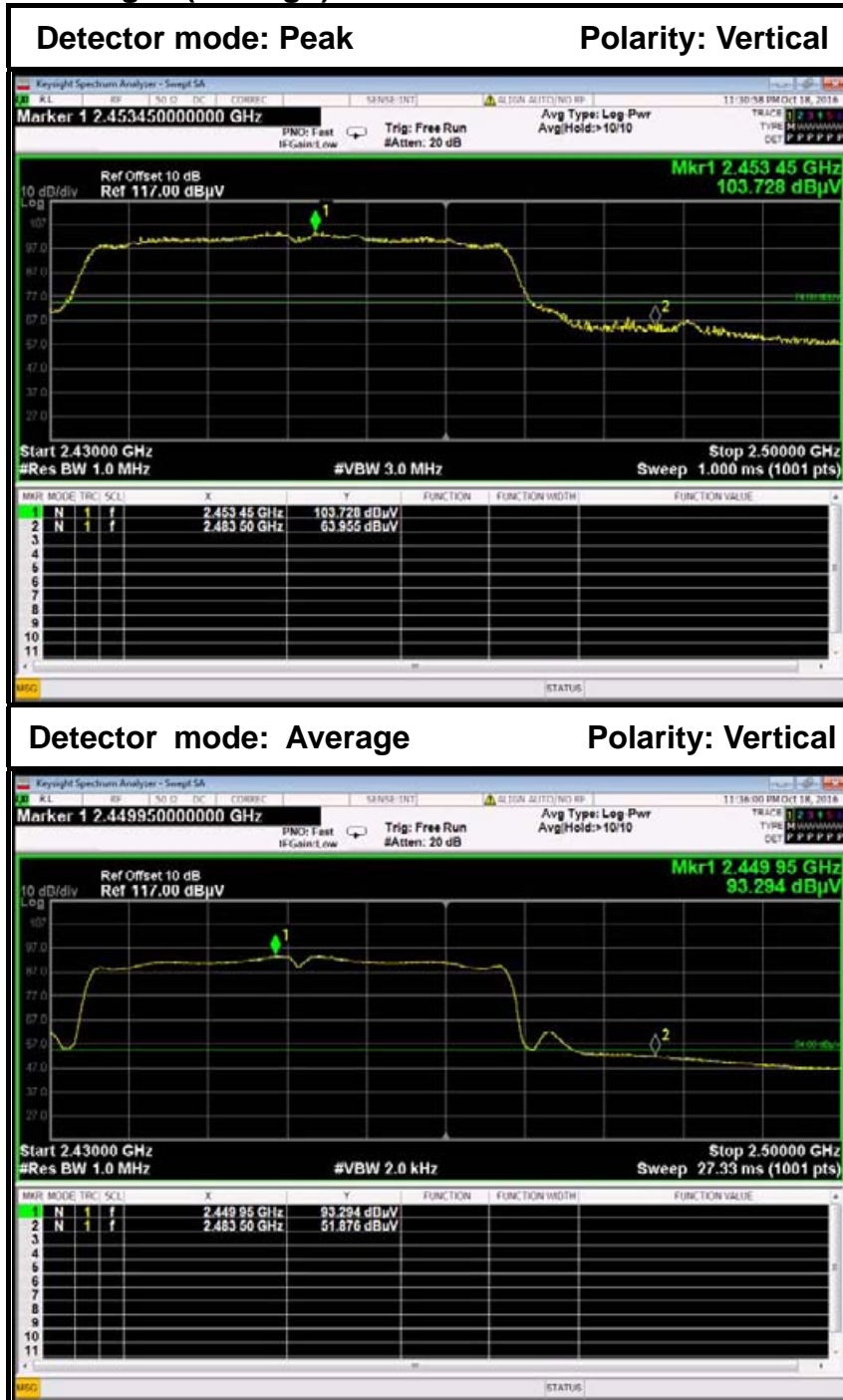
Polarity: Horizontal



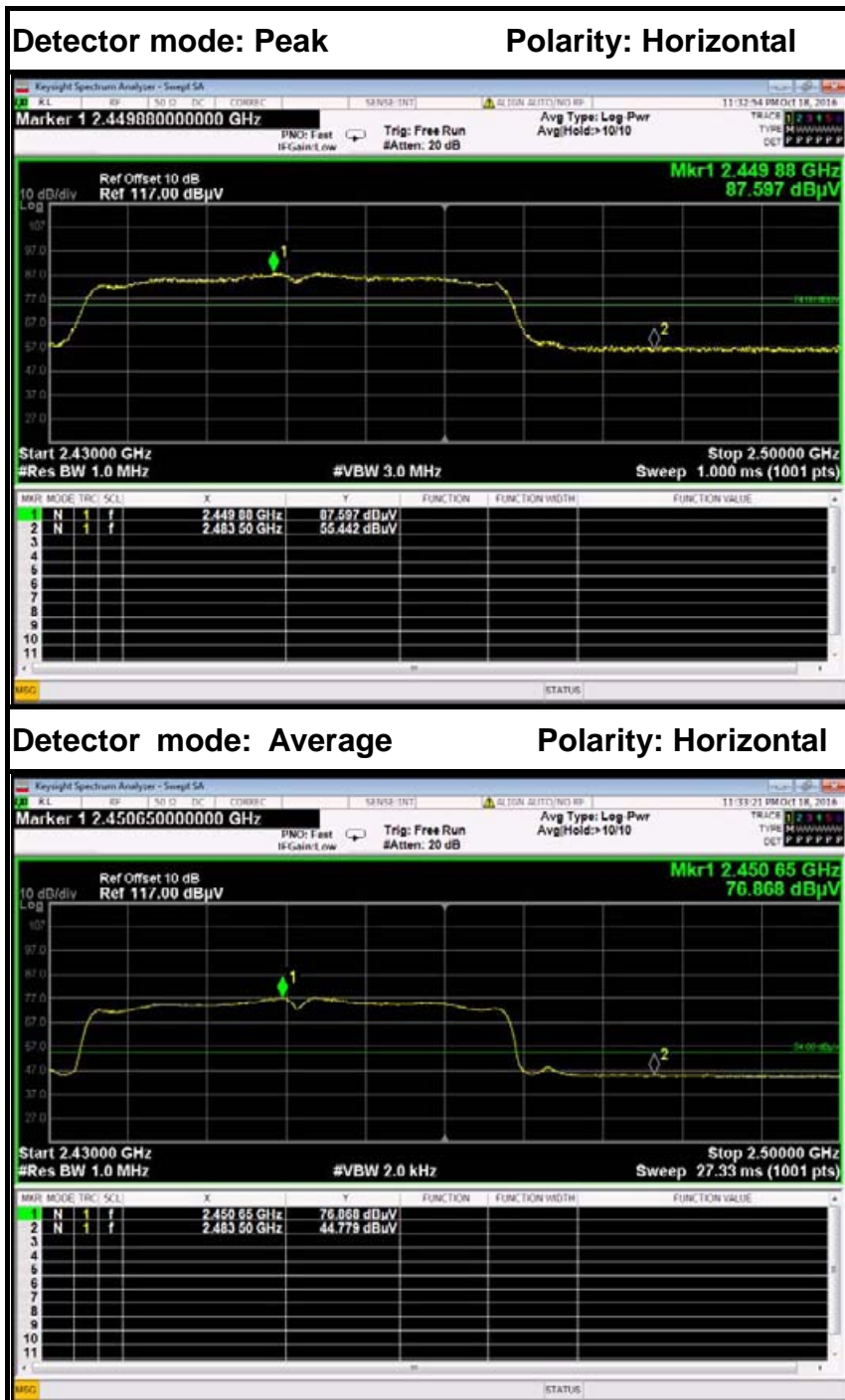
No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBu V/m)	Limit (dBu V/m)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	49.60	-6.60	56.20	74.00	-17.80	Peak	Horizontal
2	2390.0000	37.96	-6.60	44.56	54.00	-9.44	Average	Horizontal



## Band Edges (CH High)



No.	Frequency (MHz)	Reading (dBu V)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBu V/m)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	57.72	-6.24	63.96	74.00	-10.05	Peak	Vertical
2	2483.5000	45.64	-6.24	51.88	54.00	-2.12	Average	Vertical



No.	Frequency (MHz)	Reading (dBu V)	Co rrected (dB/m)	Result (dBuV/m)	Limit (dBu V/m)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	49.20	-6.24	55.44	74.00	-18.56	Peak	Horizontal
2	2483.5000	38.54	-6.24	44.78	54.00	-9.22	Average	Horizontal





## 7.7. PEAK POWER SPECTRAL DENSITY MEASUREMENT

### 7.7.1. LIMITS

According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

### 7.7.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	N9010A	MY55370330	02/21/2016	02/20/2017

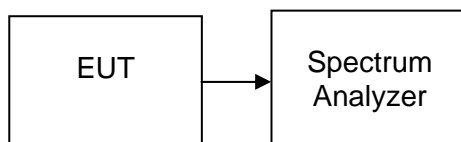
### 7.7.3. TEST PROCEDURES (please refer to measurement standard)

§15.247(e) specifies a conducted power spectral density (PSD) limit of 8 dBm in any 3 kHz band segment within the fundamental EBW during any time interval of continuous transmission. The same method as used to determine the conducted output power shall be used to determine the power spectral density (i.e., if peak-detected fundamental power was measured then use the peak PSD procedure and if average fundamental power was measured then use the average PSD procedure).

#### 10.2 Method PKPSD (peak PSD)

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
4. Set the VBW  $\geq 3 \times \text{RBW}$ .
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### 7.7.4. TEST SETUP







### 7.7.5. TEST RESULTS

*No non-compliance noted*

#### Test Data

##### Test mode: IEEE 802.11b (Antenna 0)

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-6.229	8	PASS
Mid	2437	-5.229		PASS
High	2462	-7.749		PASS

##### Test mode: IEEE 802.11g (Antenna 0)

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-13.418	8	PASS
Mid	2437	-7.798		PASS
High	2462	-13.012		PASS

##### Test mode: IEEE 802.11g (Antenna 1)

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-13.388	8	PASS
Mid	2437	-6.970		PASS
High	2462	-12.262		PASS

##### Test mode: IEEE 802.11n HT20 MHz (Combine with Antenna 0 and Antenna 1)

Channel	Frequency (MHz)	PPSD (dBm)			Limit (dBm)	Test Result
		Antenna 1	Antenna 2	Total		
Low	2412	-14.046	-13.216	-10.601	8	PASS
Mid	2437	-8.191	-8.078	-5.124		PASS
High	2462	-14.854	-12.003	-10.188		PASS

##### Test mode: IEEE 802.11n HT40 MHz (Combine with Antenna 0 and Antenna 1)

Channel	Frequency (MHz)	PPSD (dBm)			Limit (dBm)	Test Result
		Antenna 1	Antenna 2	Total		
Low	2422	-21.684	-22.140	-18.896	8	PASS
Mid	2437	-12.047	-10.907	-8.429		PASS
High	2452	-20.021	-22.057	-17.910		PASS



## Test Plot

### IEEE 802.11b mode (Antenna 0)

#### PPSD (CH Low)



#### PPSD (CH Mid)

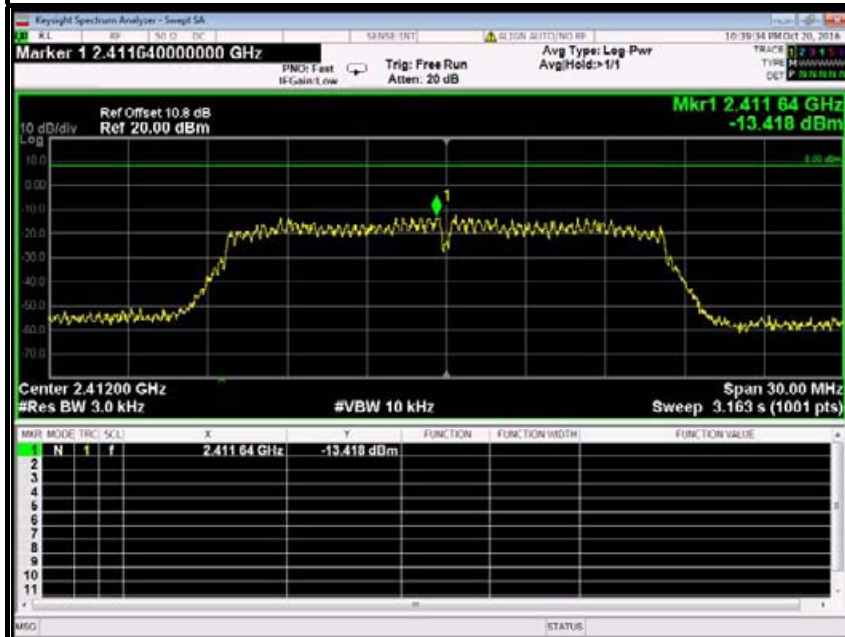




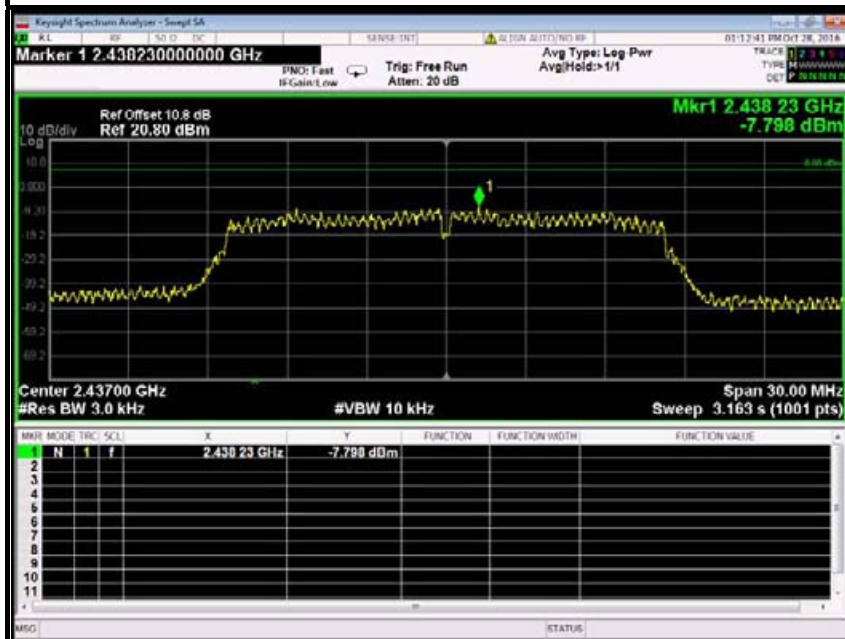


IEEE 802.11g mode (Antenna 0)

PPSD (CH Low)

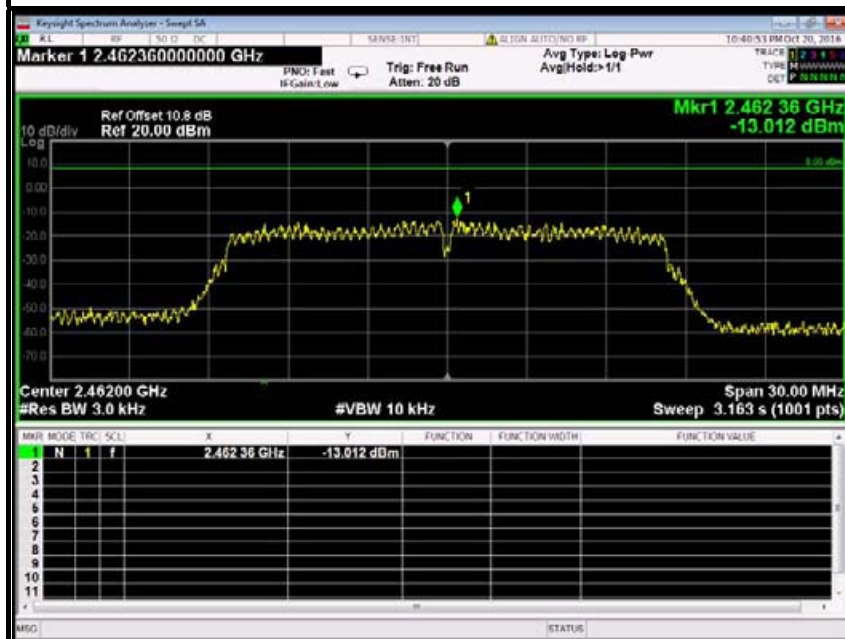


PPSD (CH Mid)



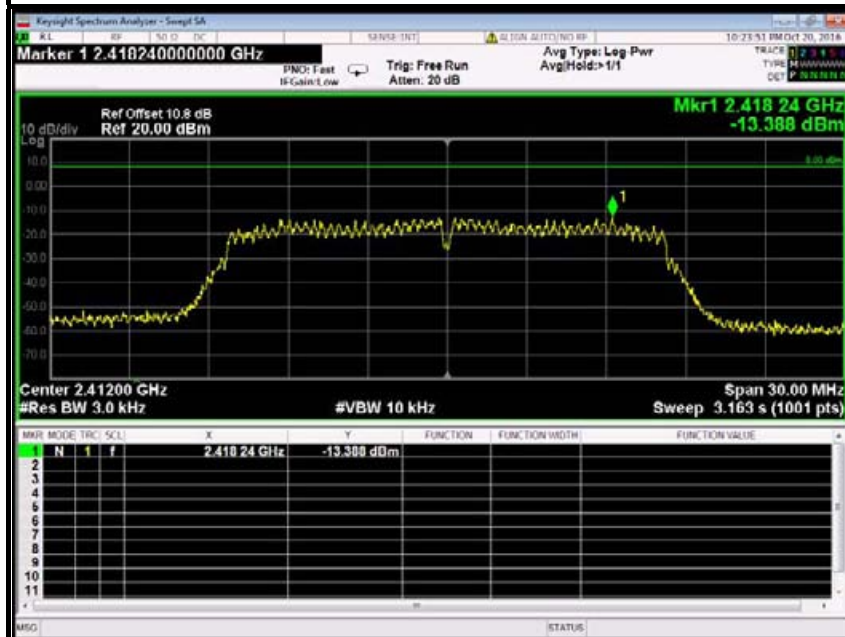


### PPSD (CH High)



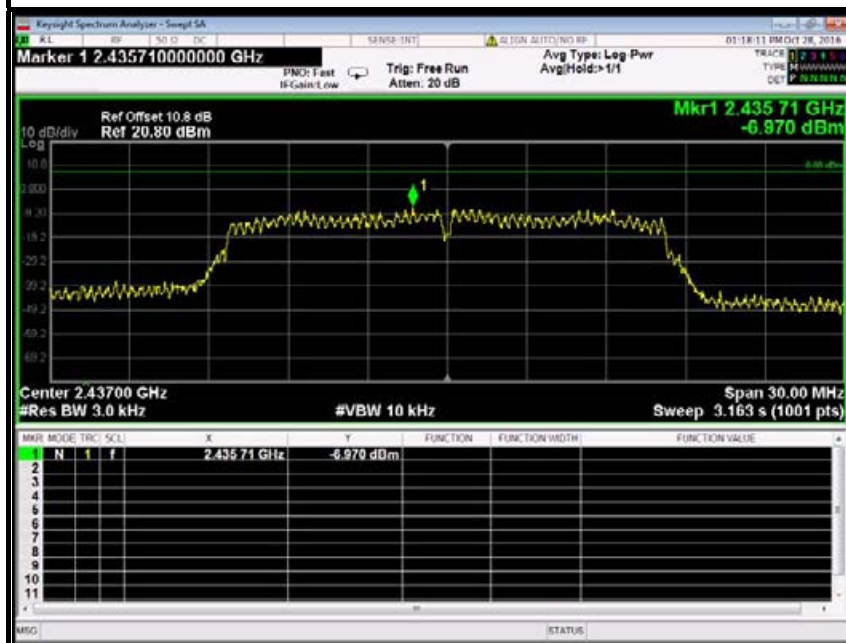
### IEEE 802.11g mode (Antenna 1)

### PPSD (CH Low)

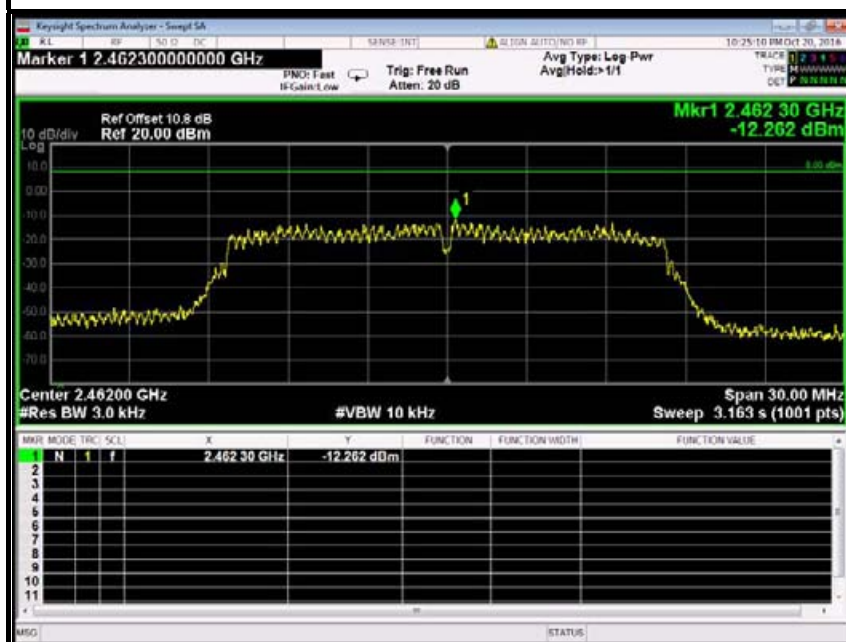




### PPSD (CH Mid)



### PPSD (CH High)

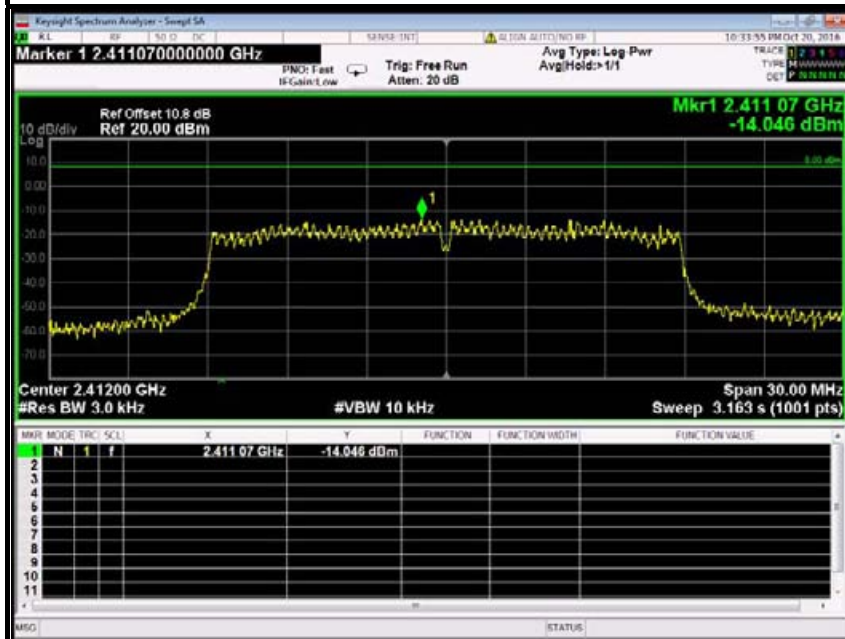




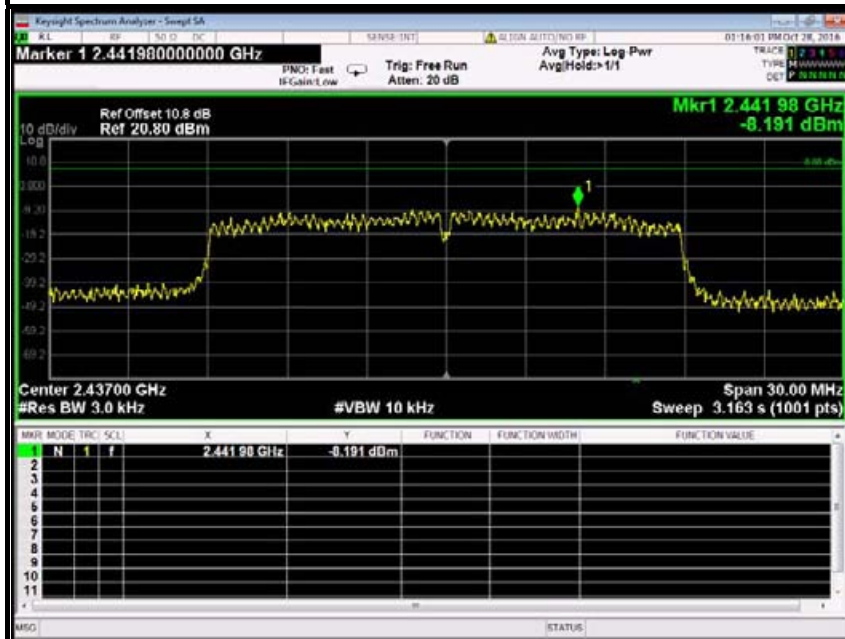


IEEE 802.11n HT20 MHz mode (Antenna 0)

PPSD (CH Low)

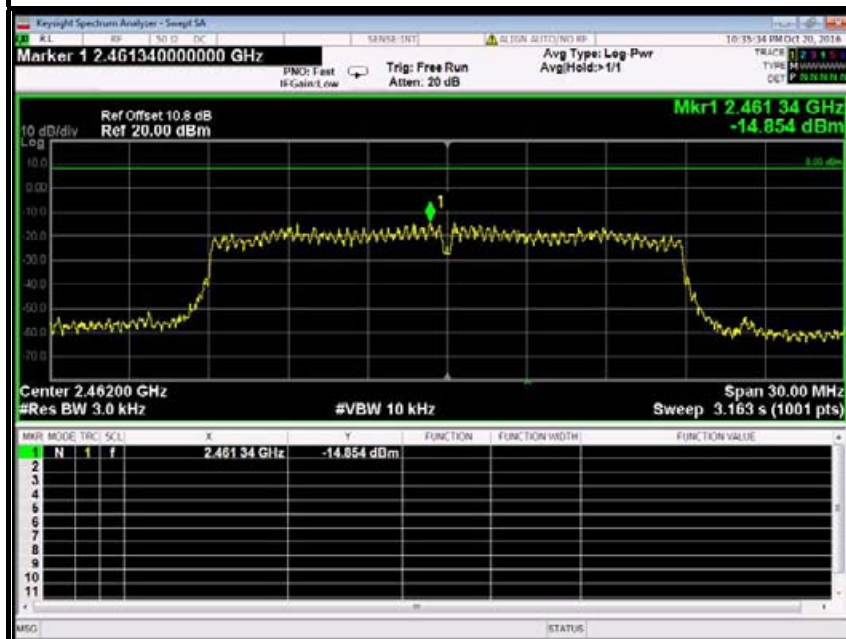


PPSD (CH Mid)



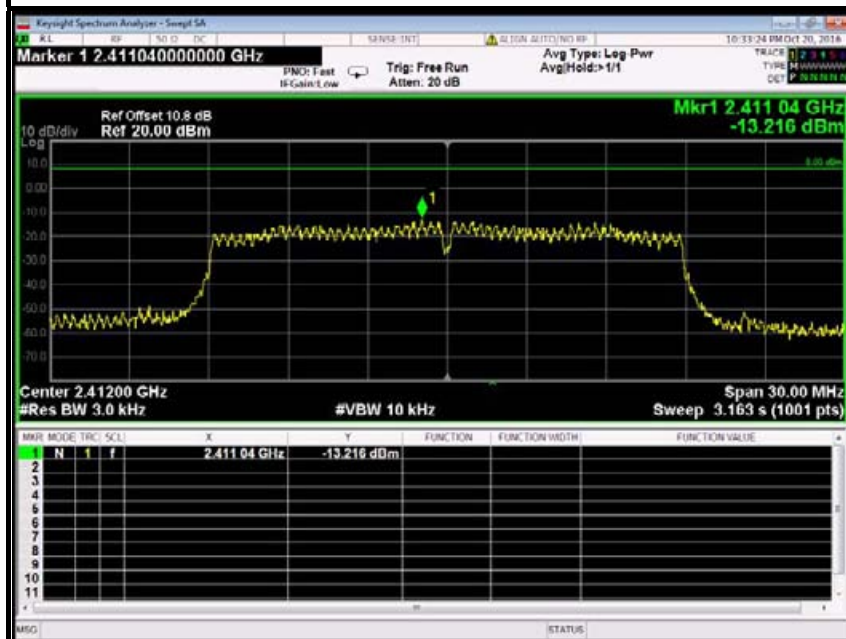


### PPSD (CH High)



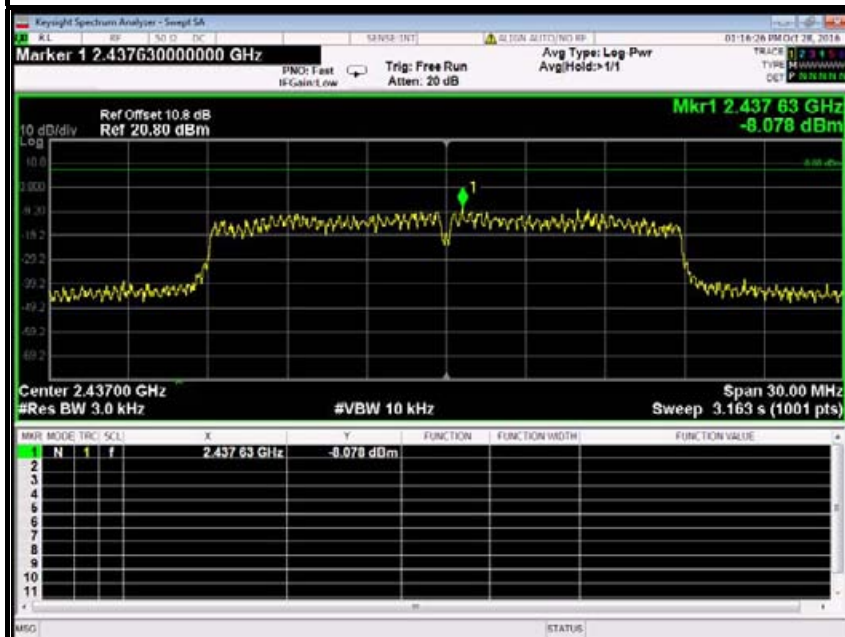
### IEEE 802.11n HT20 MHz mode (Antenna 1)

### PPSD (CH Low)

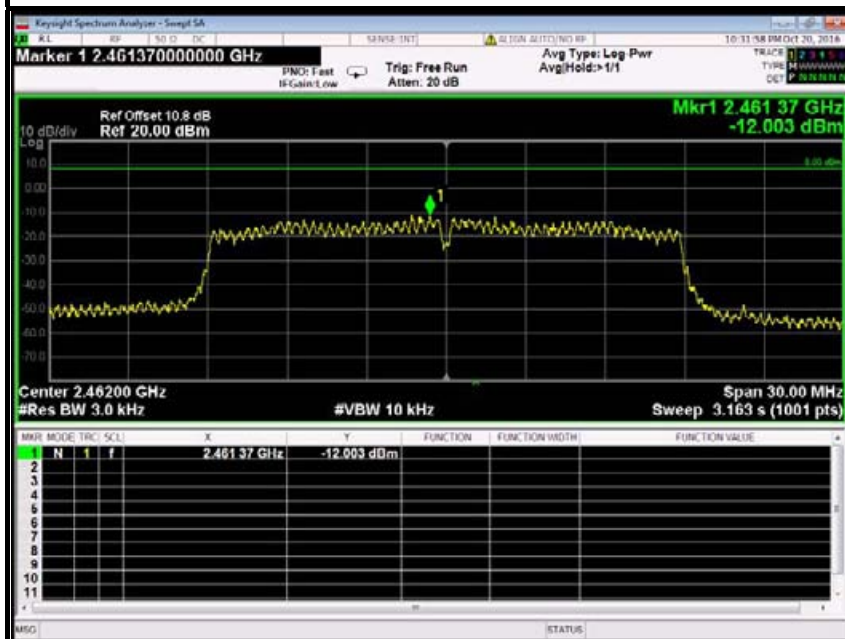




### PPSD (CH Mid)



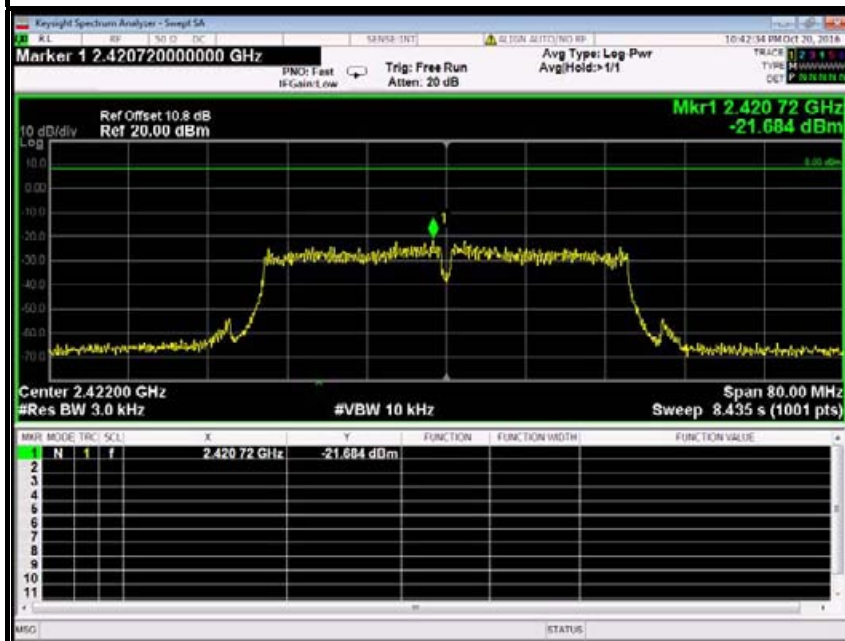
### PPSD (CH High)



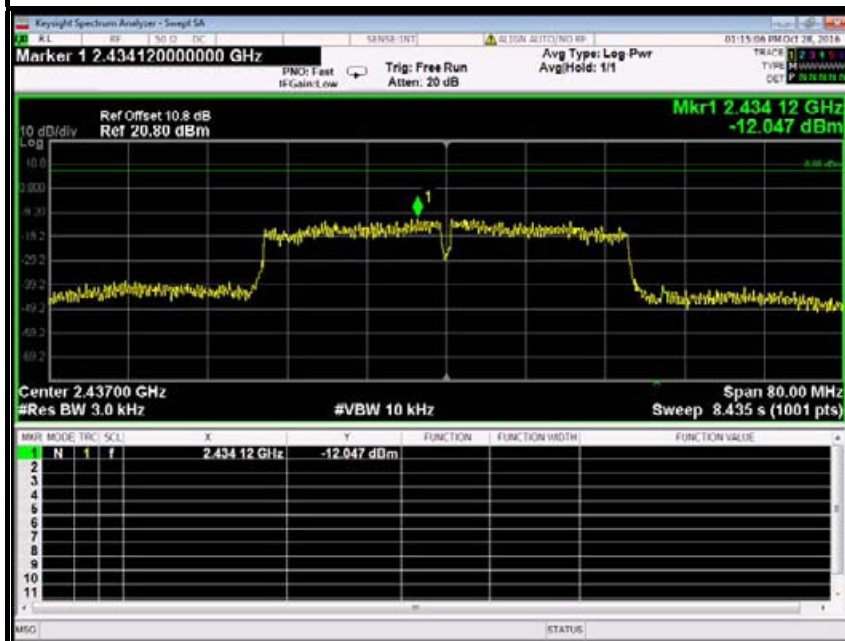


IEEE 802.11n HT40 MHz mode (Antenna 0)

PPSD (CH Low)



PPSD (CH Mid)



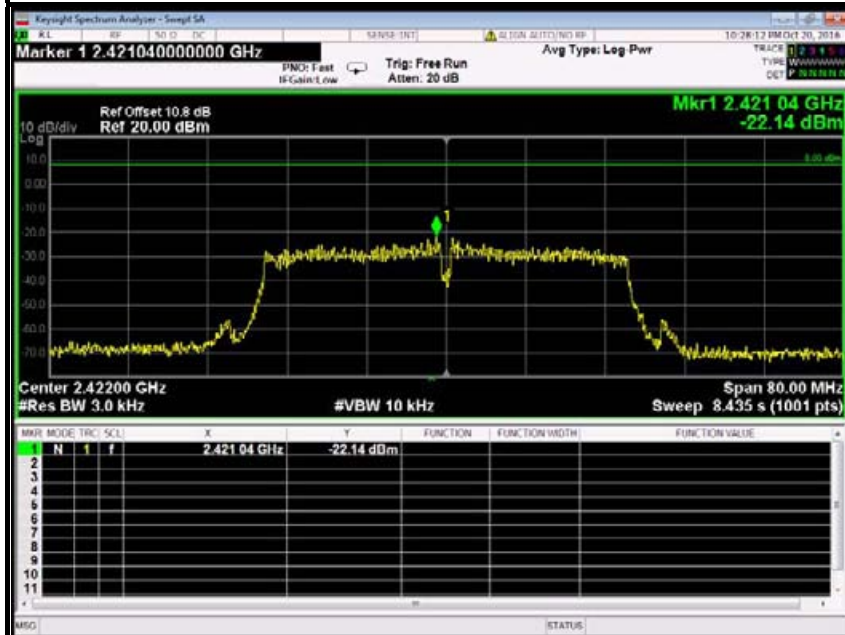


### PPSD (CH High)



### IEEE 802.11n HT40 MHz mode (Antenna 1)

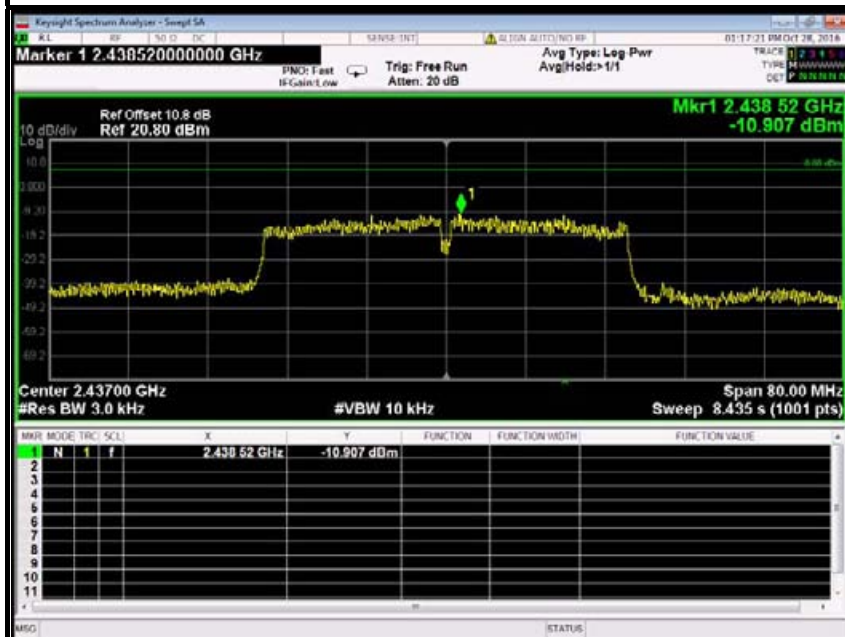
### PPSD (CH Low)







### PPSD (CH Mid)



### PPSD (CH High)

