RF TEST REPORT for UNII device

No. 160602638SHA-002

Applicant	:	Hansong(Nanjing) Technology Ltd 8th Kangping Road, Jiangning Economy&Technology Development Zone, Nanjing, 211106, China
Manufacturer	:	Hansong(Nanjing) Technology Ltd 8th Kangping Road, Jiangning Economy&Technology Development Zone, Nanjing, 211106, China
Product Name	:	Play-Fi Wireless Module
Type/Model	:	Caprica 2L

SUMMARY

The equipment complies with the requirements according to the following standard(s):

47CFR Part 15 (2016): Radio Frequency Devices

RSS-247 Issue 1 (May 2015): Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

RSS-Gen Issue 4 (November 2014): General Requirements for Compliance of Radio Apparatus

ANSI C63.10 (2013): American National Standard for Testing Unlicensed Wireless Devices

Date of issue: August 9, 2016

Prepared by:

Wade Zhang (*Project Engineer*)

Reviewed by:

Daniel Zhao (*Reviewer*)

Description of Test Facility

Name: Intertek Testing Services Limited Shanghai
Address: Building 86, No. 1198 Qinzhou Rd., North, Shanghai 200233, P.R. China

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IC Assigned Code: 2042B-1

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Content

1. General Information

1.1 Applicant Information

Applicant	:	Hansong(Nanjing) Technology Ltd 8th Kangping Road, Jiangning Economy&Technology Development Zone, Nanjing, 211106, China
Name of contact	:	Anya Sun
Tel	:	0086-025-66604242
Fax	:	0086-025-66612098
Manufacturer	:	Hansong(Nanjing) Technology Ltd 8th Kangping Road, Jiangning Economy&Technology Development Zone, Nanjing, 211106, China

1.2 Identification of the EUT

Product Name	:	Play-Fi Wireless Module
Type/model	:	Caprica 2L
FCC ID	:	XCO-PLAYFI0754
IC	:	7756A-PLAYFI0754

1.3 Technical specification

Operation Frequency Band	:	5150 ~ 5250MHz; 5250 ~ 5350MHz; 5470 ~ 5725MHz; 5725 ~ 5850MHz
Type of Modulation	:	OFDM(BPSK,QPSK,16QAM,64QAM)
EUT Modes of Modulation	:	802.11a; 802.11n HT20, 802.11n HT40
Channel Number	:	For 5150 ~ 5250MHz band: Channel 36 - 48 For 5250 ~ 5350MHz Band: Channel 52 - 64; For 5470 ~ 5725MHz Band: Channel 100 - 140; For 5725 ~ 5850MHz band: Channel 149 - 165 (No transmission among 5600-5650MHz)
Description of EUT	:	The EUT is a WIFI module, it support 2.4G band and 5G Bands. And there have only one model. We tested it and listed the 5G bands results in this report.
Port identification	:	/
Rating	:	100-240V ~ 50/60Hz
Declared Temperature range	:	0°C ~ 50°C
Category of EUT	:	Class B
EUT type	:	☒ Table top ☐ Floor standing
Sample received date	:	July 21, 2016
Sample Identification No	:	*0160721-19-001*
Date of test	:	July 21, 2016 ~ August 04, 2016

Antenna List:

No.	Model	Type	Band(s)	Max Peak Gain(dBi)
1	RC12WFI0237A1	FPCB	2.4GHz - 2.5GHz	4.2
			5GHz - 5.875 GHz	4.5
2	RC1WFI0779A	FPCB	2.4GHz - 2.5GHz	3.0
			5GHz - 5.875 GHz	2.7
3	RC1WFI0886A	Dipole	2.4GHz - 2.5GHz	1.1
			5GHz - 5.875 GHz	2.9

NOTE:
1: This device does not support CDD transmissions for 802.11a/b/g mode.

2: For CDD transmissions, If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,
  Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

- For power measurements on IEEE 802.11 devices,
  Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
  Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
  Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.

2. Test Specification

2.1 Instrument list

Selected	Equipment	Type	Manu.	Internal no.	Cal. Date	Due date
☒	PXA Analyzer	N9030A	Agilent	EC5338	2016/3/4	2017/3/3
☒	Vector SG	N5182B	Agilent	EC5175	2016/3/4	2017/3/3
☒	Power sensor	U2021XA	Agilent	EC5338-1	2016/3/4	2017/3/3
☒	MXG Analog SG	N5181A	Agilent	EC5338-2	2016/3/4	2017/3/3
☒	Power meter	N1911A/N1921A	Agilent	EC4318	2016/4/10	2017/4/9
☒	EMI Receiver	ESCS 30	R&S	EC 2107	2015/10/20	2016/10/19
☒	A.M.N.	ESH2-Z5	R&S	EC 3119	2015/12/16	2017/12/15
☒	I.S.N.	FCC-TLISN-T8-02	FCC	EC3756	2016/2/16	2017/2/15
☒	EMI chamber	3m	Albatross	EC 3048	2016/5/5	2017/5/4
☒	Test Receiver	ESIB 26	R&S	EC 3045	2015/10/20	2016/10/19
☒	Test Receiver	ESCI 7	R&S	EC4501	2016/2/24	2017/2/23
☒	Bilog Antenna	CBL 6112D	TESEQ	EC 4206	2016/5/30	2017/5/29
☒	Horn antenna	HF 906	R&S	EC 3049	2015/9/12	2016/9/11
☒	Horn antenna	HAP18-26W	TOYO	EC 4792-3	2014/6/12	2017/6/11
☒	Pre-amplifier	Pre-amp 18	R&S	EC 5262	2016/5/24	2017/5/23
☒	Pre-amplifier	Tpa0118-40	R&S	EC 4792-2	2016/4/11	2017/4/10
☒	Shielded room	-	Zhongyu	EC 2838	2016/1/9	2017/1/8

2.2 Test Standard

47CFR Part 15 (2016): Radio Frequency Devices

ANSI C63.10 (2013): American National Standard for Testing Unlicensed Wireless Devices

RSS-247 Issue 1 (May 2015): Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

RSS-Gen Issue 4 (November 2014): General Requirements for Compliance of Radio Apparatus

KDB 789033 D02 General UNII Test Procedures New Rules v01r02

2.3 Mode of operation during the test / Test peripherals used

While testing transmitting mode of EUT, the engineering mode was applied and continuously transmission was applied.

The test setting software and command is offered by the manufactory.

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, the pre-scan for all data rates in each modulation and bands was tested, and the worst case was found and used in all test cases.

The lowest, middle and highest channel were tested as representatives.

Freq. Band	Modulation	Lowest(MHz)	Middle(MHz)	Highest(MHz)
5150~5250MHz	802.11a	5180	5200	5240
	802.11n HT20	5180	5200	5240
	802.11n HT40	5190	/	5230
5250~5350MHz	802.11a	5260	5300	5320
	802.11n HT20	5260	5300	5320
	802.11n HT40	5270	/	5310
5470~5725 MHz	802.11a	5500	5580	5700
	802.11n HT20	5500	5580	5700
	802.11n HT40	5510	5550	5670
5725~5850MHz	802.11a	5745	5785	5825
	802.11n HT20	5745	5785	5825
	802.11n HT40	5755	/	5795

Test Mode description:

Radiated test construction:
Mode 1: EUT with antenna 1;
Mode 2: EUT with antenna 2;
Mode 3: EUT with antenna 3;

Conducted test construction:
Mode 4: EUT RF port connected to SPA directly;

Test peripherals used:

Item No	Description	Band and Model	S/No
1	Laptop computer	HP ProBook 6470b	NA
2	Engineering Board	Hansong	NA
3	RS-232 cable	1.8m Unshieling	NA
4	Power Supply Adaptor	DYS650-180280W-K	NA
Note: The accessories are used for configuration only and not used during test.			

Data rate VS Power

The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases.

After this pre-scan, we choose the following table of the data rata as the worst case.

Freq. Band	Modulation	Worst case data rate
5150~5250MHz 5250~5350MHz; 5470~5725MHz; 5725~5850MHz	802.11a	6Mbps
	802.11n HT20	MCS0
	802.11n HT40	MCS0

Duty cycle:

Duty cycle	Duty cycle(x)	Duty cycle factor（dB）
802.11a	1.00	0.00
802.11n20	1.00	0.00
802.11n40	1.00	0.00

2.4 Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Maximum Conducted Output Power & EIRP	15.407(a)	RSS-247 Issue 1 Clause 6	Pass
Power spectral density	15.407(a)	RSS-247 Issue 1 Clause 6	Pass
Radiated emission	15.407 (b) 15.205, 15.209	RSS-247 Issue 1 Clause 6	Pass
Power line conducted emission	15.207	RSS-247 Issue 1 Clause 6	Pass
Minimum 6dB Bandwidth	15.407(e)	-	Pass
26 dB Bandwidth	15.403(i)	-	Tested
Emission Bandwidth (99%)	15.403(i)	RSS-Gen Issue 4 Clause 8.8	Tested
Frequency Stability	15.407(g)	-	Pass

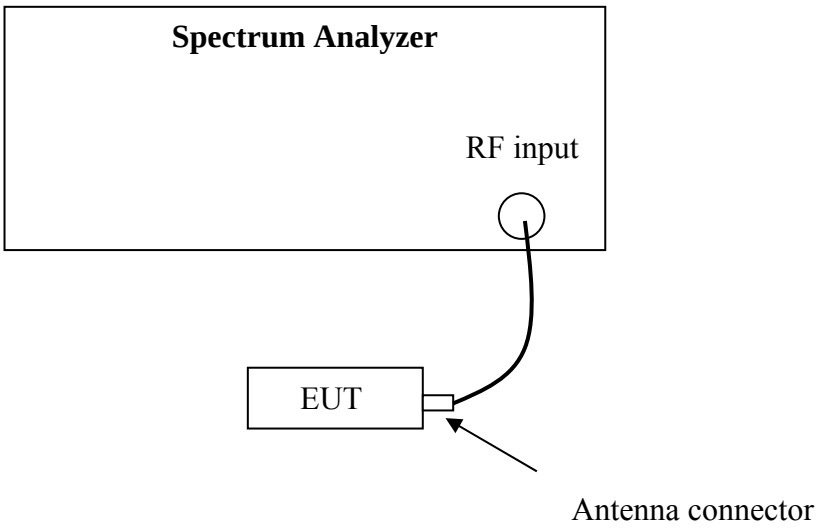
3. Occupied Bandwidth & 26dB Emission Bandwidth

Test Status: Tested

3.1 Test limit

None

3.2 Test Configuration



3.3 Test procedure and test setup

The bandwidth was measured from the antenna port of the EUT according to the measurement method refer to KDB 789033D02 v01r02: section C.

Emission Bandwidth (EBW)

a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

99 Percent Occupied Bandwidth

The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 · RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

3.4 Test protocol

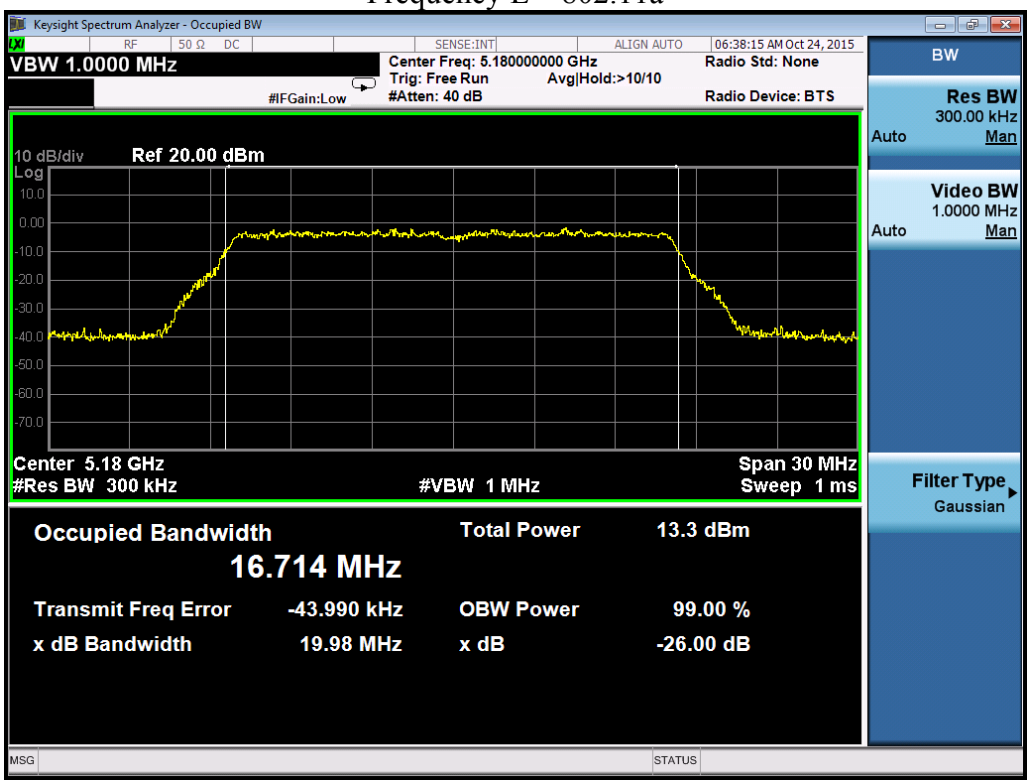
Temperature : 25 °C
Relative Humidity: 55 %

U-NII-1 Band:

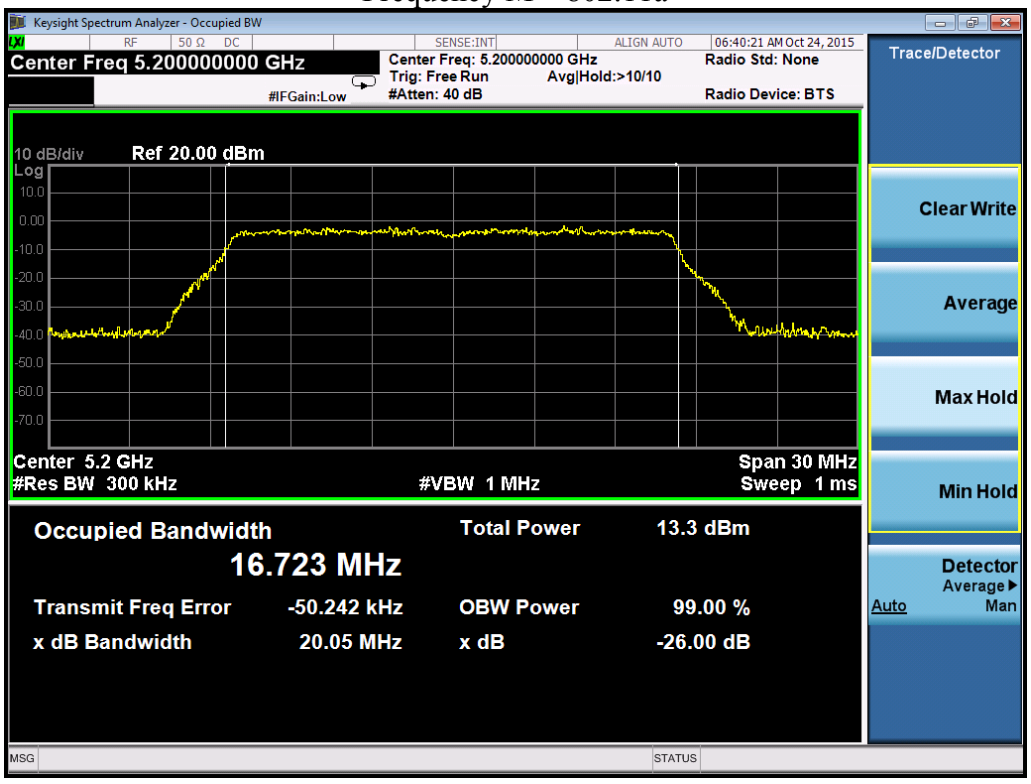
Mode	Frequency (MHz)	26 dB BW (MHz)		99% dB BW (MHz)	
		Port 0	Port 1	Port 0	Port 1
802.11a	5180	19.98	20.03	16.714	16.724
	5200	20.05	20.12	16.723	16.719
	5240	20.04	19.99	16.676	16.657
802.11n20	5180	20.33	20.55	17.850	17.872
	5200	20.49	20.41	17.854	17.844
	5240	20.44	20.37	17.847	17.854
802.11n40	5190	41.99	42.04	36.957	36.937
	5230	41.75	41.57	36.724	36.691

Test Plots as bellow:

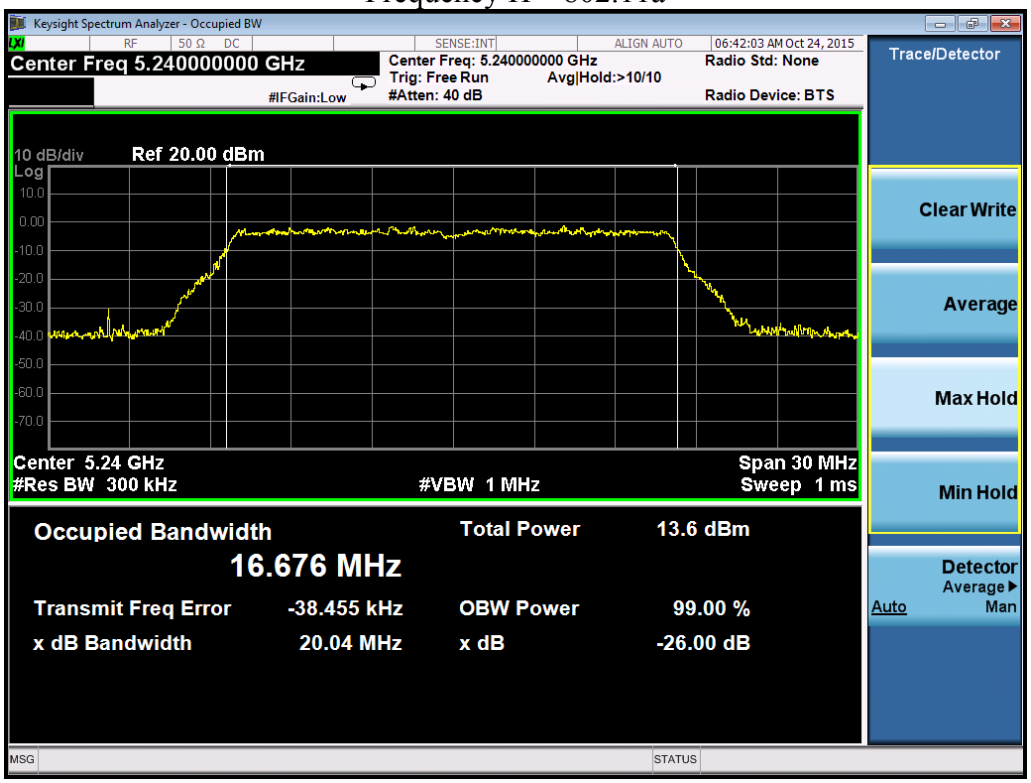
Port 1
Frequency L – 802.11a



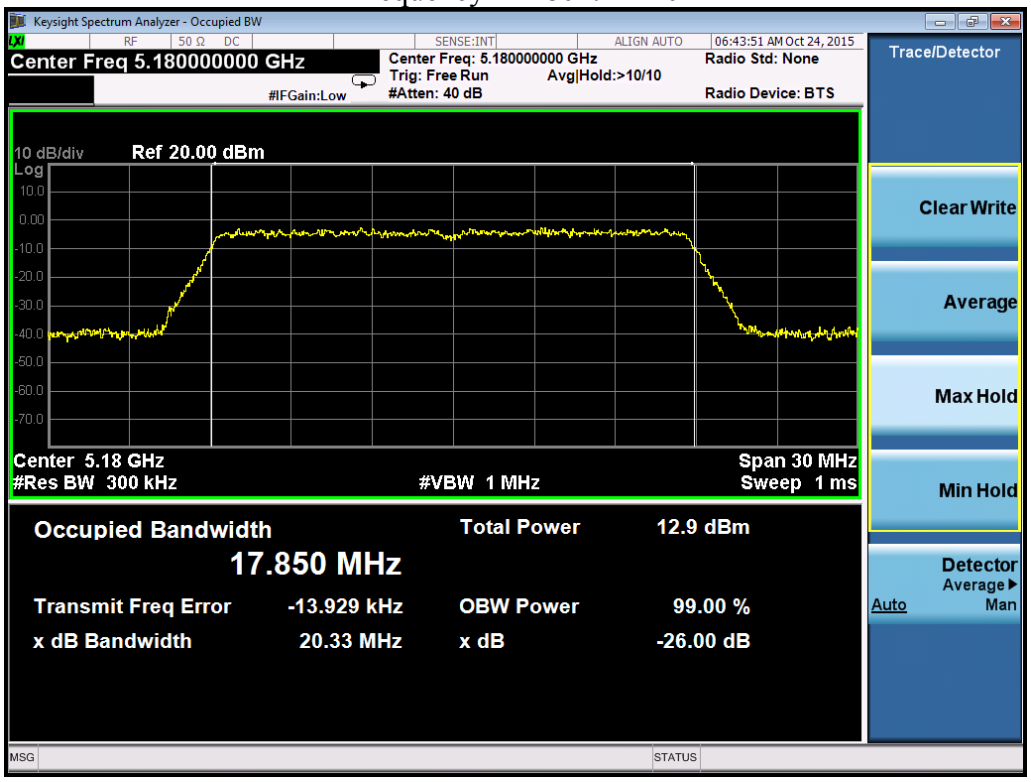
Frequency M – 802.11a



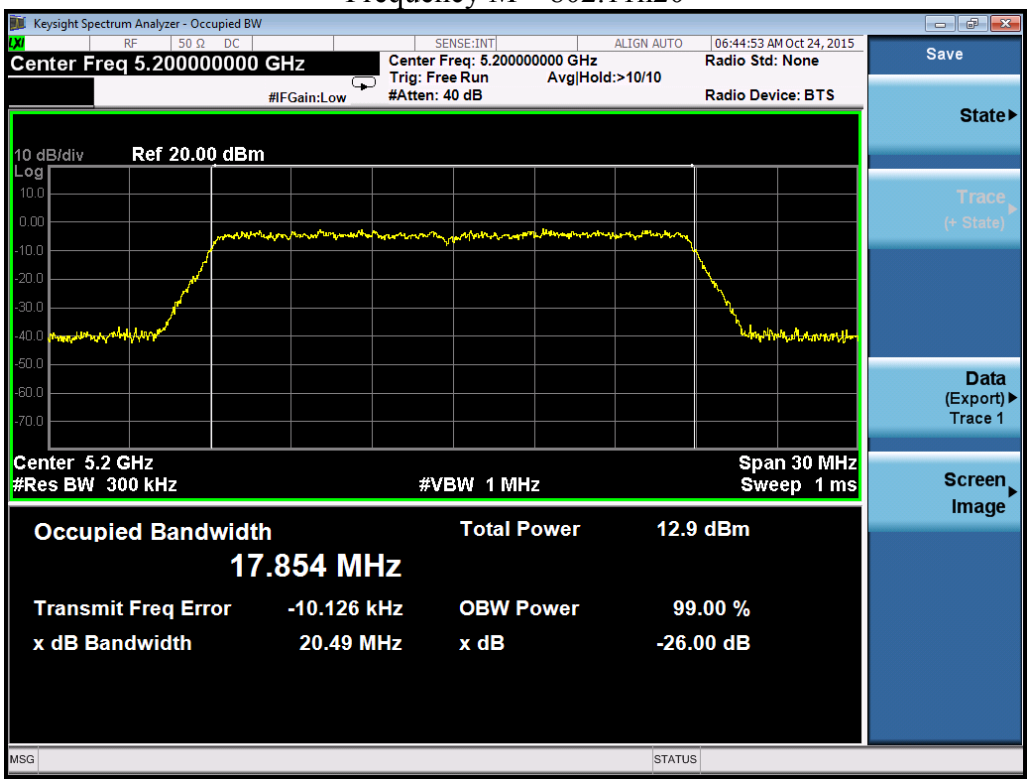
Frequency H – 802.11a



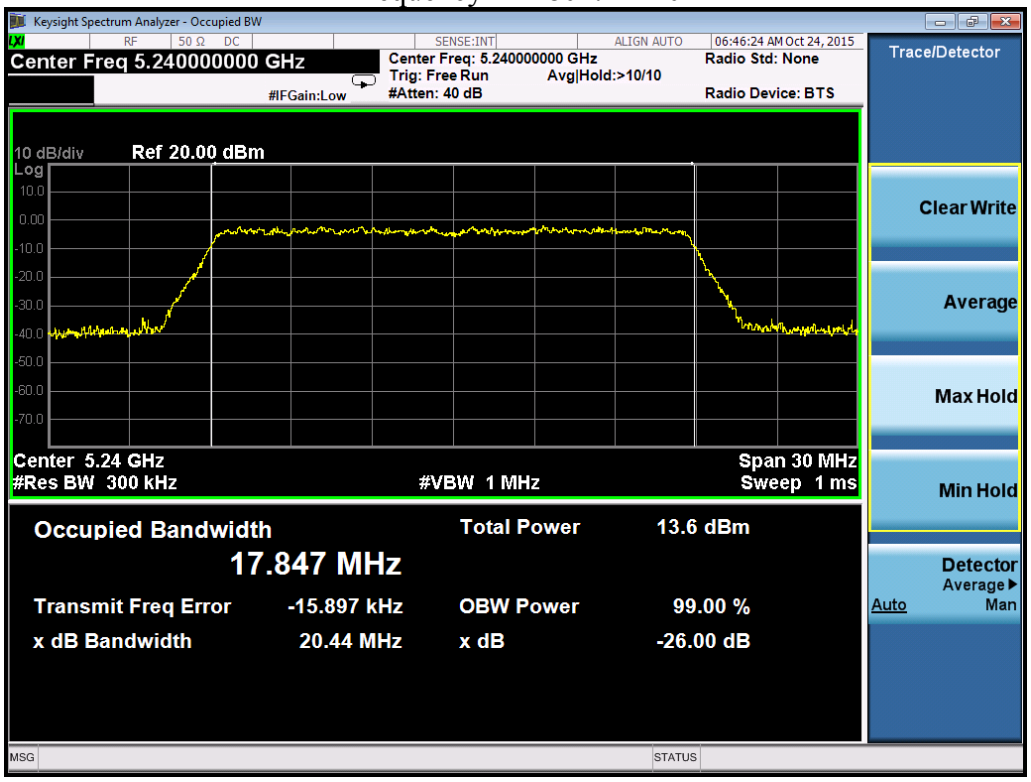
Frequency L – 802.11n20



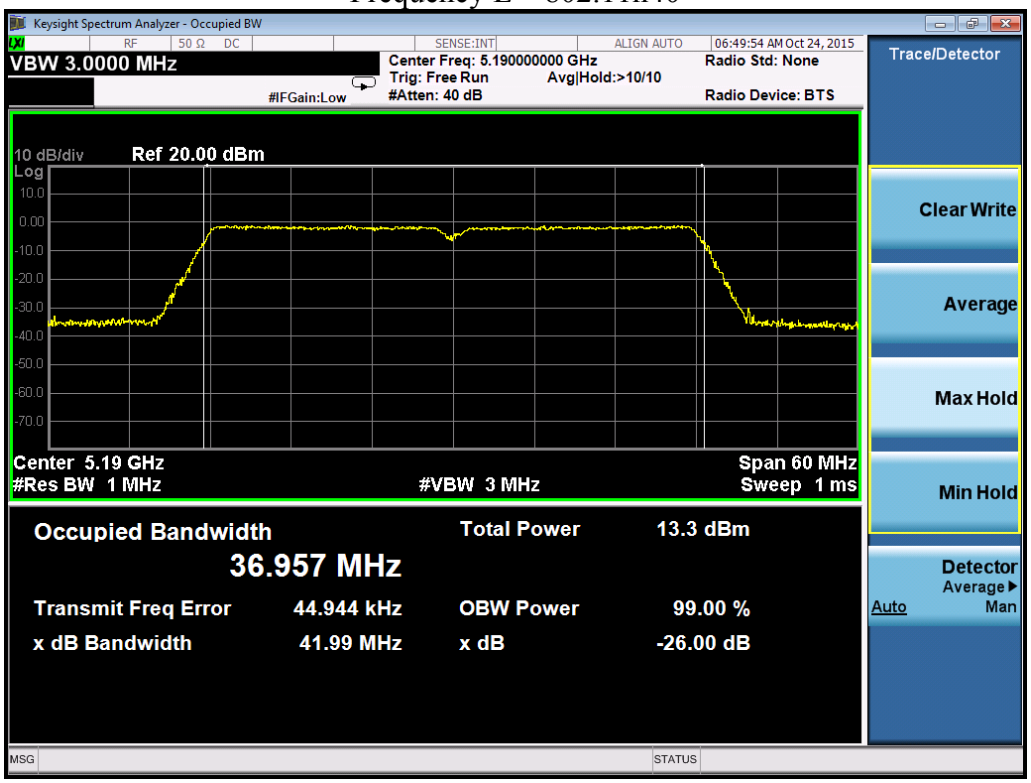
Frequency M – 802.11n20



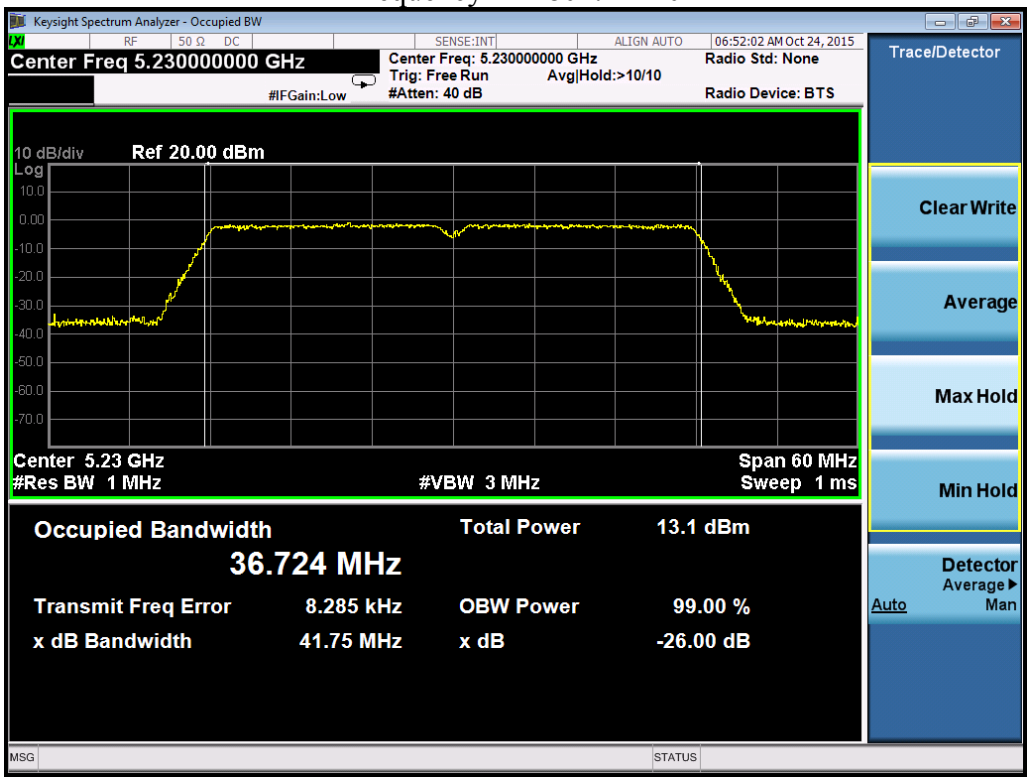
Frequency H – 802.11n20



Frequency L – 802.11n40

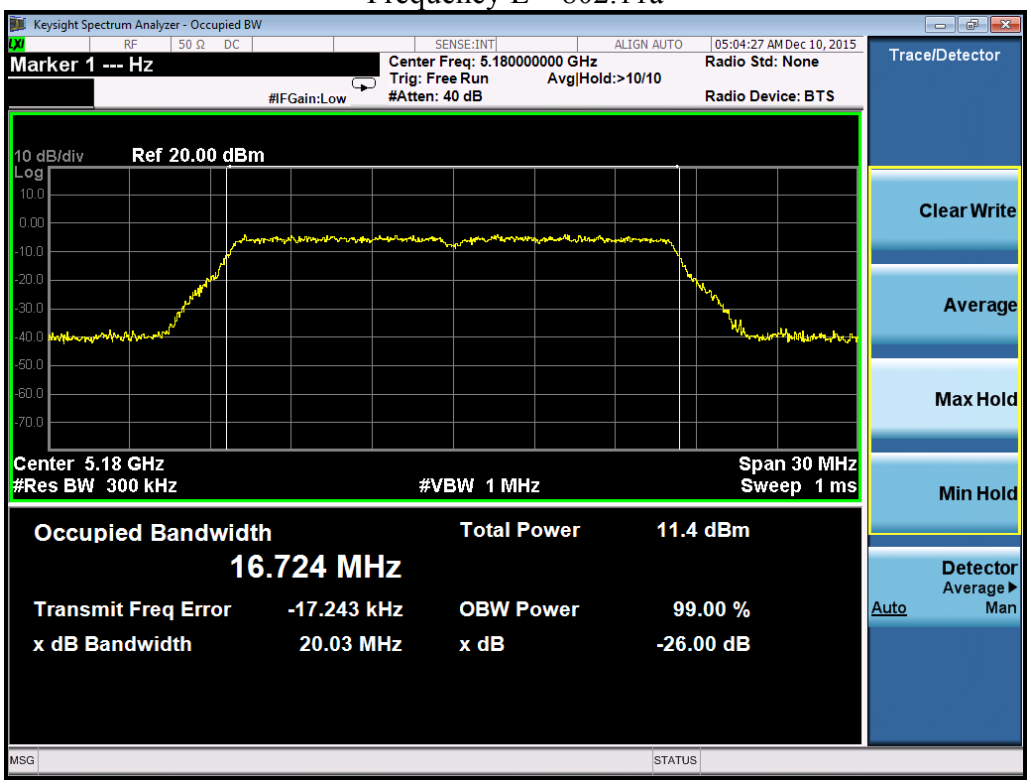


Frequency H – 802.11n40

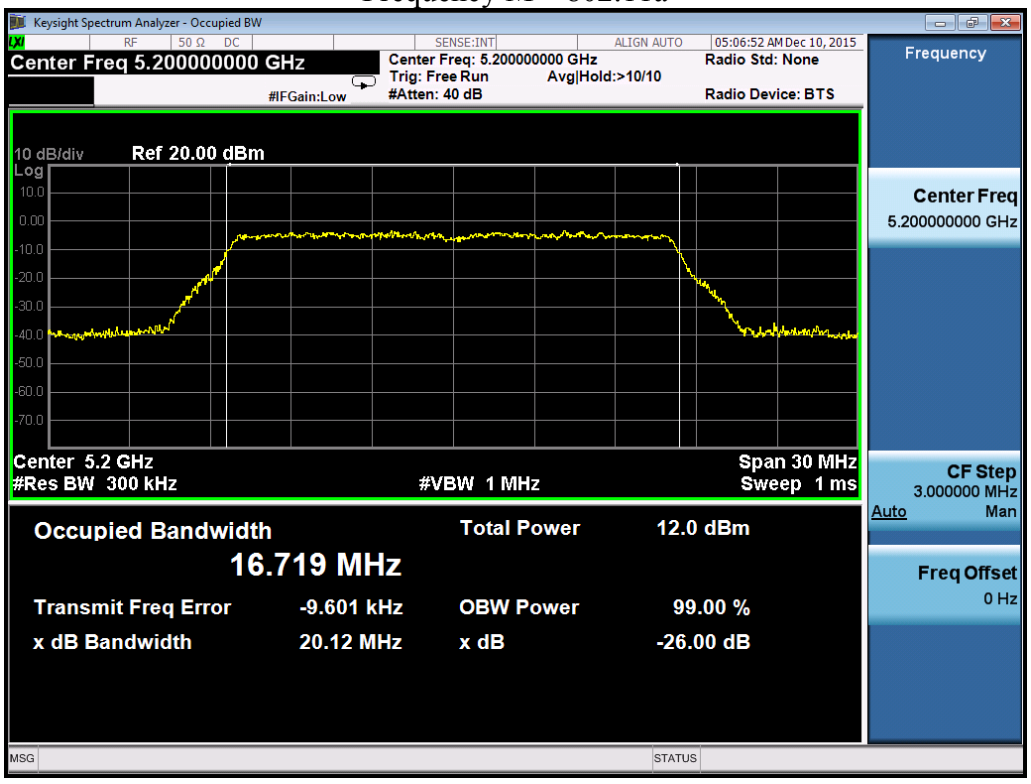


Port 2

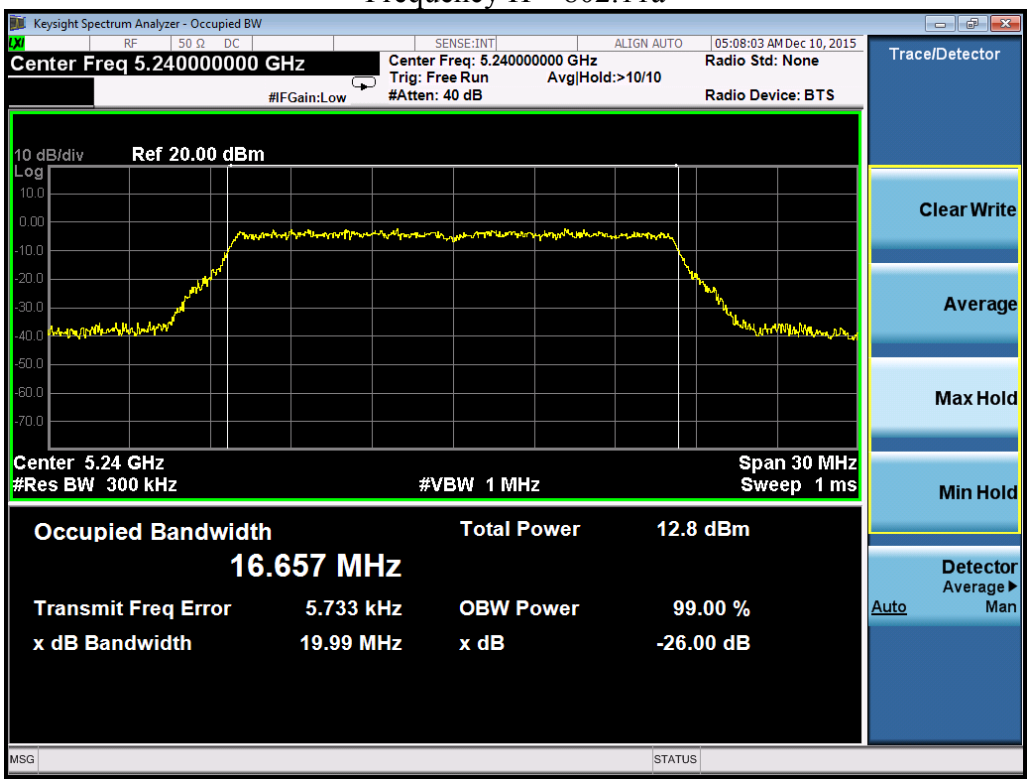
Frequency L – 802.11a



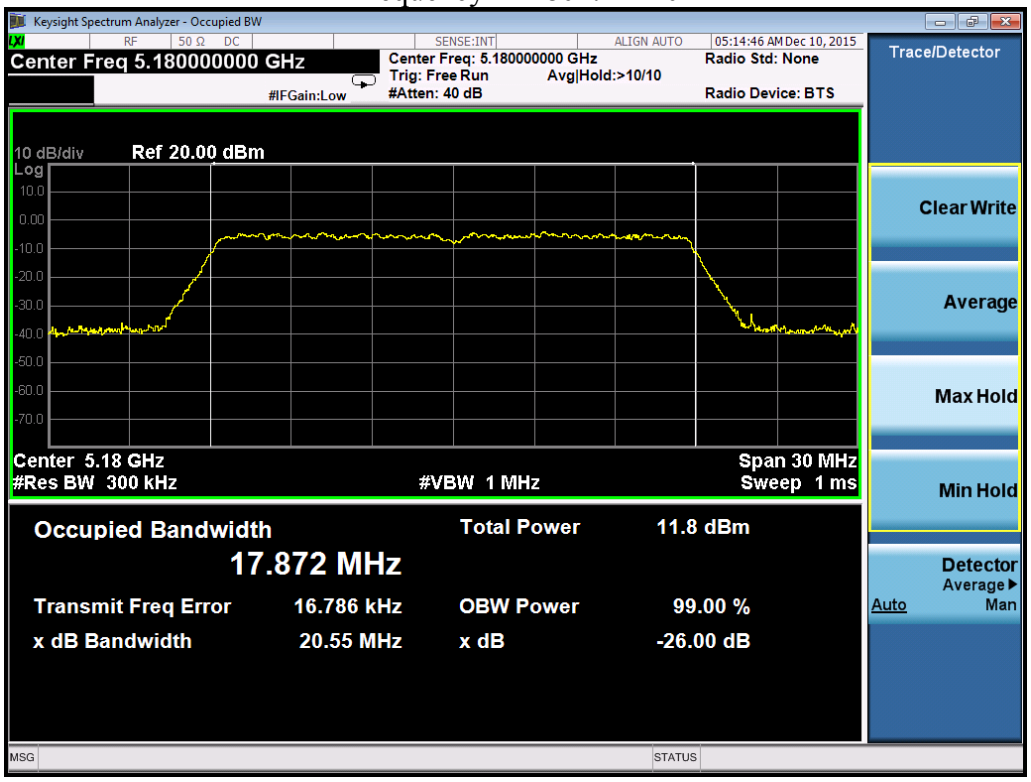
Frequency M – 802.11a



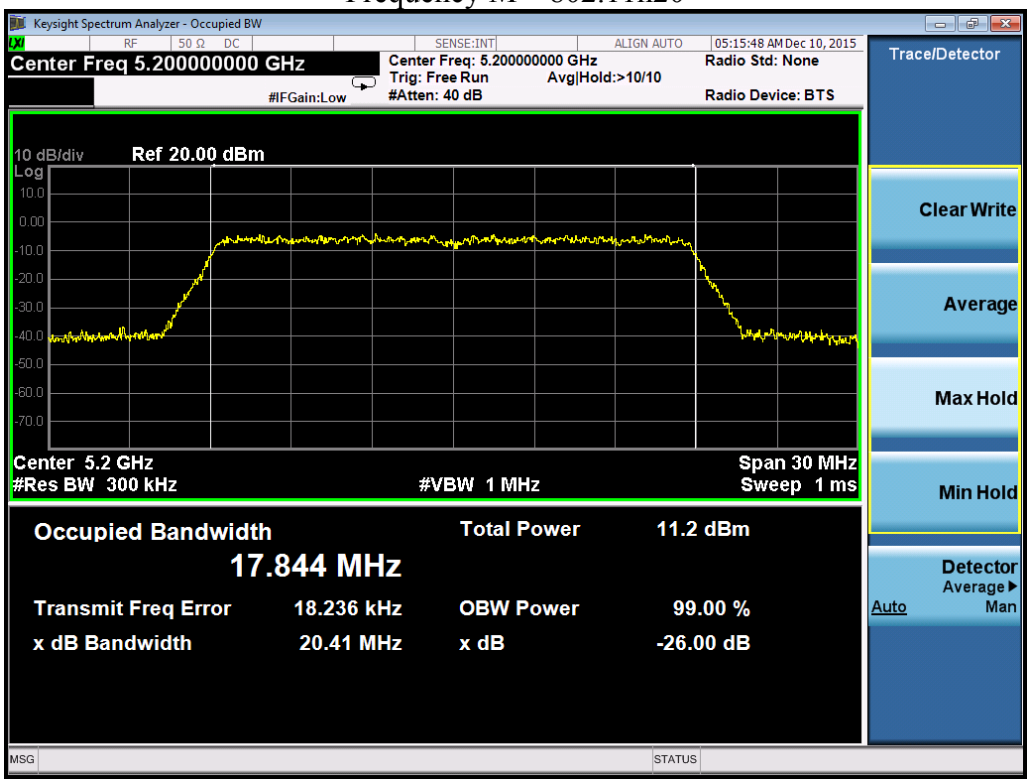
Frequency H – 802.11a



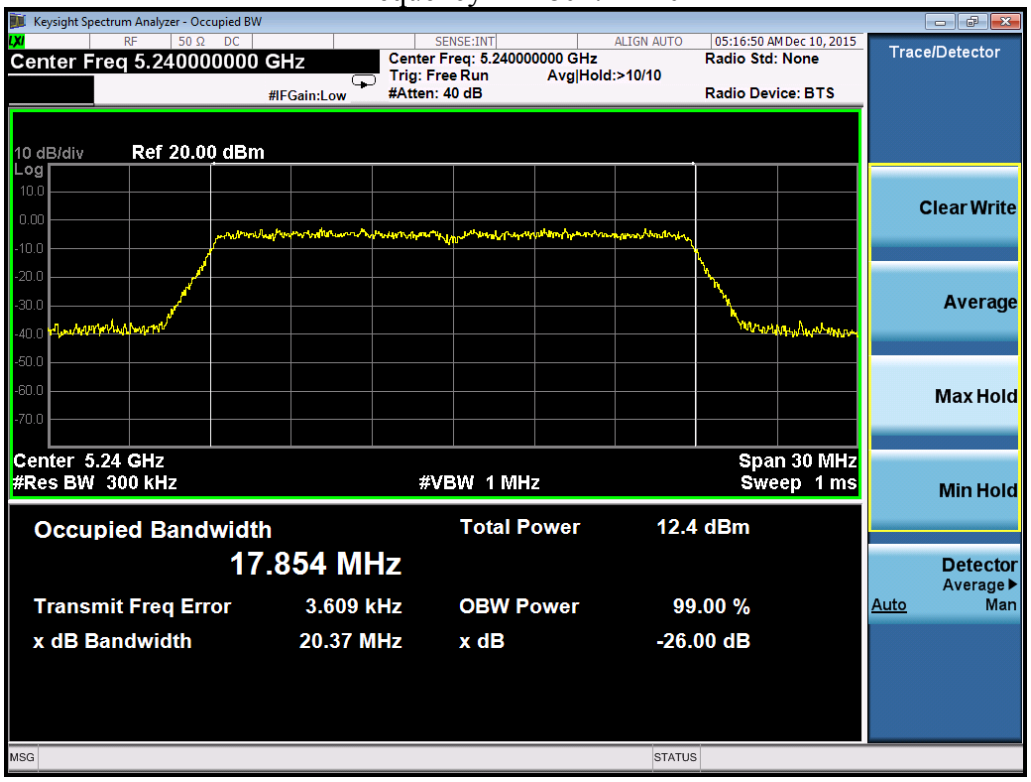
Frequency L – 802.11n20



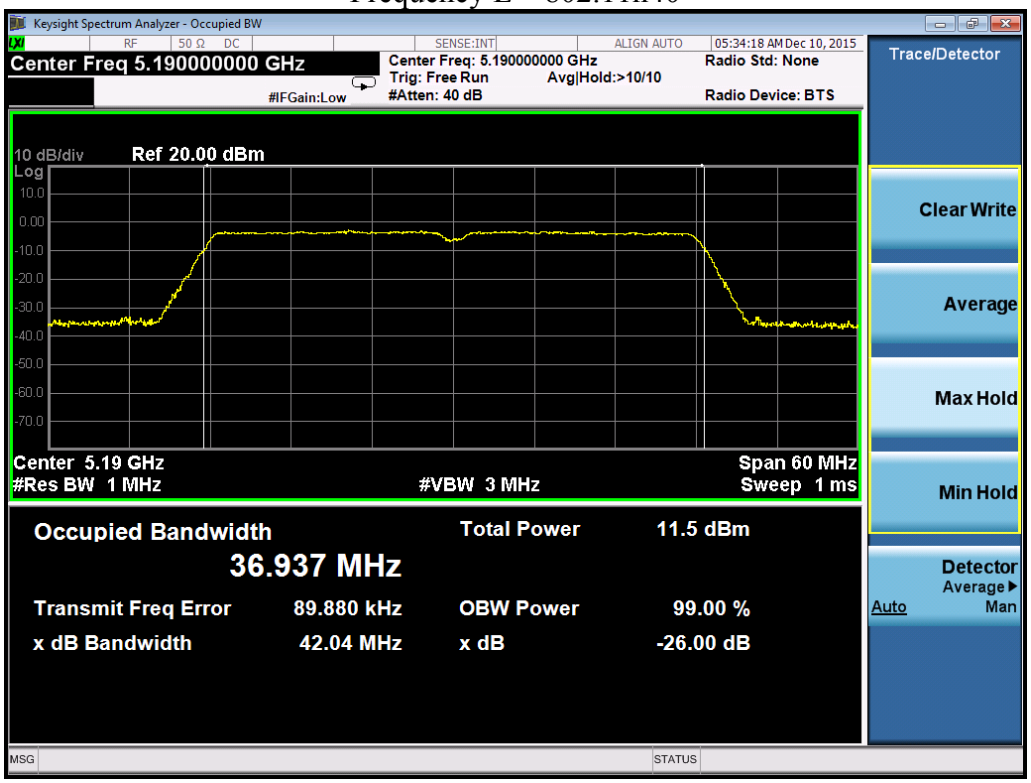
Frequency M – 802.11n20



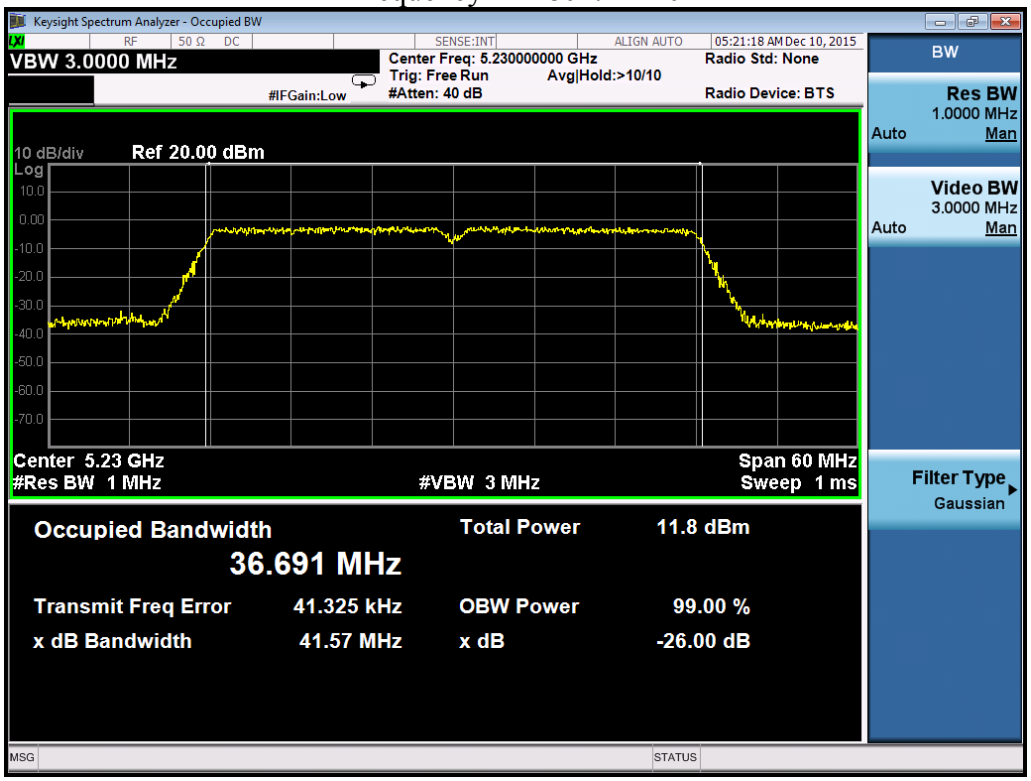
Frequency H – 802.11n20



Frequency L – 802.11n40



Frequency H – 802.11n40



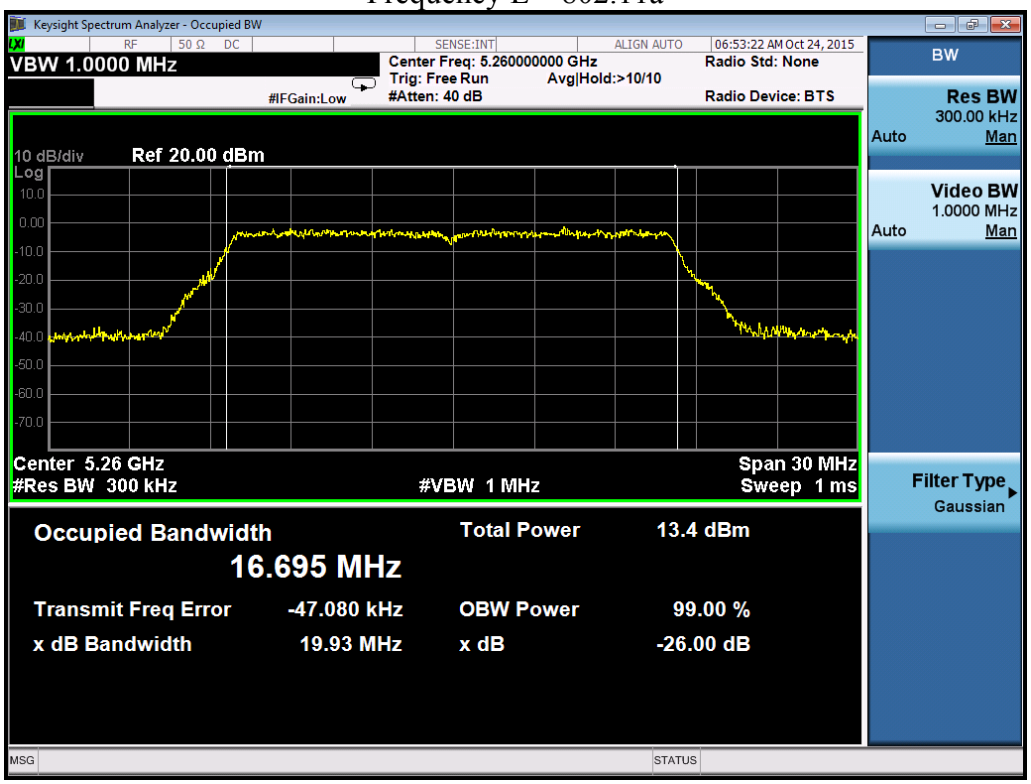
U-NII-2A Band:

Mode	Frequency (MHz)	26 dB BW (MHz)		99% dB BW (MHz)	
		Port 0	Port 1	Port 0	Port 1
802.11a	5260	19.93	20.10	16.695	16.709
	5300	20.14	19.98	16.718	16.689
	5320	19.97	20.00	16.714	16.651
802.11n20	5260	20.47	20.50	17.858	17.847
	5300	20.50	20.46	17.855	17.867
	5320	20.51	20.62	17.845	17.871
802.11n40	5270	41.76	41.77	36.931	36.815
	5310	41.61	41.70	36.801	36.773

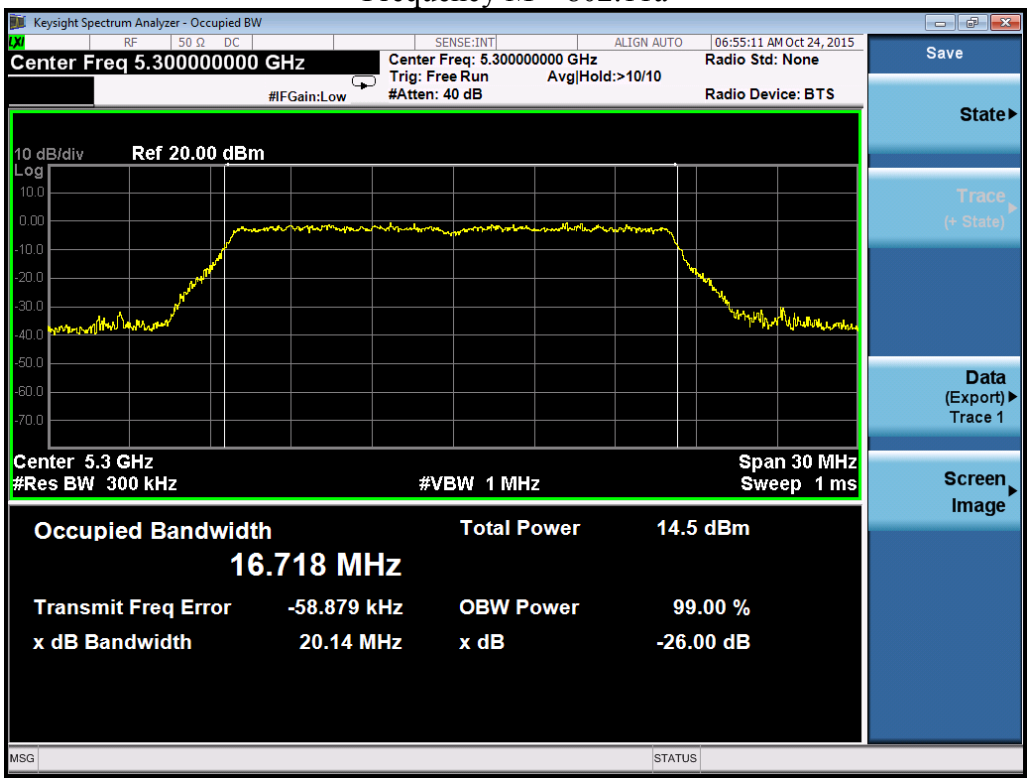
Test Plots as bellow:

Port 1

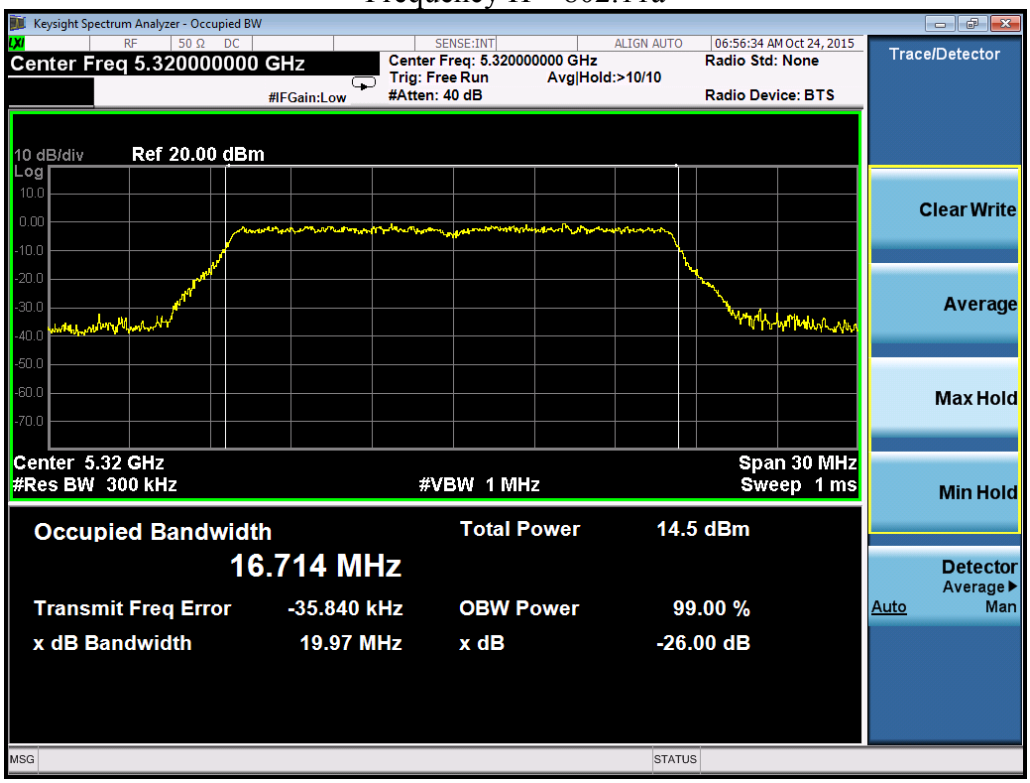
Frequency L – 802.11a



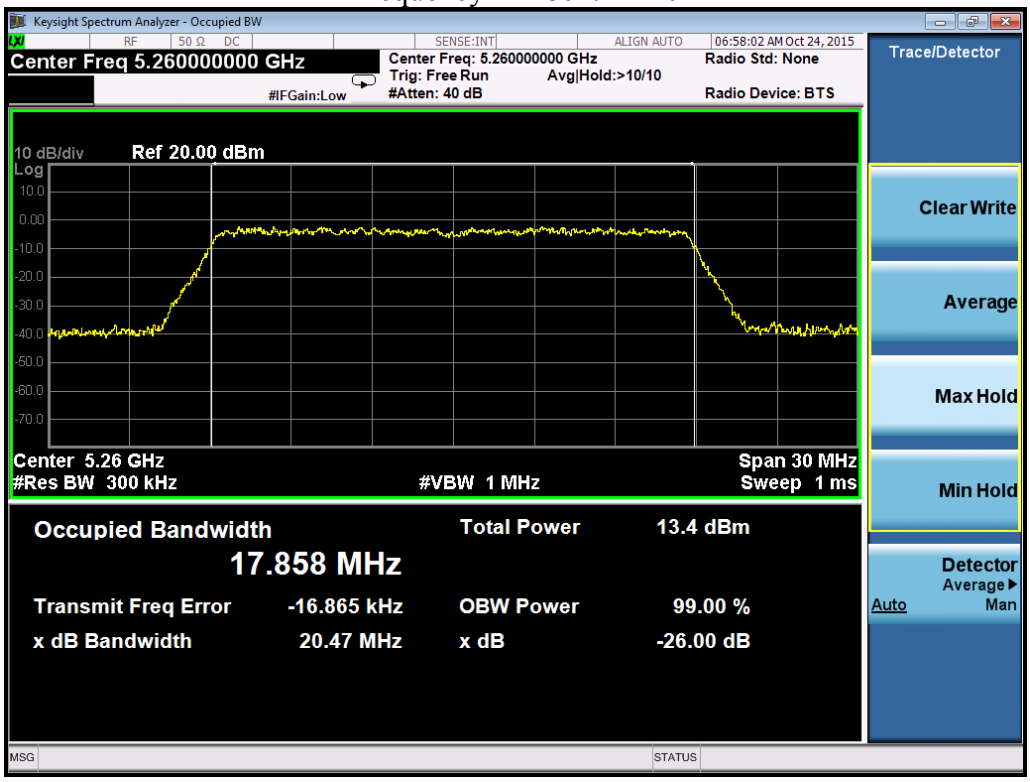
Frequency M – 802.11a



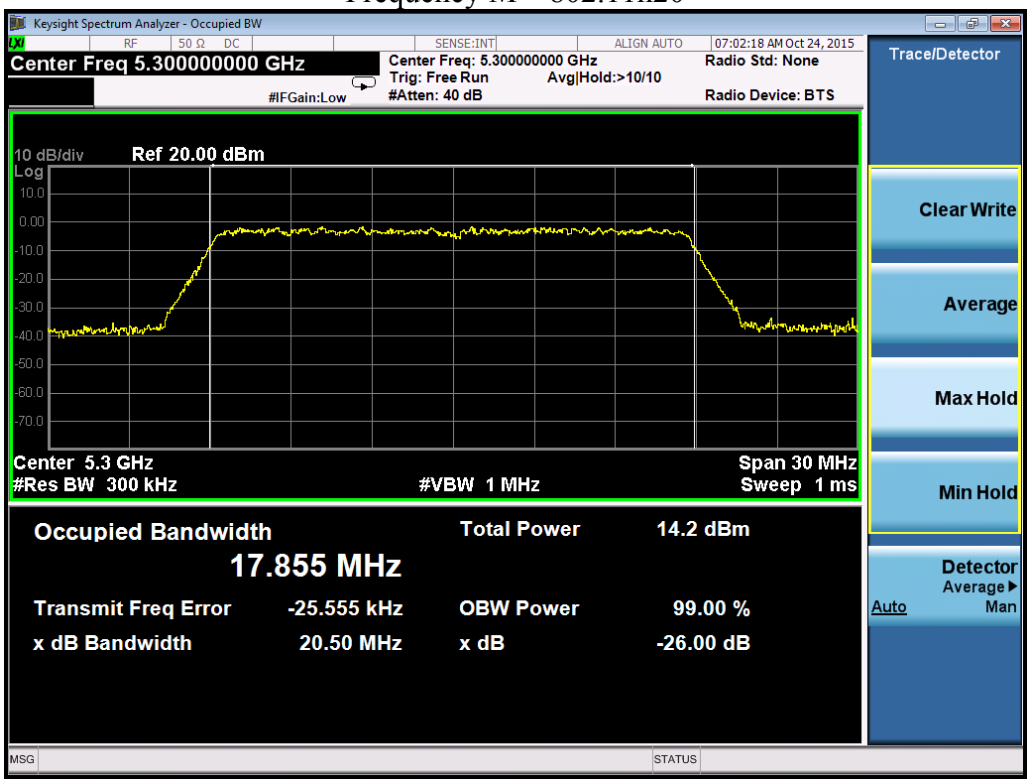
Frequency H – 802.11a



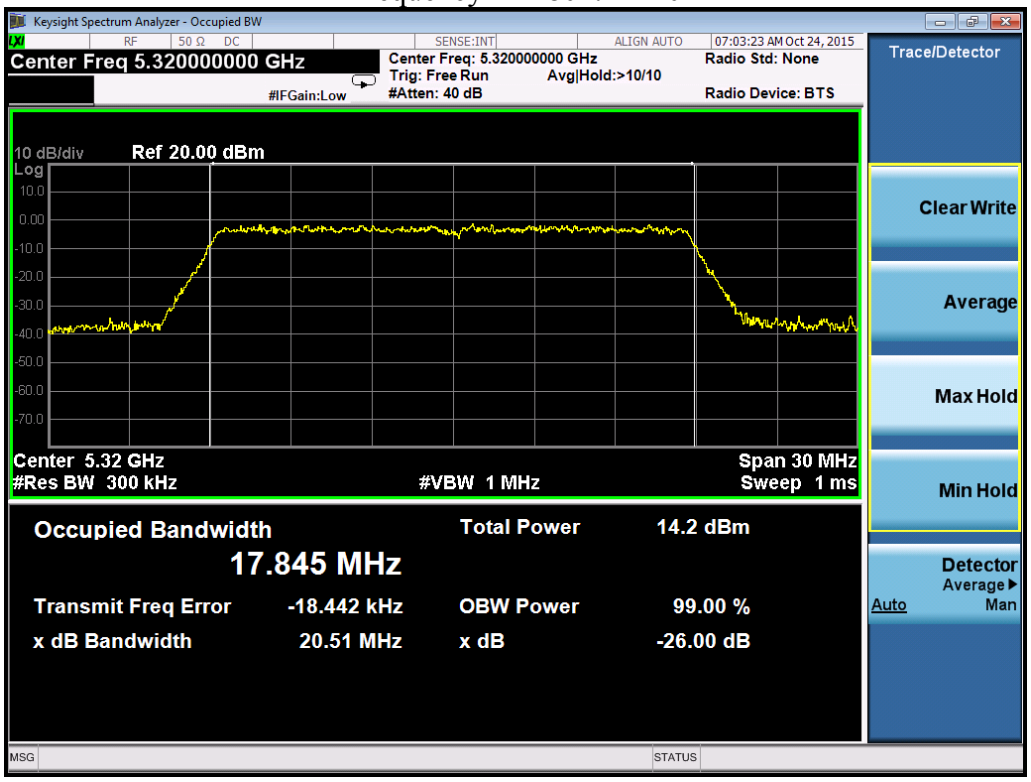
Frequency L – 802.11n20



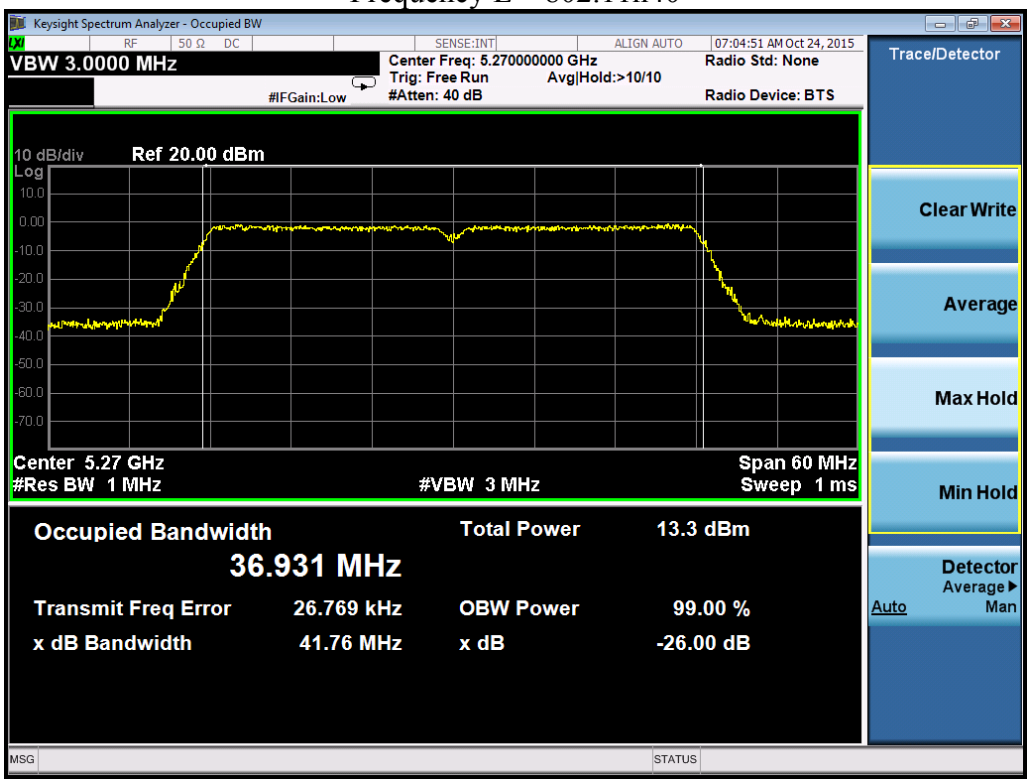
Frequency M – 802.11n20



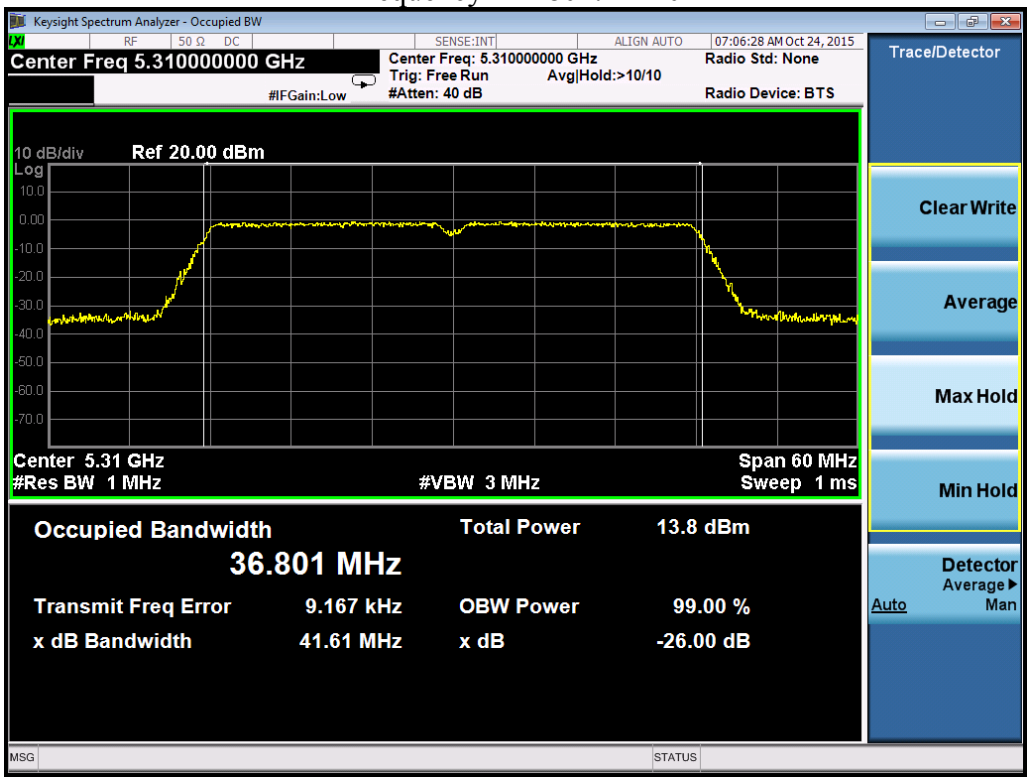
Frequency H – 802.11n20



Frequency L – 802.11n40

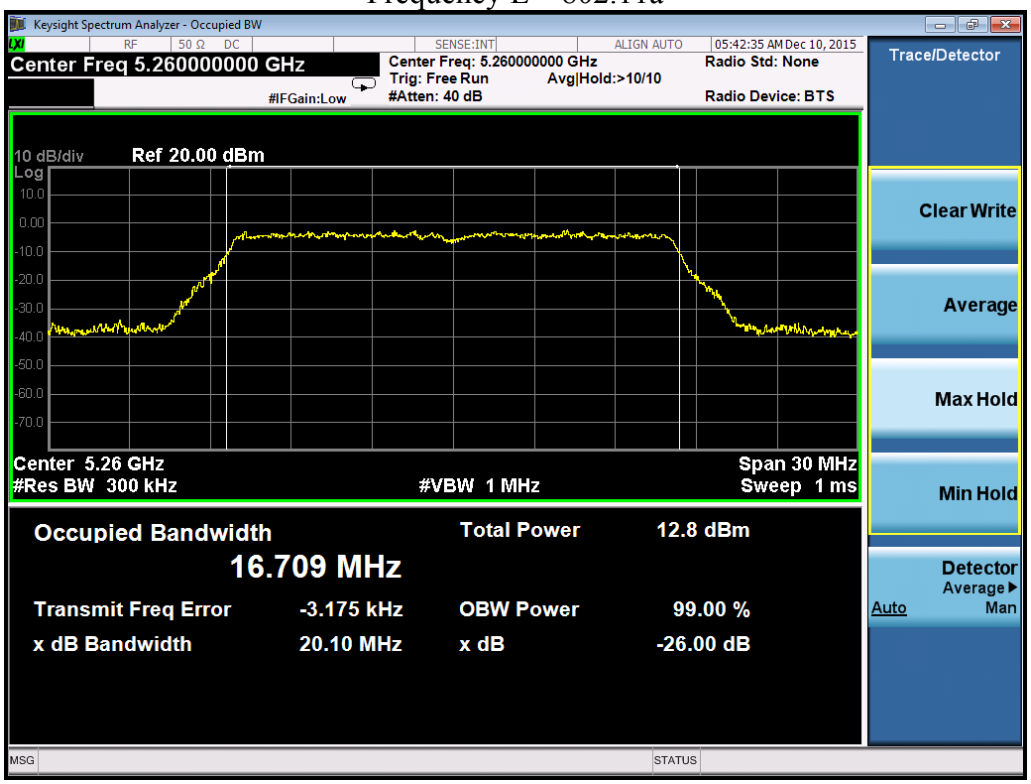


Frequency H – 802.11n40

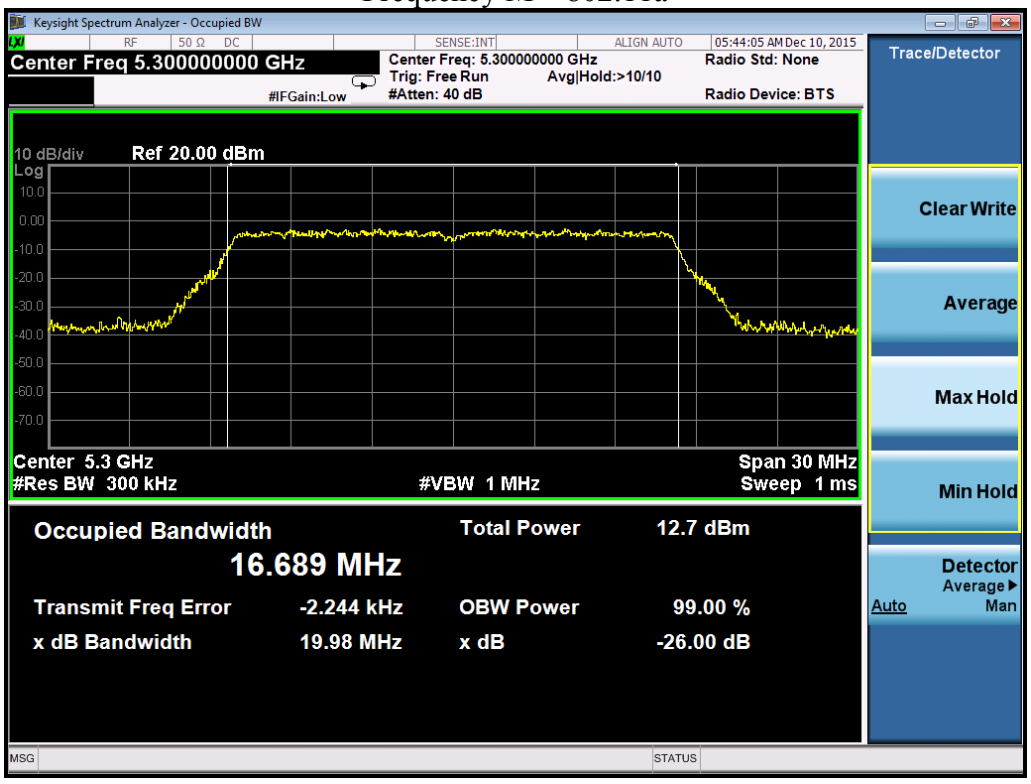


Port 2

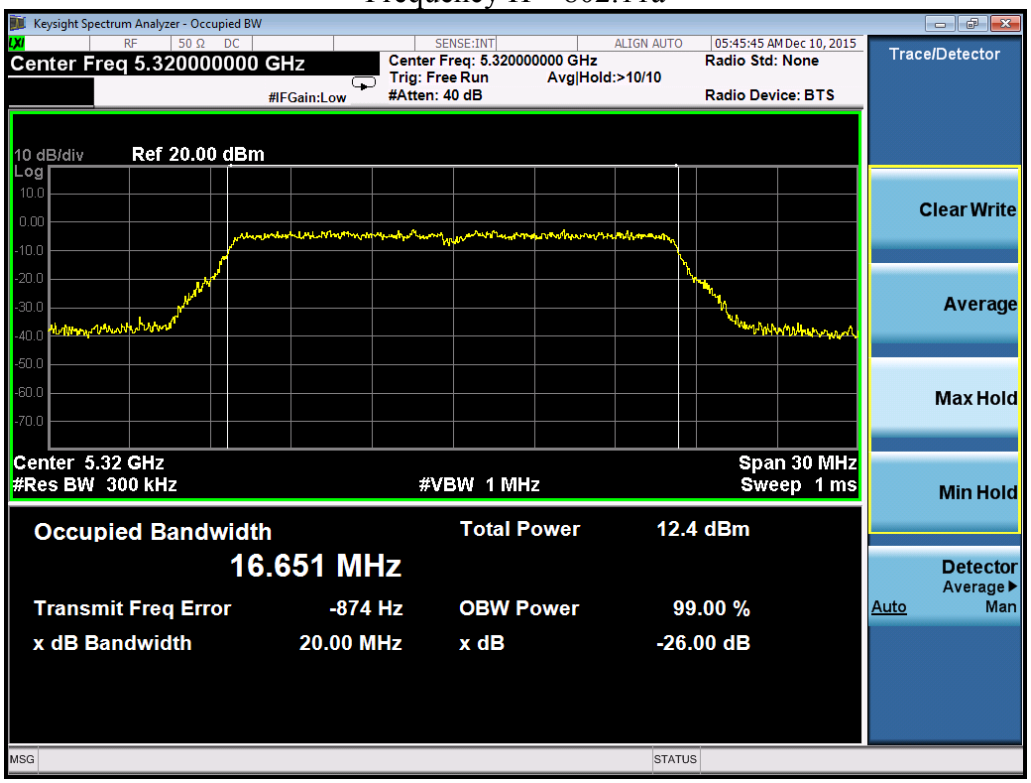
Frequency L – 802.11a



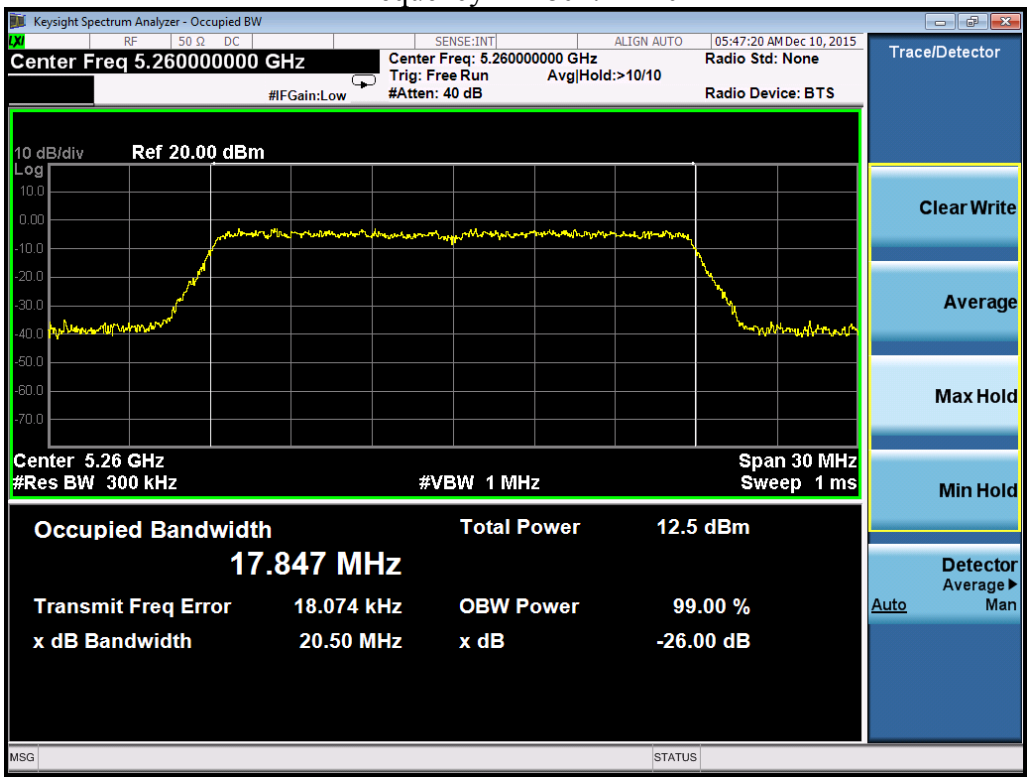
Frequency M – 802.11a



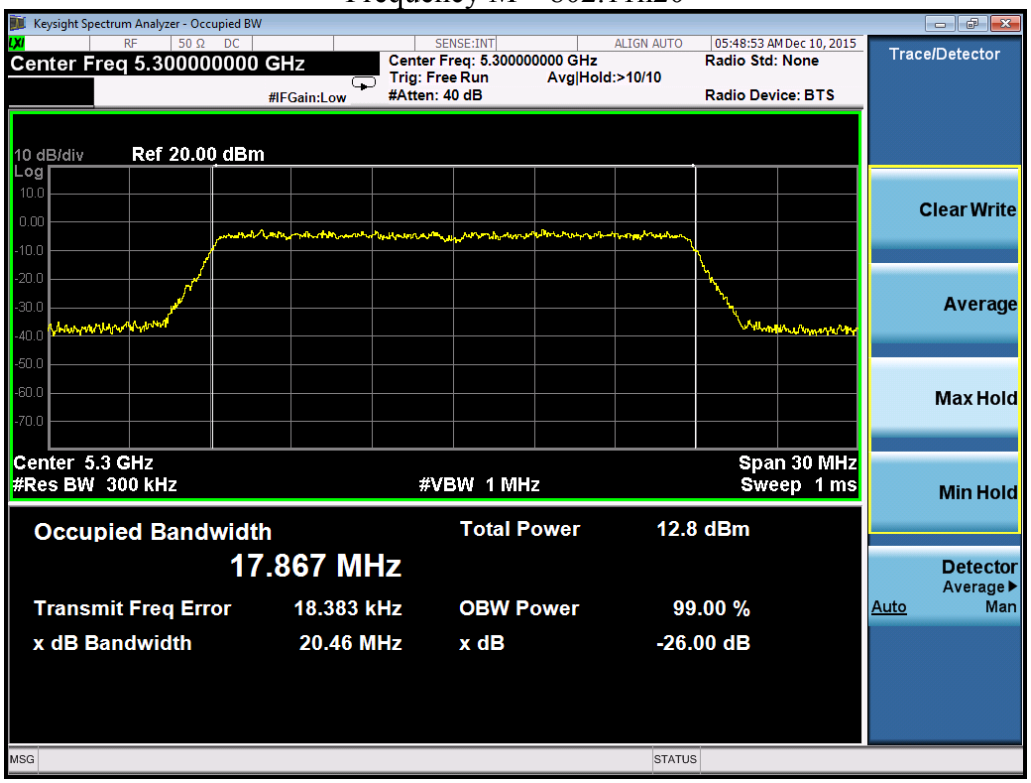
Frequency H – 802.11a



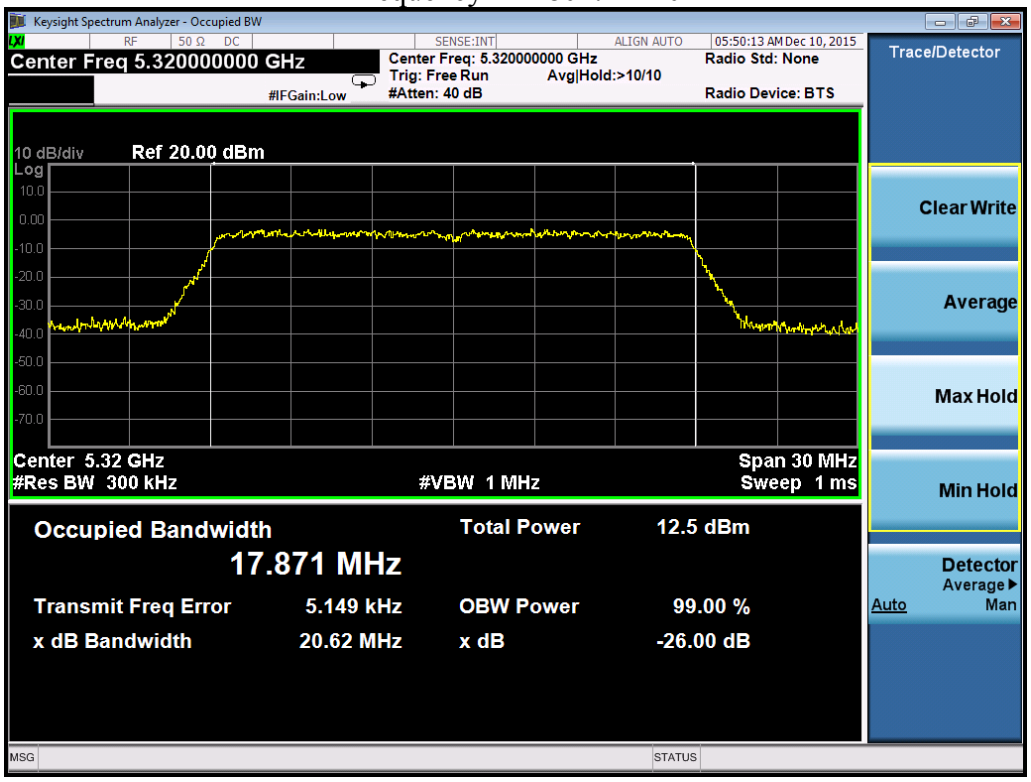
Frequency L – 802.11n20



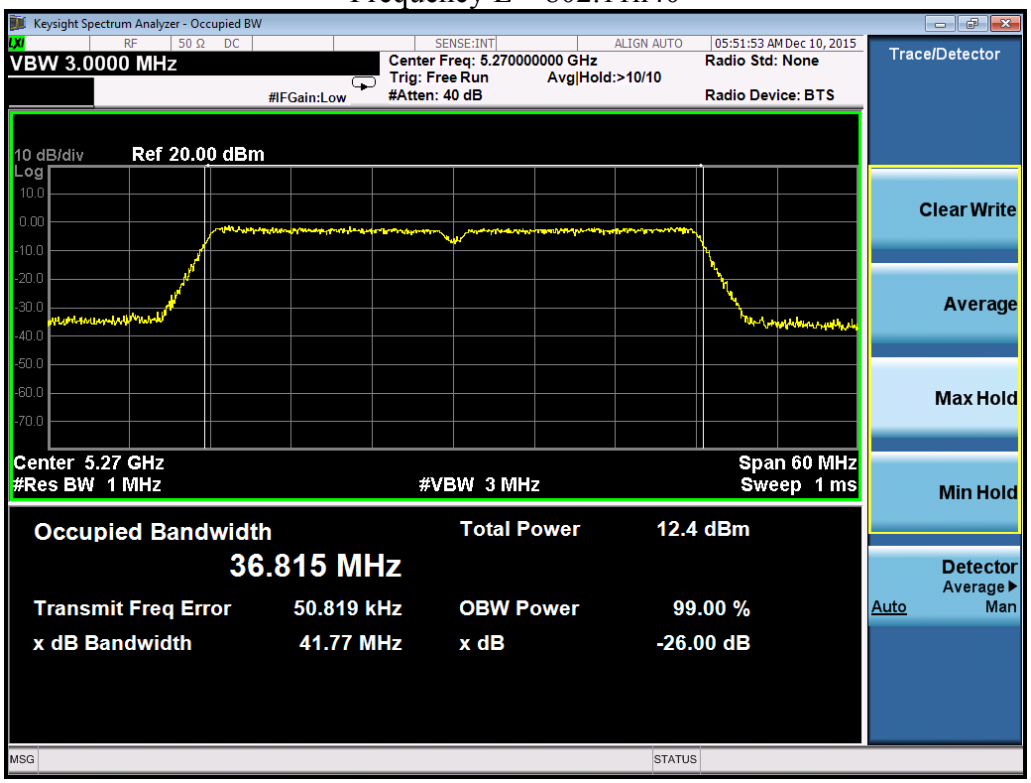
Frequency M – 802.11n20



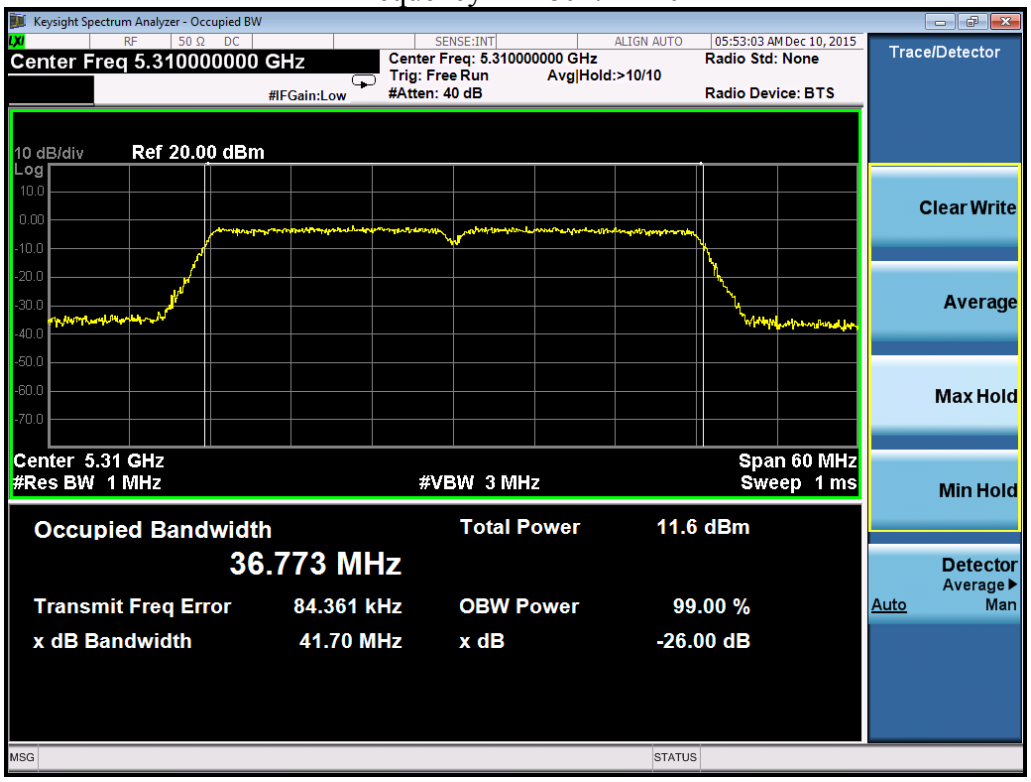
Frequency H – 802.11n20



Frequency L – 802.11n40



Frequency H – 802.11n40



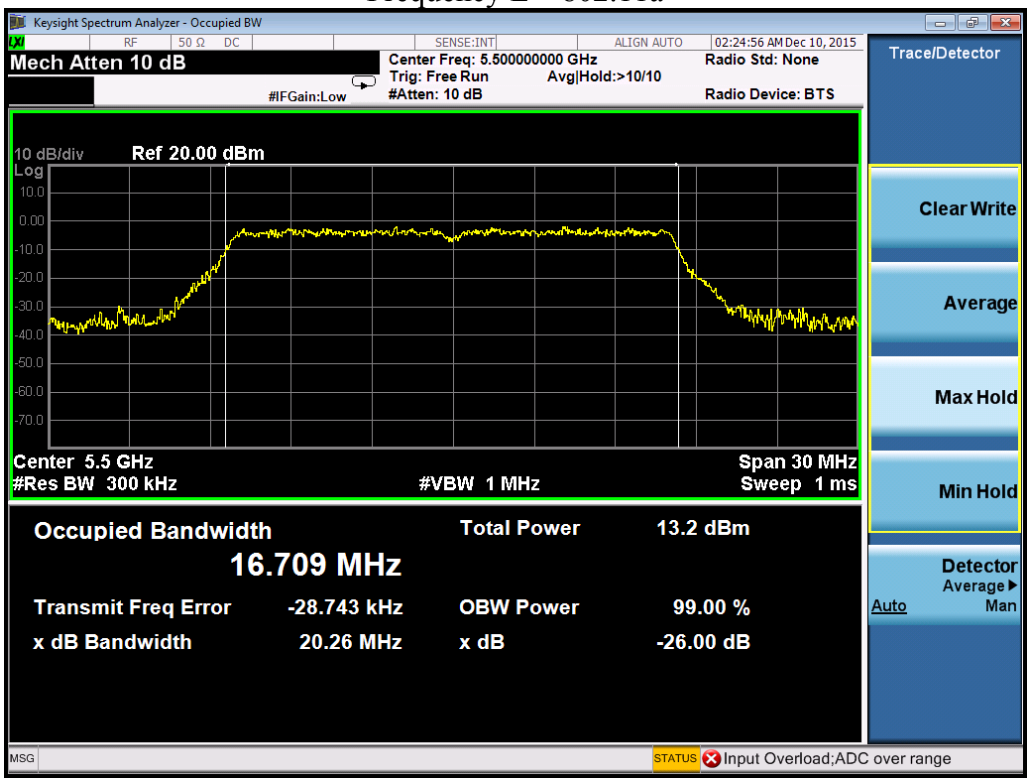
U-NII-2C Band:

Mode	Frequency (MHz)	26 dB BW (MHz)		99% dB BW (MHz)	
		Port 0	Port 1	Port 0	Port 1
802.11a	5500	20.26	22.04	16.709	16.691
	5580	19.97	20.30	16.752	16.743
	5700	20.20	20.05	16.714	16.721
802.11n20	5500	20.46	20.48	17.884	17.874
	5580	20.47	20.50	17.904	17.880
	5700	20.37	20.45	17.873	17.861
802.11n40	5510	42.43	41.67	37.275	36.863
	5550	41.69	41.92	36.907	36.989
	5670	42.45	41.67	37.093	36.644

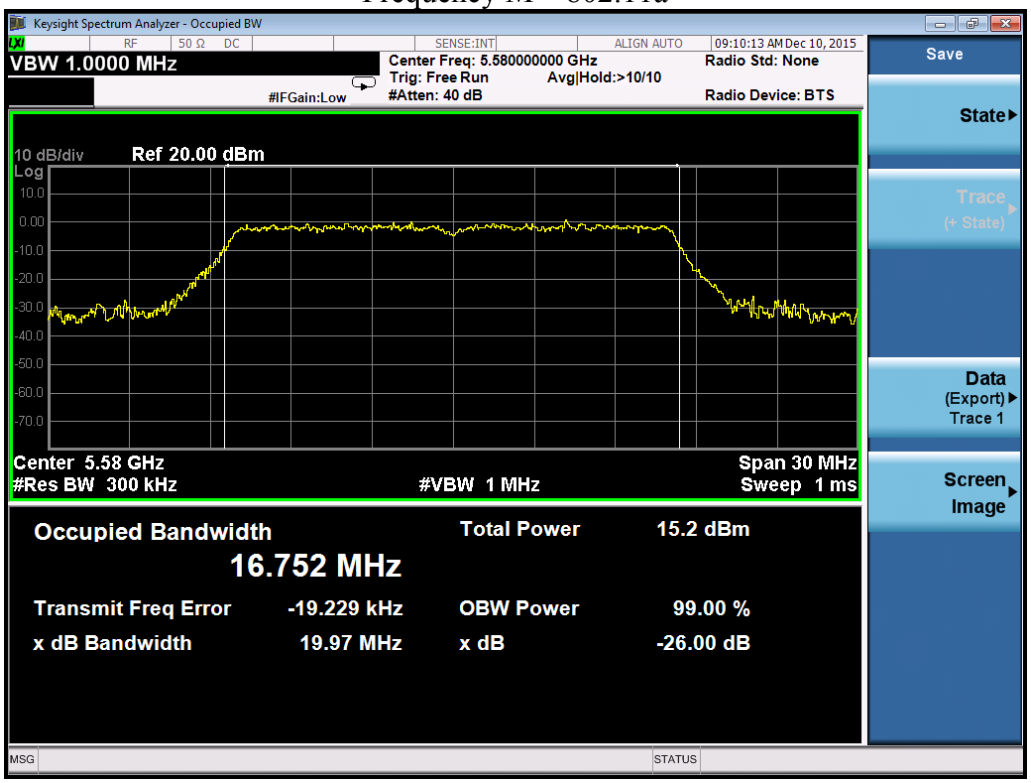
Test Plots as bellow:

Port 1

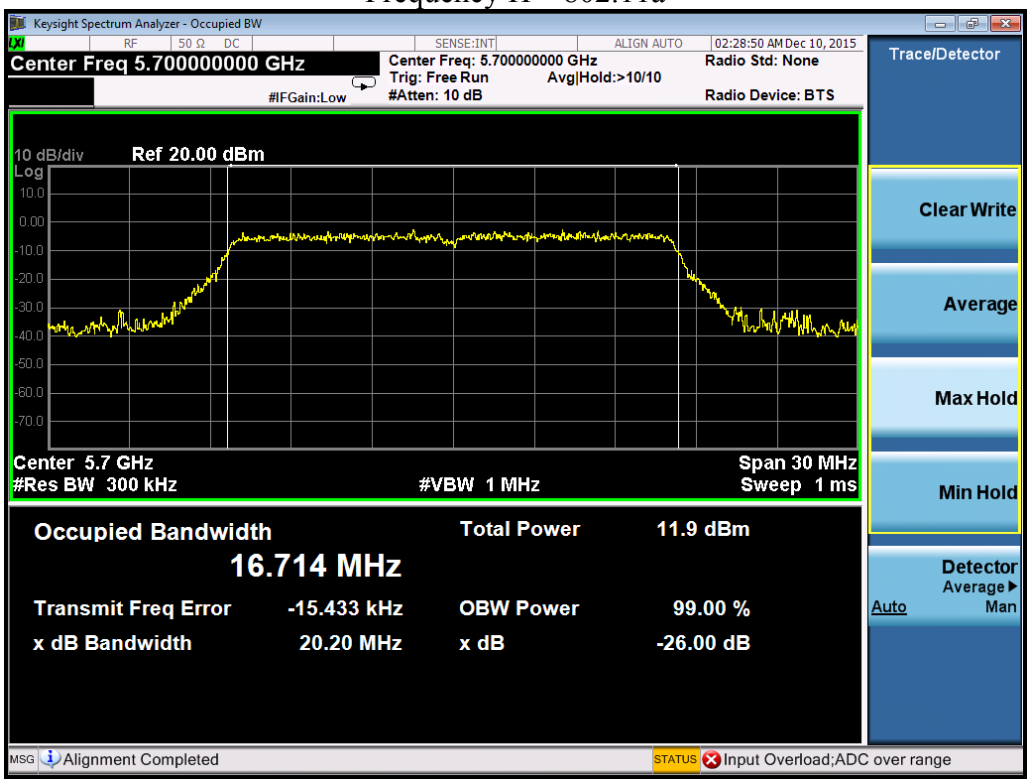
Frequency L – 802.11a



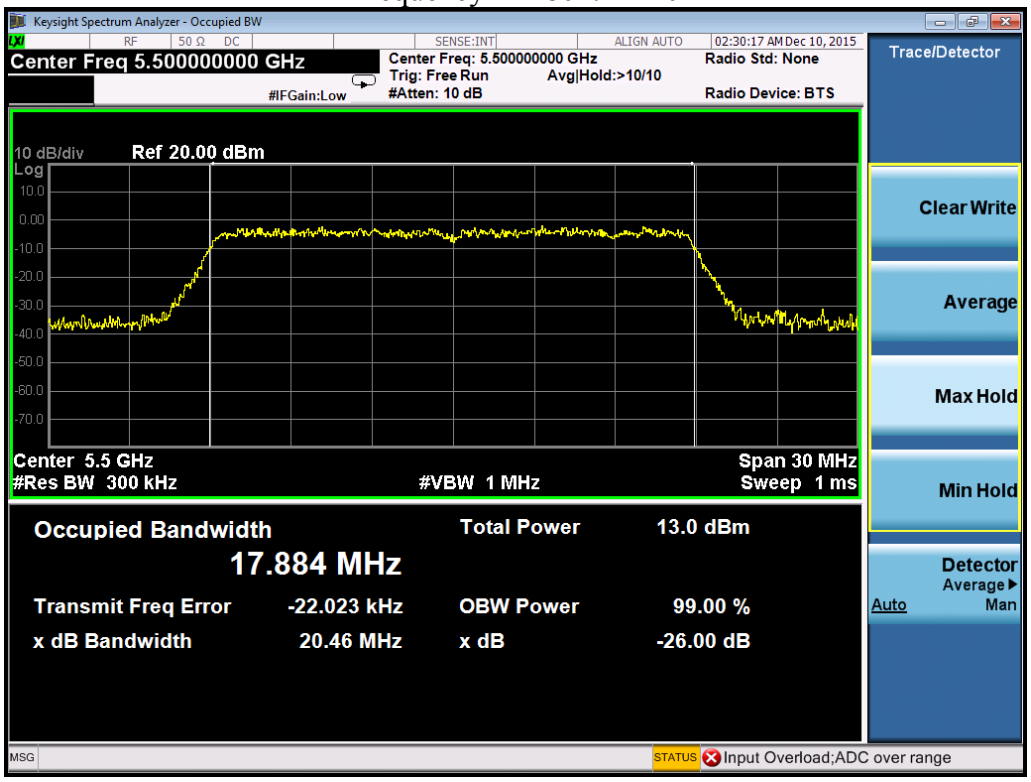
Frequency M – 802.11a



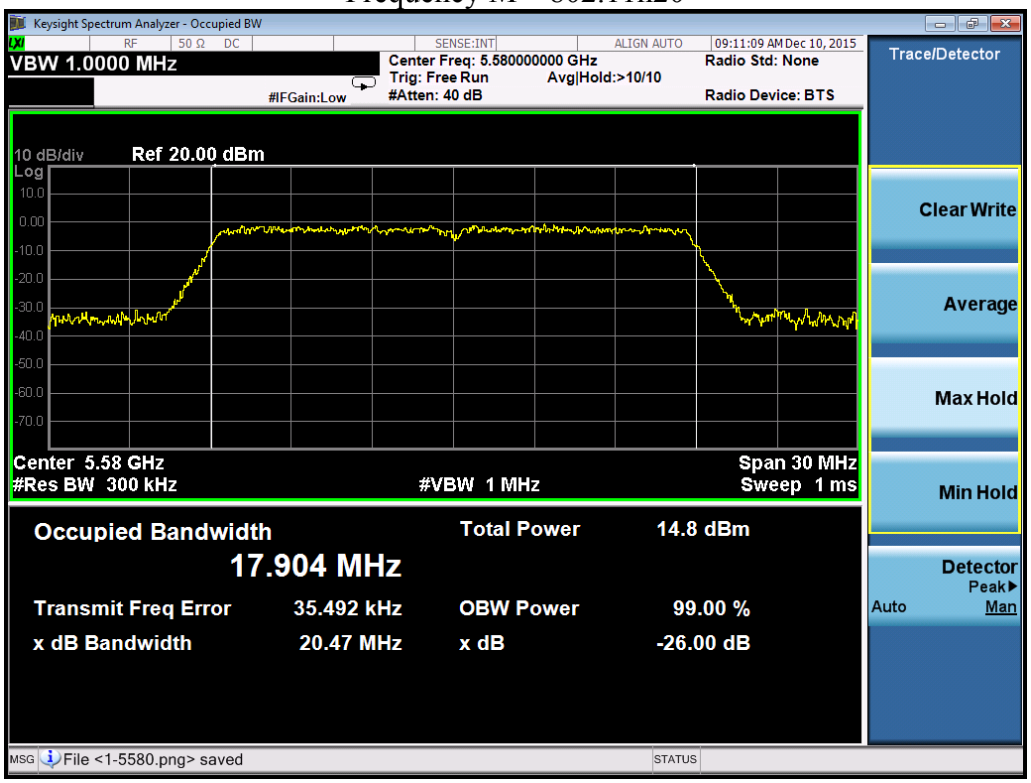
Frequency H – 802.11a



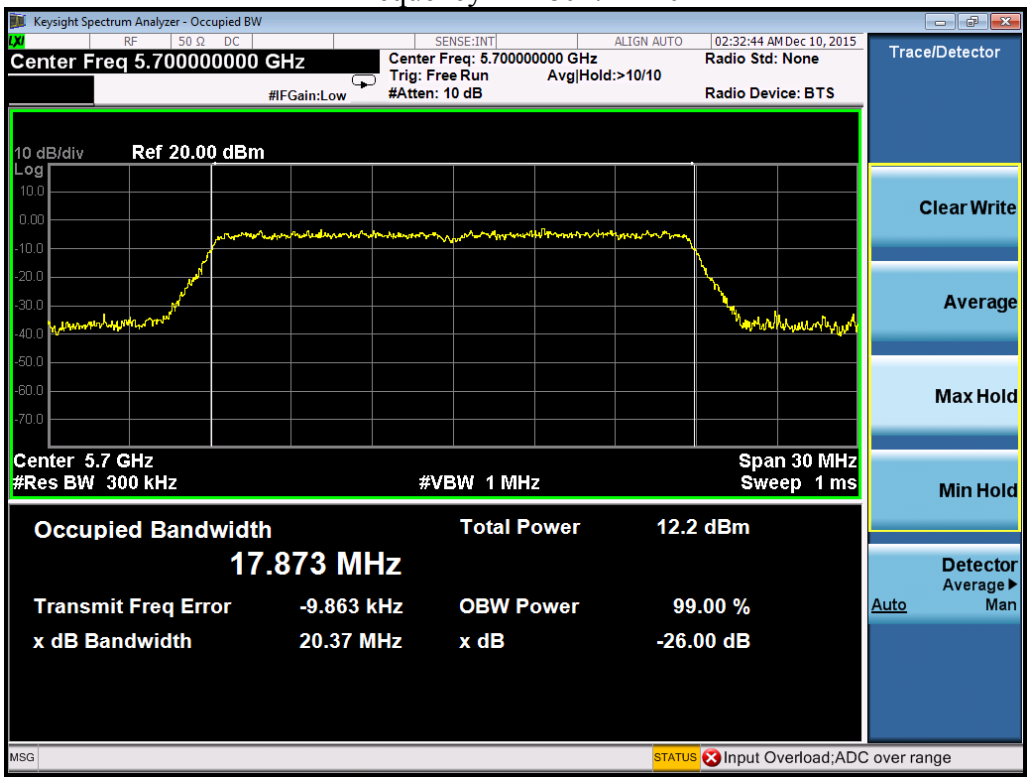
Frequency L – 802.11n20



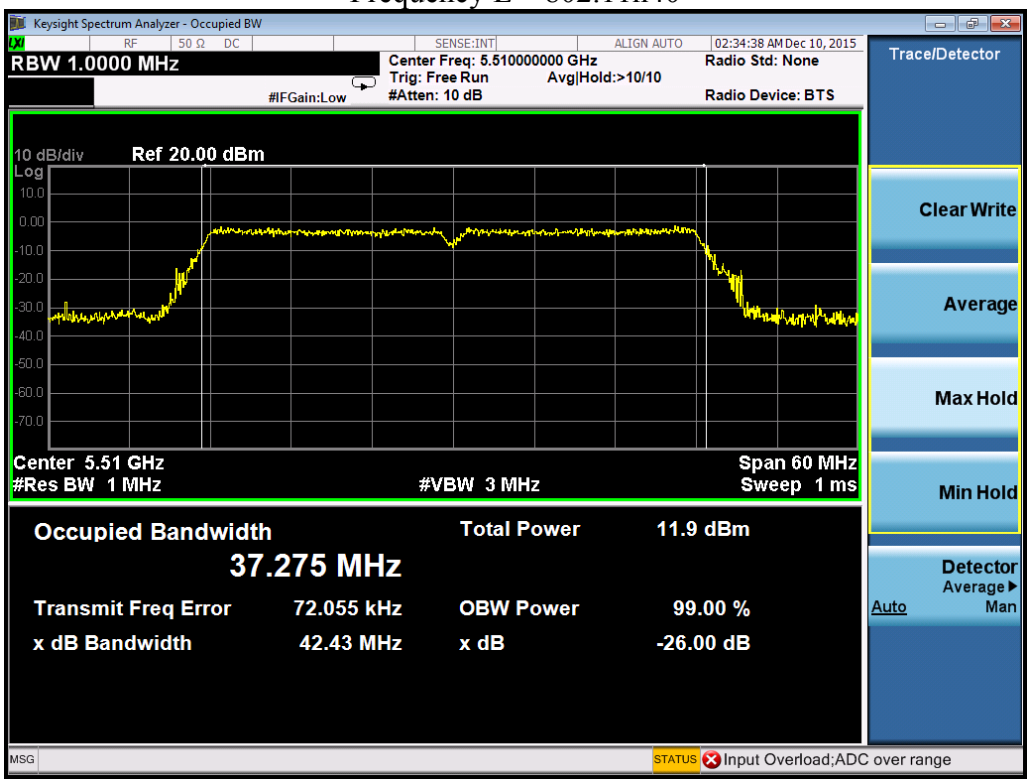
Frequency M – 802.11n20



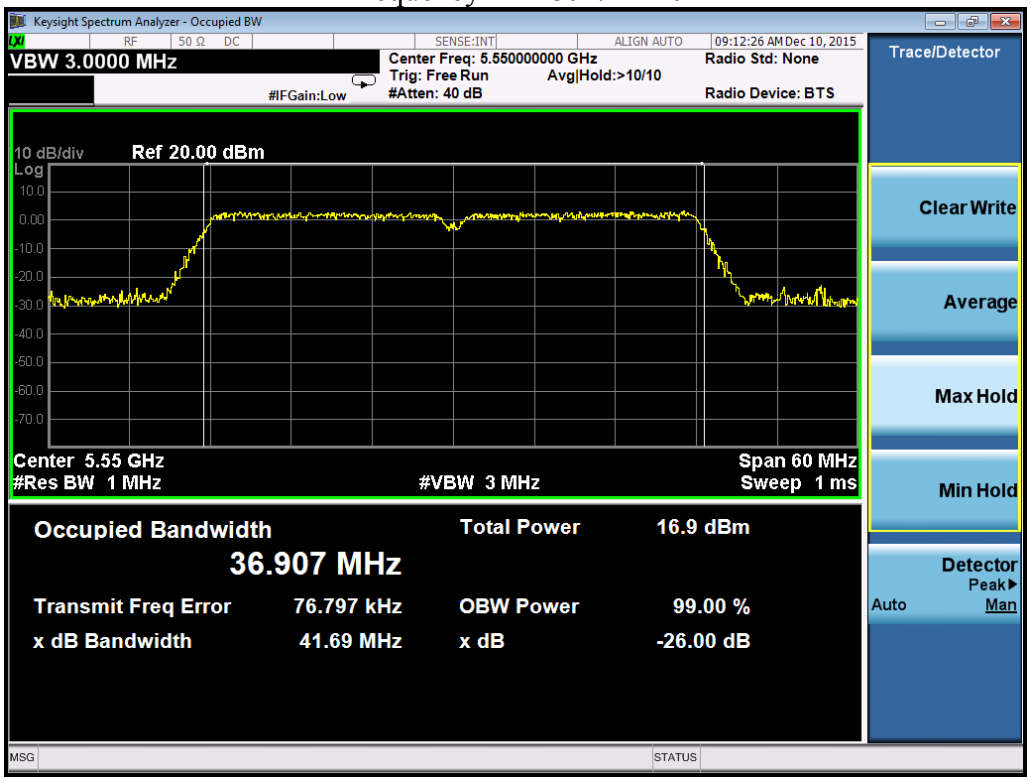
Frequency H – 802.11n20



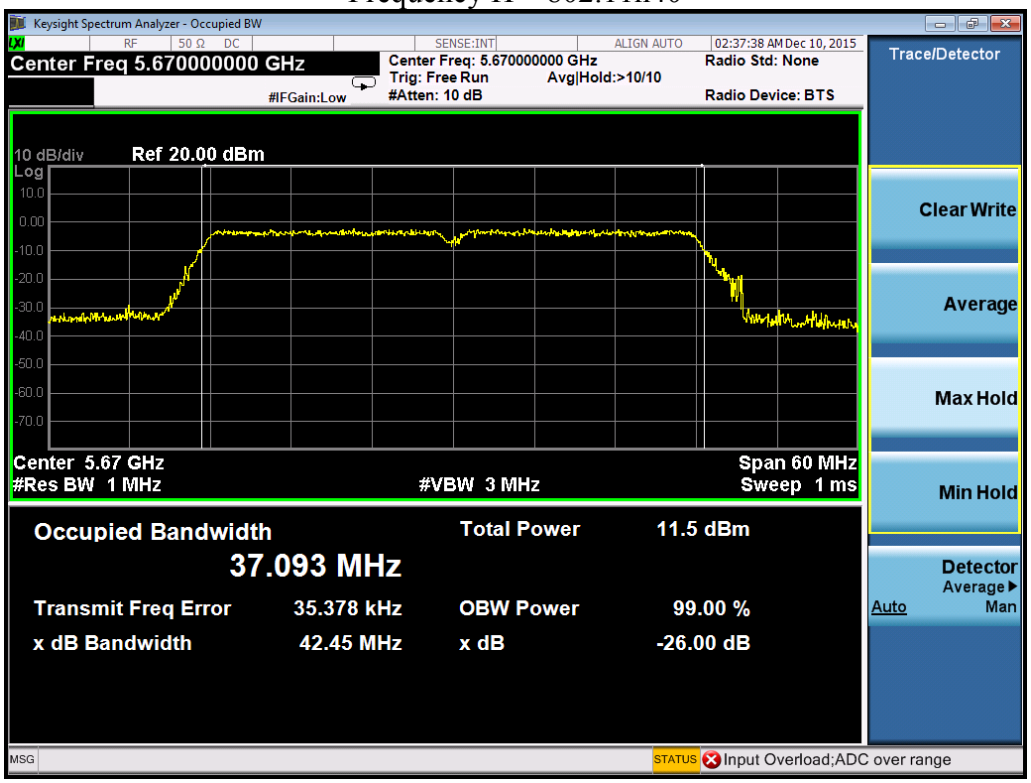
Frequency L – 802.11n40



Frequency M – 802.11n40

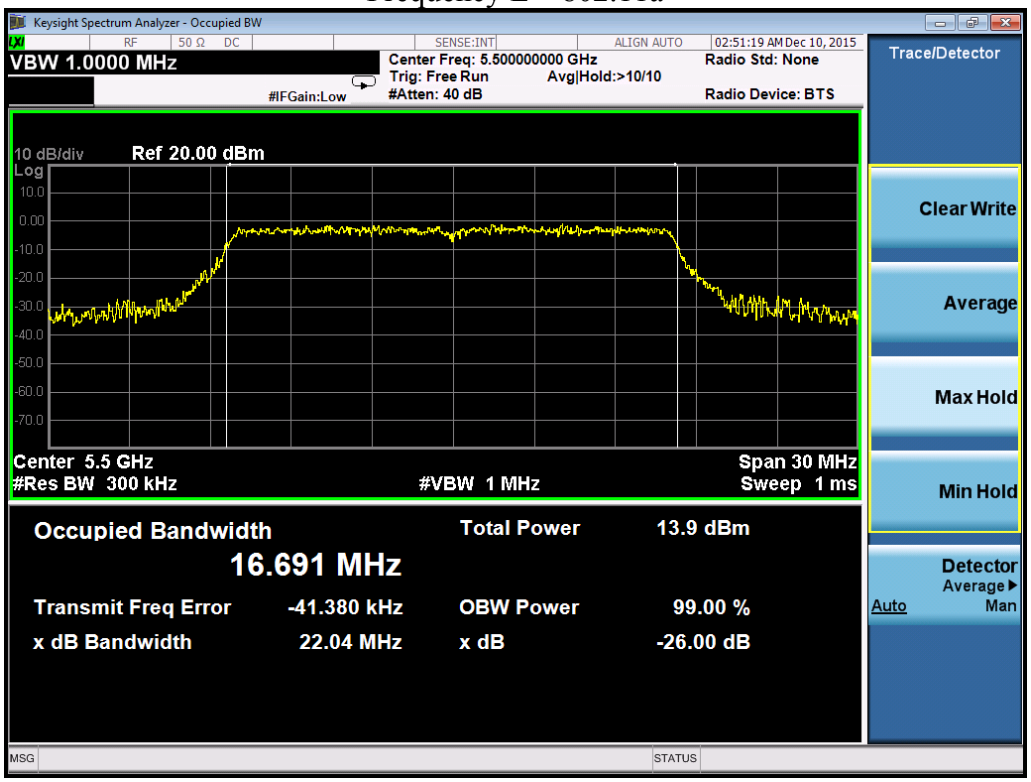


Frequency H – 802.11n40

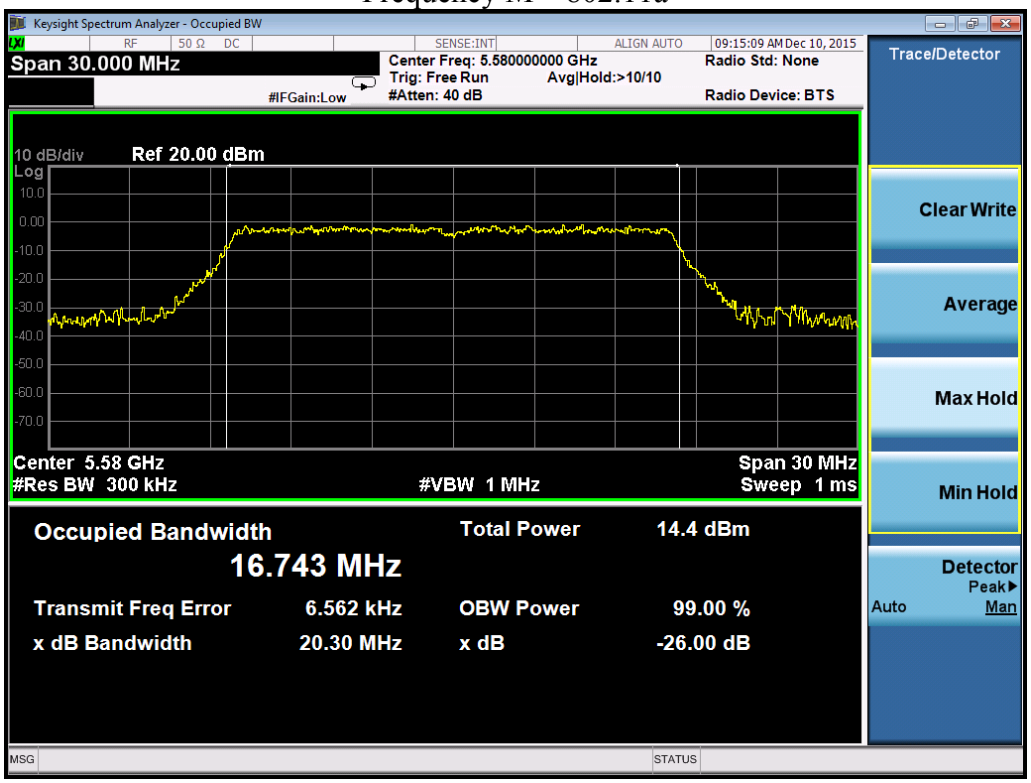


Port 2

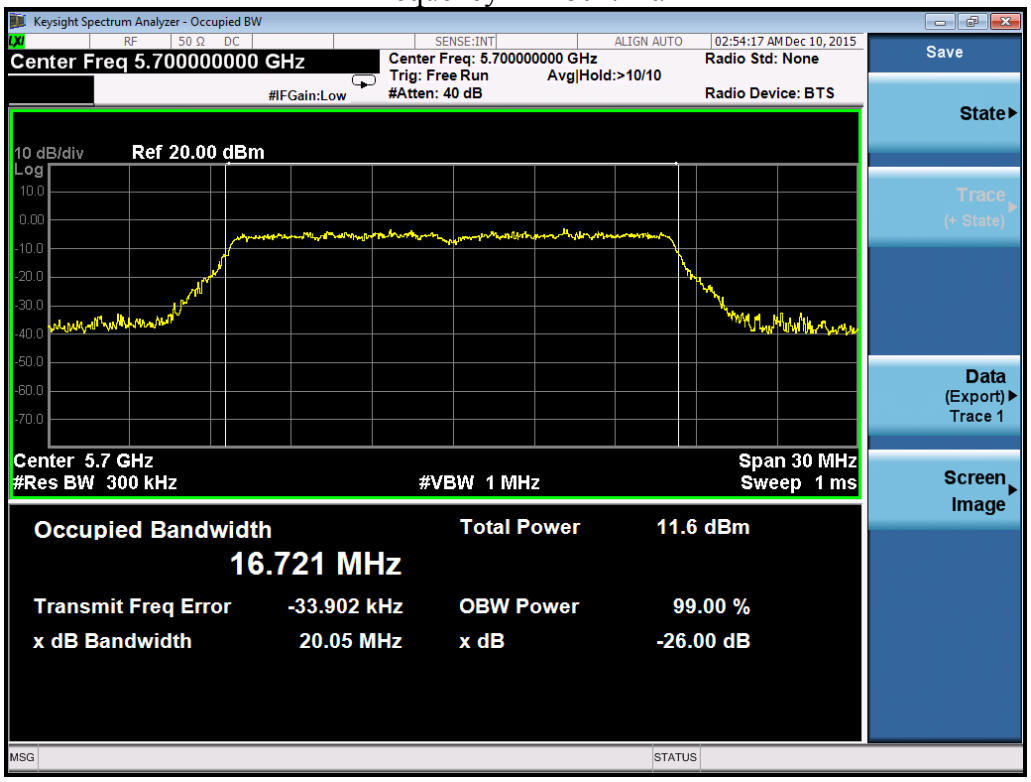
Frequency L – 802.11a



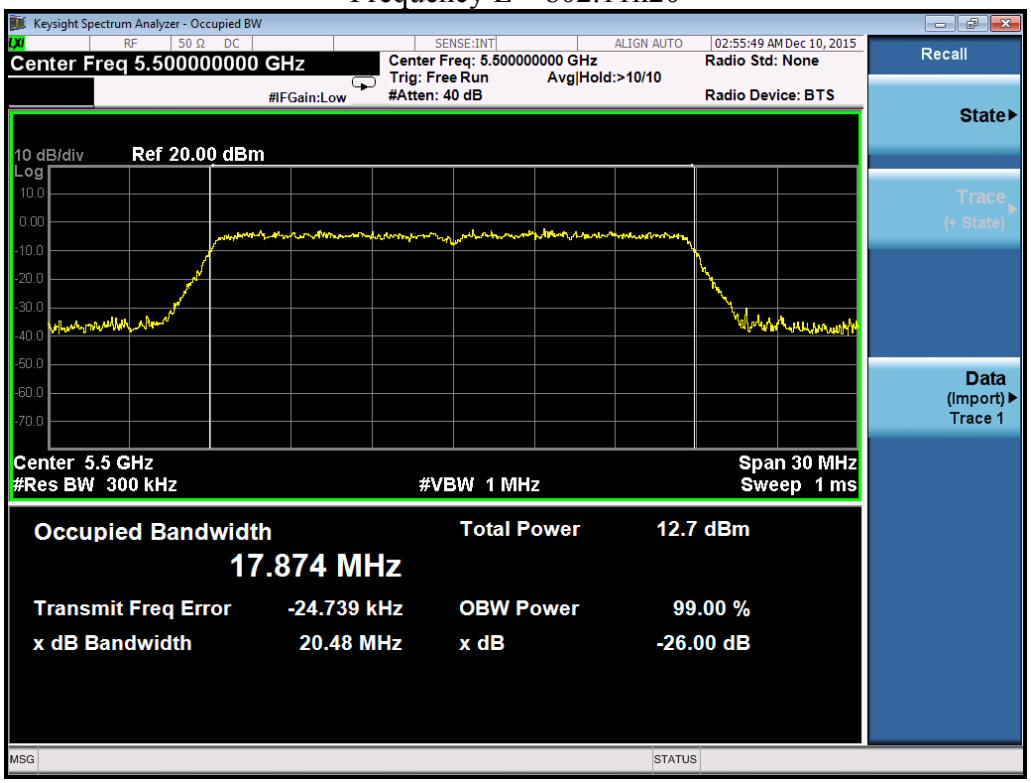
Frequency M – 802.11a



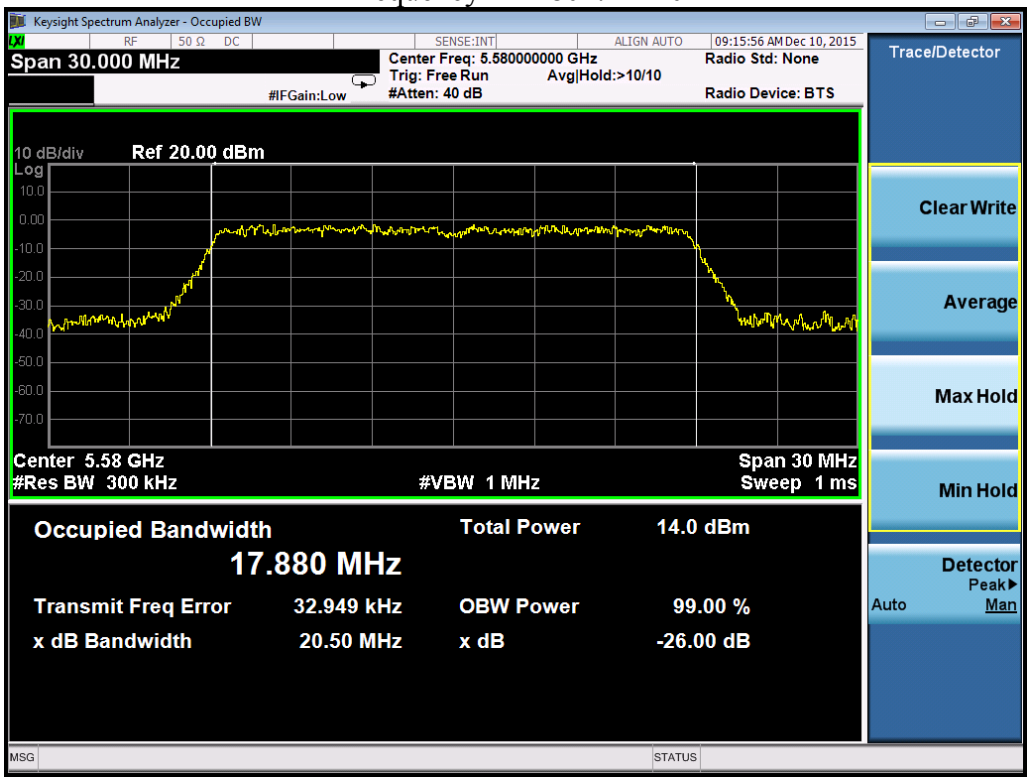
Frequency H – 802.11a



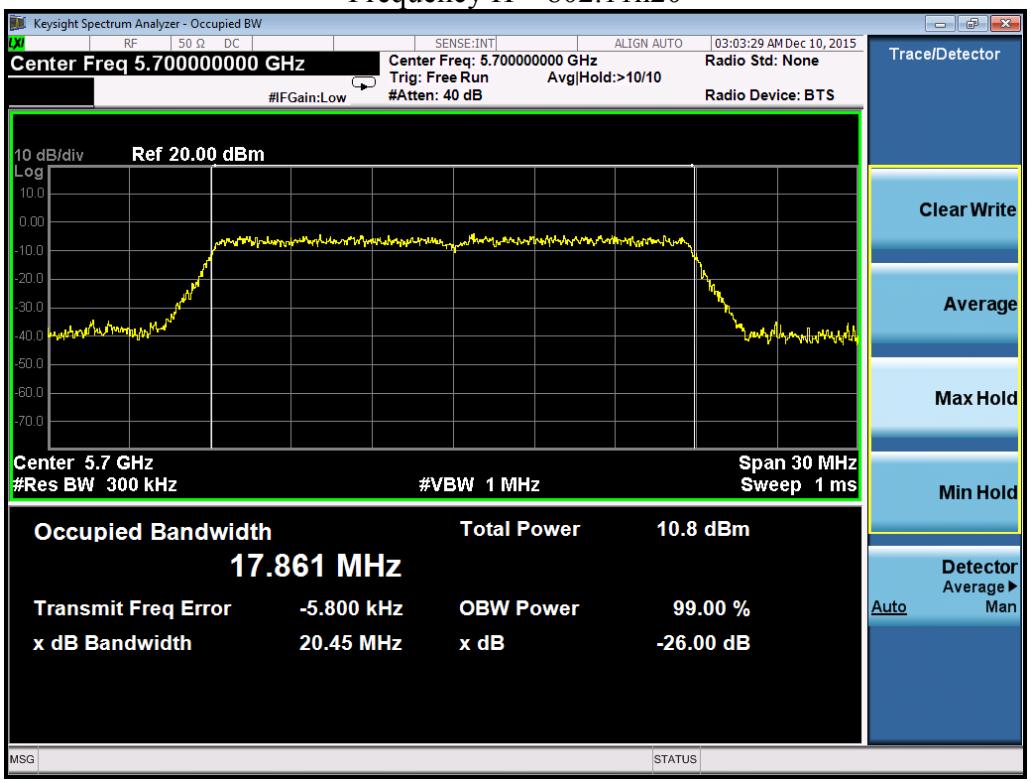
Frequency L – 802.11n20



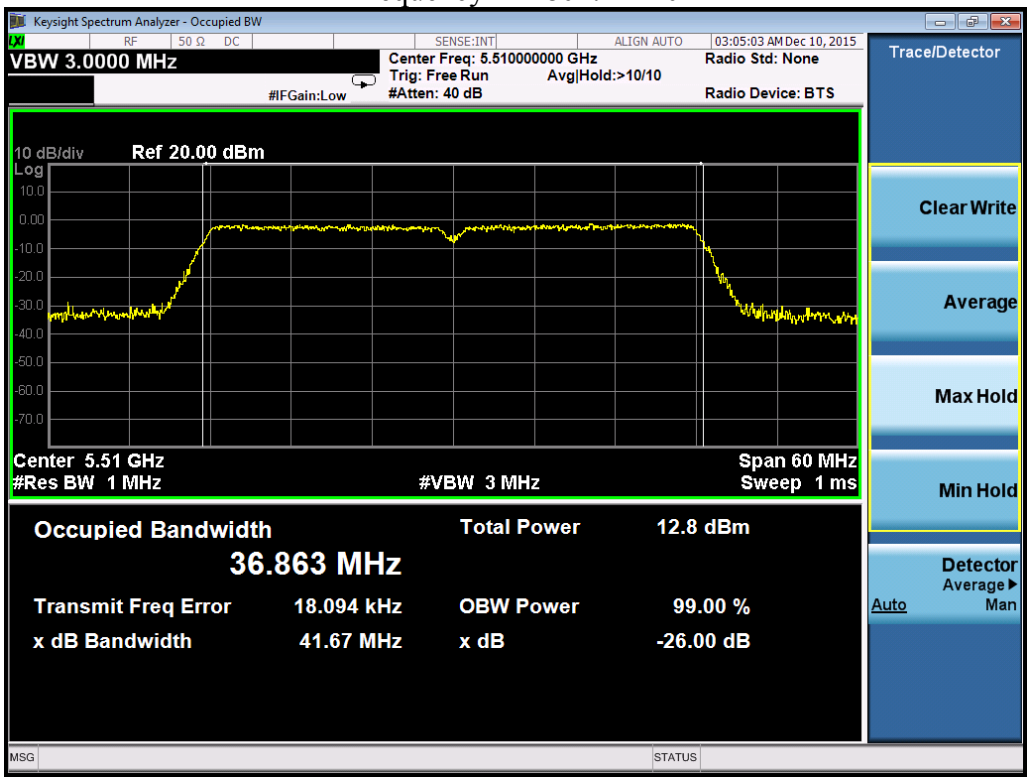
Frequency M – 802.11n20



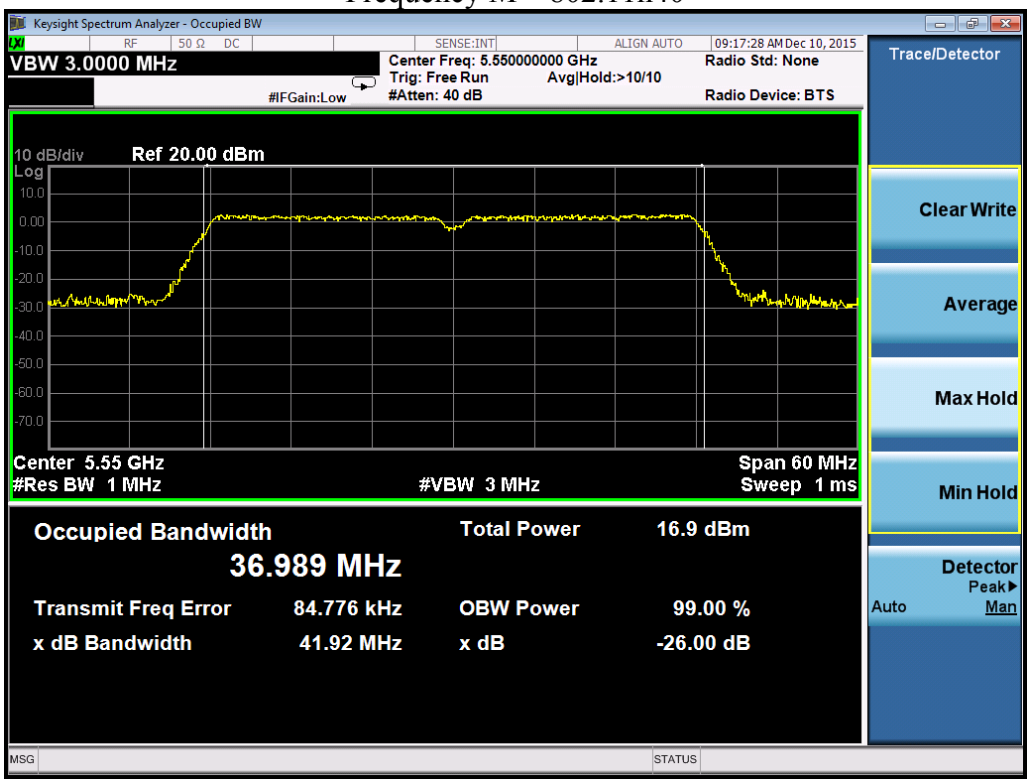
Frequency H – 802.11n20



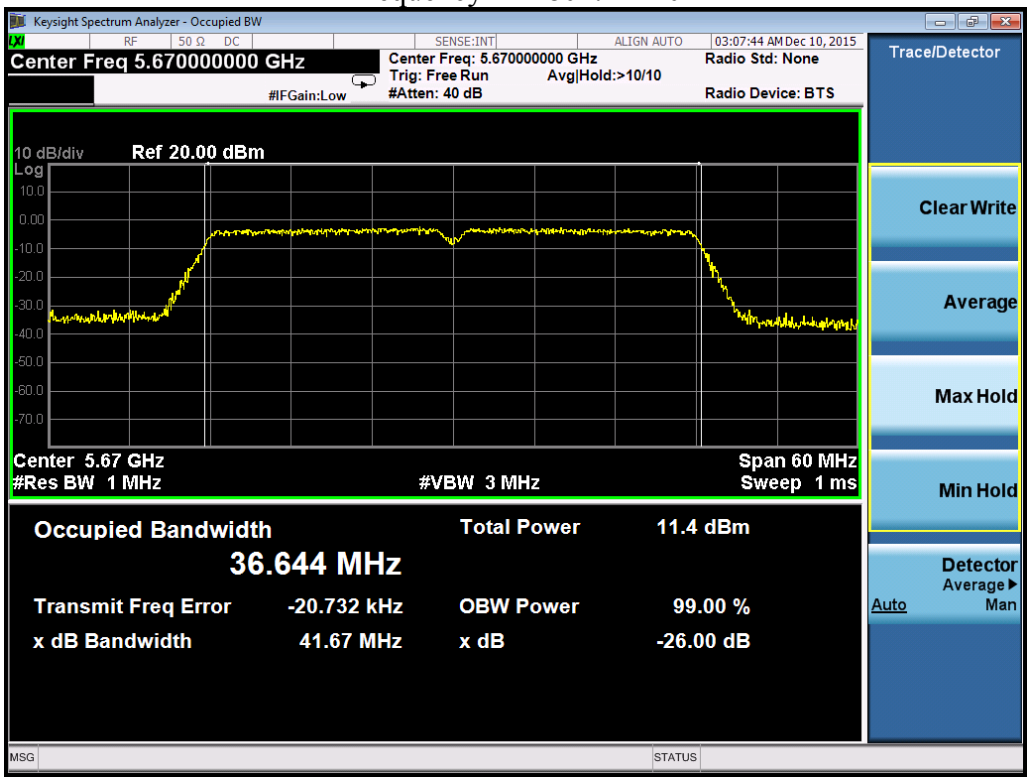
Frequency L – 802.11n40



Frequency M – 802.11n40



Frequency H – 802.11n40



4. Maximum Conducted Output Power & EIRP

Test result: Pass

4.1 Test limit

☐ For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.

☐ For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.

☐ For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

☒ For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

☒ For Frequency Band 5150-5250 MHz, The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz.

☒ For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

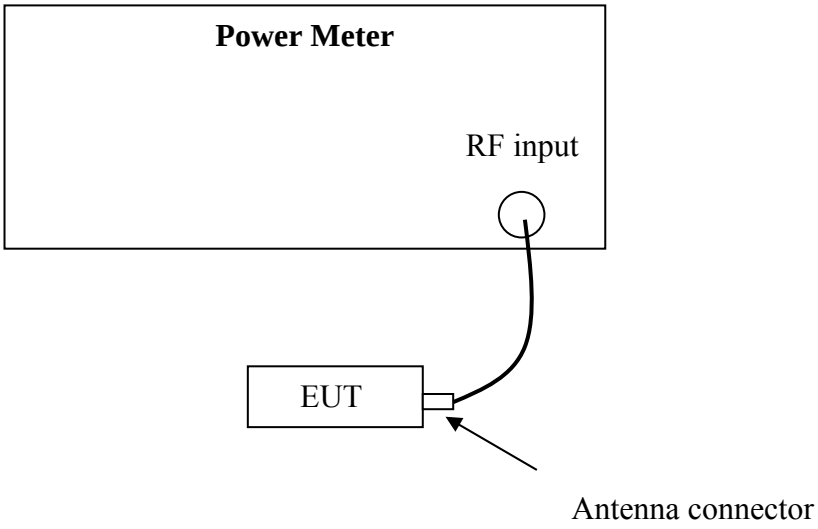
☒ For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz.

☒ For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

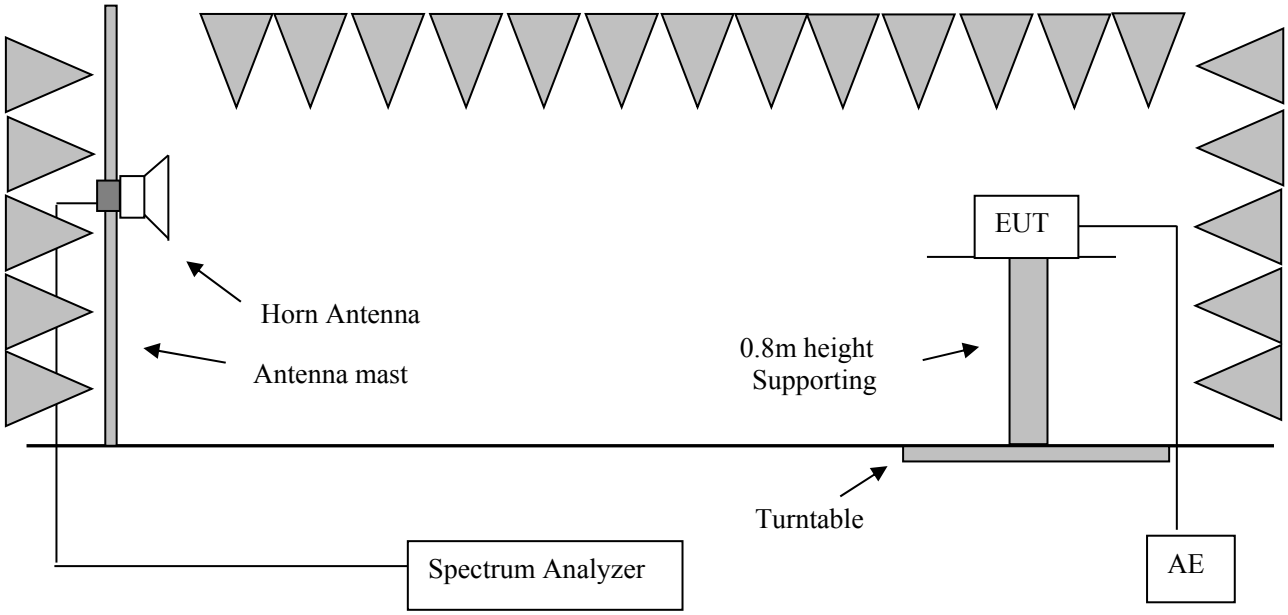
If transmitting antennas of directional gain greater than 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.2 Test Configuration

☒ Maximum Conducted Output Power test



☐ Maximum EIRP test



4.3 Test procedure and test setup

The power output per FCC §15.407(a) was measured on the EUT using a 50 ohm RF cable connected to spectrum analyzer and the measurement method refer to KDB 789033D02 v01 r02: Method PM.
The EIRP test is conducted at any elevation angle above 30 degrees as measured from the horizon.

4.4 Test protocol

Temperature : 25 °C
Relative Humidity : 55 %

U-NII-1 Band Conducted Power:

Mode	Frequency (MHz)	Reading (dBm)		Max Power (mw)	Max Power (dBm)	Limit (dBm)	Margin (dB)
		Port 0	Port 1				
802.11a	5180	9.50	9.38	8.91	9.50	24.00	14.50
	5200	9.56	9.55	9.04	9.56	24.00	14.44
	5240	9.63	9.36	9.18	9.63	24.00	14.37
Mode	**Frequency (MHz)**	**Reading (dBm)**		**Total Power (mw)**	**Total Power (dBm)**	**Limit (dBm)**	**Margin (dB)**
		Port 0	**Port 1**				
802.11n20	5180	10.11	10.32	21.02	13.23	24.00	10.77
	5200	10.23	10.12	20.82	13.19	24.00	10.81
	5240	10.18	10.25	21.02	13.23	24.00	10.77
802.11n40	5190	9.31	9.38	17.20	12.36	24.00	11.64
	5230	9.35	9.34	17.20	12.36	24.00	11.64

U-NII-1 Band EIRP:
EIRP limit calculation:

Frequency range (MHz)	Mode	Min 99% bandwidth (MHz)	10+10log B (dBm)	EIRP Limit (dBm)
5150 - 5250	802.11a	16.657	22.22	22.22
	802.11n20	17.844	22.51	22.51
	802.11n40	36.691	25.65	23.00

Mode	Frequency (MHz)	Max Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
802.11a	5180	9.50	4.50	14.00	22.22	8.22
	5200	9.56	4.50	14.06	22.22	8.16
	5240	9.63	4.50	14.13	22.22	8.09
802.11n20	5180	13.23	4.50	17.73	22.51	4.78
	5200	13.19	4.50	17.69	22.51	4.82
	5240	13.23	4.50	17.73	22.51	4.78
802.11n40	5190	12.36	4.50	16.86	23.00	6.14
	5230	12.36	4.50	16.86	23.00	6.14

U-NII-2A Band Conducted Power:
Power limit calculation:

Frequency range (MHz)	Mode	26dB bandwidth (MHz)	11+10log B (dBm)	Power Limit (dBm)
5250 - 5350	802.11a	19.93	24.00	24.00
	802.11n20	20.46	24.11	24.00
	802.11n40	41.61	27.19	24.00

Mode	Frequency (MHz)	Reading (dBm)		Max Power (mw)	Max Power (dBm)	Limit (dBm)	Margin (dB)
		Port 0	Port 1				
802.11a	5260	9.43	9.39	8.77	9.43	24.00	14.57
	5300	9.49	9.55	9.02	9.55	24.00	14.45
	5320	9.77	9.68	9.48	9.77	24.00	14.23
Mode	**Frequency (MHz)**	**Reading (dBm)**		**Total Power (mw)**	**Total Power (dBm)**	**Limit (dBm)**	**Margin (dB)**
		Port 0	**Port 1**				
802.11n20	5260	10.45	10.53	22.39	13.50	24.00	10.50
	5300	10.25	10.37	21.48	13.32	24.00	10.68
	5320	10.58	10.26	22.05	13.43	24.00	10.57
802.11n40	5270	9.59	9.68	18.39	12.65	24.00	11.35
	5310	9.66	9.74	18.67	12.71	24.00	11.29

U-NII-2A Band EIRP:
EIRP limit calculation:

Frequency range (MHz)	Mode	Min 99% bandwidth (MHz)	17+10log B (dBm)	EIRP Limit (dBm)
5250 - 5350	802.11a	16.651	29.21	29.21
	802.11n20	17.845	29.52	29.52
	802.11n40	36.773	32.66	30.00

Mode	Frequency (MHz)	Max Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
802.11a	5260	9.43	4.50	13.93	29.21	15.28
	5300	9.55	4.50	14.05	29.21	15.16
	5320	9.77	4.50	14.27	29.21	14.94
802.11n20	5260	13.50	4.50	18.00	29.52	11.52
	5300	13.32	4.50	17.82	29.52	11.70
	5320	13.43	4.50	17.93	29.52	11.59
802.11n40	5270	12.65	4.50	17.15	30.00	12.85
	5310	12.71	4.50	17.21	30.00	12.79

U-NII-2C Band Conducted Power:
Power limit calculation:

Frequency range (MHz)	Mode	26dB bandwidth (MHz)	11+10log B (dBm)	Power Limit (dBm)
5470 - 5725	802.11a	19.97	24.00	24.00
	802.11n20	20.37	24.09	24.00
	802.11n40	41.67	27.20	24.00

Mode	Frequency (MHz)	Reading (dBm)		Max Power (mw)	Max Power (dBm)	Limit (dBm)	Margin (dB)
		Port 0	Port 1				
802.11a	5500	10.52	9.35	11.27	10.52	24.00	13.48
	5580	10.21	8.93	10.50	10.21	24.00	13.79
	5700	9.43	8.45	8.77	9.43	24.00	14.57
Mode	**Frequency (MHz)**	**Reading (dBm)**		**Total Power (mw)**	**Total Power (dBm)**	**Limit (dBm)**	**Margin (dB)**
		Port 0	**Port 1**				
802.11n20	5500	10.56	9.59	20.48	13.11	24.00	10.89
	5580	10.28	9.32	19.22	12.84	24.00	11.16
	5700	9.47	8.28	15.58	11.93	24.00	12.07
802.11n40	5510	10.78	9.75	21.41	13.31	24.00	10.69
	5550	10.29	9.36	19.32	12.86	24.00	11.14
	5670	9.48	8.68	16.25	12.11	24.00	11.89

U-NII-2C Band EIRP:
EIRP limit calculation:

Frequency range (MHz)	Mode	Min 99% bandwidth (MHz)	17+10log B (dBm)	EIRP Limit (dBm)
5470 - 5725	802.11a	16.691	29.22	29.22
	802.11n20	17.861	29.52	29.52
	802.11n40	36.644	32.64	30.00

Mode	Frequency (MHz)	Max Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
802.11a	5500	10.52	4.50	15.02	29.22	14.20
	5580	10.21	4.50	14.71	29.22	14.51
	5700	9.43	4.50	13.93	29.22	15.29
802.11n20	5500	13.11	4.50	17.61	29.52	11.91
	5580	12.84	4.50	17.34	29.52	12.18
	5700	11.93	4.50	16.43	29.52	13.09
802.11n40	5510	13.31	4.50	17.81	30.00	12.19
	5550	12.86	4.50	17.36	30.00	12.64
	5670	12.11	4.50	16.61	30.00	13.39

U-NII-3 Band Conducted Power:

Mode	Frequency (MHz)	Reading (dBm)		Max Power (mw)	Max Power (dBm)	Limit (dBm)	Margin (dB)
		Port 0	Port 1				
802.11a	5745	9.66	9.76	9.46	9.76	30.00	20.24
	5785	9.59	9.42	9.10	9.59	30.00	20.41
	5825	9.73	9.55	9.40	9.73	30.00	20.27
Mode	**Frequency (MHz)**	**Reading (dBm)**		**Total Power (mw)**	**Total Power (dBm)**	**Limit (dBm)**	**Margin (dB)**
		Port 0	**Port 1**				
802.11n20	5745	10.23	10.34	21.36	13.30	30.00	16.70
	5785	10.54	10.89	23.60	13.73	30.00	16.27
	5825	10.49	10.34	22.01	13.43	30.00	16.57
802.11n40	5755	9.55	9.64	18.22	12.61	30.00	17.39
	5795	9.34	9.39	17.28	12.38	30.00	17.62

5. Power spectral density

Test result: **Pass**

5.1 Test limit

☐ For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.

☐ For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.

☒ For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

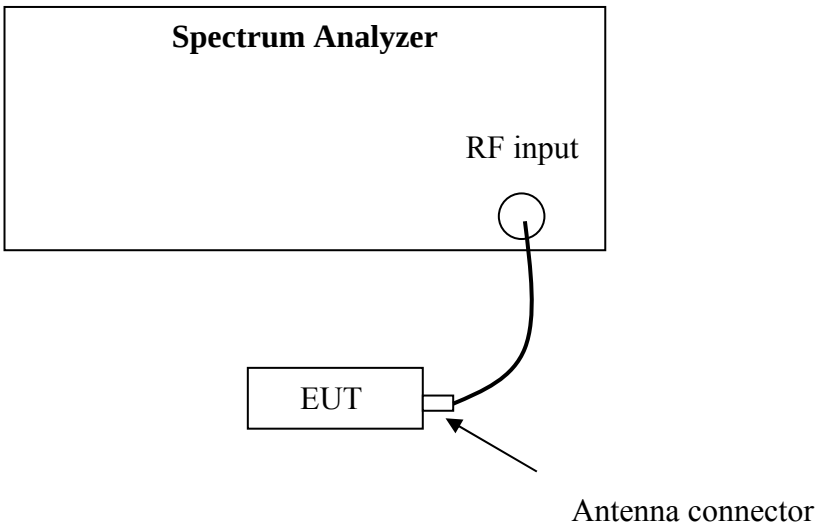
☒For the 5.15-5.25 GHz The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

☒ For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

☒ For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

If the transmitting antenna of directional gain greater than 6dBi is used, the PSD shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
If there have a beamforming type, the limit should be the less of original and original + 6 – antenna gain-beamforming gain.

5.2 Test Configuration



5.3 Test procedure and test setup

The power spectral density per FCC §15.407(a) was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 1MHz, the video bandwidth set at 3 MHz (measurement method refer to KDB 789033D02 v01r02: section F). Power spectral density was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.

5.4 Test Protocol

Temperature : 25 °C
Relative Humidity : 55 %

U-NII-1 Band:

Mode	Frequency (MHz)	Reading (dBm/MHz)		Max PSD (mw/MHz)	Max PSD (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
		Port0	Port 1				
802.11a	5180	-3.409	-3.733	0.46	-3.41	11.00	14.41
	5200	-3.722	-3.736	0.42	-3.72	11.00	14.72
	5240	-3.232	-3.581	0.48	-3.23	11.00	14.23
Mode	**Frequency (MHz)**	**Reading (dBm/MHz)**		**Total PSD (mw/MHz)**	**Total PSD (dBm/MHz)**	**Limit (dBm/MHz)**	**Margin (dB)**
		Port0	**Port 1**				
802.11n20	5180	-4.207	-4.201	0.76	-1.19	11.00	12.19
	5200	-4.043	-4.167	0.78	-1.09	11.00	12.09
	5240	-3.698	-3.963	0.83	-0.82	11.00	11.82
802.11n40	5190	-6.571	-6.357	0.45	-3.45	11.00	14.45
	5230	-6.612	-6.831	0.43	-3.71	11.00	14.71

EIRP PSD:

Mode	Frequency (MHz)	Max PSD (dBm/MHz)	Antenna Gain (dBi)	EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
802.11a	5180	-3.41	4.50	1.09	10.00	8.91
	5200	-3.72	4.50	0.78	10.00	9.22
	5240	-3.23	4.50	1.27	10.00	8.73
802.11n20	5180	-1.19	4.50	3.31	10.00	6.69
	5200	-1.09	4.50	3.41	10.00	6.59
	5240	-0.82	4.50	3.68	10.00	6.32
802.11n40	5190	-3.45	4.50	1.05	10.00	8.95
	5230	-3.71	4.50	0.79	10.00	9.21

Test Plots as bellow:

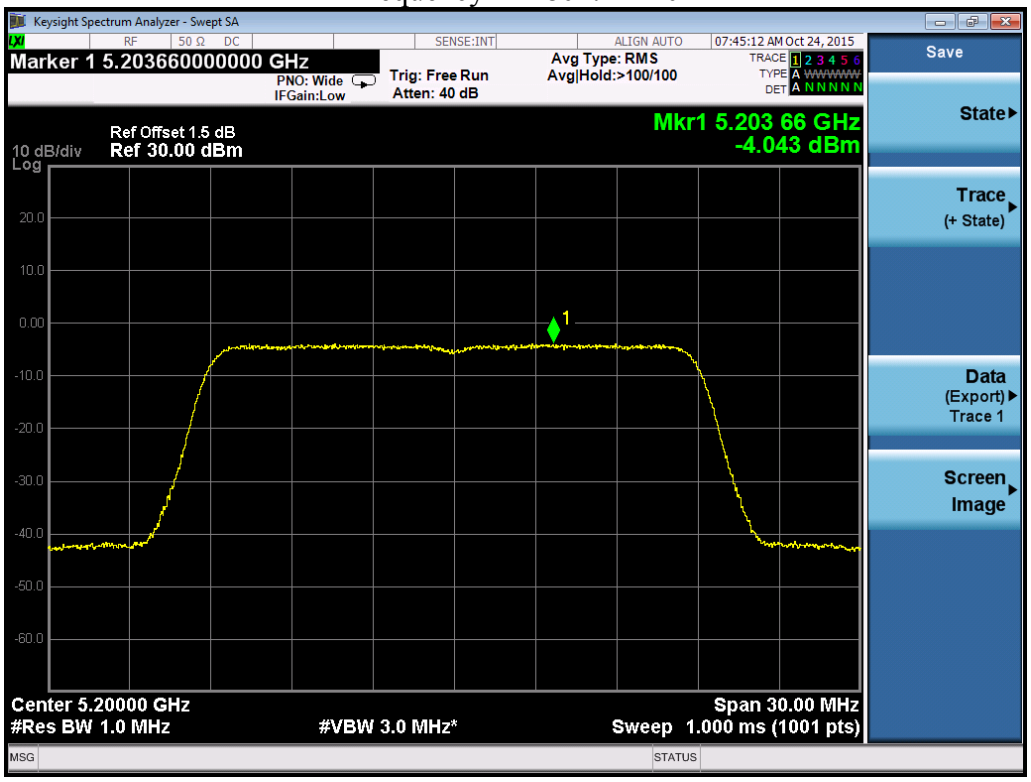
Port 1

Frequency L – 802.11a

Frequency M – 802.11a

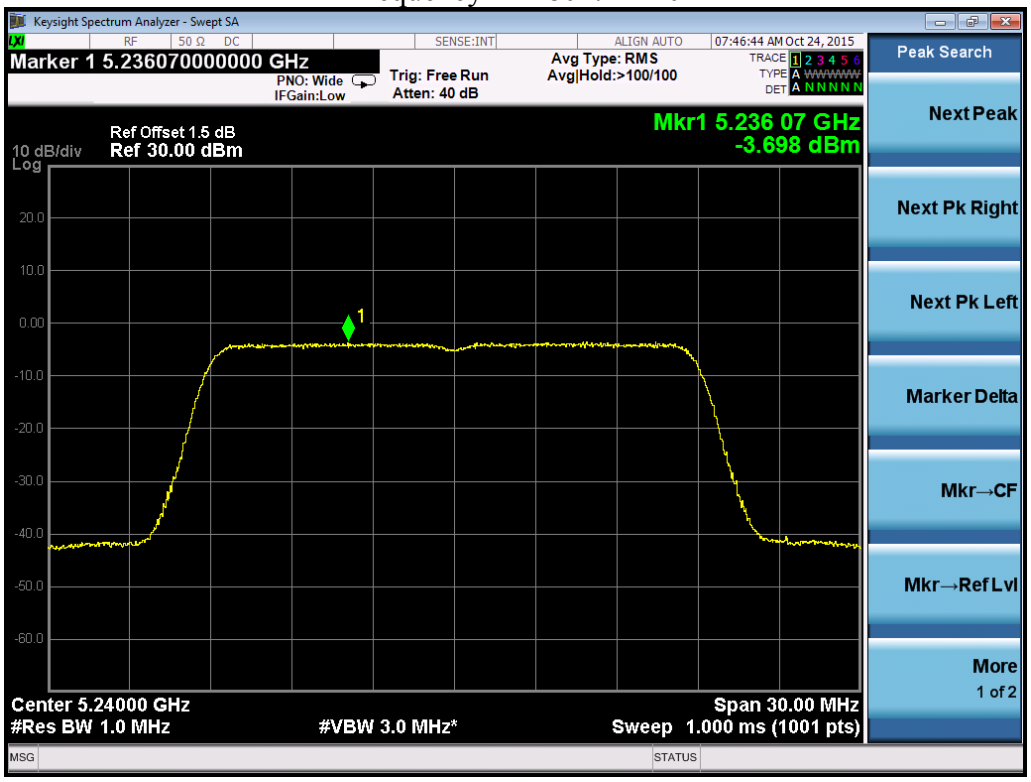
Frequency H – 802.11a

Frequency L – 802.11n20

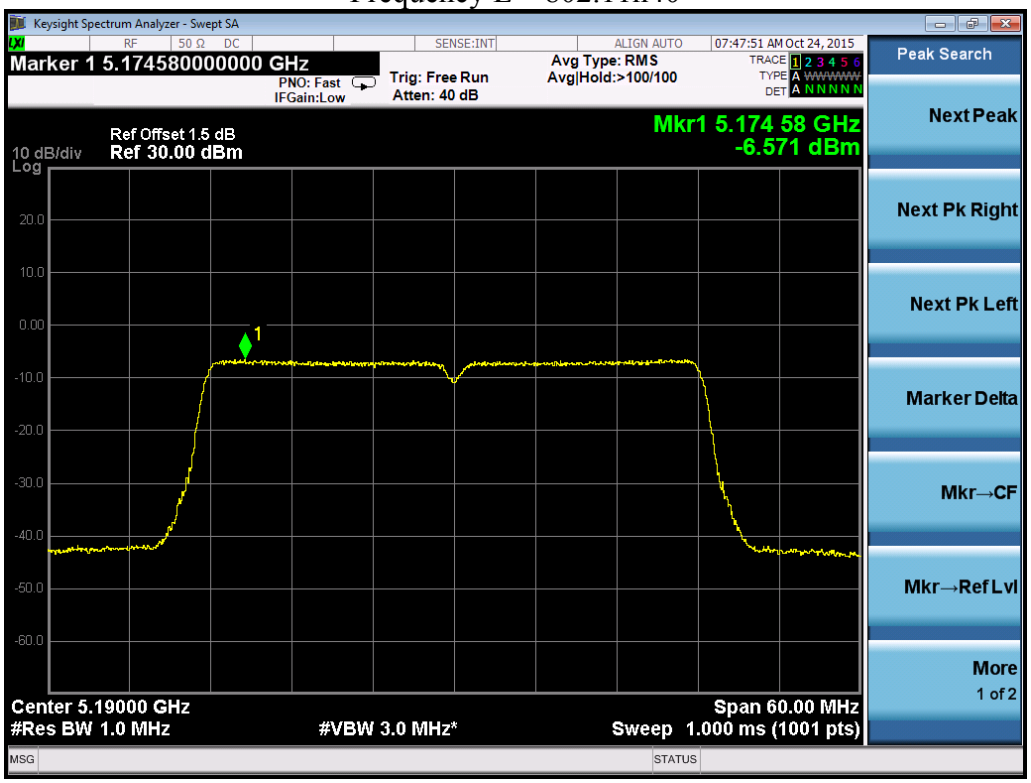


Frequency M – 802.11n20

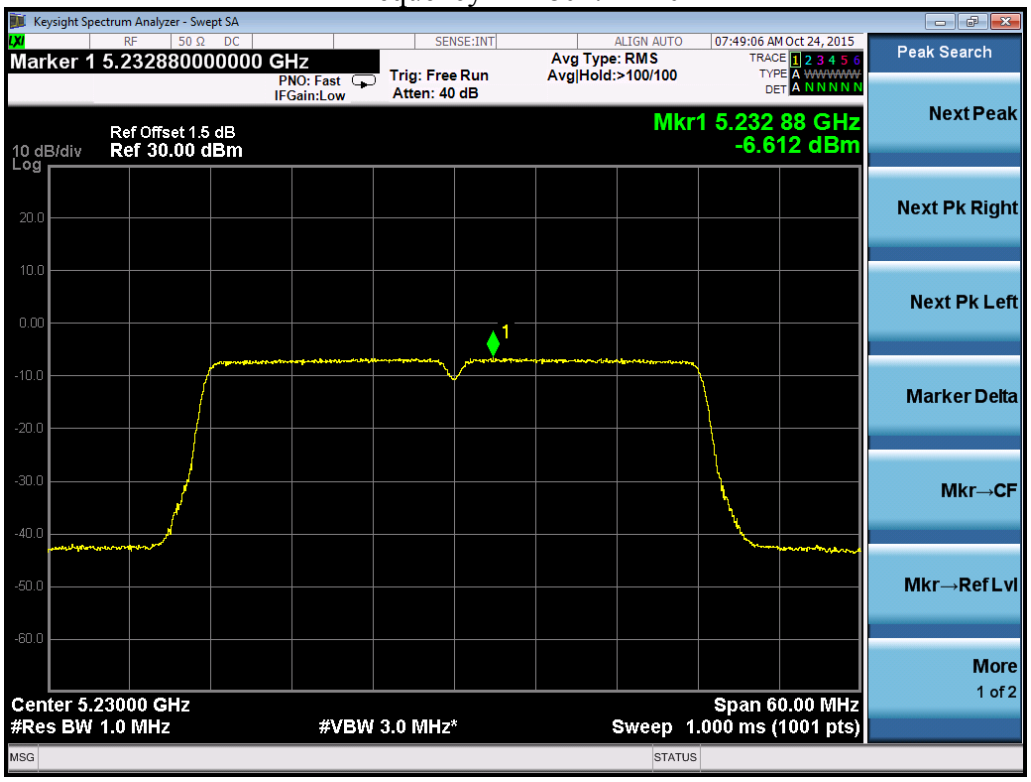
Frequency H – 802.11n20



Frequency L – 802.11n40



Frequency H – 802.11n40



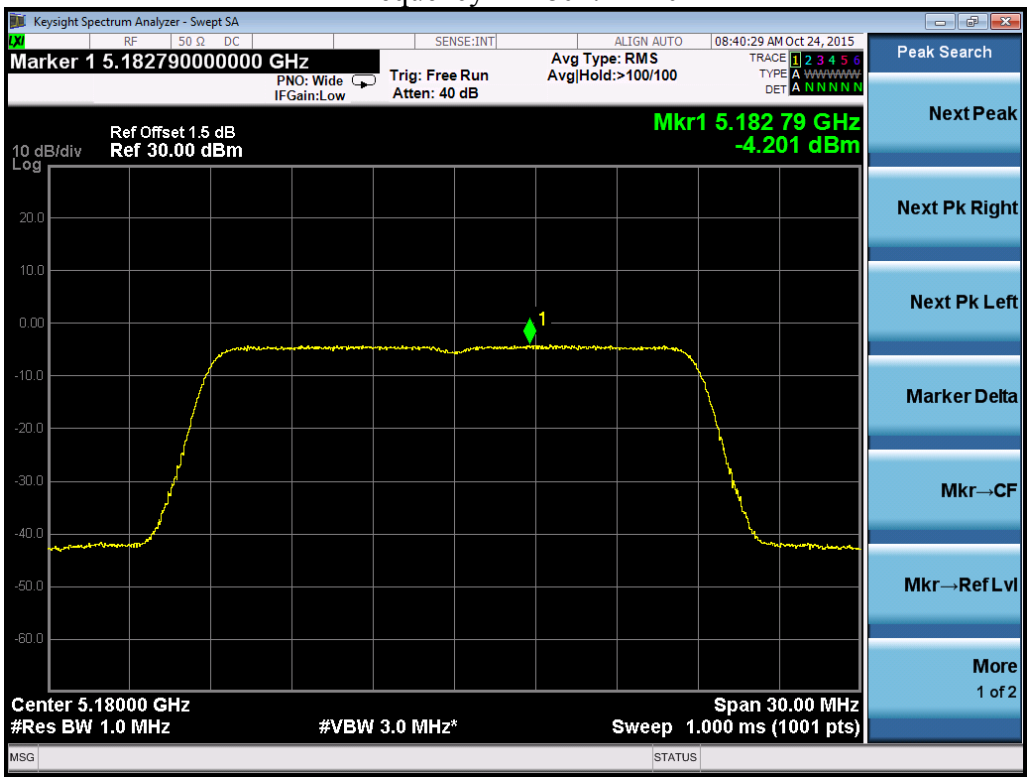
Port 2

Frequency L – 802.11a

Frequency M – 802.11a

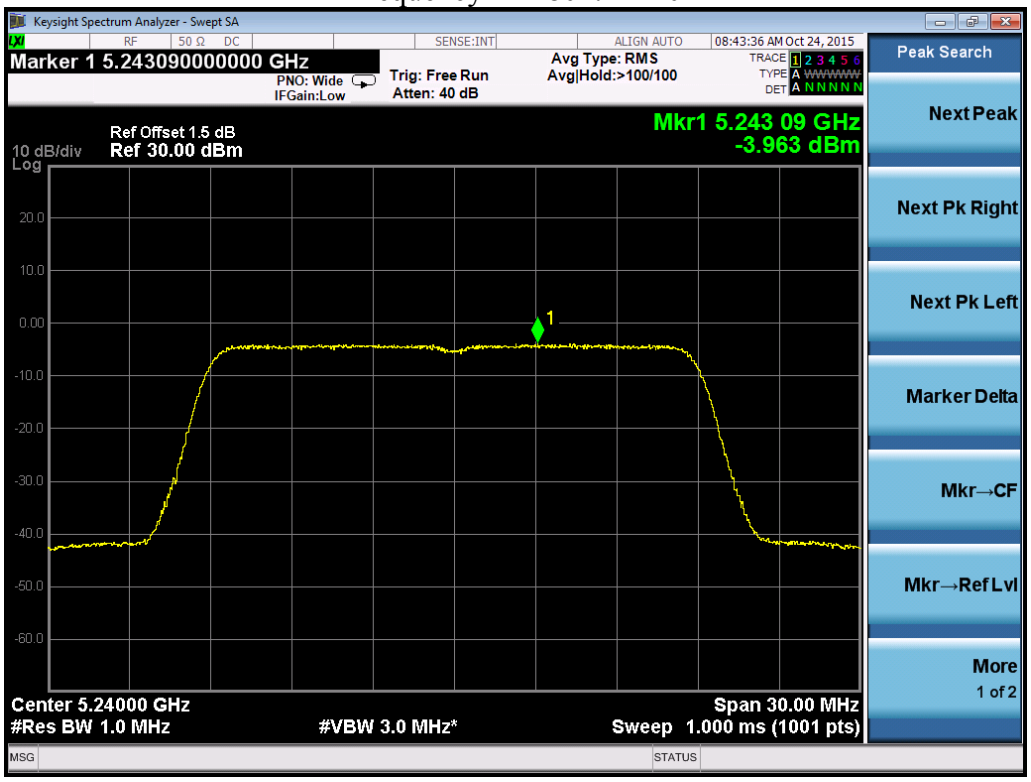
Frequency H – 802.11a

Frequency L – 802.11n20

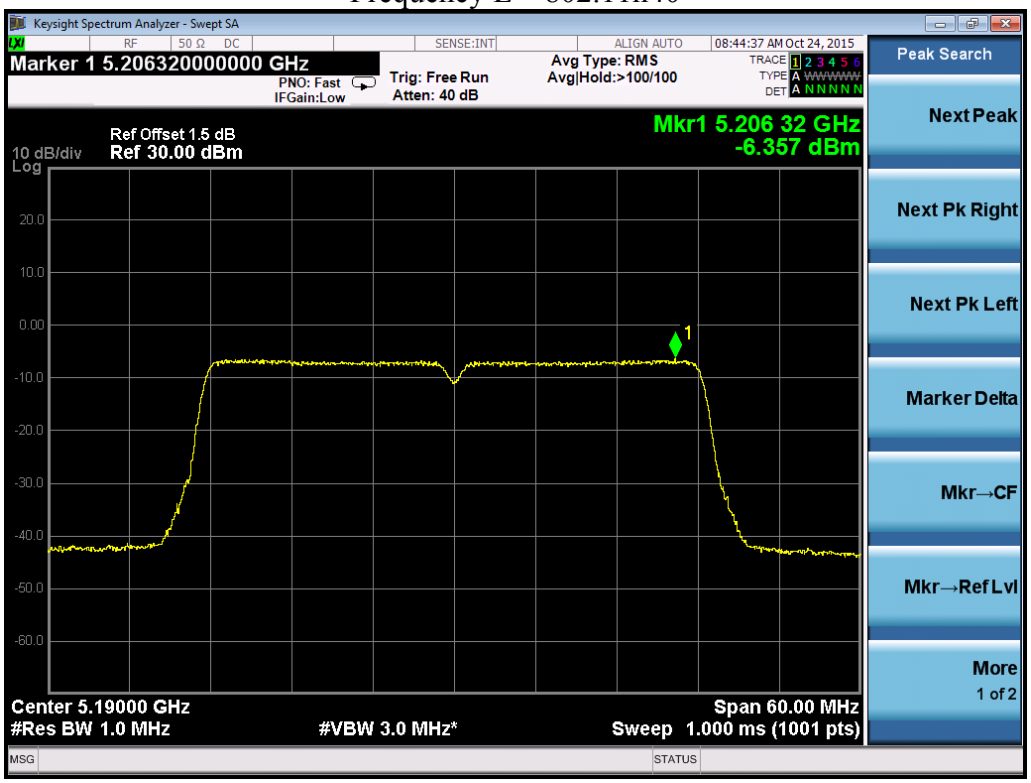


Frequency M – 802.11n20

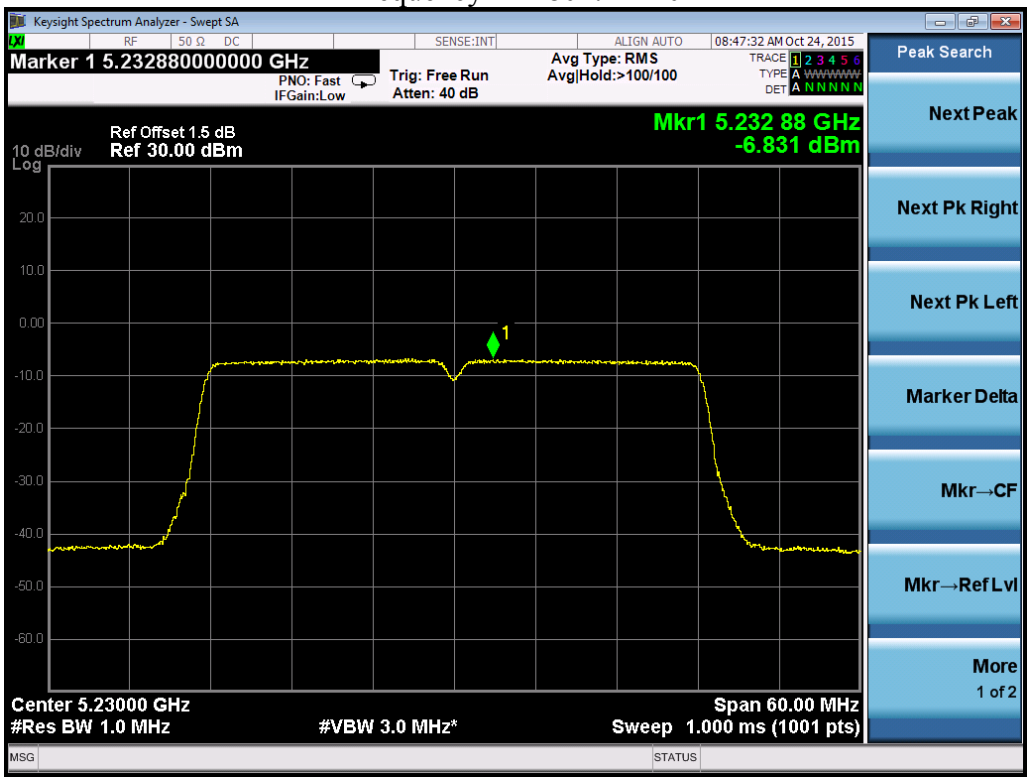
Frequency H – 802.11n20



Frequency L – 802.11n40



Frequency H – 802.11n40



U-NII-2A Band:

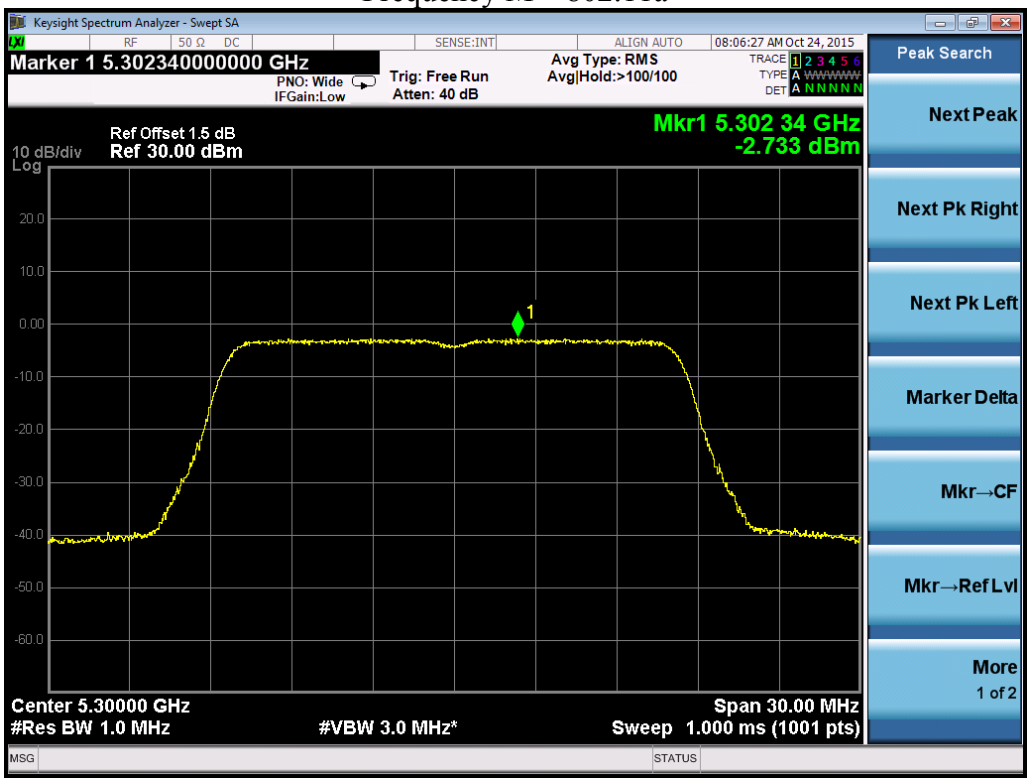
Mode	Frequency (MHz)	Reading (dBm/MHz)		Max PSD (mw/MHz)	Max PSD (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
		Port0	Port 1				
802.11a	5260	-3.447	-3.581	0.45	-3.45	11.00	14.45
	5300	-2.733	-2.823	0.53	-2.73	11.00	13.73
	5320	-2.566	-2.978	0.55	-2.57	11.00	13.57
Mode	**Frequency (MHz)**	**Reading (dBm/MHz)**		**Total PSD (mw/MHz)**	**Total PSD (dBm/MHz)**	**Limit (dBm/MHz)**	**Margin (dB)**
		Port0	**Port 1**				
802.11n20	5260	-3.676	-3.821	0.84	-0.74	11.00	11.74
	5300	-3.033	-3.241	0.97	-0.13	11.00	11.13
	5320	-2.766	-3.111	1.02	0.08	11.00	10.92
802.11n40	5270	-6.333	-6.472	0.46	-3.39	11.00	14.39
	5310	-6.115	-6.244	0.48	-3.17	11.00	14.17

Test Plots as bellow:

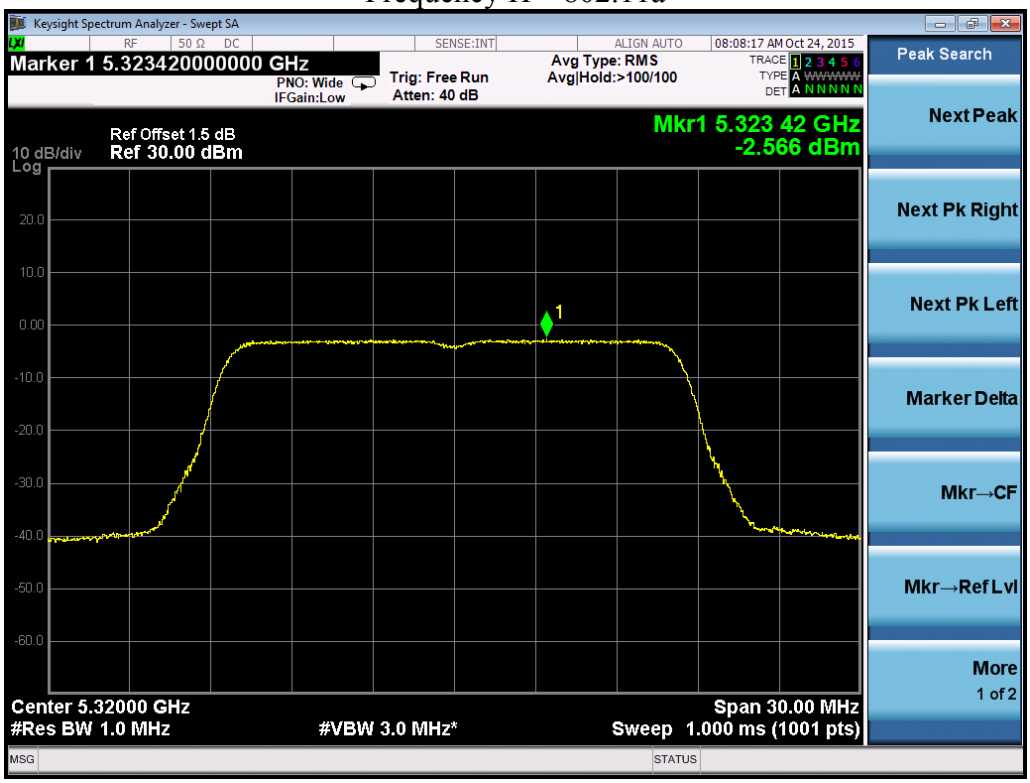
Port 1

Frequency L – 802.11a

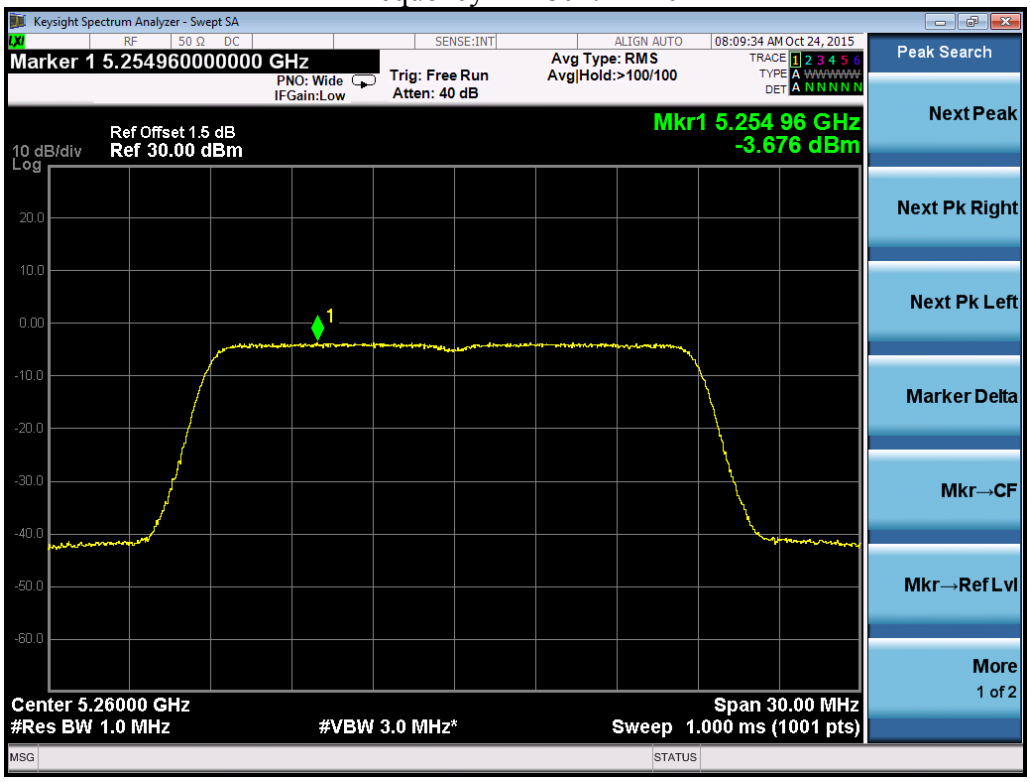
Frequency M – 802.11a



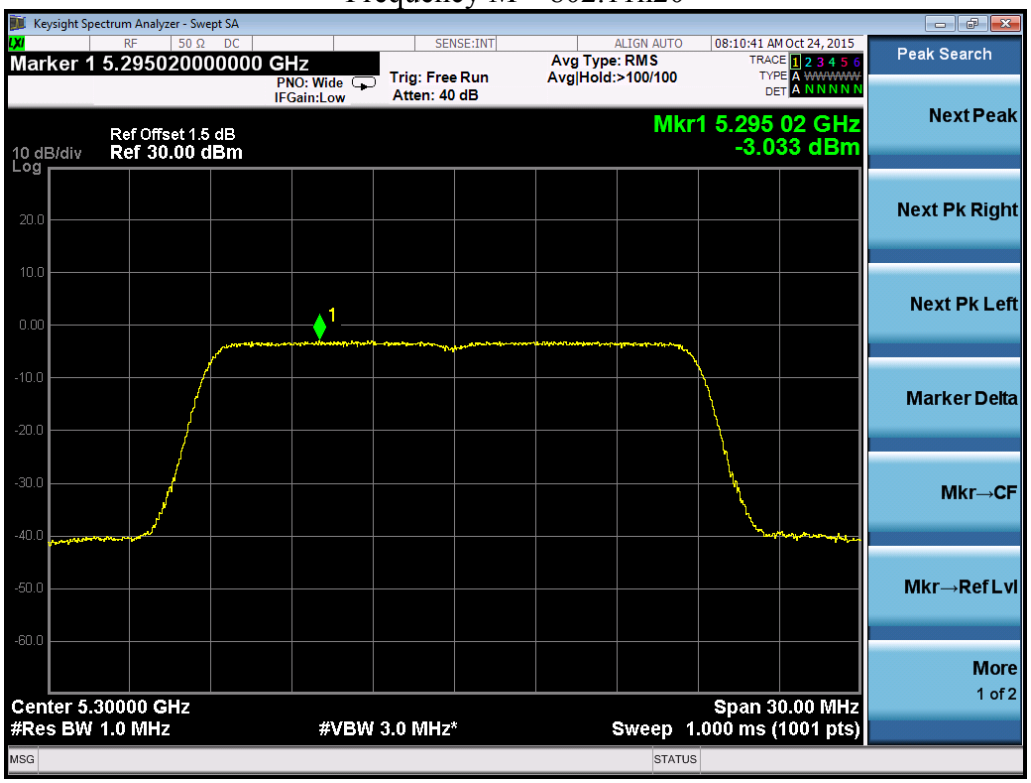
Frequency H – 802.11a



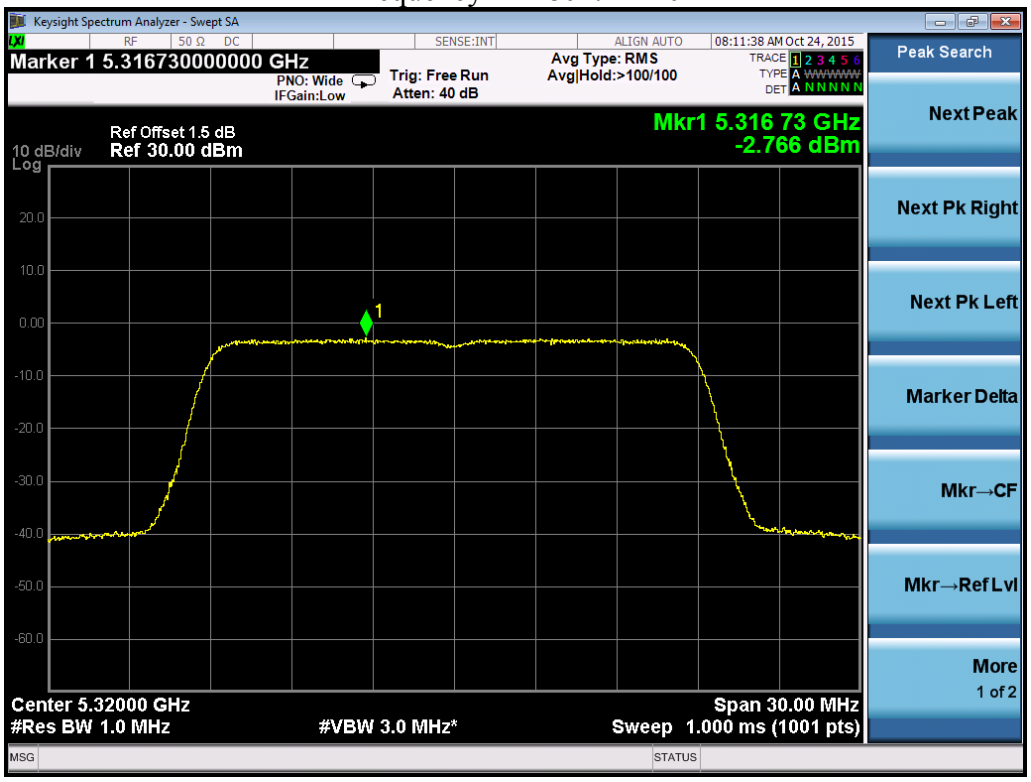
Frequency L – 802.11n20



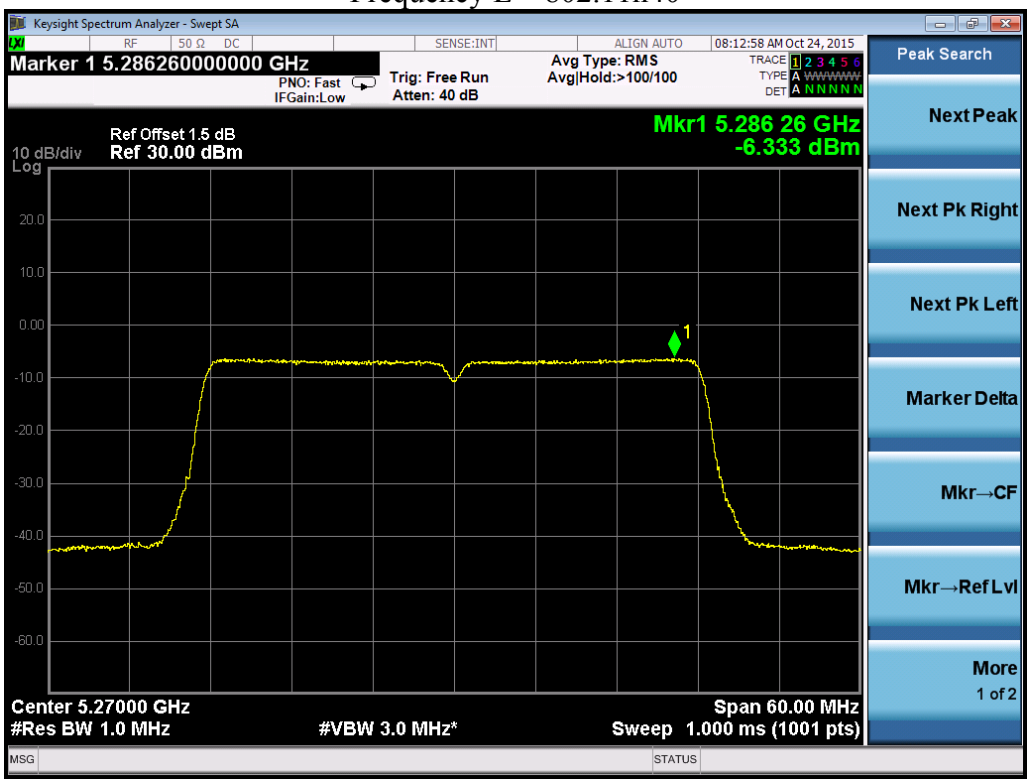
Frequency M – 802.11n20



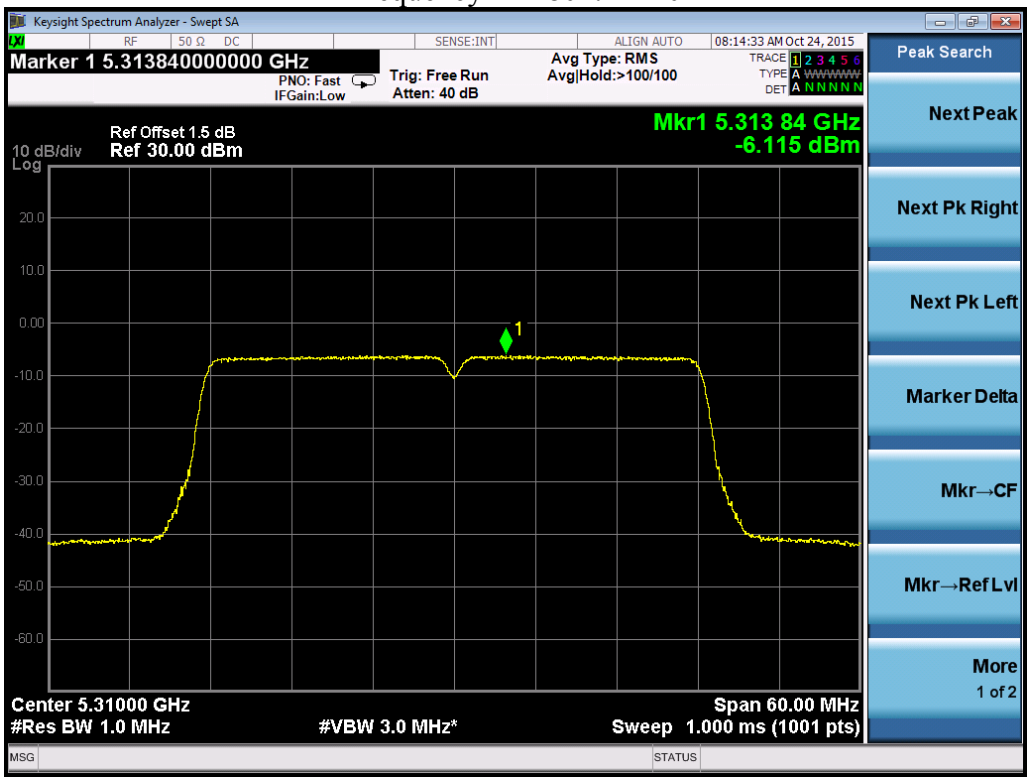
Frequency H – 802.11n20



Frequency L – 802.11n40



Frequency H – 802.11n40



Port 2

Frequency L – 802.11a

Frequency M – 802.11a