RF TEST REPORT for UNII device
No. 160401630SHA-001

Applicant	:	Aruba Networks, Inc 1344 Crossman Ave. Sunnyvale, CA,94089
Manufacturer	:	Aruba Networks, Inc 1344 Crossman Ave. Sunnyvale, CA,94089
Product Name	:	Wireless Access Point
Type/Model	:	APINH103

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

47CFR Part 15 (2015): Radio Frequency Devices (Subpart E)

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

Date of issue: April 20, 2016

Prepared by:

Wade Zhang (*Project Engineer*)

Reviewed by:

Daniel Zhao (*Reviewer*)

Description of Test Facility

Name: Intertek Testing Services Limited Shanghai
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IC Assigned Code: 2042B-1

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Content

1. General Information

1.1 Applicant Information

Applicant	:	Aruba Networks, Inc
		1344 Crossman Ave. Sunnyvale, CA,94089
Name of contact	:	Rob Hastings
Tel	:	650-236-9611
Fax	:	/
Email	:	rob.hgastings@hpe.com
Manufacturer	:	Aruba Networks, Inc
		1344 Crossman Ave. Sunnyvale, CA,94089

1.2 Identification of the EUT

Product Name	:	Wireless Access Point
Type/model	:	APINH103
FCC ID	:	Q9DAPINH103

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,HT40;
Channel Number	:	For 5150 ~ 5250MHz band: Channel 36 - 48 For 5250 ~ 5350MHz Band: Channel 52 - 64; For 5470 ~ 5725MHz Band: Channel 100 - 144; For 5725 ~ 5850MHz band: Channel 149 - 165
Description of EUT	:	The EUT is a wireless access point, and it is a 2×2 MIMO product.
Port identification	:	power port 1; RJ45 ports 5
Antenna	:	1: R-AN-WLL-ARB-1: Integral, 3.5dBi for 2.4GHz band, 3.7dBi for 5GHz band; 2: R-AN-WLL-ARB-3： Integral, 3.6dBi for 2.4GHz band, 3.3dBi for 5GHz band;
Rating	:	DC 12V, 1A (Adaptor) or DC 57V, 350 mA(PoE)
Declared Temperature range	:	0°C ~ 40°C
Category of EUT	:	Class B
EUT type	:	☒ Table top☐ Floor standing
Sample received date	:	January 10, 2016
Sample Identification No	:	MAC:000B86BA11CB
Date of test	:	January 10, 2016 – February 18, 2016

Antenna Description:

Model	Type	Gain (dBi)	Modulation Type	Bean forming	Frequency Band (MHz)
R-AN-WLL-ARB-1	Omni	3.5	802.11b	No	2400-2500
			802.11g	No	
			802.11n HT20	No	
			802.11n HT40	No	
		3.7	802.11a	No	4900-5875
			802.11n HT20	No	
			802.11n HT40	No	
R-AN-WLL-ARB-3	Omni	3.6	802.11b	No	2400-2500
			802.11g	No	
			802.11n HT20	No	
			802.11n HT40	No	
		3.3	802.11a	No	4900-5875
			802.11n HT20	No	
			802.11n HT40	No	

NOTE:
1: 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	Instrument	EC no.	Model	Valid until date
☒	Semi anechoic chamber	EC 3048	-	2016-5-10
☒	EMI test receiver	EC 3045	ESIB26	2016-10-18
☒	Broadband antenna	EC 4206	CBL 6112D	2016-4-26
☒	Horn antenna	EC 3049	HF906	2016-4-26
☒	Pre-amplifier	EC 5262	pre-amp 18	2016-5-24
☒	Pre-amplifier	EC 4792-2	TPA0118-40	2016-4-9
☒	High Pass Filter	EC 4797-1	WHKX 1.0/15G-10SS	2017-1-6
☒	High Pass Filter	EC 4797-2	WHKX 2.8/18G-12SS	2017-1-6
☒	High Pass Filter	EC 4797-3	WHKX 7.0/1.8G-8SS	2017-1-6
☒	Band Reject Filter	EC 4797-4	WRCGV2400/2483/10SS	2017-1-6
☒	Fully anechoic chamber	EC 3047	-	2016-5-10
☒	PXA Signal Analyzer	EC5338	N9030A	2016-11-16
☒	Test Receiver	EC 4501	ESCI 7	2017-1-12
☒	Power sensor/Power meter	EC4318	N1911A/N1921A	2016-4-19
☒	Power sensor	EC5338-1	U2021XA	2016-10-1
☒	MXG Analog Signal Generator	EC5338-2	N5181A	2016-11-5
☒	MXG Vector Signal Generator	EC5338-1	N51812B	2016-12-28

2.2 Test Standard

47CFR Part 15 (2015)
ANSI C63.10 (2013)
KDB 789033 D02 General UNII Test Procedures New Rules v01r01
KDB 662911 D01 Multiple Transmitter Output v02r01

2.3 Mode of operation during the test / Test peripherals used

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

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	5600	5720
	802.11n HT20	5500	5600	5720
	802.11n HT40	5510	5590	5710
5725~5850MHz	802.11a	5745	5785	5825
	802.11n HT20	5745	5785	5825
	802.11n HT40	5755	/	5795

The following test mode(s) were pre-test:

Mode No.	Main Equipment	2.4G antena	5G antena
1	APINH103	R-AN-WLL-ARB-1	R-AN-WLL-ARB-1
2	APINH103	R-AN-WLL-ARB-3	R-AN-WLL-ARB-3

After pre-test, We listed the worst mode (mode 1) test data in the report.

Test peripherals used:

Item No	Name	Band and Model	Description	S/No
1	Laptop computer	HP ProBook 6470b	100-240V AC 50/60Hz	NA
2	Controller	Aruba 3600	100-240V AC 50/60Hz	NA
3	AC/DC Adaptor	Sunny SYS1357-1812	Input:100-240V~1.0A MAX,50-60Hz Output:+12V DC 1.0A	NA
4	POE DC Power	PowerDsine PD-6555G300	Input:100-240Vac,50/60Hz,0.5A Output:57VDC 0.35A	NA
5	LAN Cable	/	1.5m un-shielding *2 10m un-shielding *4	NA

Test software setting:

The power level setting for 802.11a/n is used with ART software offered by the manufactory.

Freq. Band	Mode 1	Frequency (MHz)	ART Setting
U-NII 1 5150~5250MHz	802.11a	5180	18.0
		5200	18.0
		5240	18.0
	802.11n20	5180	18.0
		5200	18.0
		5240	18.0
	802.11n40	5190	18.0
		5230	18.0
U-NII 2 5250~5350MHz	802.11a	5260	18.0
		5300	18.0
		5320	18.0
	802.11n20	5260	18.0
		5300	18.0
		5320	18.0
	802.11n40	5270	18.0
		5310	18.0
U-NII 2ext 5470~5725 MHz	802.11a	5500	18.0
		5600	18.0
		5720	18.0
	802.11n20	5500	18.0
		5600	18.0
		5720	18.0
	802.11n40	5510	18.0
		5590	18.0

		5710	18.0
U-NII 3 5725~5850MHz	802.11a	5745	18.0
		5785	18.0
		5825	18.0
	802.11n20	5745	18.0
		5785	18.0
		5825	18.0
	802.11n40	5755	18.0
		5795	18.0

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	MCS8
	802.11n HT40	MCS8

Duty cycle:

Duty cycle	On(ms)	On+Off (ms)	Duty cycle(x)	Duty cycle factor（dB）
802.11a	1.362	1.408	0.97	0.14
802.11n20	0.662	0.708	0.94	0.29
802.11n40	0.345	0.375	0.92	0.36

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	RESULT
Maximum Conducted Output Power	15.407(a)	Pass
Power spectral density	15.407(a)	Pass
Minimum 6dB Bandwidth	15.407(e)	Pass
Radiated emission	15.407 (b) 15.205, 15.209	Pass
Power line conducted emission	15.207	Pass
26 dB Bandwidth & Emission Bandwidth (99%)	15.403(i)	Tested

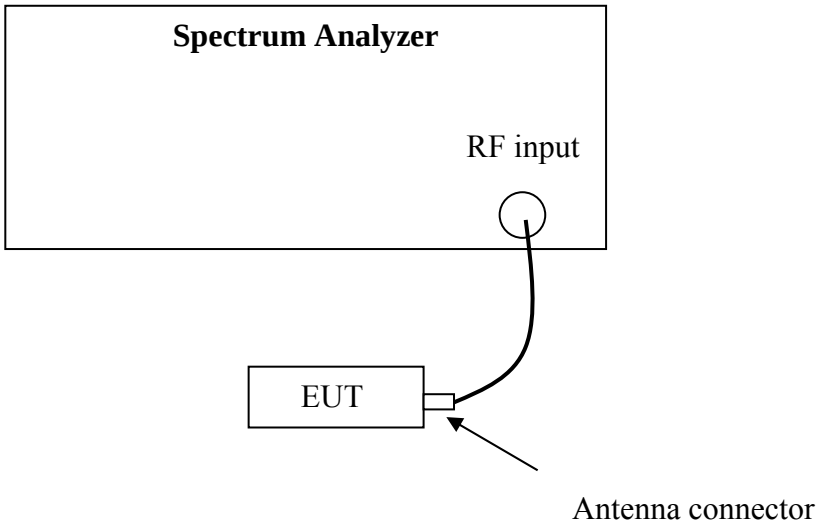
3. Occupied Bandwidth & 26dB Emission Bandwidth

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 v01: 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

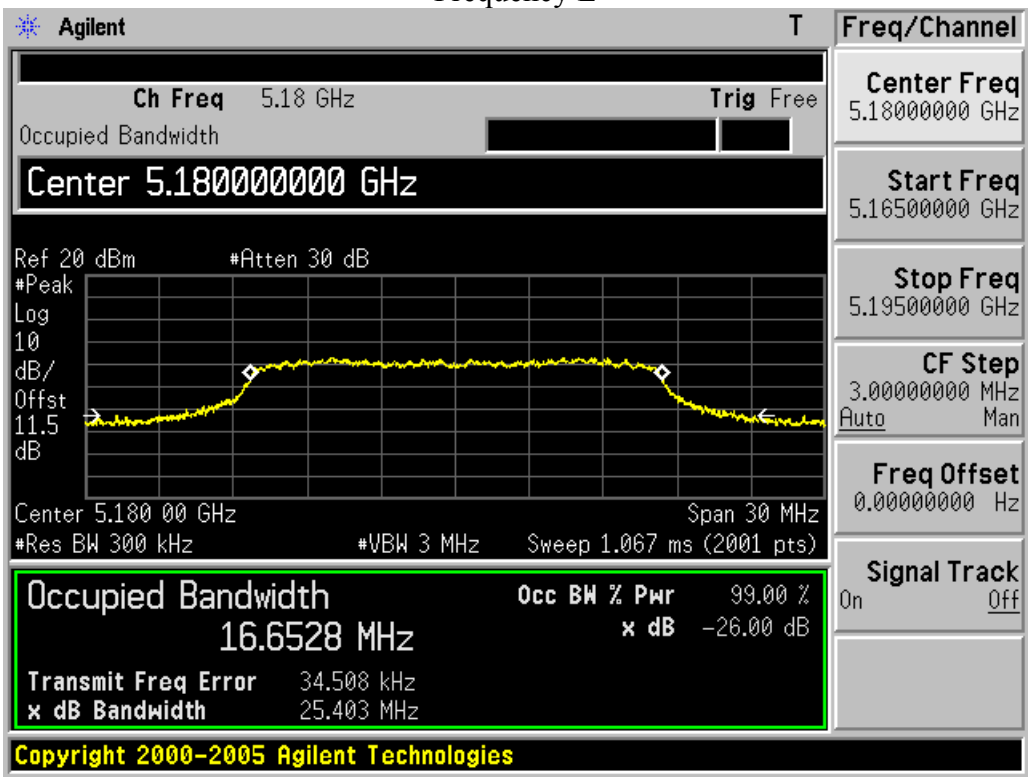
Relative Humidity : 55 %

Frequency Band	Mode	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
U-NII 1	802.11a	5180	25.403	16.653
		5200	22.817	16.766
		5240	27.941	17.049
	802.11n20	5180	28.383	17.815
		5200	27.155	17.825
		5240	29.919	17.988
	802.11n40	5190	69.486	37.513
		5230	79.353	38.100

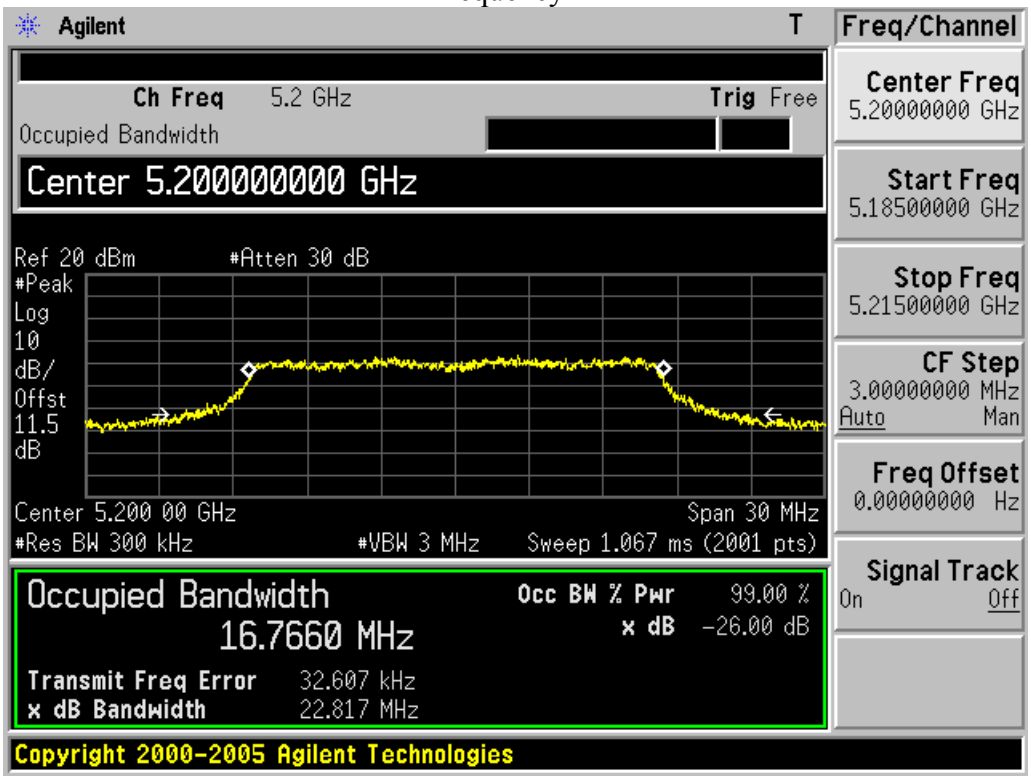
Test Plots as bellow:

802.11a

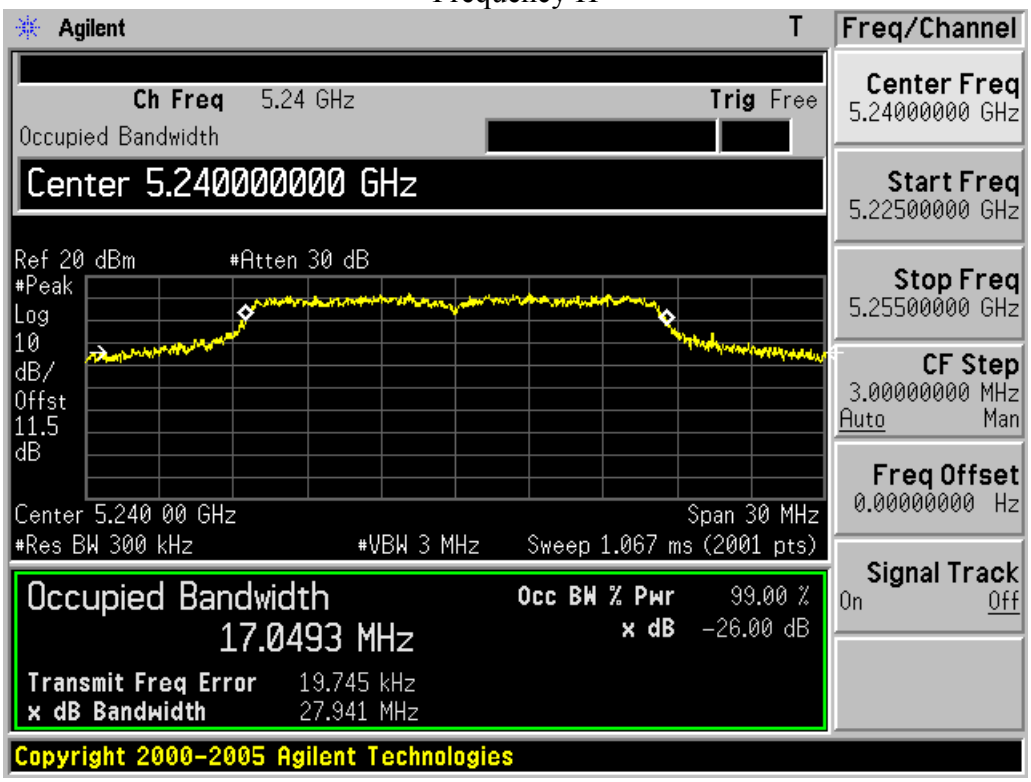
Frequency L



Frequency M

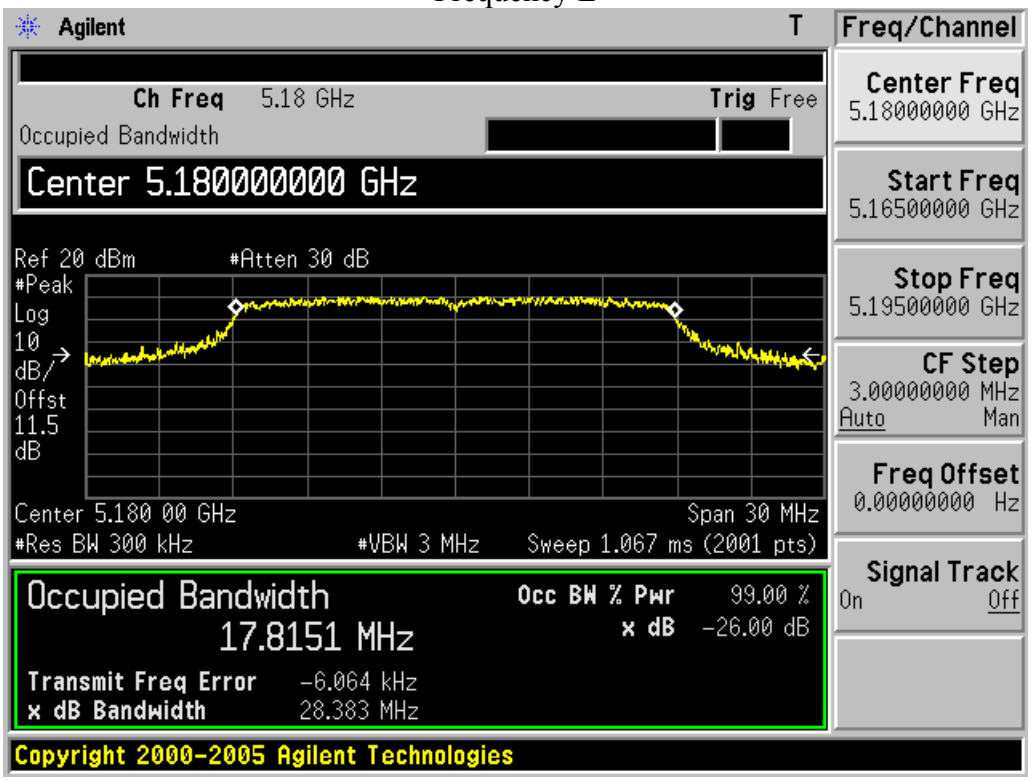


Frequency H

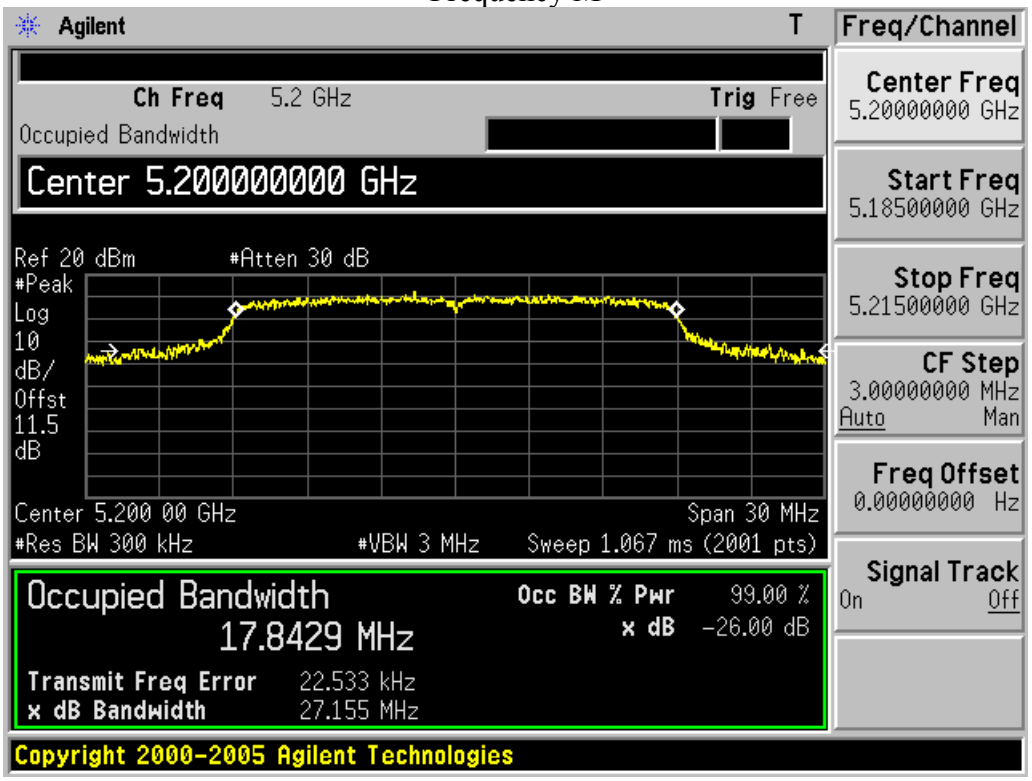


802.11n20

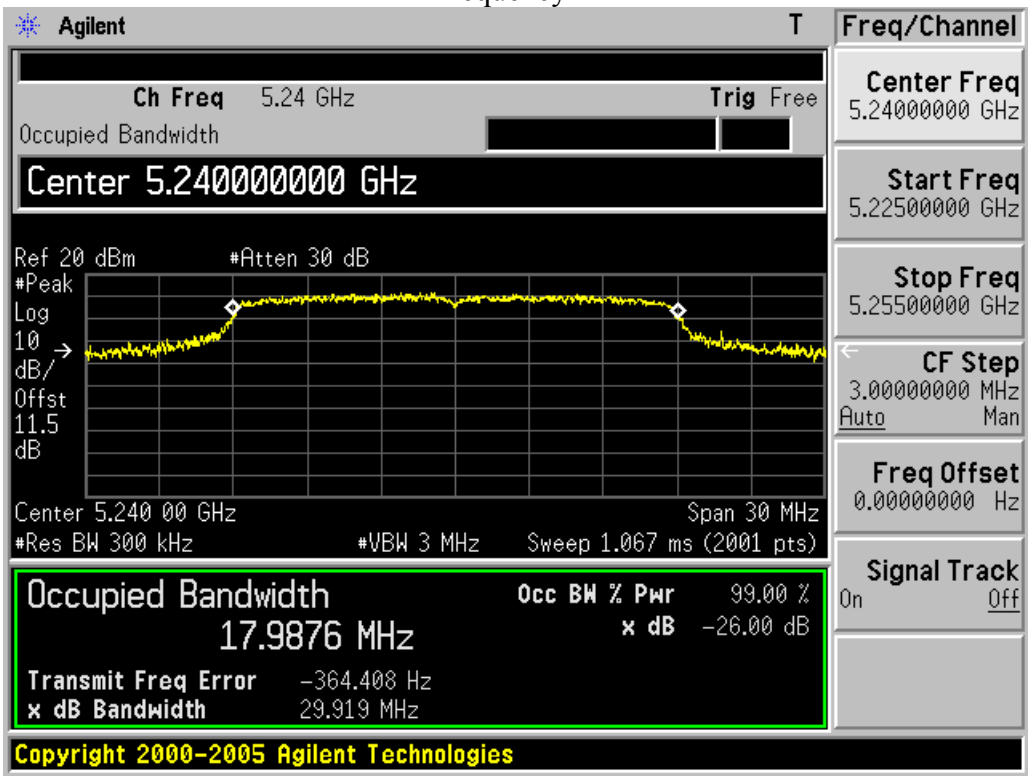
Frequency L



Frequency M

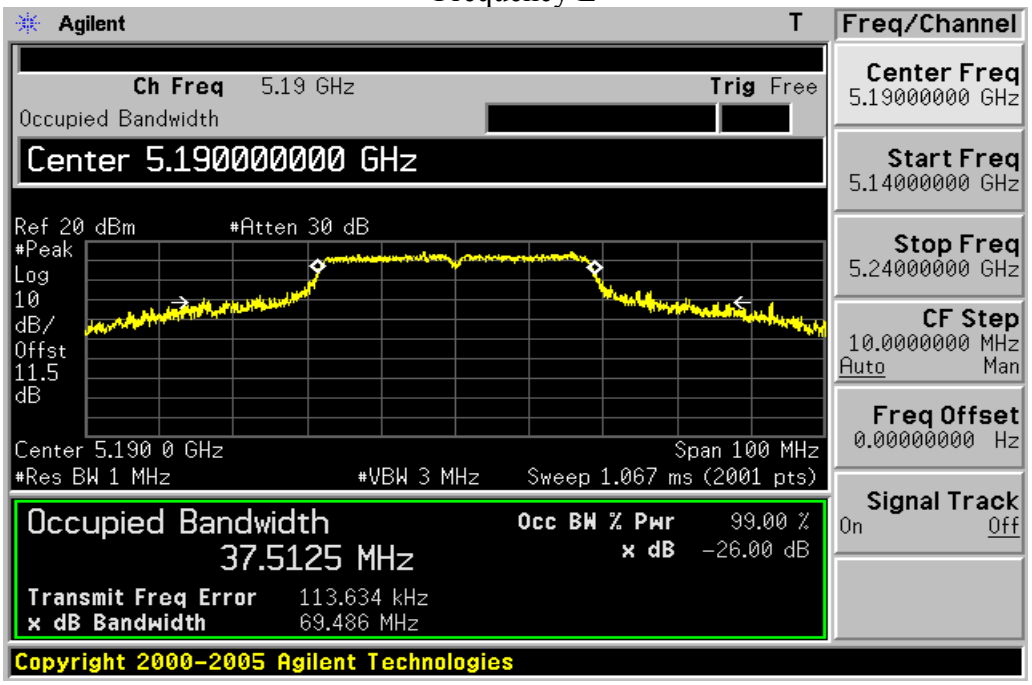


Frequency H

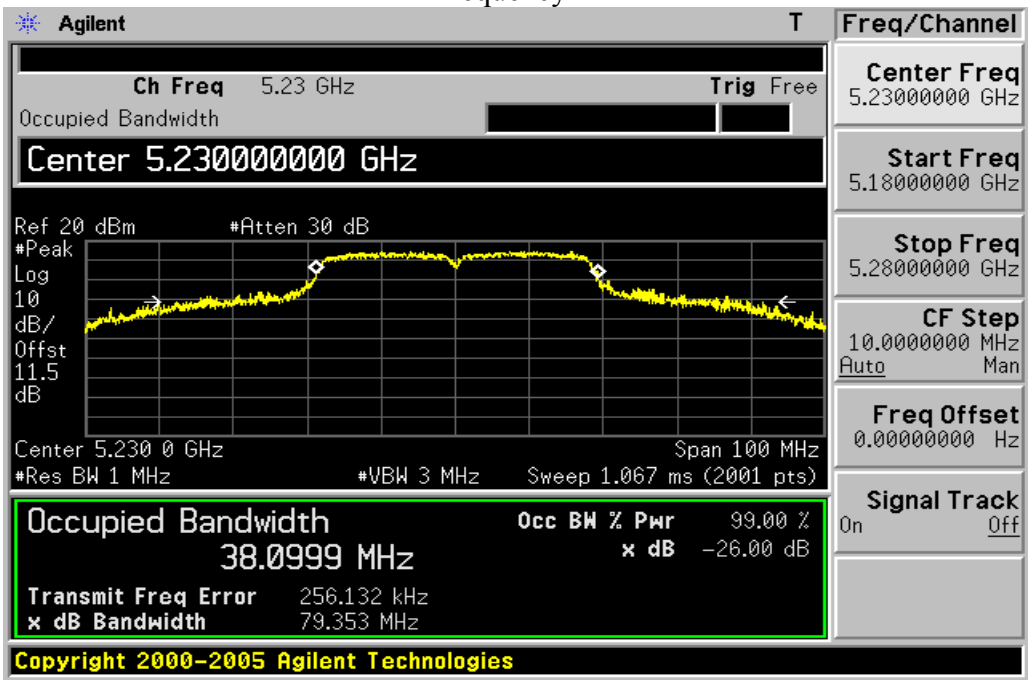


802.11n40

Frequency L



Frequency H

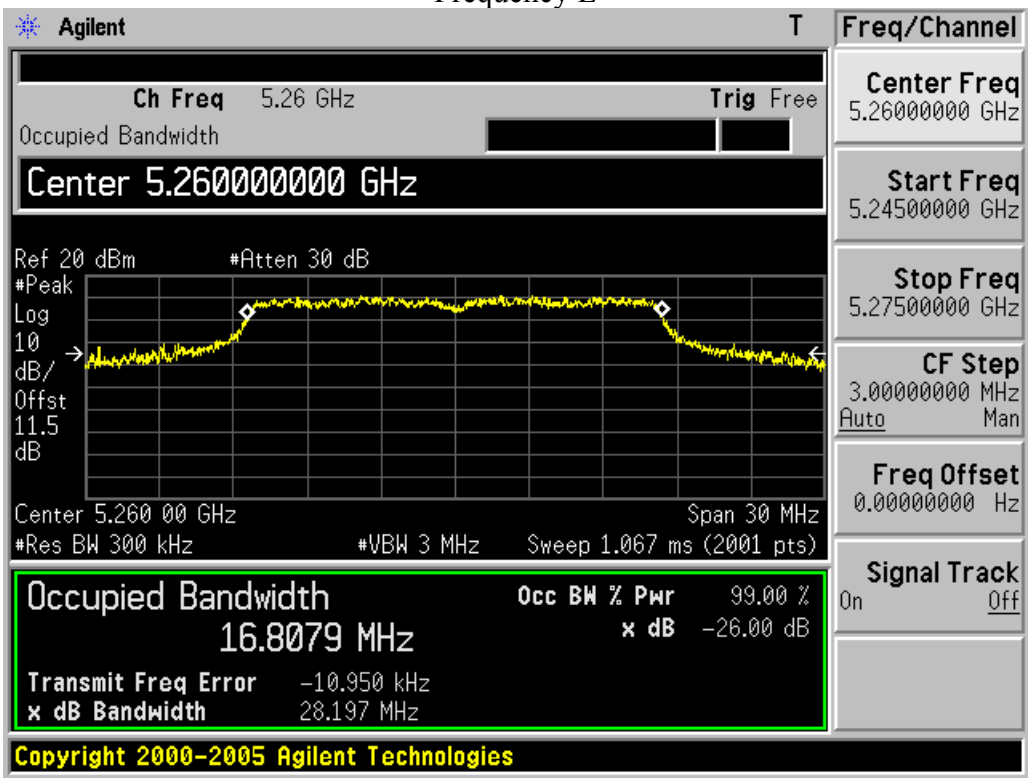


Frequency Band	Mode	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
U-NII 2A	802.11a	5260	28.197	16.808
		5300	26.262	16.765
		5320	26.225	16.887
	802.11n20	5260	29.236	17.999
		5300	29.571	18.031
		5320	29.423	17.970
	802.11n40	5270	78.300	38.537
		5310	73.449	37.563

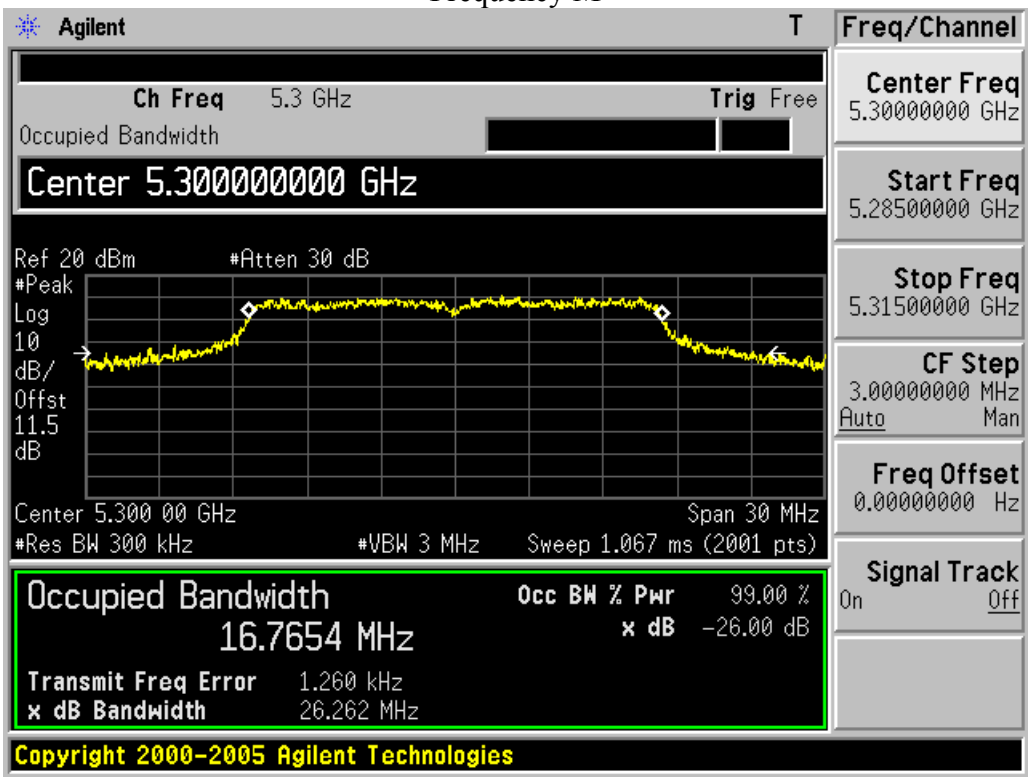
Test Plots as bellow:

802.11a

Frequency L



Frequency M



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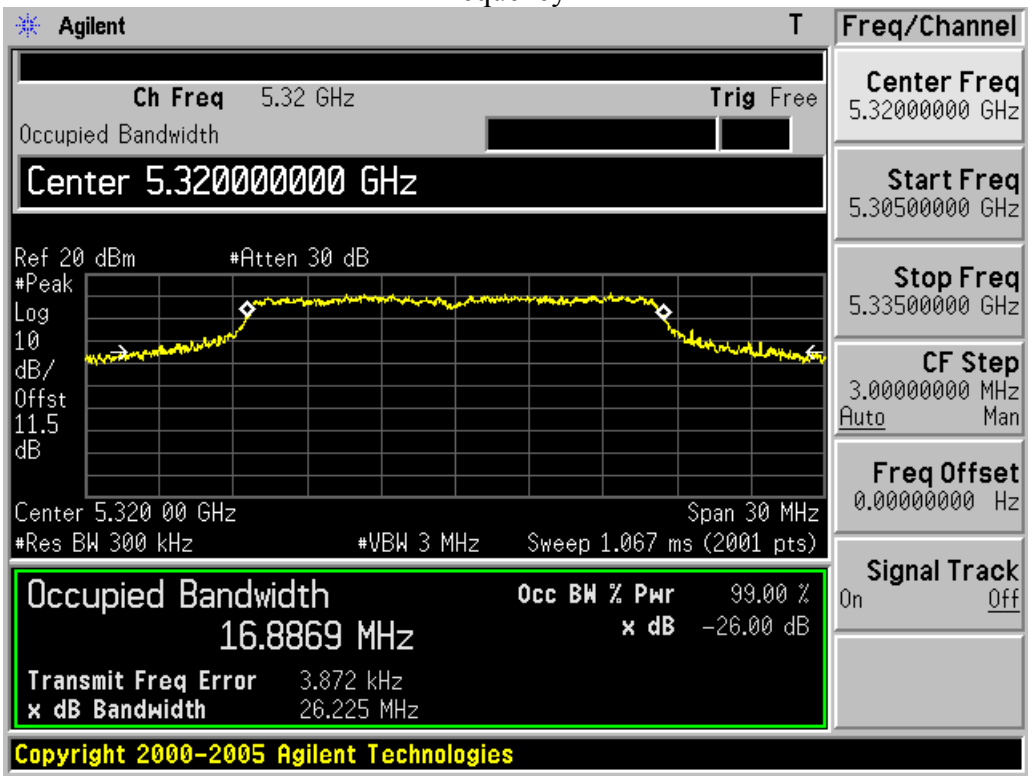
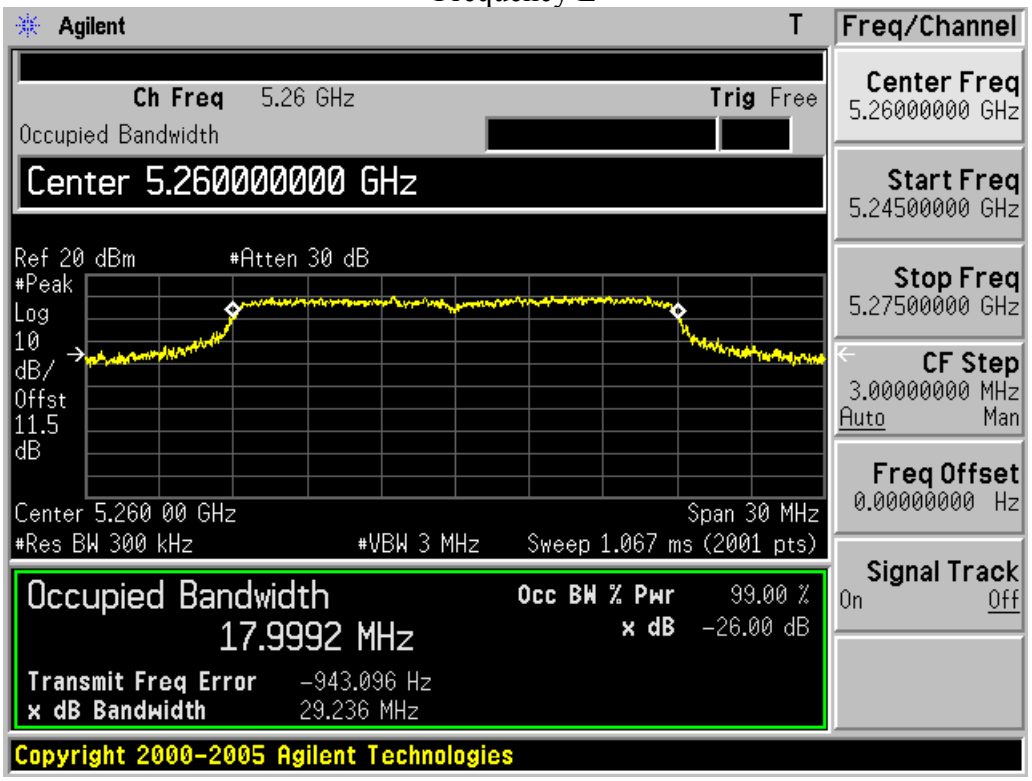
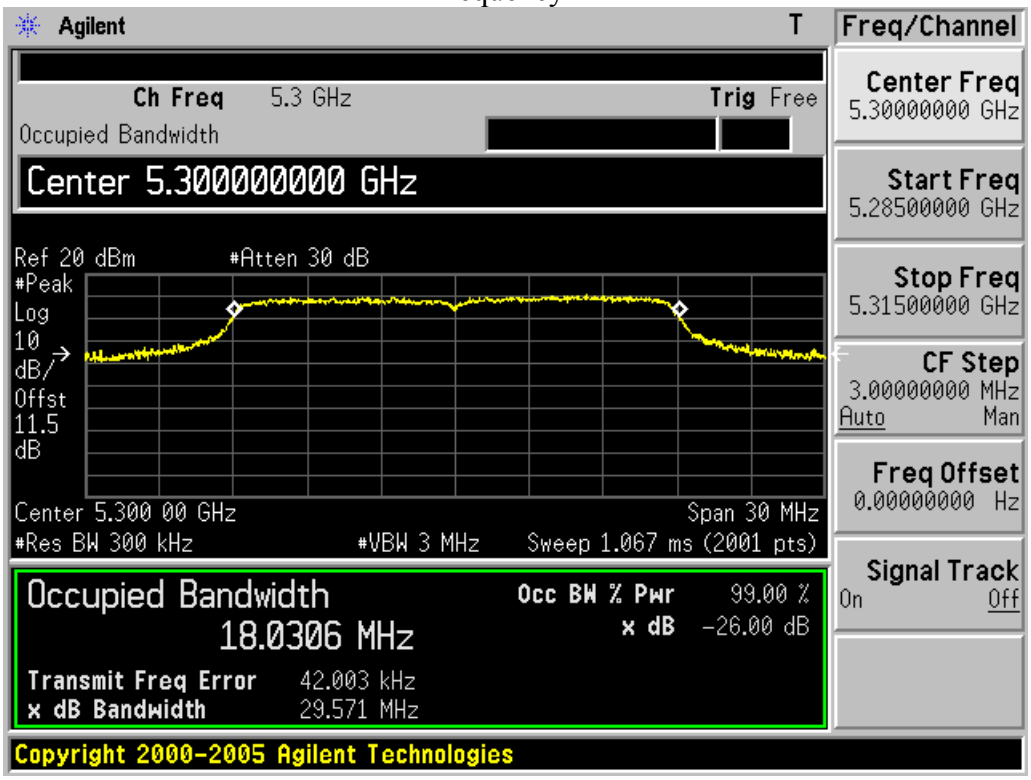


802.11n20

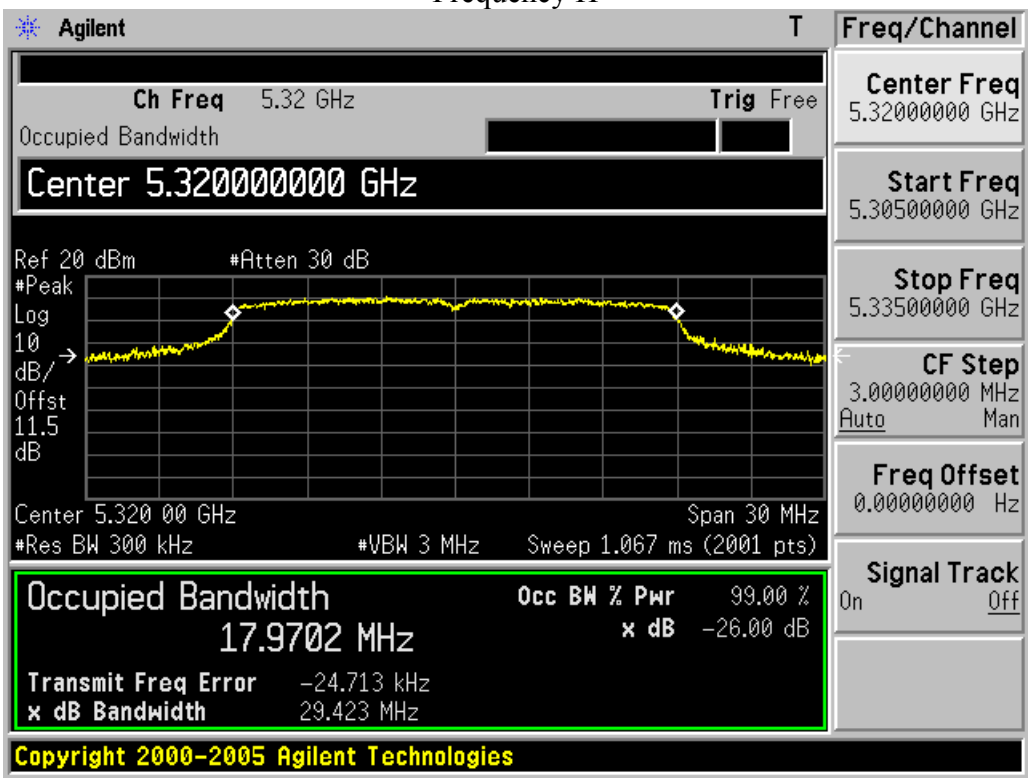
Frequency L



Frequency M

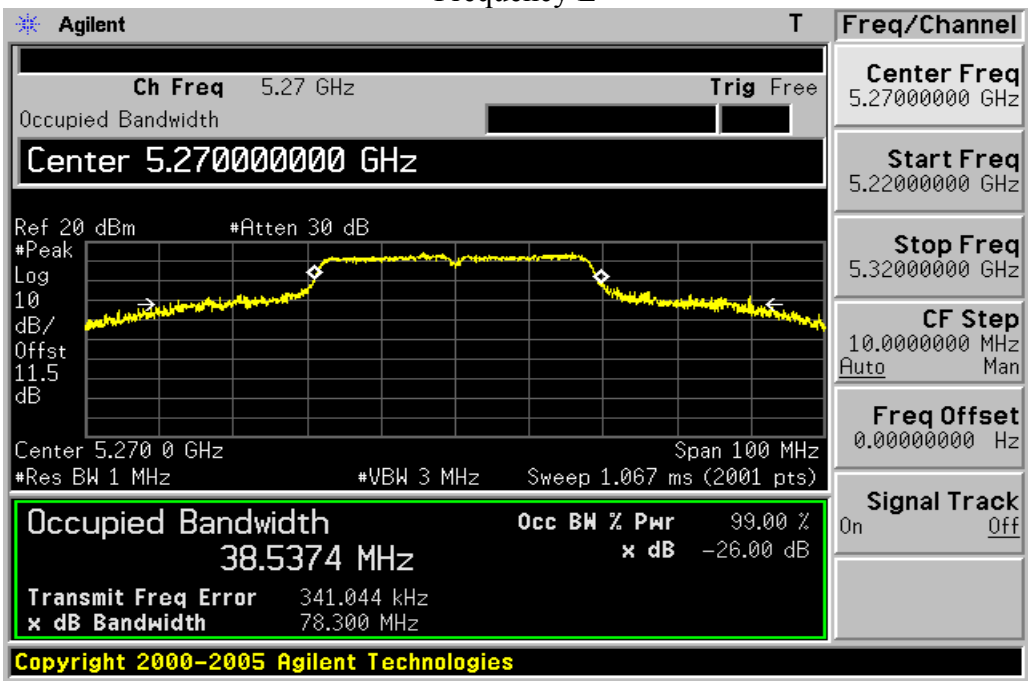


Frequency H

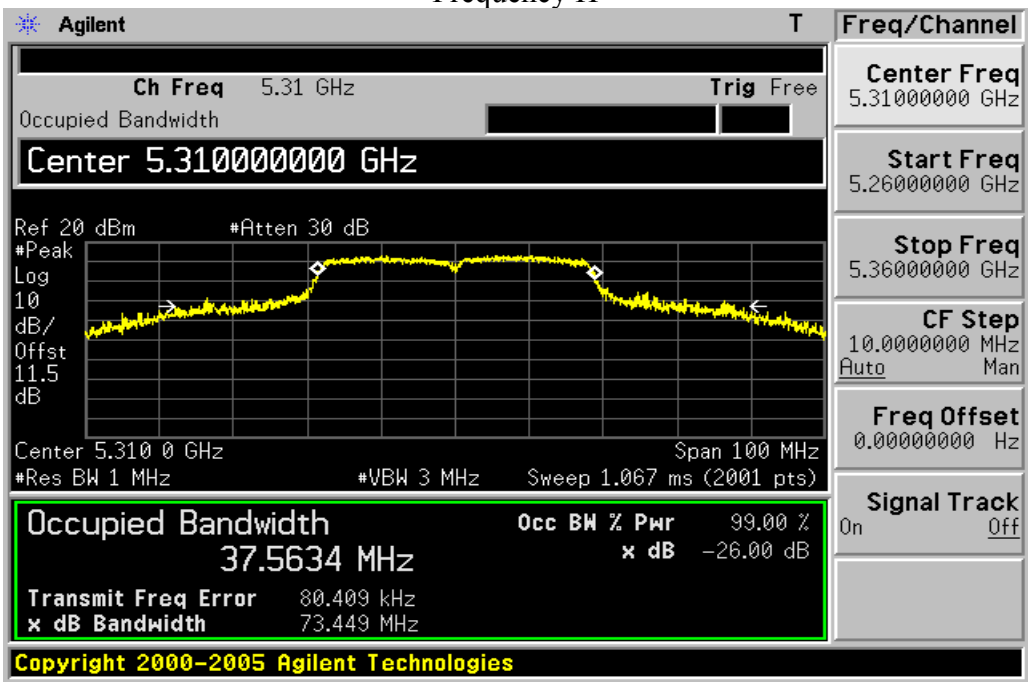


802.11n40

Frequency L



Frequency H

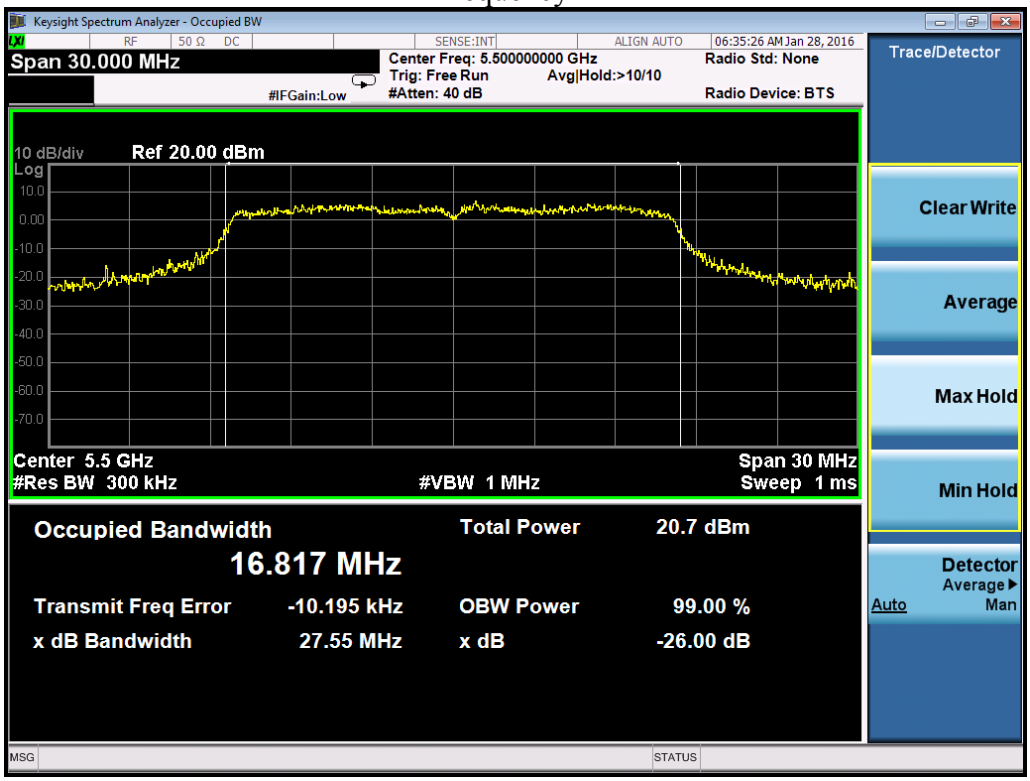


Frequency Band	Mode	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
U-NII 2C	802.11a	5500	27.550	16.817
		5600	29.080	16.983
		5720	28.100	16.908
	802.11n20	5500	24.290	17.872
		5600	27.740	17.918
		5720	24.780	17.890
	802.11n40	5510	55.350	36.914
		5590	57.810	36.866
		5710	54.990	36.753

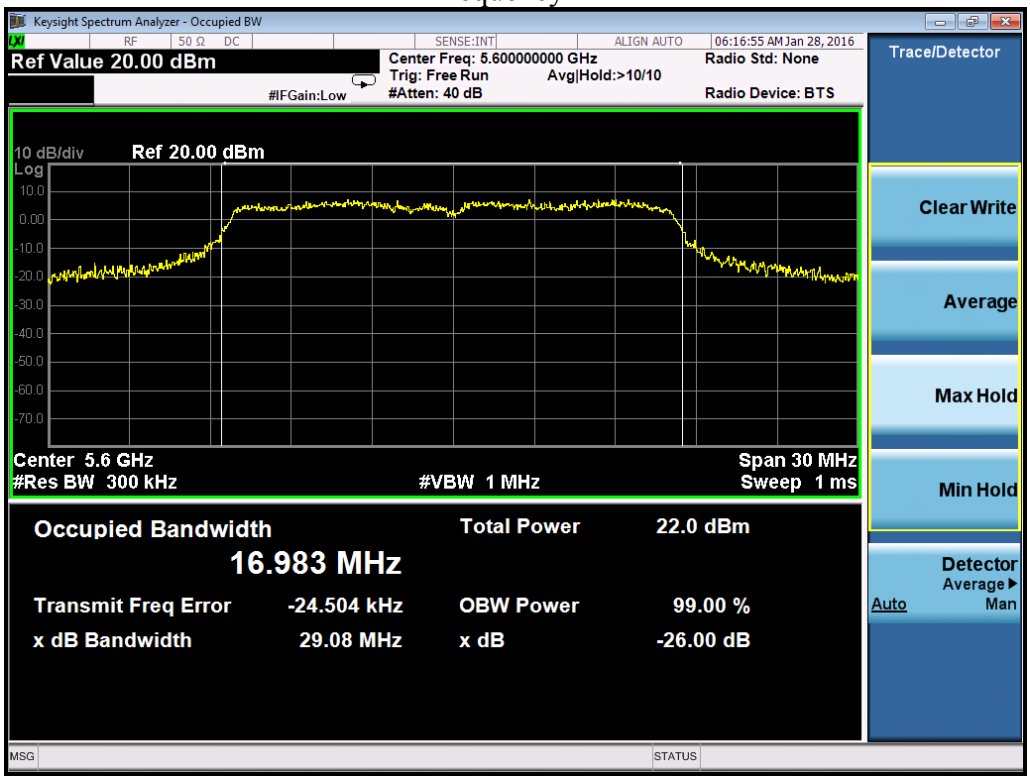
Test Plots as bellow:

802.11a

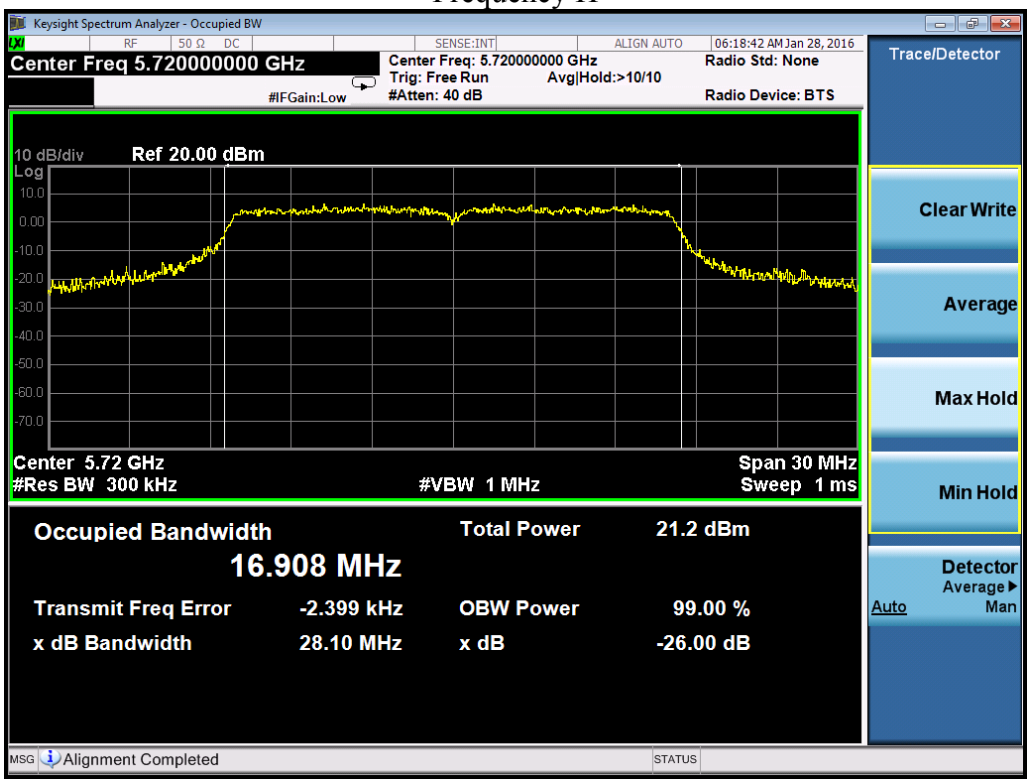
Frequency L



Frequency M

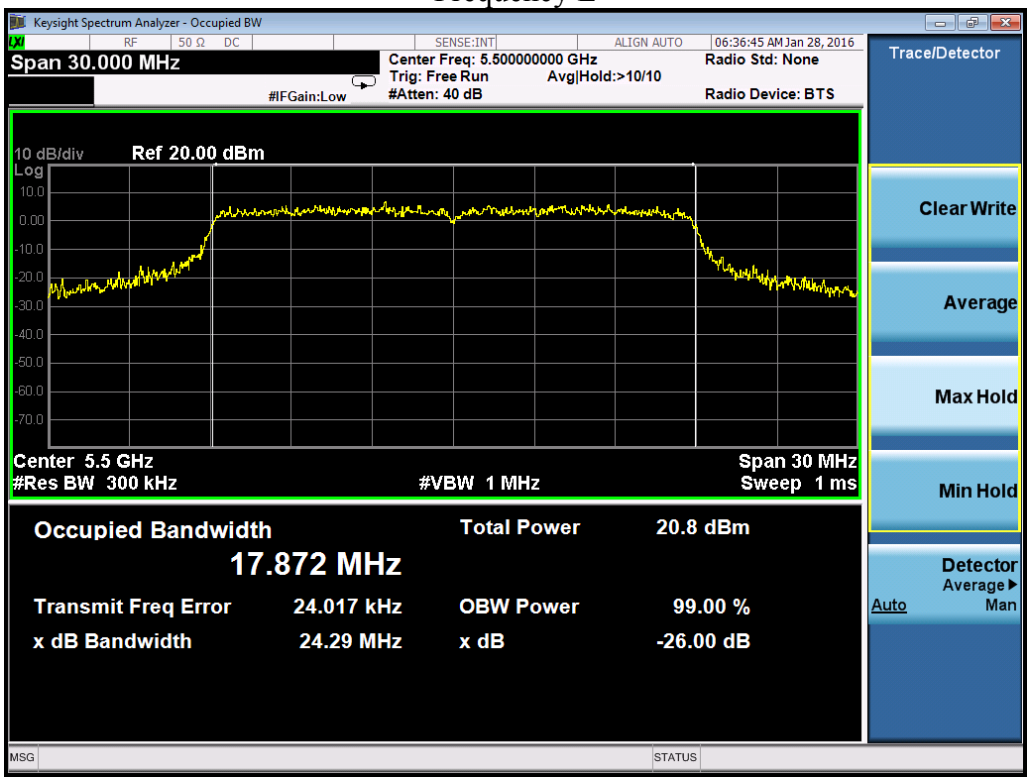


Frequency H

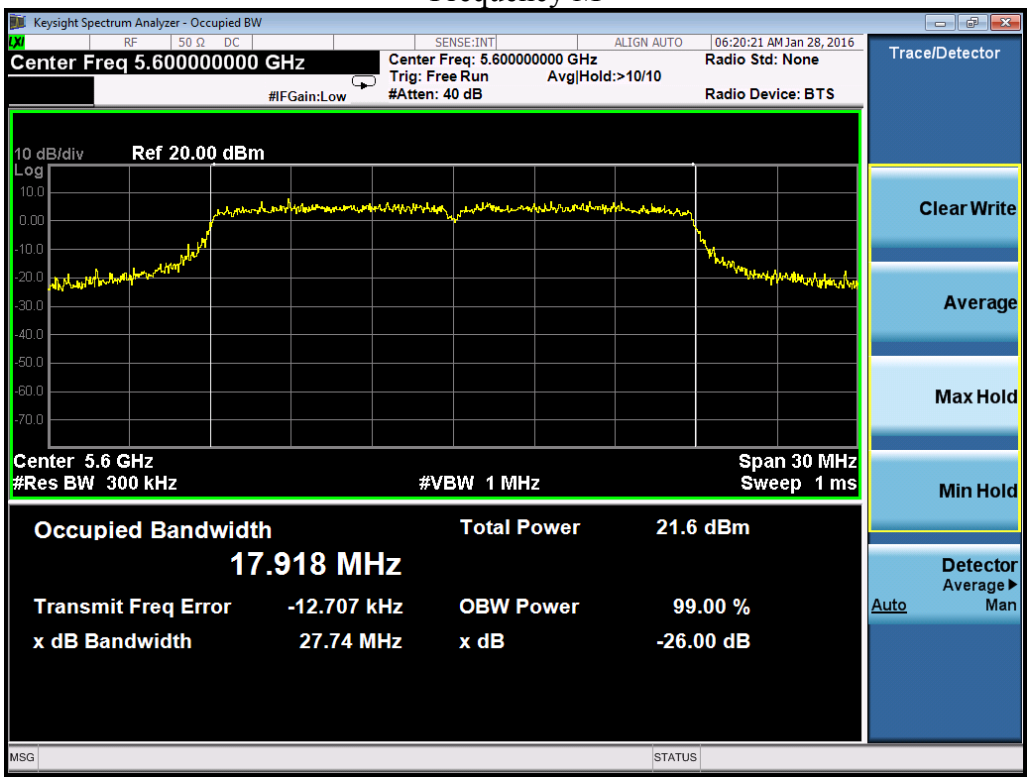


802.11n20

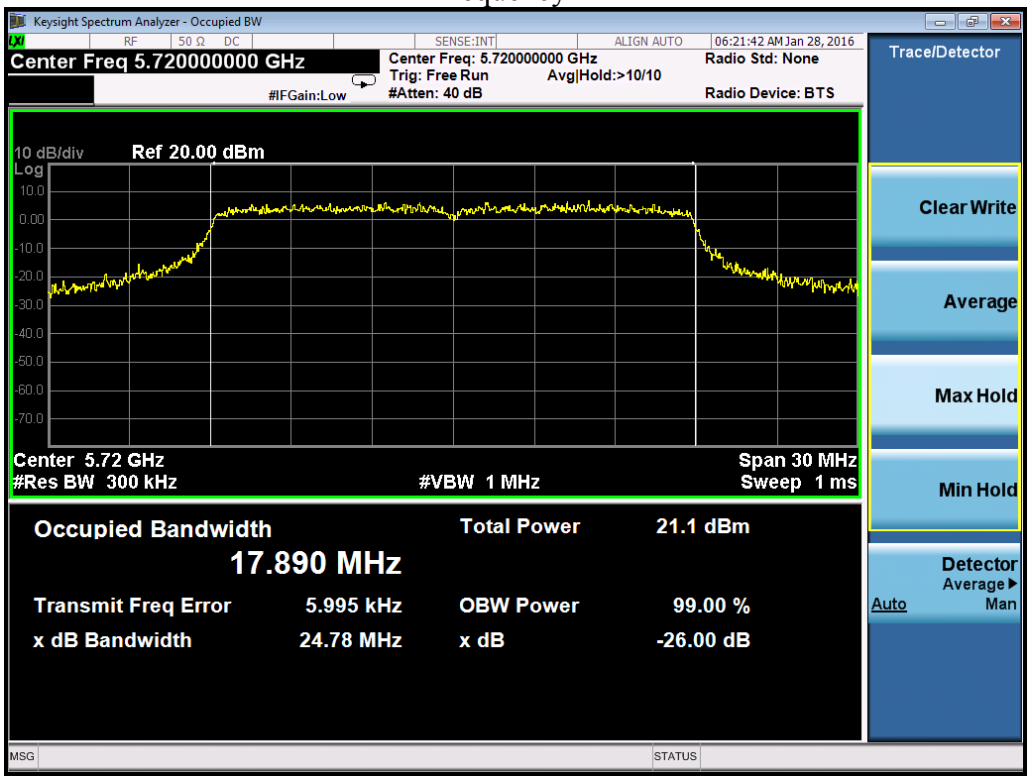
Frequency L



Frequency M

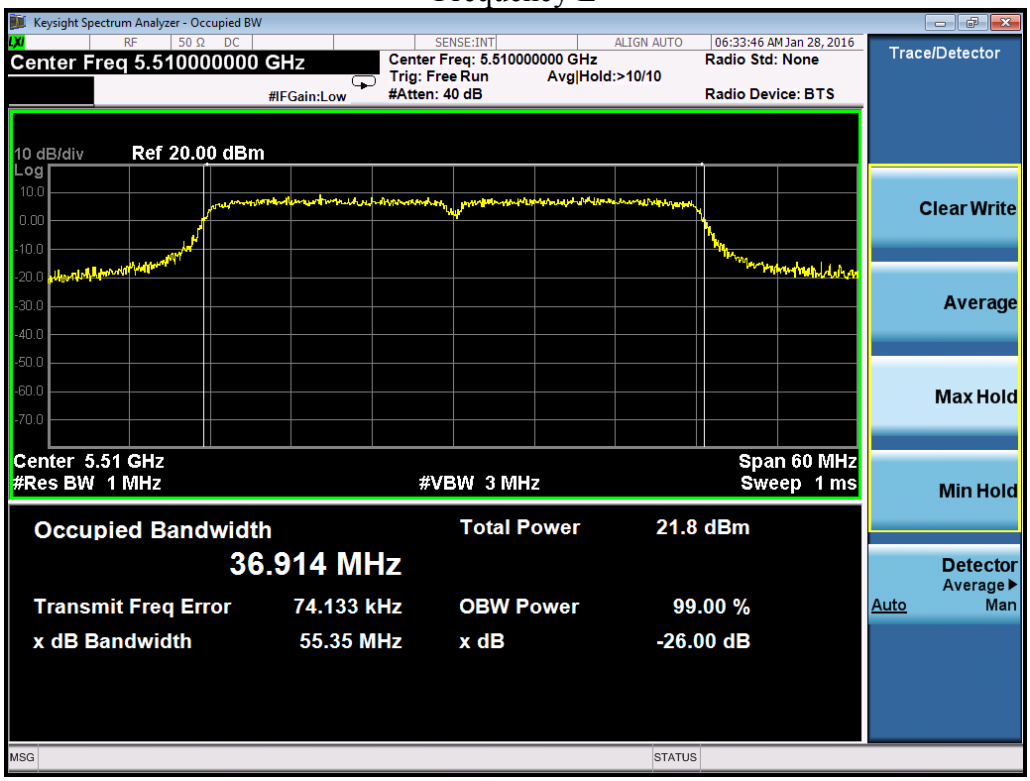


Frequency H

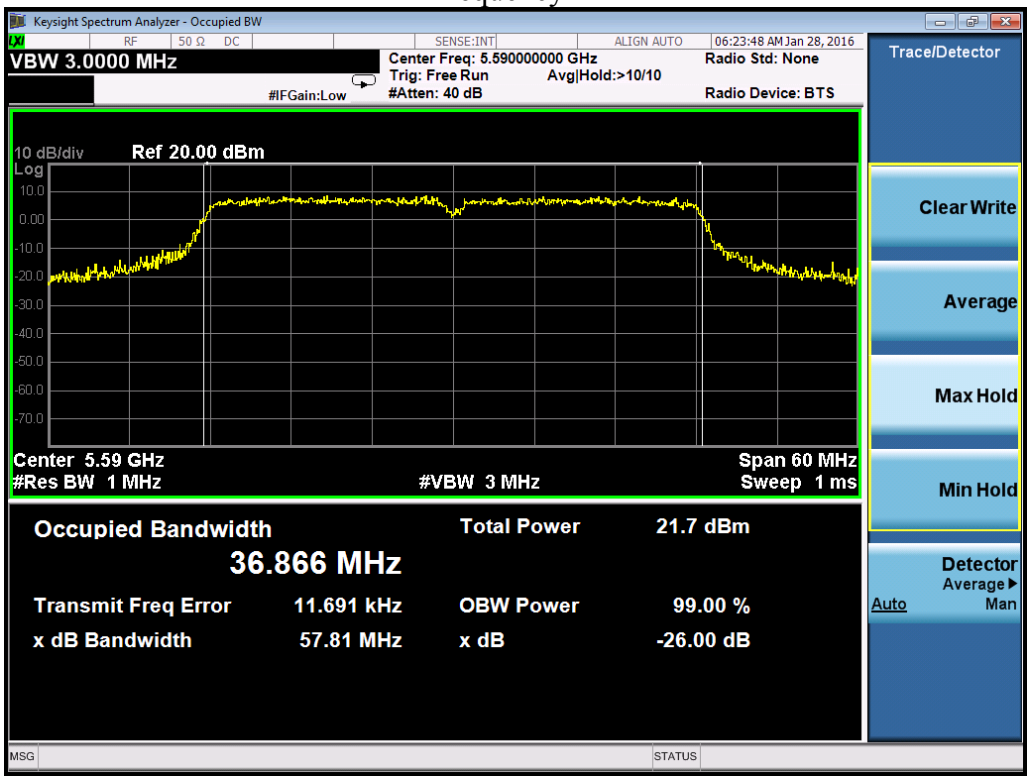


802.11n40

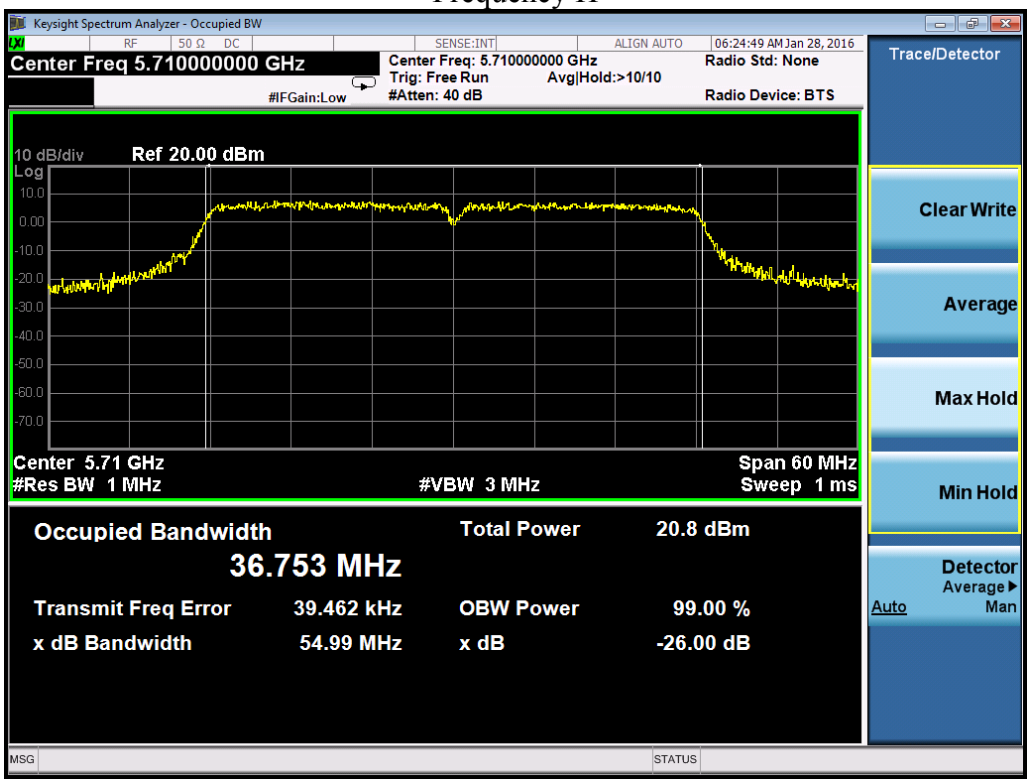
Frequency L



Frequency M



Frequency H



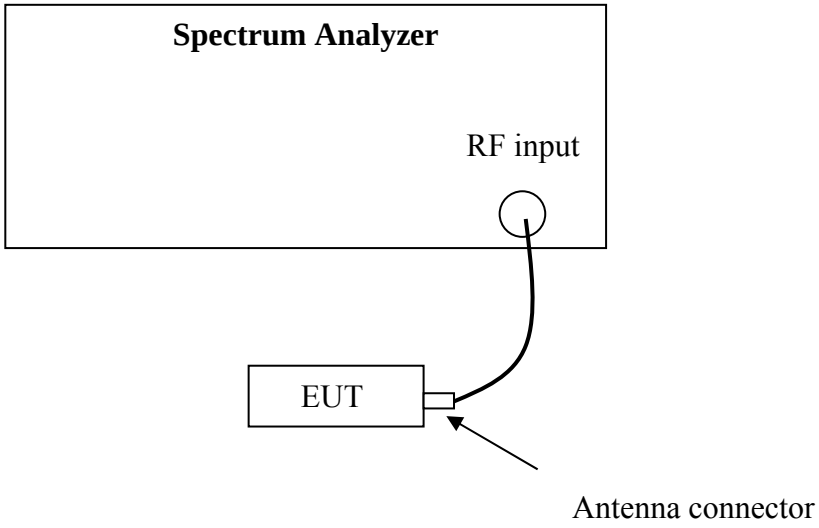
4. Minimum 6dB Bandwidth

Test result: PASS

4.1 Limit

For systems using digital modulation techniques that may operate in the 5725 - 5850 MHz band, the minimum 6 dB bandwidth shall be at least 500 kHz.

4.2 Test Configuration



4.3 Test Procedure and test setup

The minimum 6dB Bandwidth was measured from the antenna port of the EUT according to the measurement method refers to KDB 789033D02 v01: Section C.

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

4.4 Test Protocol

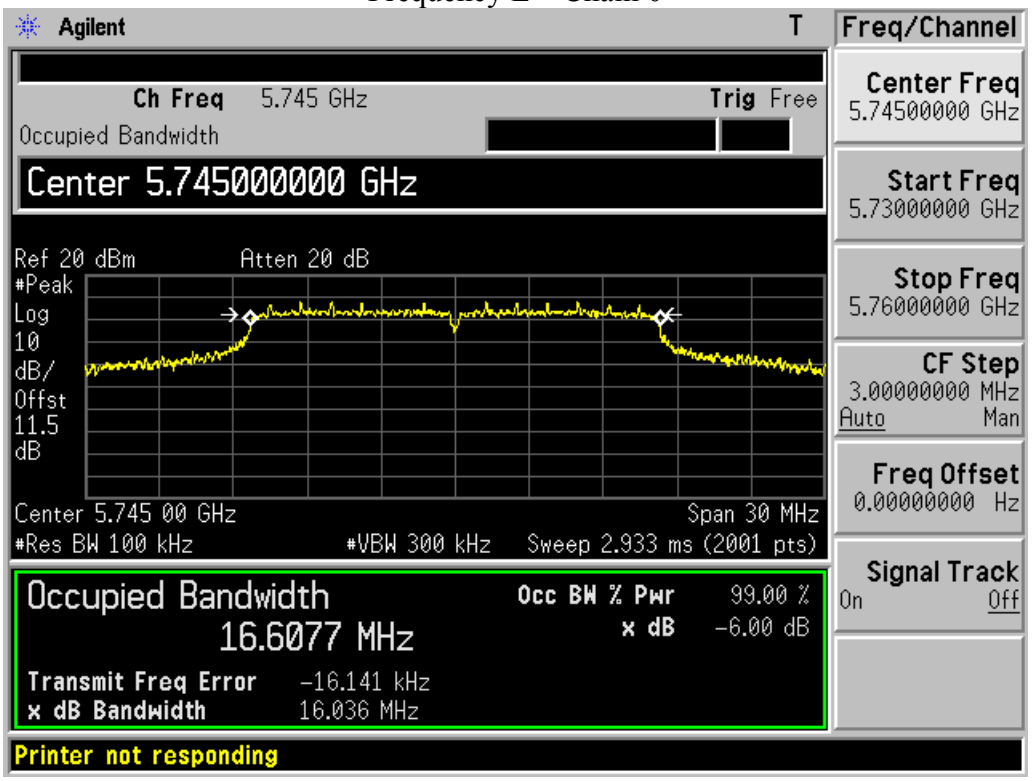
Temperature : 25 °C
Relative Humidity : 55 %

Modulation	Frequency (MHz)	Minimum 6dB Bandwidth (MHz)		Limits (MHz)
		Port 0	Port 1	
802.11a	5745	16.036	15.710	≥0.5
	5785	16.064	16.309	≥0.5
	5825	16.322	16.051	≥0.5
802.11n20	5745	17.608	16.703	≥0.5
	5785	17.611	17.629	≥0.5
	5825	17.599	17.568	≥0.5
802.11n40	5755	35.868	35.729	≥0.5
	5795	35.720	35.444	≥0.5

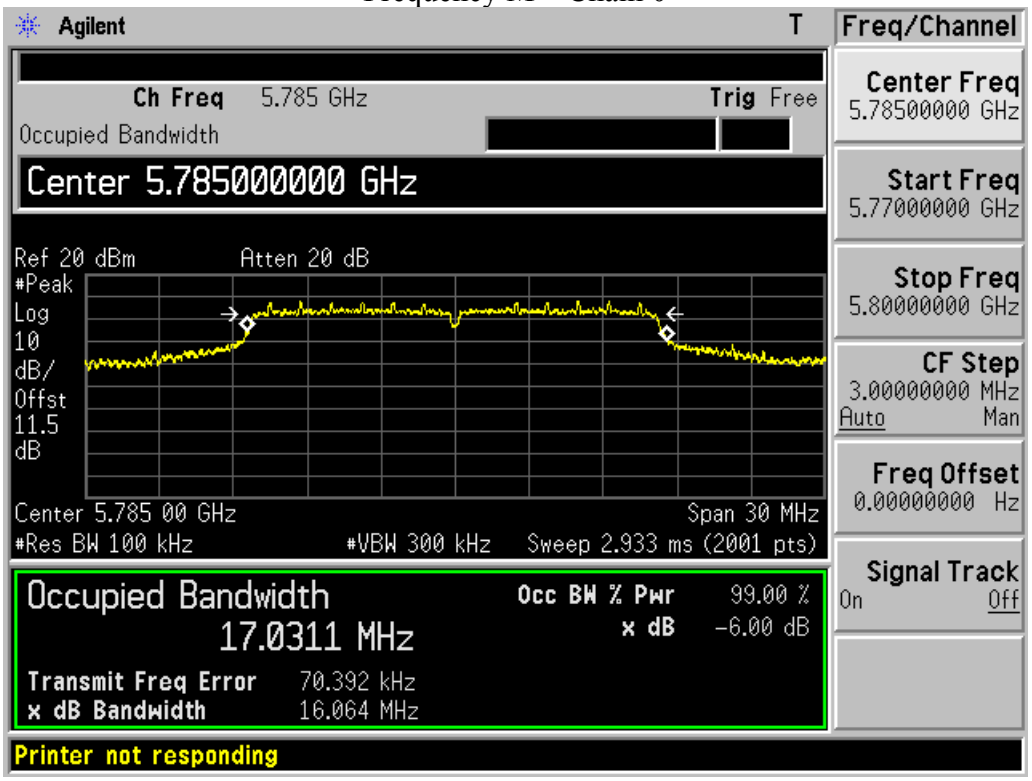
Test Plots as bellow:

802.11a

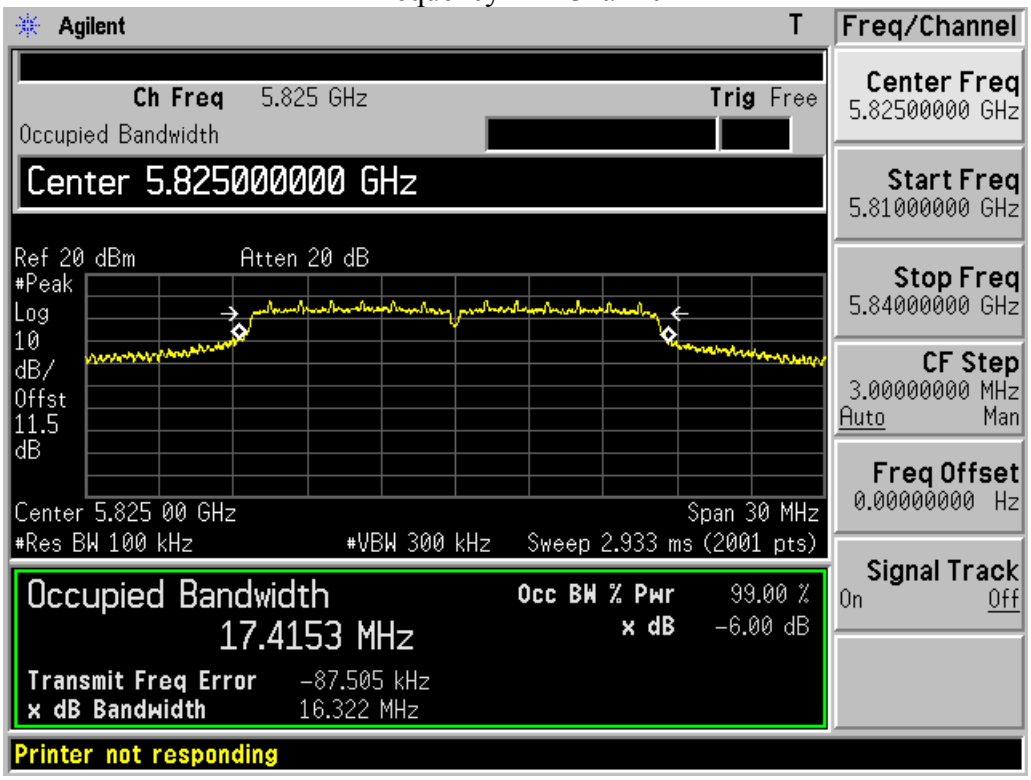
Frequency L – Chain 0



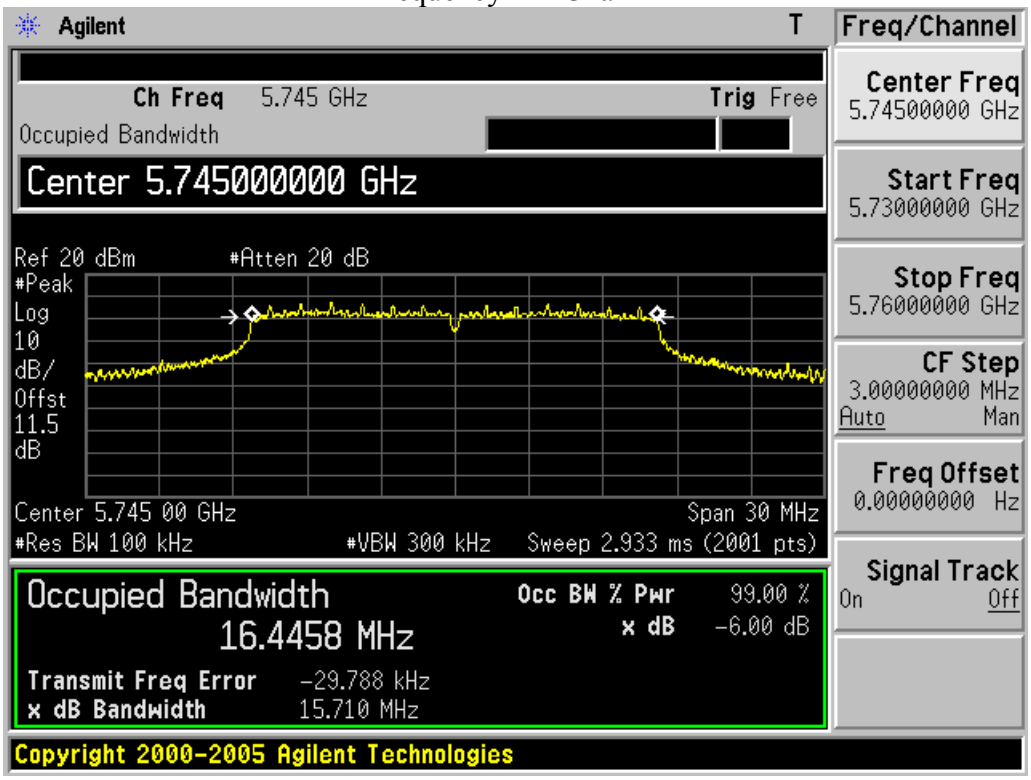
Frequency M – Chain 0



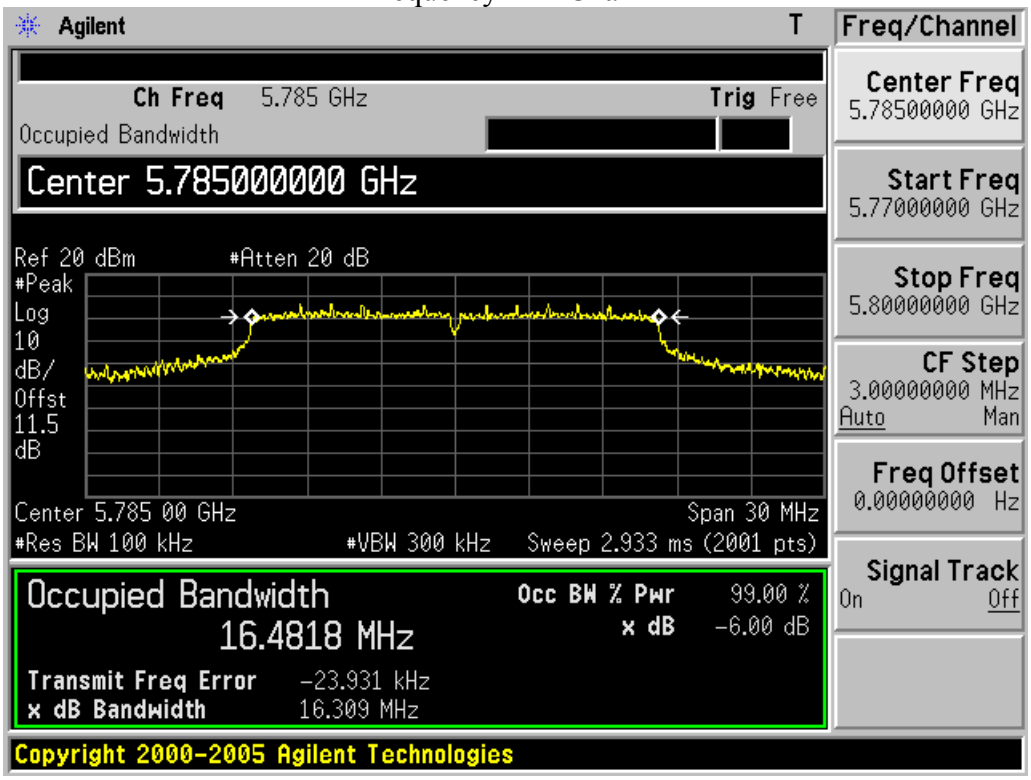
Frequency H – Chain 0



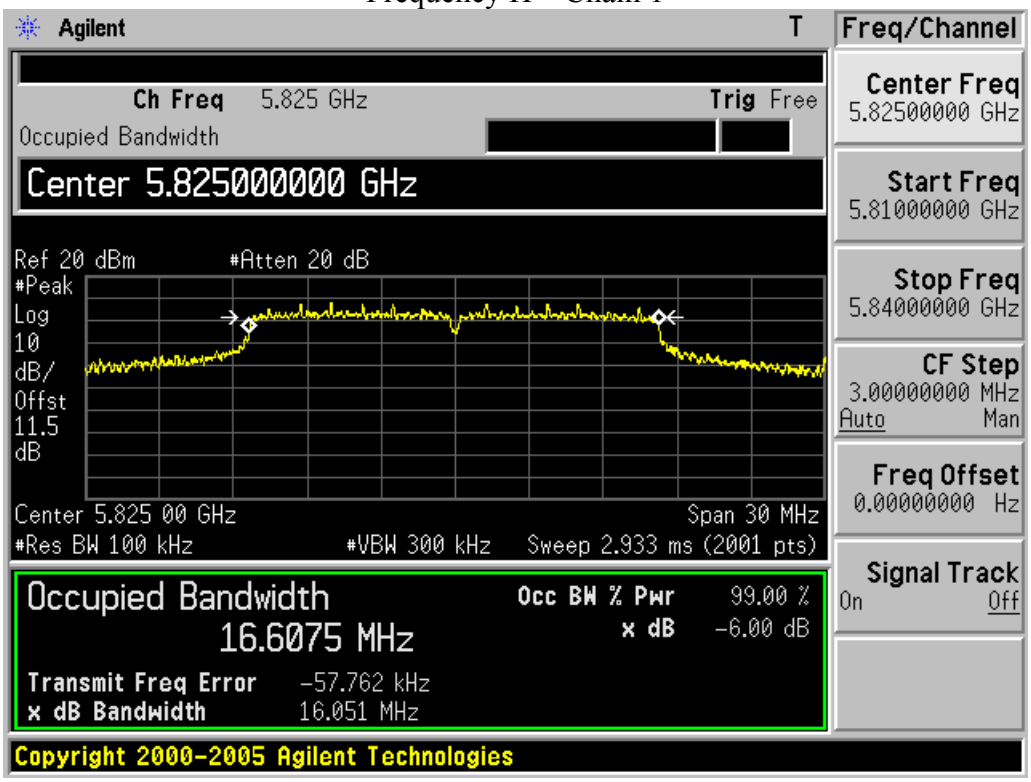
Frequency L – Chain 1



Frequency M – Chain 1

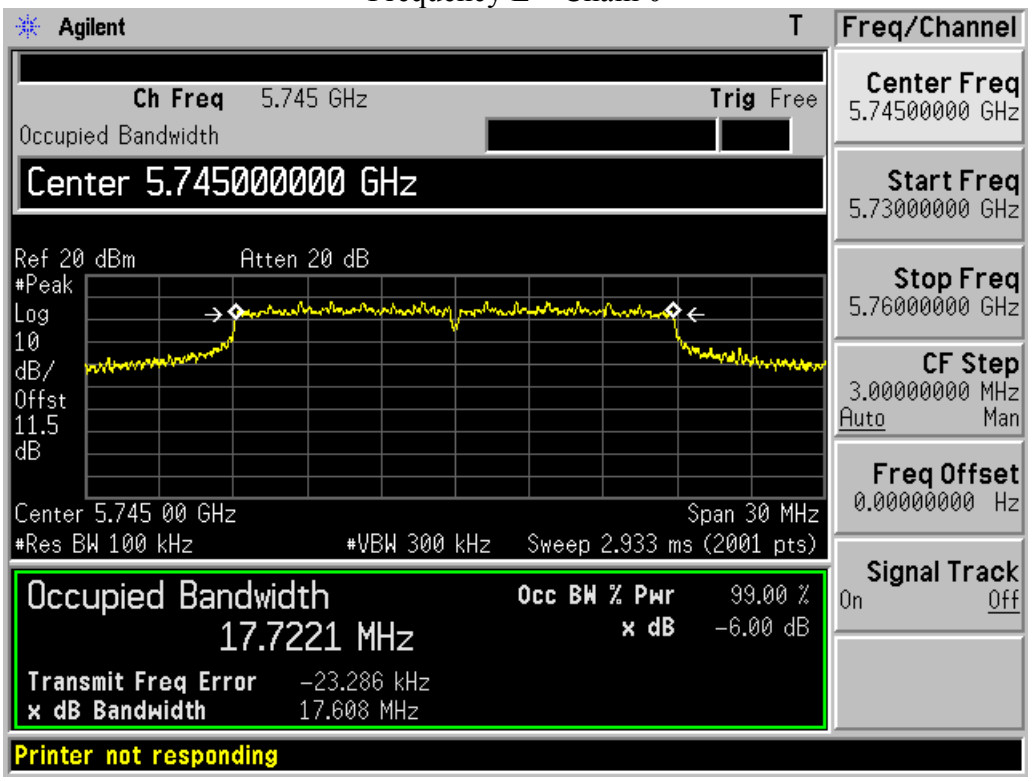


Frequency H – Chain 1

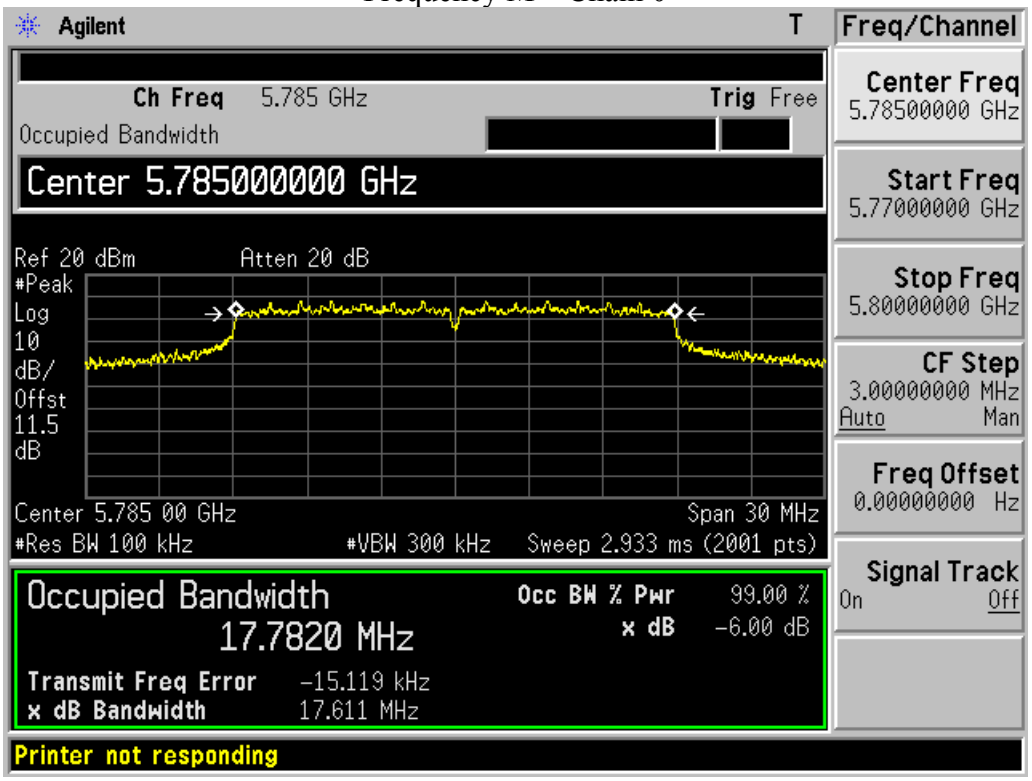


802.11n20

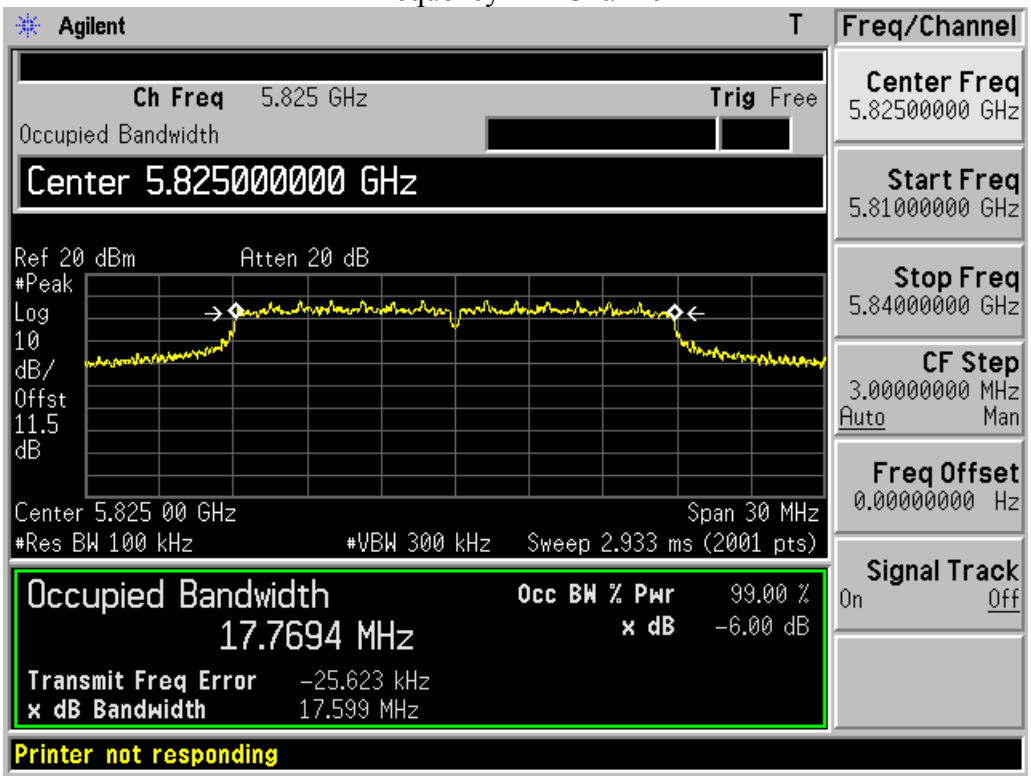
Frequency L – Chain 0



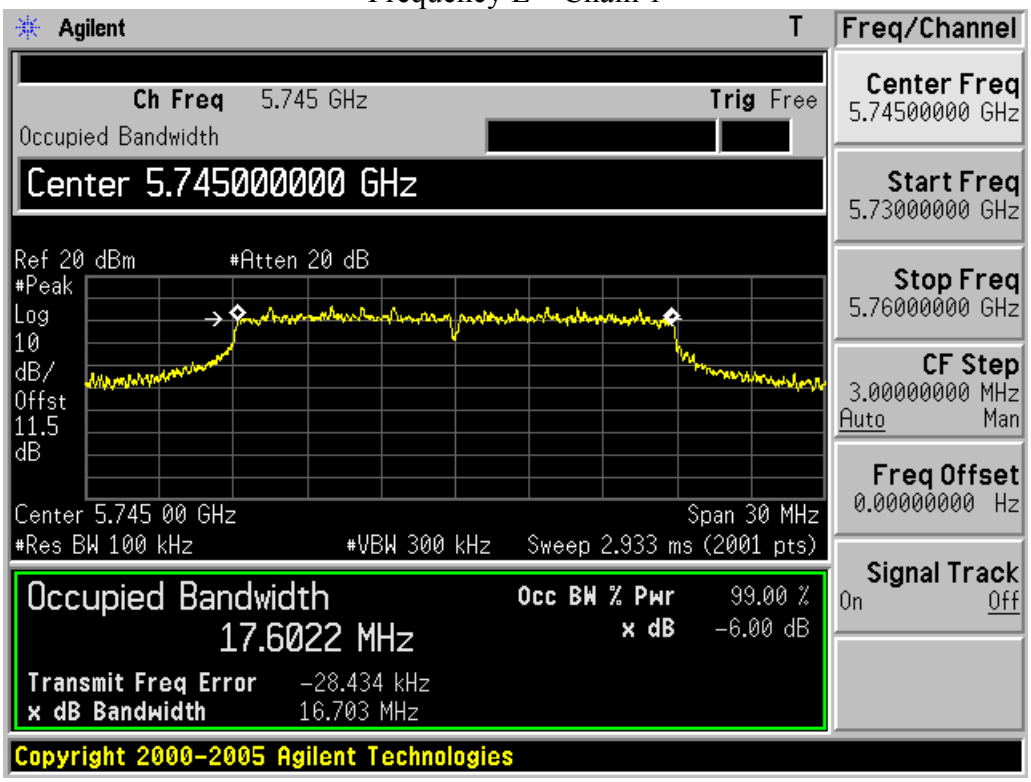
Frequency M – Chain 0



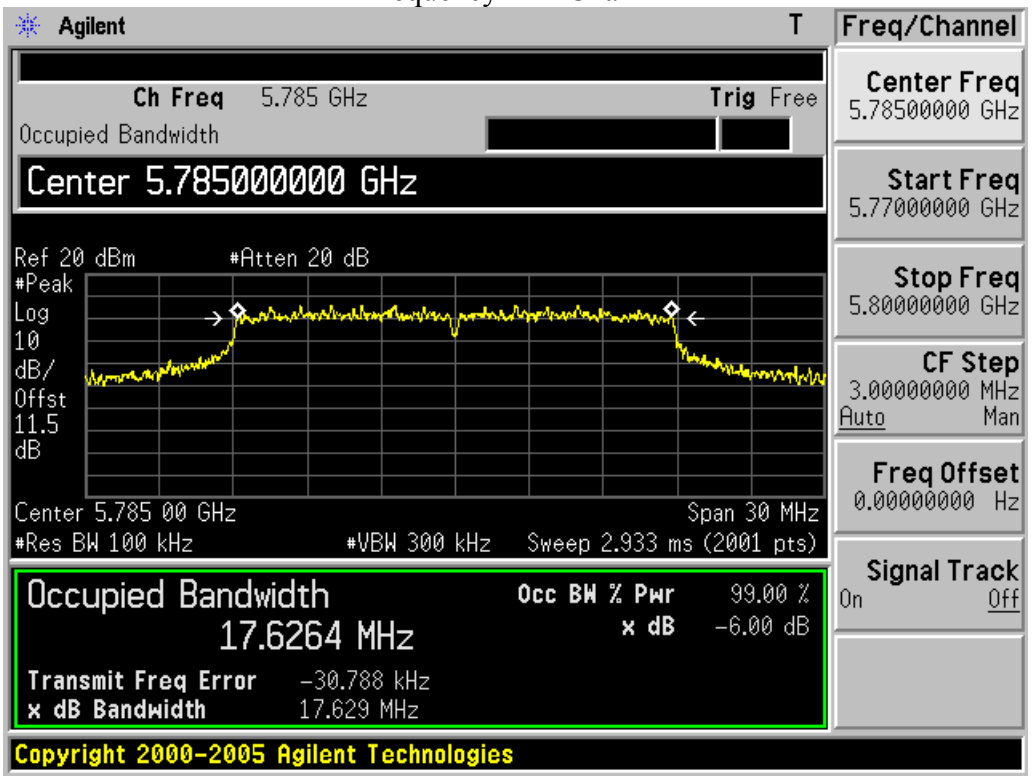
Frequency H – Chain 0



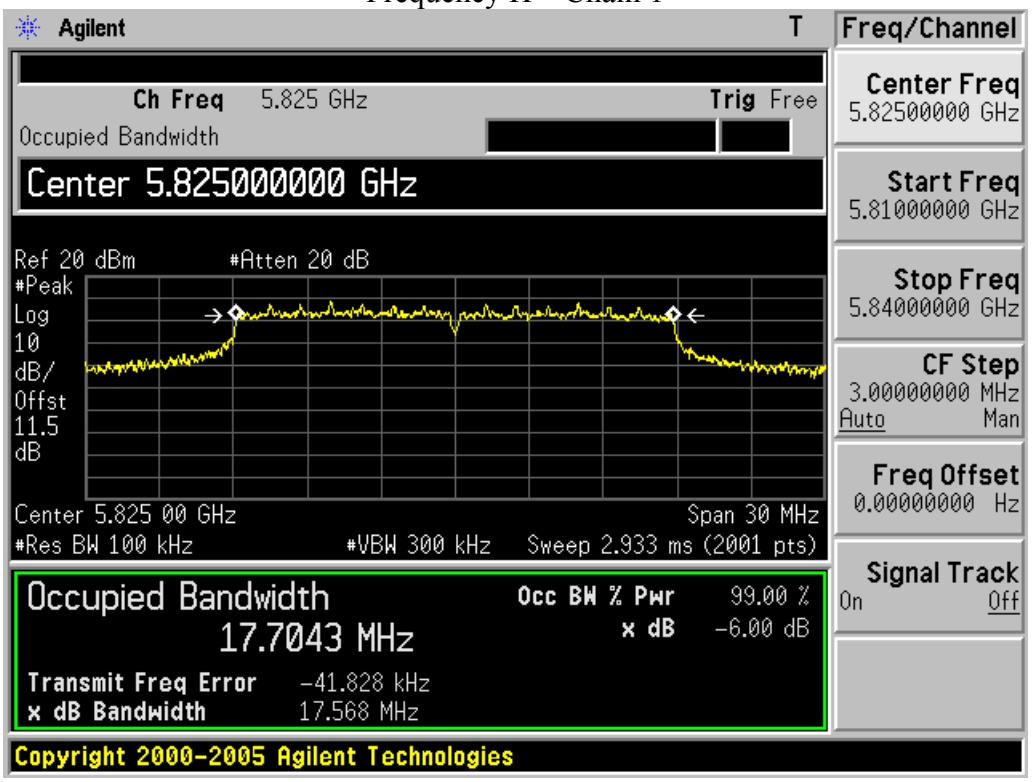
Frequency L – Chain 1



Frequency M – Chain 1

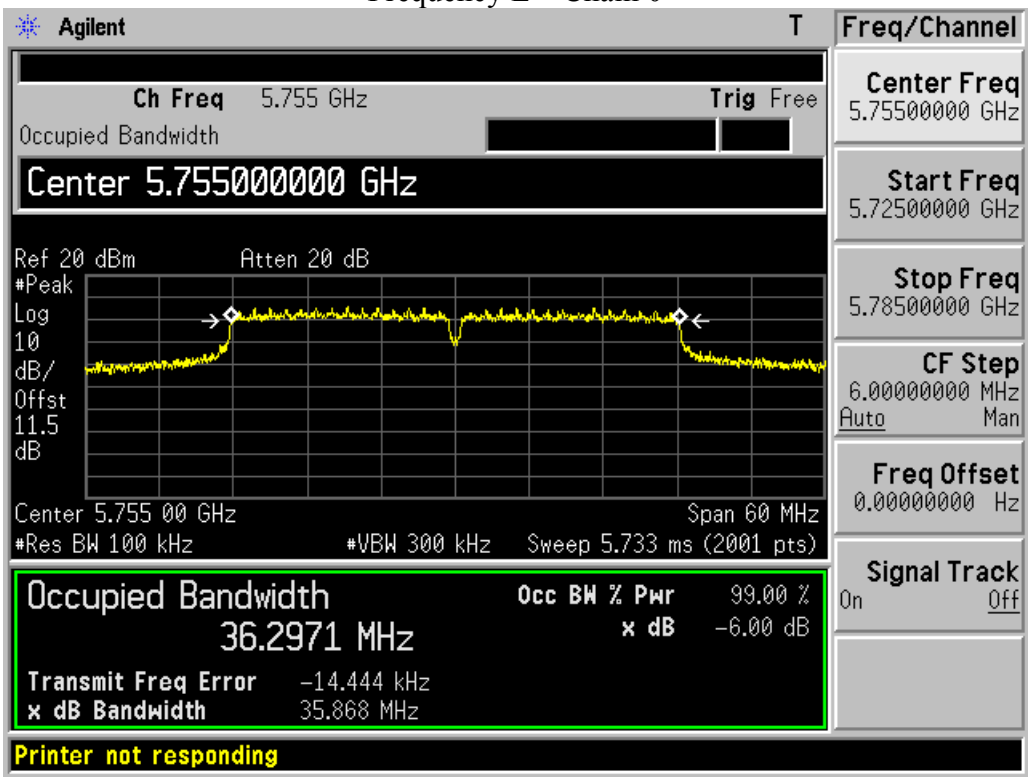


Frequency H – Chain 1

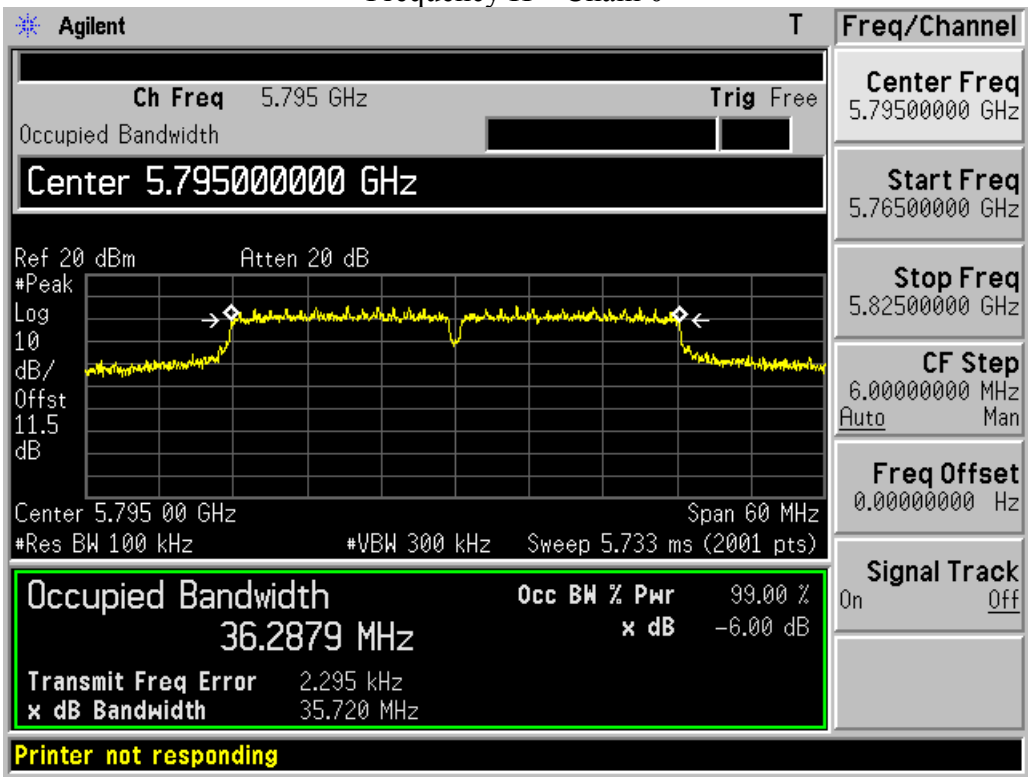


802.11n40

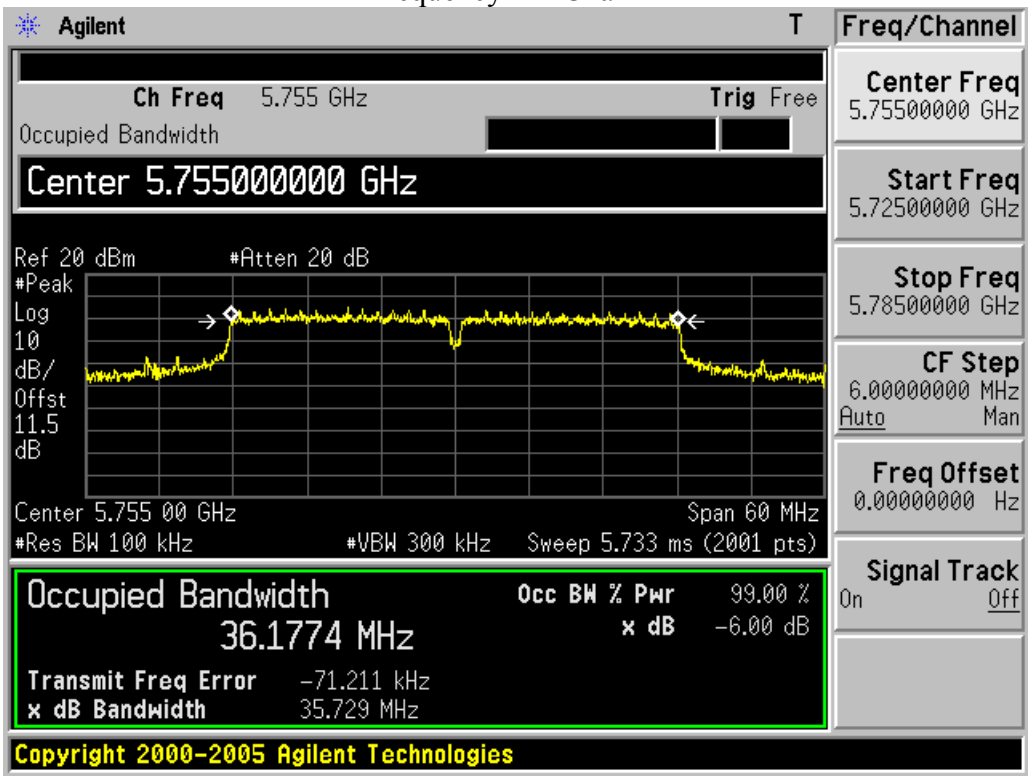
Frequency L – Chain 0



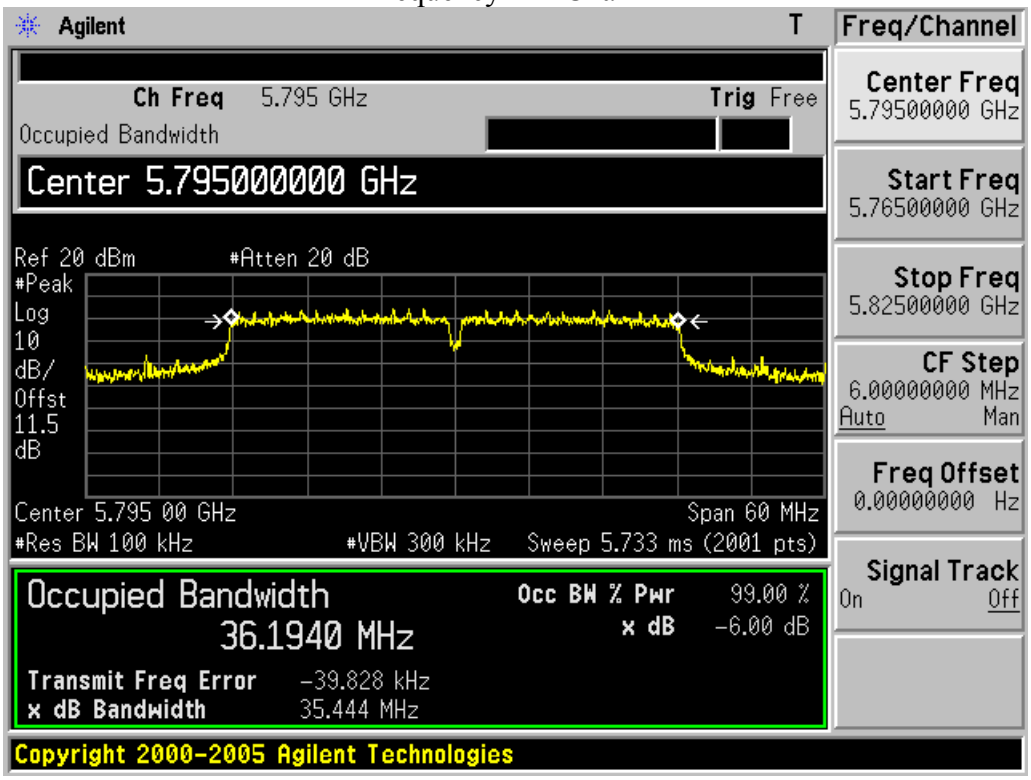
Frequency H – Chain 0



Frequency L – Chain 1



Frequency H – Chain 1



5. Maximum Conducted Output Power

Test result: Pass

5.1 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. The maximum e.i.r.p.at any elevation angle above 30 degrees from the horizon must not exceed 125 mW (21 dBm).

☒ 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.

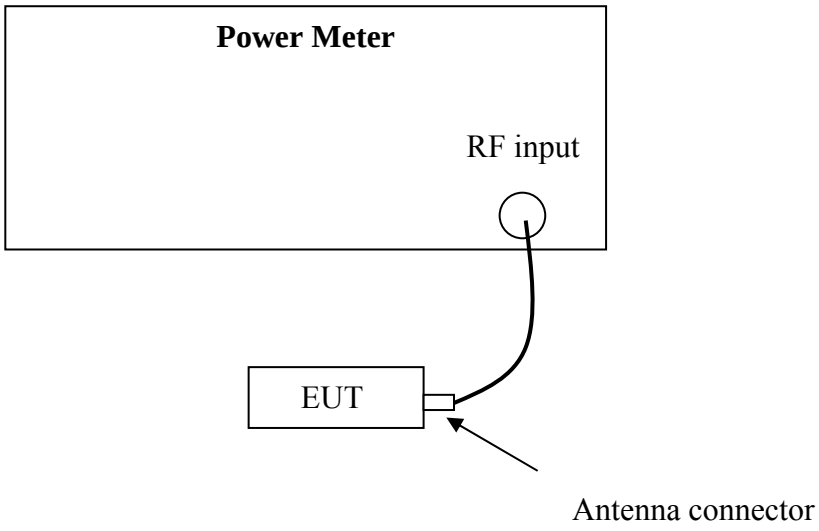
☐ For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

☒ For 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 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.

5.2 Test Configuration



5.3 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 789033 D02 General UNII Test Procedures New Rules v01: Method PM.

Method PM(Measurement using an RF average power meter):

(i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.

- The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
- At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
- The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

(ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section B).

(iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

(iv) Adjust the measurement in dBm by adding 10 log(1/x) where x is the duty cycle (e.g., 10 log(1/0.25) if the duty cycle is 25 percent).

5.4 Test protocol

Temperature : 25 °C
Relative Humidity : 55 %

U-NII-1 Band Conducted Power:

Mode	Frequency (MHz)	Reading (dBm)		Duty cycle factor	Total Power (dBm)	Limit (dBm)	Margin (dB)
		Port 0	Port 1				
802.11a	5180	18.13	17.64	0.14	21.05	30.00	8.95
	5200	17.94	17.56	0.14	20.91	30.00	9.09
	5240	17.79	17.29	0.14	20.70	30.00	9.30
802.11n20	5180	18.19	17.79	0.29	21.30	30.00	8.70
	5200	17.86	17.47	0.29	20.97	30.00	9.03
	5240	17.65	17.22	0.29	20.74	30.00	9.26
802.11n40	5190	18.25	17.45	0.36	21.24	30.00	8.76
	5230	18.18	17.51	0.36	21.23	30.00	8.77

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

Frequency range (MHz)	Mode	26dB bandwidth (MHz)	11+10log B (dBm)	Chosen limit (dBm)
5250 - 5350	802.11a	26.225	25.19	24.00
	802.11n20	29.236	25.66	24.00
	802.11n40	73.449	29.66	24.00
Note: 1. Chosen limit is 24dBm or 11dBm + 10logB(26dB bandwidth) which is lesser;				

Mode	Frequency (MHz)	Reading (dBm)		Duty cycle factor	Total Power (dBm)	Limit (dBm)	Margin (dB)
		Port 0	Port 1				
802.11a	5260	19.21	19.41	0.14	22.47	24.00	1.53
	5300	18.79	18.82	0.14	21.96	24.00	2.04
	5320	18.81	18.75	0.14	21.93	24.00	2.07
802.11n20	5260	18.85	19.16	0.29	22.31	24.00	1.69
	5300	18.45	18.11	0.29	21.59	24.00	2.41
	5320	18.16	18.18	0.29	21.47	24.00	2.53
802.11n40	5270	17.81	17.56	0.36	21.06	24.00	2.94
	5310	17.61	17.86	0.36	21.11	24.00	2.89

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

Frequency range (MHz)	Mode	26dB bandwidth (MHz)	11+10log B (dBm)	Chosen limit (dBm)
5470 - 5725	802.11a	27.550	25.40	24.00
	802.11n20	24.290	24.85	24.00
	802.11n40	54.990	28.40	24.00
Note: 1. Chosen limit is 24dBm or 11dBm + 10logB(26dB bandwidth) which is lesser;				

Mode	Frequency (MHz)	Reading (dBm)		Duty cycle factor	Total Power (dBm)	Limit (dBm)	Margin (dB)
		Port 0	Port 1				
802.11a	5500	17.21	17.28	0.14	20.40	24.00	3.60
	5600	17.54	17.65	0.14	20.75	24.00	3.25
	5720	17.22	17.13	0.14	20.33	24.00	3.67
802.11n20	5500	17.13	17.02	0.29	20.38	24.00	3.62
	5600	17.43	17.36	0.29	20.70	24.00	3.30
	5720	17.18	17.27	0.29	20.53	24.00	3.47
802.11n40	5510	17.85	18.15	0.36	21.38	24.00	2.62
	5590	17.27	17.19	0.36	20.60	24.00	3.40
	5710	17.36	17.32	0.36	20.71	24.00	3.29

U-NII-3 Band Conducted Power:

Mode	Frequency (MHz)	Reading (dBm)		Total Power (mw)	Total Power (dBm)	Limit (dBm)	Margin (dB)
		Port 0	Port 1				
802.11a	5745	17.98	17.04	0.14	20.69	30.00	9.31
	5785	17.91	17.03	0.14	20.65	30.00	9.35
	5825	17.85	17.16	0.14	20.67	30.00	9.33
802.11n20	5745	18.15	17.10	0.29	20.96	30.00	9.04
	5785	17.68	17.02	0.29	20.66	30.00	9.34
	5825	17.85	17.16	0.29	20.82	30.00	9.18
802.11n40	5755	17.98	17.12	0.36	20.94	30.00	9.06
	5795	17.65	17.16	0.36	20.78	30.00	9.22

6. Power spectral density

Test result: **Pass**

6.1 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.

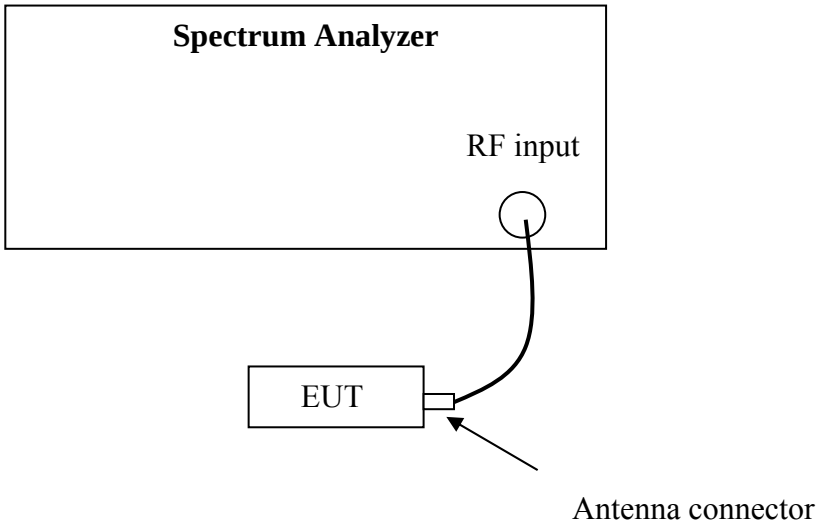
☐For the 5.15-5.25 GHz The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

☒ 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.

6.2 Test Configuration



4.3 Test procedure and test setup

The power spectral density per FCC §15.407(a) was measured from the antenna port of the EUT according to the measurement method refer to KDB 789033D02 v01: section F.

1. Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power…". (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)

2. Use the peak search function on the instrument to find the peak of the spectrum and record its value.

3. Make the following adjustments to the peak value of the spectrum, if applicable: a) If Method SA-2 or SA-2 Alternative was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.
b) If Method SA-3 Alternative was used and the linear mode was used in step II.E.2.g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.

4. The result is the Maximum PSD over 1 MHz reference bandwidth.

5. For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (*i.e.,* 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply: a) Set RBW ≥ 1/*T*, where *T* is defined in section II.B.l.a).
b) Set VBW ≥ 3 RBW.
c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the sections 5.c) and 5.d) above, since RBW=100 kHZ is available on nearly all spectrum analyzers.

4.4 Test Protocol

Temperature : 25 °C
Relative Humidity : 55 %

U-NII 1 Band:

Mode	Frequency (MHz)	Chosen limit (dBm)	Antenna value (dBi)	Final limit (dBm)
802.11a	5180	17.00	6.70	16.30
	5200	17.00	6.70	16.30
	5240	17.00	6.70	16.30
802.11n20	5180	17.00	3.70	17.00
	5200	17.00	3.70	17.00
	5240	17.00	3.70	17.00
802.11n40	5190	17.00	3.70	17.00
	5230	17.00	3.70	17.00

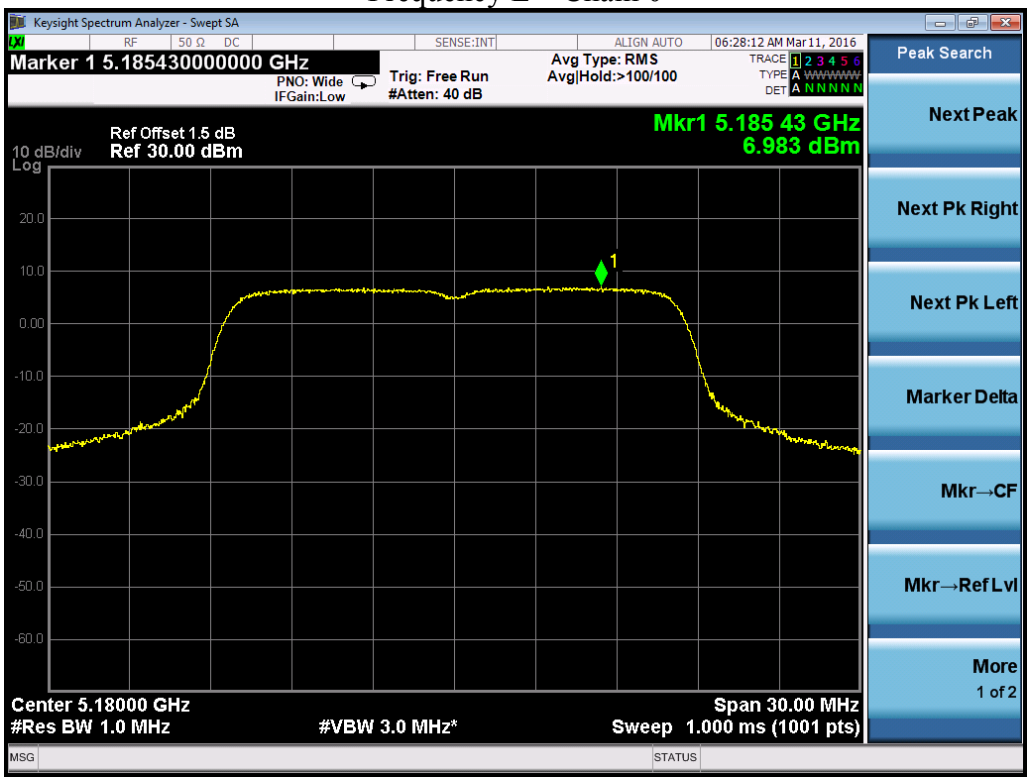
Note: 1. Antenna value = Antenna gain + beamforming if applied;
2. For 802.11 a mode, the CDD Array Gain= 3.0dBi;
3. Final limit is calculated as Chosen limit – Antenna value exceeding 6dBi.

Mode	Frequency (MHz)	PSD (dBm)		Duty Cycle factor (dB)	Total PSD (dBm/ MHz)	Limit (dBm/ MHz)	Margin (dB)
		Port 0	Port 1				
802.11a	5180	6.983	5.931	0.14	9.64	16.70	7.06
	5200	6.834	5.935	0.14	9.56	16.70	7.14
	5240	6.506	5.746	0.14	9.30	16.70	7.40
802.11n20	5180	6.342	5.485	0.29	9.24	17.00	7.76
	5200	6.624	5.565	0.29	9.43	17.00	7.57
	5240	6.054	5.703	0.29	9.18	17.00	7.82
802.11n40	5190	4.057	3.893	0.36	7.35	17.00	9.65
	5230	3.659	3.546	0.36	6.98	17.00	10.02

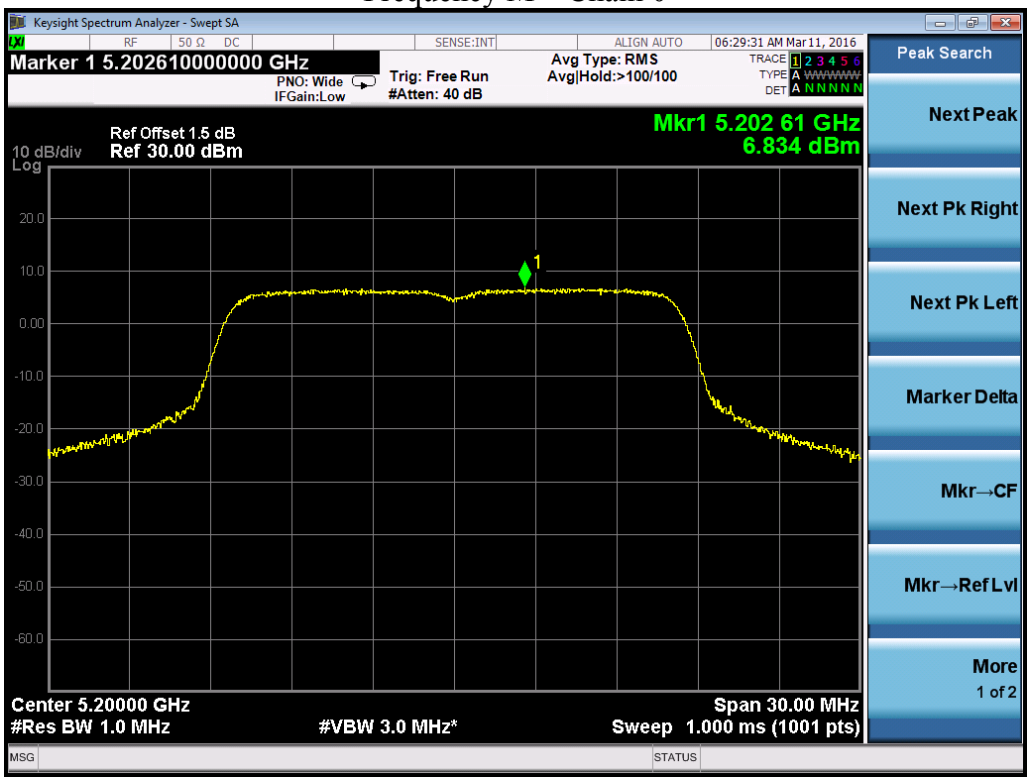
Test Plots as bellow:

802.11a

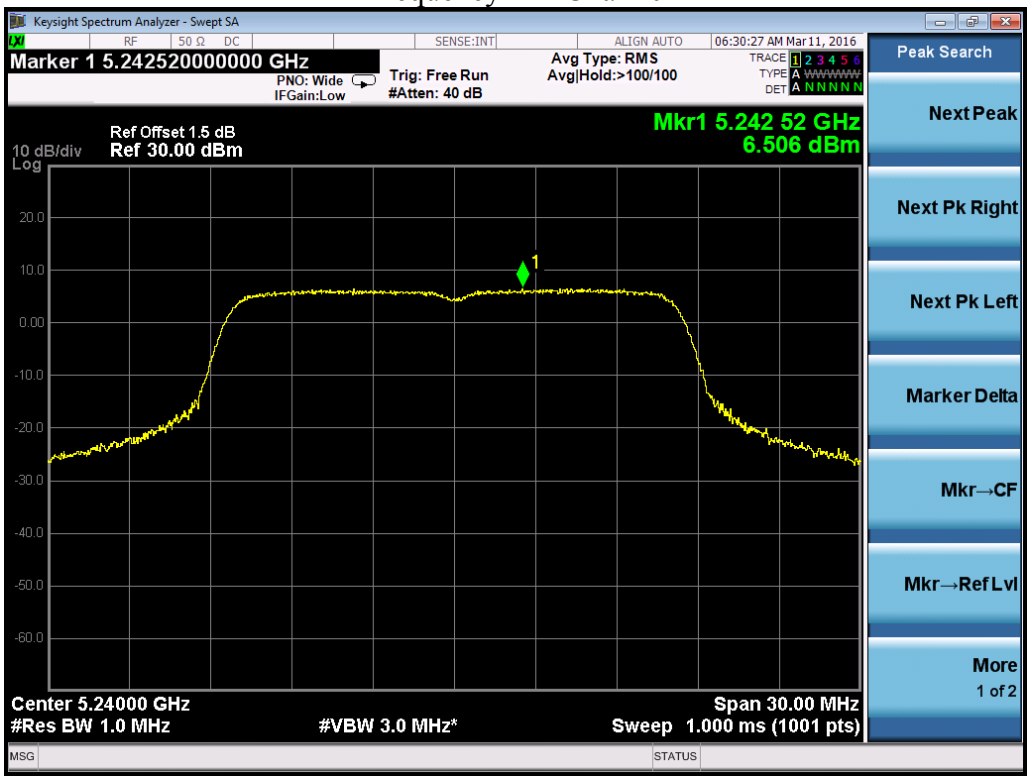
Frequency L – Chain 0



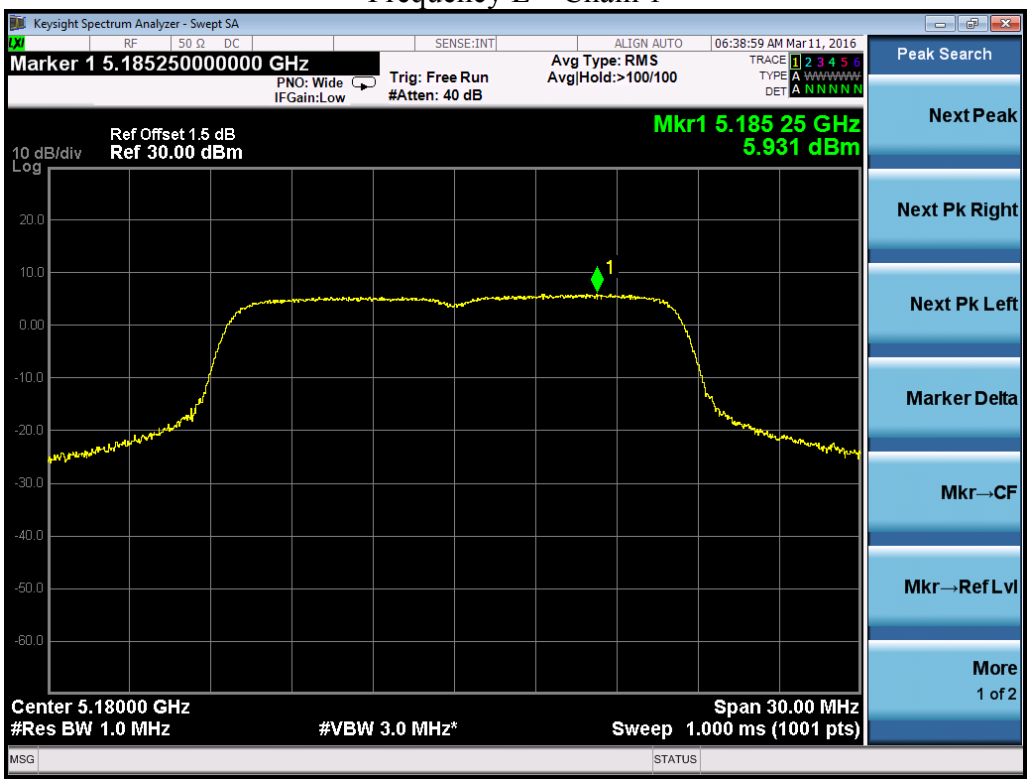
Frequency M – Chain 0



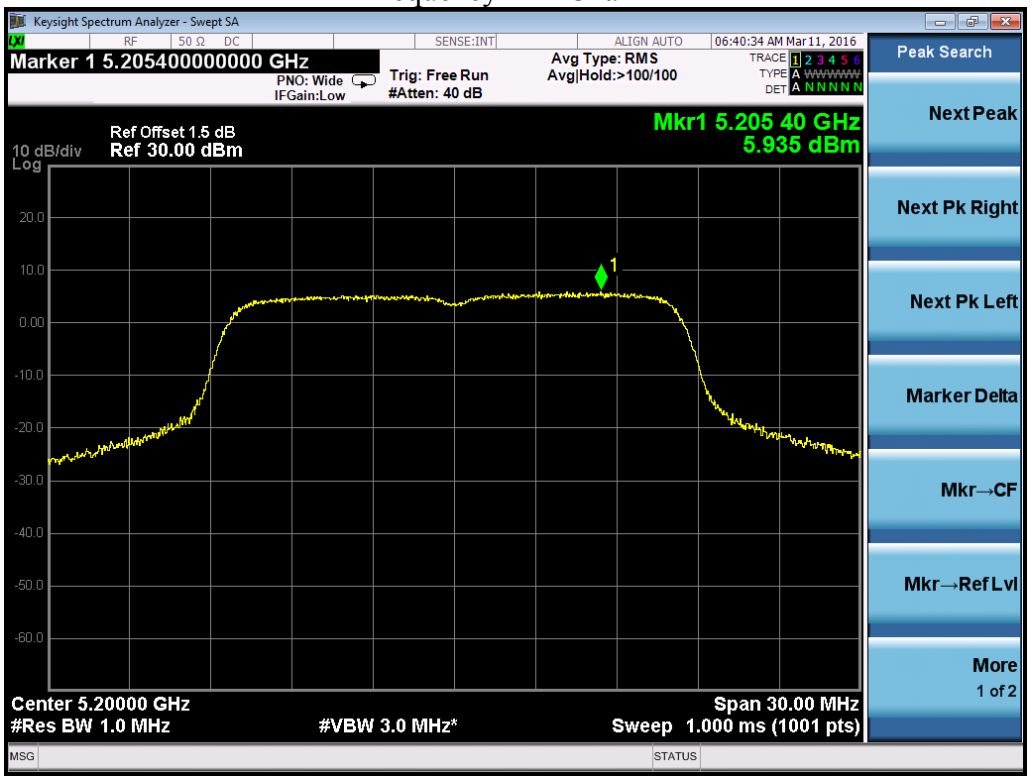
Frequency H – Chain 0



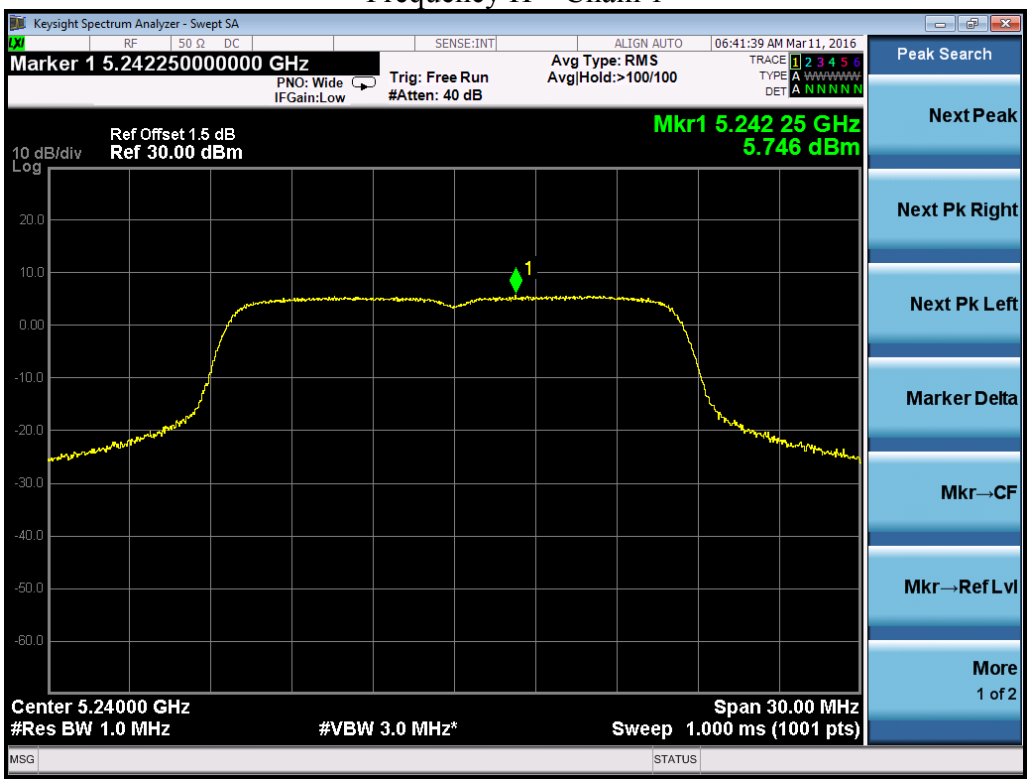
Frequency L – Chain 1



Frequency M – Chain 1

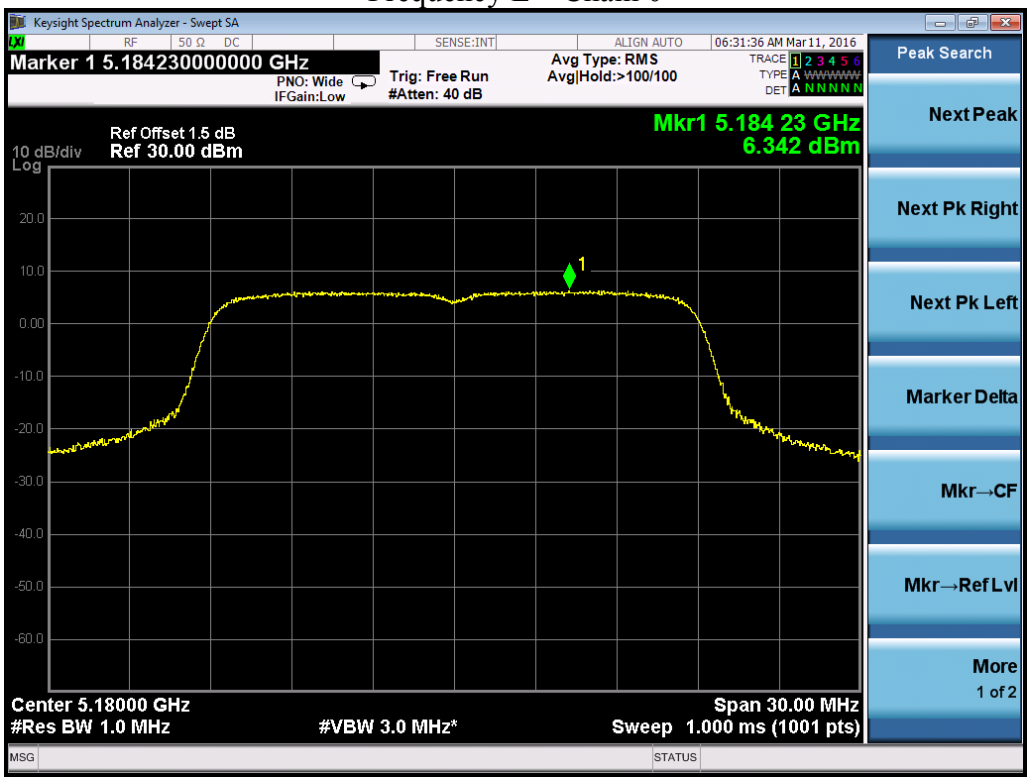


Frequency H – Chain 1

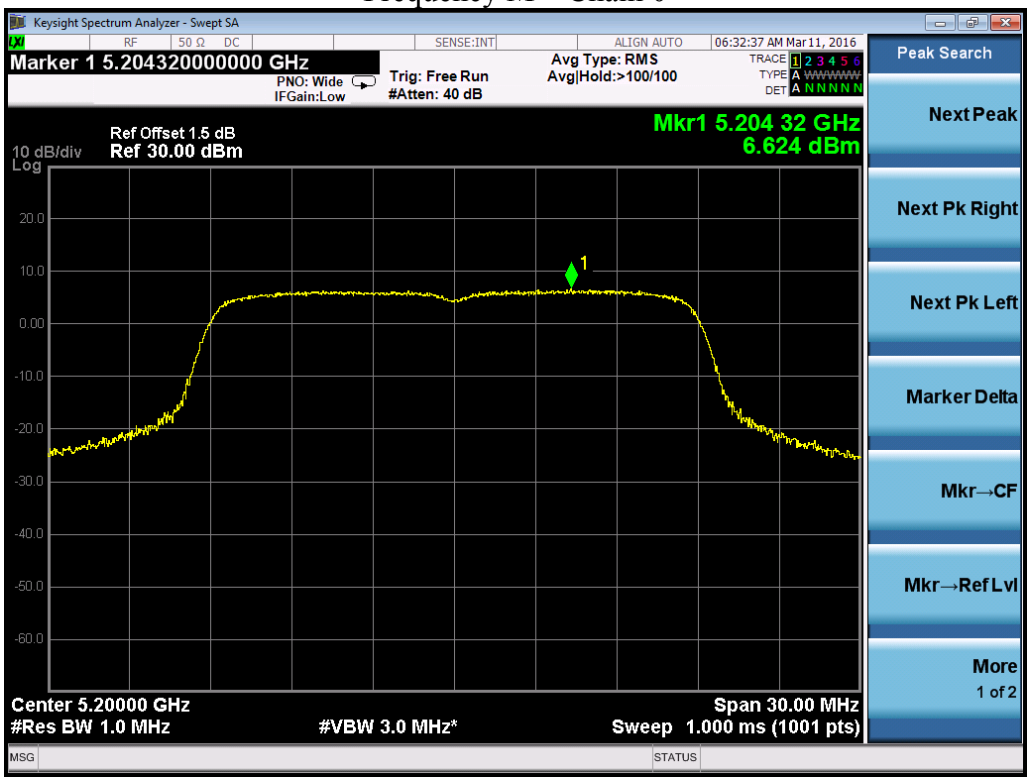


802.11n20

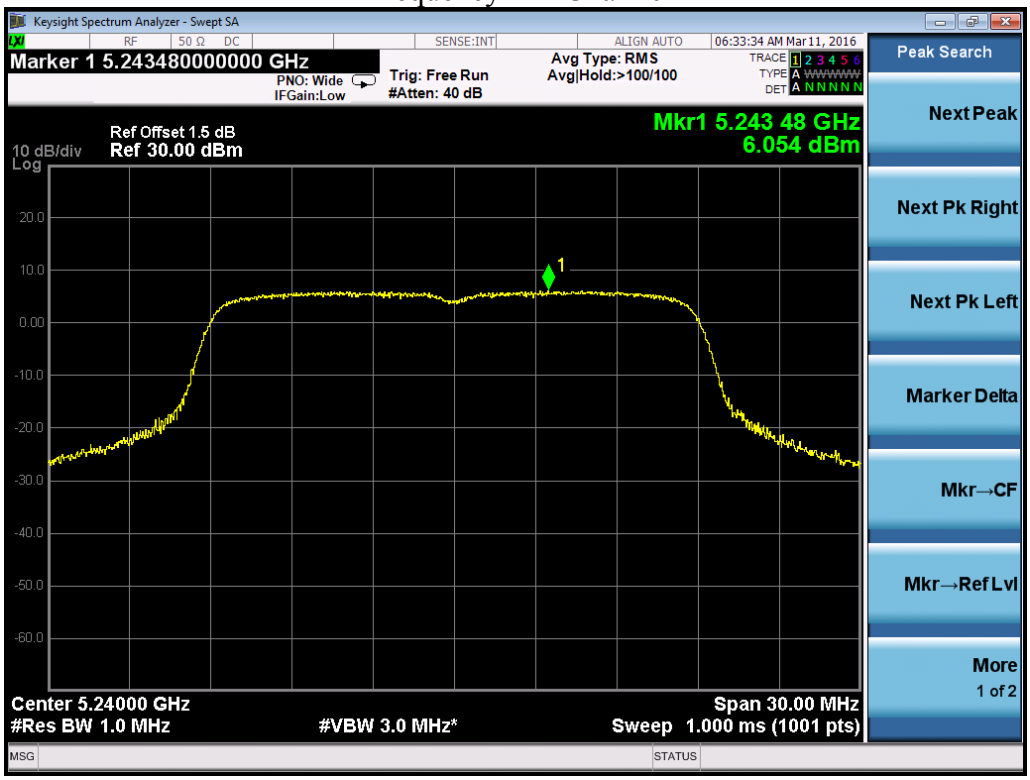
Frequency L – Chain 0



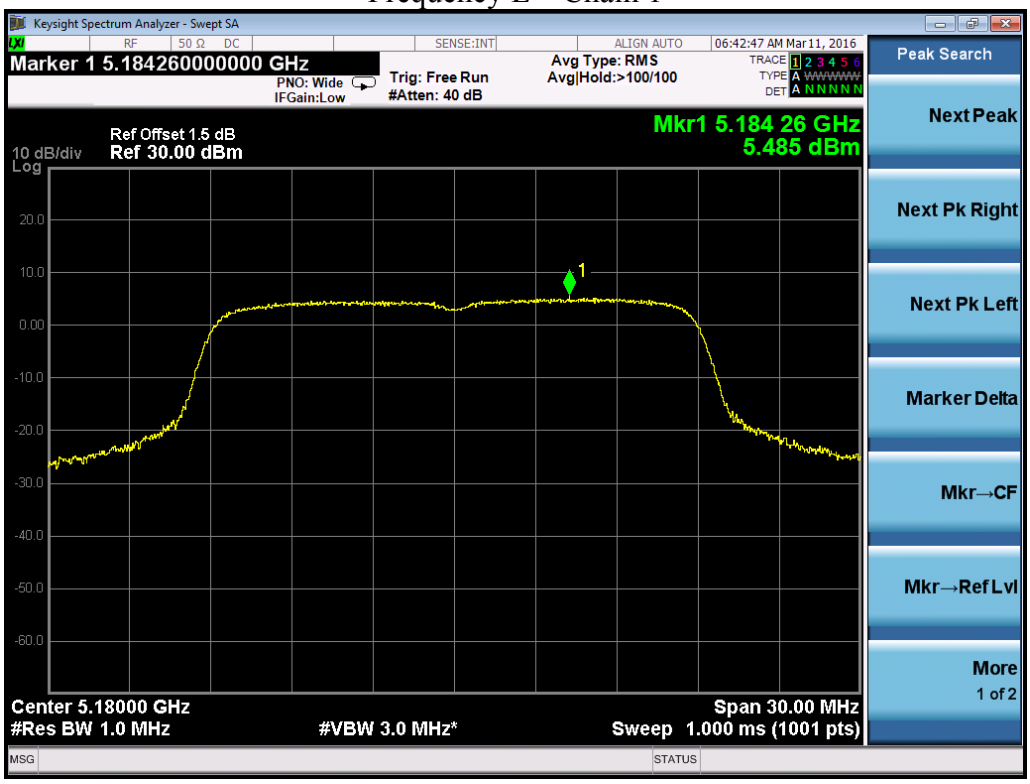
Frequency M – Chain 0



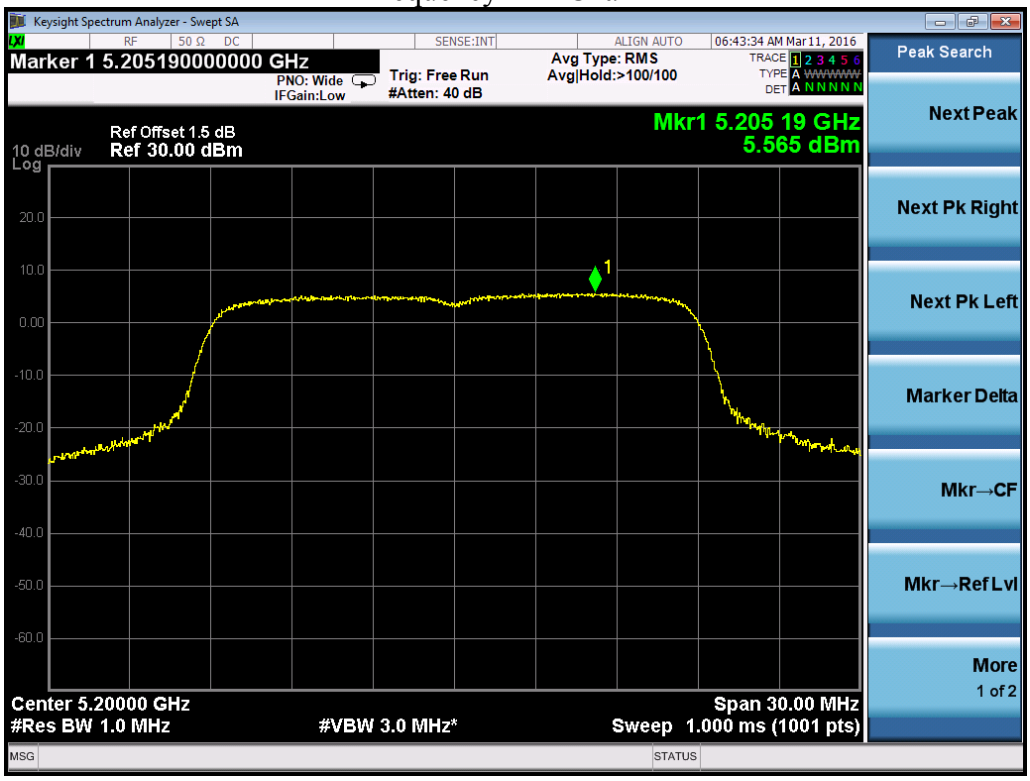
Frequency H – Chain 0



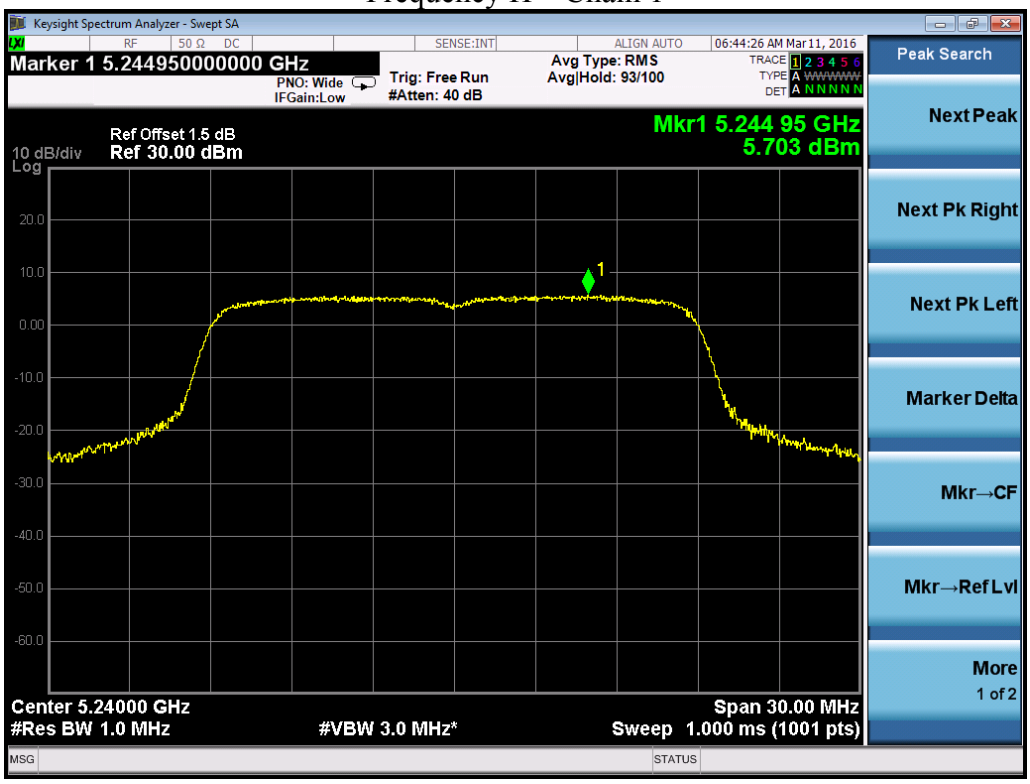
Frequency L – Chain 1



Frequency M – Chain 1

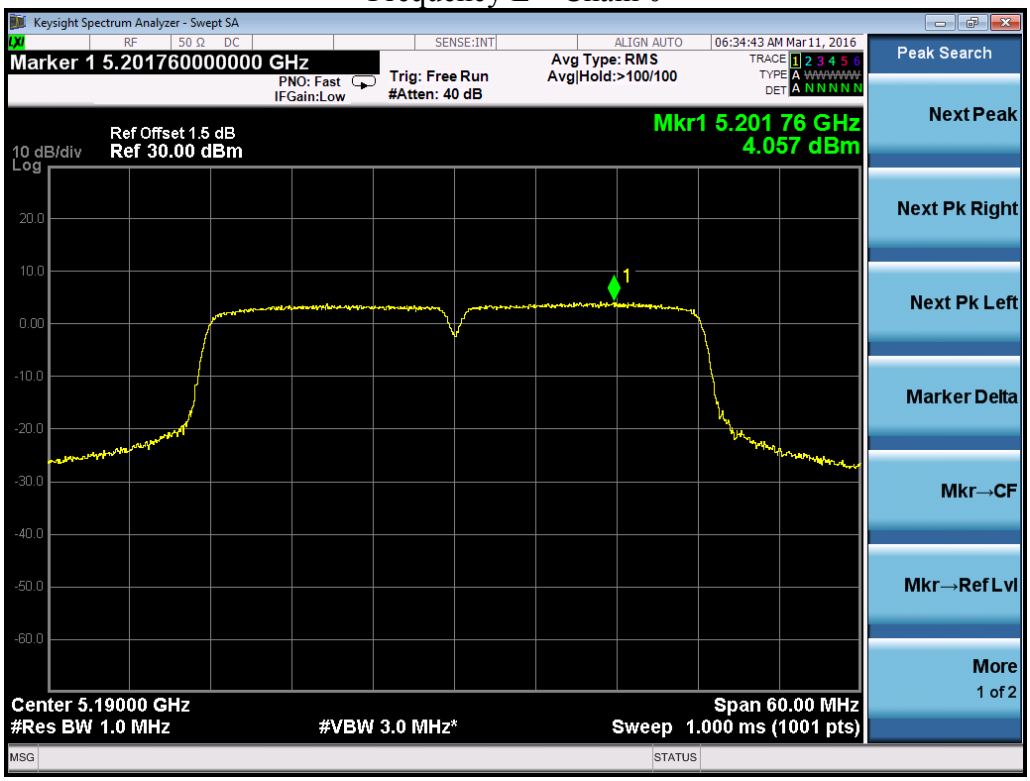


Frequency H – Chain 1

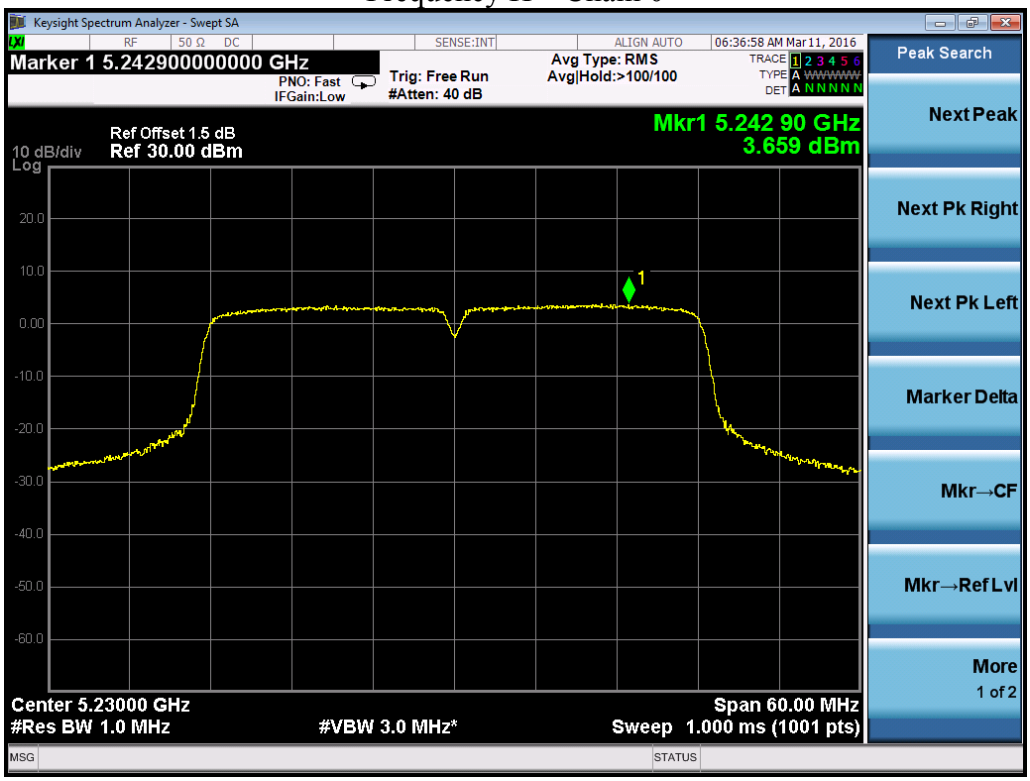


802.11n40

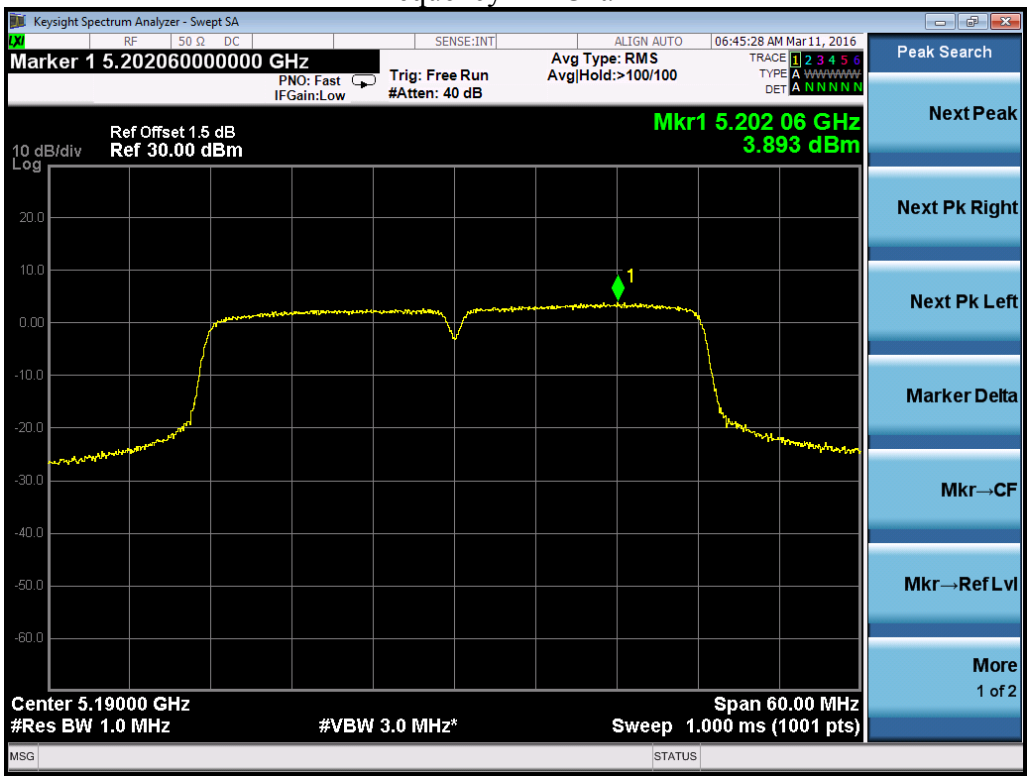
Frequency L – Chain 0



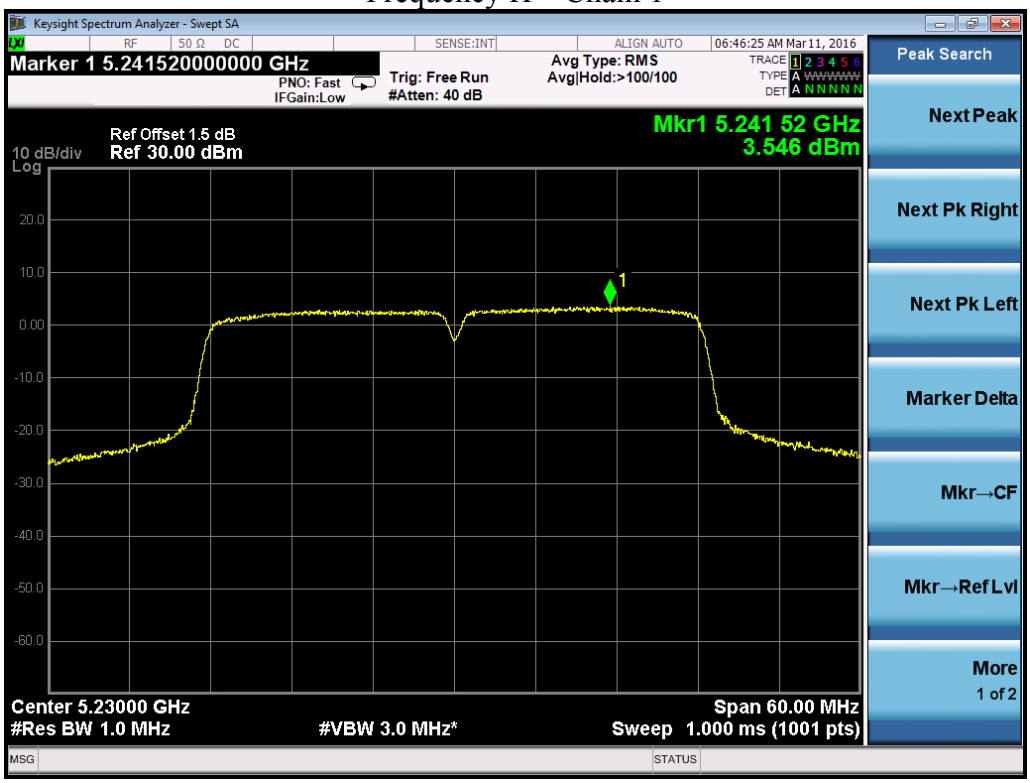
Frequency H – Chain 0



Frequency L – Chain 1



Frequency H – Chain 1



U-NII 2A Band:

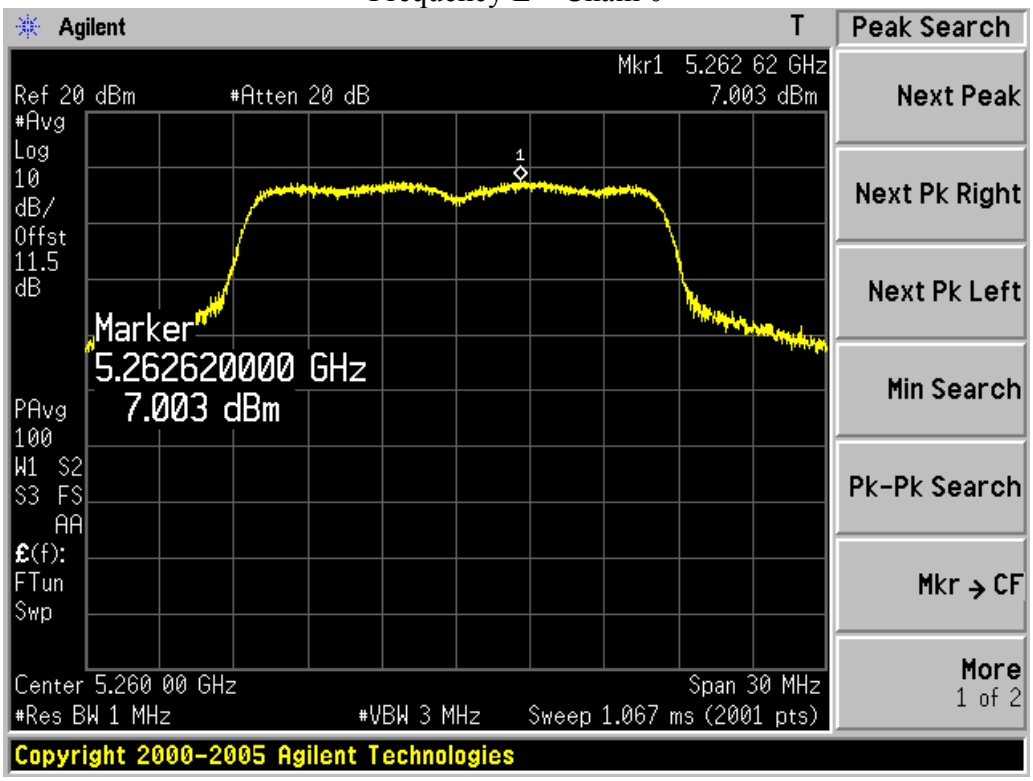
Mode	Frequency (MHz)	Chosen limit (dBm)	Antenna value (dBi)	Final limit (dBm)
802.11a	5260	11.00	6.70	10.30
	5300	11.00	6.70	10.30
	5320	11.00	6.70	10.30
802.11n20	5260	11.00	3.70	11.00
	5300	11.00	3.70	11.00
	5320	11.00	3.70	11.00
802.11n40	5270	11.00	3.70	11.00
	5310	11.00	3.70	11.00
Note: 1. Antenna value = Antenna gain + beamforming if applied; 2. For 802.11 a mode, the CDD Array Gain= 3.0dBi; 3. Final limit is calculated as Chosen limit – Antenna value exceeding 6dBi.				

Mode	Frequency (MHz)	PSD (dBm)		Duty Cycle factor (dB)	Total PSD (dBm/ MHz)	Limit (dBm/ MHz)	Margin (dB)
		Port 0	Port 1				
802.11a	5260	7.003	7.066	0.14	10.19	10.30	0.11
	5300	7.115	6.389	0.14	9.92	10.30	0.38
	5320	6.696	6.027	0.14	9.53	10.30	0.77
802.11n20	5260	6.912	7.226	0.29	10.37	11.00	0.63
	5300	7.358	6.869	0.29	10.42	11.00	0.58
	5320	6.021	7.972	0.29	10.41	11.00	0.59
802.11n40	5270	4.209	4.402	0.36	7.68	11.00	3.32
	5310	3.869	3.926	0.36	7.27	11.00	3.73

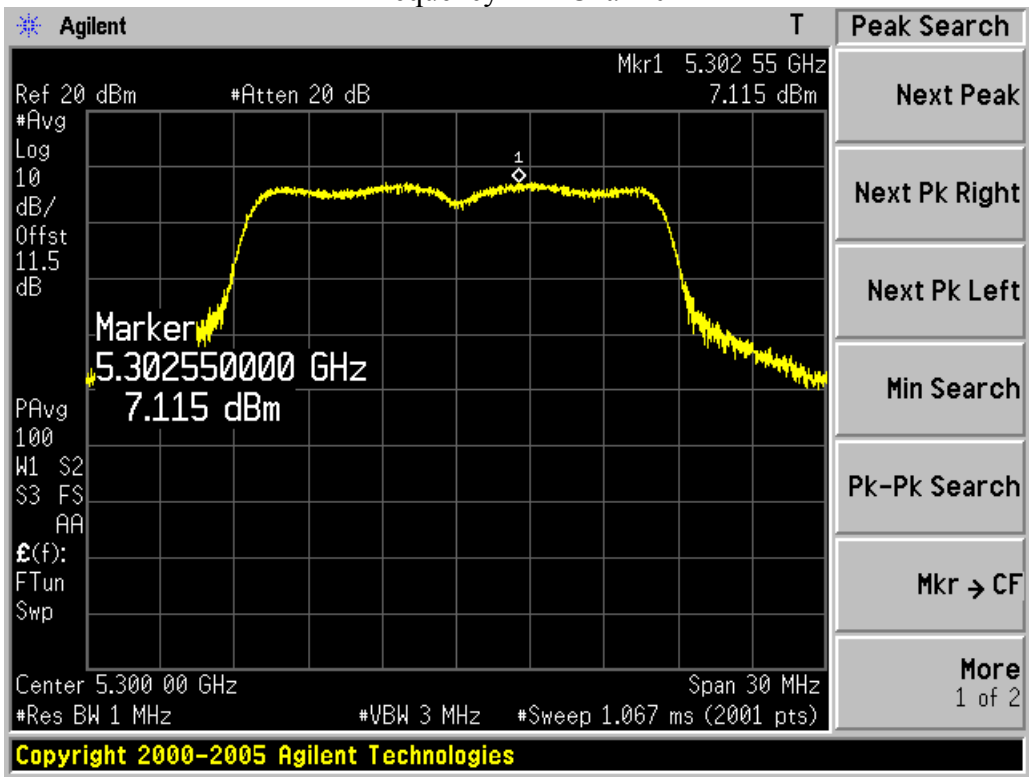
Test Plots as bellow:

802.11a

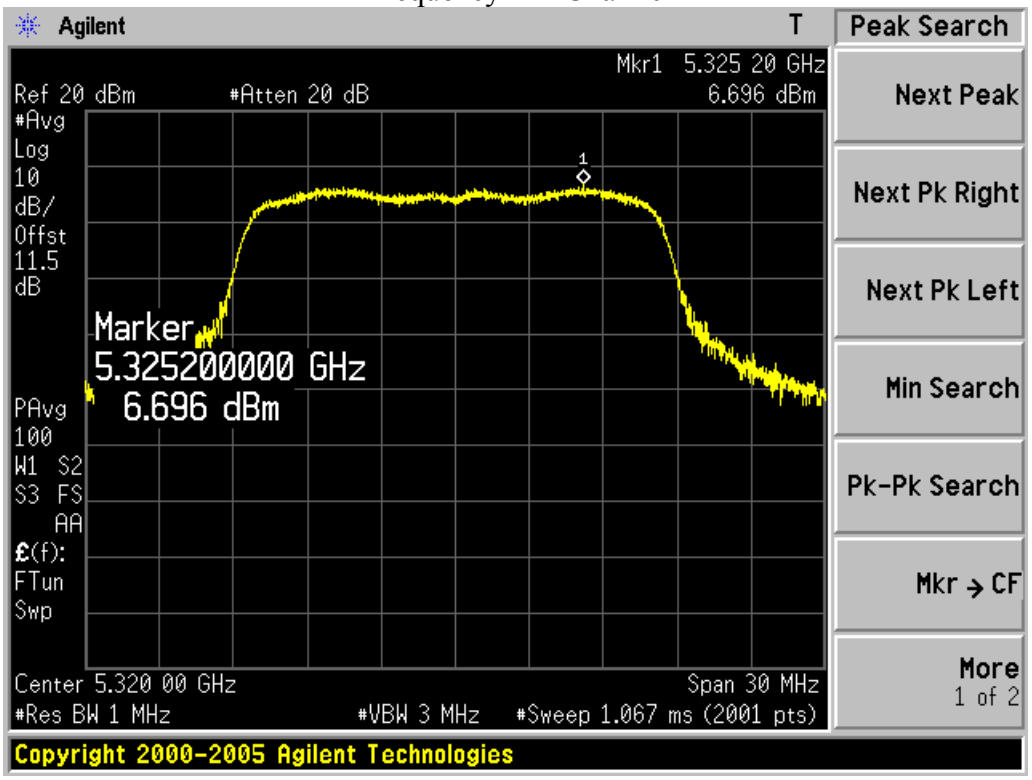
Frequency L – Chain 0



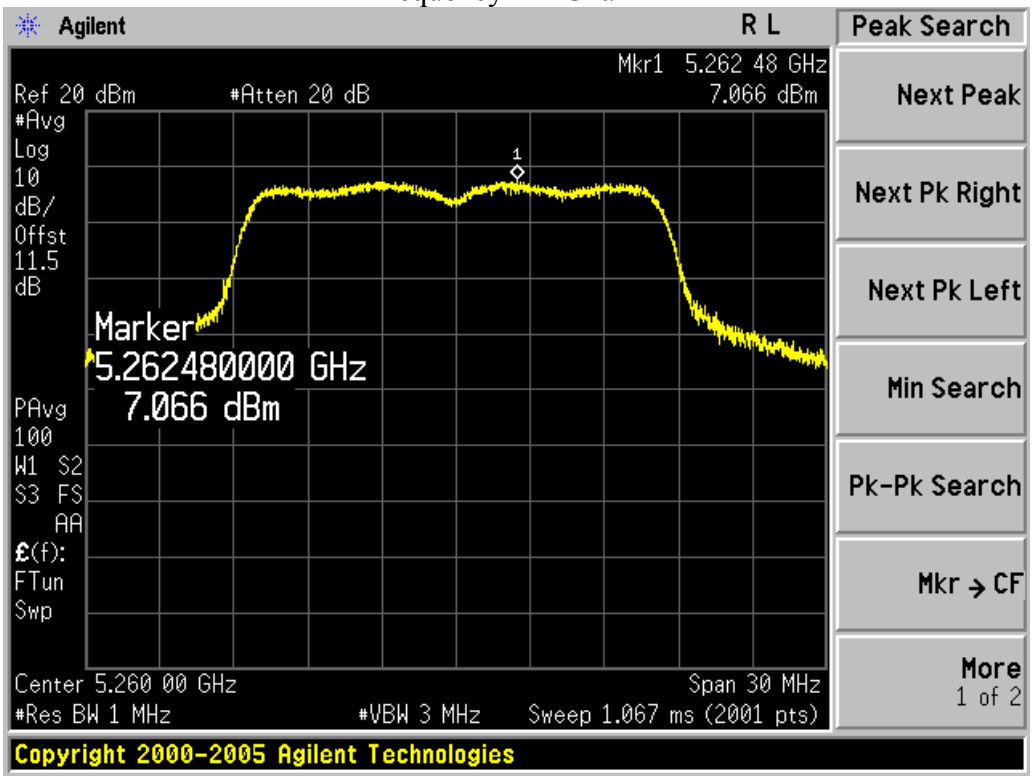
Frequency M – Chain 0



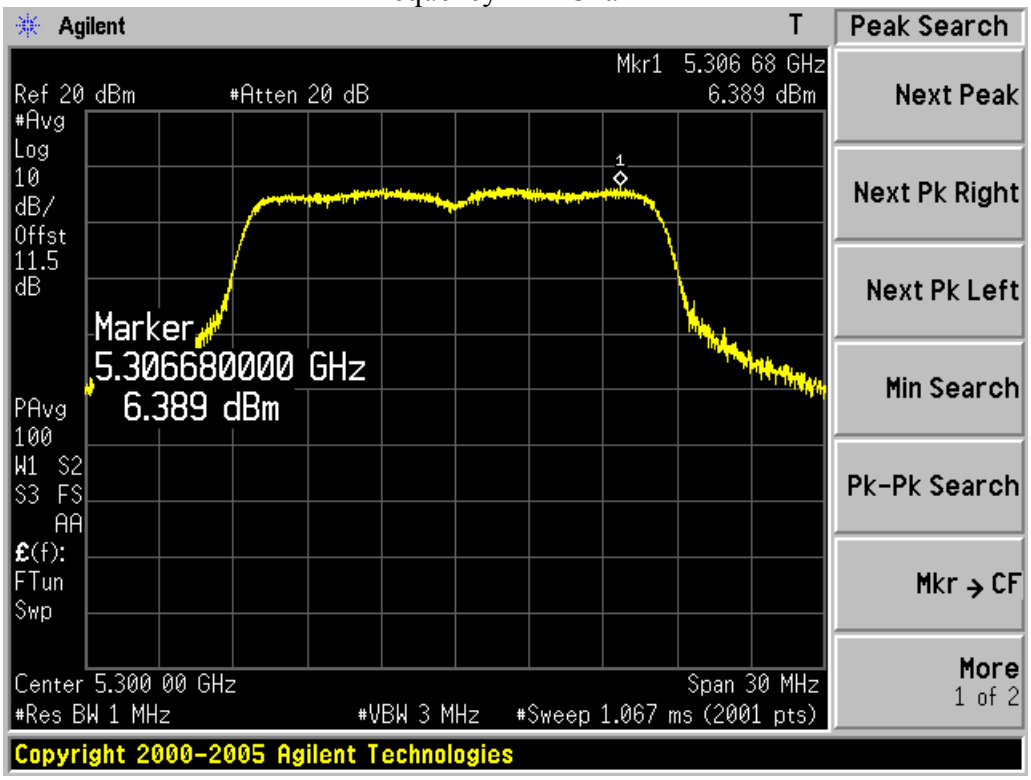
Frequency H – Chain 0



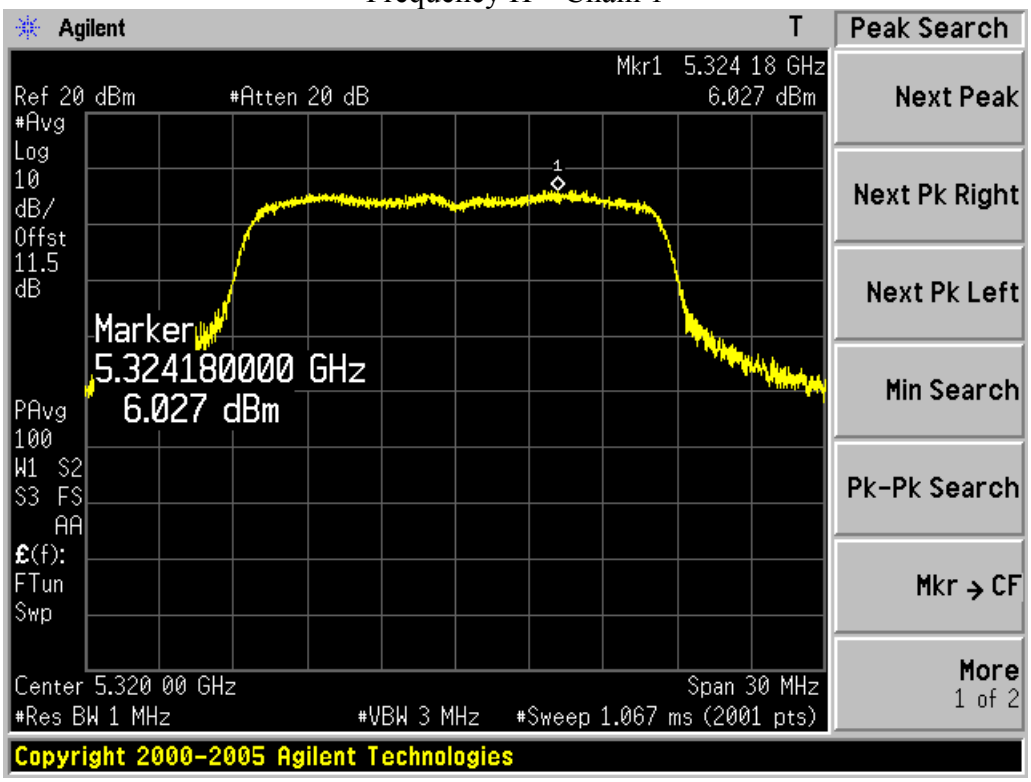
Frequency L – Chain 1



Frequency M – Chain 1

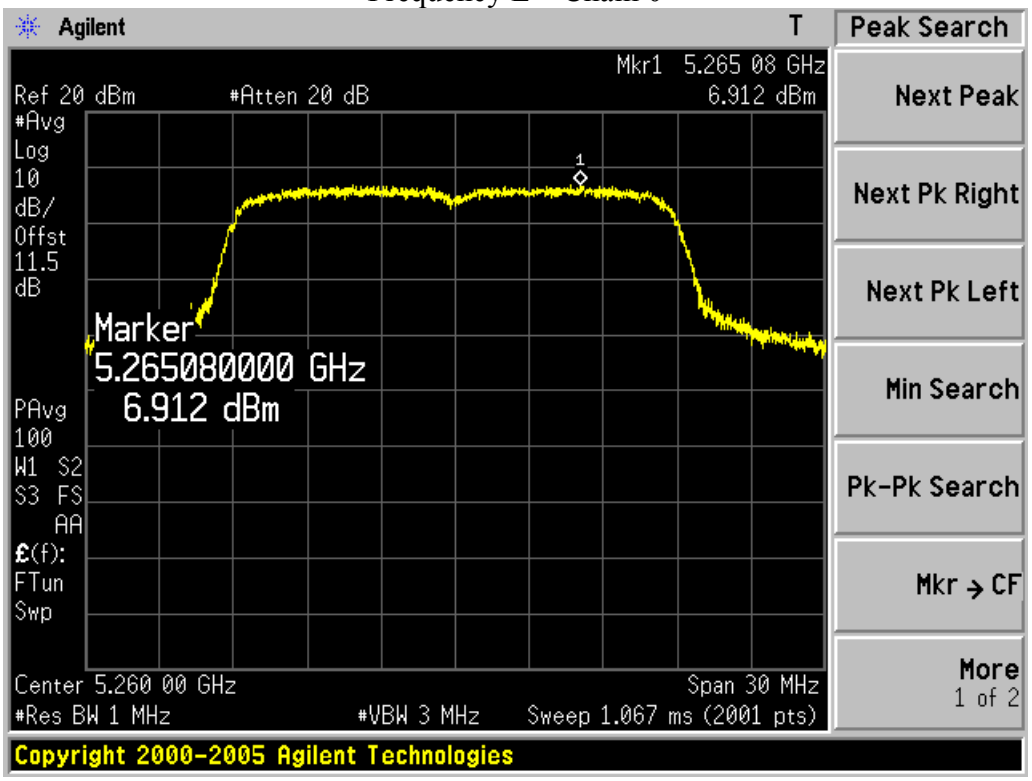


Frequency H – Chain 1

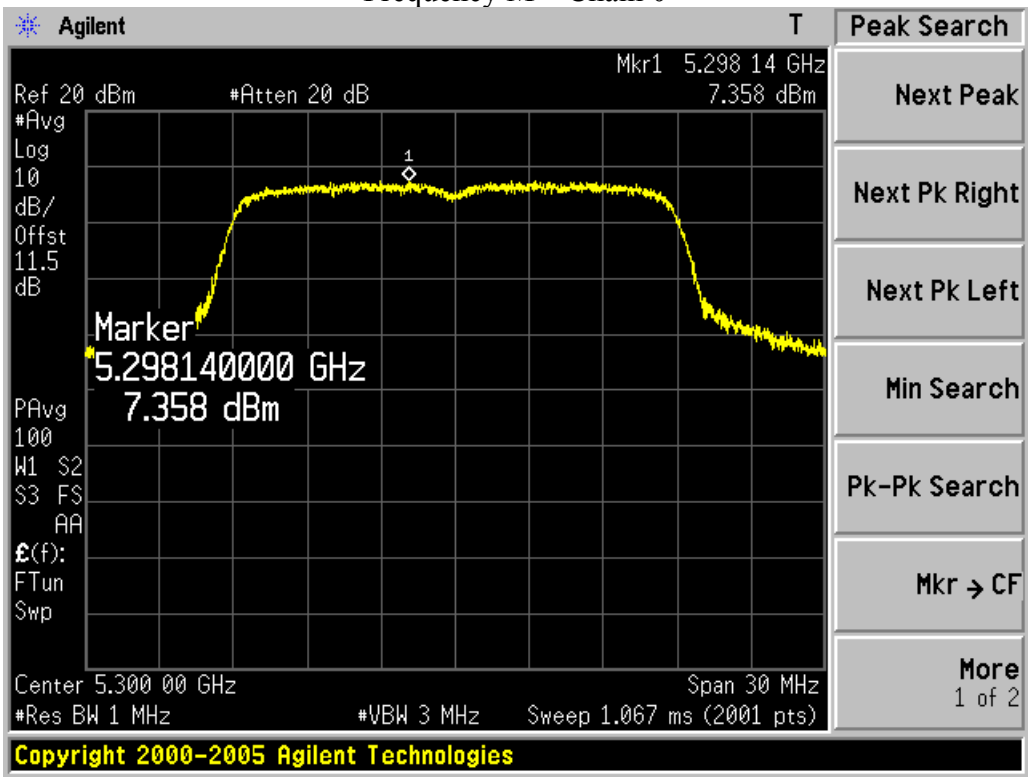


802.11n20

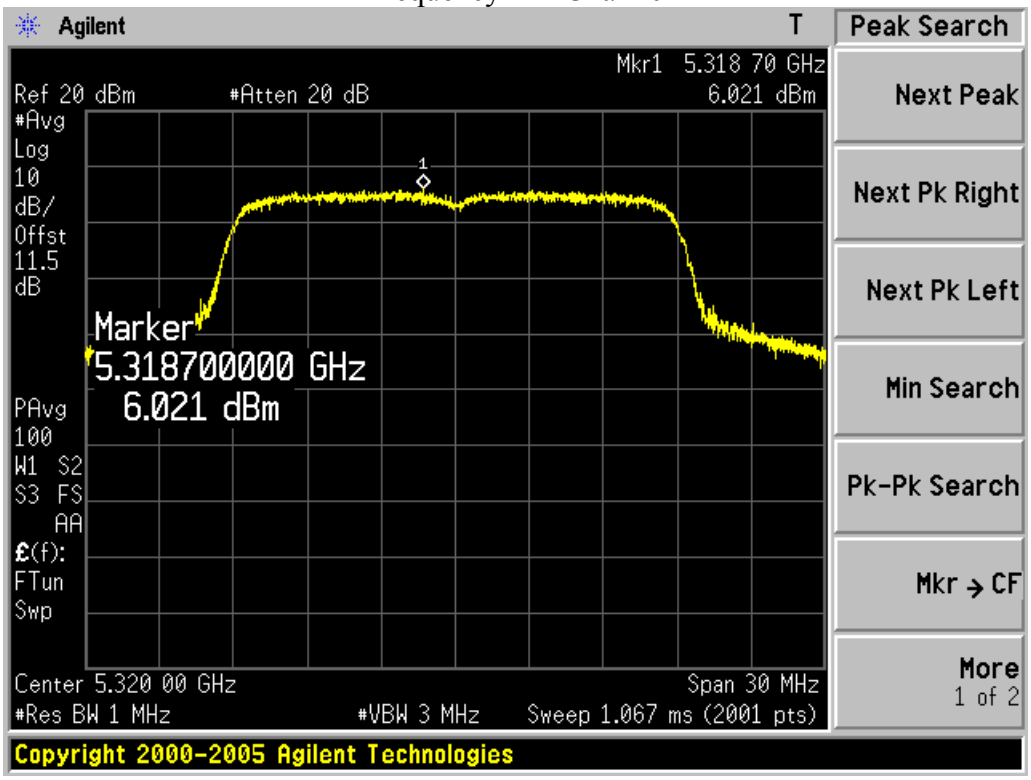
Frequency L – Chain 0



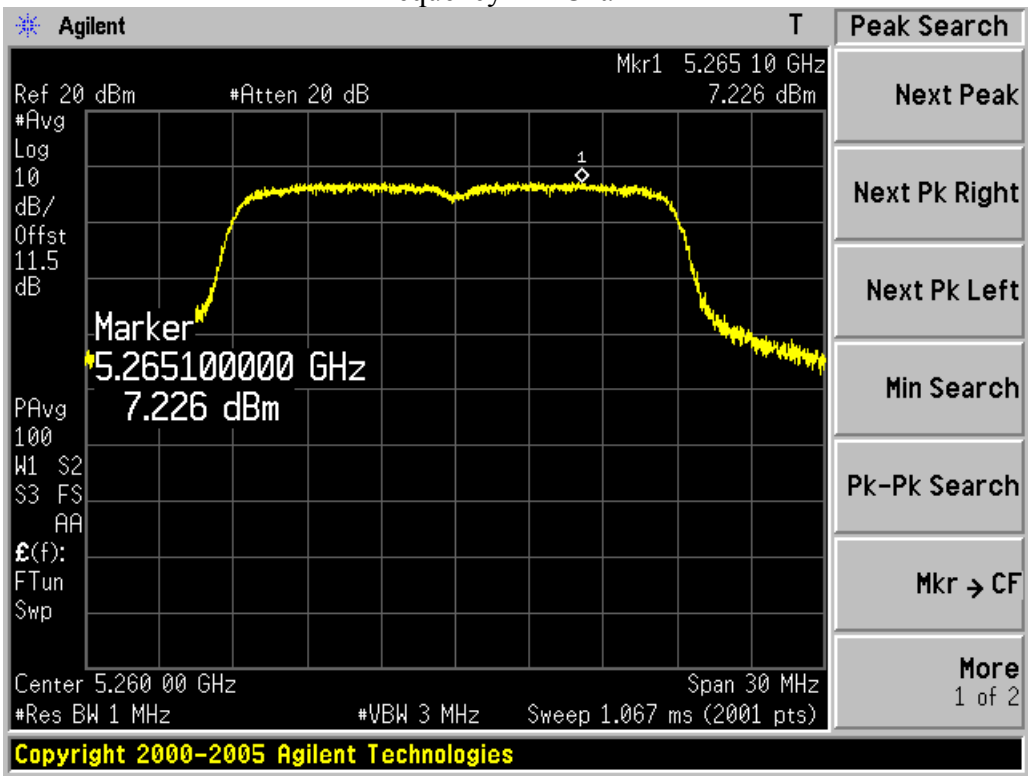
Frequency M – Chain 0



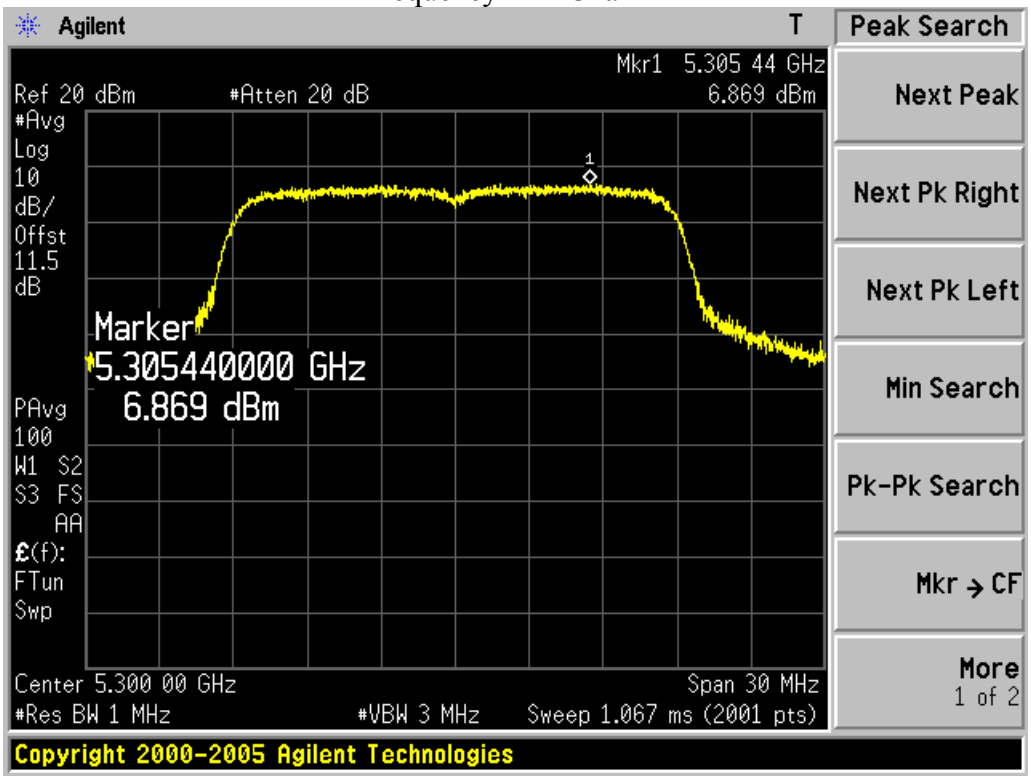
Frequency H – Chain 0



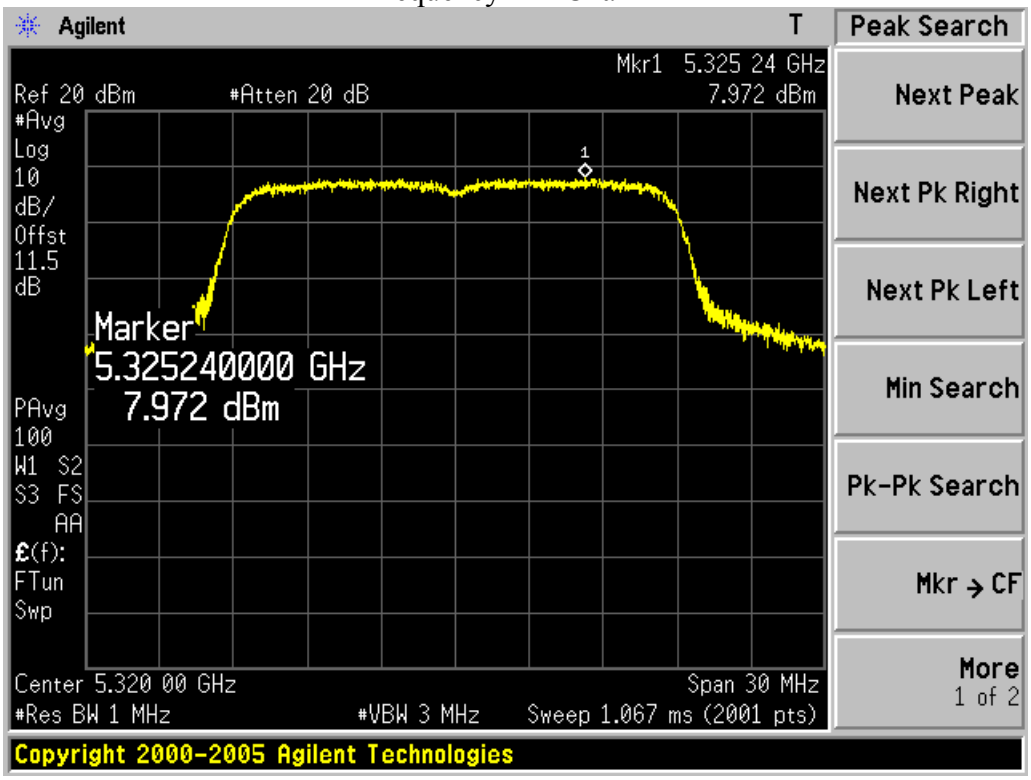
Frequency L – Chain 1



Frequency M – Chain 1

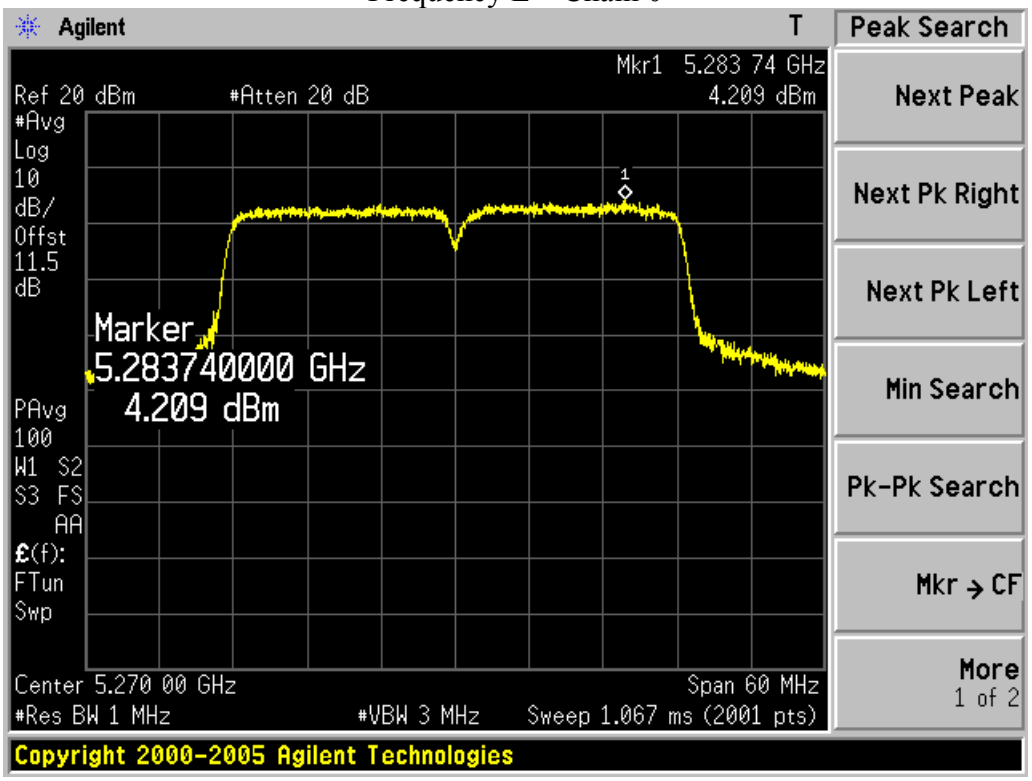


Frequency H – Chain 1

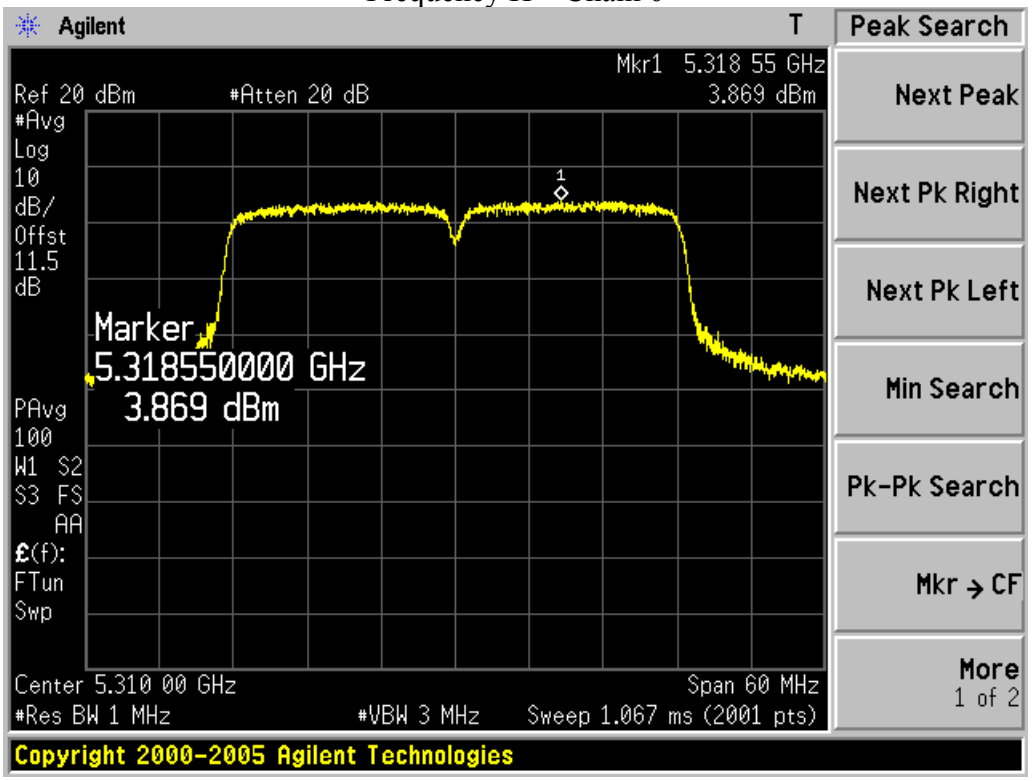


802.11n40

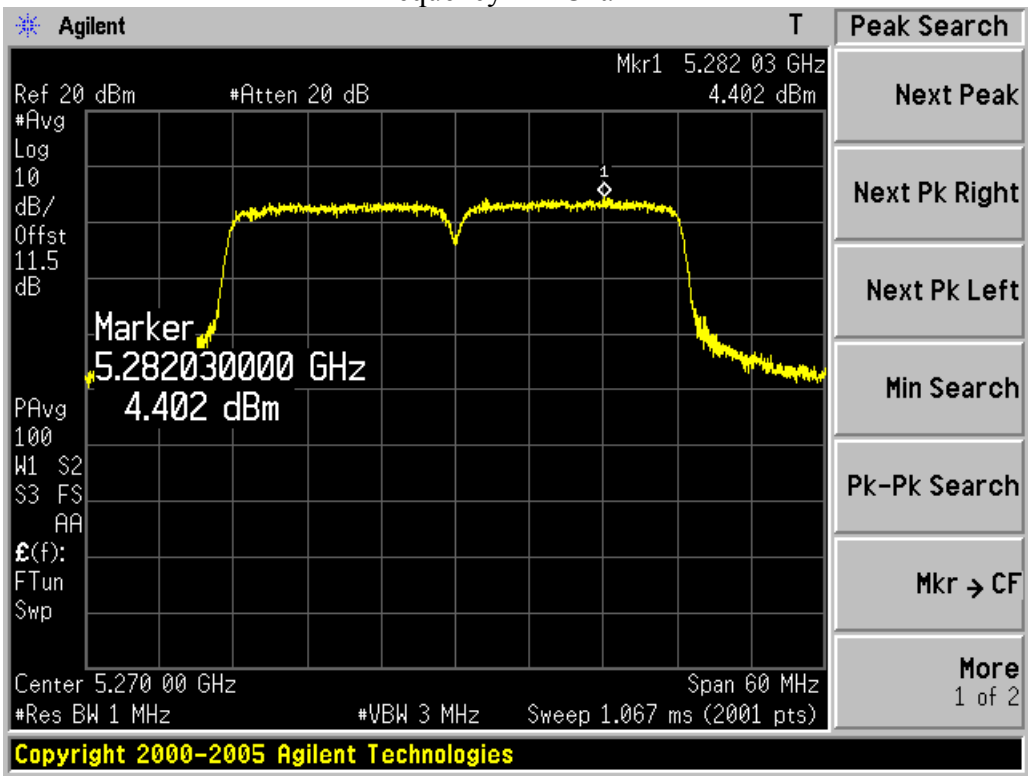
Frequency L – Chain 0



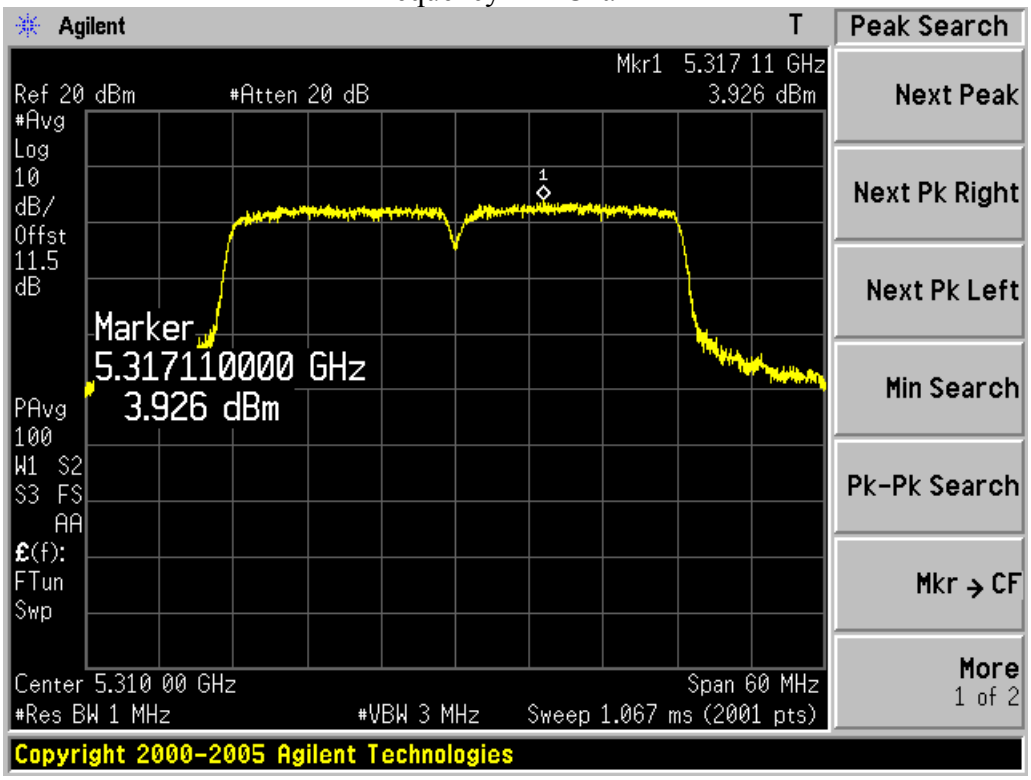
Frequency H – Chain 0



Frequency L – Chain 1



Frequency H – Chain 1



U-NII-2C Band:

Mode	Frequency (MHz)	Chosen limit (dBm)	Antenna value (dBi)	Final limit (dBm)
802.11a	5500	11.00	6.70	10.30
	5600	11.00	6.70	10.30
	5720	11.00	6.70	10.30
802.11n20	5500	11.00	3.70	11.00
	5600	11.00	3.70	11.00
	5720	11.00	3.70	11.00
802.11n40	5510	11.00	3.70	11.00
	5590	11.00	3.70	11.00
	5710	11.00	3.70	11.00
Note: 1. Antenna value = Antenna gain + beamforming if applied; 2. For 802.11 a mode, the CDD Array Gain= 3.0dBi; 3. Final limit is calculated as Chosen limit – Antenna value exceeding 6dBi.				

Mode	Frequency (MHz)	PSD (dBm)		Duty Cycle factor (dB)	Total PSD (dBm/ MHz)	Limit (dBm/ MHz)	Margin (dB)
		Port 0	Port 1				
802.11a	5500	5.609	5.611	0.14	8.76	10.30	1.54
	5600	5.501	5.410	0.14	8.61	10.30	1.69
	5720	4.548	4.214	0.14	7.54	10.30	2.76
802.11n20	5500	4.822	4.859	0.29	8.14	11.00	2.86
	5600	4.340	4.347	0.29	7.65	11.00	3.35
	5720	4.022	3.574	0.29	7.11	11.00	3.89
802.11n40	5510	1.875	2.215	0.36	5.42	11.00	5.58
	5590	2.212	1.967	0.36	5.46	11.00	5.54
	5710	1.277	0.949	0.36	4.49	11.00	6.51

Test Plots as bellow:

802.11a

Frequency L – Chain 0

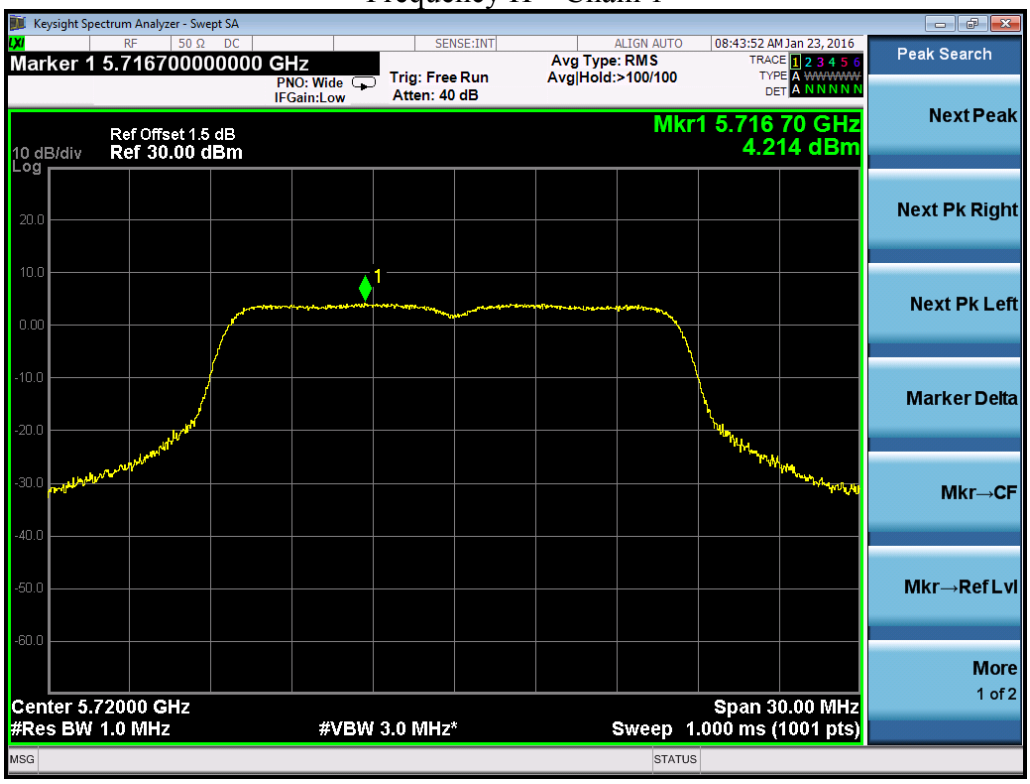
Frequency M – Chain 0

Frequency H – Chain 0

Frequency L – Chain 1

Frequency M – Chain 1

Frequency H – Chain 1



802.11n20

Frequency L – Chain 0

Frequency M – Chain 0

Frequency H – Chain 0

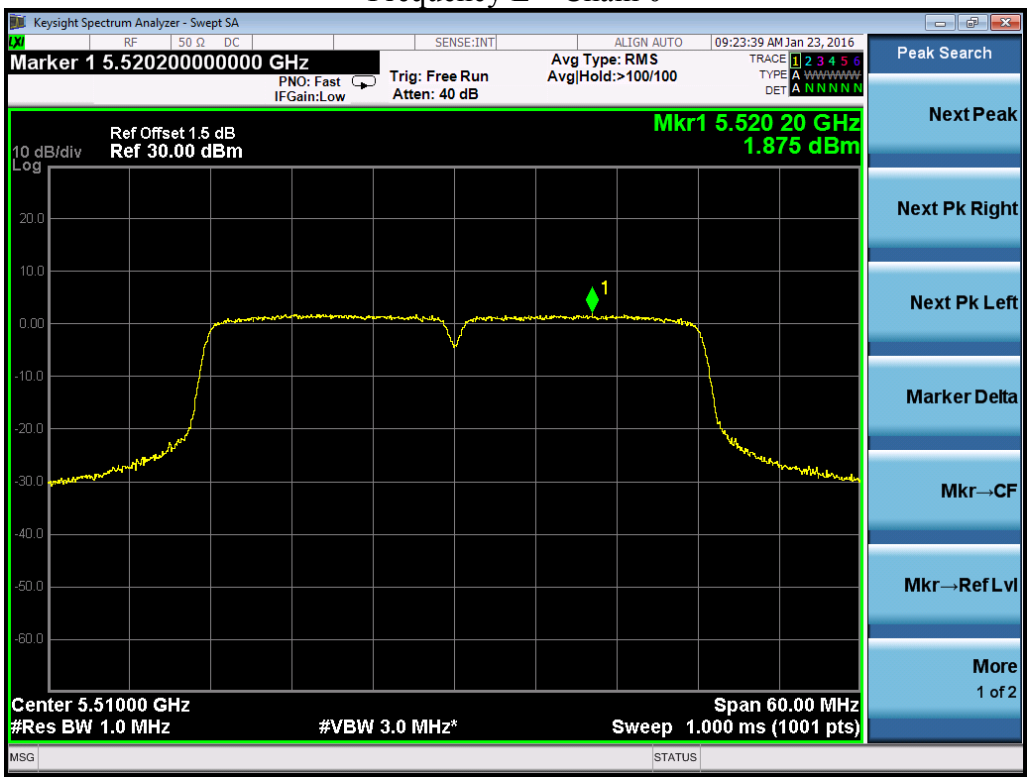
Frequency L – Chain 1

Frequency M – Chain 1

Frequency H – Chain 1

802.11n40

Frequency L – Chain 0



Frequency M – Chain 0

Frequency H – Chain 0

Frequency L – Chain 1

Frequency M – Chain 1

Frequency H – Chain 1

U-NII-3 Band:

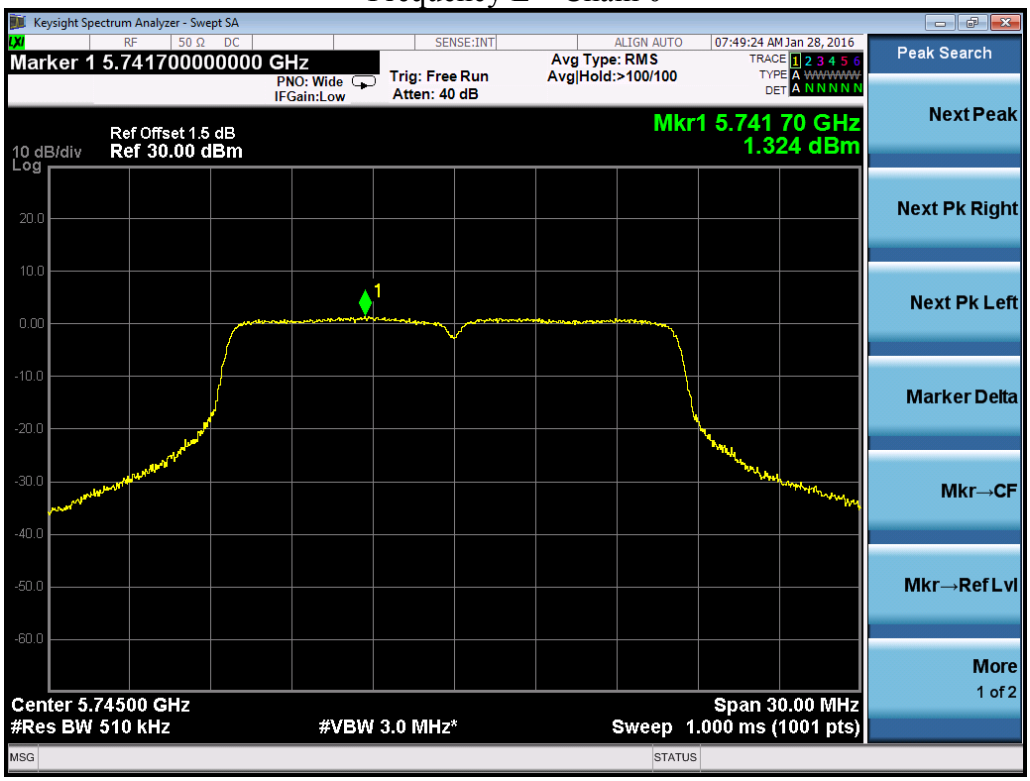
Mode	Frequency (MHz)	Chosen limit (dBm)	Antenna value (dBi)	Final limit (dBm)
802.11a	5745	30.00	6.70	29.30
	5785	30.00	6.70	29.30
	5825	30.00	6.70	29.30
802.11n20	5745	30.00	3.70	30.00
	5785	30.00	3.70	30.00
	5825	30.00	3.70	30.00
802.11n40	5755	30.00	3.70	30.00
	5795	30.00	3.70	30.00
Note: 1. Antenna value = Antenna gain + beamforming if applied; 2. For 802.11 a mode, the CDD Array Gain= 3.0dBi; 3. Final limit is calculated as Chosen limit – Antenna value exceeding 6dBi.				

Mode	Frequency (MHz)	PSD (dBm)		Duty Cycle factor (dB)	Total PSD (dBm/ MHz)	Limit (dBm/ MHz)	Margin (dB)
		Port 0	Port 1				
802.11a	5745	1.324	0.873	0.14	4.26	29.30	25.04
	5785	1.666	1.449	0.14	4.71	29.30	24.59
	5825	2.249	1.675	0.14	5.13	29.30	24.17
802.11n20	5745	1.251	0.463	0.29	4.18	30.00	25.82
	5785	1.412	1.128	0.29	4.57	30.00	25.43
	5825	1.465	1.316	0.29	4.69	30.00	25.31
802.11n40	5755	-1.472	-2.043	0.36	1.62	30.00	28.38
	5795	-1.453	-1.796	0.36	1.75	30.00	28.25

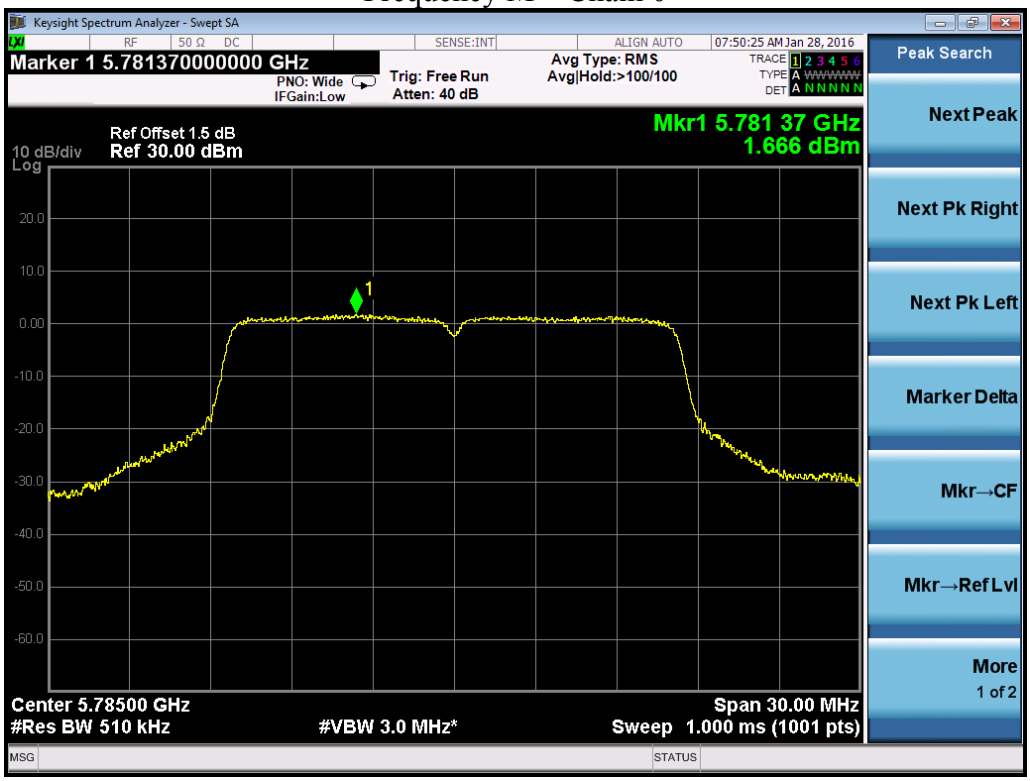
Test Plots as bellow:

802.11a

Frequency L – Chain 0

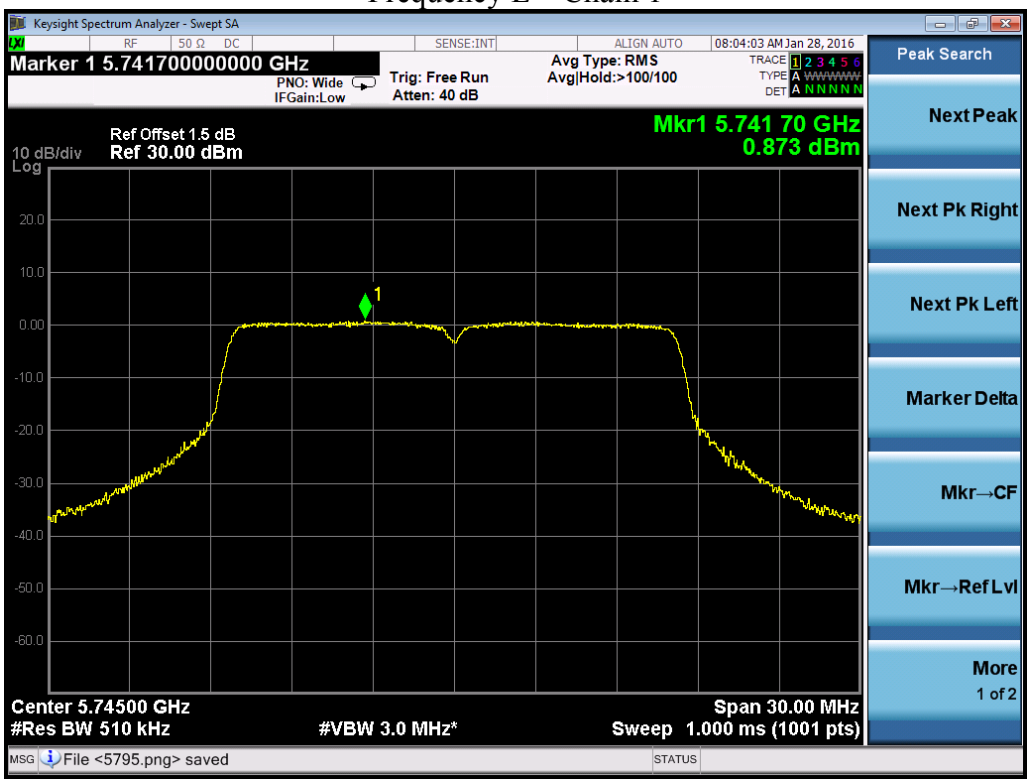


Frequency M – Chain 0

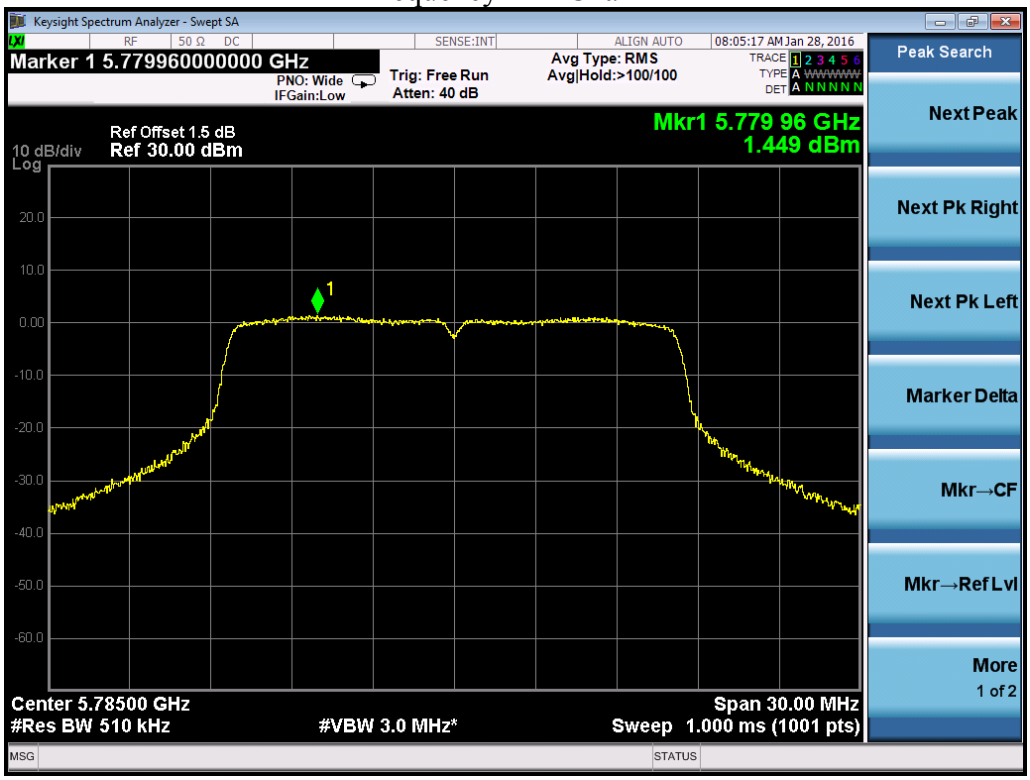


Frequency H – Chain 0

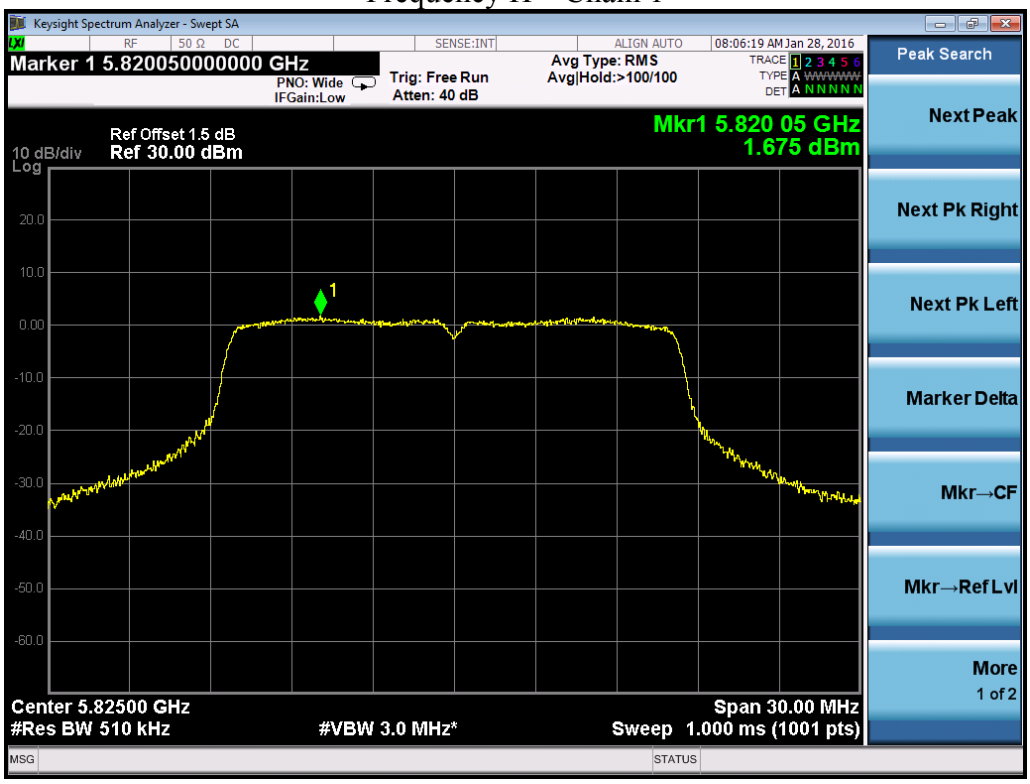
Frequency L – Chain 1



Frequency M – Chain 1

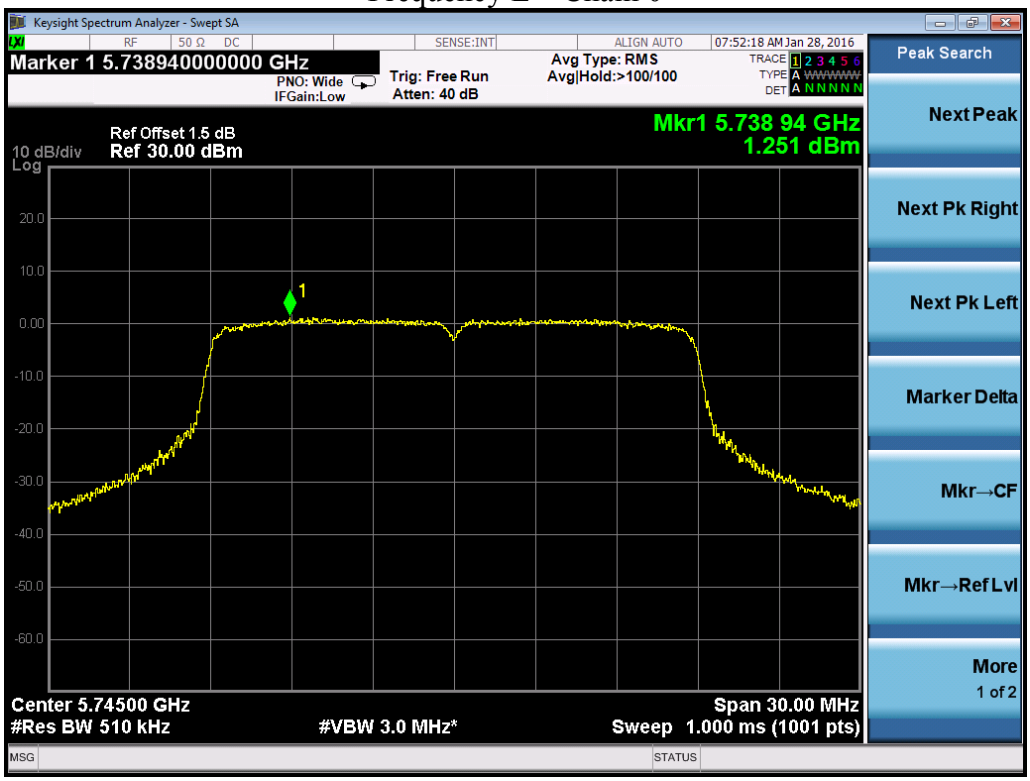


Frequency H – Chain 1

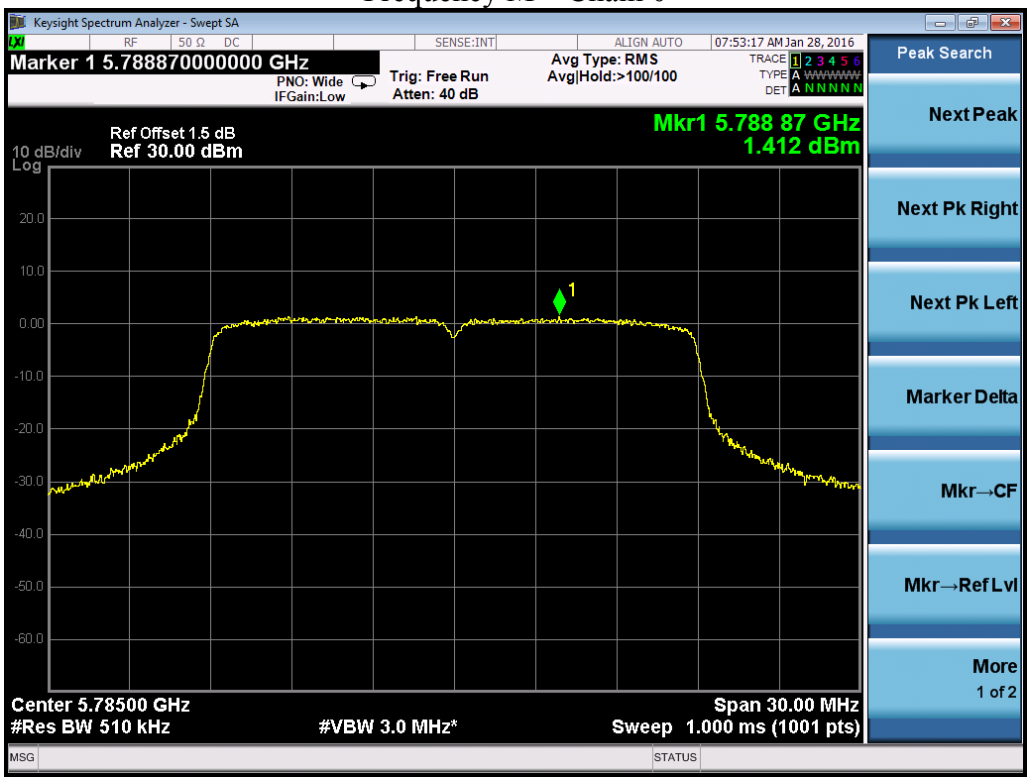


802.11n20

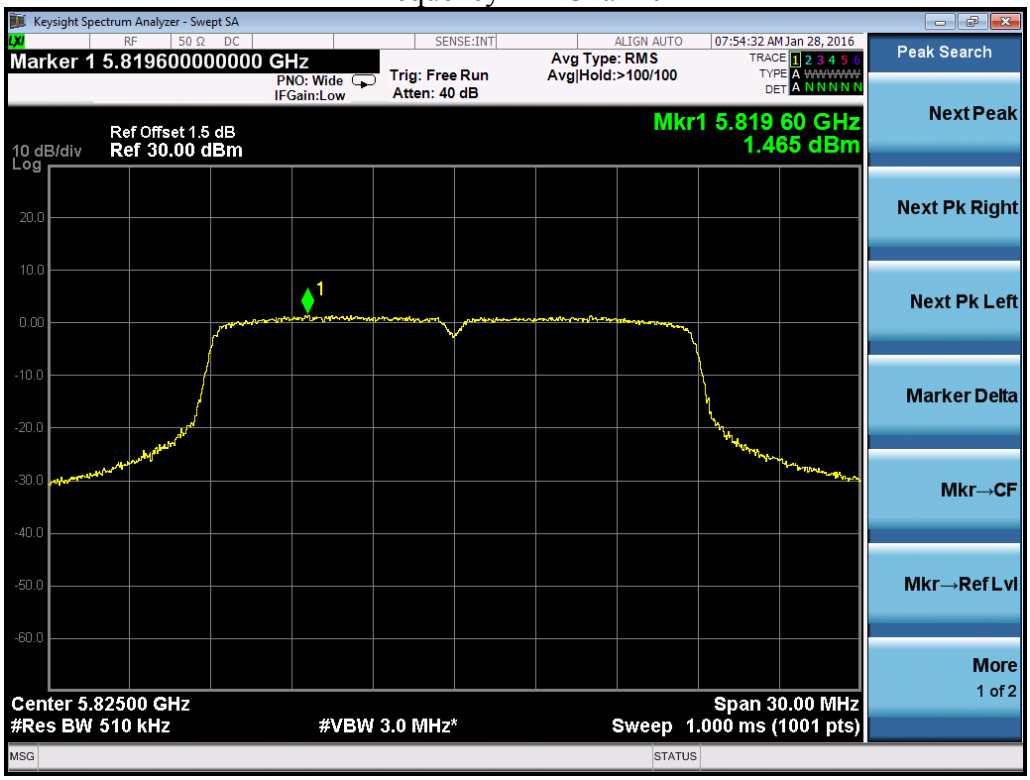
Frequency L – Chain 0



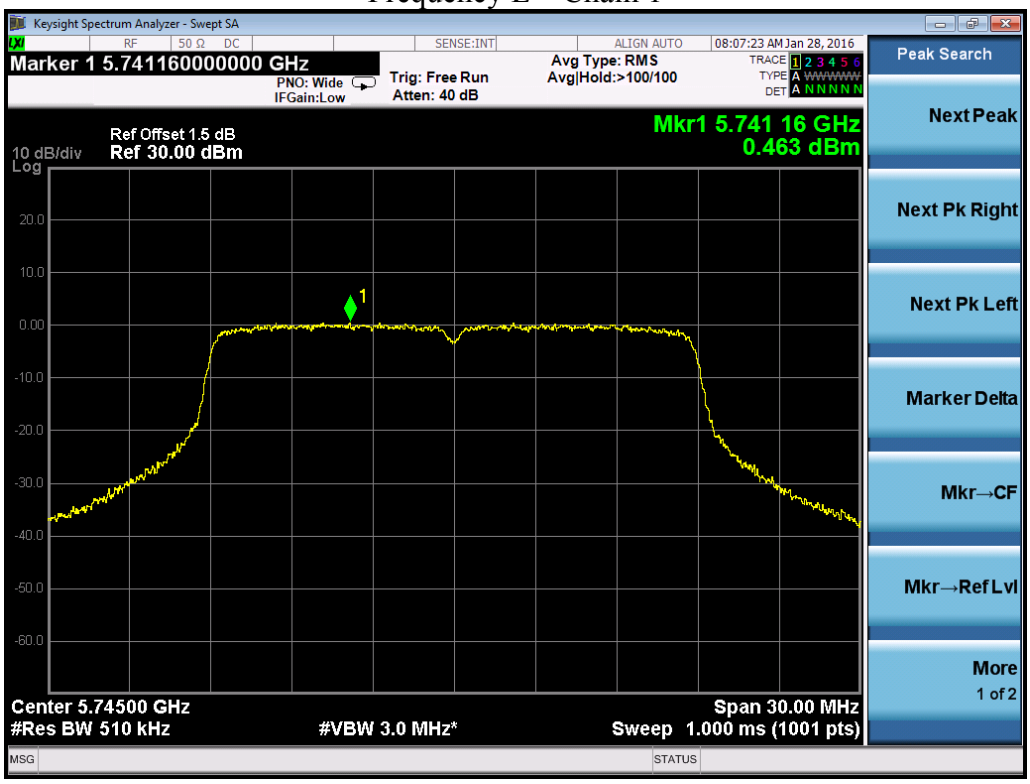
Frequency M – Chain 0



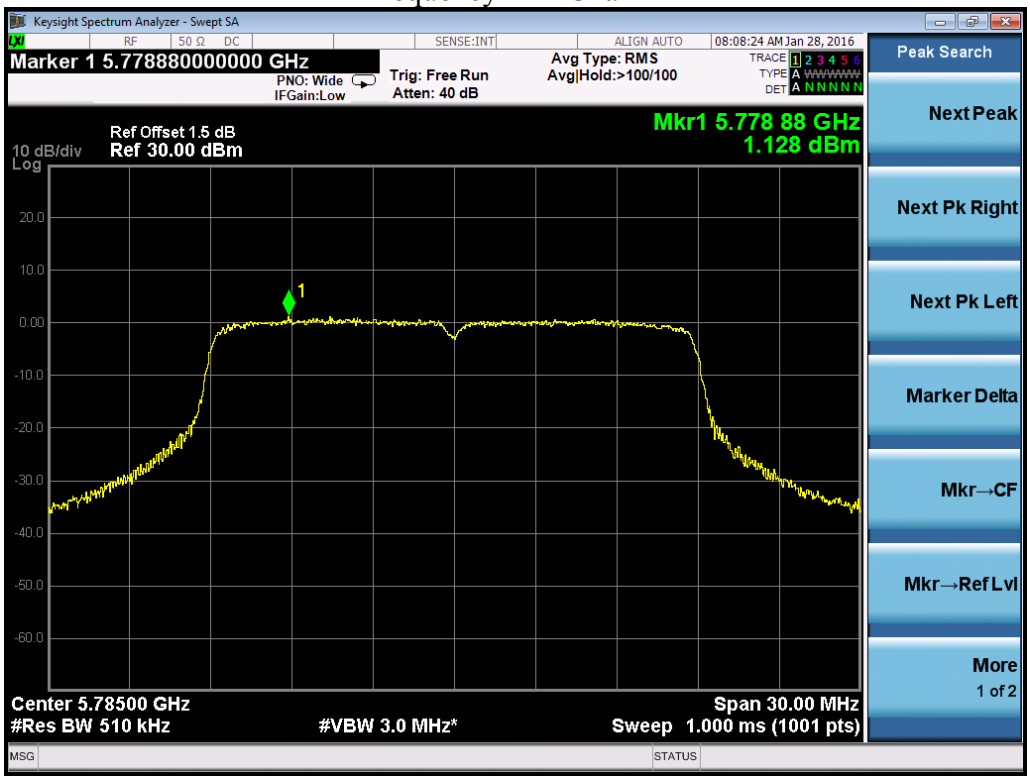
Frequency H – Chain 0



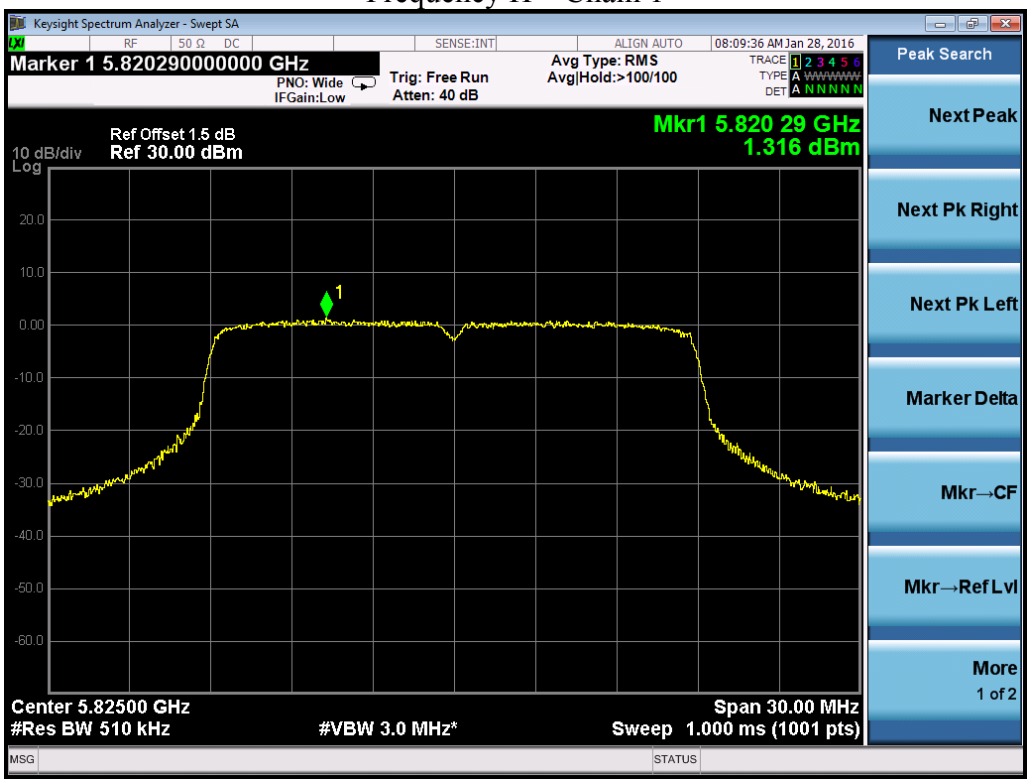
Frequency L – Chain 1



Frequency M – Chain 1

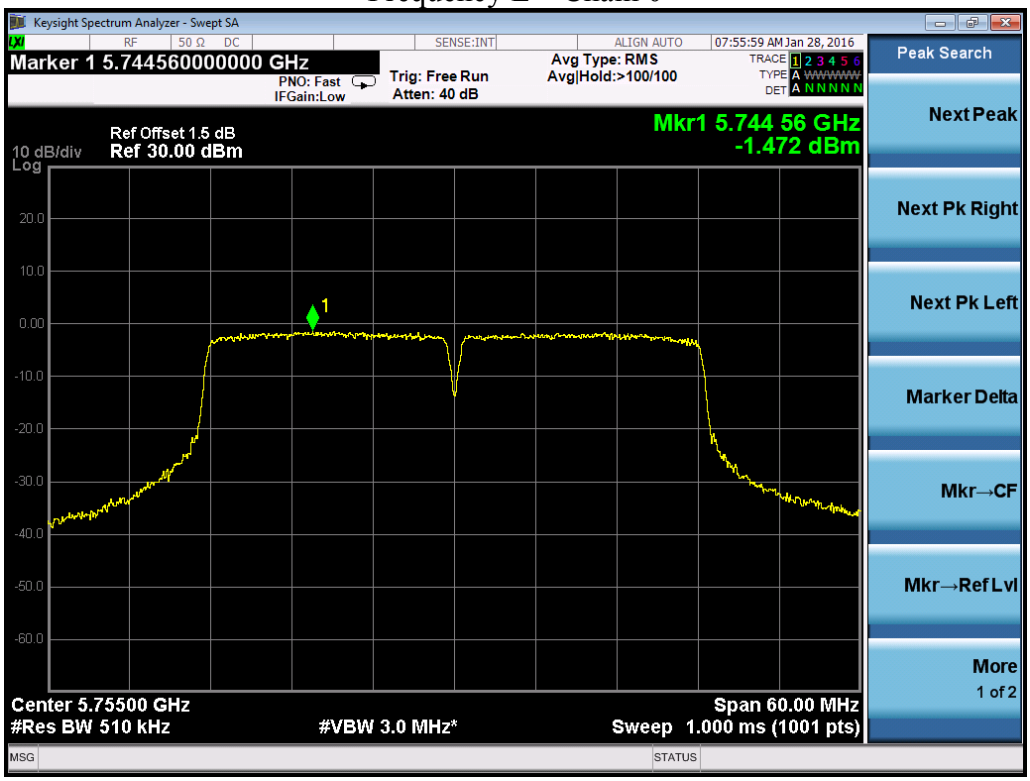


Frequency H – Chain 1



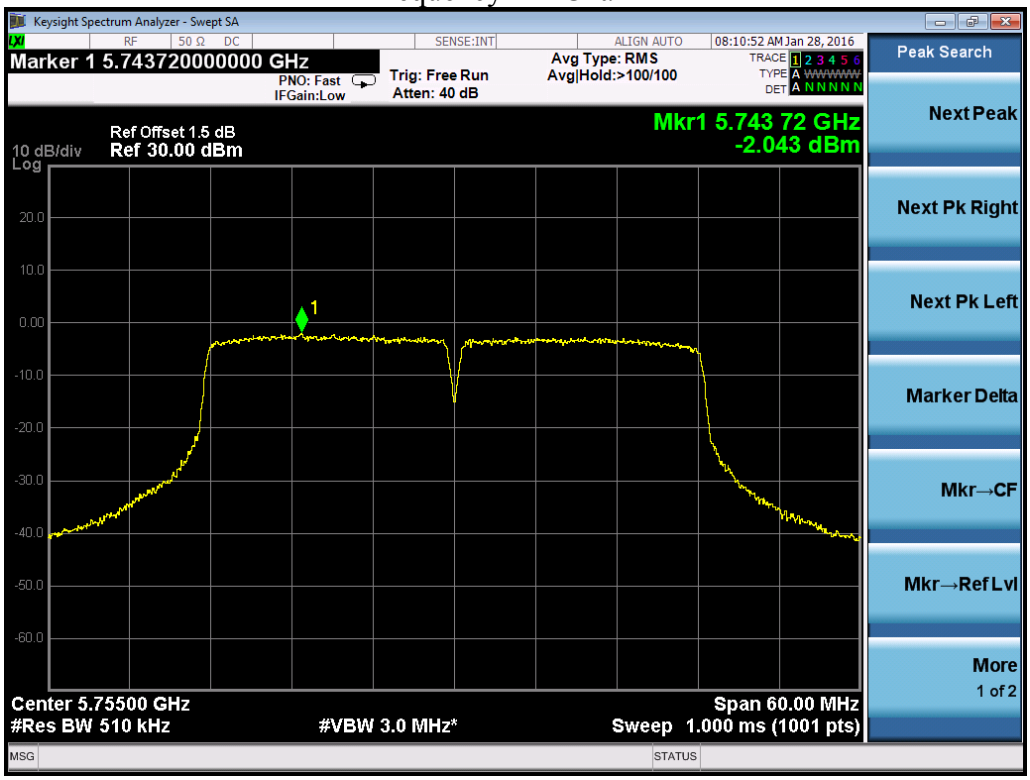
802.11n40

Frequency L – Chain 0

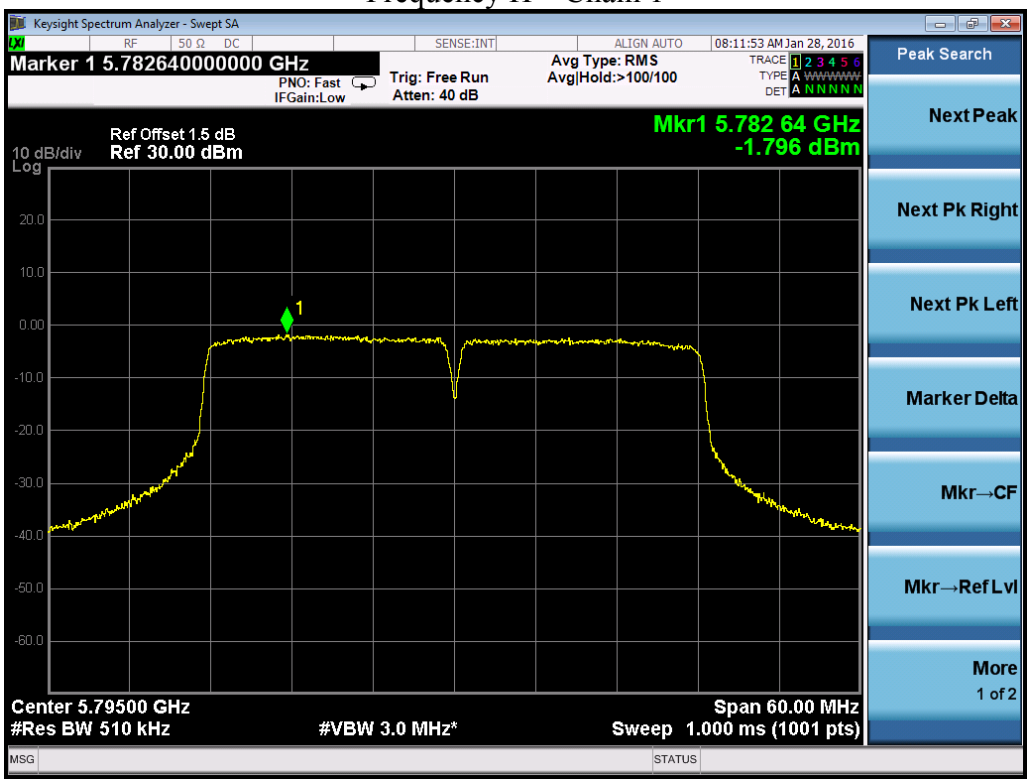


Frequency H – Chain 0

Frequency L – Chain 1



Frequency H – Chain 1



7. Radiated emission

Test result: PASS

7.1 Test limit

7.1.1 The radiated emissions below 1GHz or fall in the restricted bands, as defined in § 15.205(a), must comply with the radiated emission limits specified in § 15.209(a) showed as below:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

7.1.2 The emission which is outside the restrict bands, should comply with the limit as below:

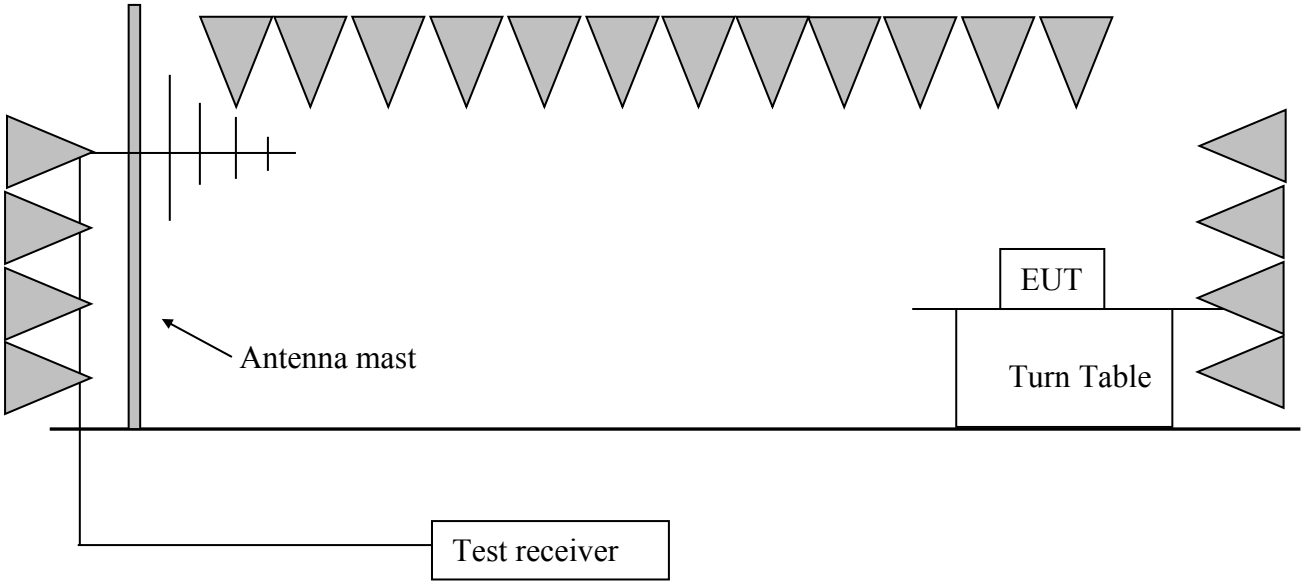
For transmitters operating in the 5.15–5.25 / 5.25 – 5.35 / 5.47 – 5.725 GHz band: all emissions outside of the 5.15 – 5.35 / 5.47 – 5.725 GHz band shall not exceed an EIRP of -27dBm/MHz.

EIRP Limit (dBm)	Equivalent Field Strength (3m) (dBμV/m)
-27	68.20

For transmitters operating in 5.725 – 5.85GHz band: emission among 5.715 – 5.725 GHz & 5.85 – 5.86 GHz shall not exceed the EIRP of -17 dBm/MHz, all emissions outside the above band shall not exceed an EIRP of -27 dBm/MHz.

EIRP Limit (dBm)	Equivalent Field Strength (3m) (dBμV/m)
-27	68.20
-17	78.20

7.2 Test Configuration



7.3 Test procedure and test setup

Radiated emission measurements were performed from 30MHz to tenth harmonic or 40GHz. The EUT for testing is arranged on a turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

Testing settings (refer to KDB 789033 D02 v01 Section G)
Below 1GHz
1, Analyzer center frequency was set to the frequency of the radiated spurious emission.
2, Span=encompass the entire emission
3, RBW=120KHz
4, Detector=Quasi-Peak
5, Trace was allowed to stabilize

Peak Measurements above 1GHz
1, Analyzer center frequency was set to the frequency of the radiated spurious emission.
2, Span=encompass the entire emission
3, RBW=1MHz
4, VBW=3MHz
4, Detector= Peak (Max-hold)
5, Trace was allowed to stabilize

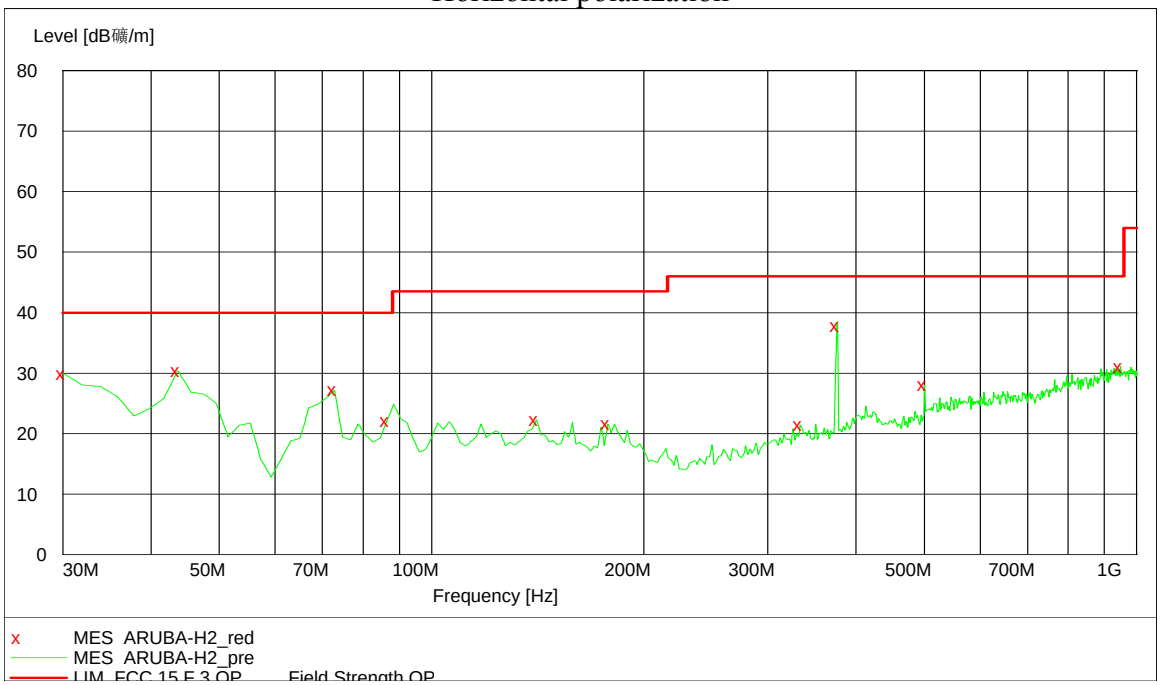
Average Measurements above 1GHz
1, Analyzer center frequency was set to the frequency of the radiated spurious emission.
2, Span=encompass the entire emission
3, RBW=1MHz
4, VBW=3MHz
4, Detector= RMS (Max-hold)
5, Trace was allowed to stabilize

7.4 Test protocol

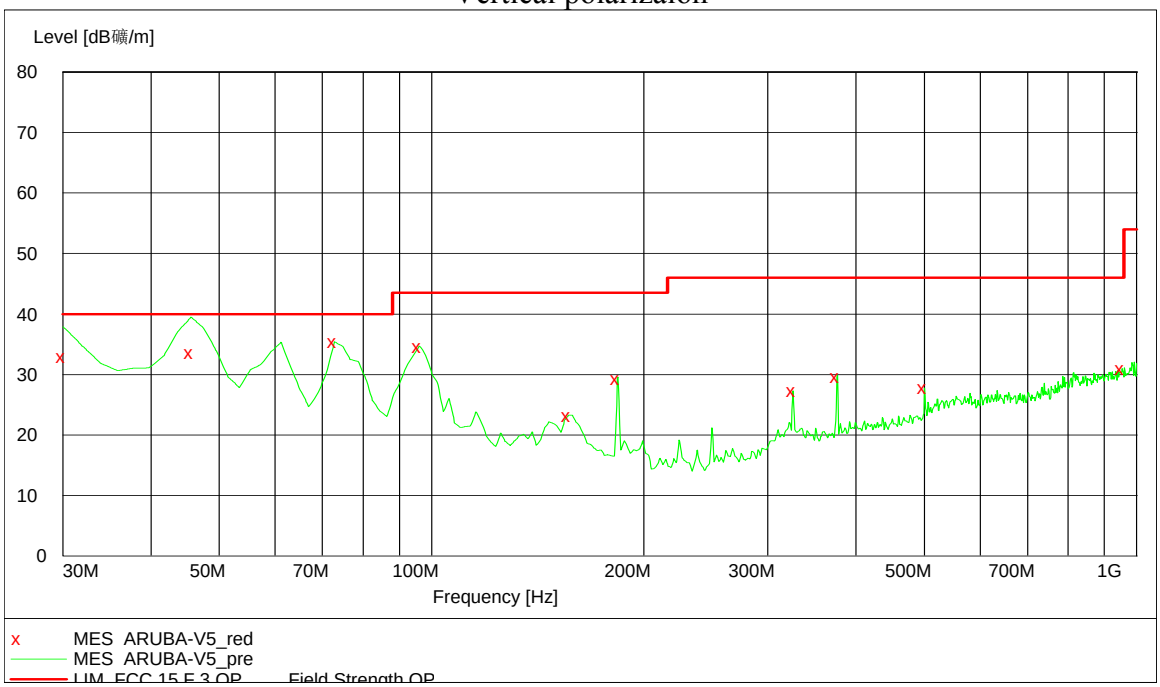
Temperature	:	25 °C
Relative Humidity	:	55 %

Test graph < 1GHz: (Worst case: POE Mode)

Horizontal polarization



Vertical polarizaion



Test data:

Polarization	Frequency (MHz)	Emission level (dBμV/m)	Limits (dBμV/m)	Margin (dBμV/m)	Detector
V	30.00	32.90	40.00	7.10	QP
	45.55	33.50	40.00	6.50	QP
	72.77	35.40	40.00	4.60	PK
	96.09	34.70	43.50	8.80	PK
	183.57	29.30	43.50	14.20	PK
	953.35	31.00	46.00	15.00	PK
H	30.00	29.90	40.00	10.10	PK
	43.61	30.40	40.00	9.60	PK
	72.77	27.20	40.00	12.80	PK
	86.37	22.10	40.00	17.90	PK
	376.01	37.80	46.00	8.20	PK
	949.46	31.10	46.00	14.90	PK

Test data >1GHz:

The emission was conducted from 1GHz to 25GHz.

U-NII-1 Band:

802.11a

Channel	Polarity	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H&V	5180	-2.71	116.75	Fundamental	/	PK
	H&V	5150	-2.77	51.55	74.00	22.45	PK
	H&V	10360	5.98	59.57	74.00	14.43	PK
	H&V	10360	5.98	44.91	54.00	9.09	AV
M	H&V	5200	-2.67	116.26	Fundamental	/	PK
	H&V	10400	6.09	59.50	74.00	14.50	PK
	H&V	10400	6.09	44.60	54.00	9.40	AV
H	H&V	5240	-2.60	115.14	Fundamental	/	PK
	H&V	10480	6.30	57.55	74.00	16.45	PK
	H&V	10480	6.30	44.46	54.00	9.54	AV

802.11n20

Channel	Polarity	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H&V	5180	-2.71	116.34	Fundamental	/	PK
	H&V	5150	-2.77	53.24	74.00	20.76	PK
	H&V	10360	5.98	61.85	74.00	12.15	PK
	H&V	10360	5.98	47.65	54.00	6.35	AV
M	H&V	5200	-2.67	115.22	Fundamental	/	PK
	H&V	10400	6.09	61.24	74.00	12.76	PK
	H&V	10400	6.09	46.31	54.00	7.69	AV
H	H&V	5240	-2.60	110.42	Fundamental	/	PK
	H&V	10480	6.30	57.55	74.00	16.45	PK
	H&V	10480	6.30	43.15	54.00	10.85	AV

802.11n40

Channel	Polarity	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H&V	5190	-2.69	115.23	Fundamental	/	PK
	H&V	5150	-2.77	53.32	74.00	20.68	PK
	H&V	10380	6.03	58.25	74.00	15.75	PK
	H&V	10380	6.03	45.65	54.00	8.35	AV
H	H&V	5230	-2.62	114.64	Fundamental	/	PK
	H&V	10460	6.25	60.26	74.00	13.74	PK
	H&V	10460	6.25	46.44	54.00	7.56	AV

U-NII-2A Band:

802.11a

Channel	Polarity	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H&V	5260	-2.56	116.55	Fundamental	/	PK
	H&V	10520	6.35	59.58	74.00	14.42	PK
	H&V	10520	6.35	43.95	54.00	10.05	AV
M	H&V	5300	-2.48	116.87	Fundamental	/	PK
	H&V	10600	6.37	59.26	74.00	14.74	PK
	H&V	10600	6.37	43.36	54.00	10.64	AV
H	H&V	5320	-2.45	117.25	Fundamental	/	PK
	H&V	5350	-2.39	61.88	74.00	12.12	PK
	H&V	5350	-2.39	47.50	54.00	6.50	AV
	H&V	10640	6.37	58.21	74.00	15.79	PK
	H&V	10640	6.37	43.12	54.00	10.88	AV

802.11n20

Channel	Polarity	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H&V	5260	-2.56	117.31	Fundamental	/	PK
	H&V	10520	6.35	58.58	74.00	15.42	PK
	H&V	10520	6.35	43.28	54.00	10.72	AV
M	H&V	5300	-2.48	117.42	Fundamental	/	PK
	H&V	10600	6.37	59.02	74.00	14.98	PK
	H&V	10600	6.37	44.01	54.00	9.99	AV
H	H&V	5320	-2.45	117.32	Fundamental	/	PK
	H&V	5350	-2.39	59.89	74.00	14.11	PK
	H&V	5350	-2.39	49.89	54.00	4.11	AV
	H&V	10640	6.37	57.68	74.00	16.32	PK
	H&V	10640	6.37	42.85	54.00	11.15	AV

802.11n40

Channel	Polarity	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H&V	5270	-2.54	115.73	Fundamental	/	PK
	H&V	10540	6.36	58.23	74.00	15.77	PK
	H&V	10540	6.36	42.86	54.00	11.14	AV
H	H&V	5310	-2.46	116.26	Fundamental	/	PK
	H&V	5350	-2.39	61.55	74.00	12.45	PK
	H&V	5350	-2.39	51.30	54.00	2.70	AV
	H&V	10620	6.37	57.66	74.00	16.34	PK
	H&V	10620	6.37	42.14	54.00	11.86	AV

U-NII-2C Band:

802.11a

Channel	Polarity	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H&V	5500	-2.11	116.26	Fundamental	/	PK
	H&V	5470	-2.18	51.25	68.20	16.95	PK
	H&V	11000	6.43	57.63	74.00	16.37	PK
	H&V	11000	6.43	42.14	54.00	11.86	AV
M	H&V	5600	-1.97	117.63	Fundamental	/	PK
	H&V	11200	7.33	57.48	74.00	16.52	PK
	H&V	11200	7.33	44.62	54.00	9.38	AV
H	H&V	5720	-1.75	116.39	Fundamental	/	PK
	H&V	11440	7.21	59.44	74.00	14.56	PK
	H&V	11440	7.21	46.77	54.00	7.23	AV

802.11n20

Channel	Polarity	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H&V	5500	-2.11	115.26	Fundamental	/	PK
	H&V	5470	-2.18	52.33	68.20	15.87	PK
	H&V	11000	6.43	57.68	74.00	16.32	PK
	H&V	11000	6.43	42.14	54.00	11.86	AV
M	H&V	5600	-1.97	115.53	Fundamental	/	PK
	H&V	11200	7.33	57.52	74.00	16.48	PK
	H&V	11200	7.33	43.65	54.00	10.35	AV
H	H&V	5720	-1.75	116.36	Fundamental	/	PK
	H&V	11440	7.21	58.84	74.00	15.16	PK
	H&V	11440	7.21	44.58	54.00	9.42	AV

802.11n40

Channel	Polarity	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H&V	5510	-2.09	113.25	Fundamental	/	PK
	H&V	5470	-2.18	50.29	68.20	17.91	PK
	H&V	11020	6.47	58.71	74.00	15.29	PK
	H&V	11020	6.47	43.25	54.00	10.75	AV
M	H&V	5590	-2.02	114.52	Fundamental	/	PK
	H&V	11180	6.63	58.73	74.00	15.27	PK
	H&V	11180	6.63	43.44	54.00	10.56	AV
H	H&V	5710	-1.81	115.37	Fundamental	/	PK
	H&V	11420	7.09	58.23	74.00	15.77	PK
	H&V	11420	7.09	43.52	54.00	10.48	AV

U-NII-3 Band:
802.11a

Channel	Polarity	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H&V	5745	-1.67	117.75	Fundamental	/	PK
	H&V	5715	-1.67	64.45	68.20	3.75	PK
	H&V	5715	-1.67	49.56	54.00	4.44	AV
	H&V	11490	7.38	57.60	74.00	16.40	PK
	H&V	11490	7.38	42.50	54.00	11.50	AV
M	H&V	5785	-1.60	116.44	Fundamental	/	PK
	H&V	11570	7.35	57.10	74.00	16.90	PK
	H&V	11570	7.35	42.30	54.00	11.70	AV
H	H&V	5825	-1.54	118.15	Fundamental	/	PK
	H&V	5860	-1.54	52.45	68.20	15.75	PK
	H&V	11650	7.29	57.40	74.00	16.60	PK
	H&V	11650	7.29	42.30	54.00	11.70	AV

802.11n20

Channel	Polarity	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H&V	5745	-1.67	116.32	Fundamental	/	PK
	H&V	5715	-1.67	55.42	68.20	12.78	PK
	H&V	5715	-1.67	50.22	54.00	3.78	AV
	H&V	11490	7.38	57.40	74.00	16.60	PK
	H&V	11490	7.38	42.30	54.00	11.70	AV
M	H&V	5785	-1.60	116.48	Fundamental	/	PK
	H&V	11570	7.35	57.30	74.00	16.70	PK
	H&V	11570	7.35	42.40	54.00	11.60	AV
H	H&V	5825	-1.54	116.46	Fundamental	/	PK
	H&V	5860	-1.54	59.42	68.20	8.78	PK
	H&V	5860	-1.54	49.74	54.00	4.26	AV
	H&V	11650	7.29	57.25	74.00	16.75	PK
	H&V	11650	7.29	42.15	54.00	11.85	AV

802.11n40

Channel	Polarity	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H&V	5755	-1.66	115.67	Fundamental	/	PK
	H&V	5715	-1.67	57.36	68.20	10.84	PK
	H&V	5715	-1.67	47.27	54.00	6.73	AV
	H&V	11510	7.39	57.40	74.00	16.60	PK
	H&V	11510	7.39	42.50	54.00	11.50	AV
H	H&V	5795	-1.59	114.18	Fundamental	/	PK
	H&V	5860	-1.54	59.32	68.20	8.88	PK
	H&V	5860	-1.54	50.11	54.00	3.89	AV
	H&V	11590	7.33	57.40	74.00	16.60	PK
	H&V	11590	7.33	42.50	54.00	11.50	AV

Remark:
1. For fundamental & restrict emission test, no amplifier is employed.
2. Factor = Antenna Factor + Cable Loss (-Amplifier, is employed);
3. Measure level = Reading Level + Factor;
4. Over Limit = Measure level – limit;
5. If the PK reading is lower than AV limit, the AV test can be elided.

Example:

Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading level = 10dBuV.
Then Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Measure level = 10dBuV + 0.20dB/m = 10.20dBuV/m
Assuming limit = 54dBuV/m, Measure level = 10.20dBuV/m,
then Over Limit = 10.20 - 54= -43.80dBuV/m

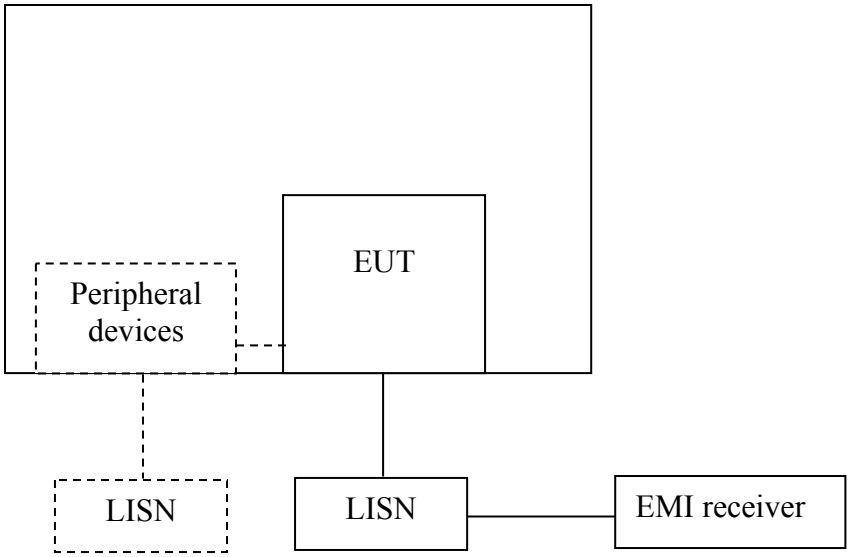
8. Power line conducted emission

Test result: **Pass**

8.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

8.2 Test configuration



☒ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

8.3 Test procedure and test set up

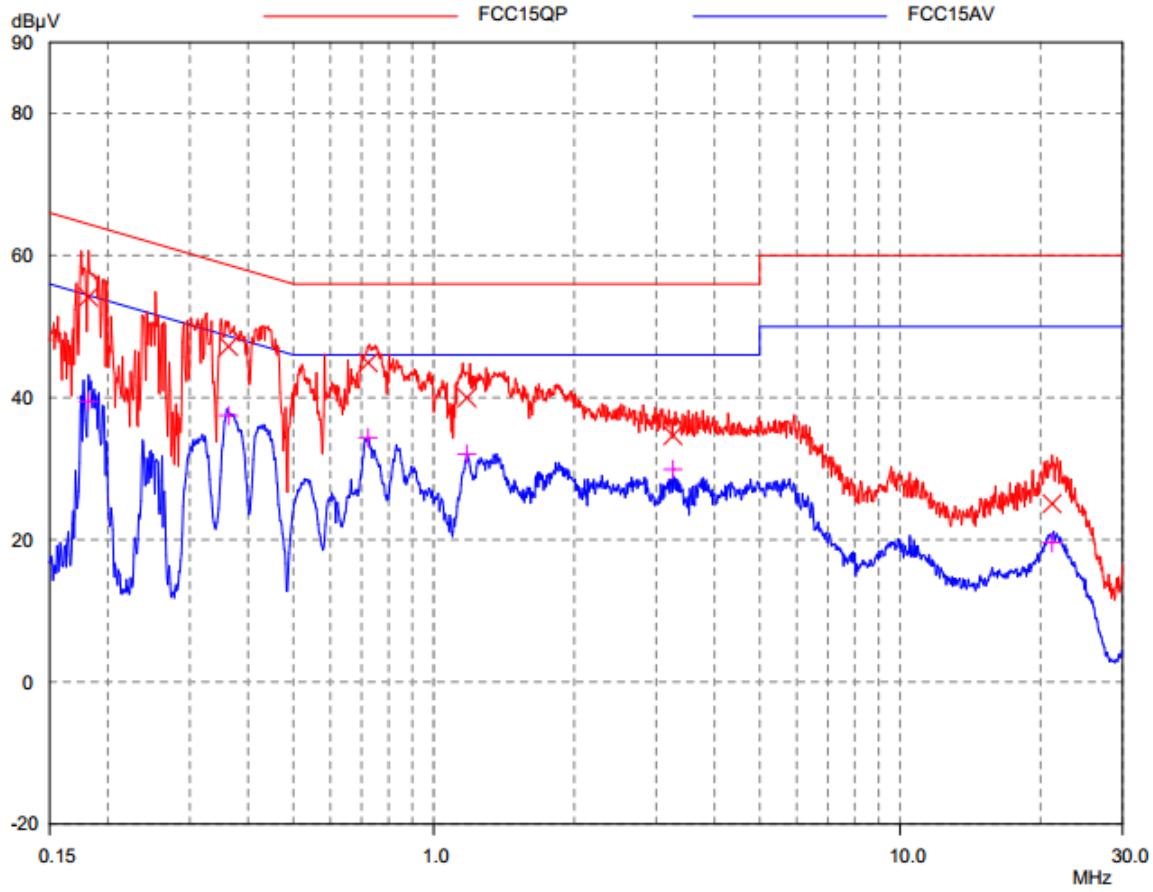
The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50Ω/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50Ω/50uH coupling impedance with 50Ω termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4 on conducted measurement.
The bandwidth of the test receiver is set at 9 kHz.

8.4 Test protocol

Temperature : 25 °C
Relative Humidity : 55 %

Supplied by AC-DC adaptor:

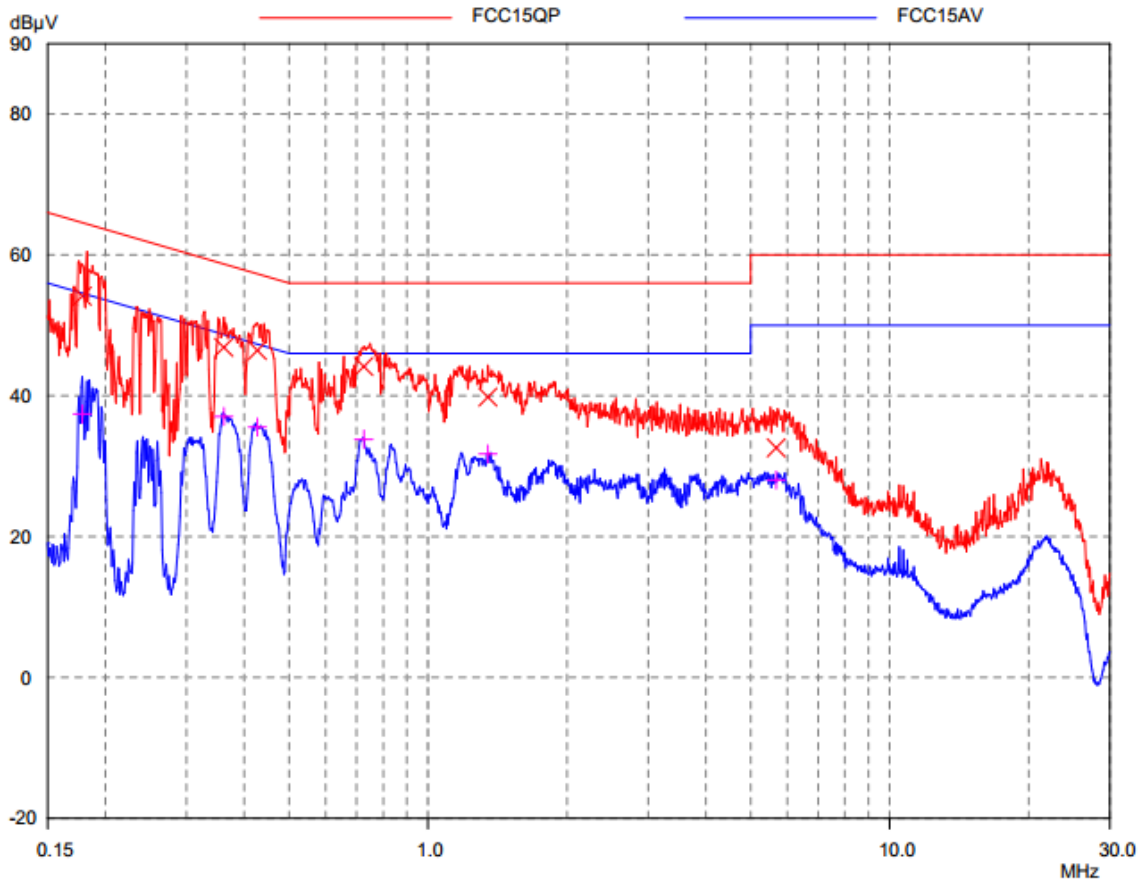
L Line



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(µV)	Limit dB(µV)	Margin (dB)	level dB(µV)	limit dB(µV)	Margin (dB)
0.182	54.17	64.41	10.24	39.50	54.41	14.91
0.362	47.23	58.67	11.44	37.48	48.67	11.19
0.723	44.92	56.00	11.08	34.35	46.00	11.65
1.177	39.99	56.00	16.01	32.05	46.00	13.95
3.257	34.68	56.00	21.32	29.89	46.00	16.11
21.178	25.08	60.00	34.92	19.61	50.00	30.39

N Line

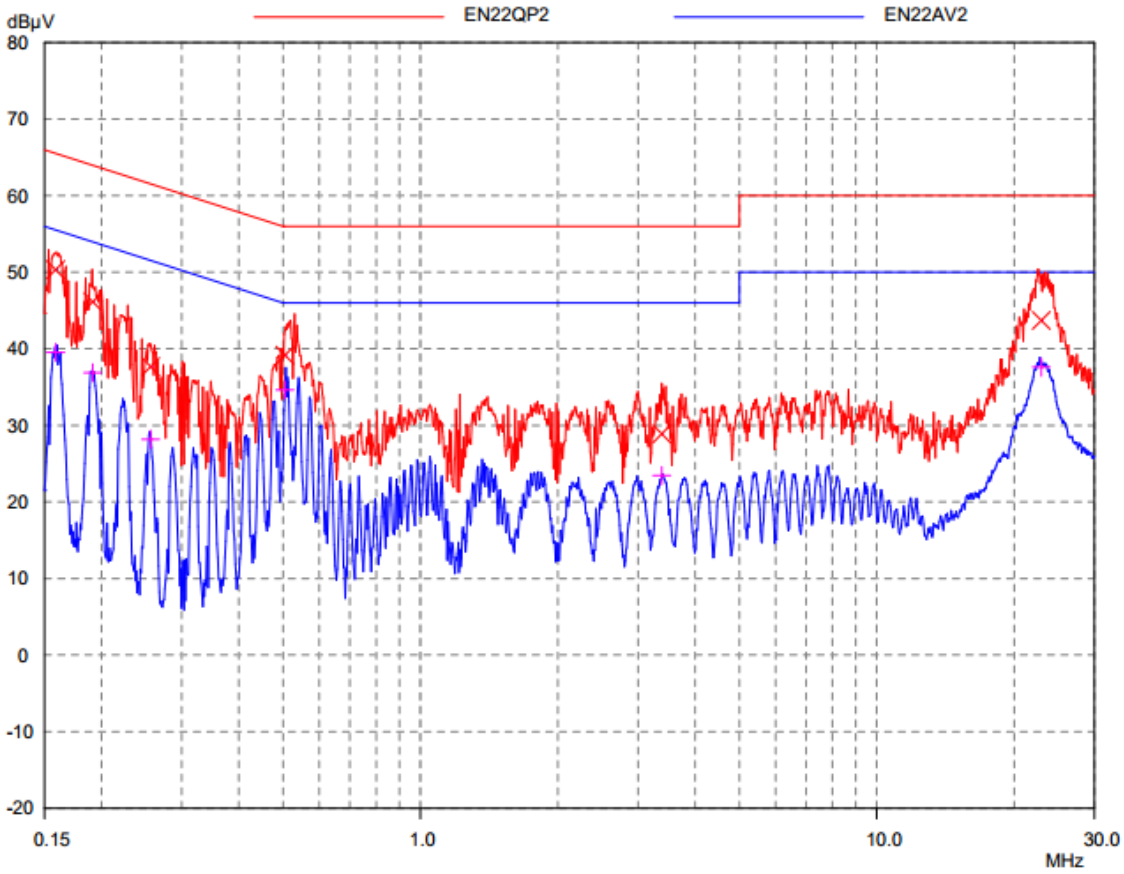


Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(µV)	Limit dB(µV)	Margin (dB)	level dB(µV)	limit dB(µV)	Margin (dB)
0.178	54.16	64.57	10.41	37.40	54.57	17.17
0.361	46.87	58.71	11.84	37.05	48.71	11.66
0.427	46.44	57.31	10.87	35.55	47.31	11.76
0.726	44.14	56.00	11.86	33.81	46.00	12.19
1.348	39.81	56.00	16.19	31.74	46.00	14.26
5.672	32.60	60.00	27.40	28.04	50.00	21.96

Supplied by POE adaptor:

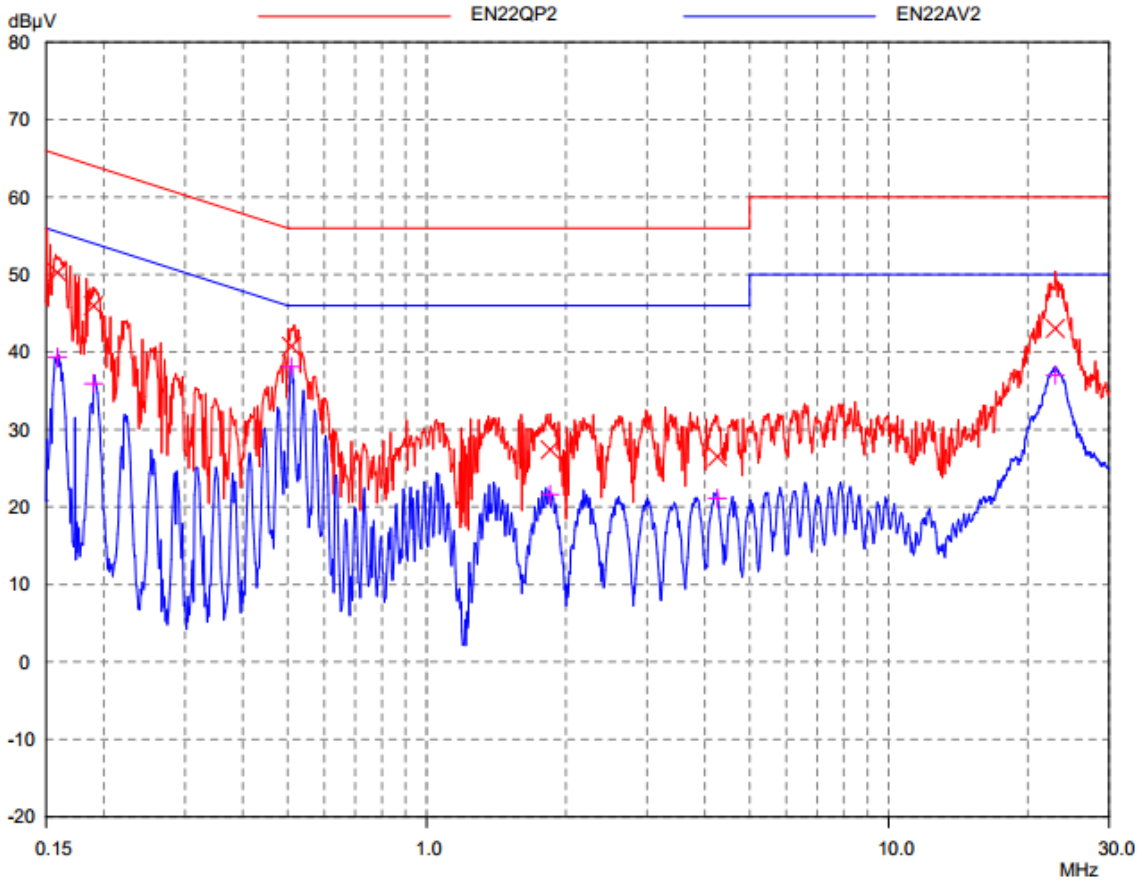
L Line



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(µV)	Limit dB(µV)	Margin (dB)	level dB(µV)	limit dB(µV)	Margin (dB)
0.159	50.33	65.54	15.21	39.55	55.54	15.99
0.191	46.13	63.98	17.85	36.88	53.98	17.10
0.256	37.66	61.56	23.90	28.19	51.56	23.37
0.505	39.16	56.00	16.84	34.62	46.00	11.38
3.376	28.89	56.00	27.11	23.43	46.00	22.57
22.939	43.71	60.00	16.29	37.60	50.00	12.40

N line

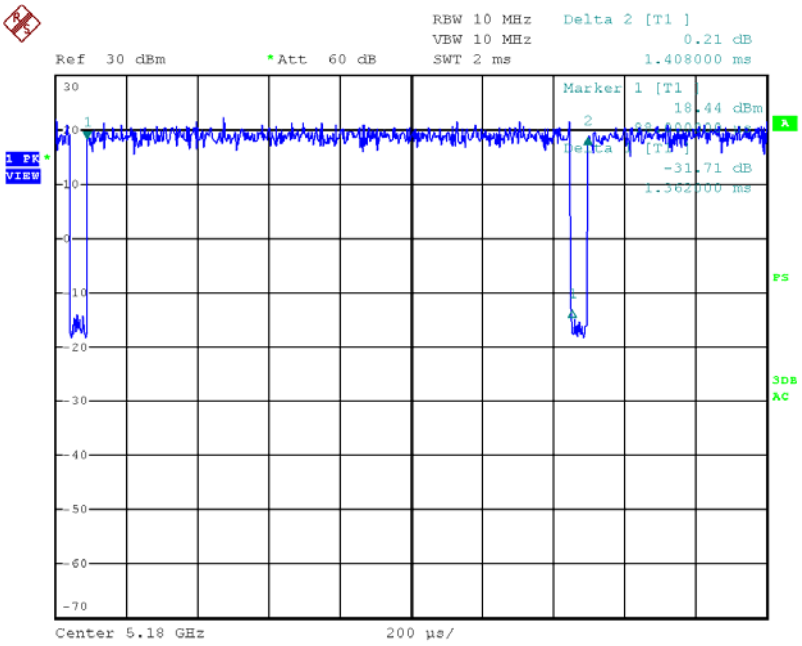


Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(µV)	Limit dB(µV)	Margin (dB)	level dB(µV)	limit dB(µV)	Margin (dB)
0.159	50.27	65.54	15.27	39.36	55.54	16.18
0.190	45.97	64.04	18.07	35.93	54.04	18.11
0.509	40.73	56.00	15.27	38.10	46.00	7.90
1.848	27.40	56.00	28.60	21.62	46.00	24.38
4.255	26.49	56.00	29.51	21.12	46.00	24.88
22.939	43.03	60.00	16.97	37.02	50.00	12.98

Appendix: Test Graph of Duty Cycle

802.11a



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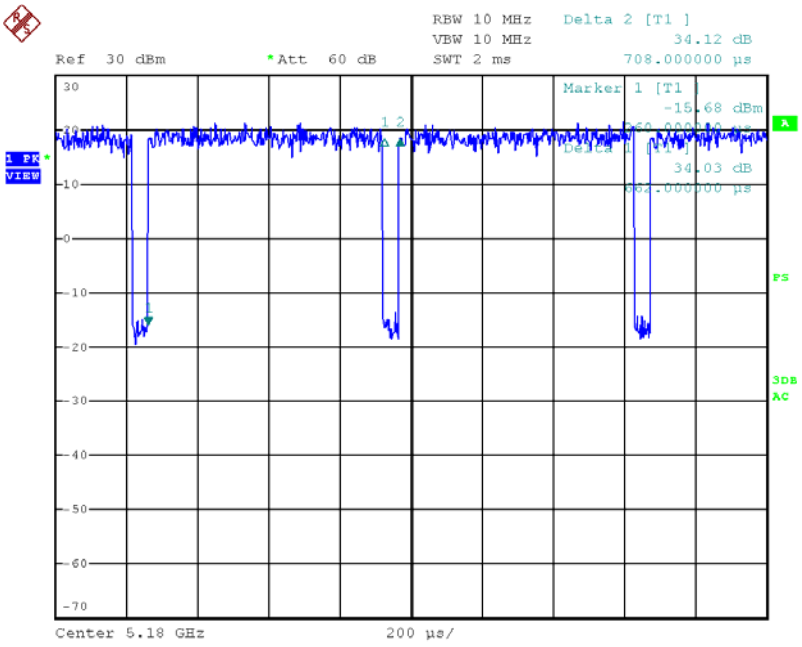
802.11n HT20



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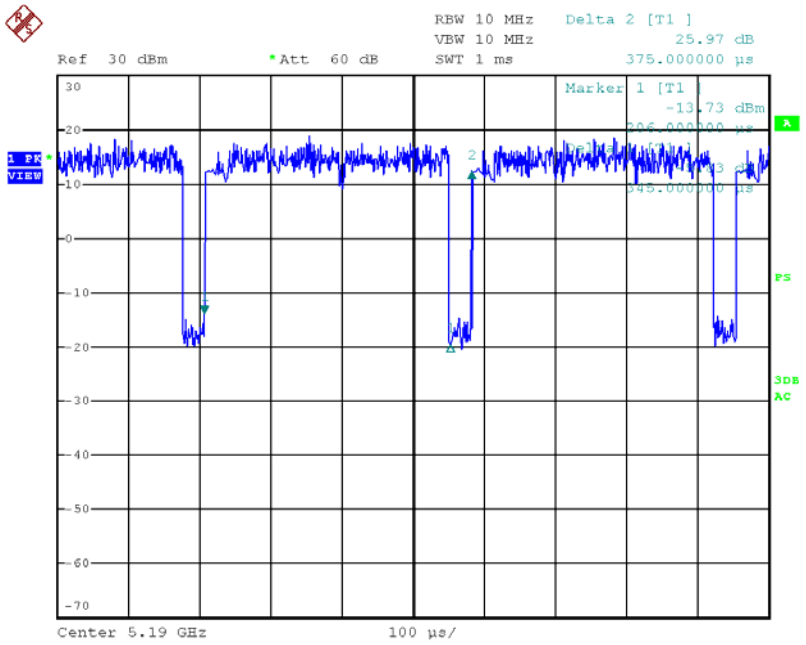
802.11n HT40



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