



FCC TEST REPORT for UNII Device (5.1G & 5.8G Band)
No. 140901611SHA-002R2

Applicant : Aruba Networks, Inc
1344 Crossman Ave. Sunnyvale, CA,94089
Manufacturer : Aruba Networks, Inc
1344 Crossman Ave. Sunnyvale, CA,94089
Equipment : Access Point
Type/Model : APEX0102

SUMMARY

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

47CFR Part 15 (2014): Radio Frequency Devices

ANSI C63.4 (2003): American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

Date of issue: Oct 17, 2014

Prepared by:

Wakeyou Wang (*Project Engineer*)

Reviewed by:

Daniel Zhao (*Reviewer*)



FCC ID: Q9DAPEX0102
IC: 4675A-APEX0102

Description of Test Facility

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IC Assigned Code: 2042B-1

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1. General Information

1.1 Applicant Information

Applicant : Aruba Networks, Inc
1344 Crossman Ave. Sunnyvale, CA,94089
Name of contact : Robert Hastings
Tel : 408-419-4093
Fax : /
Manufacturer : Aruba Networks, Inc
1344 Crossman Ave. Sunnyvale, CA,94089
Sample received date : Sep 25, 2014
Date of test : Sep 25, 2014 ~ Oct 12 , 2014

1.2 Identification of the EUT

Equipment : Access Point
Type/model : APEX0102
FCC ID : Q9DAPEX0102
IC : 4675A-APEX0102



1.3 Technical specification

Operation Frequency Band: 5150 - 5250 MHz, 5725 – 5850MHz

Modulation: BPSK
QPSK
16-QAM
64-QAM
256-QAM

Gain of Antenna: Directional Antenna, Internal

Antenna Type	Applied Chain	Gain of antenna
AC-PUMORI-ANT-2014	3	2.4GHz band: 7.4dBi
		5GHz band: 9.1dBi

Rating: AC100-240V 50/60Hz 0.6A; DC 48V,0.6A (PoE)

Declared Temperature range: -40°C ~ 65°C

Description of EUT: The EUT is a wireless access point.

Port identification: Power × 1, Console USB × 1; RJ45 ports × 2

Category of EUT: Class B

EUT type: Table top Floor standing

EUT Modes: 802.11a/b/g/n20/n40/ac80
(802.11a/n20/n40/ac80 assessed in this report)

Channel Number: 4 Channel for 5180~5240MHz for 11a/n20;
2 Channel for 5190~5230MHz for 11n40;
1 Channel for 5210MHz for 11ac80;
5 Channel for 5745~5825MHz for 11a/n20;
2 Channel for 5755~5795MHz for 11n40;
1 Channel for 5775MHz for 11ac80;

Channel Description: The channel spacing is 20MHz / 40MHz.

MIMO Function Description:

Modulation	Transmission / Idle			Beam forming	Beam forming gain
	Port 0	Port 1	Port 2		
802.11a	Transmission	Transmission	Transmission	NO	0 dBi
802.11 n20	Transmission	Transmission	Transmission	Port 0 & Port 1	3 dBi
802.11 n40	Transmission	Transmission	Transmission	Port 0 & Port 1	3 dBi
802.11 ac80	Transmission	Transmission	Transmission	Port 0 & Port 1	3 dBi

1.4 Mode of operation during the test / Test peripherals used

While testing transmitting mode of EUT, the internal modulation 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
	802.11 n20	5180	5200	5240
	802.11 n40	5190	/	5230
	802.11 ac80	/	5210	/

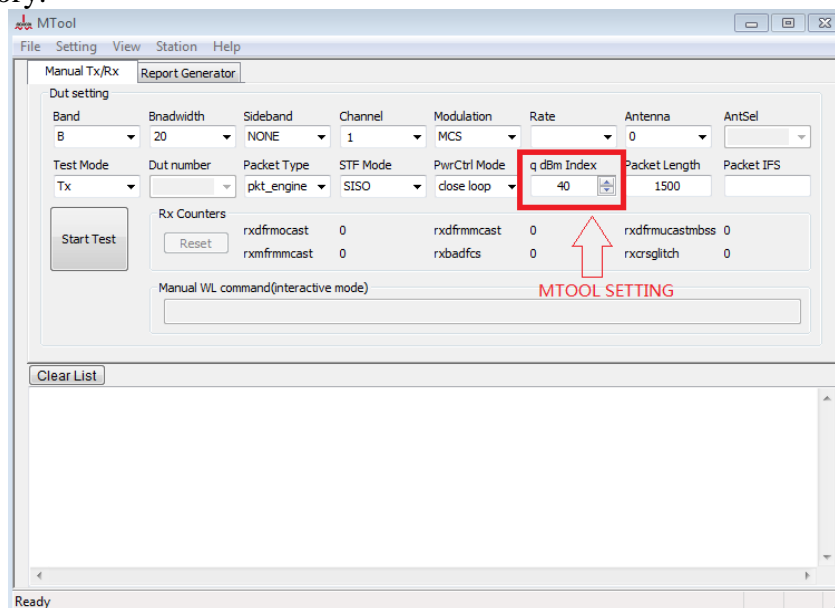
Freq. Band	Modulation	Lowest(MHz)	Middle(MHz)	Highest(MHz)
5725 - 5850MHz	802.11a	5745	5785	5825
	802.11 n20	5745	5785	5825
	802.11 n40	5755	/	5795
	802.11 ac80	/	5775	/

Test Peripherals:

PC: HP ProBook 6450b

Test software setting:

The power level setting for 802.11a/n20/n40/ac80 is used with MTOOL software offered by the manufactory.





The power level setting for 802.11a/n20/n40/ac80 is used with the software offered by the manufactory.

Freq. Band	Mode	Frequency (MHz)	Software Setting	Power Expected (dBm)
5150 - 5250MHz	802.11a	5180	80	20
		5200	80	20
		5240	80	20
	802.11 n20	5180	70	17.5
		5200	70	17.5
		5240	70	17.5
	802.11 n40	5190	76	19
		5230	78	19.5
	802.11 ac80	5210	78	19.5

Freq. Band	Mode	Frequency (MHz)	Software Setting	Power Expected (dBm)
5725 - 5850MHz	802.11a	5745	84	21
		5785	86	21.5
		5825	84	21
	802.11 n20	5745	76	19
		5785	78	19.5
		5825	76	19
	802.11 n40	5755	76	19
		5795	76	19
	802.11 ac80	5775	64	16

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.

Mode	Worst case data rate
802.11a	6Mbps
802.11 n20	MCS16
802.11 n40	MCS16
802.11 ac80	MCS0NSS3



2. Test Specification

2.1 Instrument list

Equipment	Type	Manu.	Internal no.	Cal. Date	Due date
Test Receiver	ESCS 30	R&S	EC 2107	2013-10-21	2014-10-20
Test Receiver	ESIB 26	R&S	EC 3045	2013-10-20	2014-10-19
A.M.N.	ESH2-Z5	R&S	EC 3119	2014-1-9	2015-1-8
Bilog Antenna	CBL 6112D	TESEQ	EC 4206	2013-4-28	2015-4-27
Horn antenna	HF 906	R&S	EC 3049	2013-4-28	2015-4-27
Pre-amplifier	Pre-amp 18	R&S	EC 3222	2014-4-12	2015-4-11
Semi-anechoic chamber	-	Albatross project	EC 3048	2014-5-11	2015-5-10
Power sensor / Power meter	N1911A/N1921A	Agilent	EC4318	2014-04-12	2015-04-11
Loop Antenna	FMZB 1516	SCHWARZB ECK	/	2013-11-29	2014-11-28
Temperature Camber	SETH-E	tayasaf	EC4315	2014-4-9	2015-4-9
High Pass Filter	WHKX 1.0/15G-10SS	Wainwright	EC4297-1	2014-1-8	2015-1-7
High Pass Filter	WHKX 2.8/18G-12SS	Wainwright	EC4297-2	2014-1-8	2015-1-7
High Pass Filter	WHKX 7.0/1.8G-8SS	Wainwright	EC4297-3	2014-1-8	2015-1-7
Band Reject Filter	WRCGV 2400/2483-2390/2493-35/10SS	Wainwright	EC4297-4	2014-1-8	2015-1-7

2.2 Test Standard

47CFR Part 15:2014

ANSI C63.4: 2003

KDB789033 D02 General UNII Test Procedures New Rules v01

KDB 662911 D01 Multiple Transmitter Output v02r01.



2.3 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 & EIRP	15.407(a)	Pass
Power spectral density	15.407(a)	Pass
Minimum 6dB Bandwidth	15.407(e)	Pass
Radiated emission	15.407(b), 15.209	Pass
Power line conducted emission	15.207	Pass

3. Maximum Conducted Output Power & EIRP

Test result: Pass

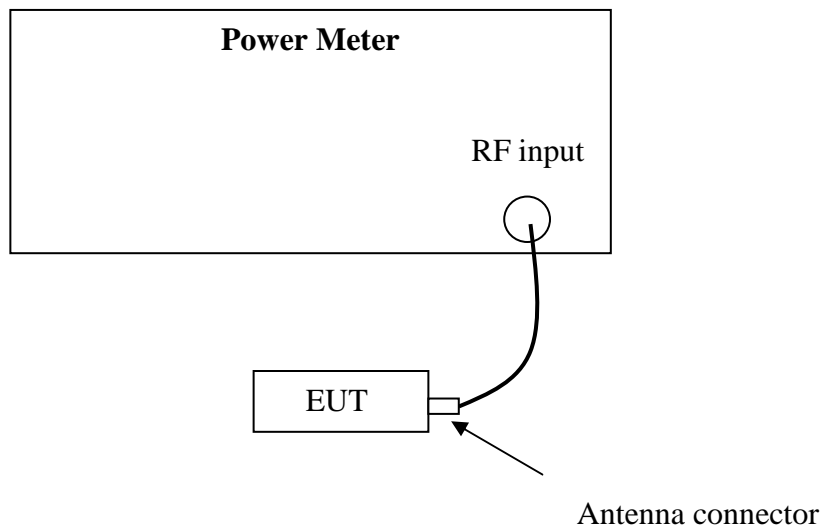
3.1 Test limit

- For outdoor access point operating in 5150-5250MHz: 30dBm, Maximum EIRP at any elevation angle above 30 degrees ≤ 21 dBm;
- For indoor access point operating in 5150-5250MHz: 30dBm;
- For fixed point-to-point access point operating in 5150-5250MHz: 30dBm;
- For mobile and portable client devices operating in 5150-5250MHz: 24dBm;
- For device operating in 5.25-5.35 GHz and 5.47-5.725 GHz: 24dBm or $11\text{dBm} + 10\log B$ (B is 26dB bandwidth);
- For device operating in 5.725-5.85 GHz: 30dBm

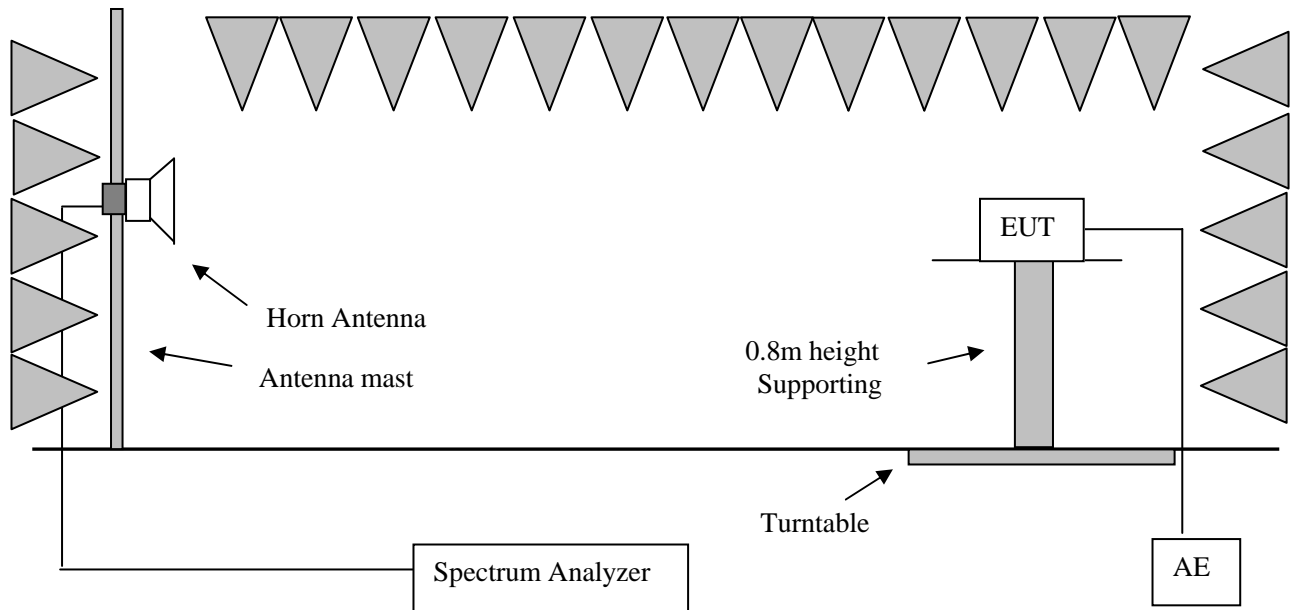
If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beamforming type, the limit should be the less of original and original + 6 –antenna gain-beamforming gain.

3.2 Test Configuration

- Maximum Conducted Output Power test



Maximum EIRP test



3.3 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: Method PM.

The EIRP test is conducted at any elevation angle above 30 degrees as measured from the horizon.

3.4 Test protocol

Temperature : 25 °C
Relative Humidity : 55 %

Maximum Conducted Output Power test

Mode	Freq (MHz)	Factor (dB)	Reading (dBm)			Total power (dBm)	Limit (dBm)
			Port 0	Port 1	Port 2		
802.11a	5180	1.2	20.69	20.71	20.65	25.45	26.90
	5200	1.2	20.25	20.56	20.17	25.10	26.90
	5240	1.2	20.49	20.44	20.30	25.18	26.90
	5745	1.2	20.33	20.51	20.42	25.19	26.90
	5785	1.2	21.40	21.56	21.29	26.19	26.90
	5825	1.2	20.98	21.28	21.16	25.91	26.90
802.11n20	5180	1.6	18.03	18.27	17.86	22.83	23.90
	5200	1.6	18.28	18.28	17.85	22.91	23.90
	5240	1.6	18.15	18.33	17.81	22.87	23.90
	5745	1.6	18.40	18.68	18.36	23.25	23.90
	5785	1.6	18.51	18.85	18.28	23.32	23.90
	5825	1.6	17.98	18.15	18.56	23.01	23.90
802.11n40	5190	2.0	17.85	17.78	17.89	22.61	23.90
	5230	2.0	18.11	18.21	18.30	22.98	23.90
	5755	2.0	18.03	17.89	18.04	22.76	23.90
	5795	2.0	17.65	17.85	17.96	22.59	23.90
802.11ac80	5210	1.6	17.56	18.03	17.86	22.59	23.90
	5775	1.6	14.03	14.21	14.51	19.03	23.90

Note: 1. Factor = Cable loss + duty cycle.

2. For antenna gain = 9.1dBi and with beamforming, the limit should be corrected.

3. Total power = $10 * \lg(10^{\text{port } 0 / 10} + 10^{\text{port } 1 / 10} + 10^{\text{port } 2 / 10})$

Maximum EIRP test

Mode	Freq (MHz)	Maximum Field Strength Reading (dBuV/m)	Maximum EIRP (dBm)	Limit (dBm)
802.11a	5180	144.70	19.50	21.00
	5200	144.40	19.20	
	5240	144.00	18.70	
802.11n20	5180	142.30	17.10	
	5200	142.60	17.40	
	5240	142.00	16.80	
802.11n40	5190	141.60	16.40	
	5230	142.10	16.90	
802.11ac80	5210	140.90	15.70	

Note: the maximum EIRP is calculated as the formula $EIRP = (Field\ Strength\ Reading * D)^2 / 30$ where D is test distance in metres while Field Strength Reading in V/m.

4. Power spectral density

Test result: Pass

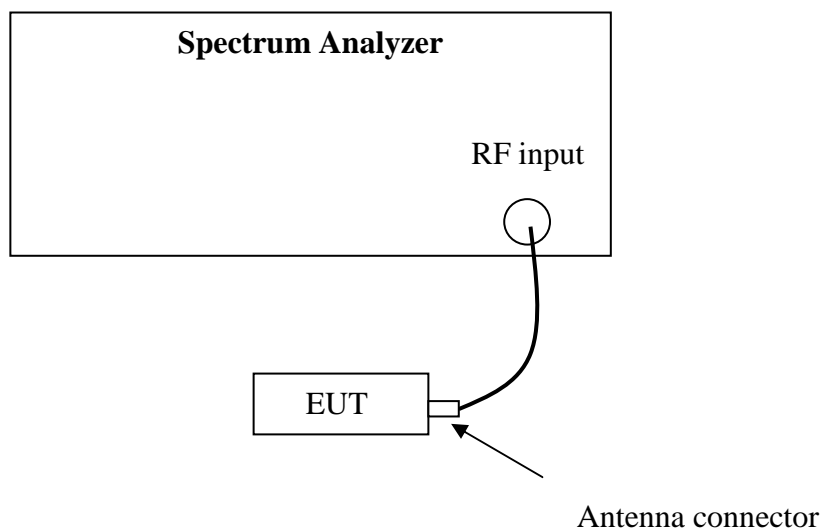
4.1 Test limit

- For outdoor access point operating in 5150-5250MHz: 17dBm/MHz;
- For indoor access point operating in 5150-5250MHz: 17dBm/MHz;
- For fixed point-to-point access point operating in 5150-5250MHz: 17dBm/MHz;
- For mobile and portable client devices operating in 5150-5250MHz: 11dBm/MHz;
- For device operating in 5.25-5.35 GHz and 5.47-5.725 GHz: 11dBm/MHz;
- For device operating in 5.725-5.85 GHz: 30dBm/500kHz;

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.

4.2 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 using a 50 ohm spectrum analyzer with the resolution bandwidth set at 1MHz, the video bandwidth set >RBW (measurement method refer to KDB 789033D02: section F).

4.4 Test Protocol

Temperature : 25 °C
Relative Humidity : 55 %

Mode	Freq (MHz)	Factor (dB)	Reading (dBm/MHz)			Total PSD (dBm/MHz)	Limit (dBm/MHz)
			Port 0	Port 1	Port 2		
802.11a	5180	1.2	8.31	8.76	8.36	13.25	13.90
	5200	1.2	8.36	8.99	8.88	13.52	13.90
	5240	1.2	8.22	9.31	8.63	13.51	13.90
802.11n20	5180	1.6	5.17	5.79	5.86	10.39	10.90
	5200	1.6	5.17	5.78	5.22	10.17	10.90
	5240	1.6	5.25	5.89	5.26	10.25	10.90
802.11n40	5190	2.0	3.69	4.33	3.65	8.67	10.90
	5230	2.0	4.18	4.97	4.34	9.28	10.90
802.11ac80	5210	1.6	1.27	1.67	1.60	6.29	10.90

Mode	Freq (MHz)	Factor (dB)	Reading (dBm/500kHz)			Total PSD (dBm/500kHz)	Limit (dBm/500kHz)
			Port 0	Port 1	Port 2		
802.11a	5745	1.2	7.21	7.36	7.15	12.01	26.90
	5785	1.2	7.23	7.94	8.03	12.52	26.90
	5825	1.2	6.24	4.10	6.43	10.48	26.90
802.11n20	5745	1.6	4.90	4.75	4.33	9.44	23.90
	5785	1.6	4.85	5.09	4.77	9.68	23.90
	5825	1.6	3.03	3.02	4.61	8.39	23.90
802.11n40	5755	2.0	1.83	1.84	2.59	6.87	23.90
	5795	2.0	1.43	1.58	2.86	6.78	23.90
802.11ac80	5775	1.6	-3.34	-3.35	-2.99	1.55	23.90

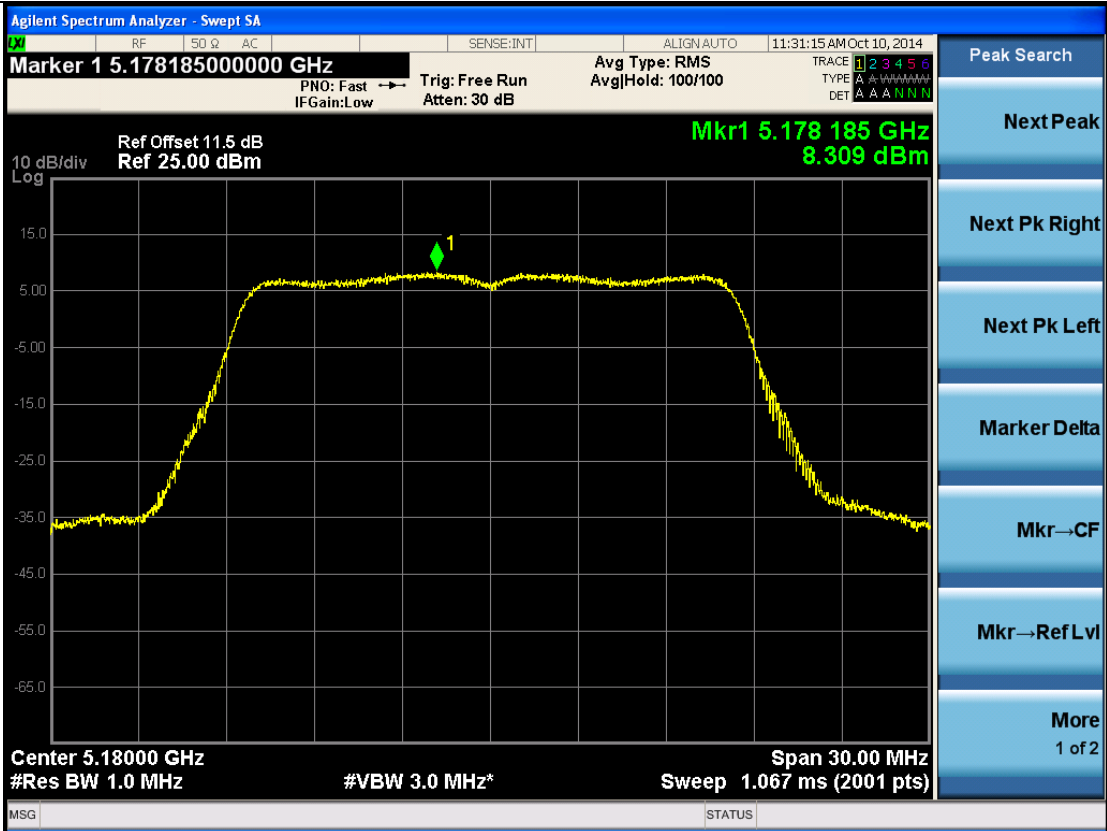
Note: 1. Factor = Cable loss + duty cycle.

2. For antenna gain = 9.1dBi and with beamforming, the limit should be corrected.

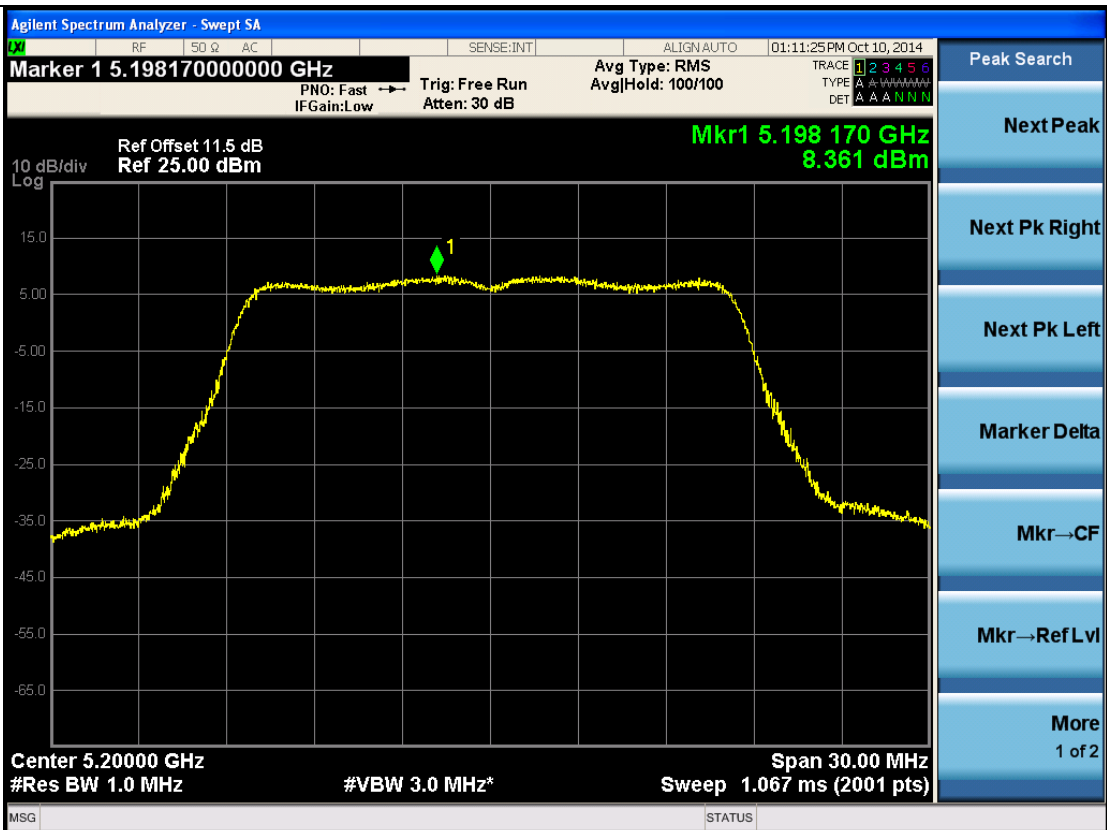
3. Total PSD = $10 * \lg(10^{\text{port } 0 / 10} + 10^{\text{port } 1 / 10} + 10^{\text{port } 2 / 10})$

Port 0

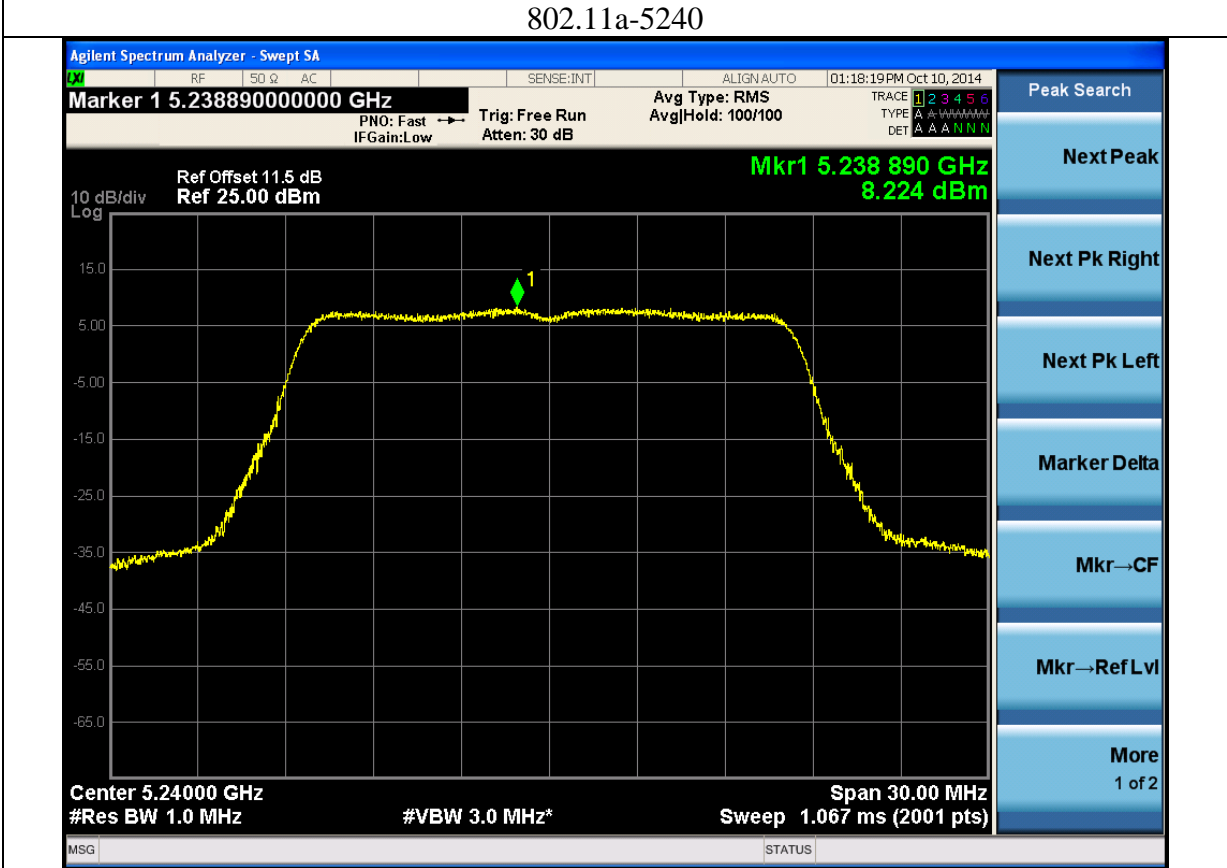
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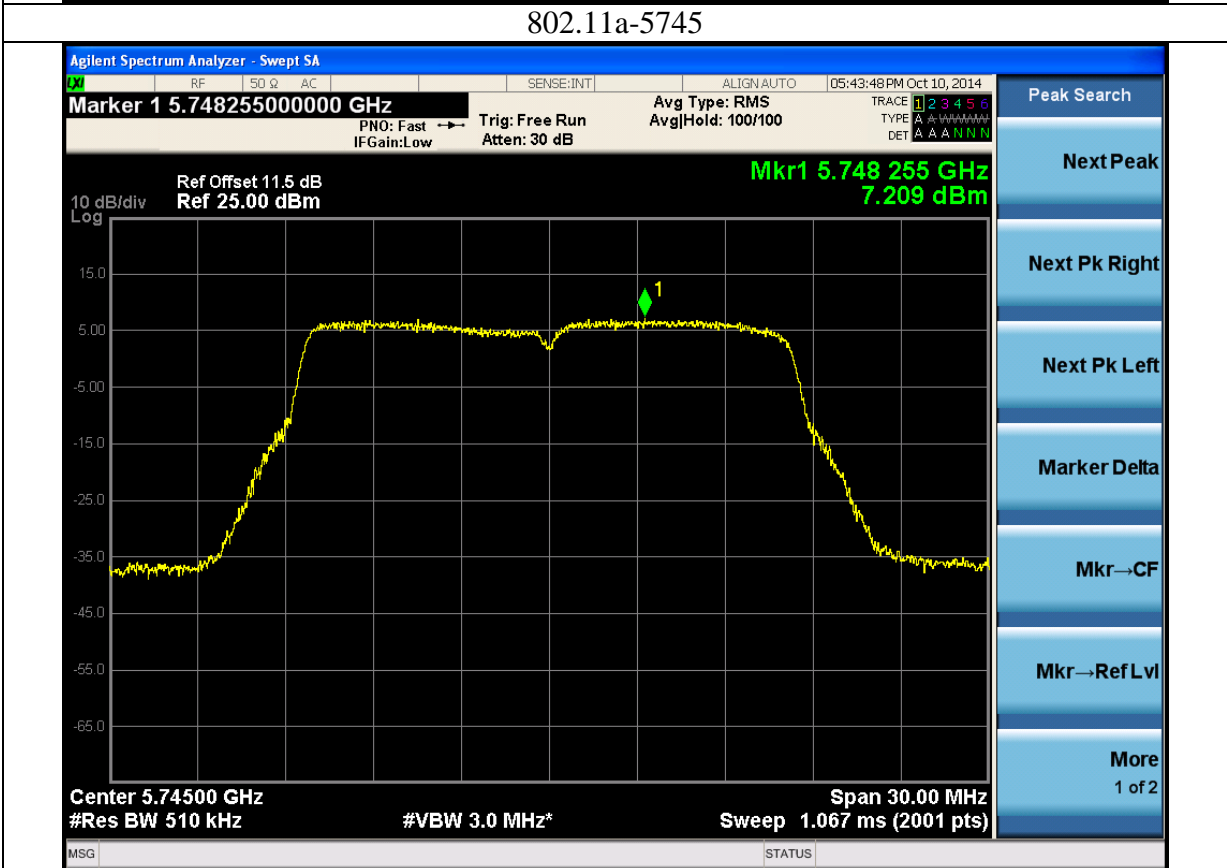
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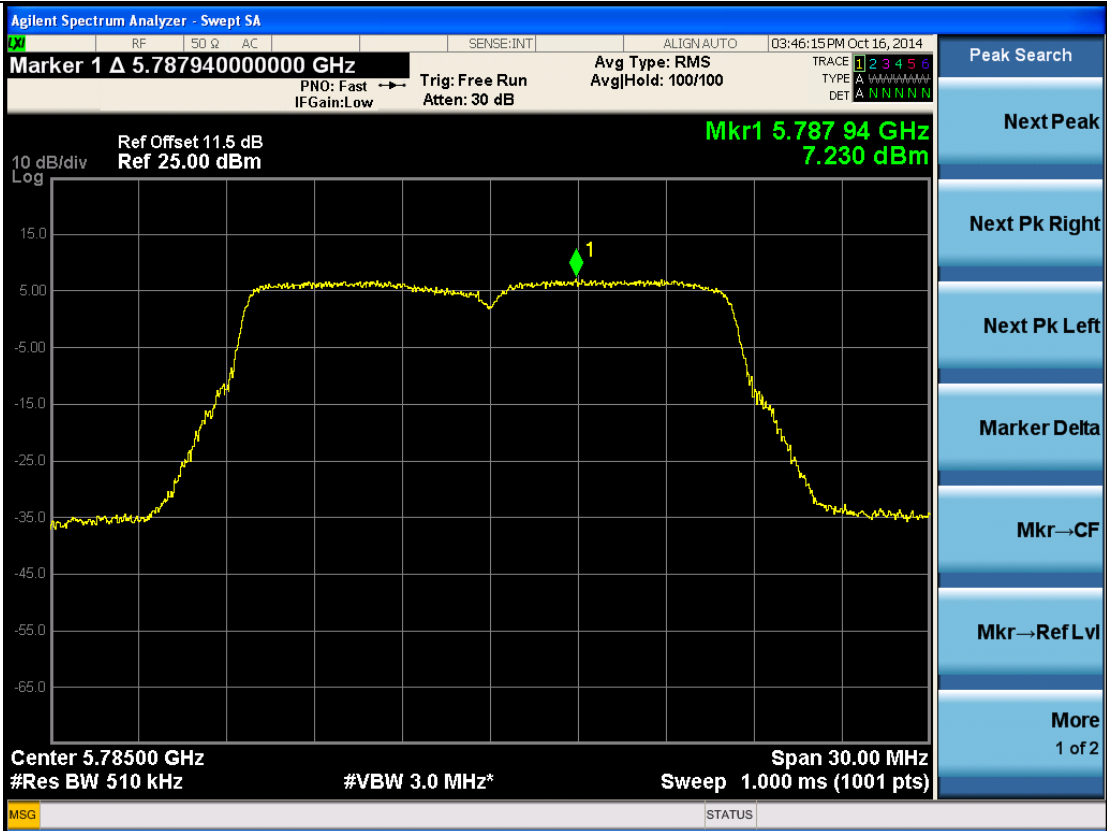
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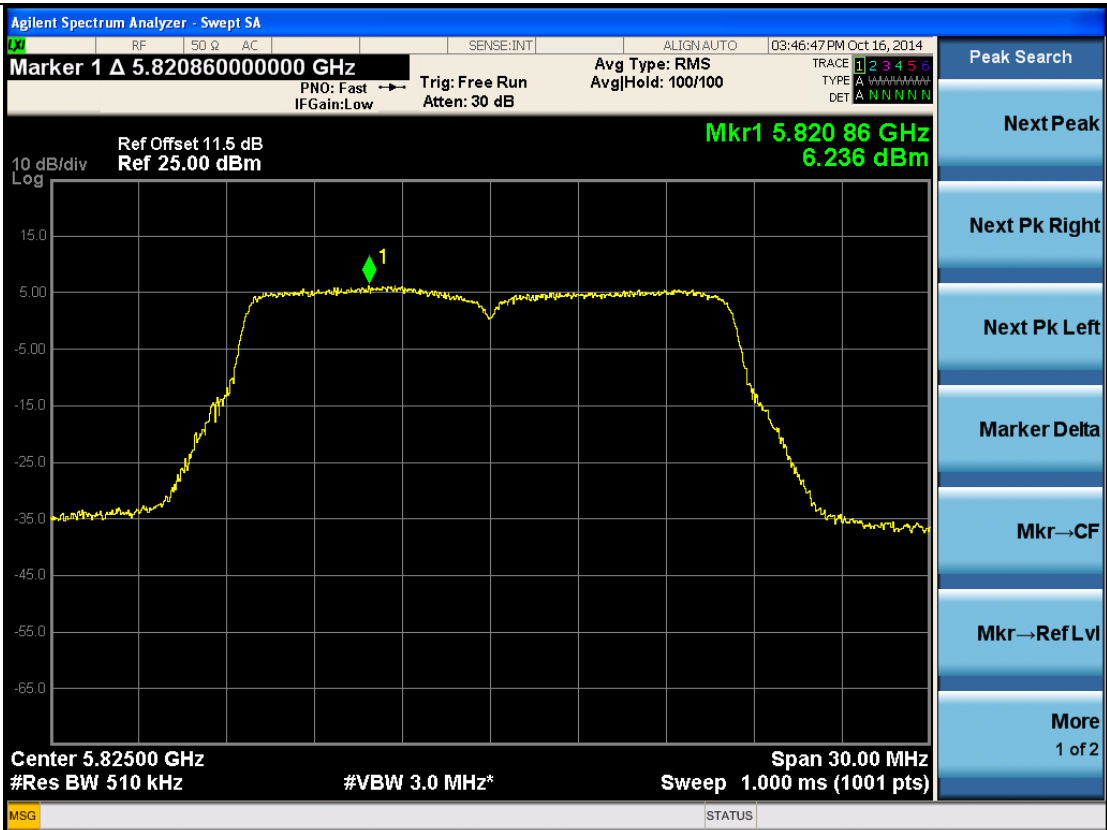
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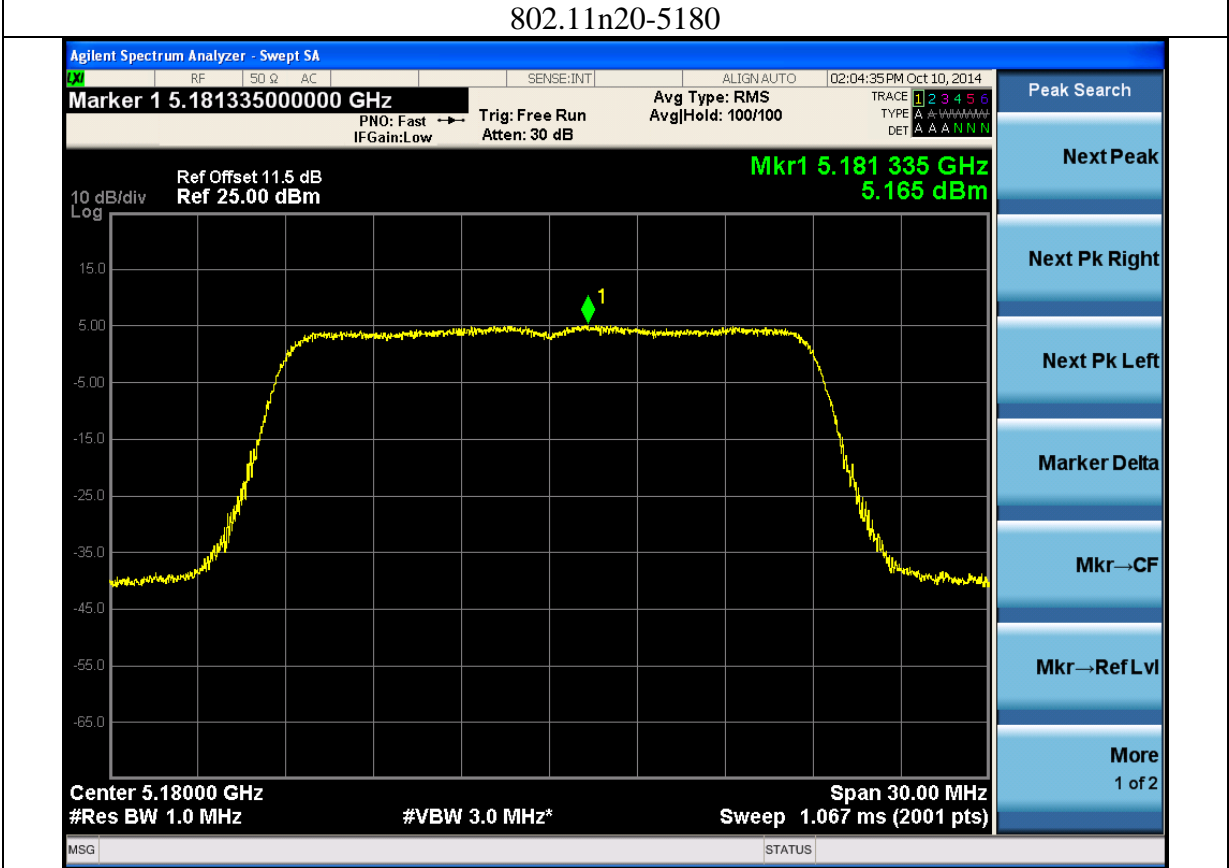
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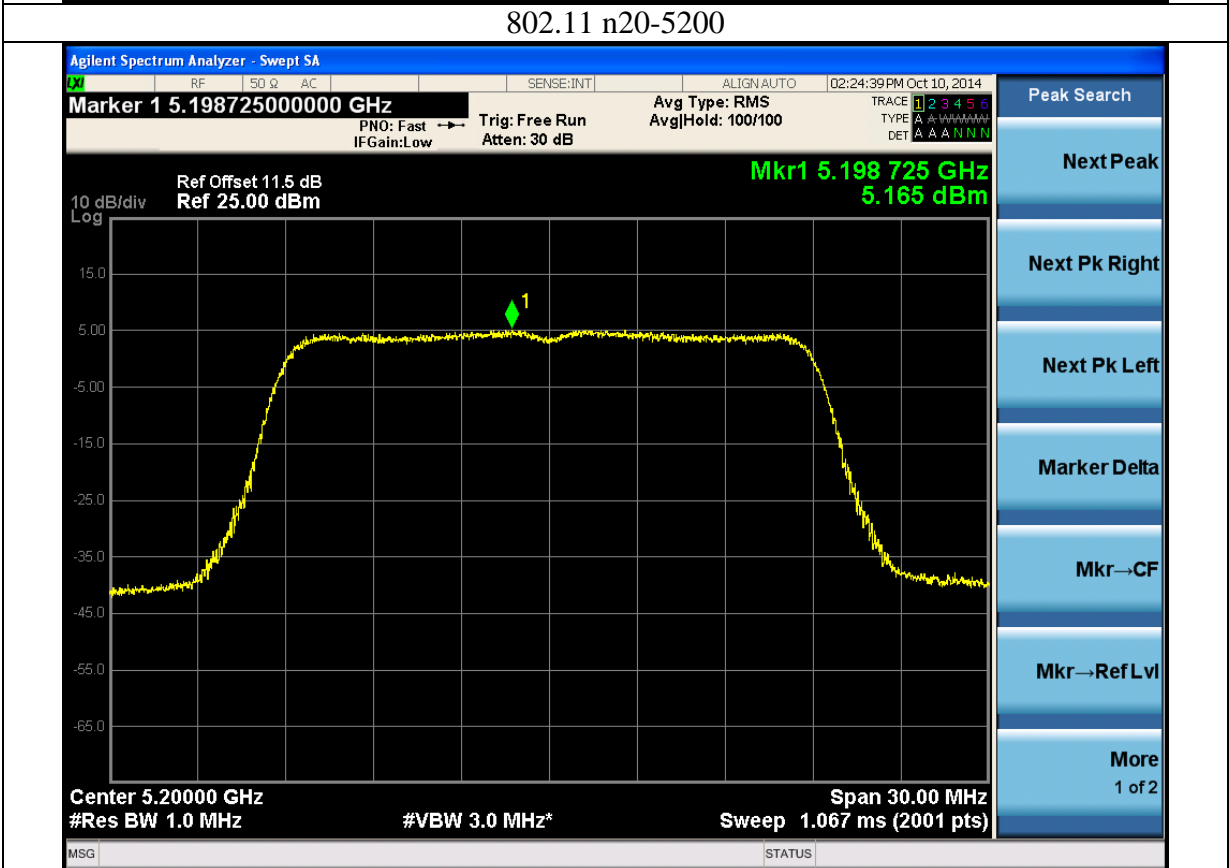
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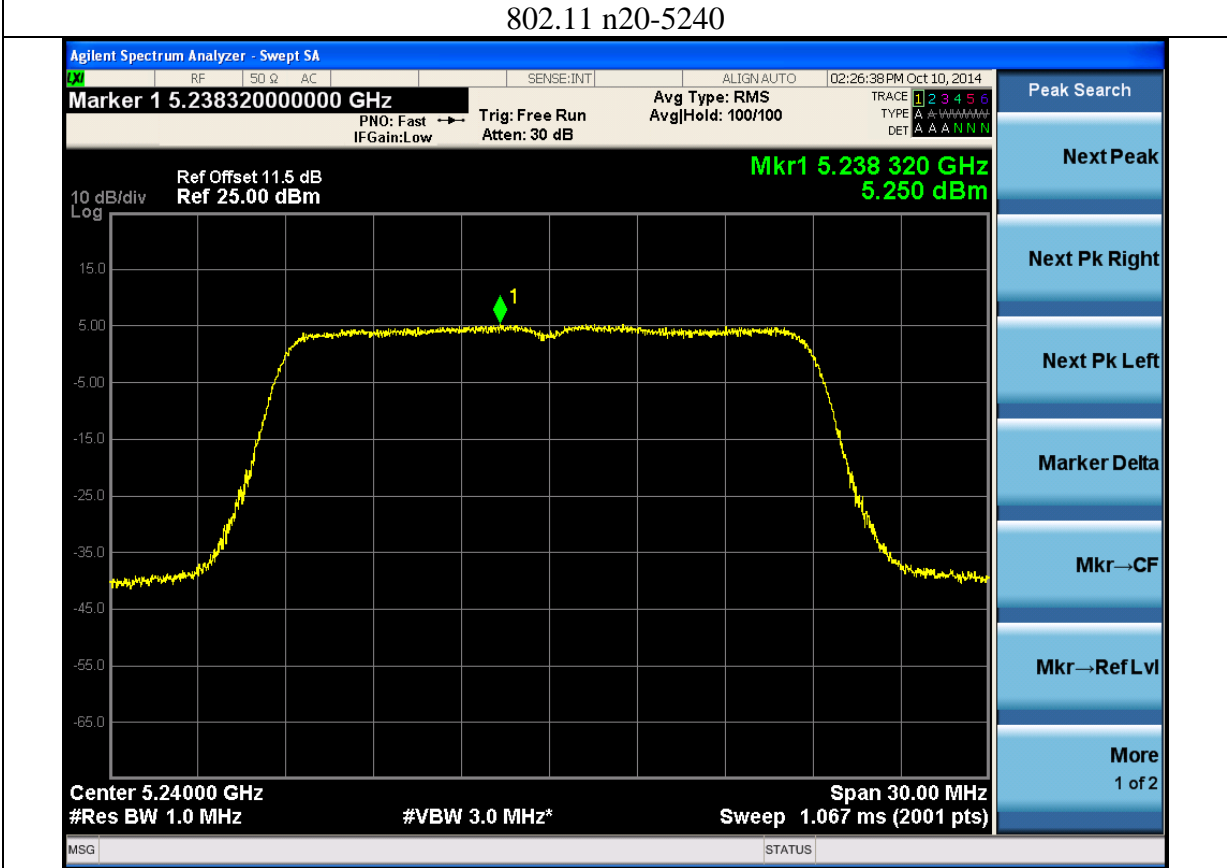
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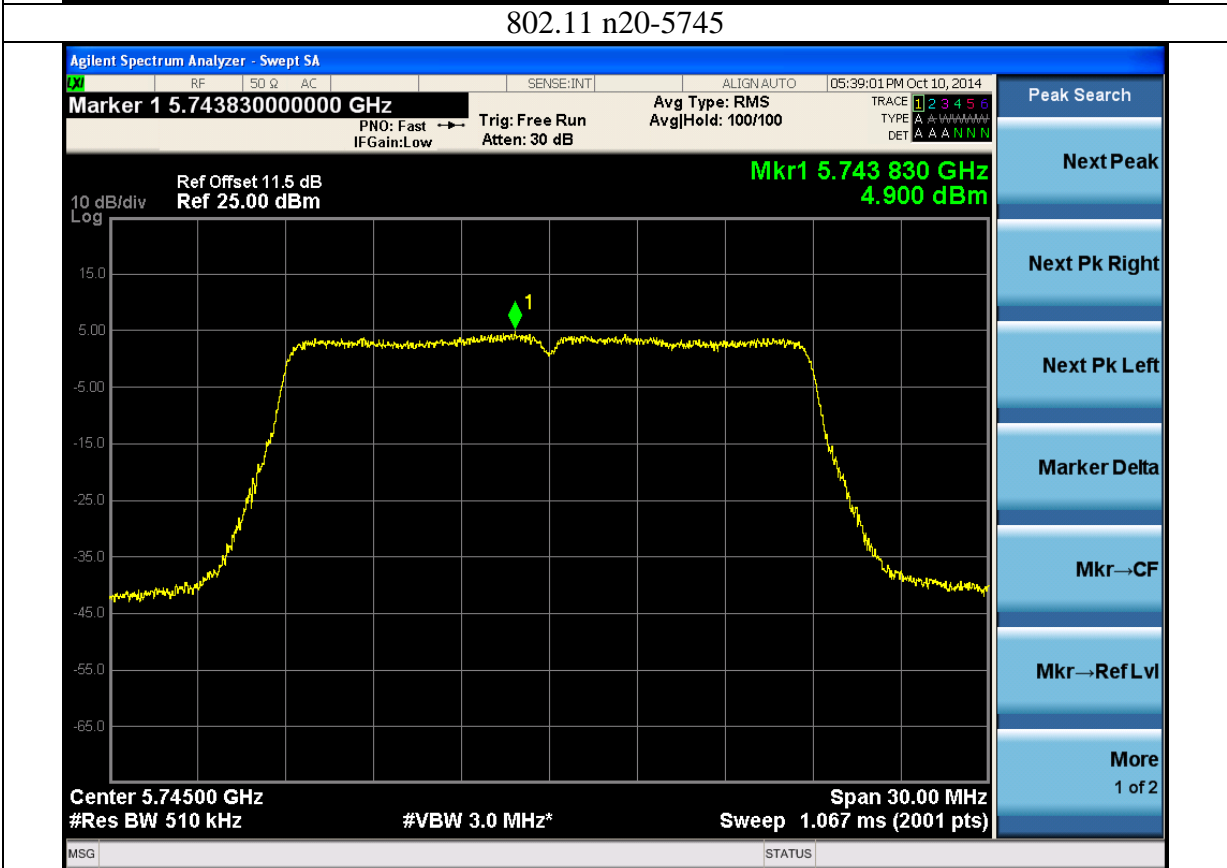
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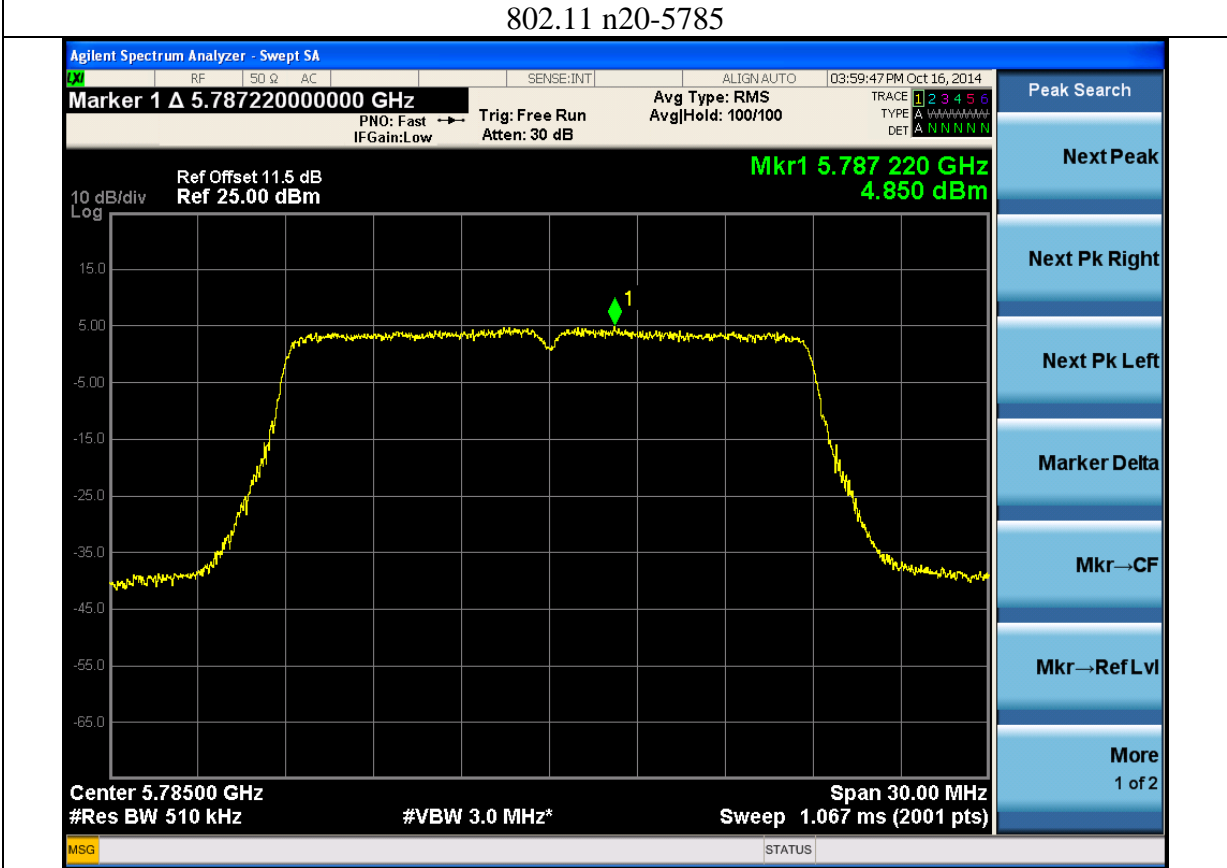
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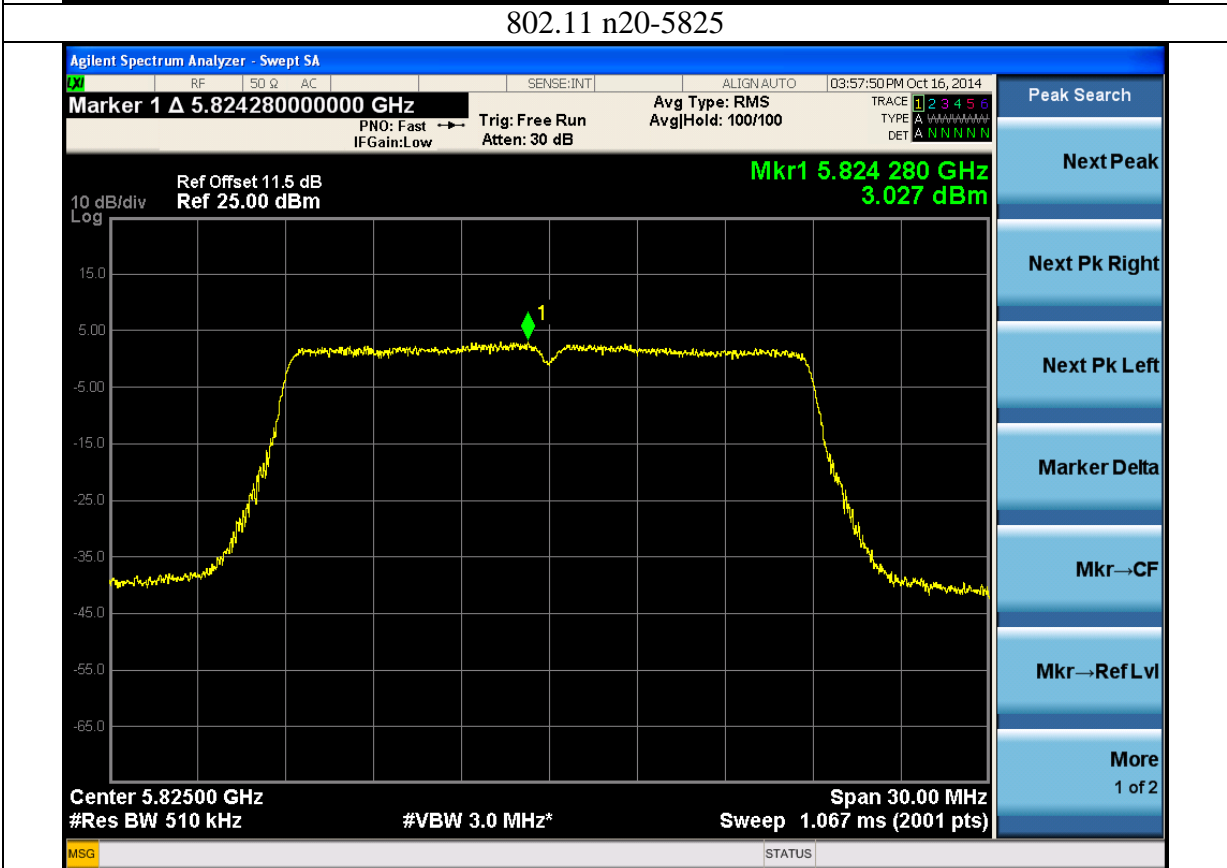
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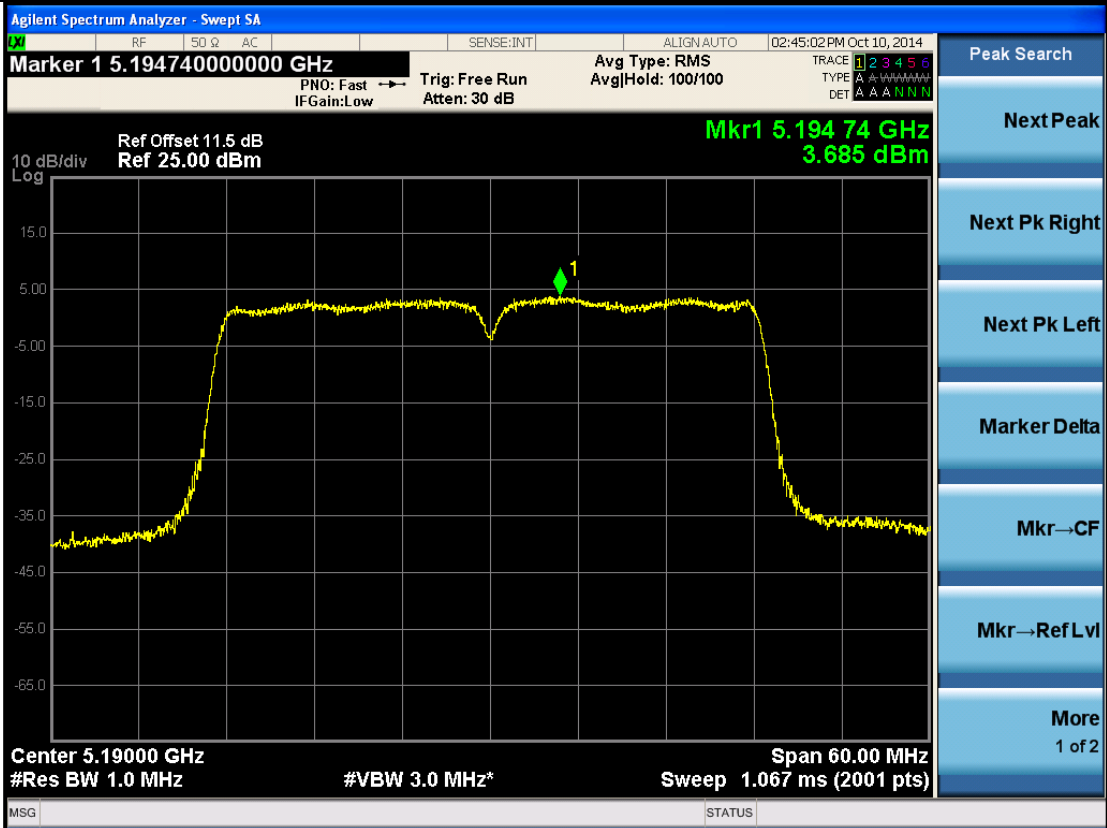
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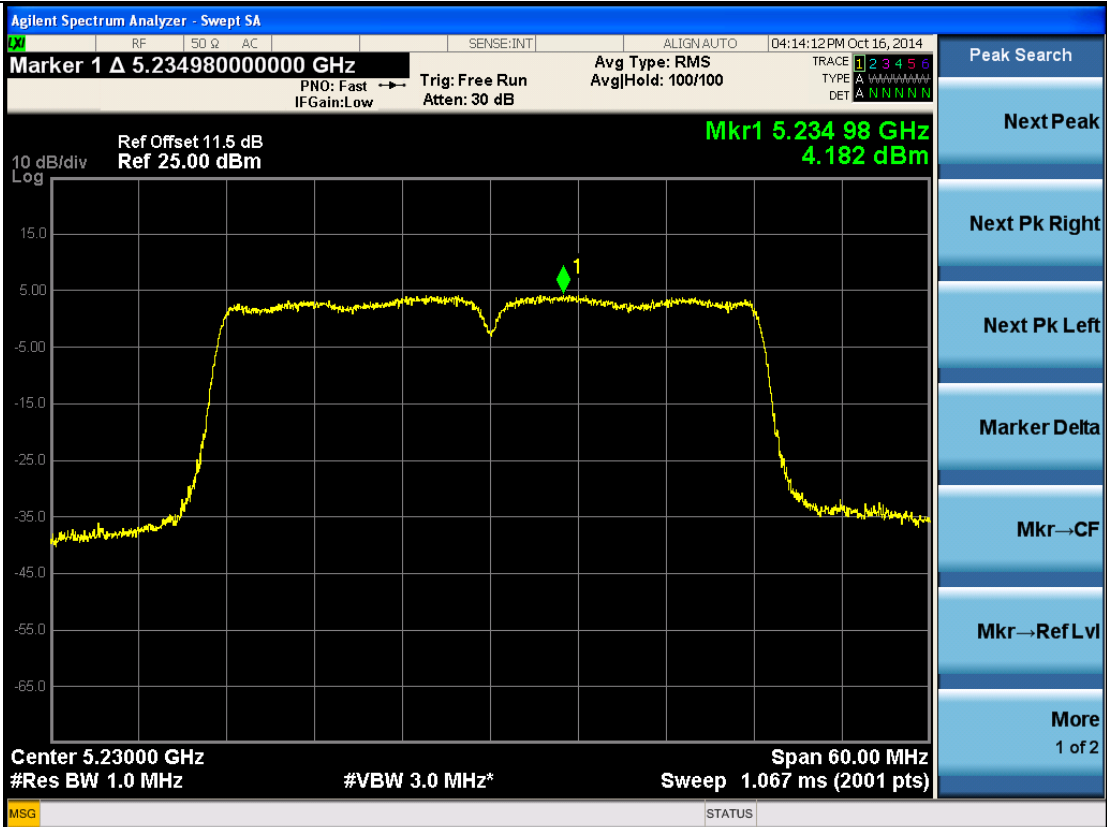
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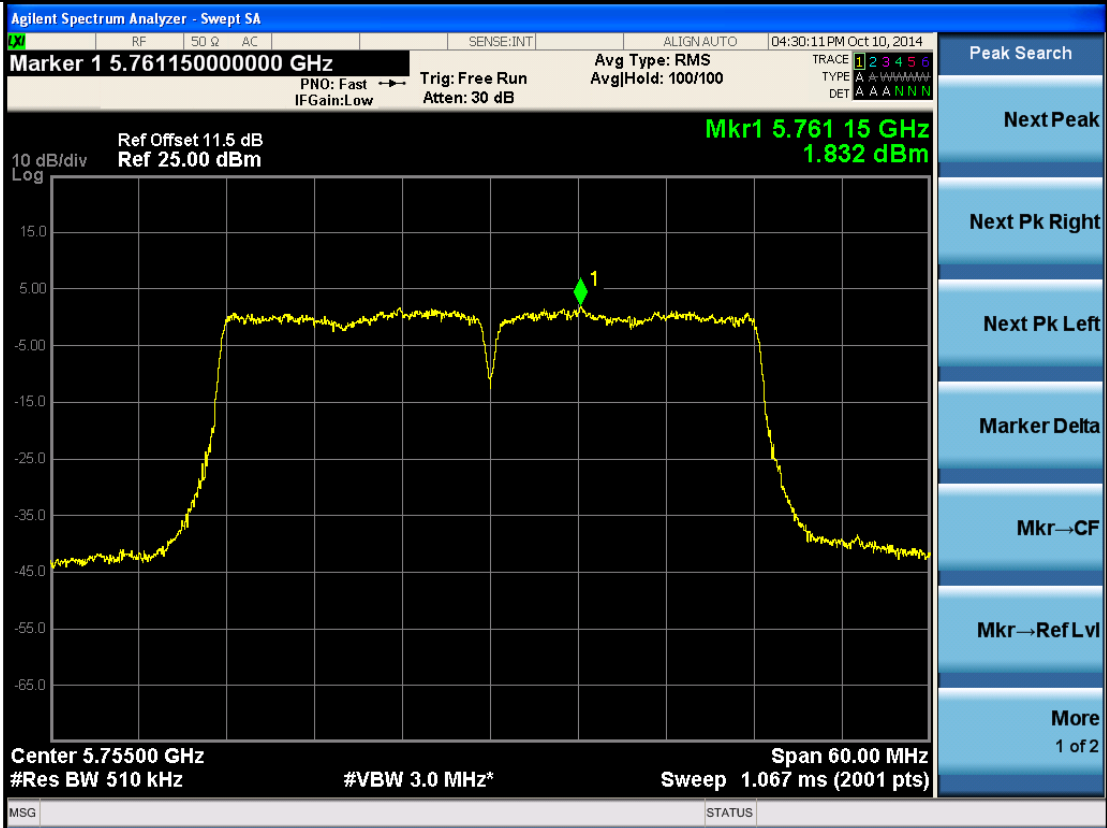
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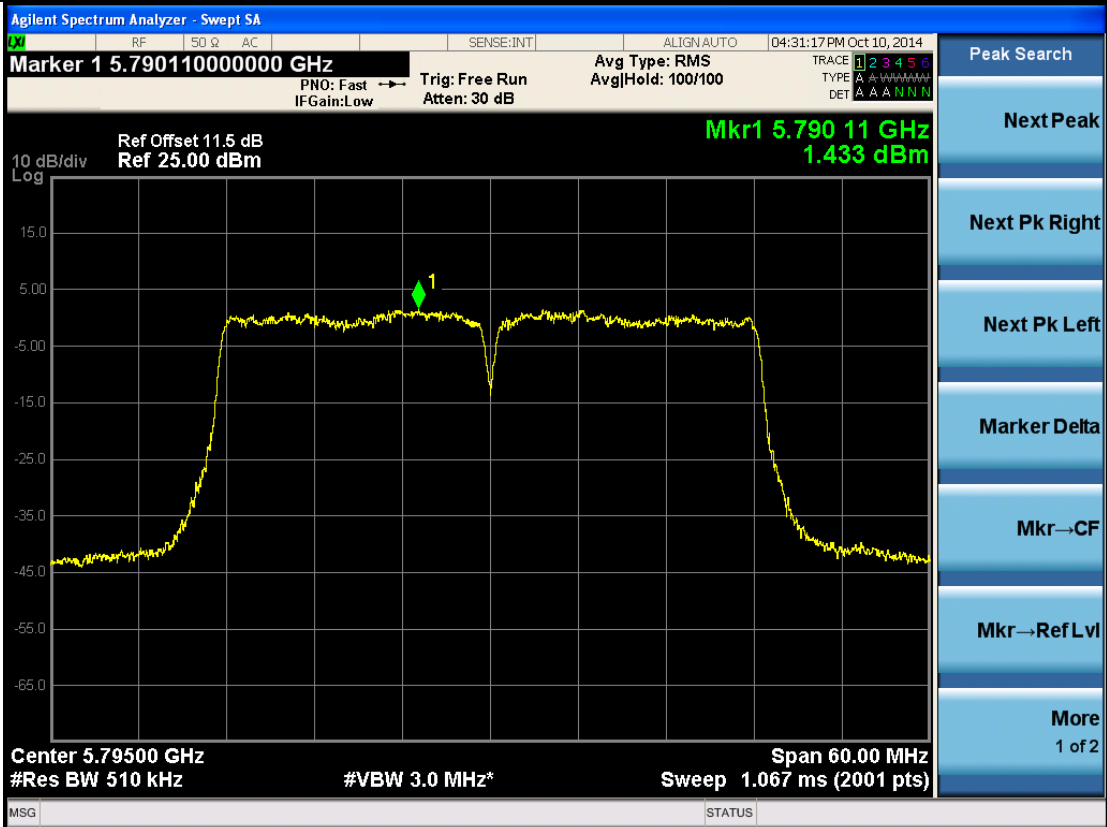
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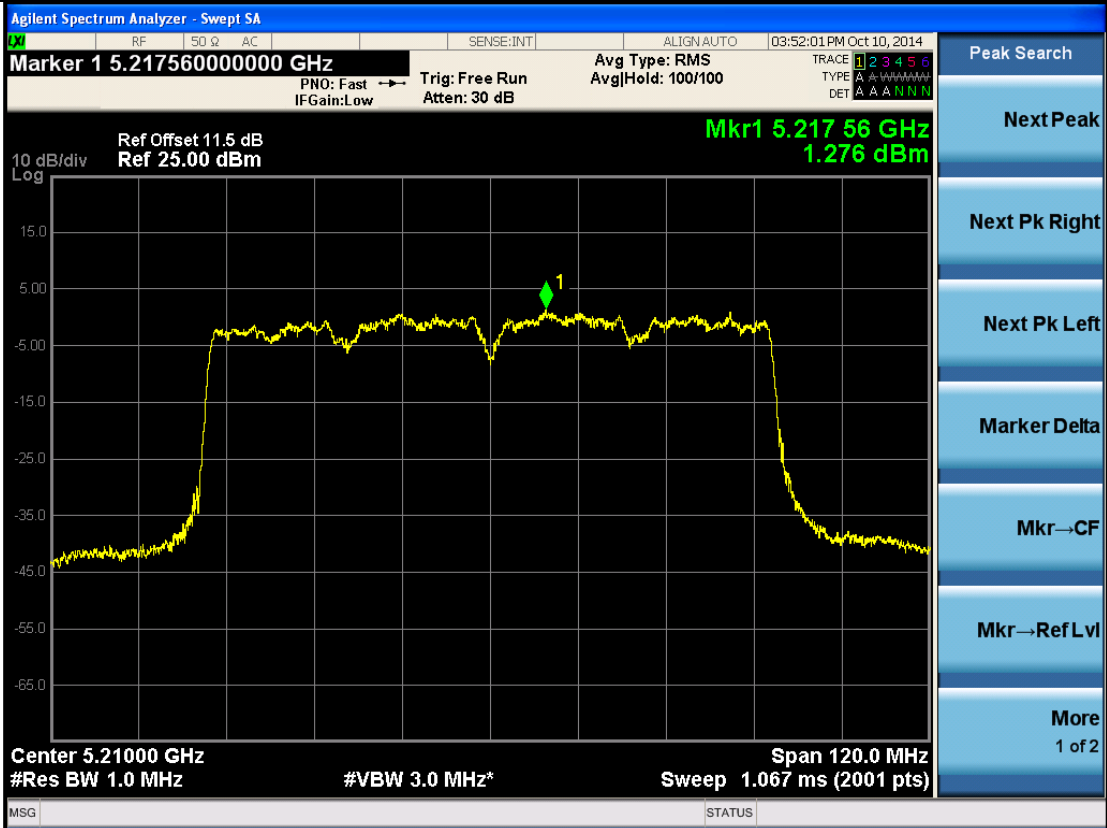
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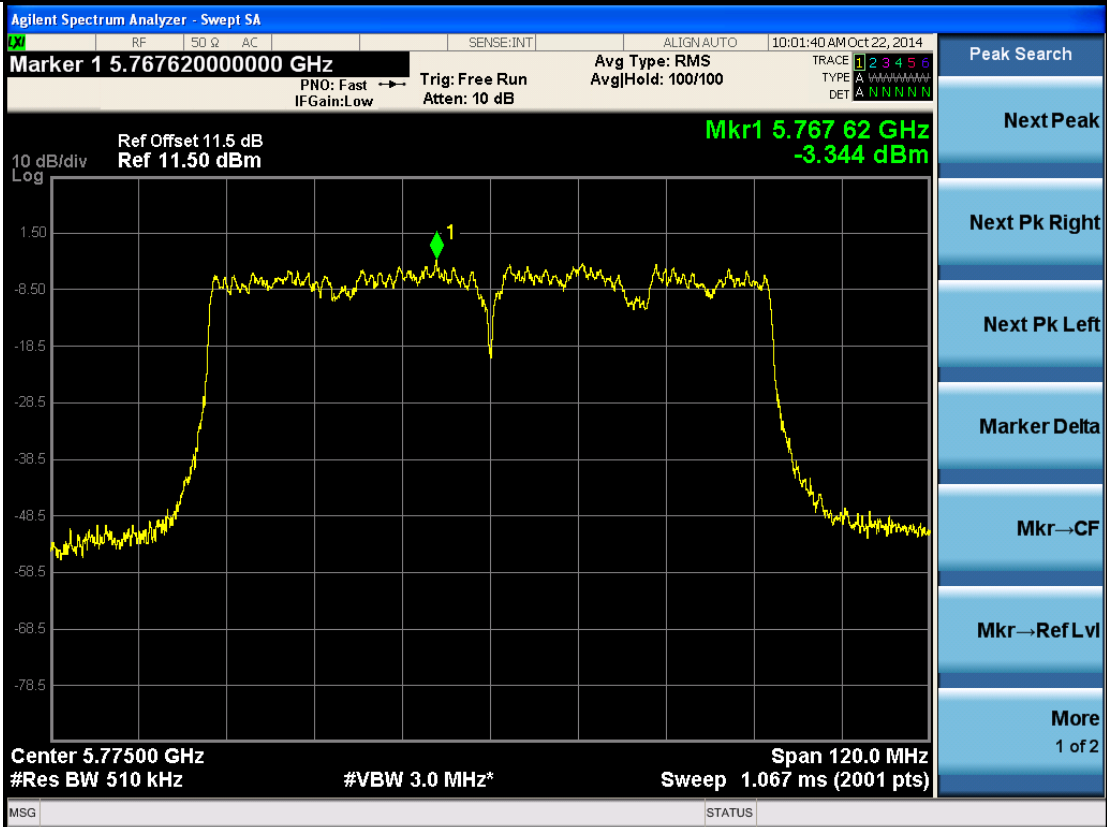
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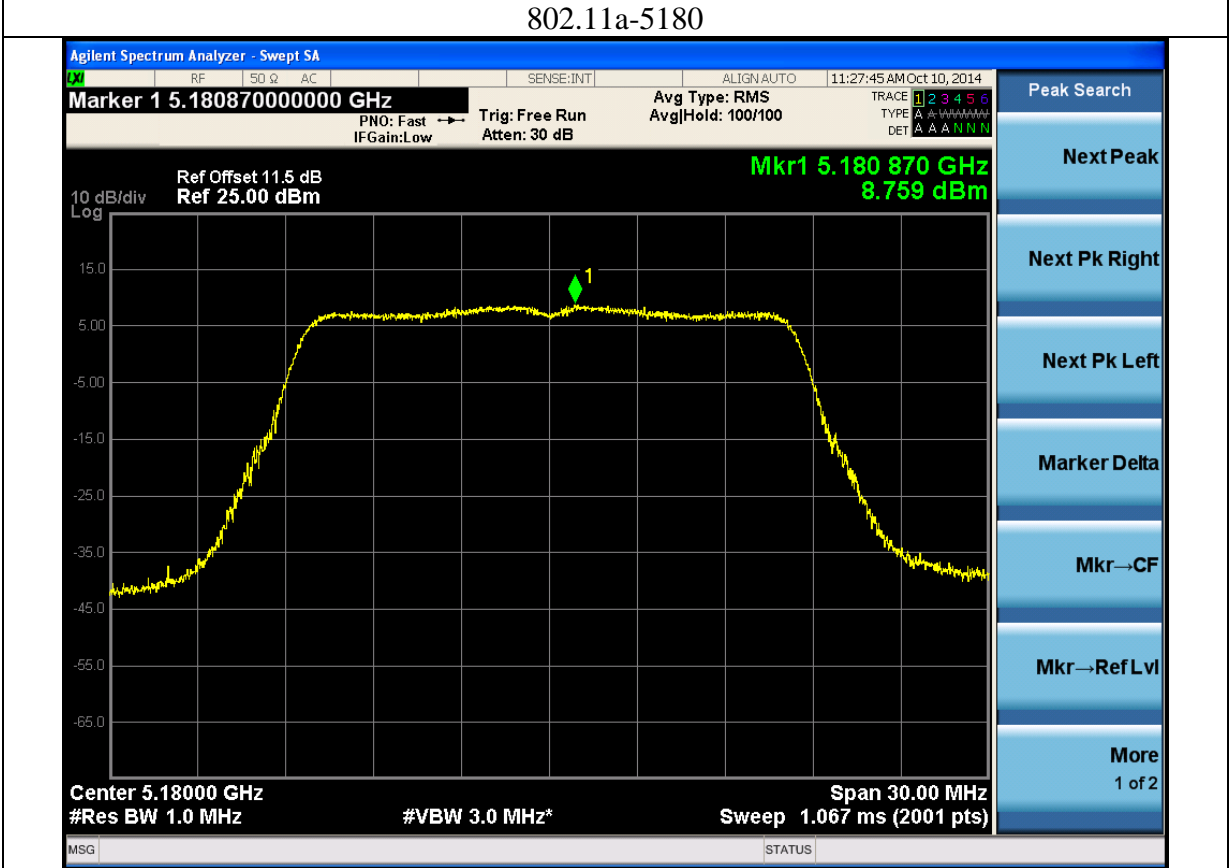


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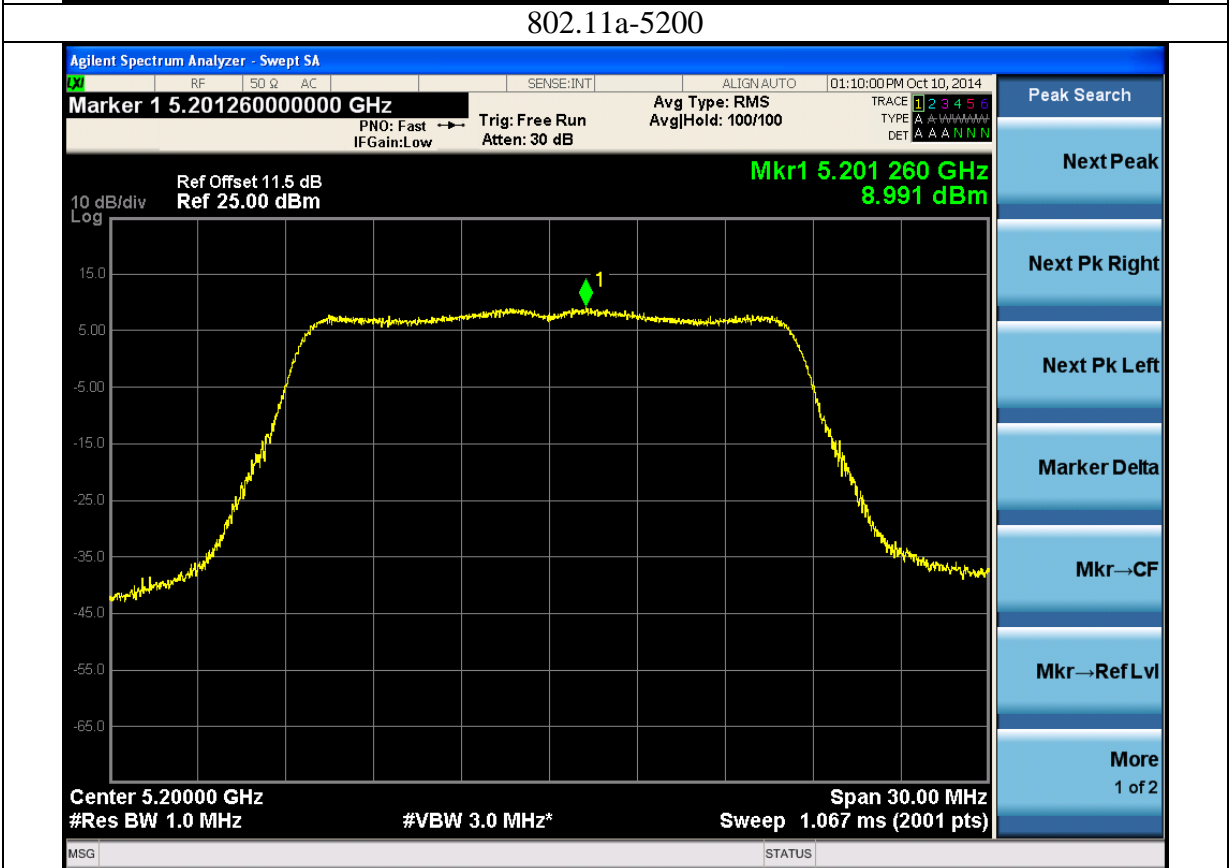


Port 1

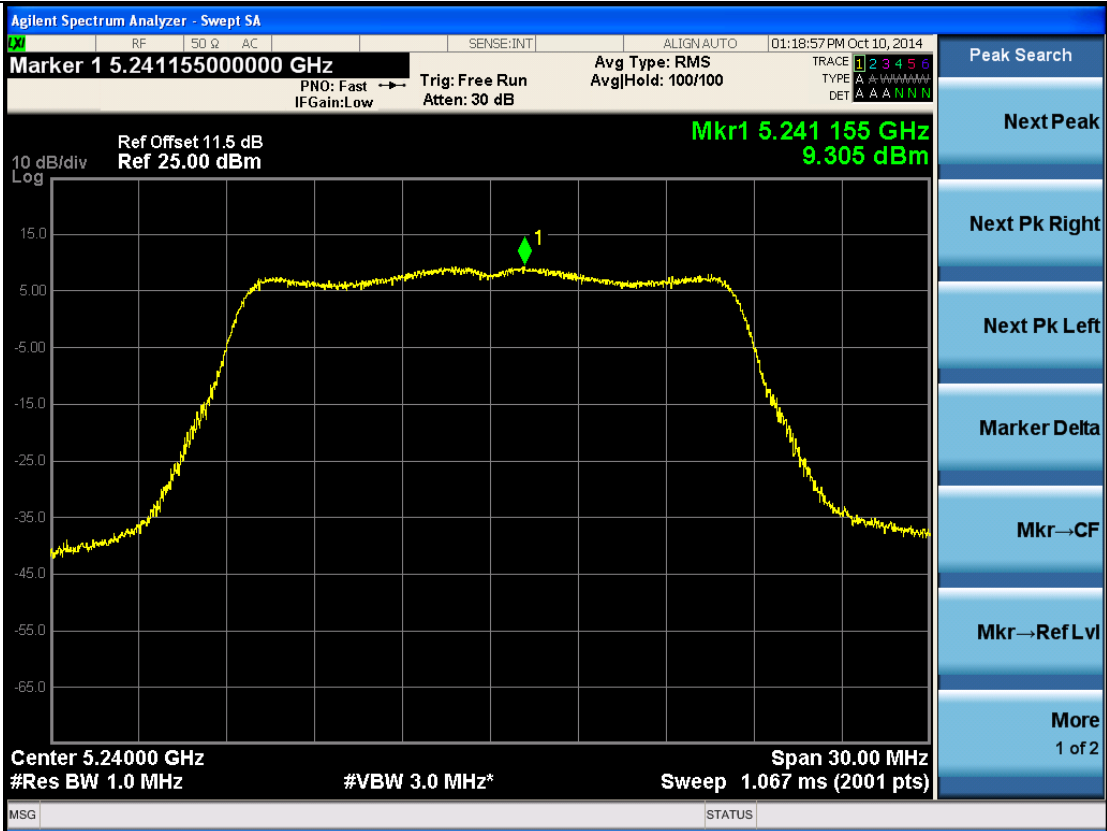
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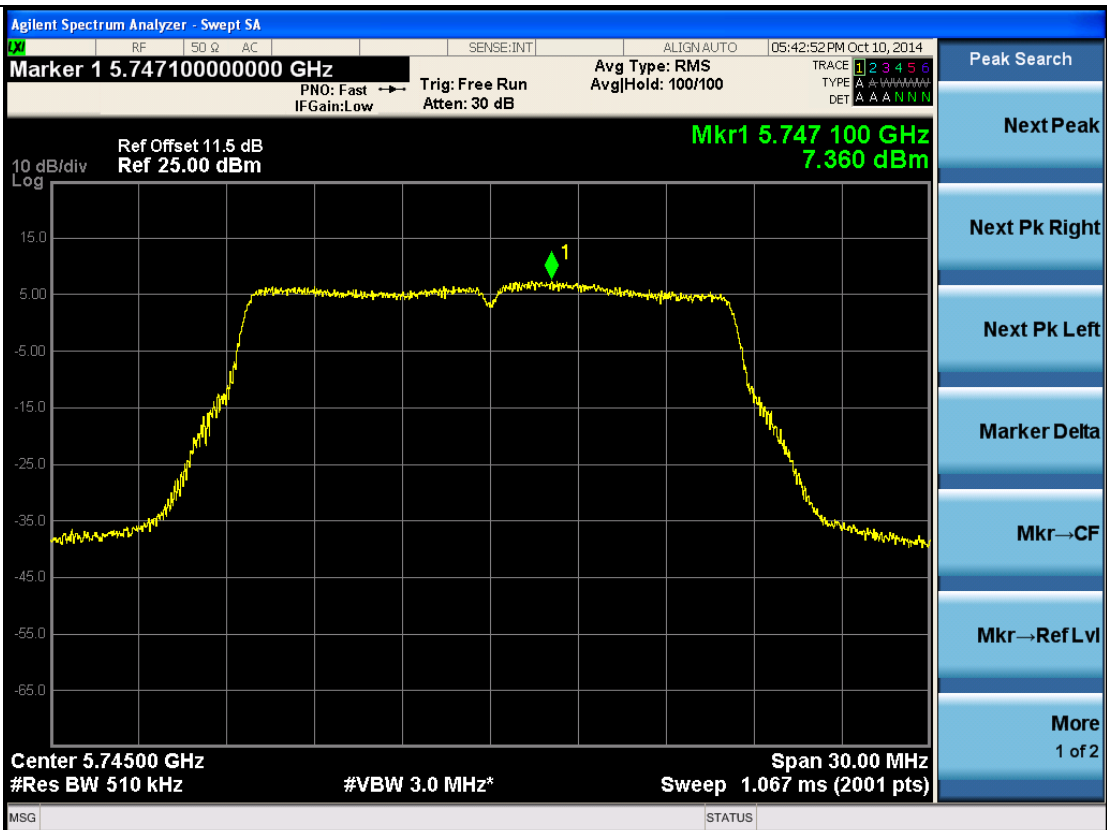
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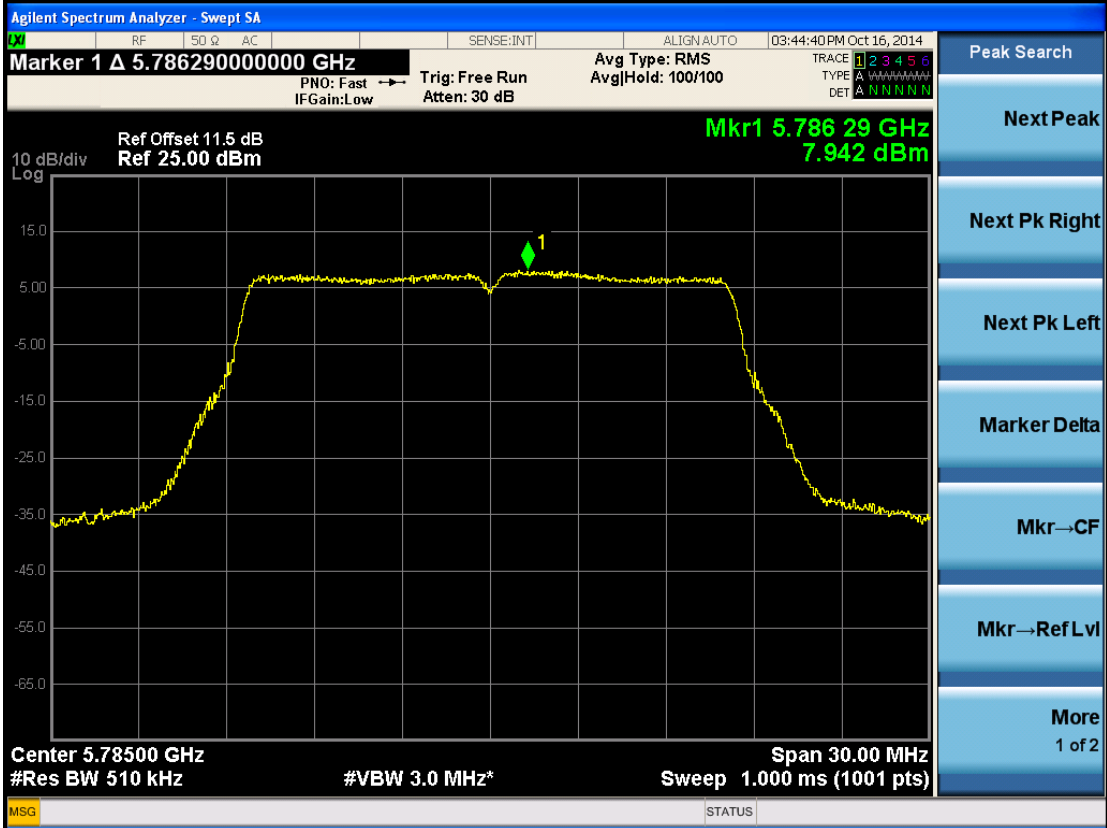
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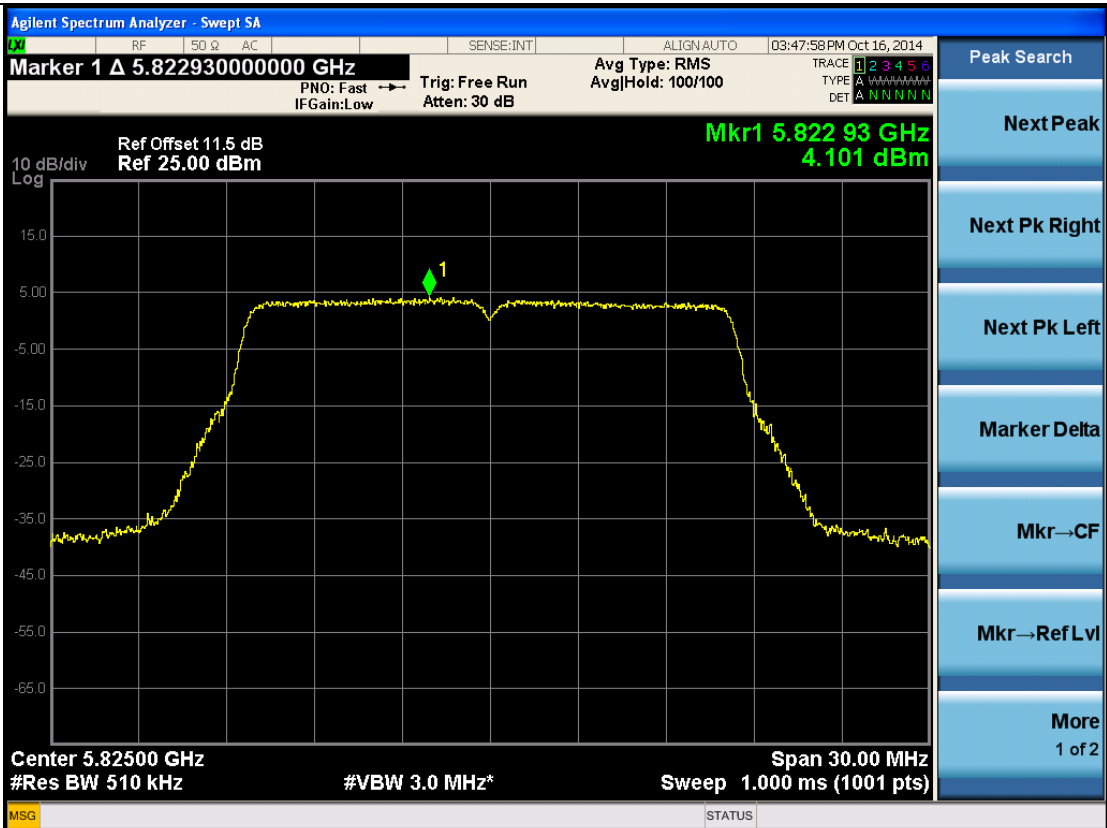
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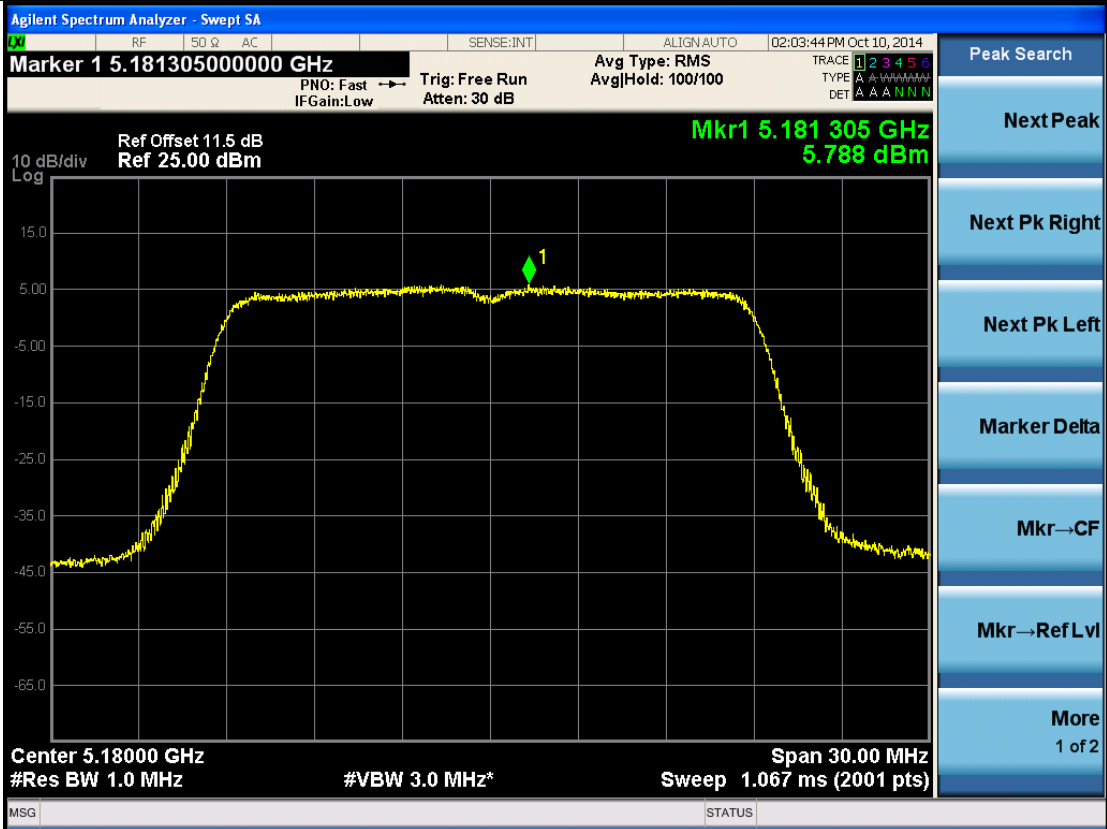
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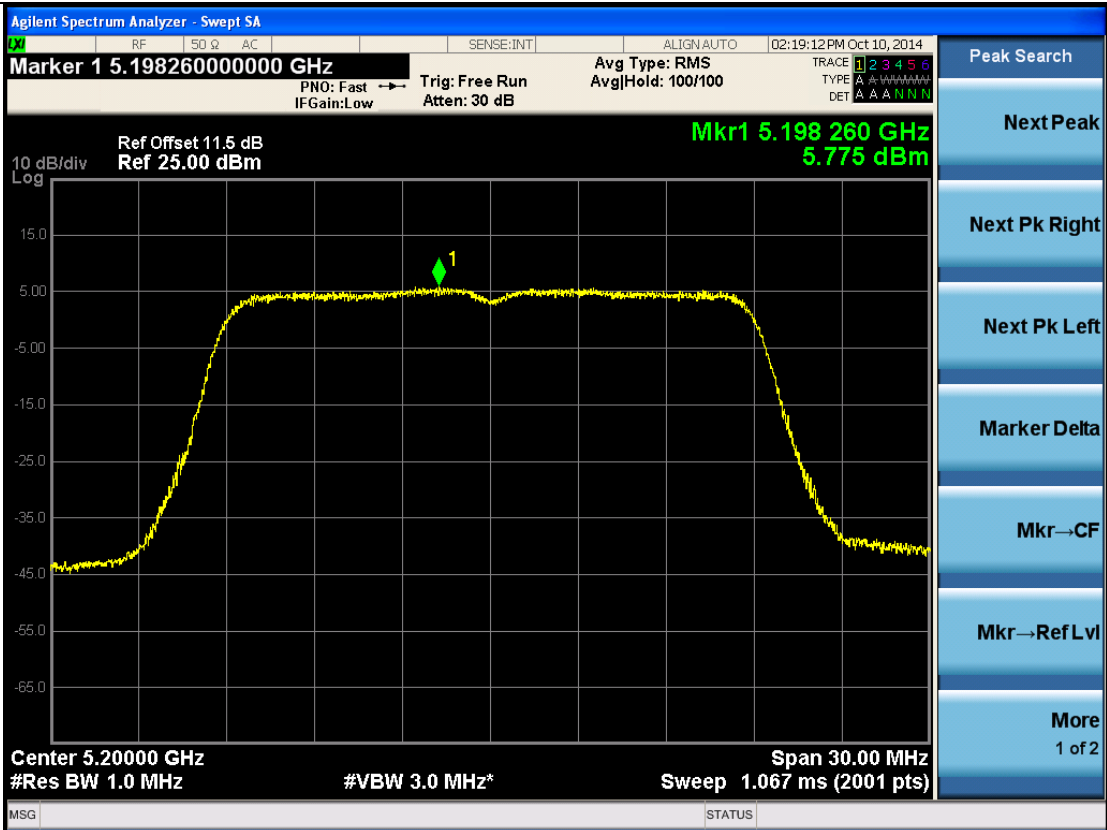
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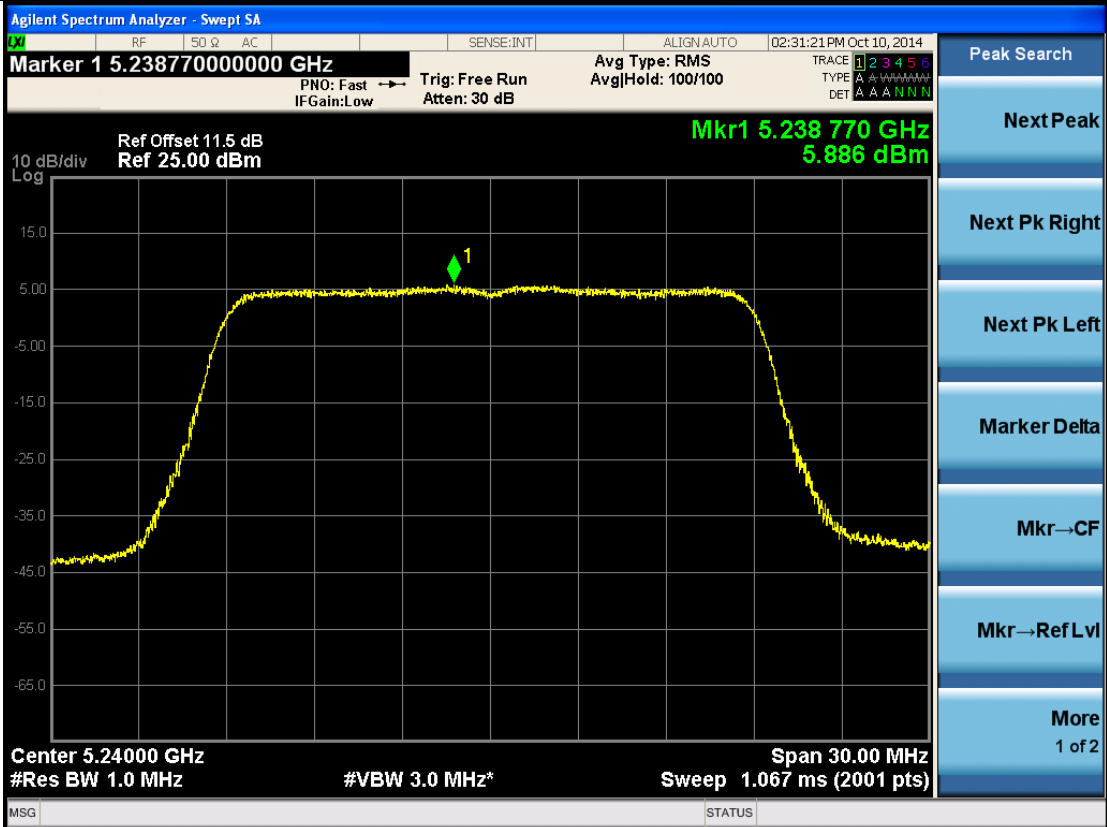
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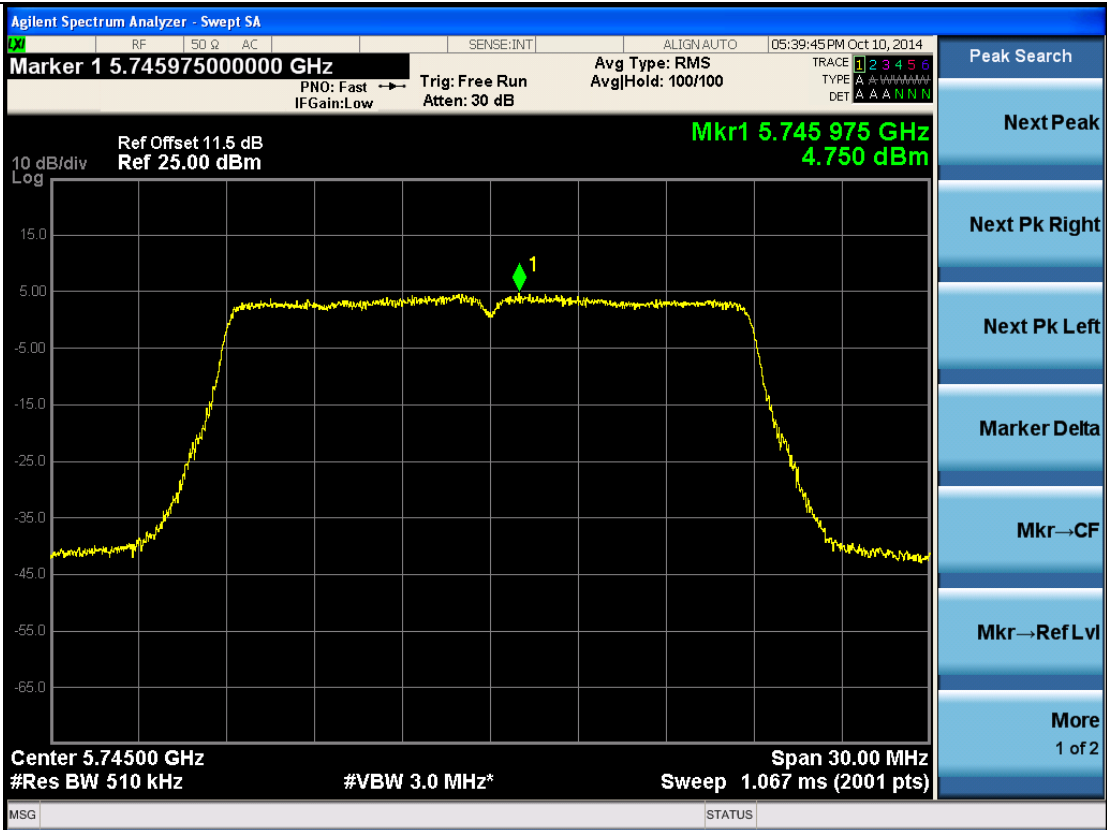
802.11 n20-5200



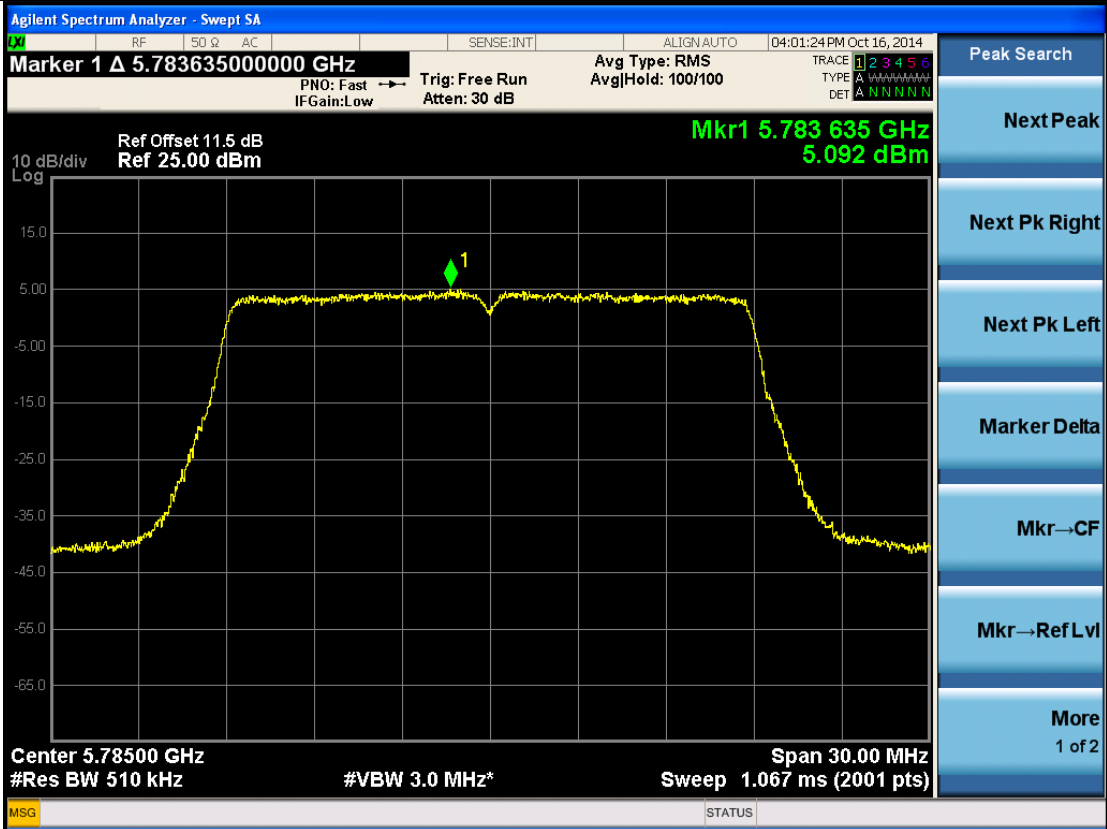
802.11 n20-5240



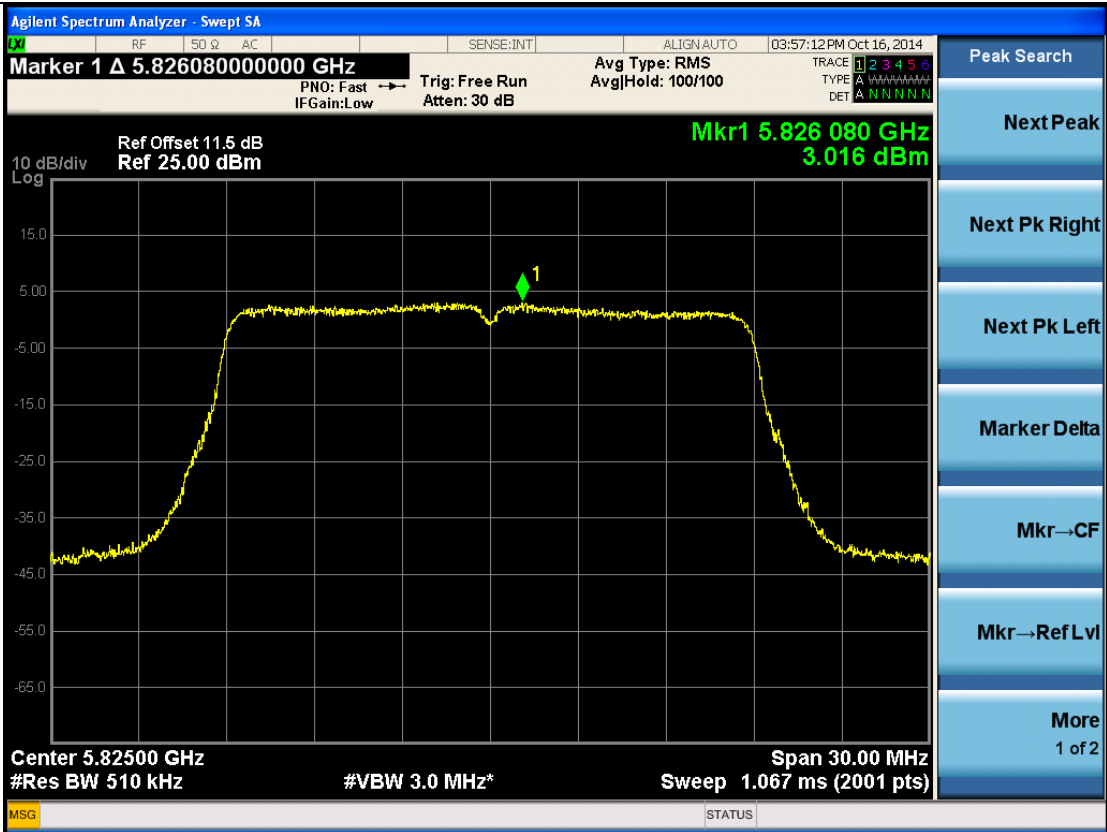
802.11 n20-5745



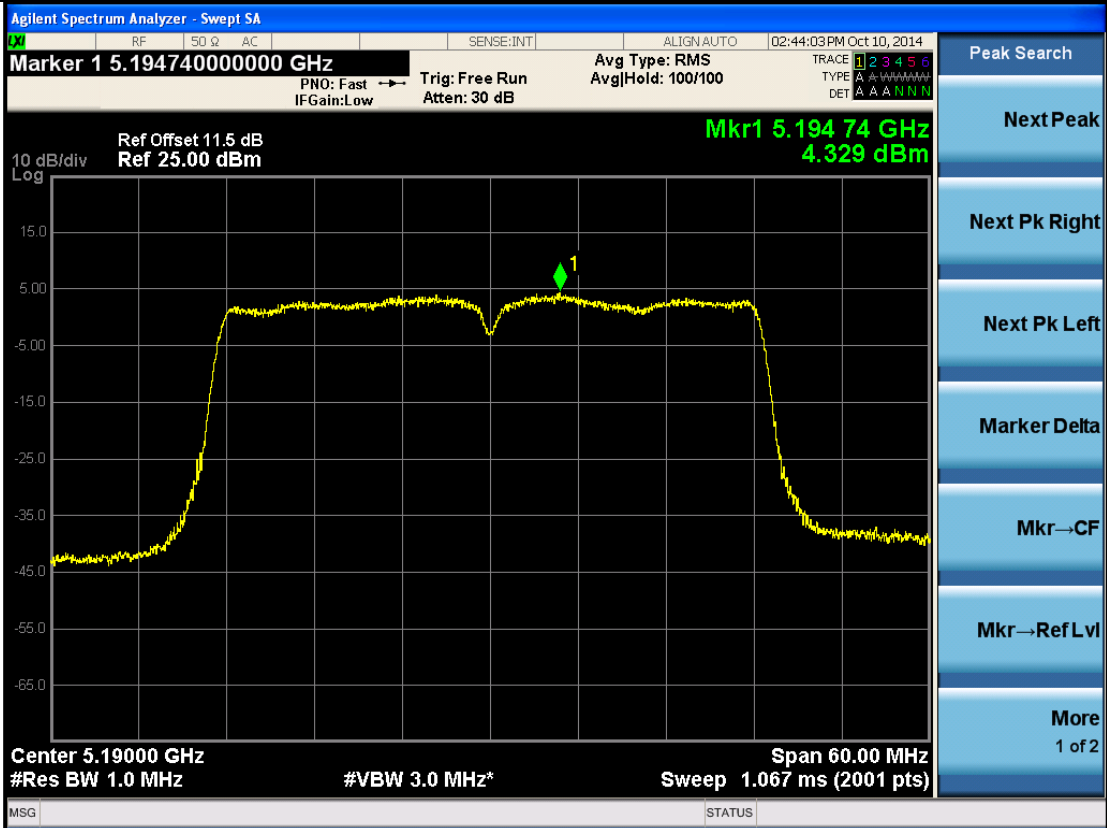
802.11 n20-5785



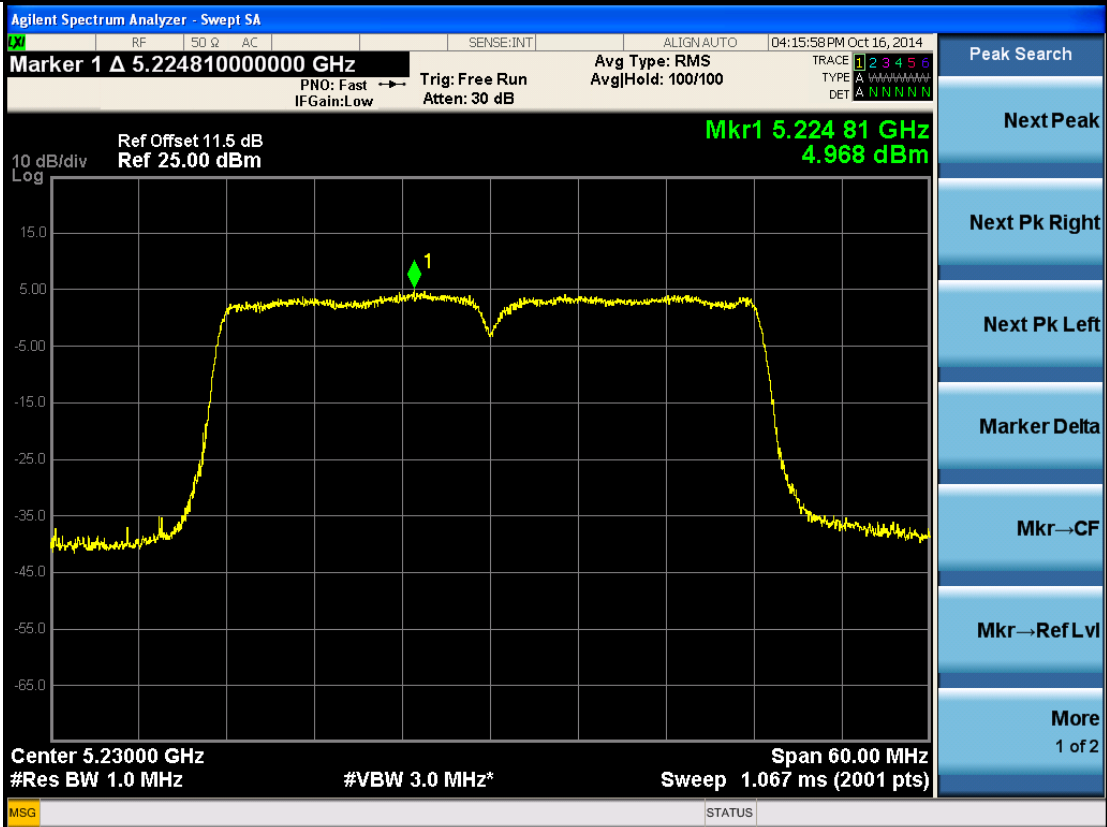
802.11 n20-5825



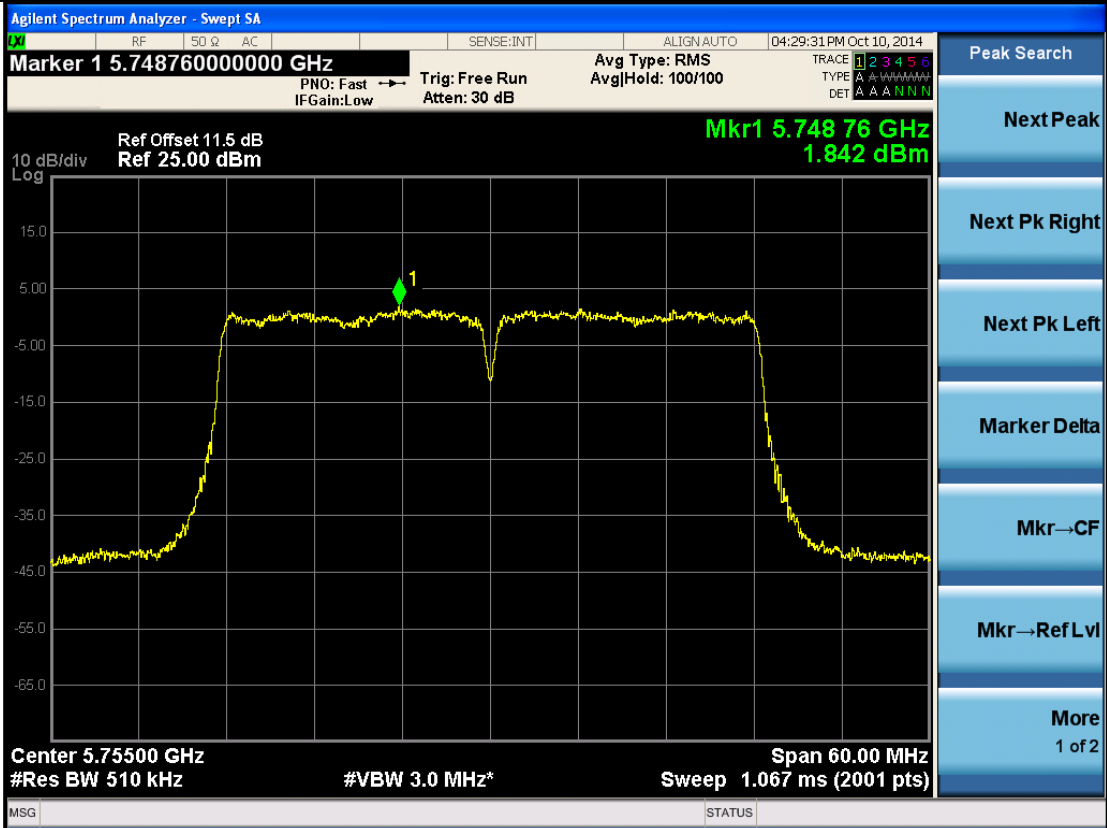
802.11n40-5190



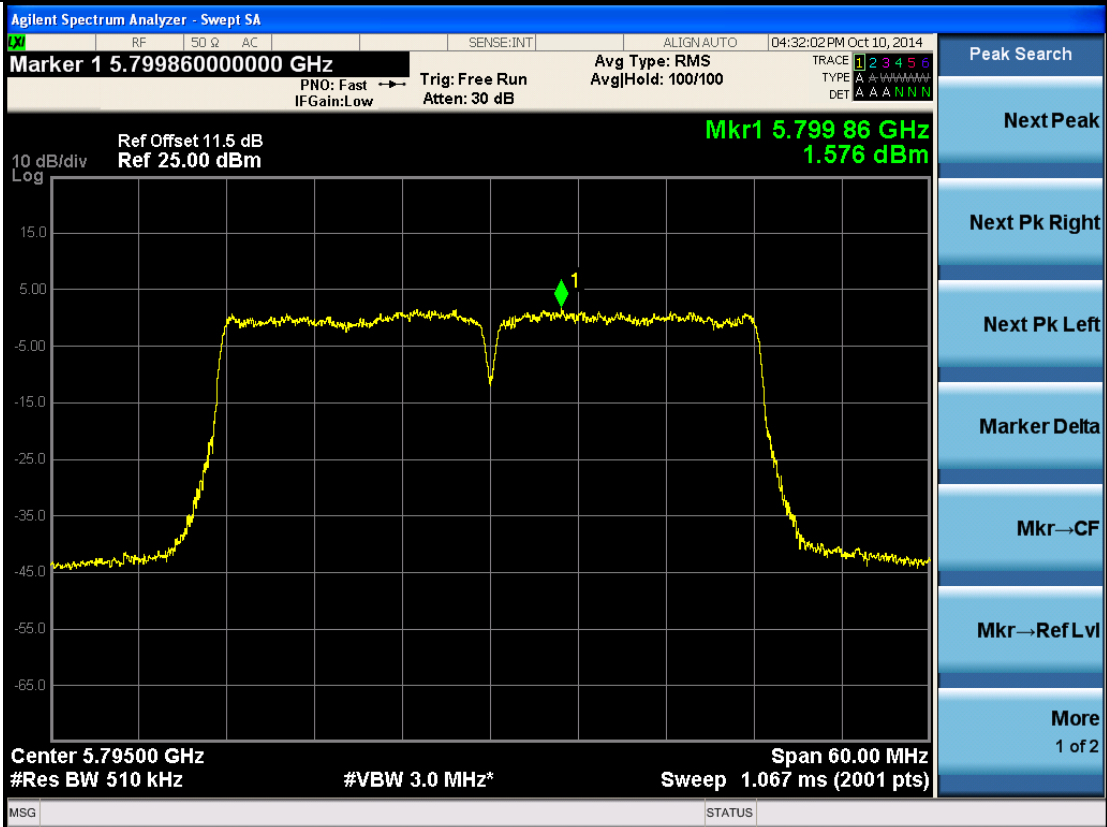
802.11n40-5230



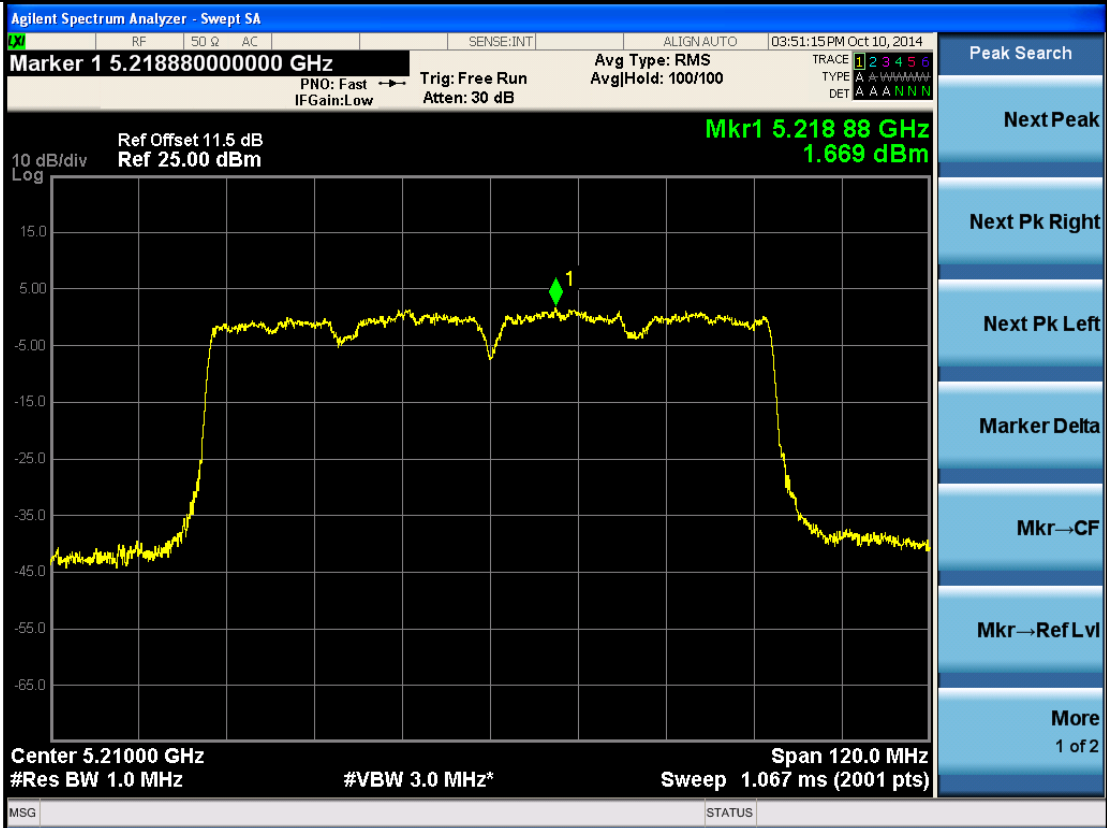
802.11n40-5755



802.11n40-5795



802.11ac80-5210

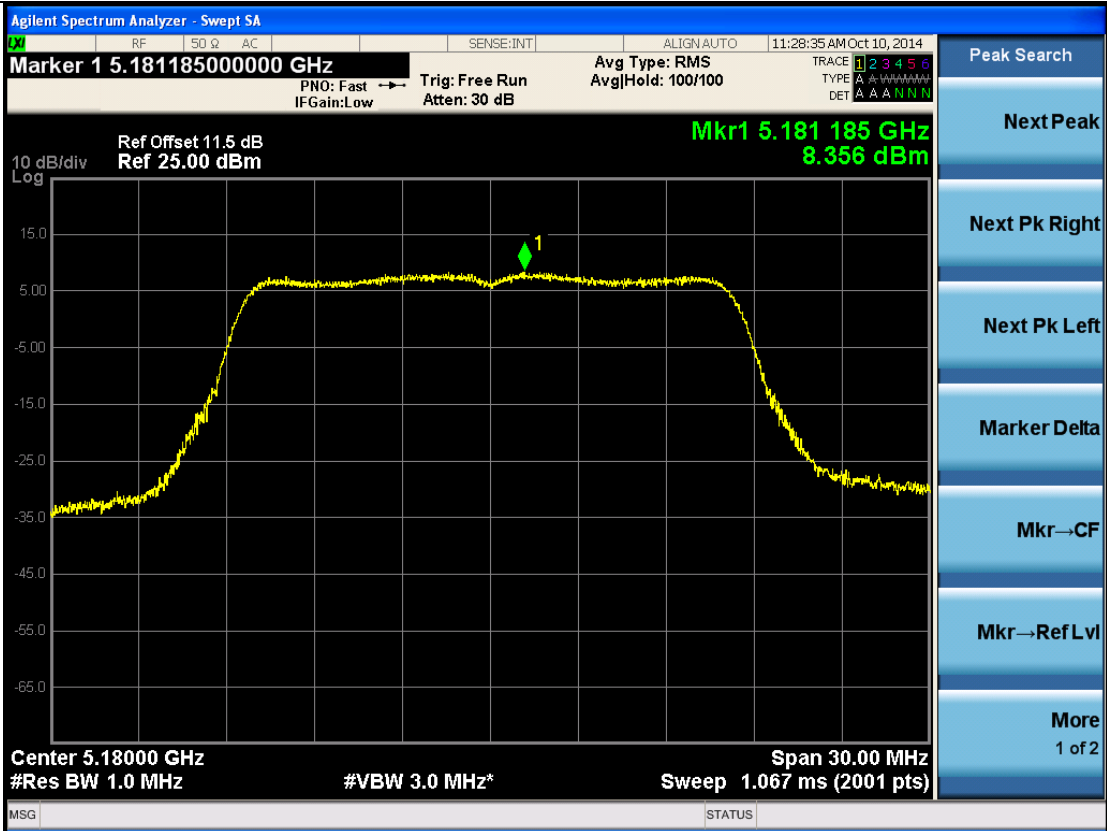


802.11ac80-5775

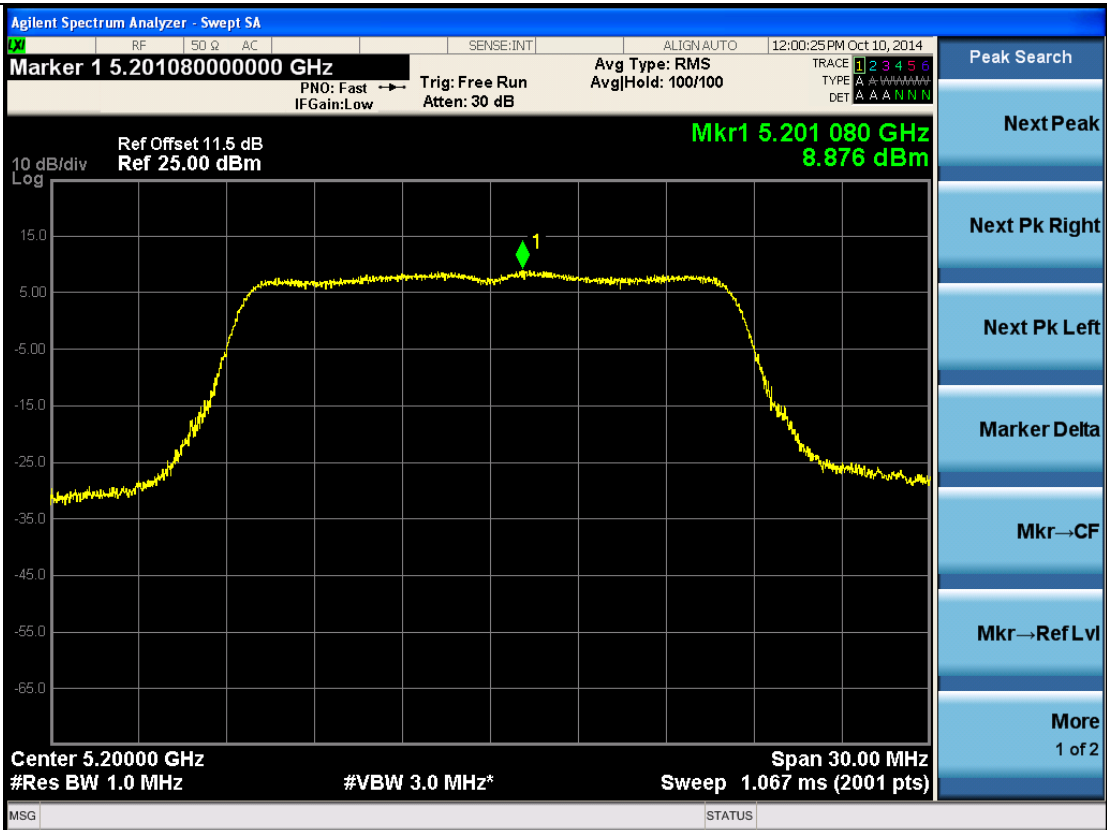


Port 2

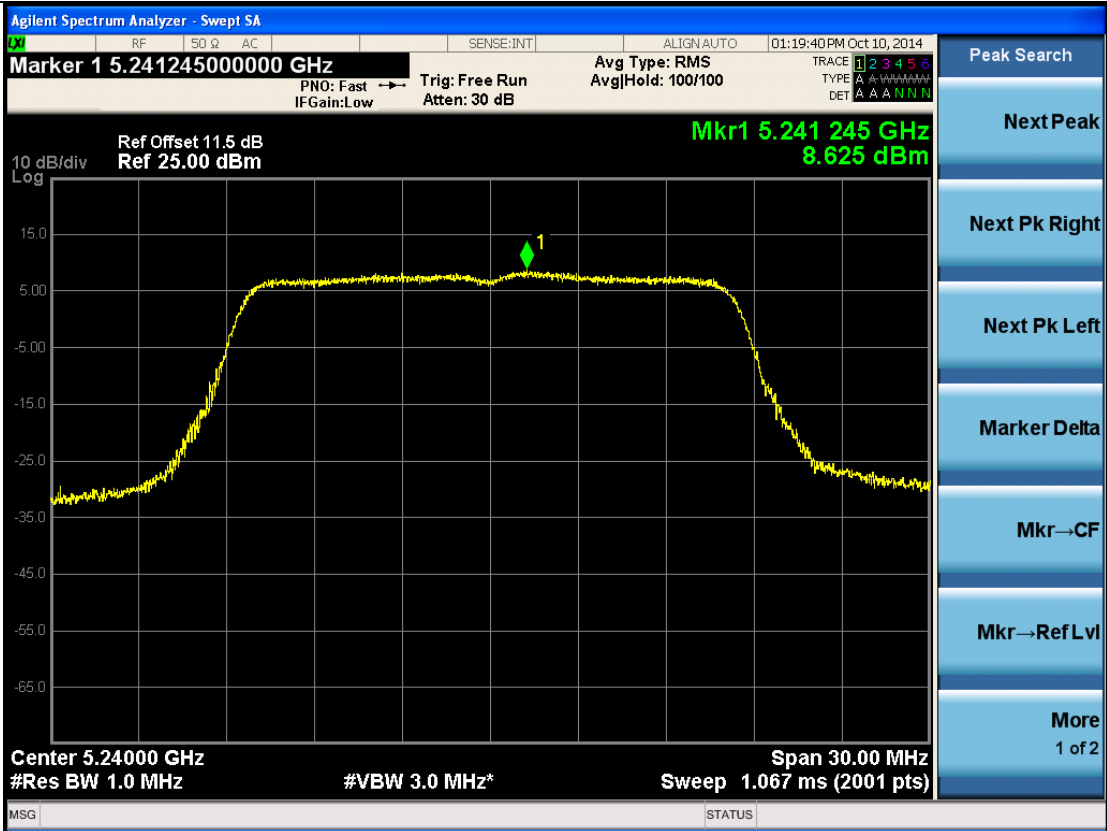
802.11a-5180



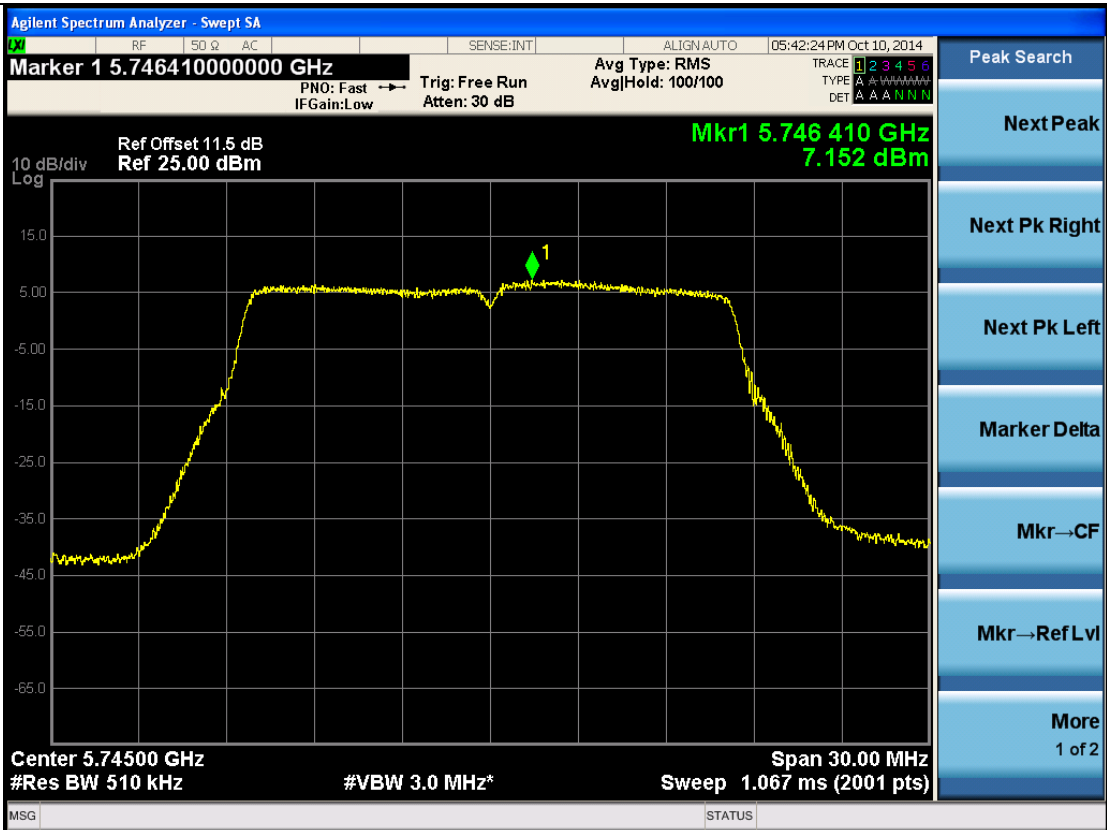
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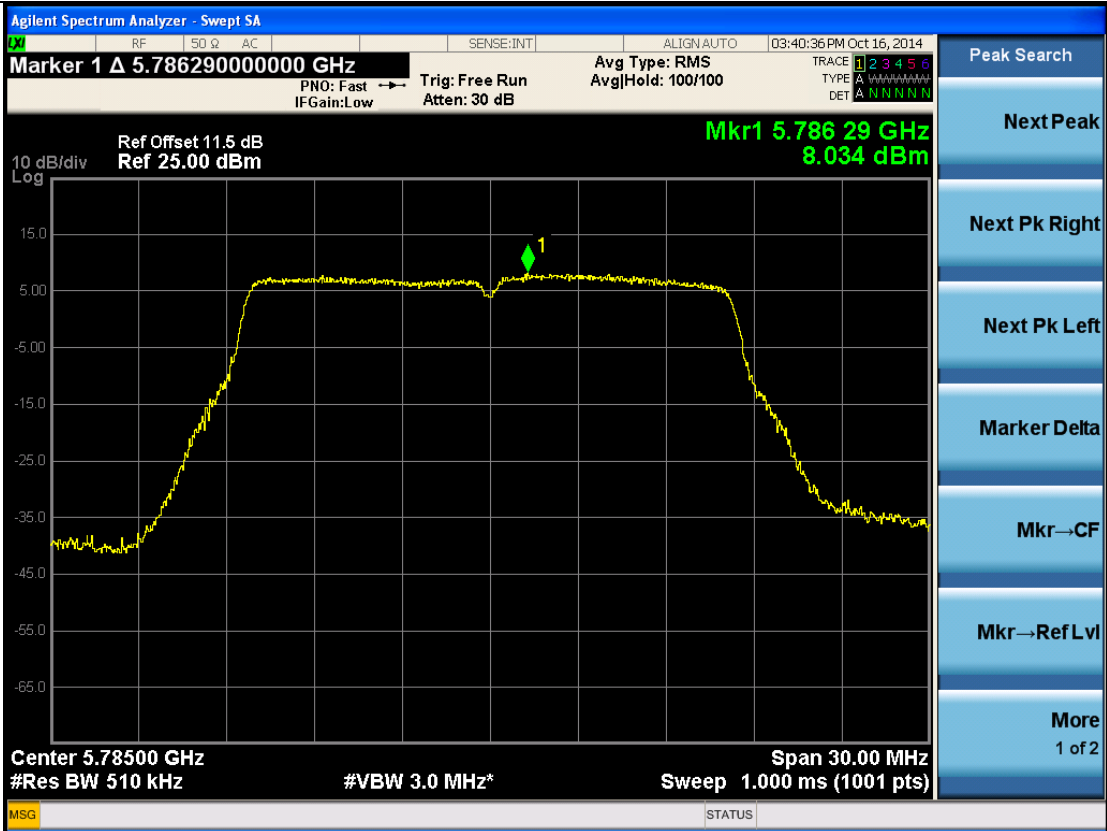
802.11a-5240



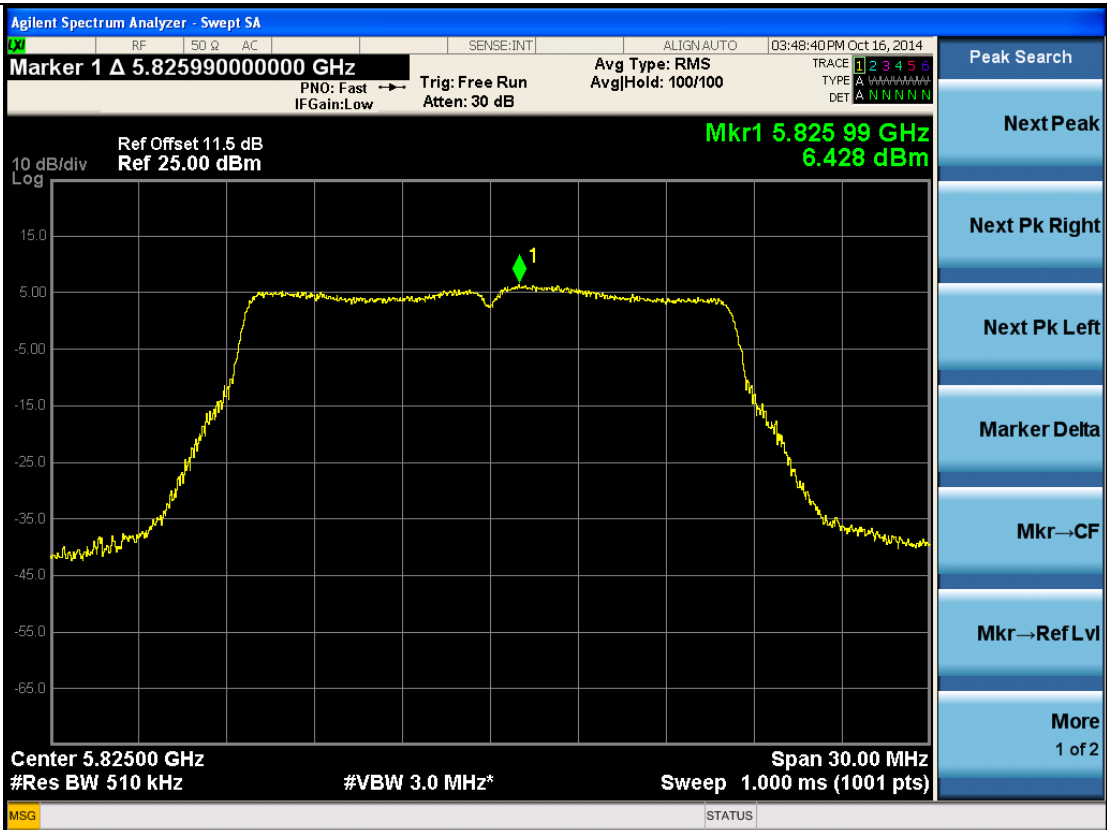
802.11a-5745



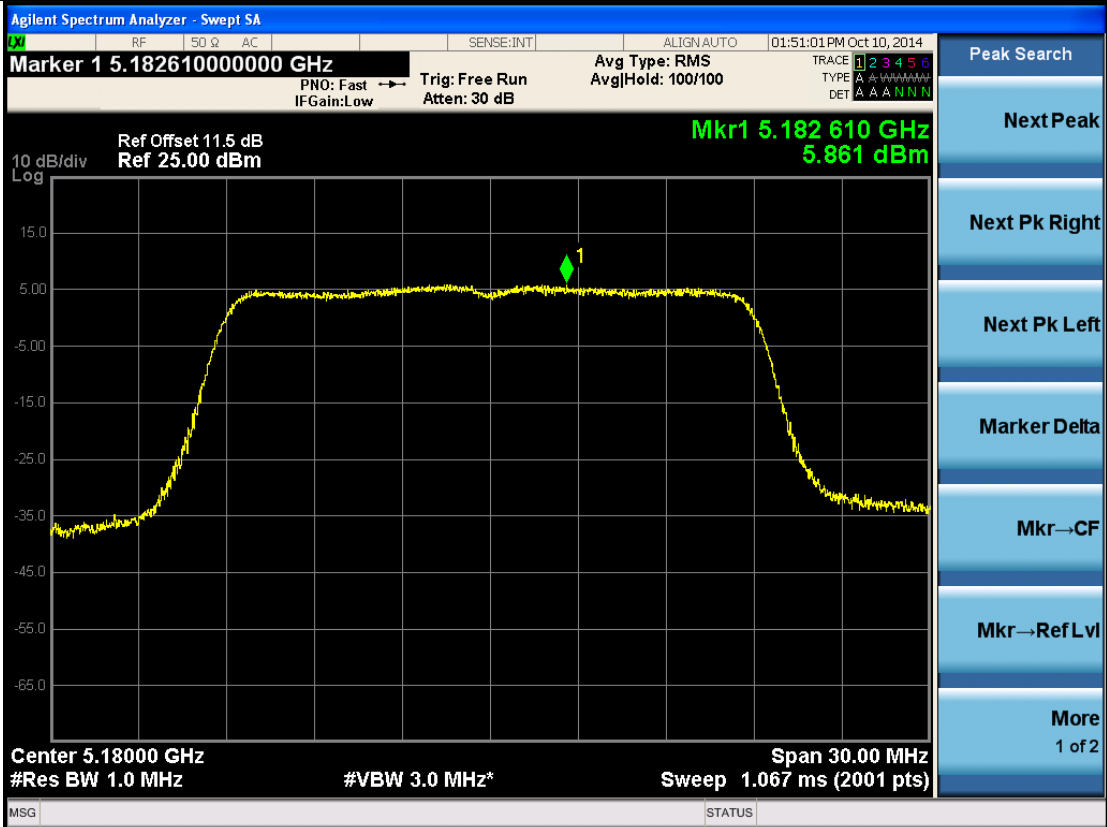
802.11a-5785



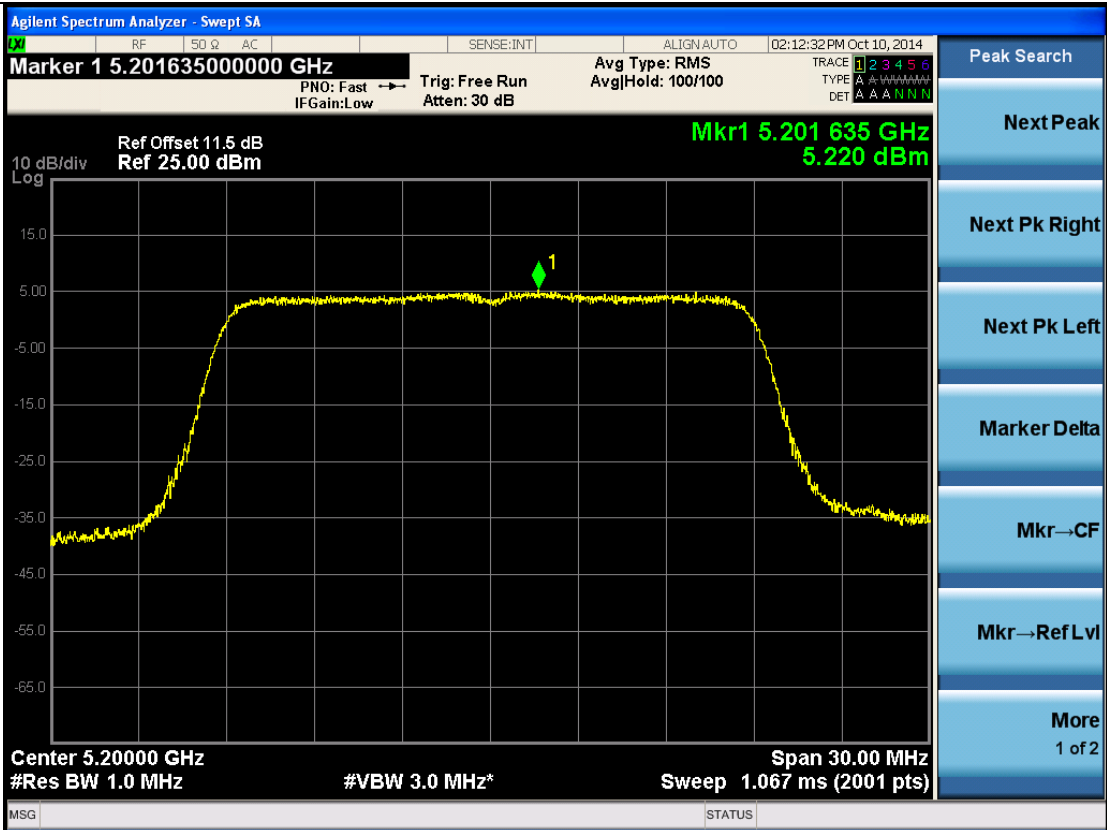
802.11a-5825



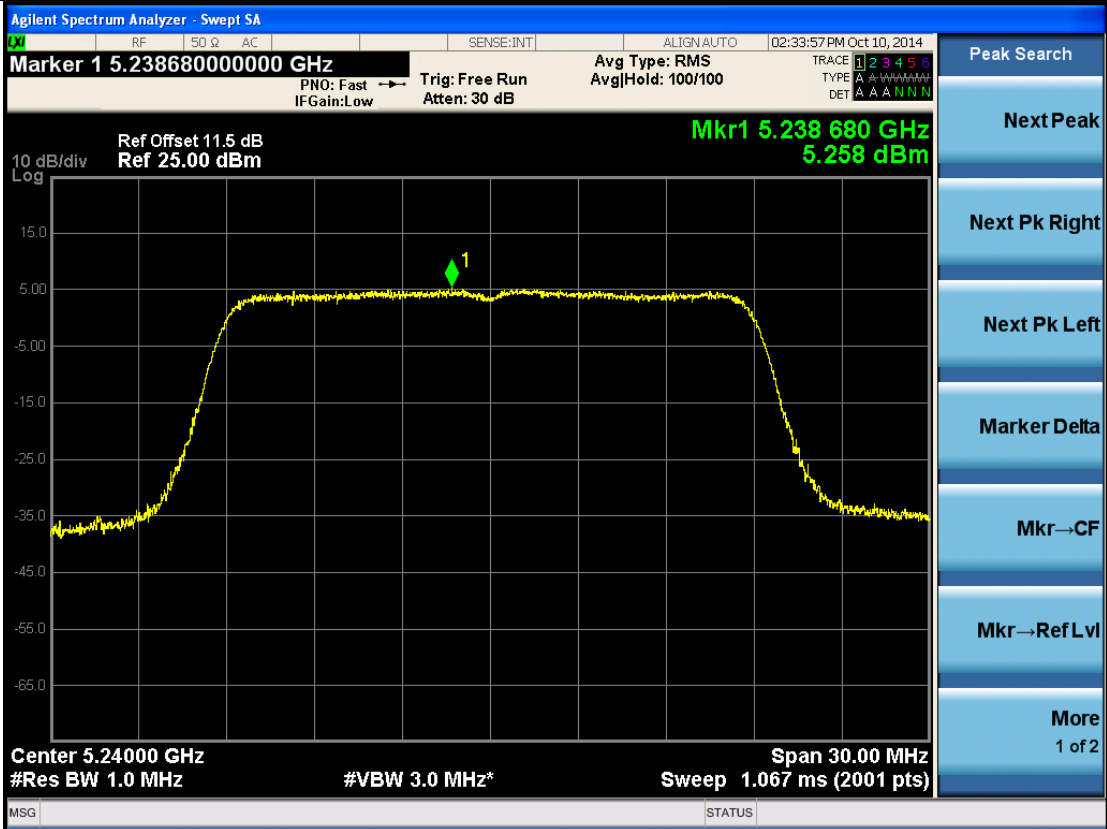
802.11n20-5180



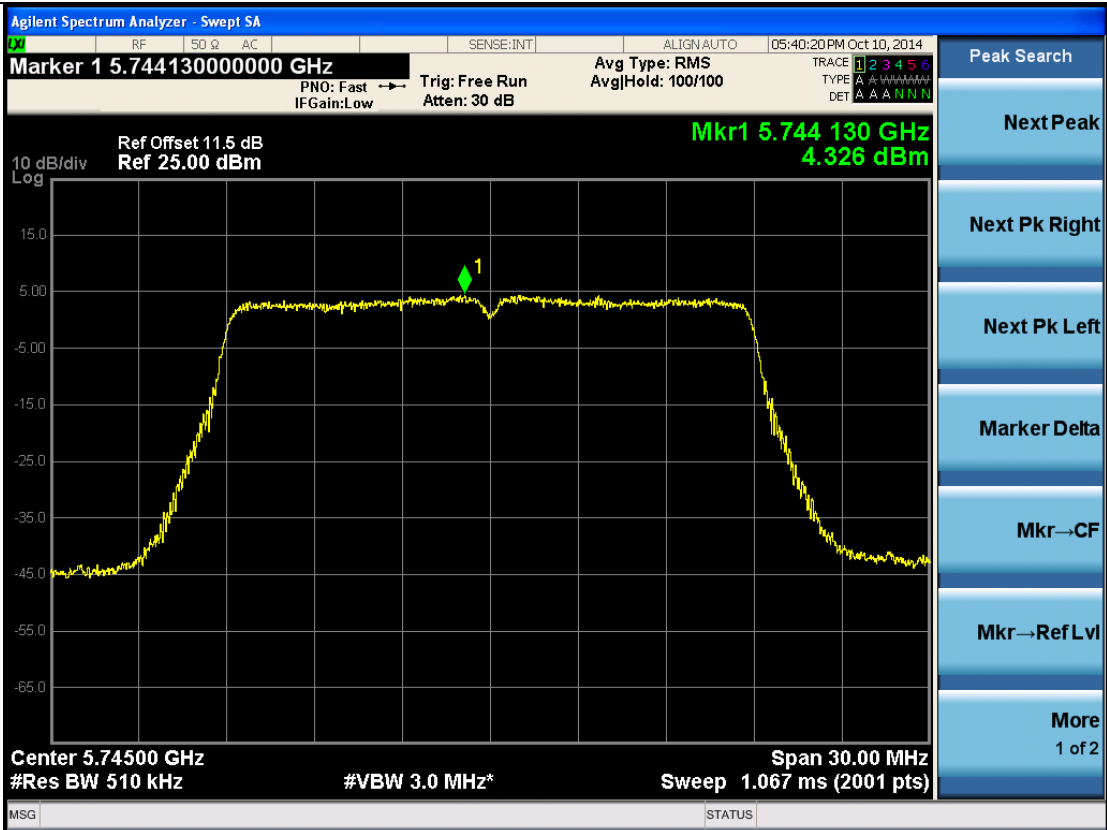
802.11 n20-5200



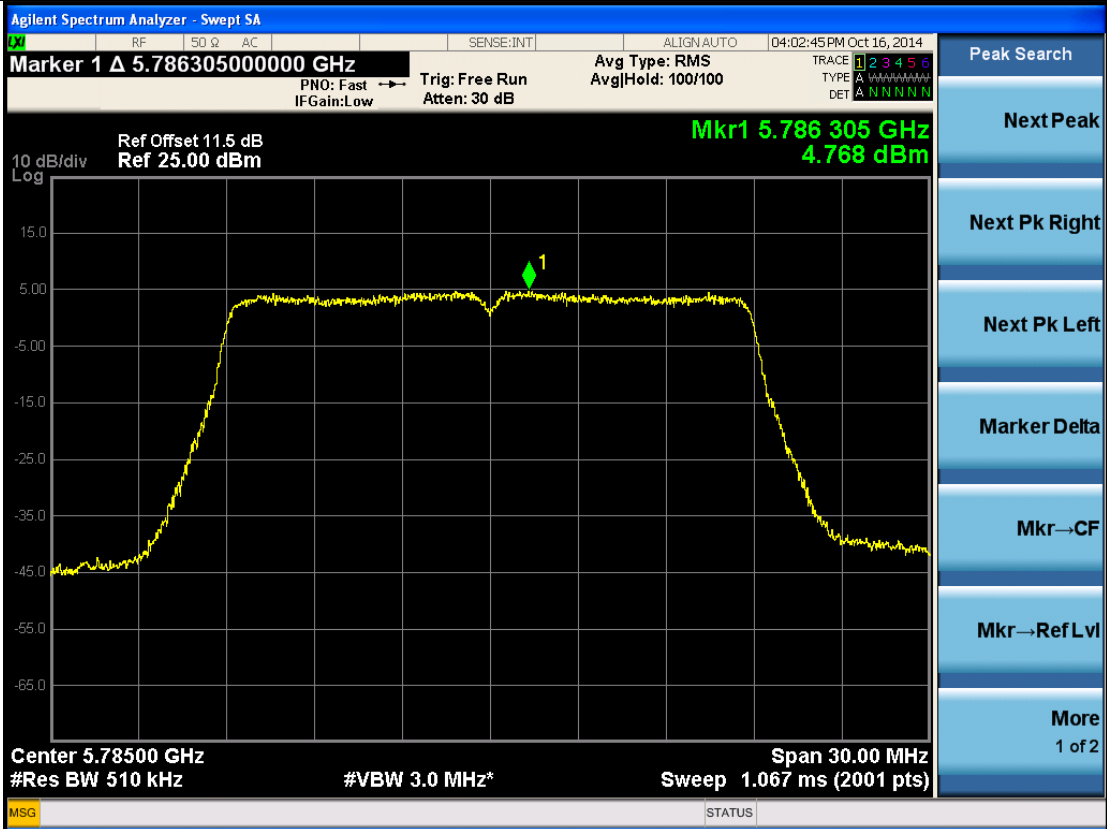
802.11 n20-5240



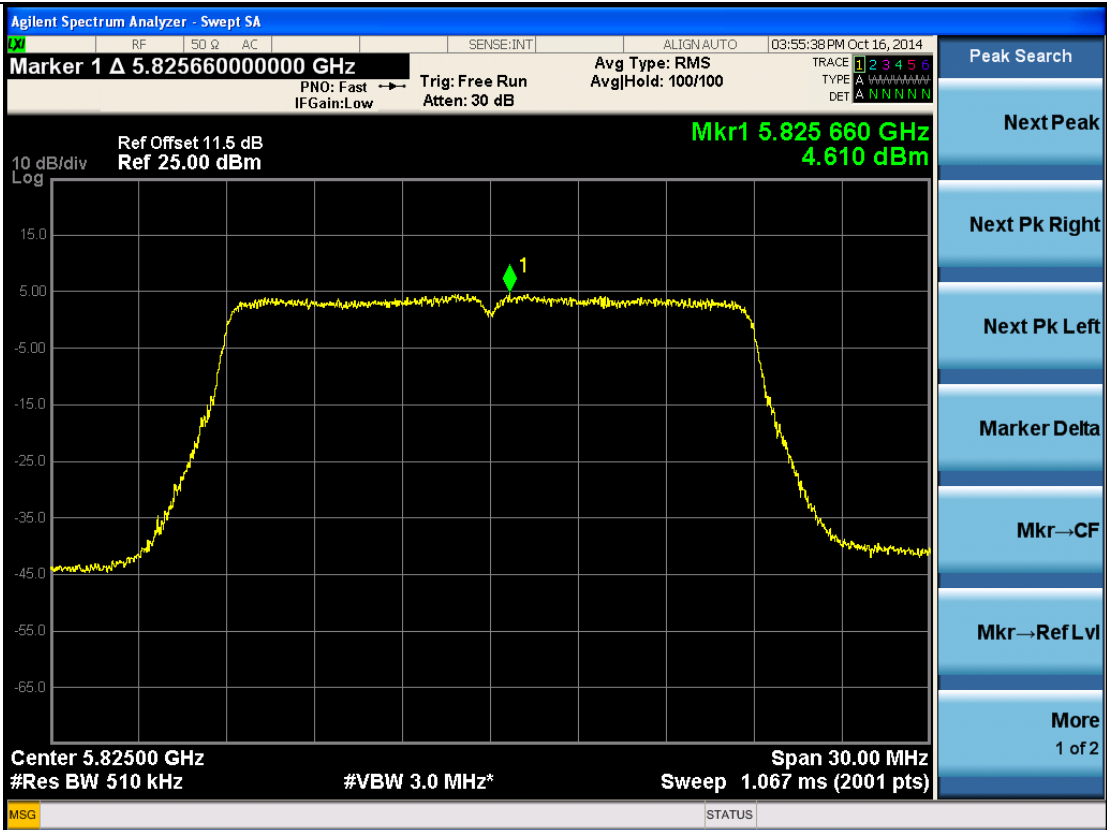
802.11 n20-5745



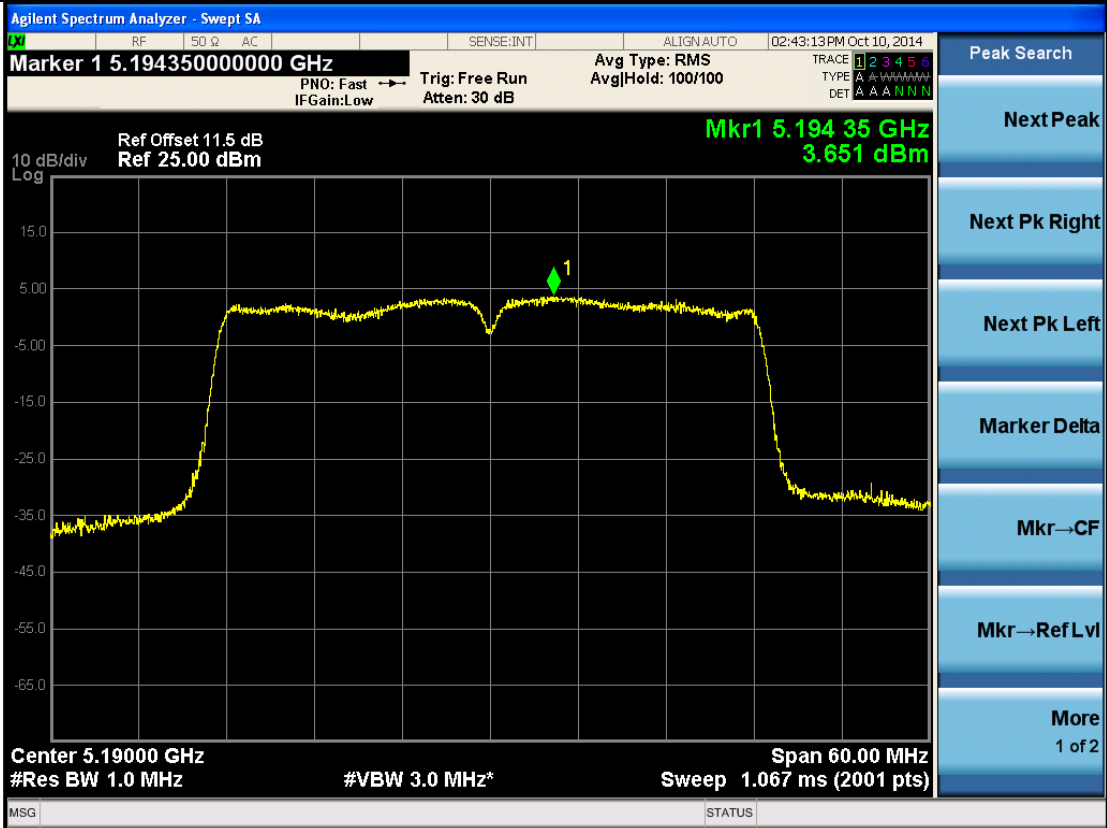
802.11 n20-5785



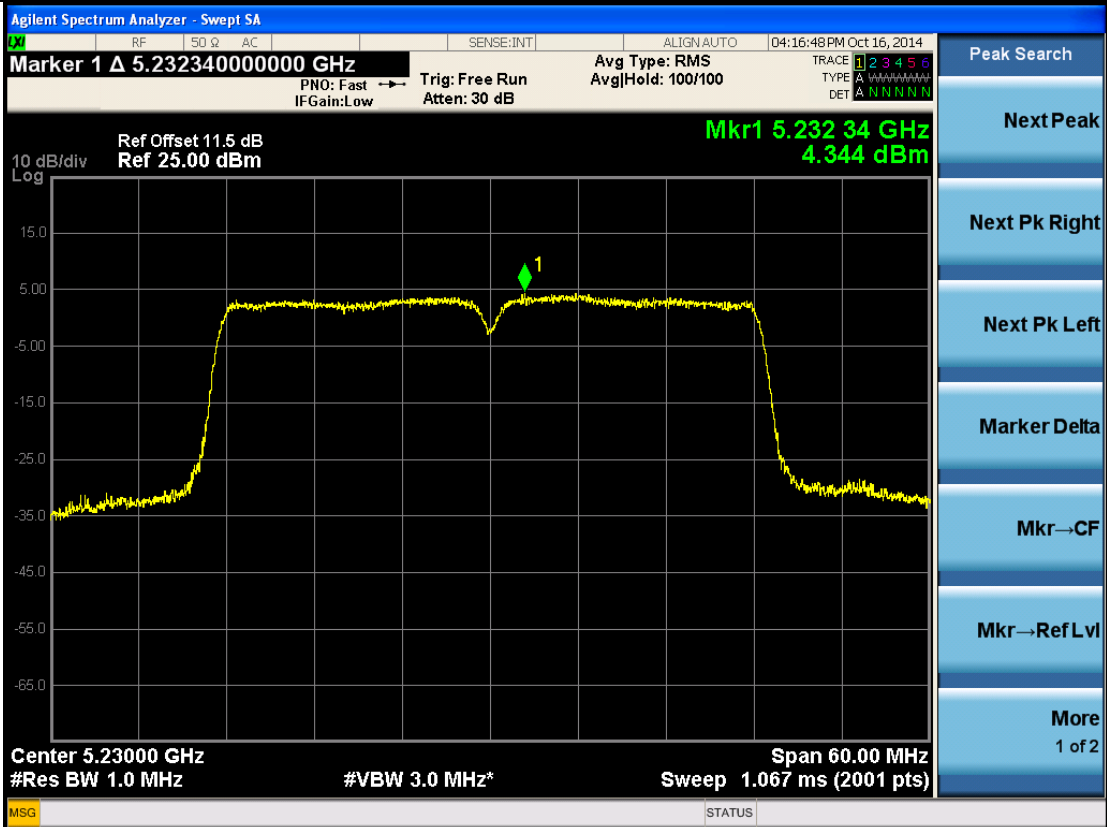
802.11 n20-5825



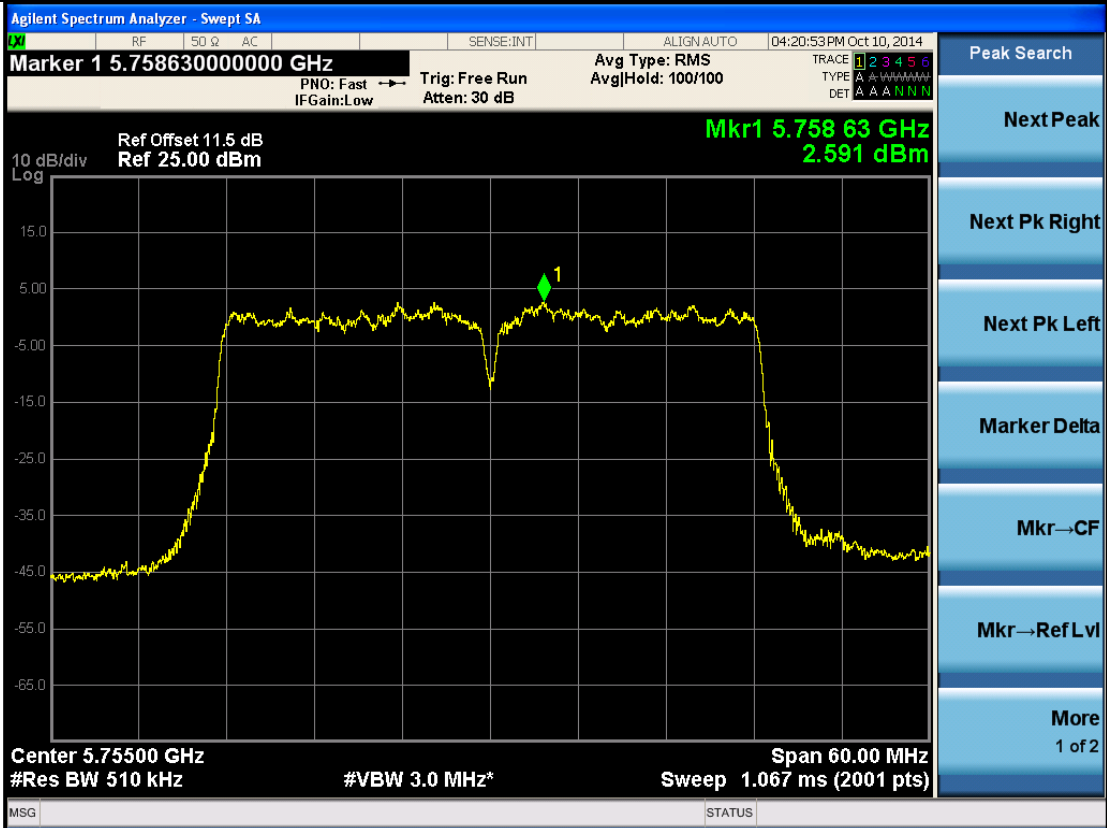
802.11n40-5190



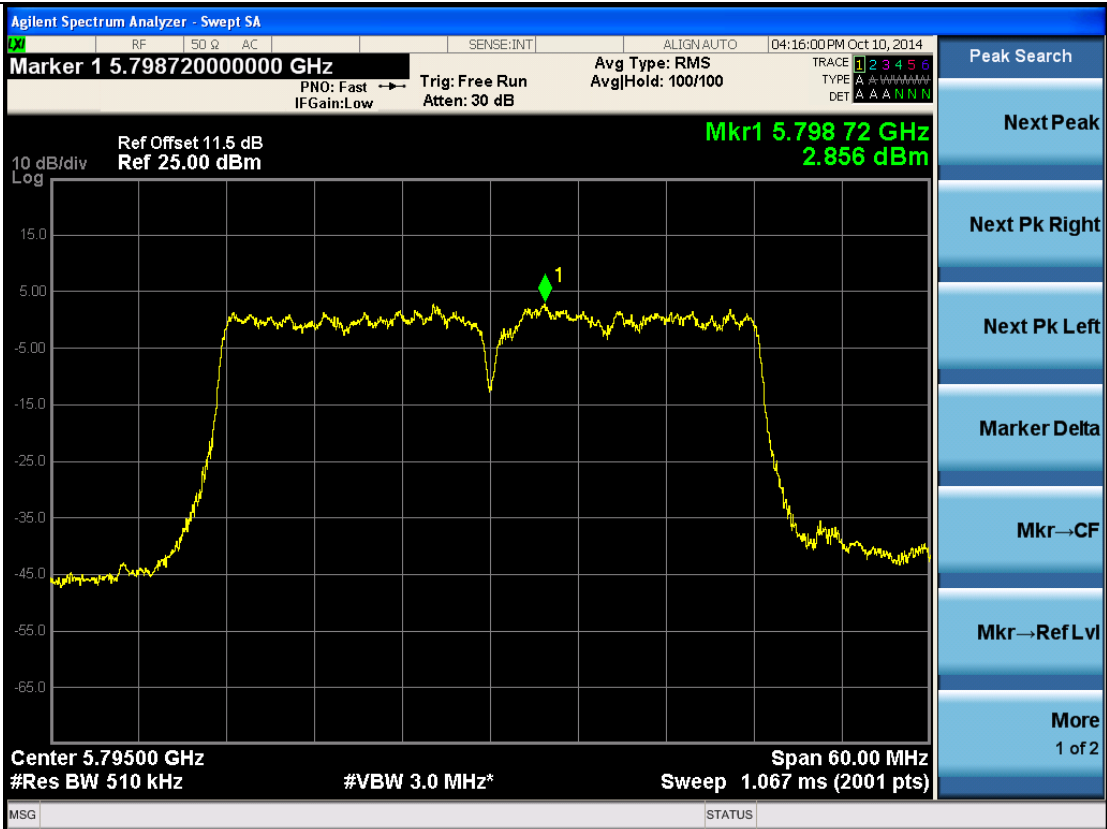
802.11n40-5230



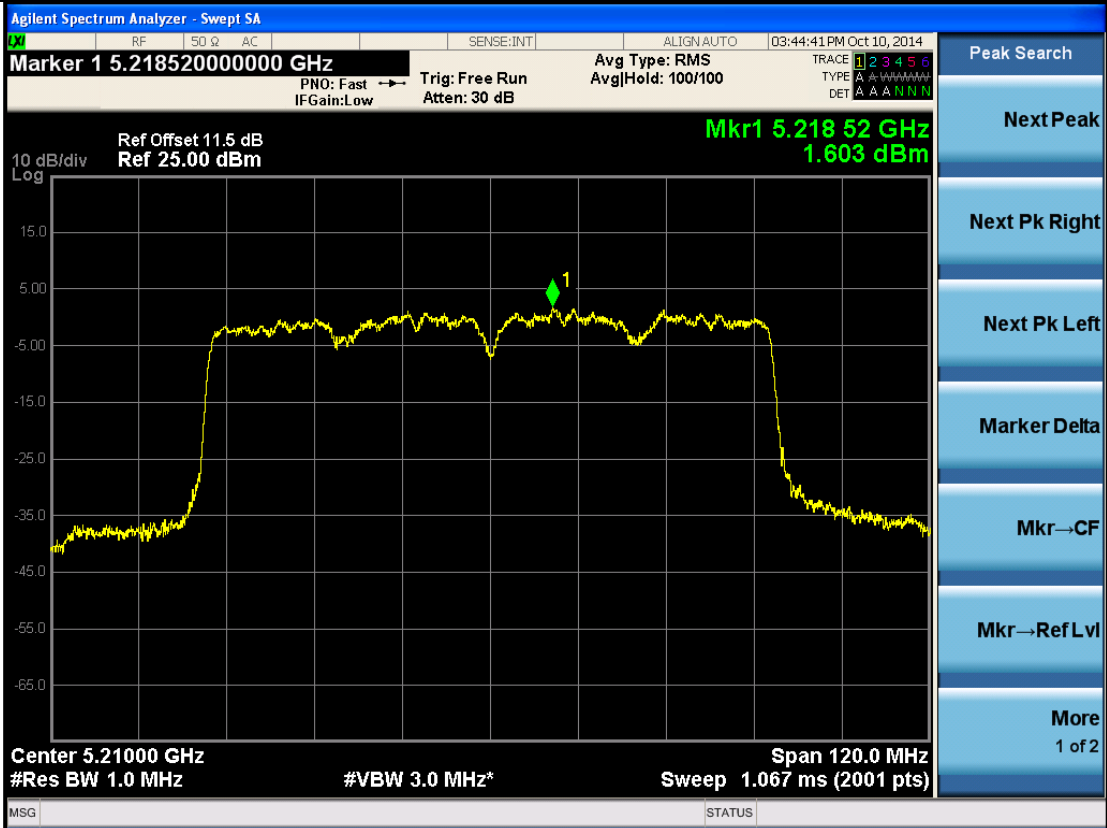
802.11n40-5755



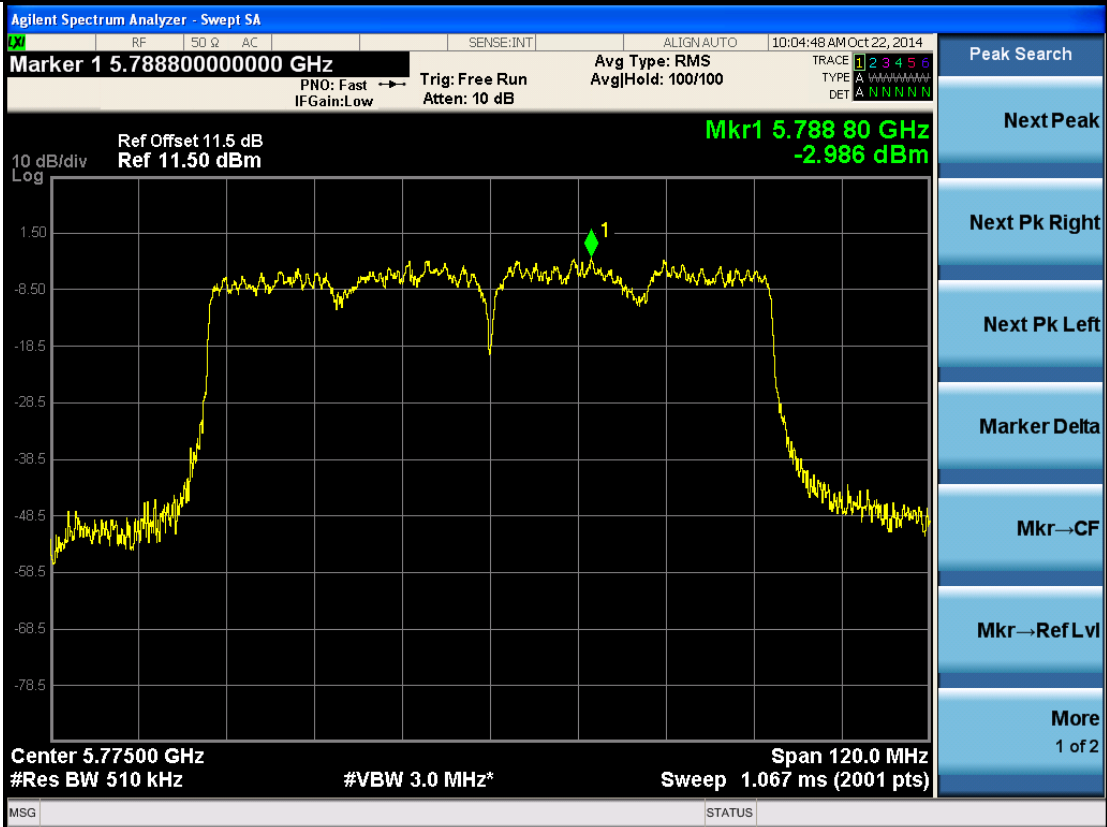
802.11n40-5795



802.11ac80-5210



802.11ac80-5775



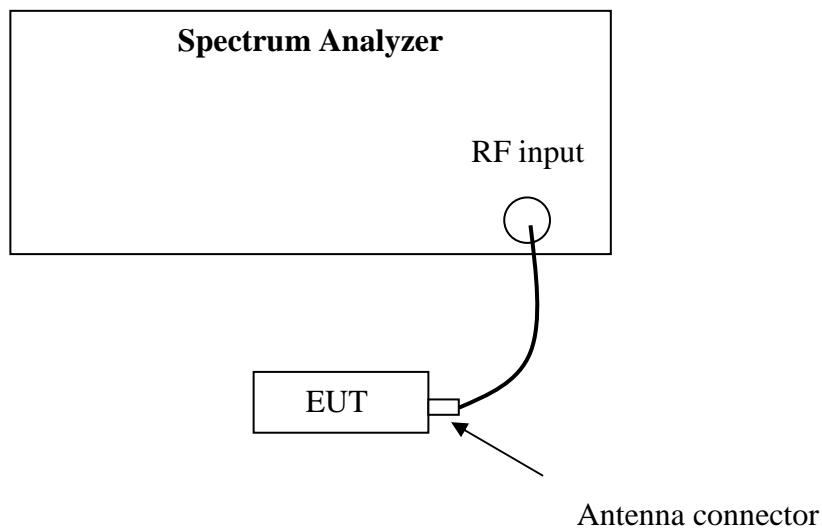
5. Minimum 6dB Bandwidth

Test result: PASS

5.1 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.

5.2 Test Configuration



5.3 Test Procedure and test setup

The power spectrum density per FCC §15.407(a)(6) was measured from the antenna port of the EUT. Using a 50ohm spectrum analyzer (measurement method refers to KDB 789033D02: Section C).

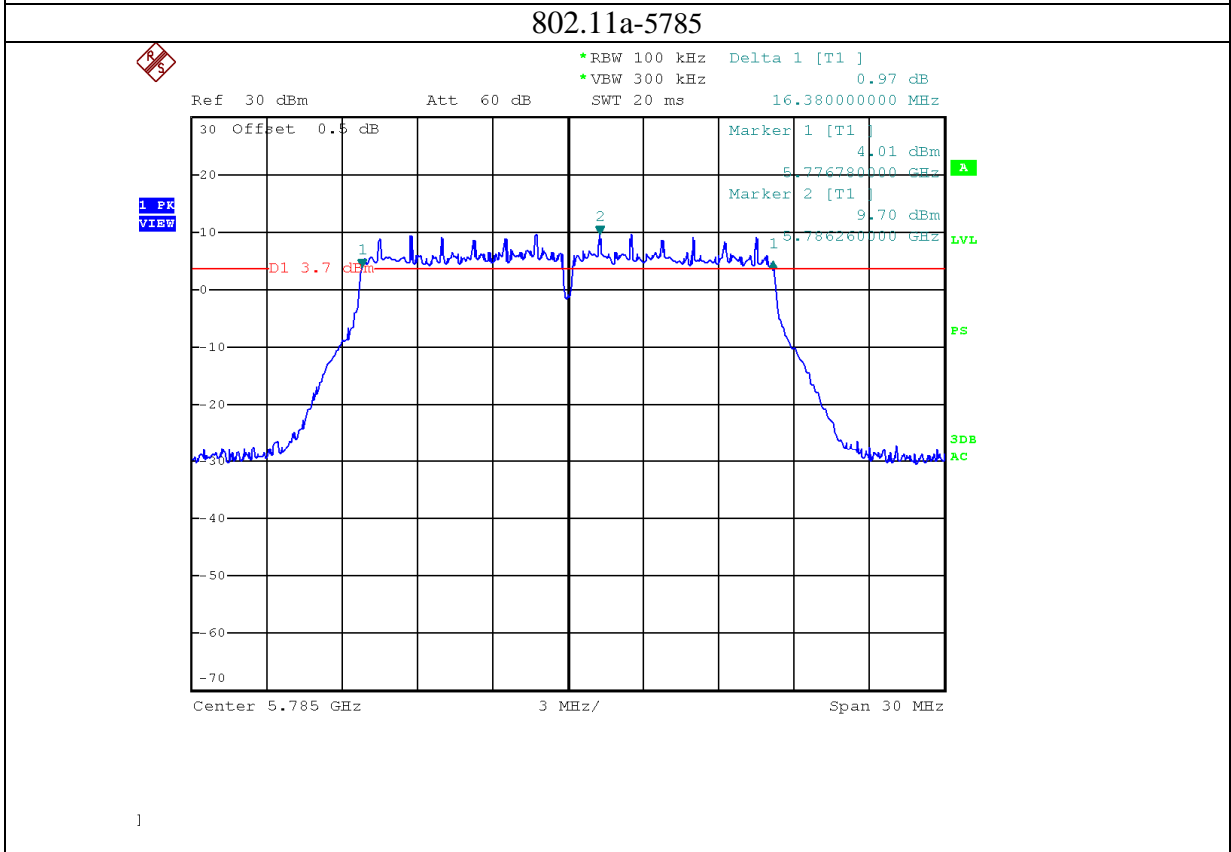
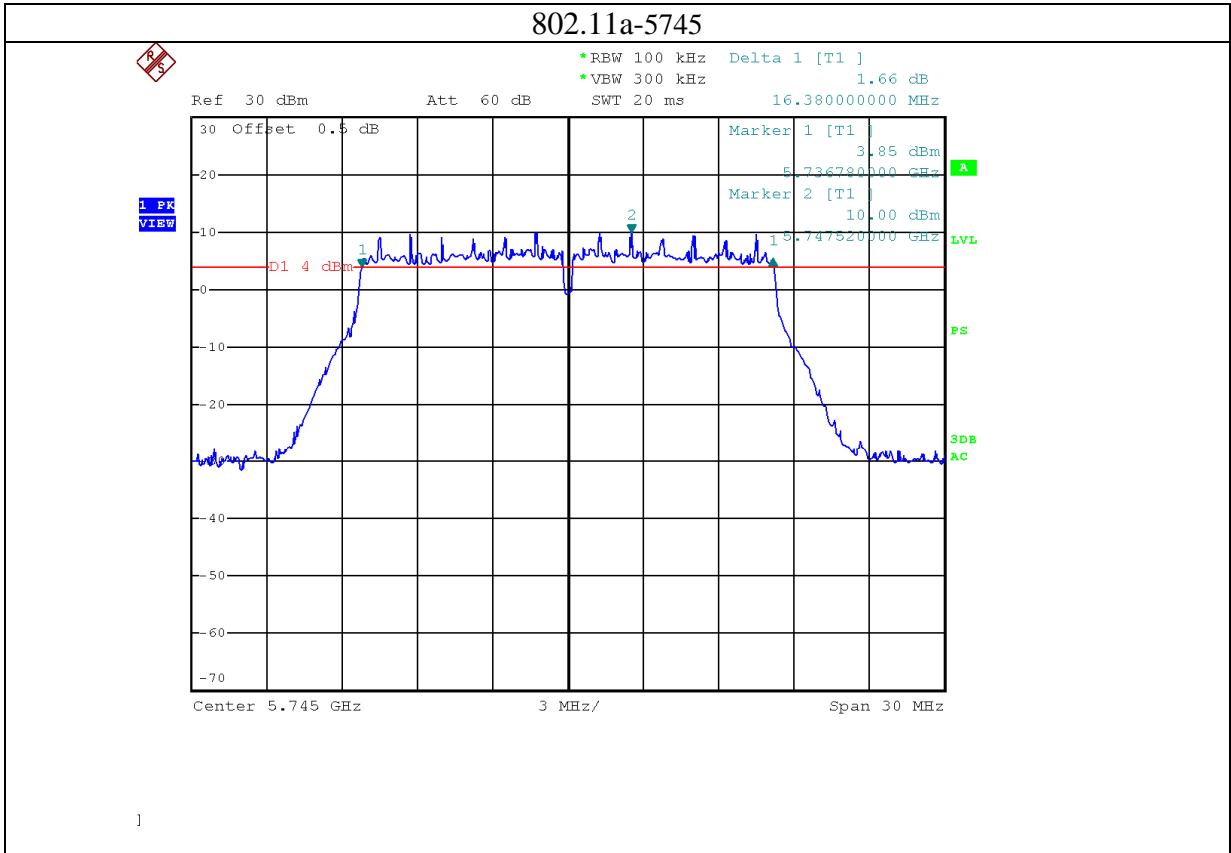


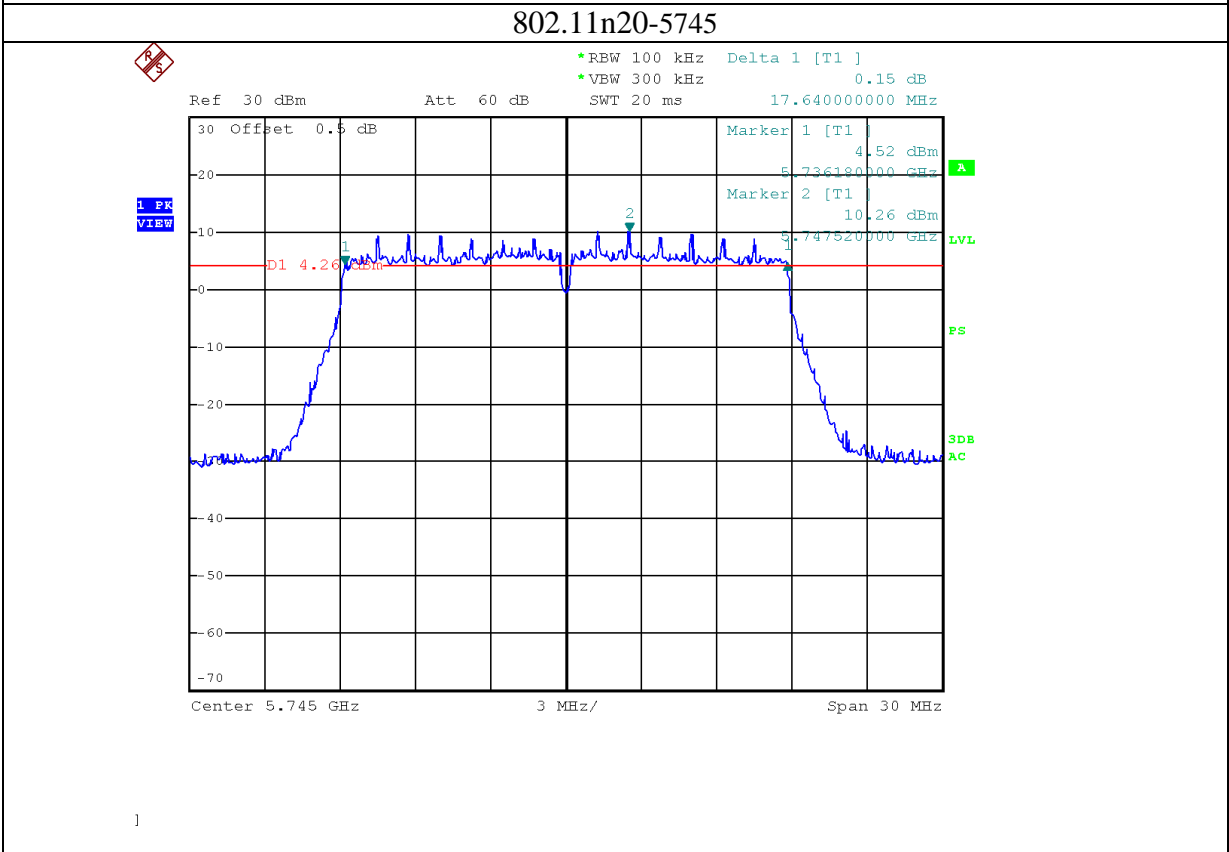
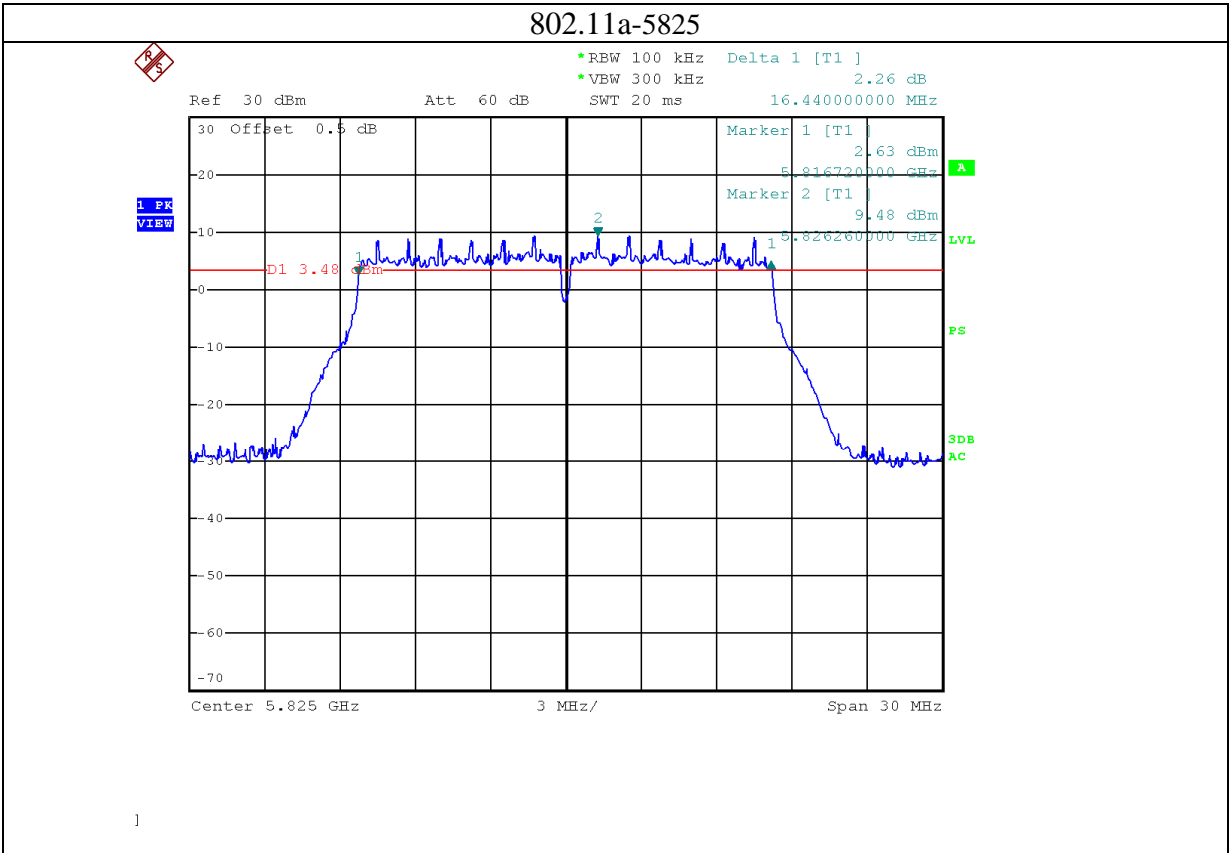
5.4 Test Protocol

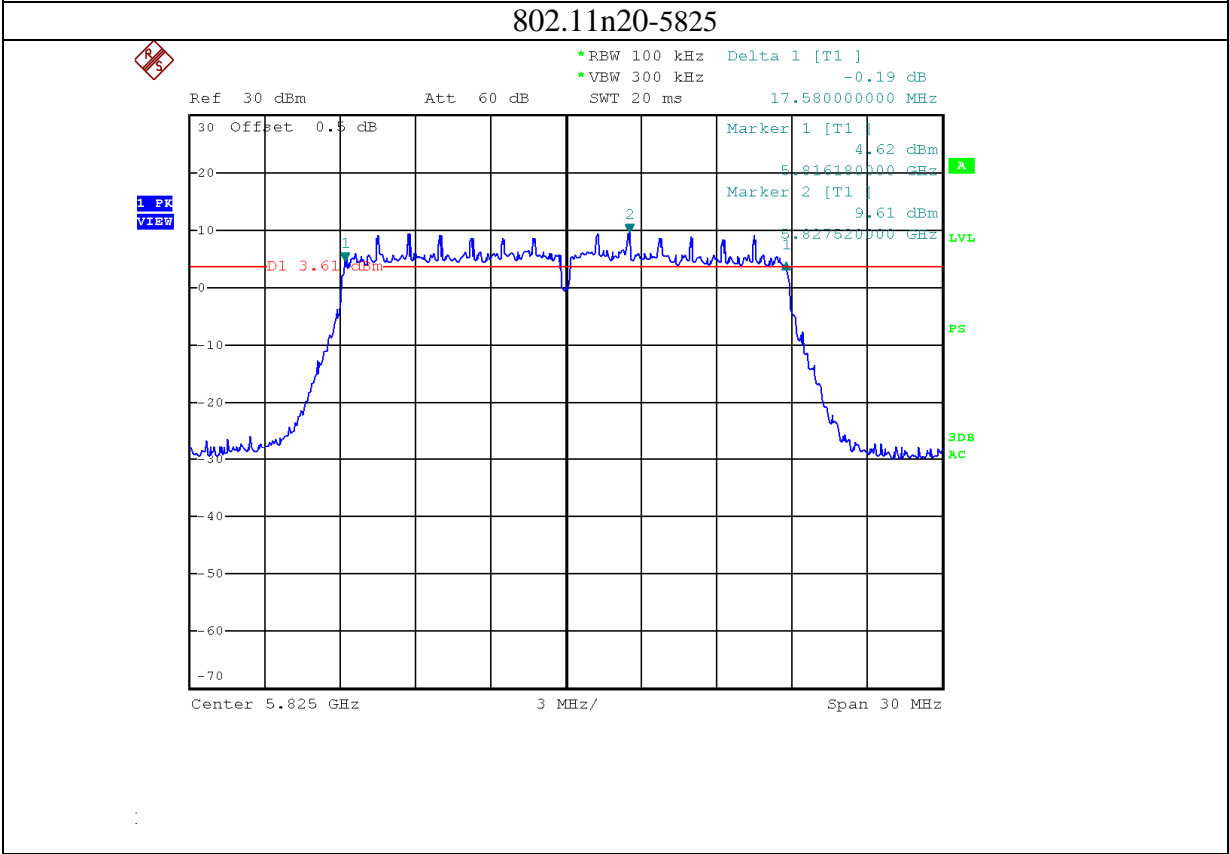
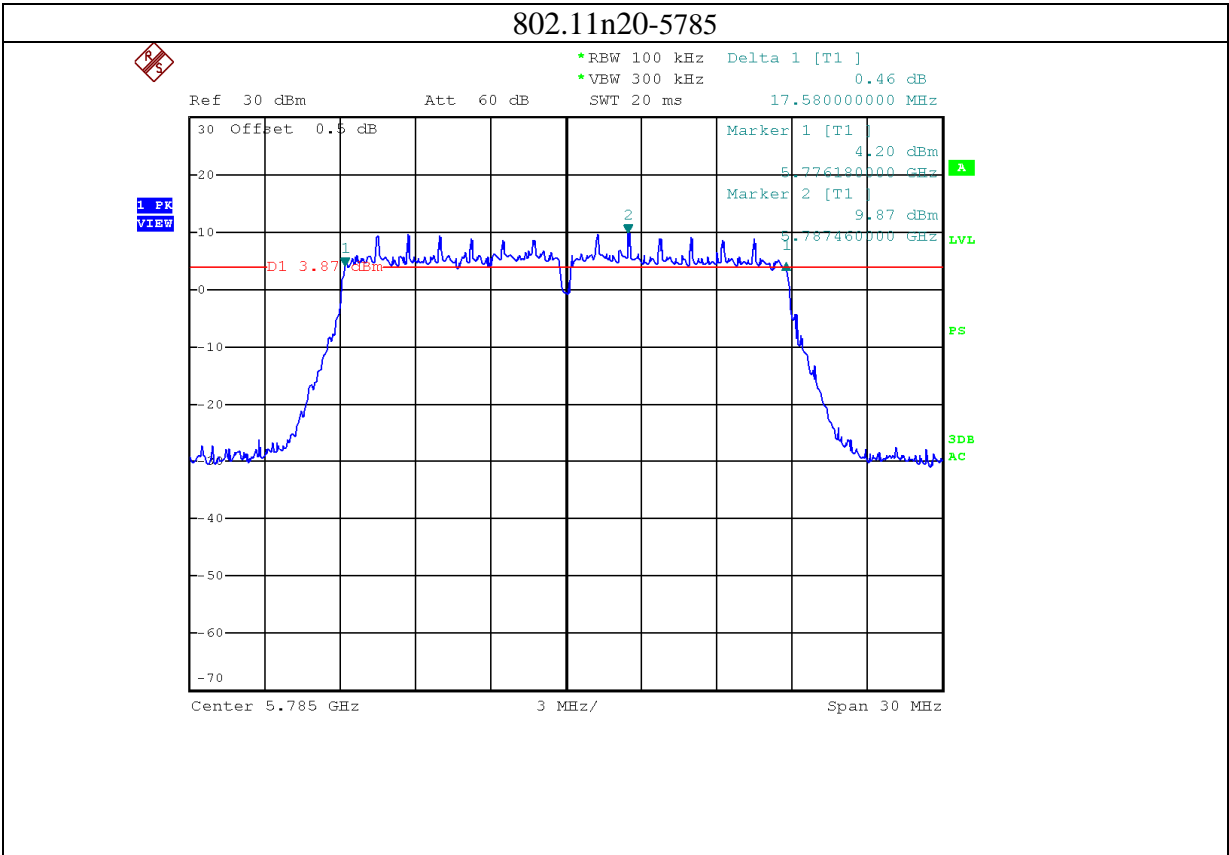
Temperature : 25 °C
Relative Humidity : 55 %

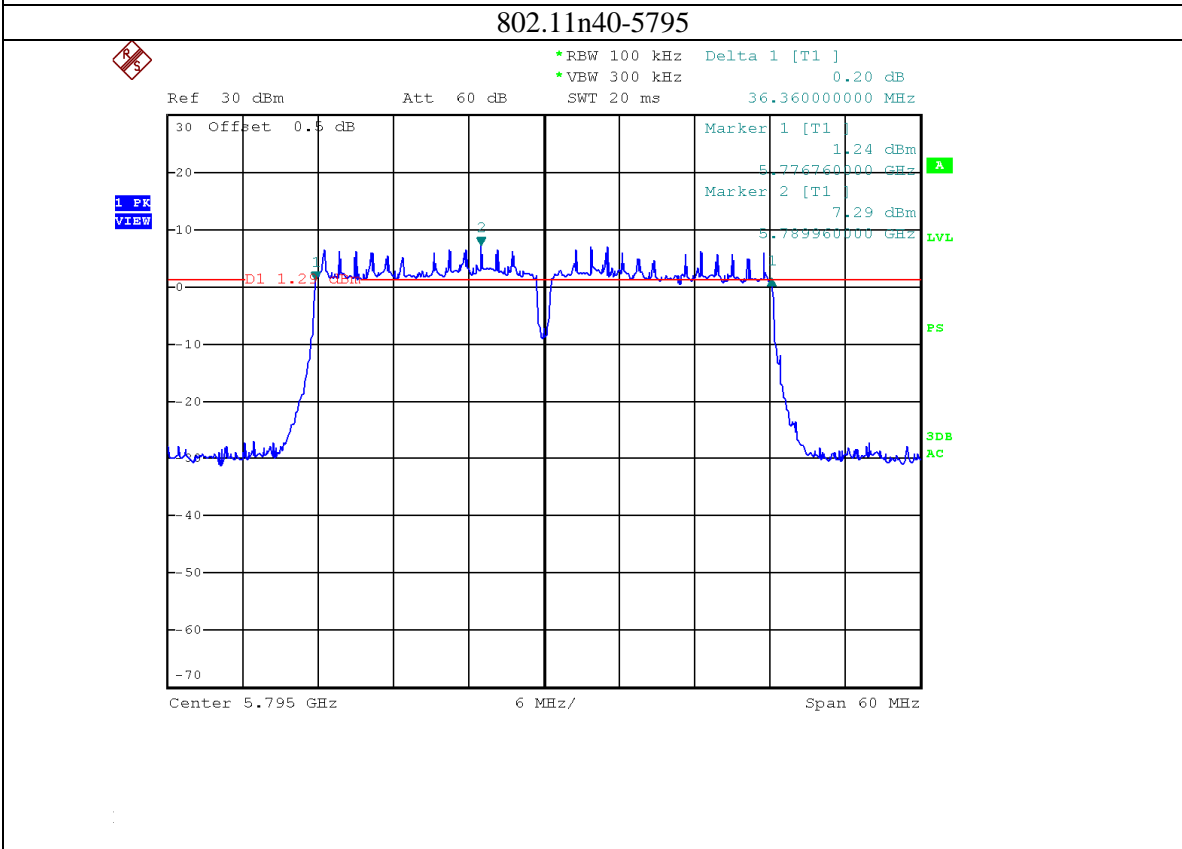
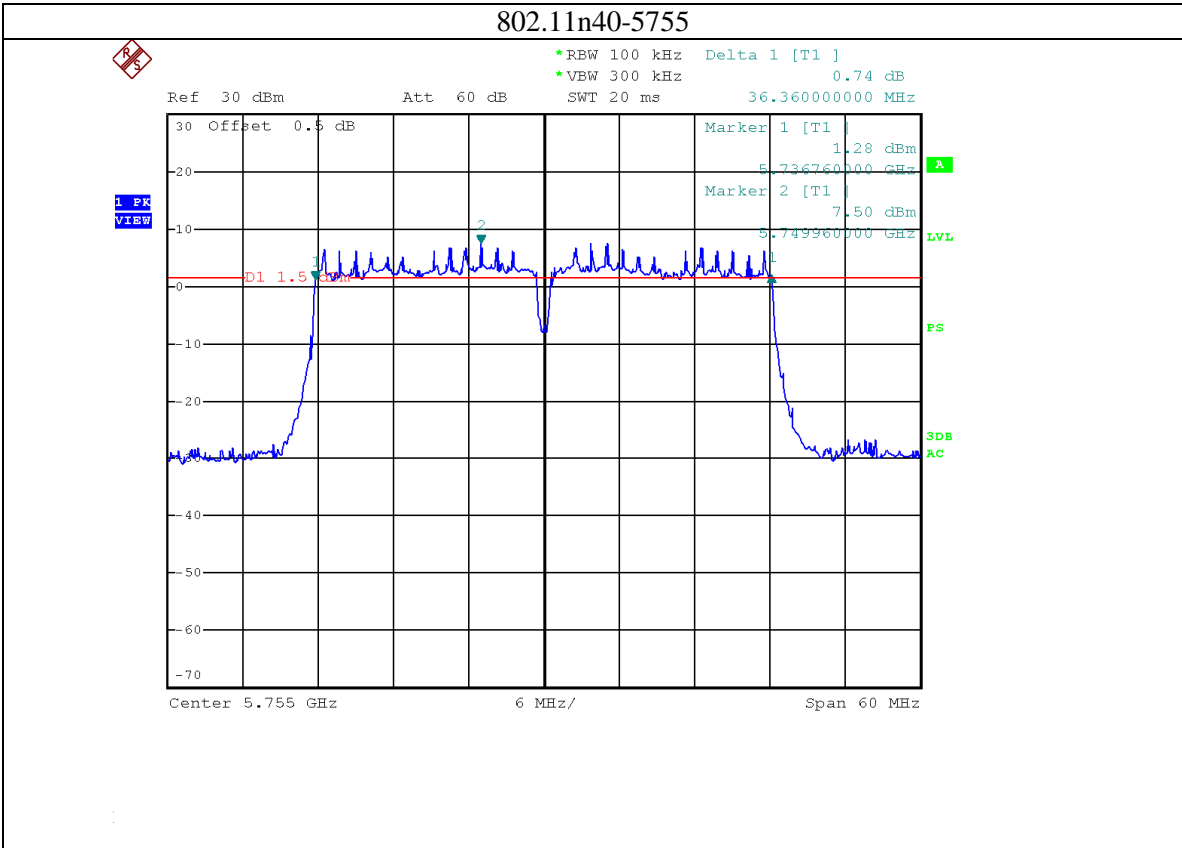
Modulation	Frequency (MHz)	Minimum 6dB Bandwidth (MHz)			Limits (MHz)
		Port0	Port 1	Port 2	
802.11a	5745	16.38	16.44	16.44	> 0.5
	5785	16.38	16.38	16.44	> 0.5
	5825	16.44	16.38	16.38	> 0.5
802.11n20	5745	17.64	17.70	17.64	> 0.5
	5785	17.58	17.58	17.64	> 0.5
	5825	17.58	17.64	17.64	> 0.5
802.11n40	5755	36.36	36.48	36.36	> 0.5
	5795	36.36	36.36	36.36	> 0.5
802.11ac80	5775	76.08	76.32	76.32	> 0.5

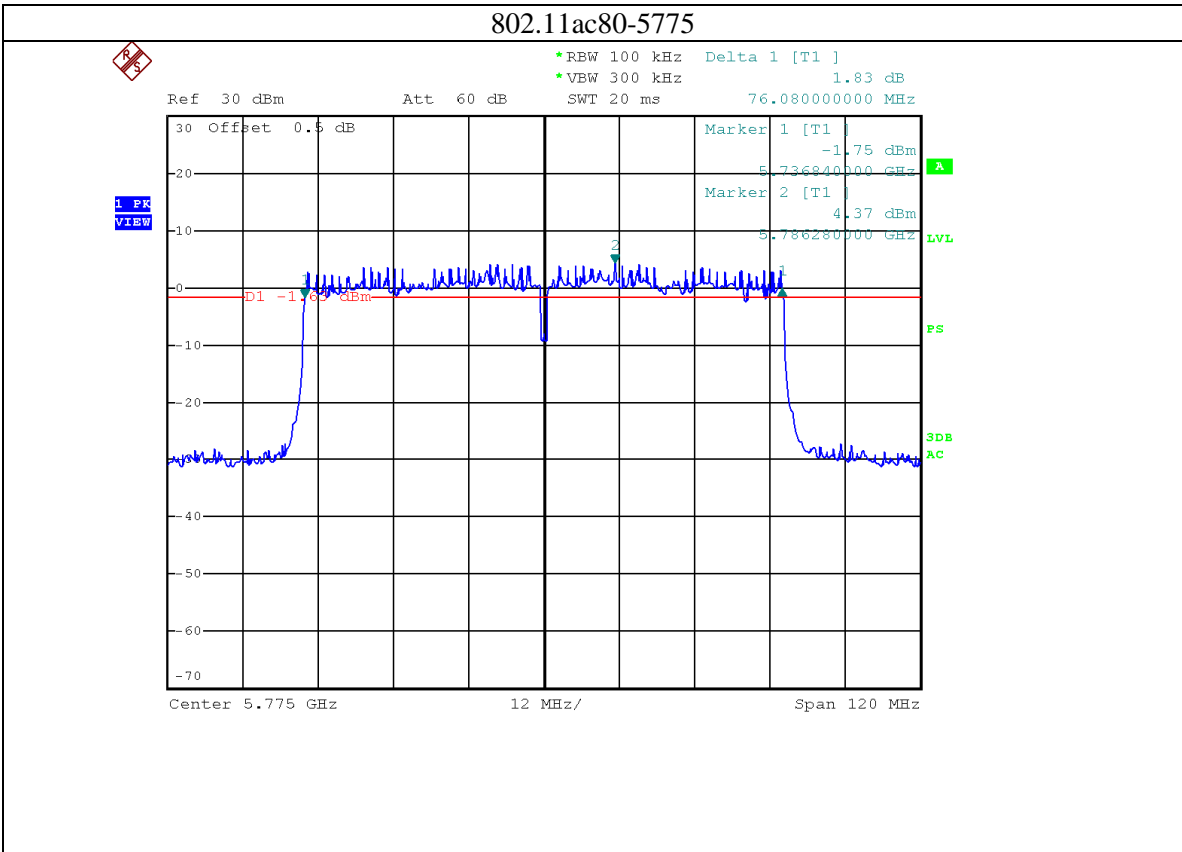
Port 0



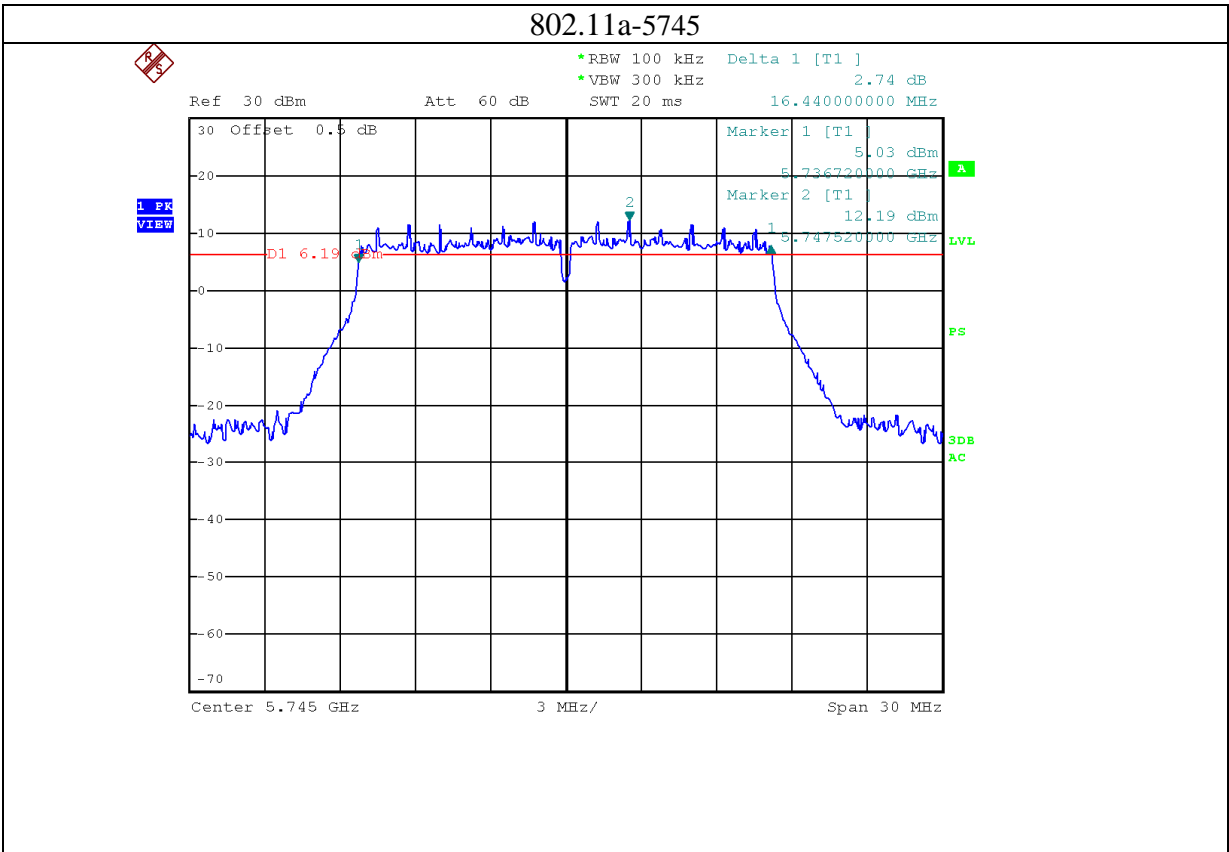


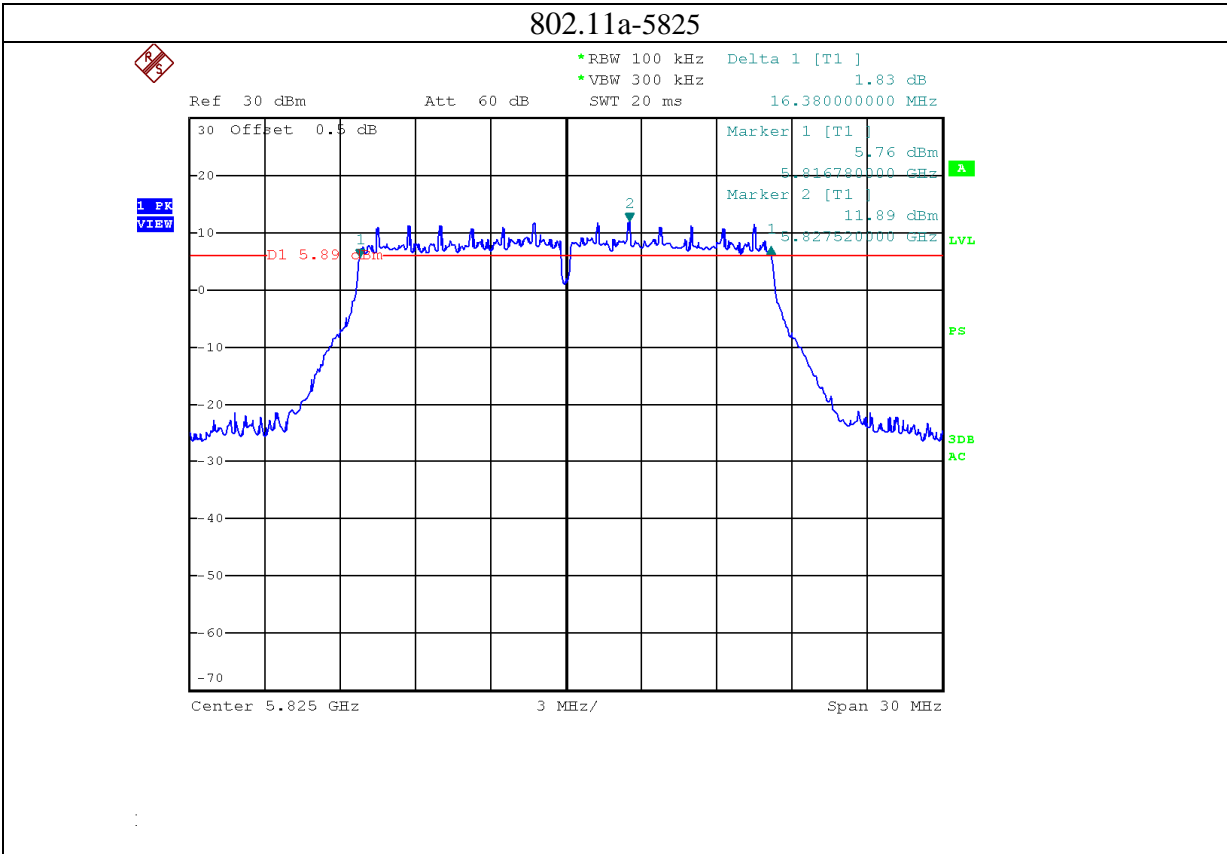
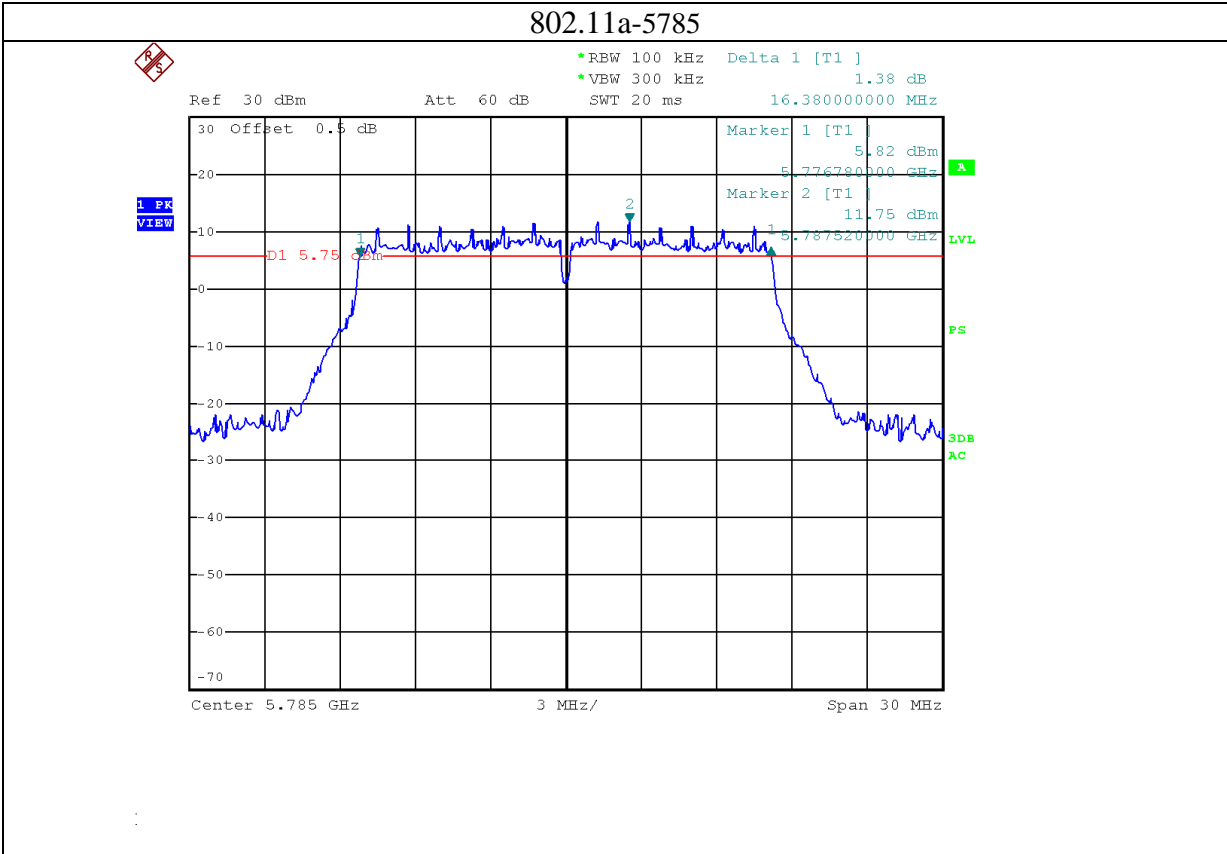


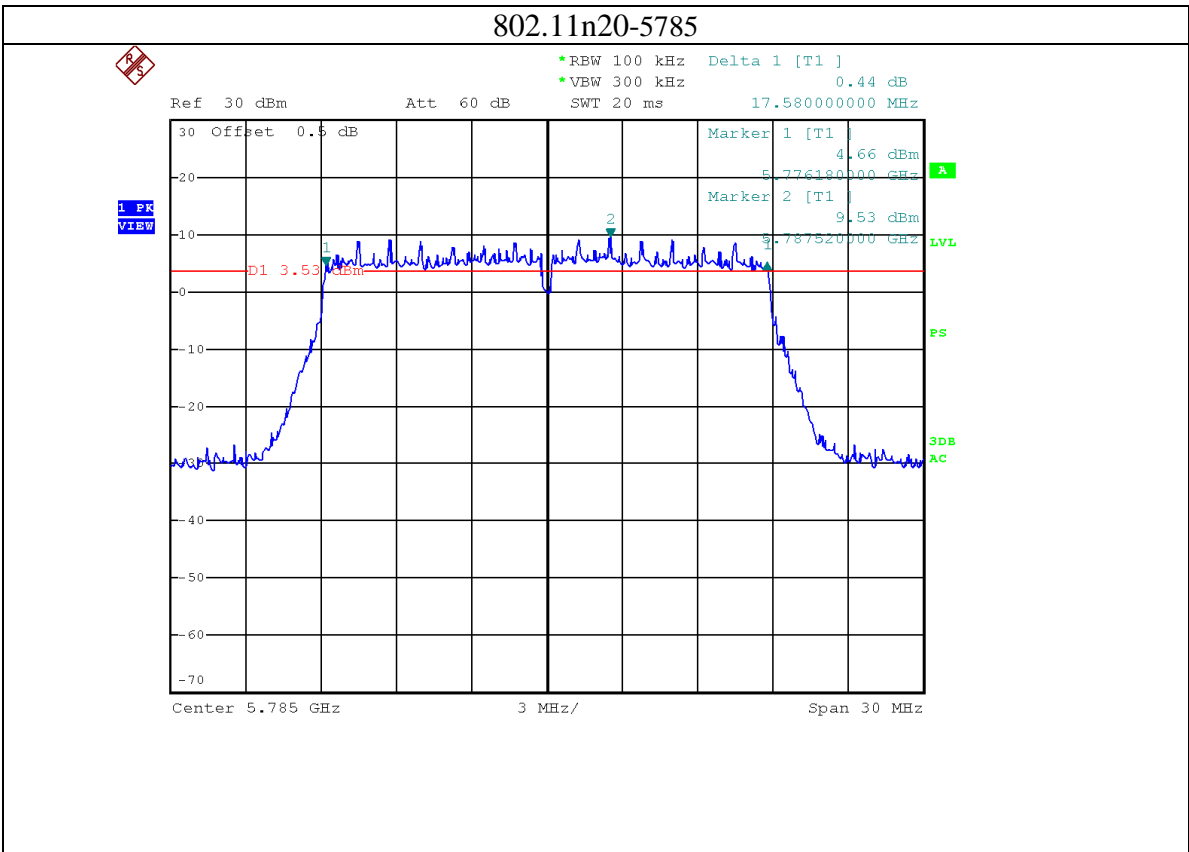
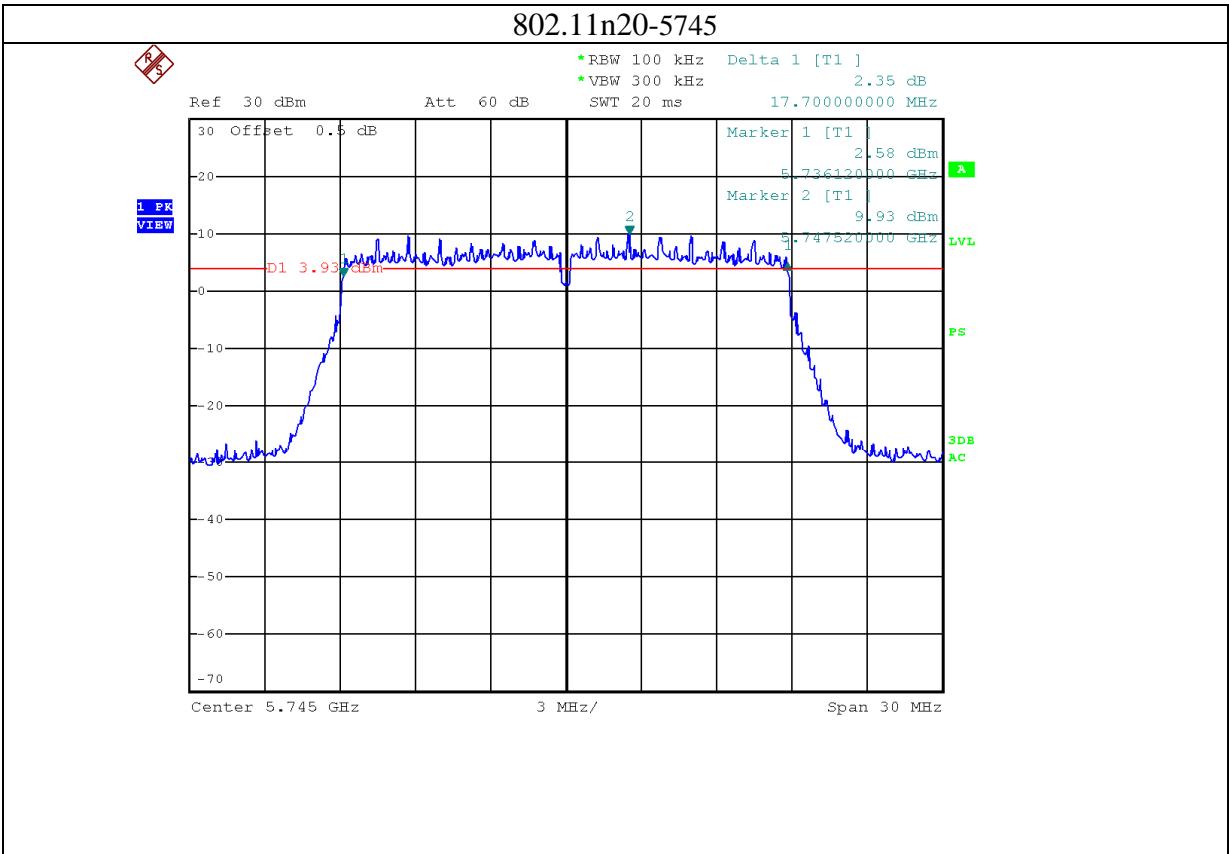


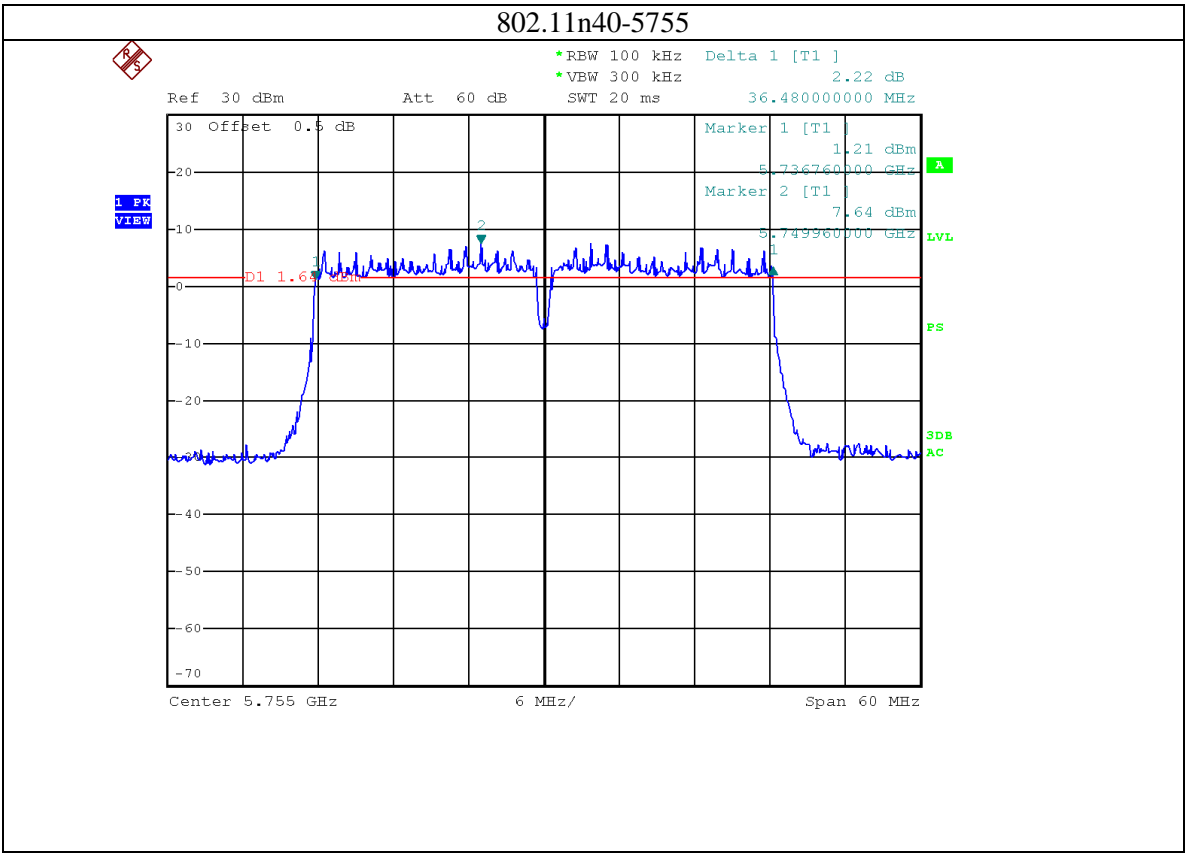
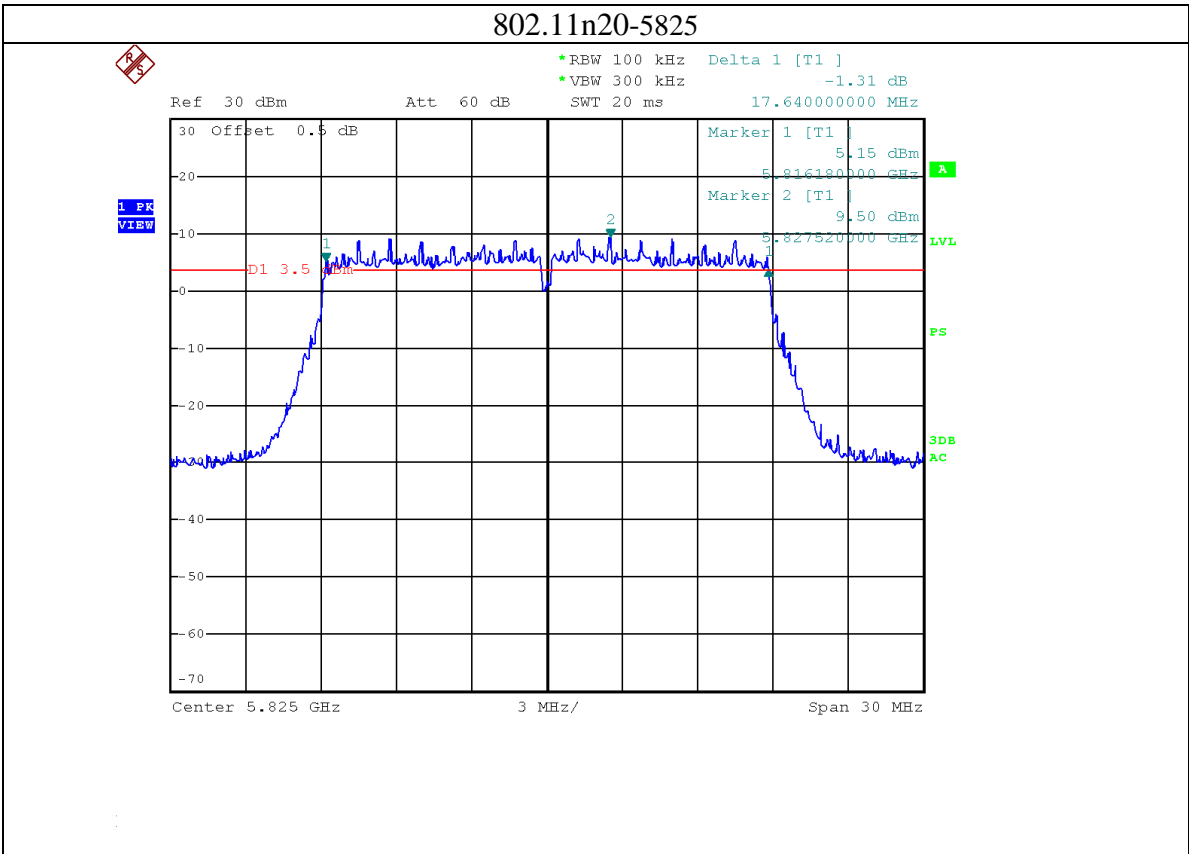


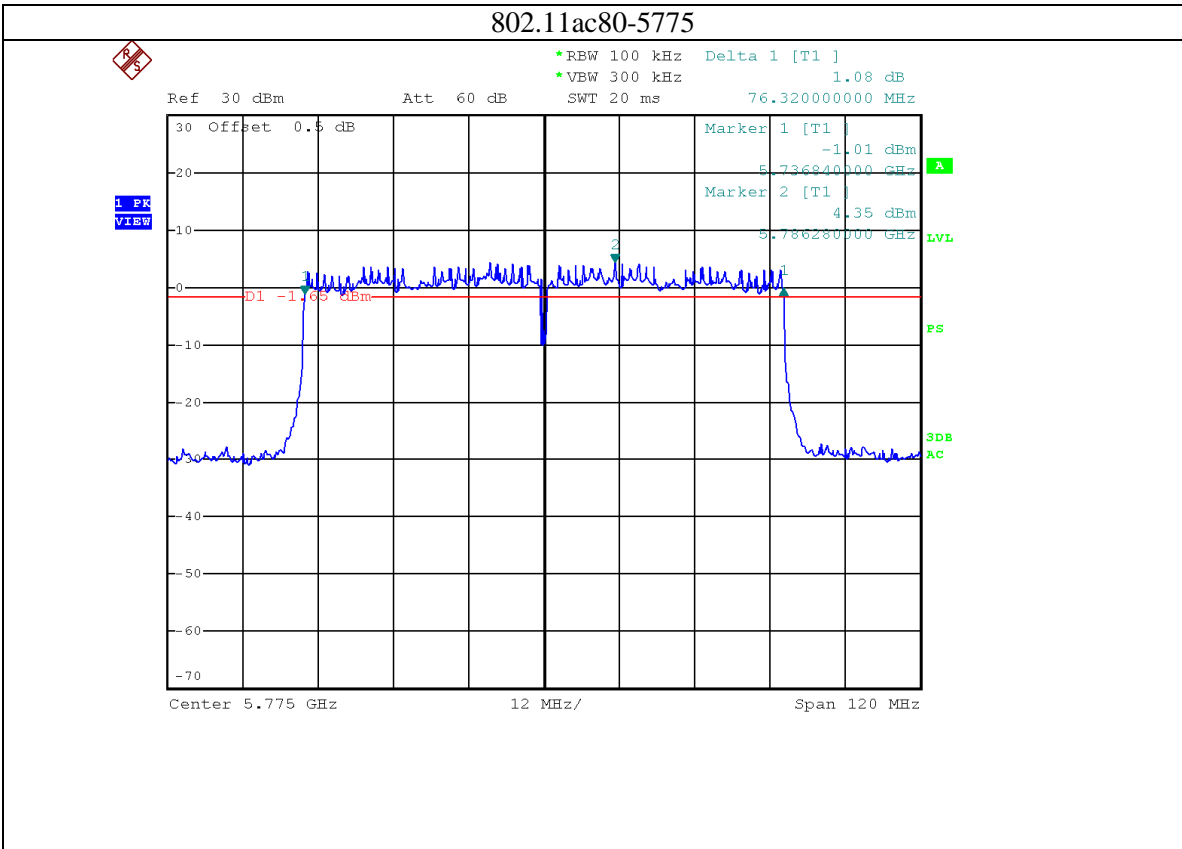
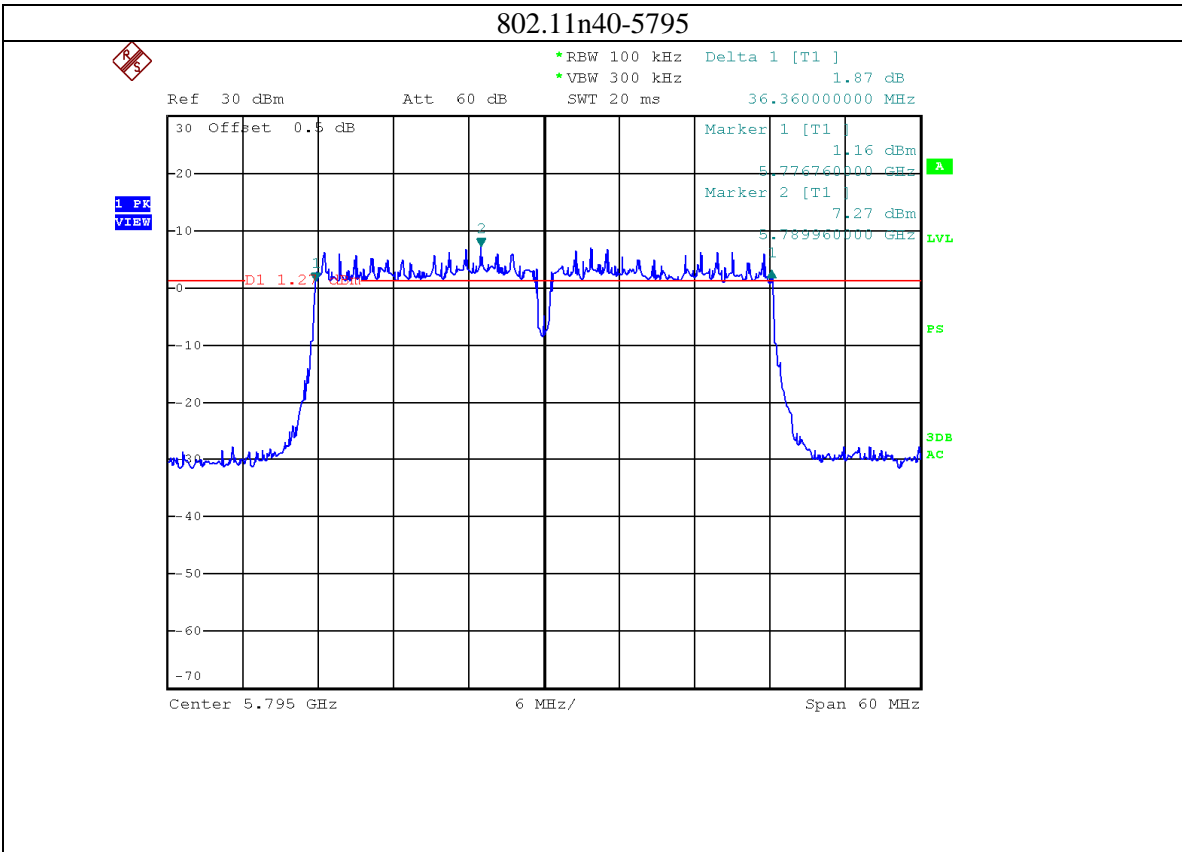
Port 1



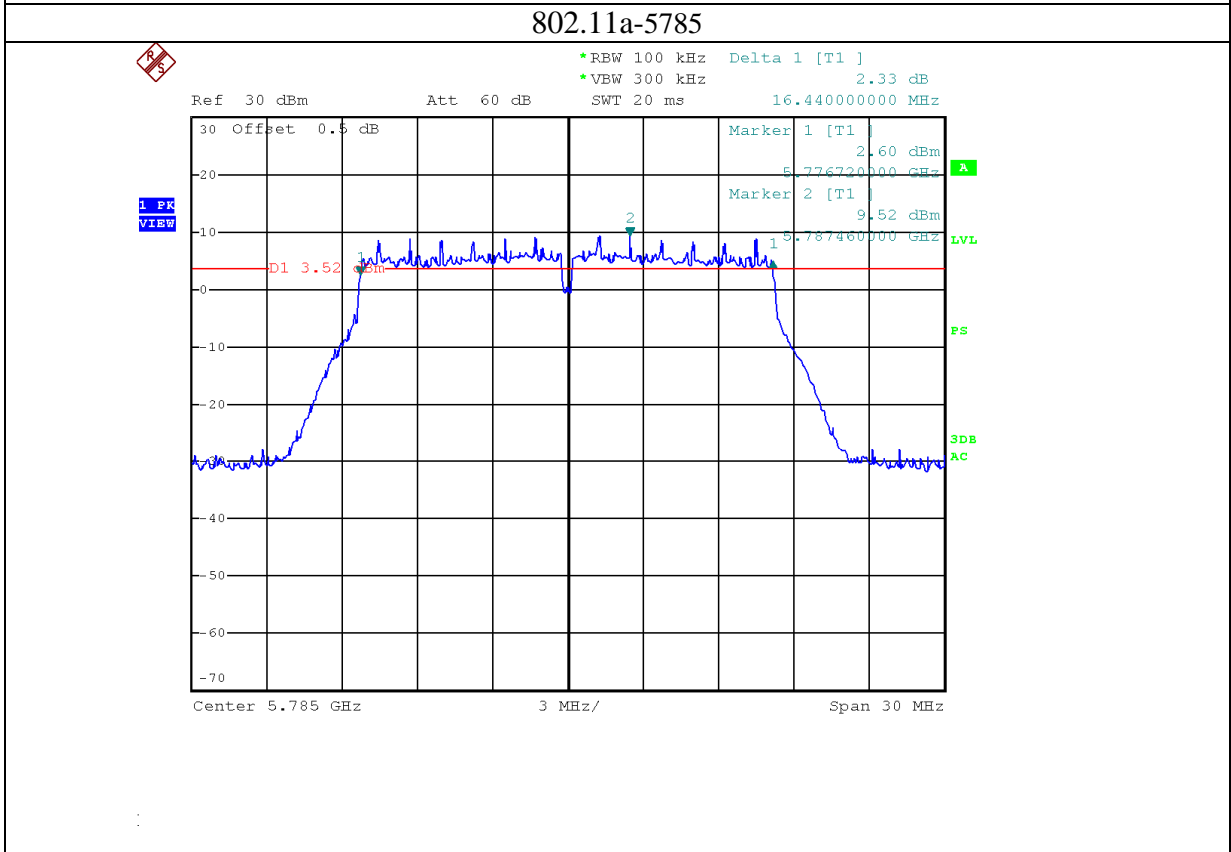
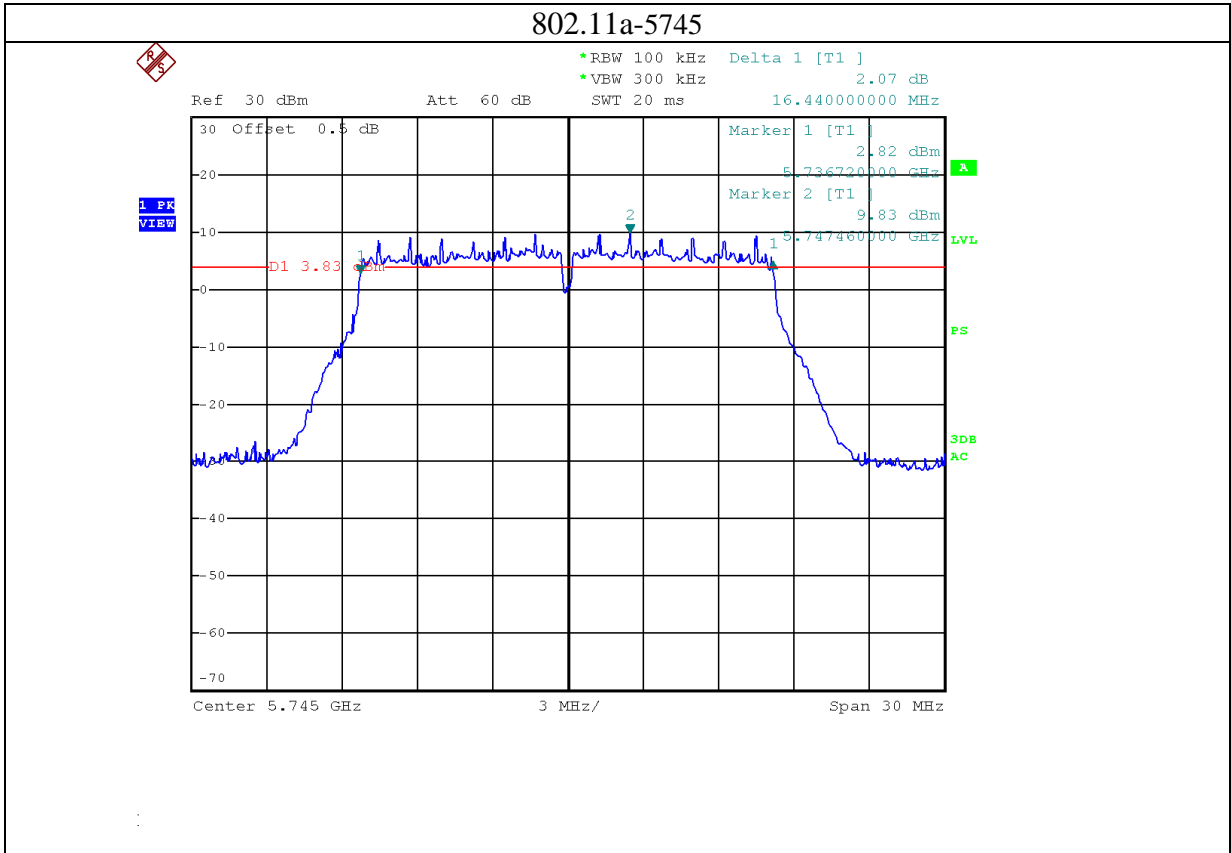


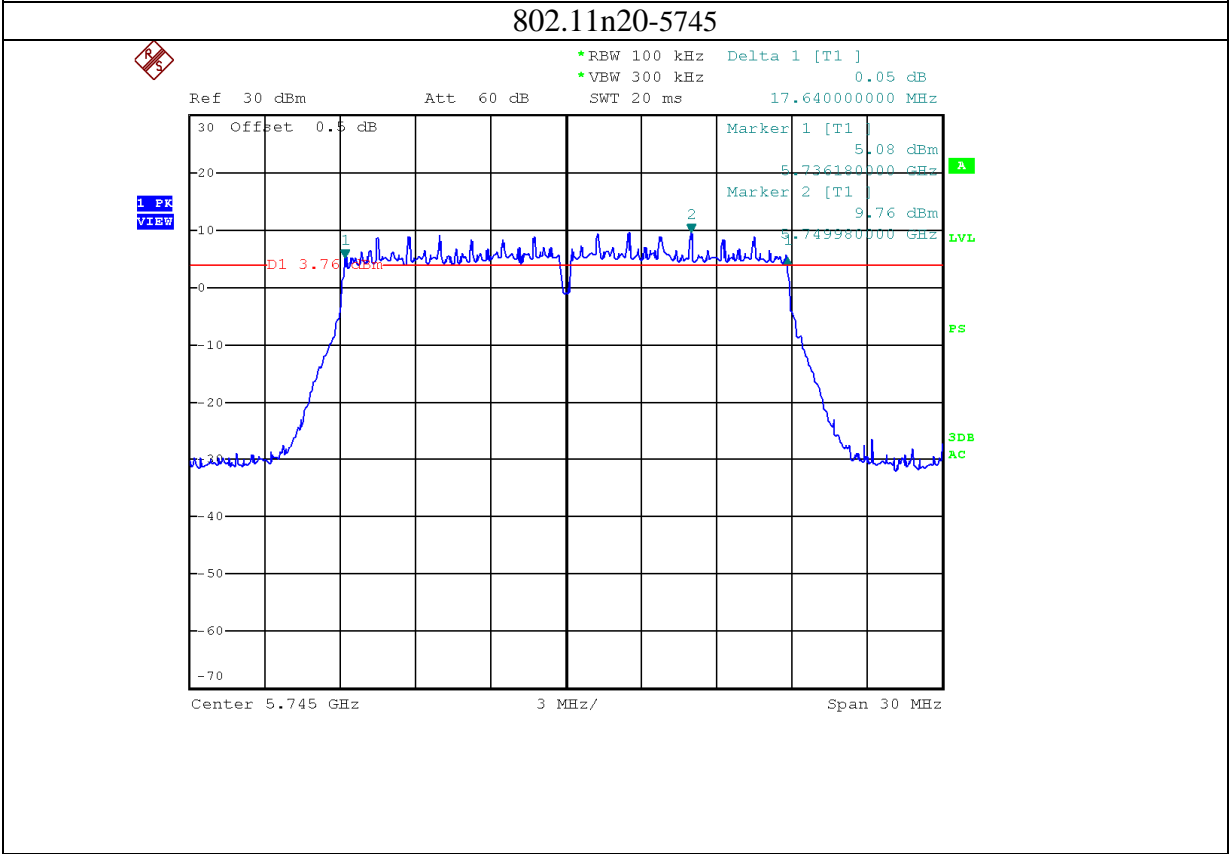
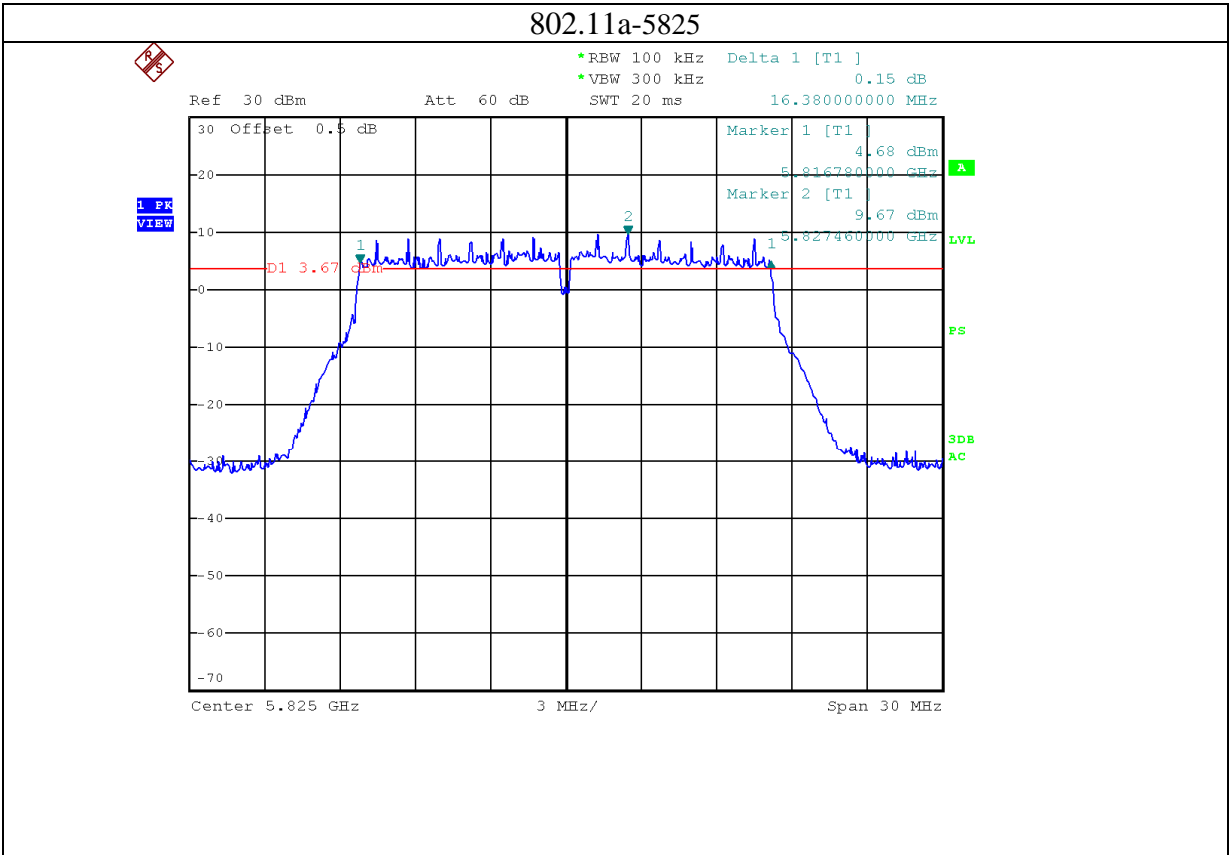


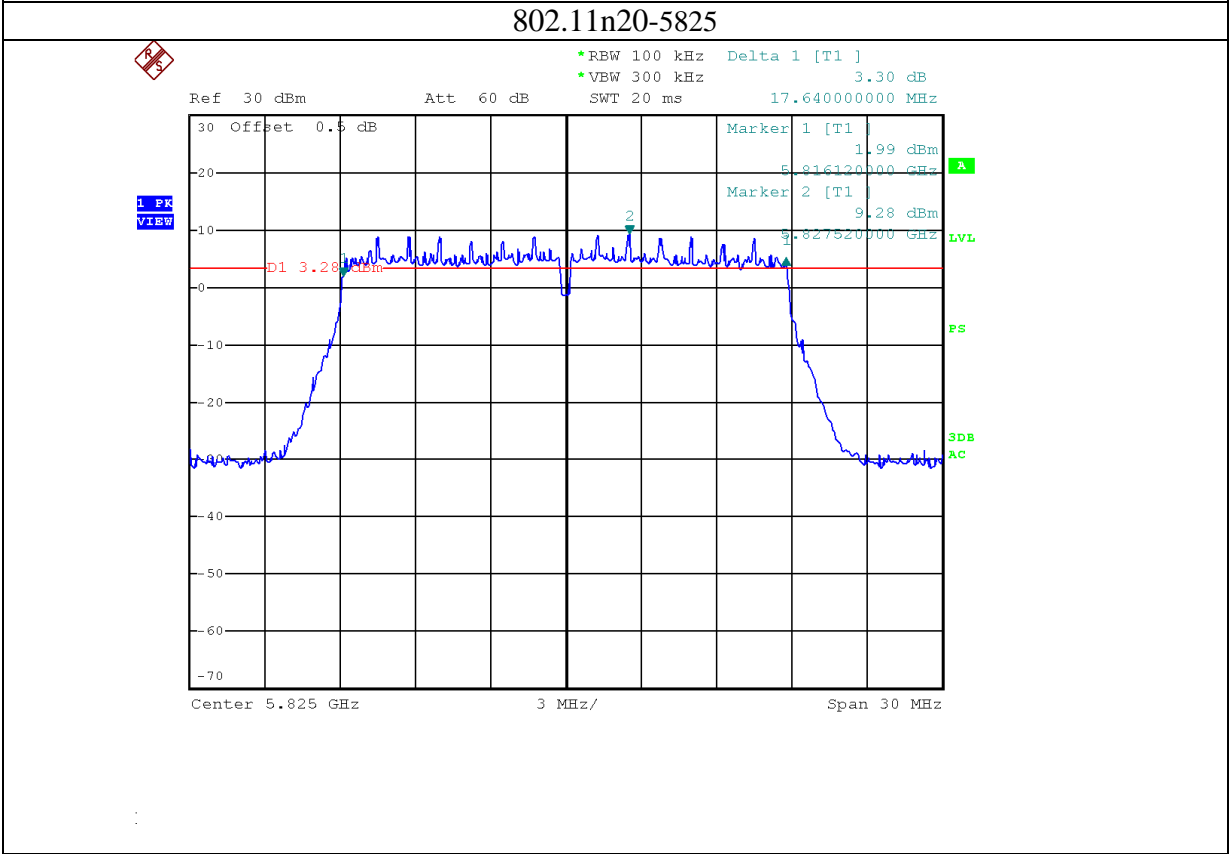
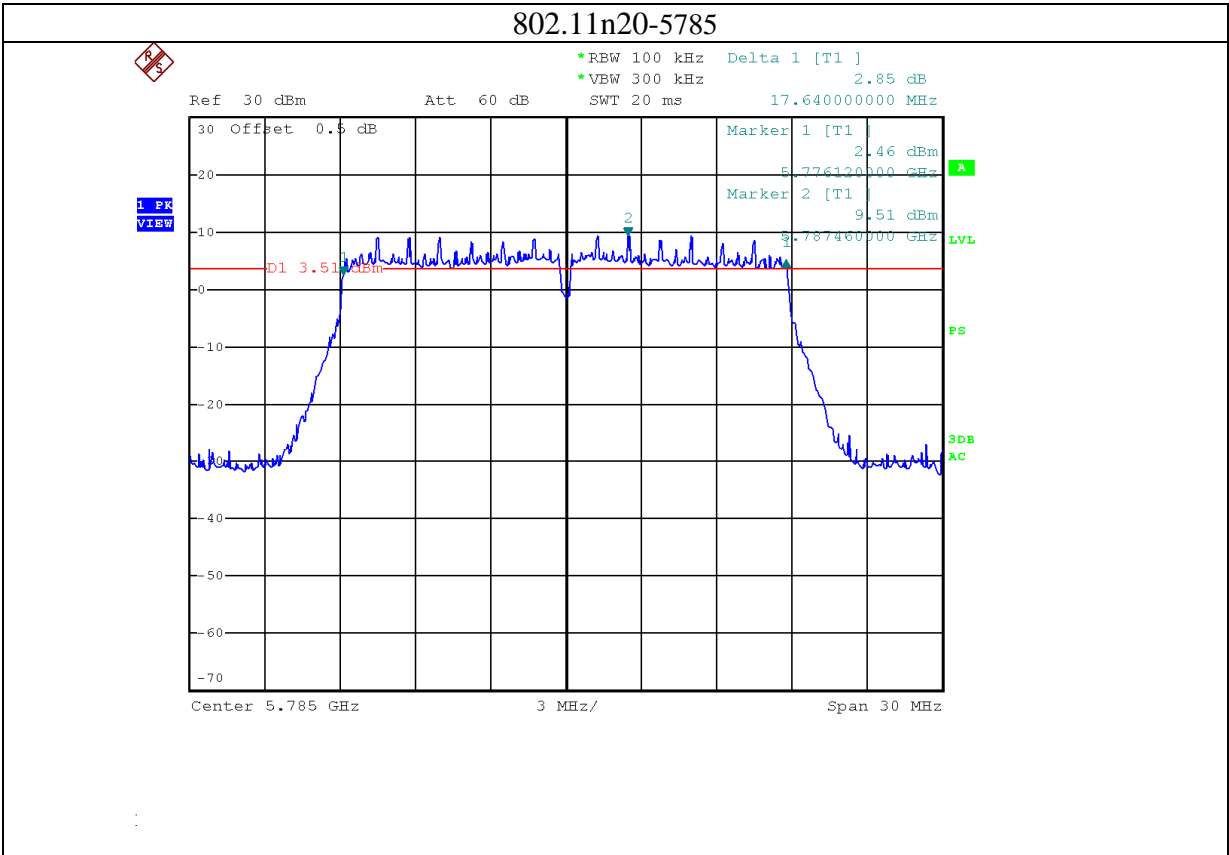


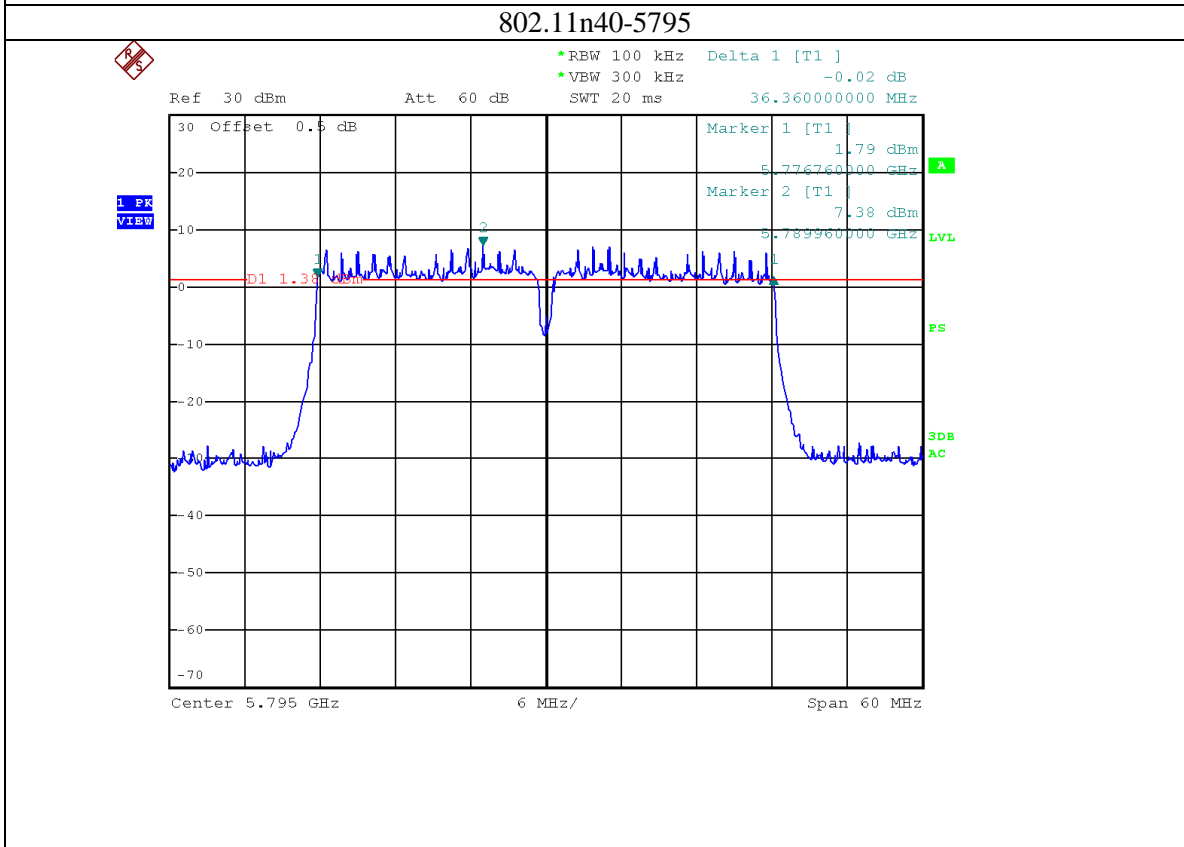
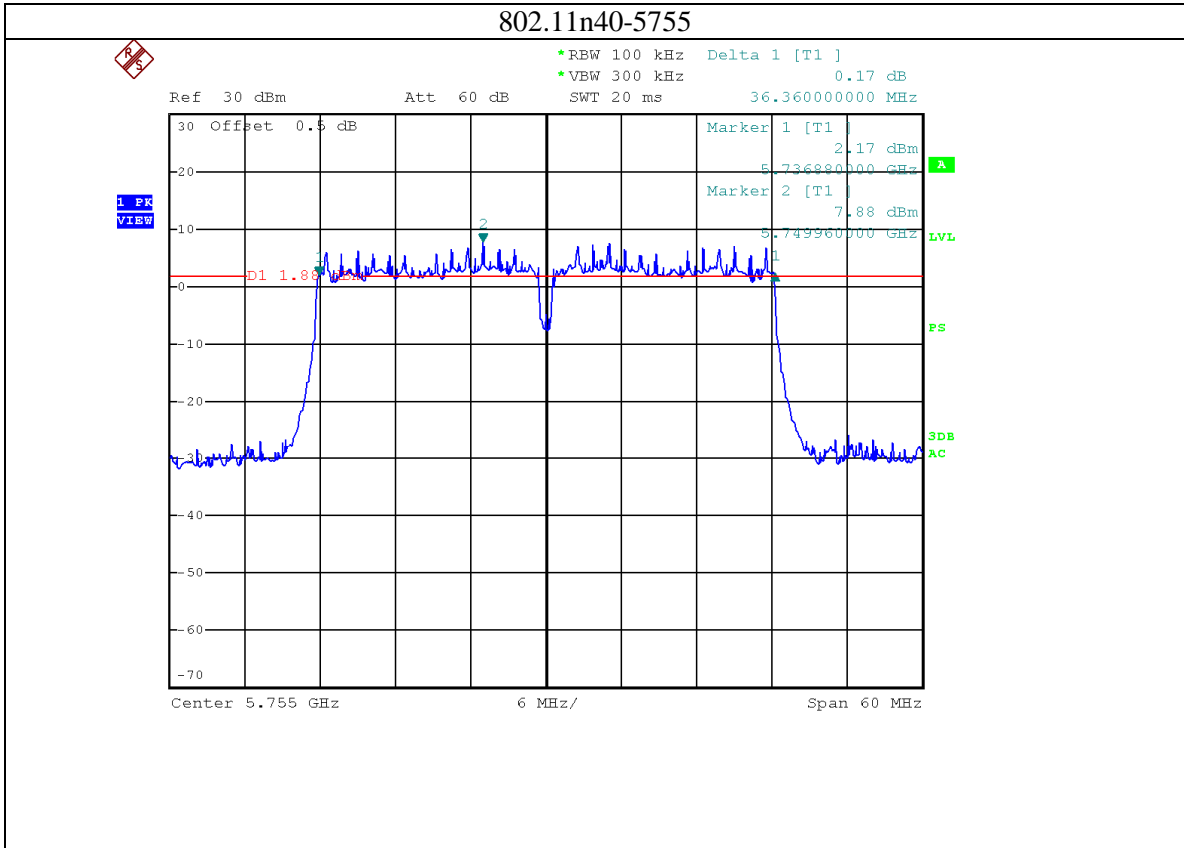


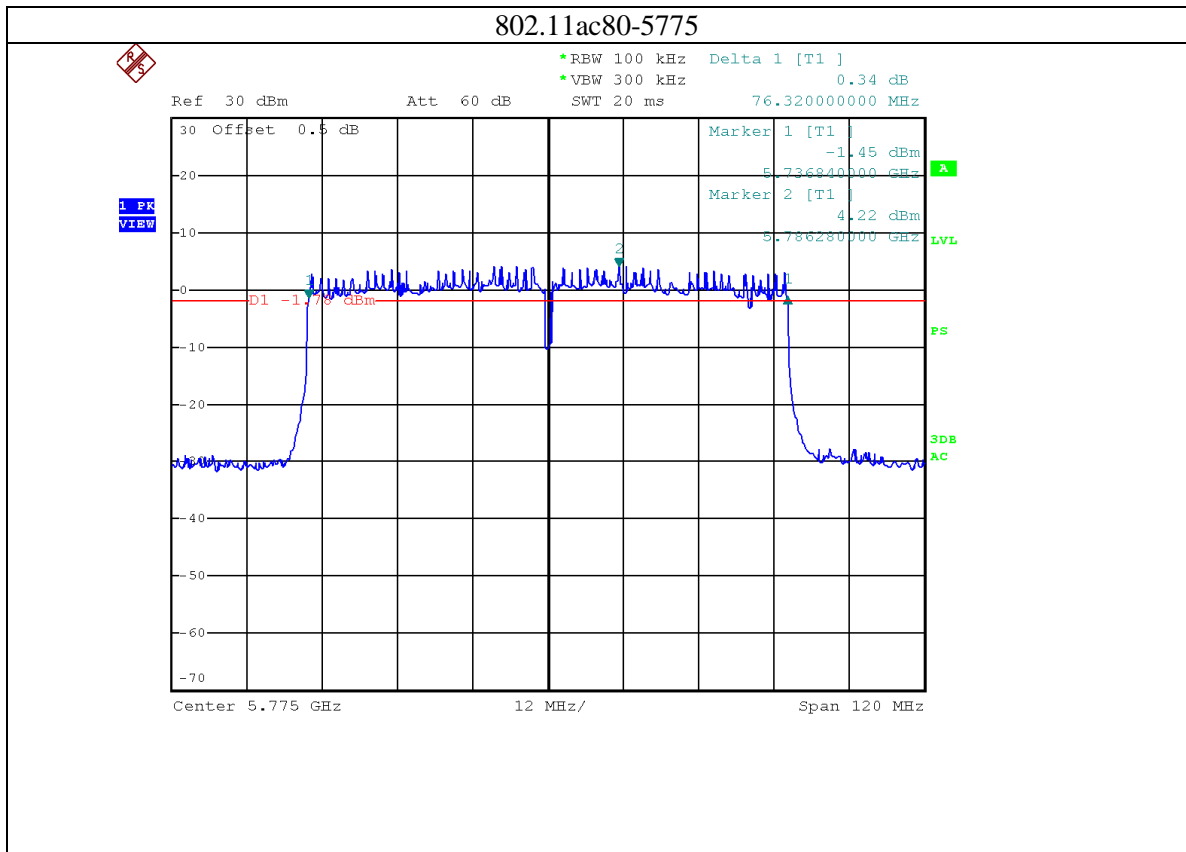
Port 2











6. Radiated emission

Test result: **PASS**

6.1 Test limit

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

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

6.1.2 The emission which is outside the restrict bands, should comply with the EIRP 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

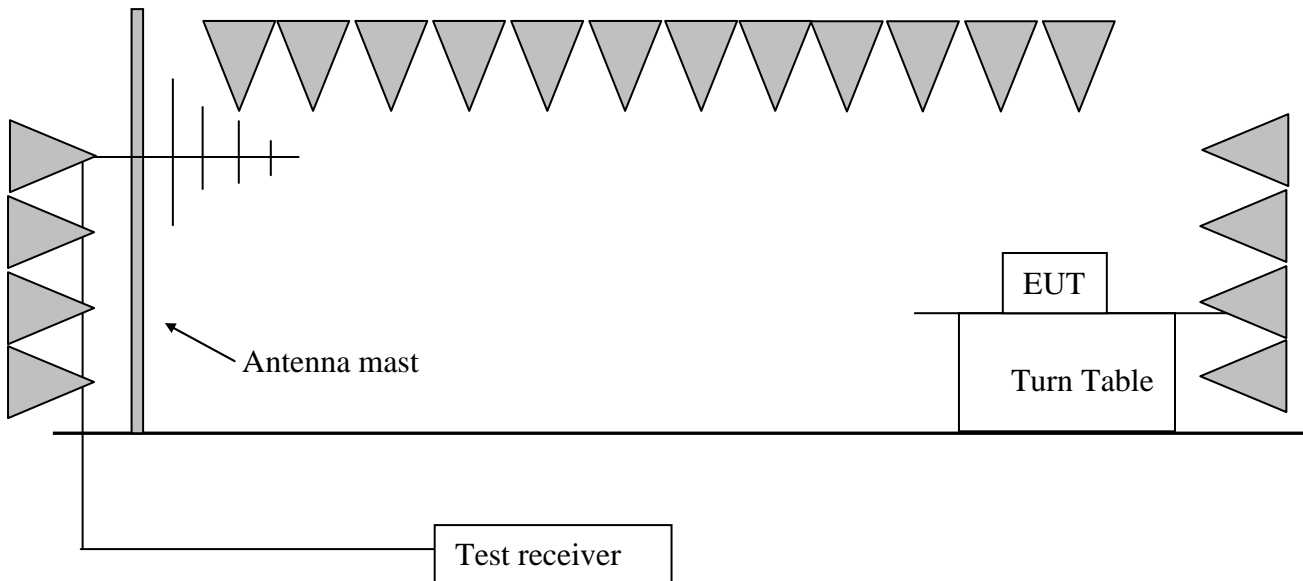
For transmitters operating in the 5.725 – 5.85GHz band: emission among 5.715 – 5.725GHz & 5.85 – 5.86GHz shall not exceed an EIRP of -17dBm/MHz all emissions outside band shall not exceed an EIRP of -27dBm/MHz.

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

Assessed with 15.209(a):

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

6.2 Test Configuration



6.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.

The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

The EUT was tested according to KDB 789033D02: Section G.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

RBW = 100kHz, VBW = 300kHz (30MHz~1GHz)

RBW = 1MHz, VBW = 3MHz (>1GHz for PK);

RBW = 1MHz, VBW = 10Hz (>1GHz for AV);

6.4 Test protocol

Temperature : 25 °C
 Relative Humidity : 55 %

Mode 802.11a

Freq (MHz)	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
5180	V	5182.09	43.68	119.10	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	V	5146.81	43.67	71.90	74.00	2.10	PK
	V	5141.77	43.67	52.90	54.00	1.10	AV
	H	10367.00	14.89	46.50	54.00	7.50	PK
	H	15540.00	23.95	45.50	54.00	8.50	PK
5200	V	5208.38	43.69	119.80	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	H	4997.99	10.48	42.30	54.00	11.70	PK
	V	10400.00	14.94	42.40	54.00	11.60	PK
	V	15600.00	23.82	44.60	54.00	9.40	PK
5240	V	5238.93	43.78	118.60	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	H	4997.99	10.48	42.50	54.00	11.50	PK
	V	10480.00	15.01	42.00	54.00	12.00	PK
	H	15720.00	23.65	45.10	54.00	8.90	PK
5745	V	5740.42	44.22	119.30	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK



	H	170.57	12.10	20.90	43.50	22.60	PK
	V	5725.00	44.19	72.50	74.00	1.50	PK
	V	5669.69	44.09	51.60	54.00	2.40	AV
	H	11489.00	17.38	47.30	54.00	6.70	PK
	H	17235.00	24.54	46.40	54.00	7.60	PK
5785	V	5789.33	44.36	119.80	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	H	4997.99	10.48	42.60	54.00	11.40	PK
	H	11547.00	17.74	49.10	54.00	4.90	PK
	H	17355.00	24.95	47.50	54.00	6.50	PK
5825	V	5829.93	44.53	118.70	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	V	5850.94	44.62	68.30	74.00	5.70	PK
	V	5850.00	44.60	47.50	54.00	6.50	AV
	H	11659.00	18.14	50.00	54.00	4.00	PK
	V	17415.00	25.19	46.00	54.00	8.00	PK



Mode 802.11n20

Freq (MHz)	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
5180	V	5180.92	43.67	118.60	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	V	5149.15	43.66	71.50	74.00	2.50	PK
	V	5150.00	43.66	51.50	54.00	2.50	AV
	H	10360.00	14.88	43.20	54.00	10.80	PK
	H	15540.00	23.95	45.10	54.00	8.90	PK
5200	V	5205.71	43.69	119.10	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	H	4997.99	10.48	42.40	54.00	11.60	PK
	V	10400.00	14.94	42.20	74.00	31.80	PK
	V	15600.00	23.82	44.20	54.00	9.80	PK
5240	V	5238.93	43.78	118.40	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	H	4997.99	10.48	42.20	74.00	31.80	PK
	V	10480.00	15.01	42.20	54.00	11.80	PK
	V	15720.00	23.65	44.40	74.00	29.60	PK
5745	V	5740.20	44.22	117.60	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	V	5724.58	44.19	69.70	74.00	4.30	PK



	V	5725.00	44.19	51.40	54.00	2.60	AV
	H	11490.00	17.39	43.10	54.00	10.90	PK
	H	17235.00	24.54	46.60	54.00	7.40	PK
5785	V	5791.29	44.37	118.20	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	H	4997.99	10.48	42.30	54.00	11.70	PK
	H	11557.00	17.71	45.30	74.00	28.70	PK
	H	17355.00	24.95	46.30	54.00	7.70	PK
5825	V	5820.25	44.49	116.90	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	V	5850.47	44.62	65.60	74.00	8.40	PK
	V	5850.00	44.60	47.80	54.00	6.20	AV
	H	11659.00	18.14	45.60	54.00	8.40	PK
	H	17415.00	25.19	46.10	74.00	27.90	PK



Mode 802.11n40

Freq (MHz)	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
5190	V	5178.80	43.67	114.60	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	V	5150.00	43.66	70.70	74.00	3.30	PK
	V	5150.00	43.66	52.70	54.00	1.30	AV
	V	10380.00	14.92	42.90	54.00	11.10	PK
	H	15570.00	23.99	45.60	54.00	8.40	PK
5230	V	5233.11	43.75	114.90	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	H	4997.99	10.48	42.50	74.00	31.50	PK
	V	10460.00	15.00	42.10	54.00	11.90	PK
	V	15690.00	23.73	44.50	54.00	9.50	PK
5755	V	5751.40	44.25	113.50	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	V	5720.33	44.18	72.70	74.00	1.30	PK
	V	5725.00	44.19	51.60	54.00	2.40	AV
	H	11510.00	17.53	42.90	54.00	11.10	PK
	V	17265.00	25.74	46.80	54.00	7.20	PK
5795	V	5797.81	44.41	113.10	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK



	V	5880.16	44.73	61.40	74.00	12.60	PK
	V	5850.00	44.60	44.40	54.00	9.60	AV
	V	11591.00	17.74	46.80	54.00	7.20	PK
	H	17358.00	25.08	46.80	54.00	7.20	PK

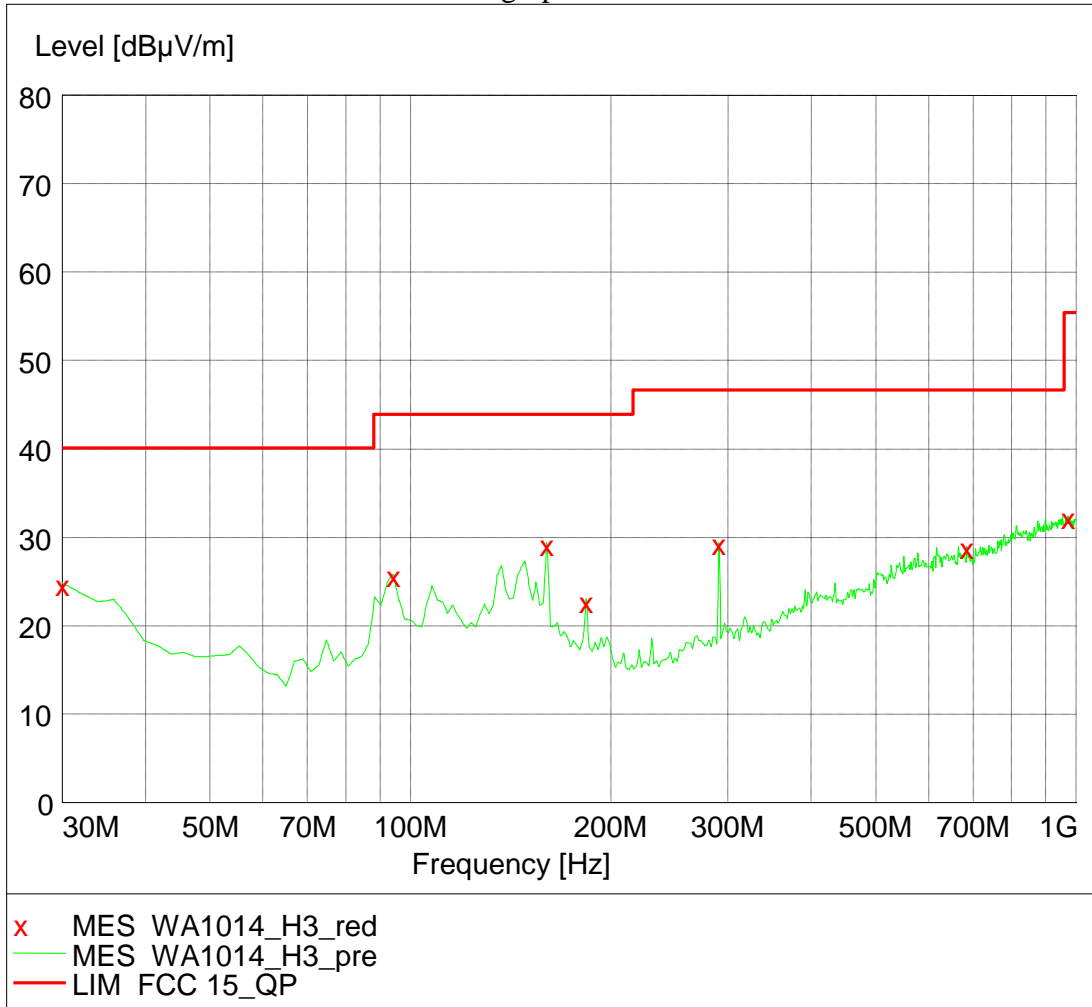
Mode 802.11ac80

Freq (MHz)	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
5210	V	5222.70	43.73	112.50	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	V	5149.20	43.66	72.30	74.00	1.70	PK
	V	5150.00	43.66	50.50	54.00	3.50	AV
	V	10420.00	14.98	42.80	54.00	11.20	PK
	H	15630.00	23.79	45.40	54.00	8.60	PK
5775	V	5780.38	44.35	110.10	/	/	PK
	V	115.53	13.40	31.00	43.50	12.50	PK
	H	163.24	13.80	29.30	43.50	14.20	PK
	H	170.57	12.10	20.90	43.50	22.60	PK
	V	5725.00	44.19	73.50	74.00	0.50	PK
	V	5718.50	44.18	47.50	54.00	6.50	AV
	V	11550.00	17.71	43.90	54.00	10.10	PK
	H	17325.00	24.87	46.30	54.00	7.70	PK

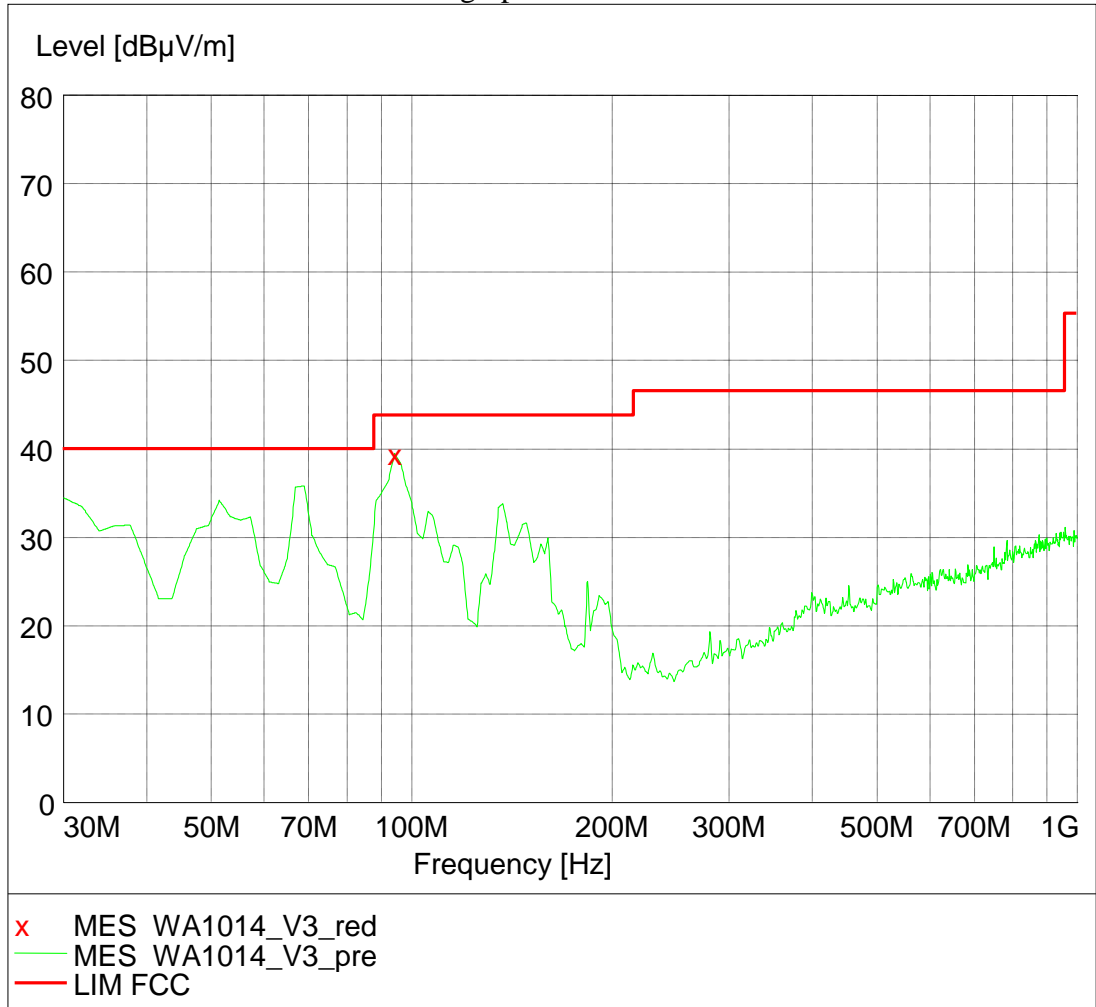
- Remark: 1. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed)
 2. Corrected Reading = Original Receiver Reading + Correct Factor
 3. Margin = limit – Corrected Reading
 4. The out of band emission for 5150-5250MHz is assessed with the limit of EIRP of -27dBm/MHz and that for 572550-5850MHz is assessed with the limit of 15.209.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
 Original Receiver Reading = 10dBuV.
 Then Correct Factor = 30.20 + 2.00 = 32.20dB/m; Corrected Reading = 10dBuV + 32.20dB/m = 42.20dBuV/m
 Assuming limit = 54dBuV/m, Corrected Reading = 42.20dBuV/m, then Margin = 54 -42.20 = 11.80dBuV/m

Horizontal test graph for lower than 1GHz



Vertical test graph for lower than 1GHz



7. Power line conducted emission

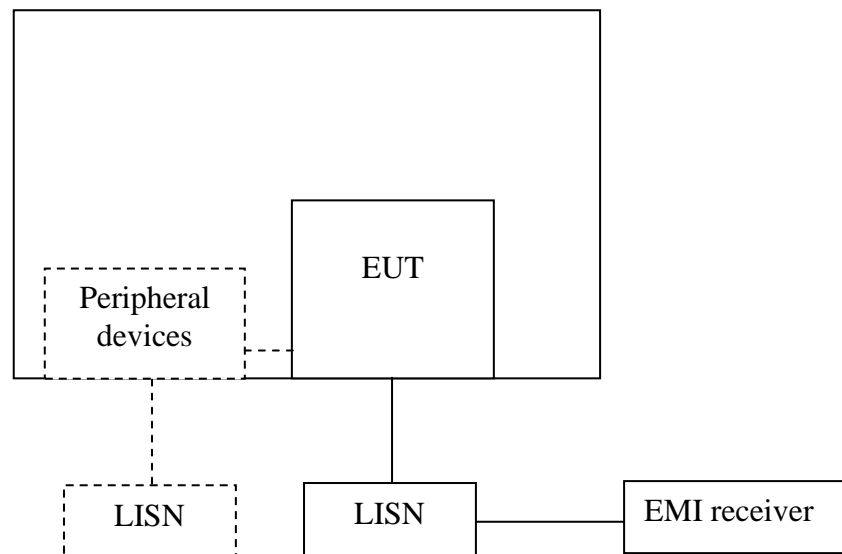
Test result: Pass

7.1 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.

7.2 Test configuration



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

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

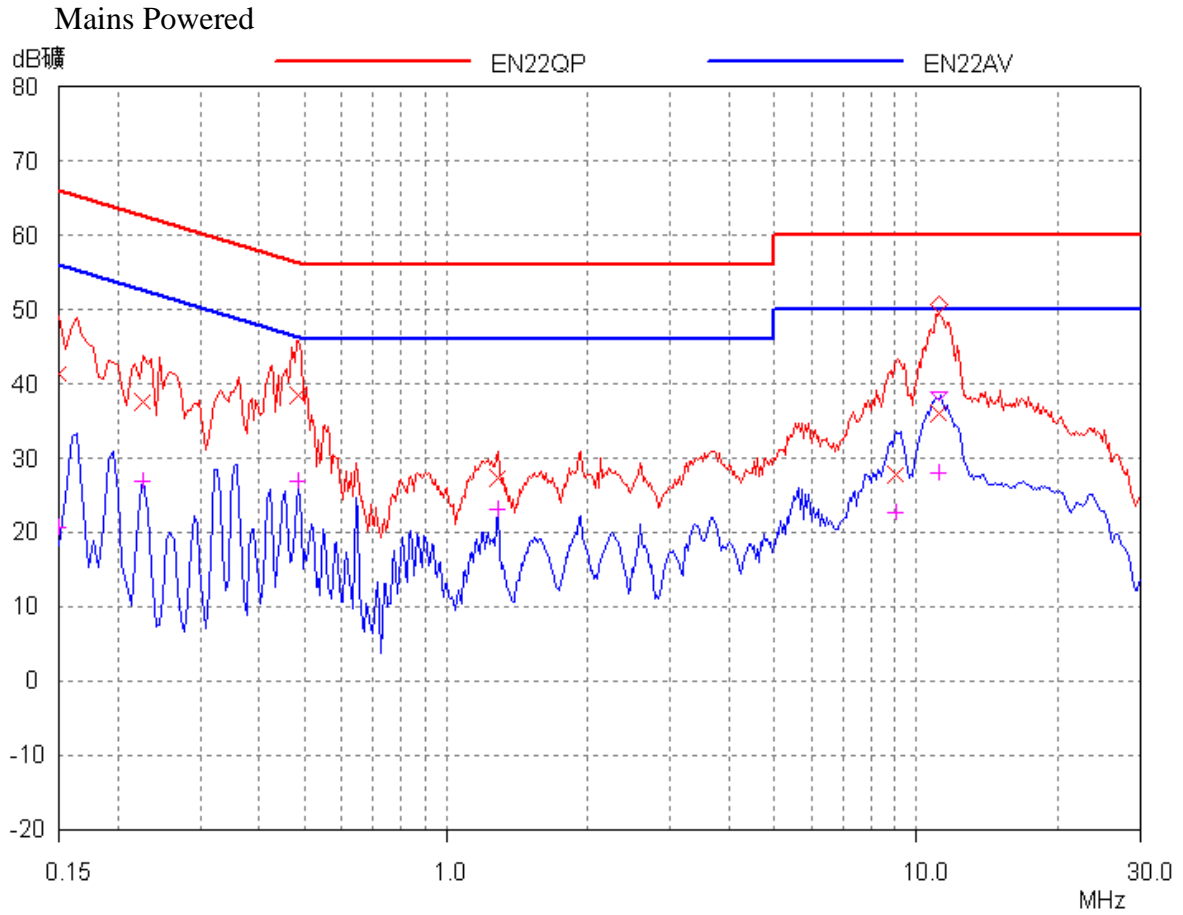
7.3 Test procedure and test set up

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a $50\Omega/50\mu\text{H}$ coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a $50\Omega/50\mu\text{H}$ 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.

7.4 Test protocol

Temperature : 25°C
Relative Humidity : 55 %



Frequency	Correct Factor (dB)	Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
		QP	AV	QP	AV	QP	AV
0.15 (N)	3.00	41.26	20.57	66.00	56.00	24.74	35.43
0.23 (L)	3.00	37.59	26.81	62.58	52.58	24.99	25.77
0.48 (L)	3.00	38.38	26.89	56.29	46.29	17.91	19.40
1.28 (N)	3.00	27.30	23.10	56.00	46.00	28.70	2.90
8.98 (L)	3.00	27.79	22.60	60.00	50.00	32.21	27.40
11.09 (L)	3.00	35.96	27.99	60.00	50.00	24.04	22.01

Remark: 1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB).
2. Margin (dB) = Limit - Corrected Reading.



Frequency	Correct Factor (dB)	Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
		QP	AV	QP	AV	QP	AV
0.17 (N)	3.00	40.00	10.70	64.77	54.77	24.77	44.07
0.31 (N)	3.00	32.35	28.26	59.87	49.87	27.52	21.61
0.52 (L)	3.00	37.35	15.20	56.00	46.00	18.65	30.80
2.24 (N)	3.00	29.05	22.85	56.00	46.00	26.95	23.15
4.17 (L)	3.00	31.54	24.63	56.00	46.00	24.46	21.37
21.78 (N)	3.00	36.60	29.40	60.00	50.00	23.40	20.60

Remark: 1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB).
2. Margin (dB) = Limit - Corrected Reading.