FCC/ IC Radio Test Report

For

Prepared by

Product Name: Touchstone Wireless Telephony Gateway

Brand Name: ARRIS

Model No.: TG1682G

Series Model: N/A

FCC ID: UIDTG1682

Test Report Number:

C140220R01-RPB

Issued for

ARRIS Group, Inc.

3871 Lakefield Drive Suite 300 Suwanee, GA 30024, U.S.A

Issued by

Compliance Certification Services Inc.

Kun shan Laboratory

No.10 Weiye Rd., Innovation park, Eco&Tec,
Development Zone, Kunshan City, Jiangsu, China

TEL: 86-512-57355888

FAX: 86-512-57370818

ACCREDITED
TESTING CERT #2541.01

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1 TEST RESULT CERTIFICATION

Product Name:	Touchstone Wireless Telephony Gateway
Trade Name:	ARRIS
Model Name.:	TG1682G
Series Model:	N/A
Applicant Discrepancy:	Initial
Device Category:	Mobile Device
Date of Test:	December 2, 2013~December,29 2013 and March 20, 2014~ March 25, 2014
Applicant:	**ARRIS Group, Inc.** 3871 Lakefield Drive Suite 300 Suwanee, GA 30024, U.S.A
Manufacturer:	**ARRIS Group, Inc.** 3871 Lakefield Drive Suite 300 Suwanee, GA 30024, U.S.A
Application Type:	Certification

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 15 Subpart E	No non-compliance noted
Canada RSS-210：issue8	No non-compliance noted

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4:2009 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.407and KDB 789033 – 20120926.
The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:

Jeff.Fang
RF Manager
Compliance Certification Service Inc.

Tested by:

Blent.Wang
Test Engineer
Compliance Certification Service Inc.

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2 EUT DESCRIPTION

Product Name:	Touchstone Wireless Telephony Gateway
Brand Name:	ARRIS
Model Name:	TG1682G
Series Model:	N/A
Model Discrepancy:	N/A
Power Adapter Power Rating :	Input: AC ~115V 60Hz 0.7A
Frequency Range :	5.15-5.25GHz
Transmit Power :	802.11a mode: 15.04 dBm 802.11an Standard-20 MHz Channel mode: 14.92 dBm 802.11an Wide-40 MHz Channel mode: 16.50 dBm 802.11ac Wide-20 MHz Channel mode: 14.44 dBm 802.11ac Wide-40 MHz Channel mode: 16.40 dBm 802.11ac Wide-40 MHz Channel mode: 16.09 dBm
Modulation Technique :	802.11a mode: OFDM (6,9,12,18,24,36,48 and 54 Mbps) 802.11an Standard-20 MHz Channel mode: OFDM (6.5,13,19.5,26,39,52,58.5 and 65 Mbps) 802.11an Wide-40 MHz Channel mode: OFDM (13.5,27,40.5,54,81,108,121.5 and 135 Mbps) 802.11ac Standard-20 MHz Channel mode: OFDM(MCS0,MCS1,MCS2,MCS3,MCS4,MCS5,MCS6,MCS7,MCS8 and MCS9) 802.11ac Wide-40 MHz Channel mode: OFDM(MCS0,MCS1,MCS2,MCS3,MCS4,MCS5,MCS6,MCS7,MCS8and MCS9) 802.11ac Wide-80 MHz Channel mode: OFDM(MCS0,MCS1,MCS2,MCS3,MCS4,MCS5,MCS6,MCS7,MCS8 and MCS9)
Number of Channels :	IEEE 802.11a mode: 4 Channels draft 802.11an 20MHz/ac 20MHz mode: 4 Channels draft 802.11an 40MHz/ac 40MHz mode: 2 Channels draft 802.11ac Wide-80 MHz Channel mode: 1 Channel
Antenna Specification:	Dipole antennas for 2.4GHz Gain 3.20 dBi and Dipole antennas for 5 GHz Gain 5.20 dBi

Remark:

1.The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.

2.This submittal(s) (test report) is intended for **FCC ID: UIDTG1682** filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.

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3 TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4
Radiated testing was performed at an antenna to EUT distance 3 meters.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed for RF field strength measurement to meet the Commissions requirement, and is operated in a manner intended to generate the maximum emission in a continuous normal application.

3.2 EUT EXERCISE

The EUT is operated in the engineering mode to fix the Tx frequency for the purposes of measurement.

According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is positioned at 0.8 m above the ground plane. According to the requirements in Section 13.3 of ANSI C63.4, the conducted emission from the EUT is measured in the frequency range between 0.15 MHz and 30MHz, using the CISPR Quasi-Peak detector mode.

Radiated Emissions

The EUT is placed on the turntable, which is 0.8 m above the ground plane. The turntable is then rotated for 360 degrees to determine the proper orientation for the maximum emission level. The EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission level. And, each emission is to be maximized by changing the horizontal and vertical polarization of the receiving antenna. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.4 of ANSI C63.4.

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3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110 0.495 - 0.505 [1] 2.1735 - 2.1905 4.125 - 4.128 4.17725 - 4.17775 4.20725 - 4.20775 6.215 - 6.218 6.26775 - 6.26825 6.31175 - 6.31225 8.291 - 8.294 8.362 - 8.366 8.37625 - 8.38675 8.41425 - 8.41475 12.29 - 12.293 12.51975 - 12.52025 12.57675 - 12.57725 13.36 - 13.41	16.42 - 16.423 16.69475 - 16.69525 16.80425 - 16.80475 25.50 - 25.67 37.50 - 38.25 73.00 - 74.60 74.80 - 75.20 108.00 - 121.94 123 - 138 149.90 - 150.05 156.52475 - 156.52525 156.70 - 156.90 162.0125 - 167.1700 167.72 - 173.20 240 - 285 322.0- 335.4	399.9 - 410 608 - 614 960.0 - 1240 1300 - 1427 1435.0 - 1626.5 1645.5 - 1646.5 1660 - 1710 1718.8 - 1722.2 2200 - 2300 2310 - 2390 2483.5 – 2500.0 2655 - 2900 3260 - 3267 3332 - 3339 3345.8 - 3358.0 3600 - 4400	4.50 - 5.15 5.35 - 5.46 7.25 - 7.75 8.025 - 8.500 9.0 - 9.2 9.3 - 9.5 10.6 - 12.7 13.25 - 13.4 14.47 - 14.5 15.35 - 16.2 17.7 - 21.4 22.01 - 23.12 23.6 - 24.0 31.2 - 31.8 36.43 - 36.5([2])

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

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3.5 DESCRIPTION OF TEST MODES

Description	Modulation Technology	Modulation Type
26dB Bandwidth and 99% Bandwidth	OFDM	BPSK
Maximum conducted output power	OFDM	BPSK
Band edges measurement	OFDM	BPSK
Peak Power Spectral Density	OFDM	BPSK
Peak excursion	OFDM	BPSK
Radiated undesirable emission	OFDM	BPSK
Conducted undesirable emission	OFDM	BPSK
Powerline conducted emission	OFDM	BPSK

The EUT transmitting and receiving with three antennas simultaneously working at a/an/ac mode, so 3x3 configuration was used for all testing in this report.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only.

IEEE 802.11a mode:

Channel Low (5180MHz), Channel Mid (5200MHz) and Channel High (5240MHz) with 54Mbps data rate were chosen for full testing.

draft 802.11an Standard-20 MHz Channel mode:

Channel Low (5180MHz), Channel Mid (5200MHz) and Channel High (5240MHz) with 65Mbps data rate were chosen for full testing.

draft 802.11an Wide-40 MHz Channel mode:

Channel Low (5190MHz)and Channel Mid (5230MHz) with 135Mbps data rate were chosen for full testing.

draft 802.11ac Standard-20 MHz Channel mode:

Channel Low (5180MHz), Channel Mid (5200MHz) and Channel High (5240MHz) with MCS9 data rate were chosen for full testing.

draft 802.11ac Wide-40 MHz Channel mode:

Channel Low (5190MHz)and Channel Mid (5230MHz) with MCS9 data rate were chosen for full testing.

draft 802.11ac Wide-80 MHz Channel mode:

Channel (5210MHz) with MCS9 data rate were chosen for full testing.

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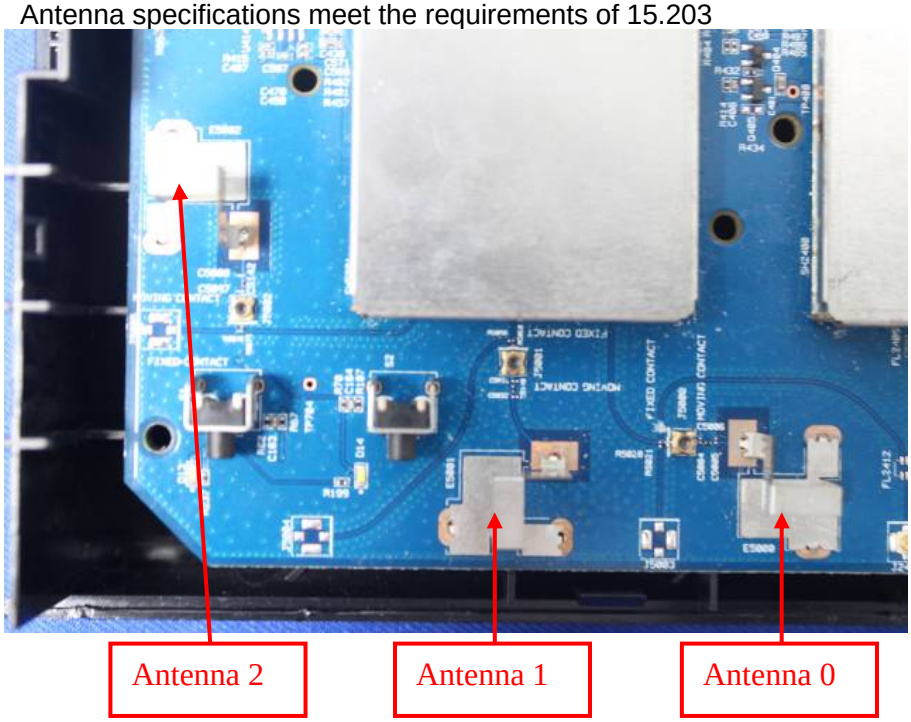
3.6 ANTENNA DESCRIPTION

Antenna specifications meet the requirements of 15.203



4 INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.1 MEASUREMENT EQUIPMENT USED

Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY44020154	2014-4-16
Spectrum Analyzer	RS	FSU26	200789	2014-8-19
Detector negative	Agilent	8473B	MY42240176	2014-5-12
OSCILLOSCOPE	Agilent	DSO6104A	MY44002585	2015-3-16
Peak and Avg Power Sensor	Agilent	E9327A	US40441788	2015-3-17
EPM-P Series Power Meter	Agilent	E4416A	GB41292714	2015-3-17
Power SPLITTER	Mini-Circuits	ZN2PD-9G	SF078500430	N.C.R
DC POWER SUPPLY	GW instek	GPS-3303C	E903131	N.C.R
Temp. / Humidity Chamber	Kingson	THS-M1	242	2014-3-12

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977 Chamber				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY44020154	2014-4-16
EMI Test Receiver	R&S	ESCI	101378	2015-1-22
Pre-Amplfier	MINI	ZFL-1000VH2	d041703	2015-1-22
Pre-Amplfier	Miteq	JS41-00101800-32-10P	1675713	2015-1-22
Bilog Antenna	Sunol	JB1	A062604	2015-3-6
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	2015-3-7
Turn Table	CT	CT123	4165	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R
Controller	CT	CT1OO	95637	N.C.R
Test Software	EZ-EMC			

Conducted Emission				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI TEST RECEIVER	R&S	ESCI	100781	2015-3-16
V (V-LISN)	SCHWARZBECK	NNLK 8129	8129-143	N.C.R
LISN (EUT)	FCC	FCC-LISN-50/250-50-2-02	05012	2015-3-16
Pulse LIMITER	R&S	ESH3-Z2	100524	2014-9-25
Test Software	EZ-EMC			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

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4.2 MEASUREMENT UNCERTAINTY

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR 100 028-1 [2] and shall correspond to an expansion factor (coverage factor) k = 1,96 or k = 2 (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Table 6 is based on such expansion factors.

Table 6: Maximum measurement uncertainty

Parameter	UNCERTAINTY
Radio frequency	±0.8 × 10-7
RF power, conducted	0.2054
Maximum frequency deviation: -within 300 Hz and 6 kHz of audio frequency	1.3%
-within 6 kHz and 25 kHz of audio frequency	0.65 dB
Adjacent channel power	0.2054
Conducted spurious emission of transmitter, valid up to 6 GHz	0.2892
Conducted emission of receivers	+1.2/-1.1 dB
Radiated emission of transmitter, valid up to 6 GHz	±3.94 dB
Radiated emission of receiver, valid up to 6 GHz	±3.94 dB
RF level uncertainty for a given BER	±0.3 dB
Temperature	0.1979
Humidity	±1 %

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5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at
☒ **No.10Weiye Rd., Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.**
The sites are constructed in conformance with the requirements of ANSI C63.4:2003 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

USA	A2LA
China	CNAS

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	Industry Canada
Japan	VCCI
Taiwan	BSMI
USA	FCC

Copies of granted accreditation certificates are available for downloading from our web site, http://www.ccsrf.com.

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6 SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No.	Equipment	Model No.	Serial No.
1	Notebook	dell	E5430

Remark:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

2.Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

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7 FCC PART 15 REQUIREMENTS

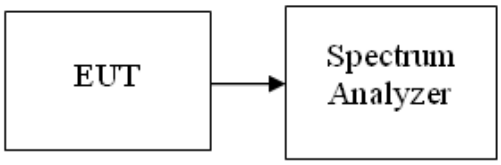
7.1 99% AND 26 DB EMISSION BANDWIDTH

LIMIT

According to §15.303(c), for purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Compliance with the emissions limits is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

Test Configuration

TEST PROCEDURE



1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low-loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW > 1%EBW, VBW > RBW, Span >26dB bandwidth, and Sweep = auto.
4. Mark the peak frequency and –26dB (upper and lower) frequency.
5. Repeat until all the rest channels were investigated.

TEST RESULTS

No non-compliance noted

Test Data

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Test mode: IEEE 802.11a mode/chain 0

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	22.540
Mid	5200	22.416
High	5240	21.717

Test mode: IEEE 802.11a mode/chain 1

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	22.276
Mid	5200	21.810
High	5240	21.347

Test mode: IEEE 802.11a mode/chain 2

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	21.334
Mid	5200	21.898
High	5240	21.723

Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 0

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	23.625
Mid	5200	22.937
High	5240	23.004

Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 1

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	23.410
Mid	5200	22.939
High	5240	22.278

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Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 2

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	22.158
Mid	5200	22.533
High	5240	22.351

Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5190	45.253
High	5230	45.358

Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 1

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5190	46.969
High	5230	45.205

Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 2

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5190	45.196
High	5230	46.015

Test mode: draft 802.11ac Standard-20 MHz Channel mode / Chain 0

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	21.956
Mid	5200	22.613
High	5240	22.701

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Test mode: draft 802.11ac Standard-20 MHz Channel mode / Chain 1

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	22.415
Mid	5200	22.782
High	5240	22.324

Test mode: draft 802.11ac Standard-20 MHz Channel mode / Chain 2

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	23.032
Mid	5200	22.239
High	5240	22.177

Test mode: draft 802.11ac Wide-40 MHz Channel mode / Chain 0

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5190	46.168
High	5230	45.469

Test mode: draft 802.11ac Wide-40 MHz Channel mode / Chain 1

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5190	45.006
High	5230	44.853

Test mode: draft 802.11ac Wide-40 MHz Channel mode / Chain 2

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5190	46.671
High	5230	46.786

Test mode: draft 802.11ac Wide-80 MHz Channel mode / Chain 0

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Mid	5210	87.795

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Test mode: draft 802.11ac Wide-80 MHz Channel mode / Chain 1

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Mid	5210	84.757

Test mode: draft 802.11ac Wide-80 MHz Channel mode / Chain 2

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Mid	5210	89.092

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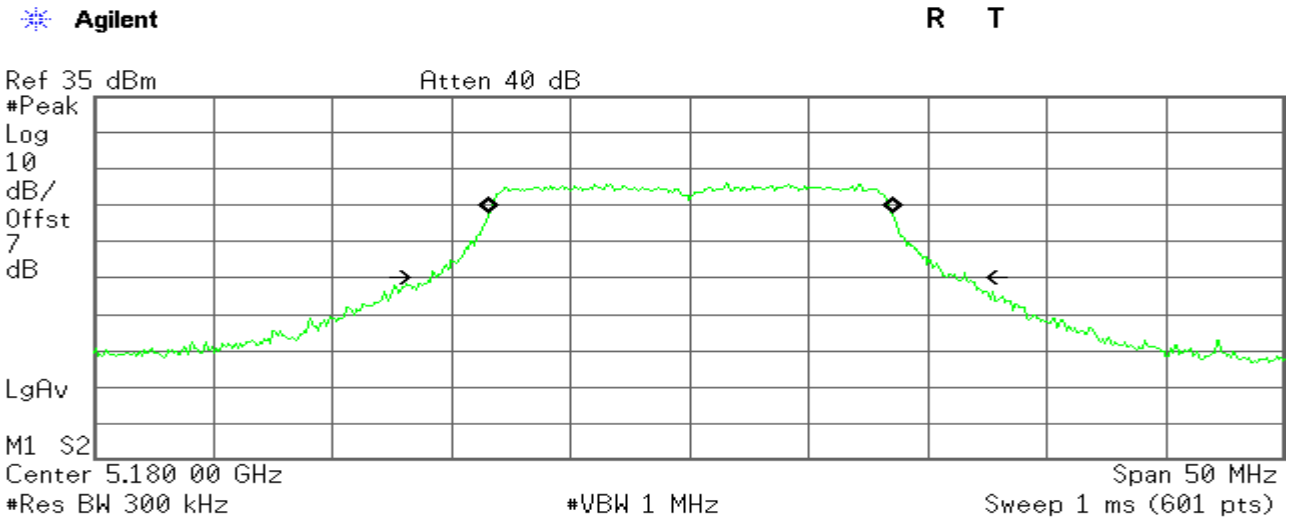
Test Plot

IEEE 802.11a mode/chain 0:

5150~5250MHz

CH Low

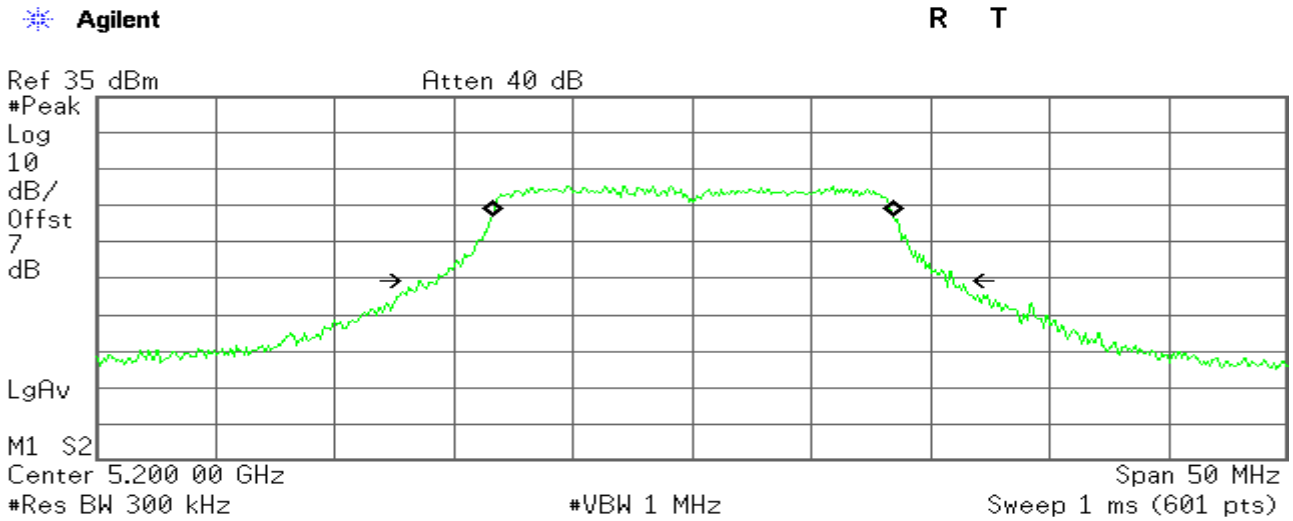


Occupied Bandwidth
16.8550 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 37.833 kHz
x dB Bandwidth 22.540 MHz

CH Mid



Occupied Bandwidth
16.7756 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 40.755 kHz
x dB Bandwidth 22.416 MHz

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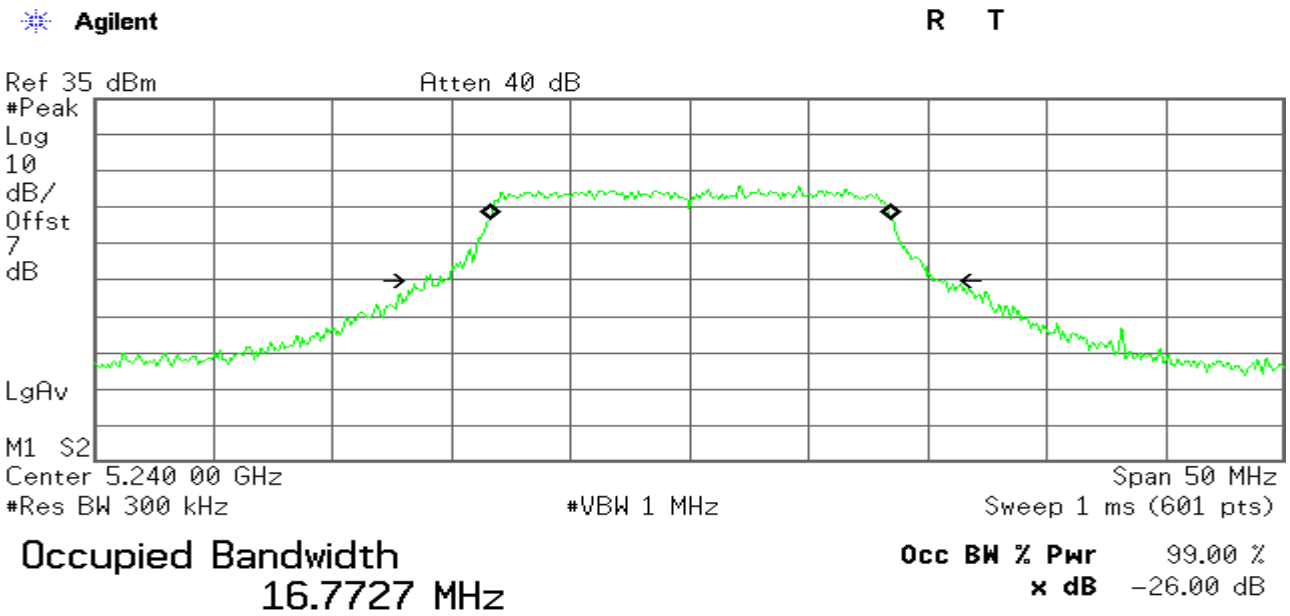
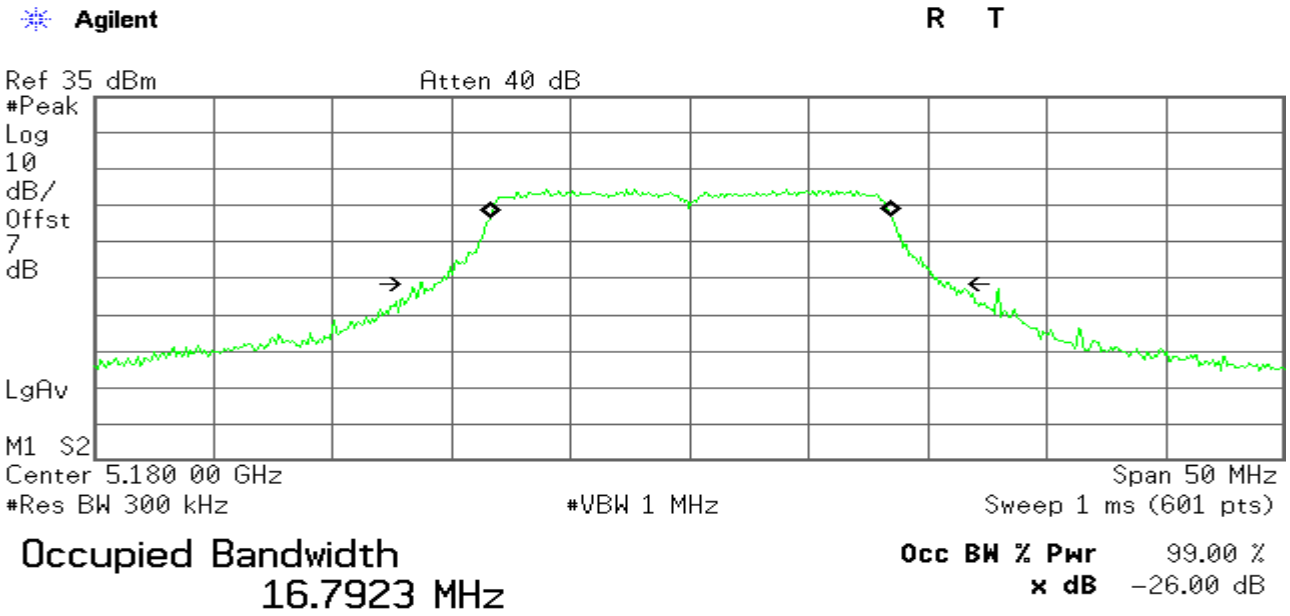
CH High



IEEE 802.11a mode/chain 1:

5150~5250MHz

CH Low



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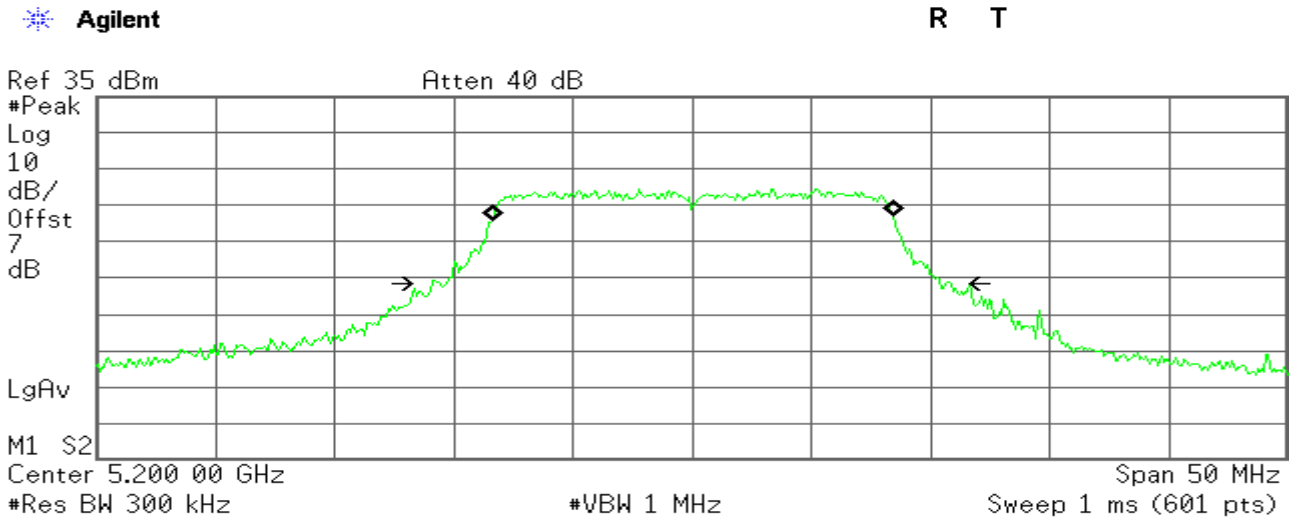
CH Mid

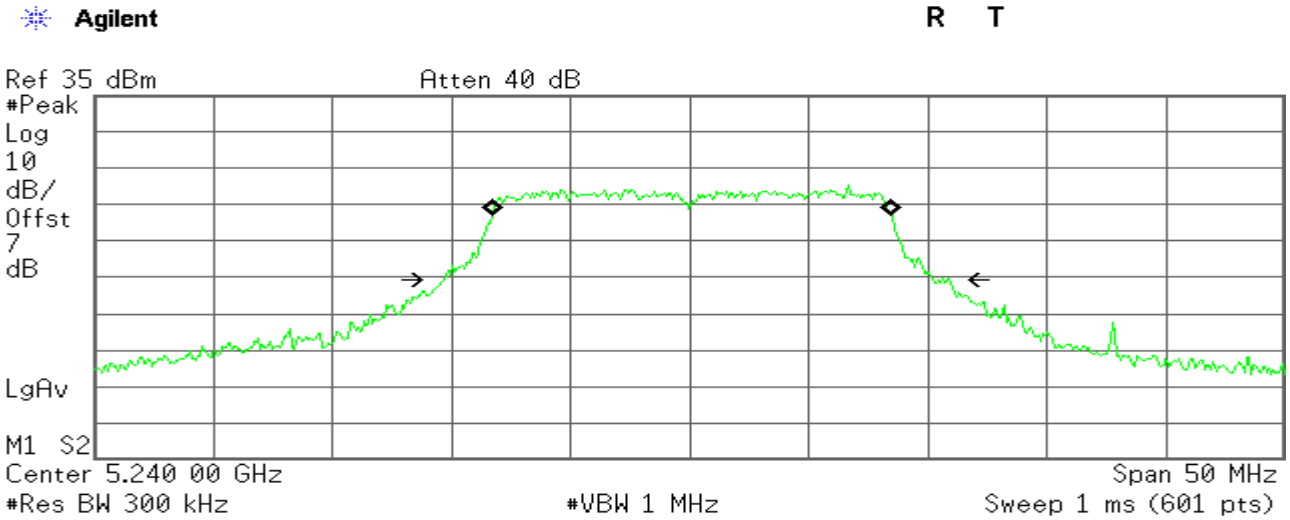


Occupied Bandwidth
16.7191 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 21.774 kHz
x dB Bandwidth 21.810 MHz

CH High



Occupied Bandwidth
16.6798 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 68.894 kHz
x dB Bandwidth 21.347 MHz

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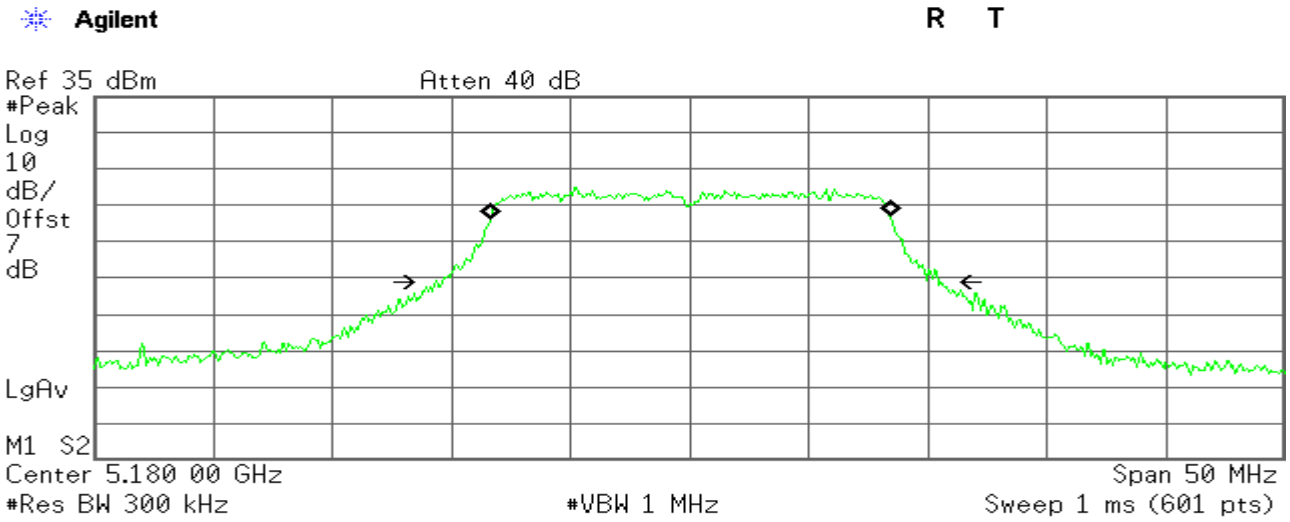
IEEE 802.11a mode/chain 2:

5150~5250MHz

CH Low

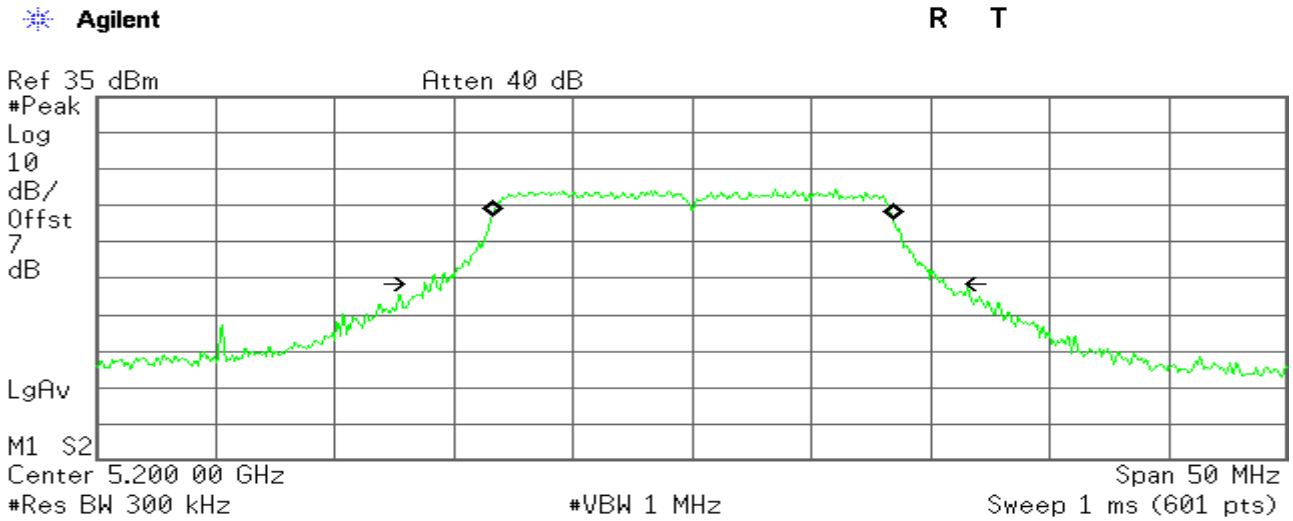


Occupied Bandwidth
16.7304 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 47.001 kHz
x dB Bandwidth 21.334 MHz

CH Mid



Occupied Bandwidth
16.7502 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 10.493 kHz
x dB Bandwidth 21.898 MHz

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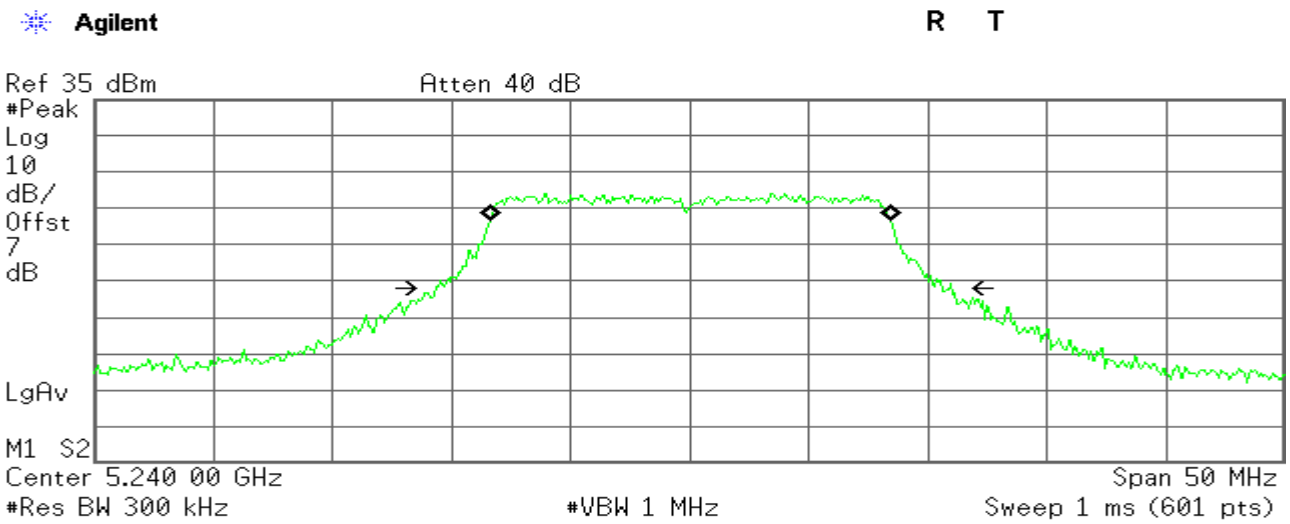
CH High



Occupied Bandwidth
16.7414 MHz

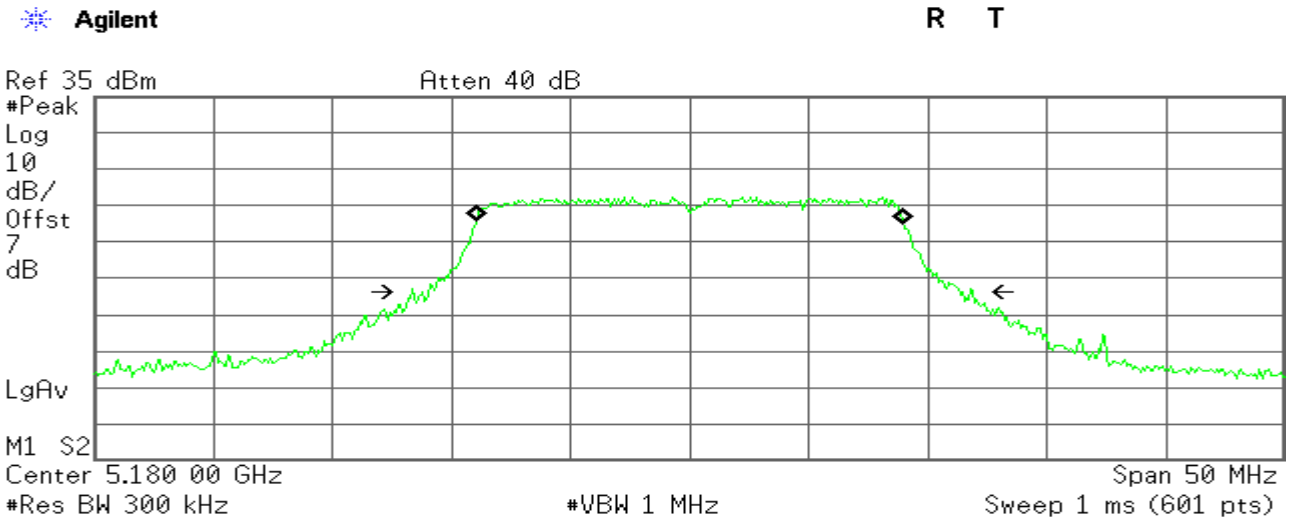
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 24.313 kHz
x dB Bandwidth 21.723 MHz

draft 802.11n Standard-20 MHz Channel mode / Chain 0

5150~5250MHz

CH Low



Occupied Bandwidth
17.8620 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 19.145 kHz
x dB Bandwidth 23.625 MHz

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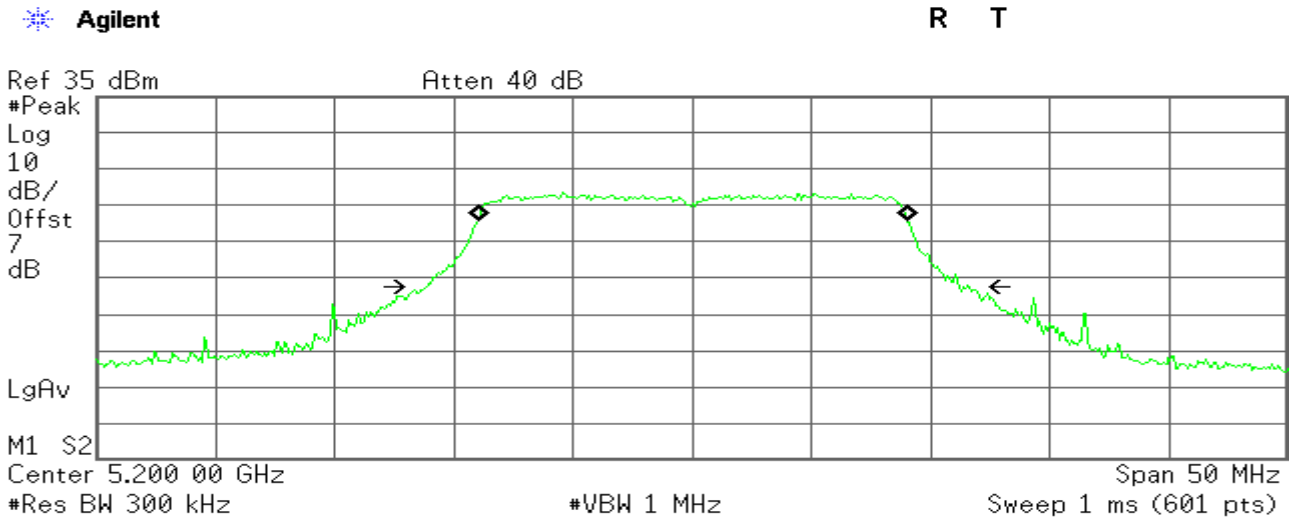
CH Mid

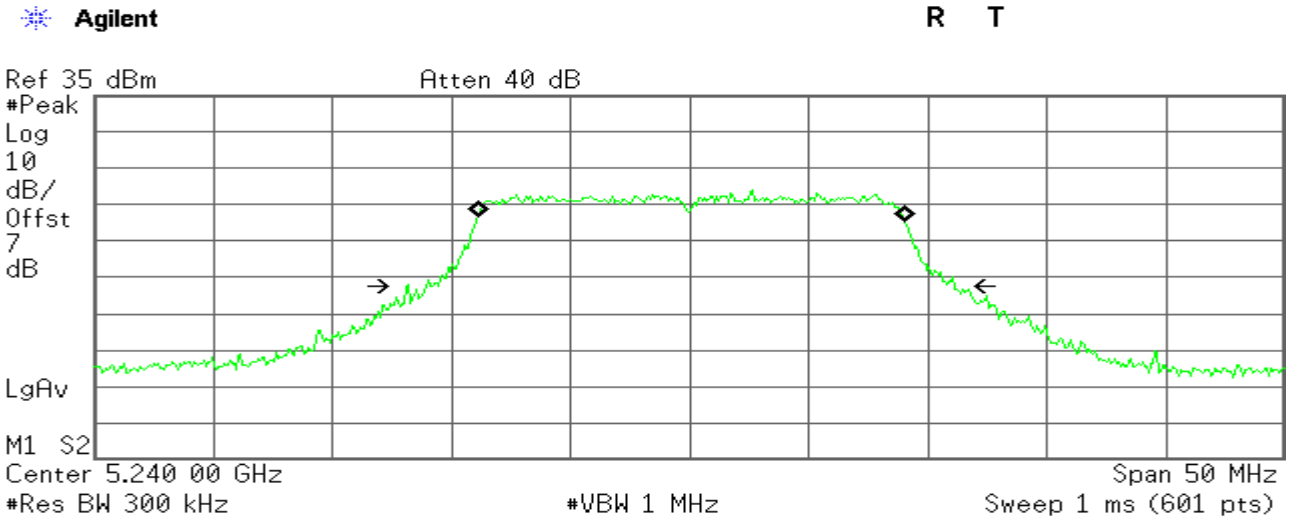


Occupied Bandwidth
17.9313 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 21.700 kHz
x dB Bandwidth 22.937 MHz

CH High



Occupied Bandwidth
17.8419 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 46.534 kHz
x dB Bandwidth 23.004 MHz

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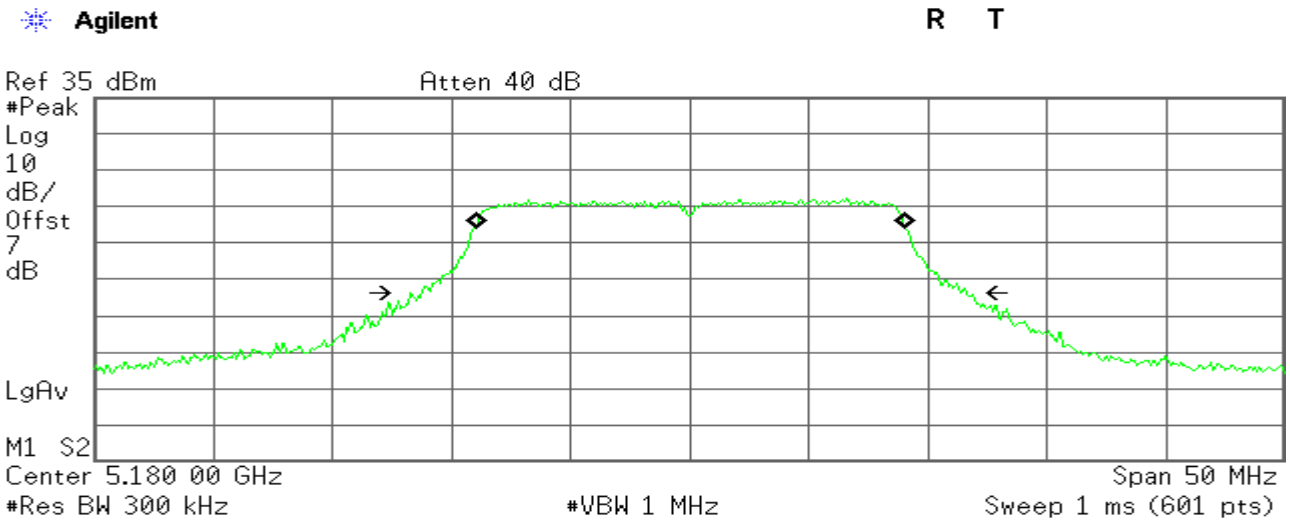
draft 802.11n Standard-20 MHz Channel mode / Chain 1

5150~5250MHz

CH Low

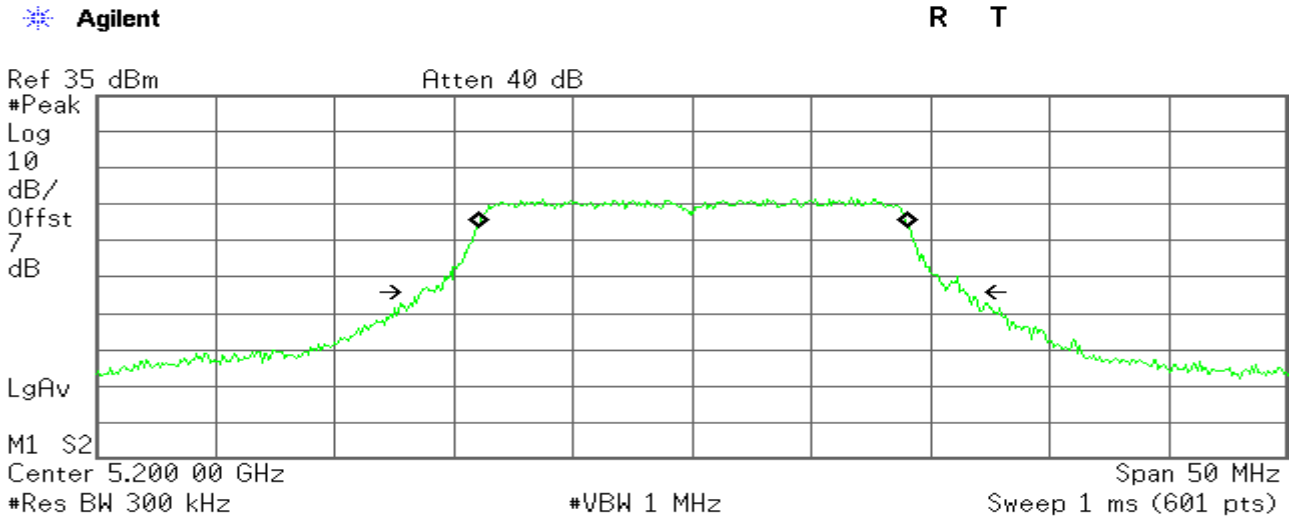


Occupied Bandwidth
17.9554 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 30.890 kHz
x dB Bandwidth 23.410 MHz

CH Mid



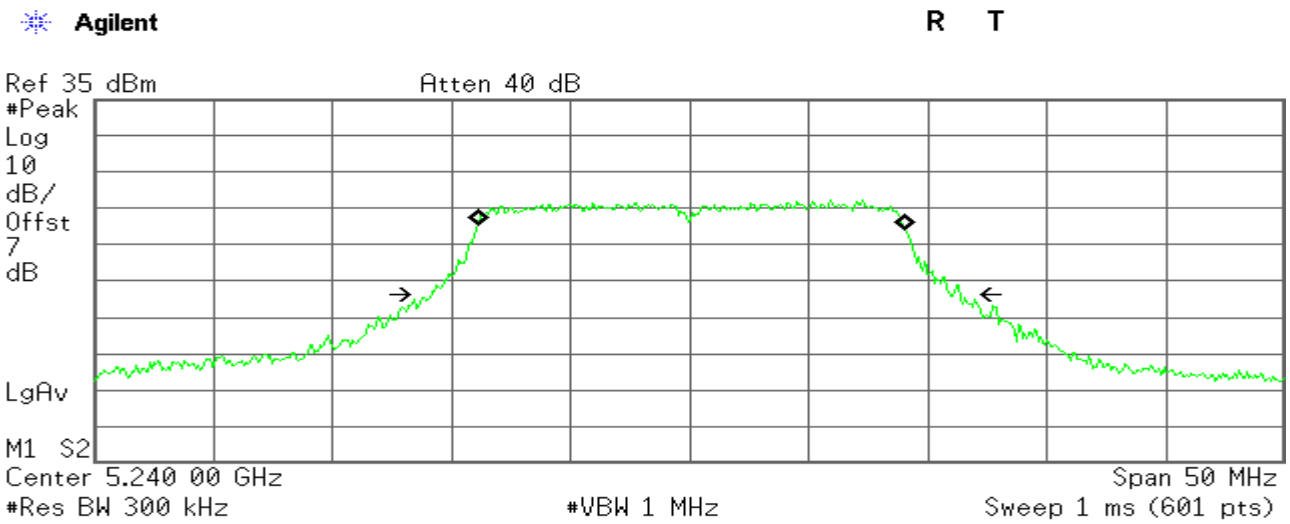
Occupied Bandwidth
17.9138 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 32.426 kHz
x dB Bandwidth 22.939 MHz

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc.

CH High



Occupied Bandwidth
17.8747 MHz

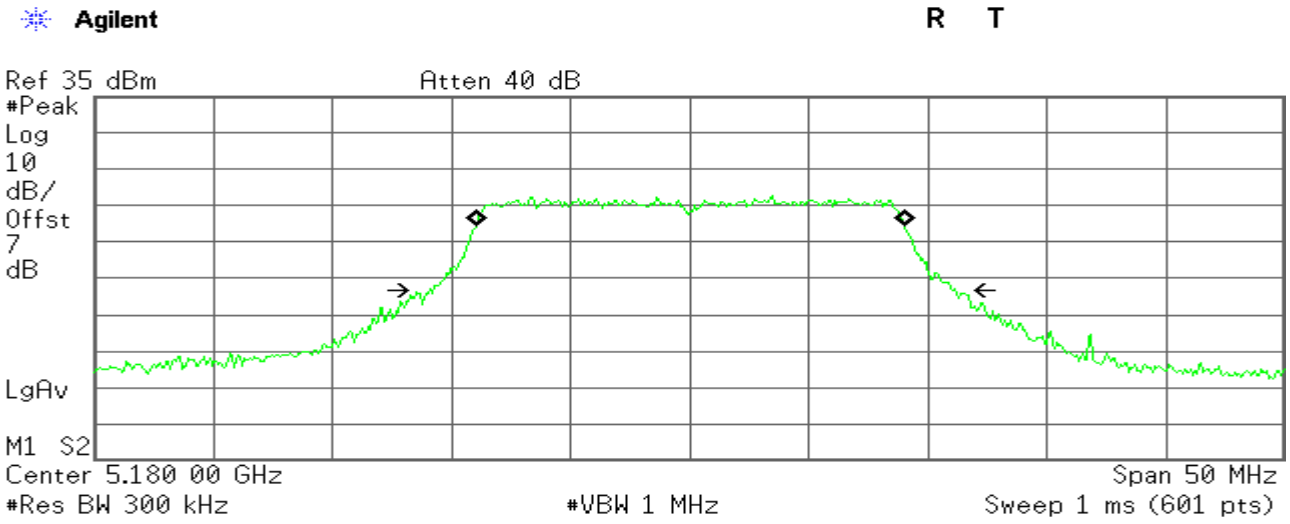
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 65.471 kHz
x dB Bandwidth 22.278 MHz

draft 802.11n Standard-20 MHz Channel mode / Chain 2

5150~5250MHz

CH Low



Occupied Bandwidth
17.8722 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 33.481 kHz
x dB Bandwidth 22.158 MHz

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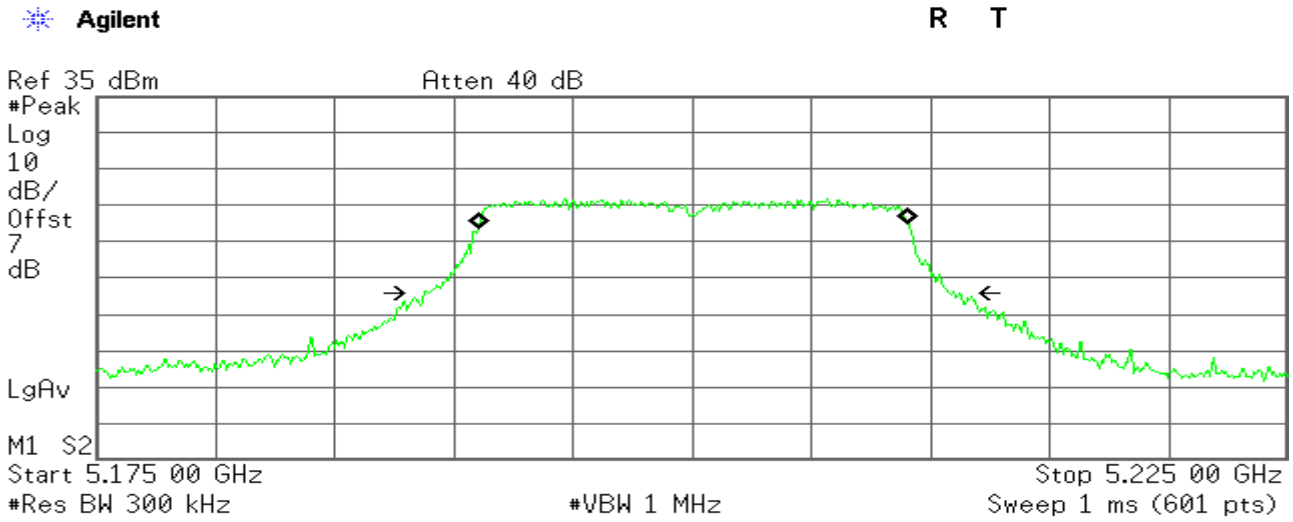
CH Mid

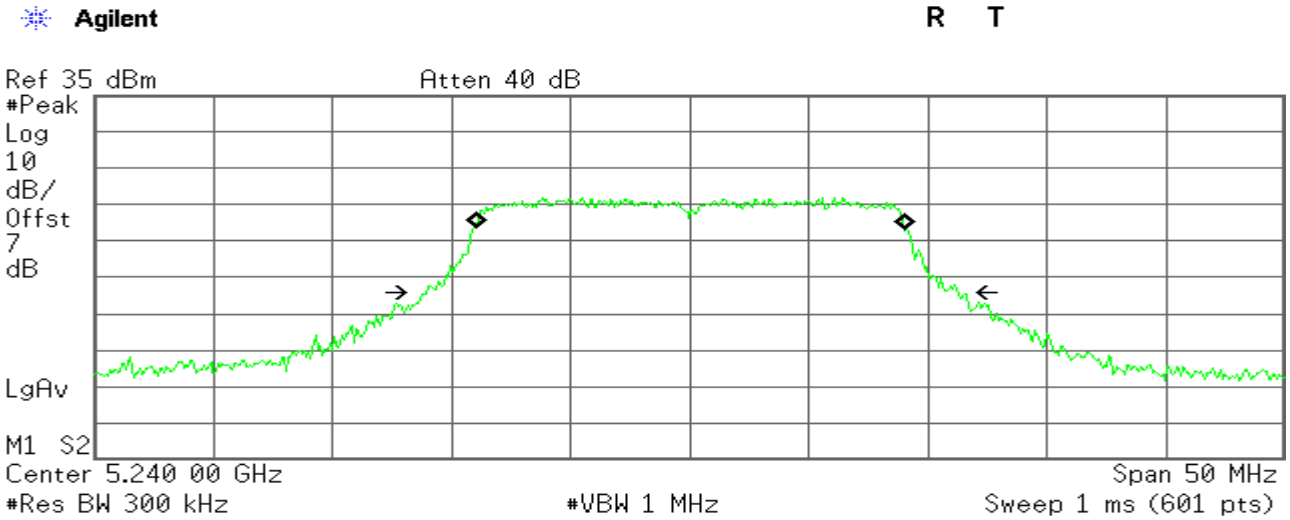


Occupied Bandwidth
17.9196 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 37.771 kHz
x dB Bandwidth 22.533 MHz

CH High



Occupied Bandwidth
17.9053 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 28.322 kHz
x dB Bandwidth 22.351 MHz

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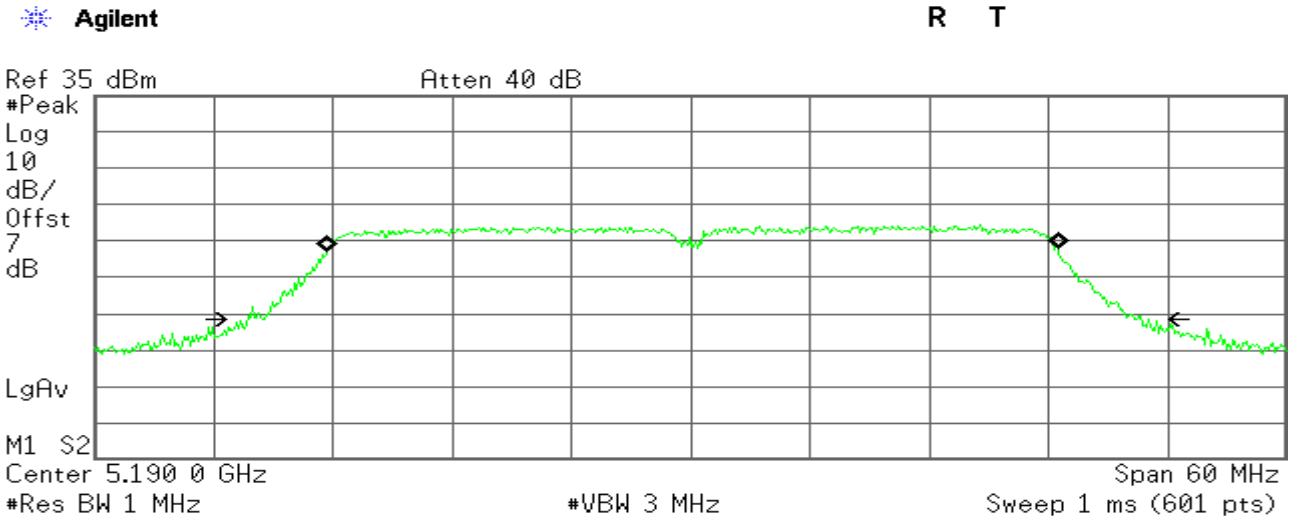
draft 802.11n Wide-40 MHz Channel mode / Chain 0

5150~5250MHz

CH Low

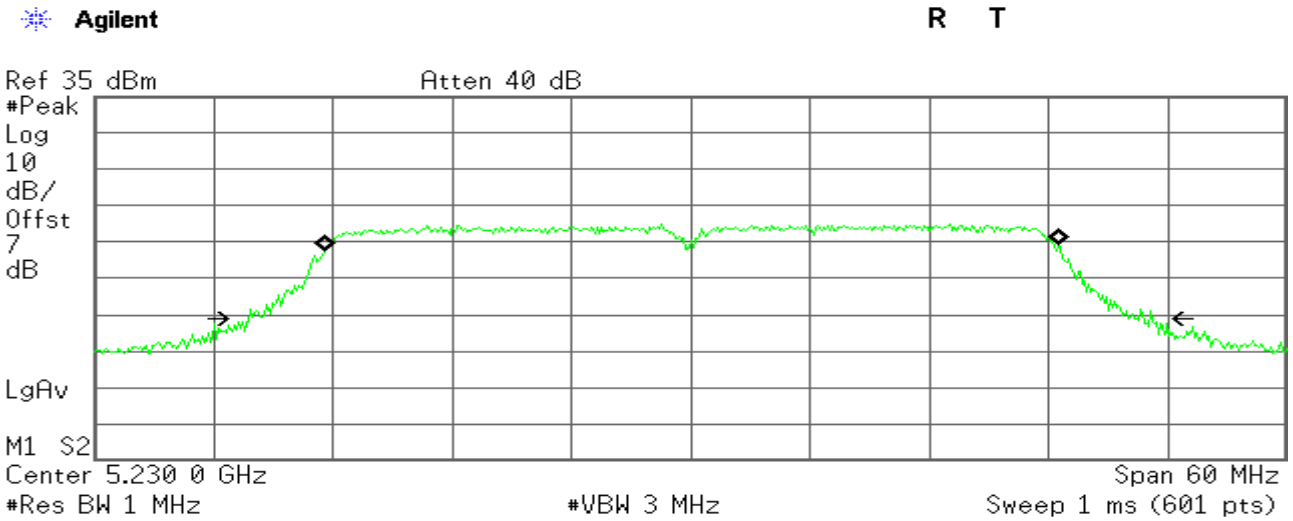


Occupied Bandwidth
36.7485 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 83.682 kHz
x dB Bandwidth 45.253 MHz

CH High



Occupied Bandwidth
36.8676 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 74.547 kHz
x dB Bandwidth 45.358 MHz

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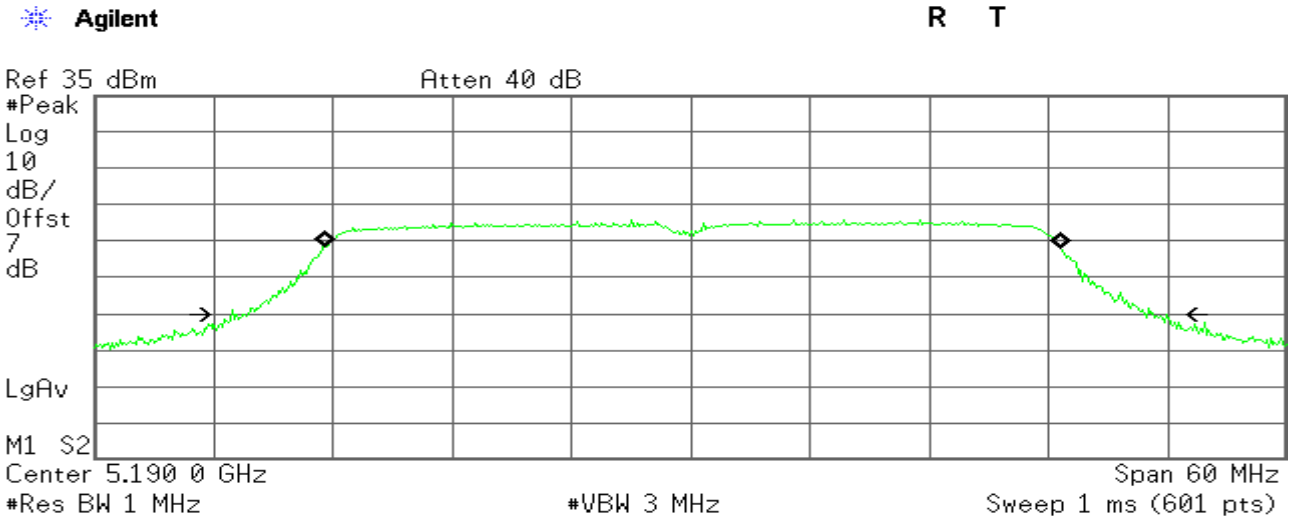
draft 802.11n Wide-40 MHz Channel mode / Chain 1

5150~5250MHz

CH Low

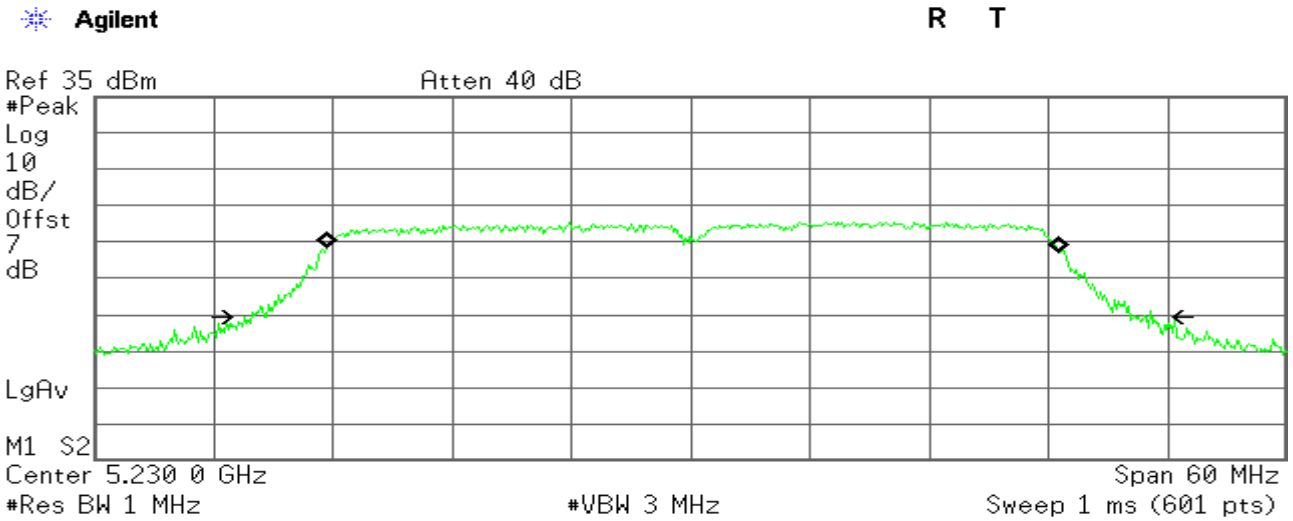


Occupied Bandwidth
37.0128 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 89.223 kHz
x dB Bandwidth 46.969 MHz

CH High



Occupied Bandwidth
36.7897 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 87.596 kHz
x dB Bandwidth 45.205 MHz

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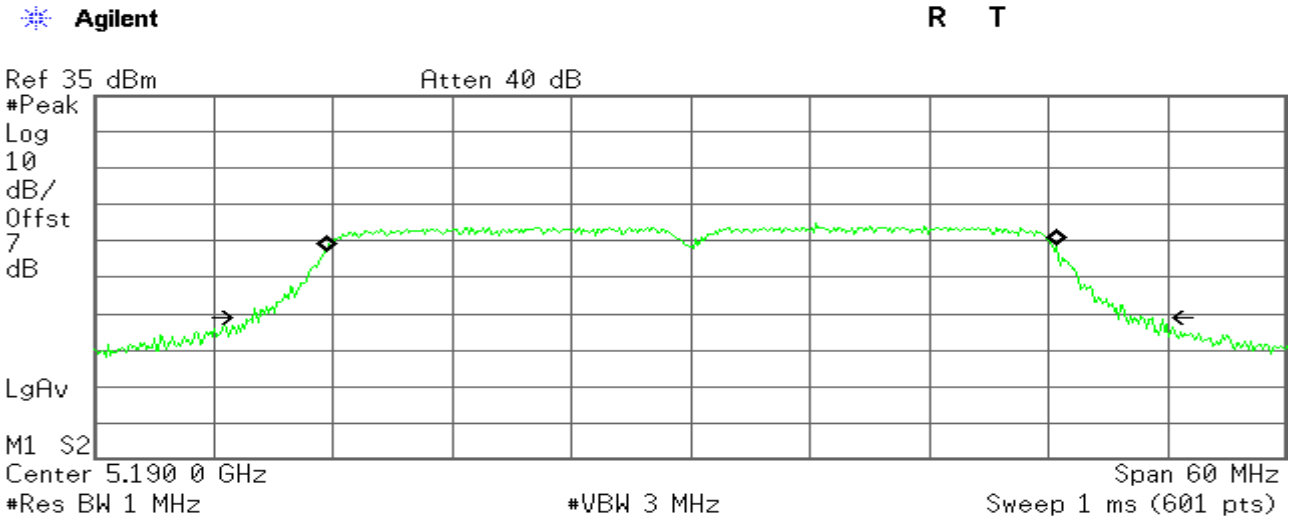
draft 802.11n Wide-40 MHz Channel mode / Chain 2
5150~5250MHz

CH Low

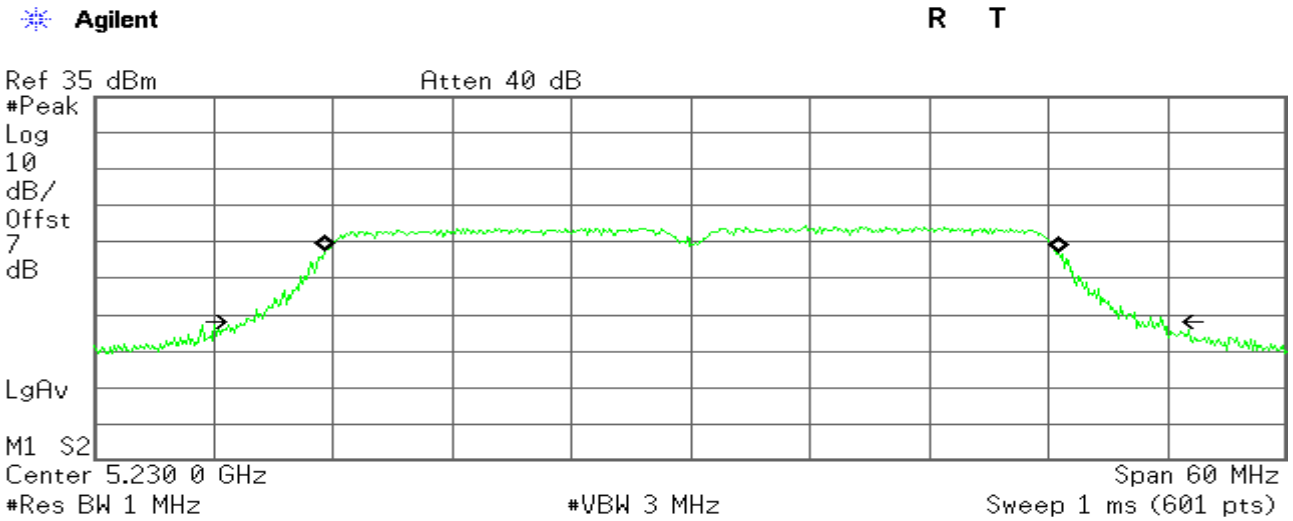


Occupied Bandwidth
36.7104 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 45.524 kHz
x dB Bandwidth 45.196 MHz

CH High



Occupied Bandwidth
36.8249 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 43.238 kHz
x dB Bandwidth 46.015 MHz

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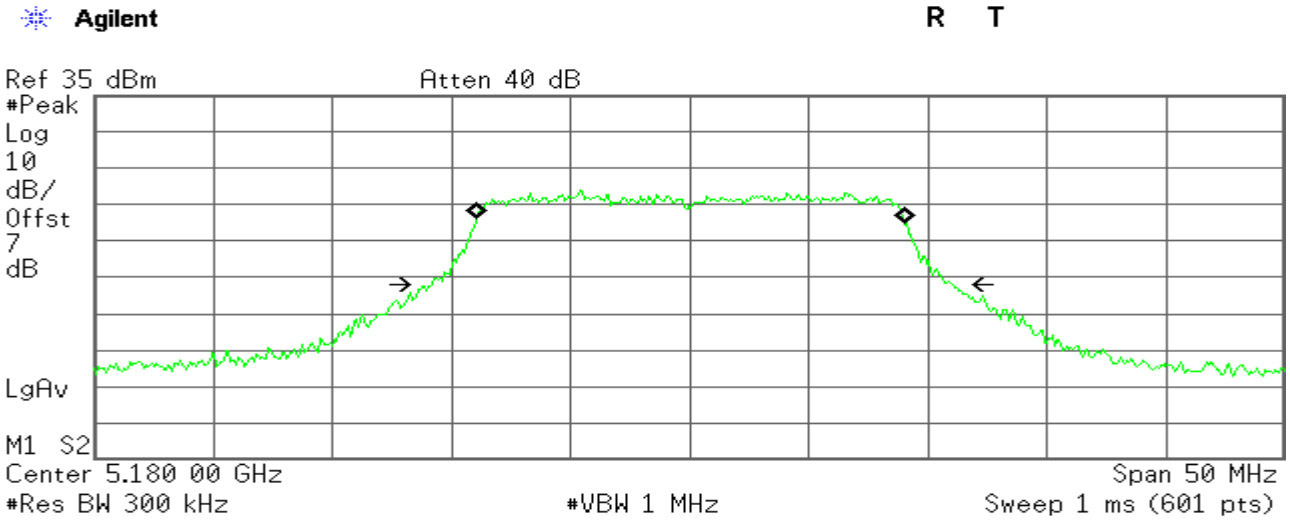
draft 802.11ac Standard-20 MHz Channel mode / Chain 0
5150~5250MHz

CH Low

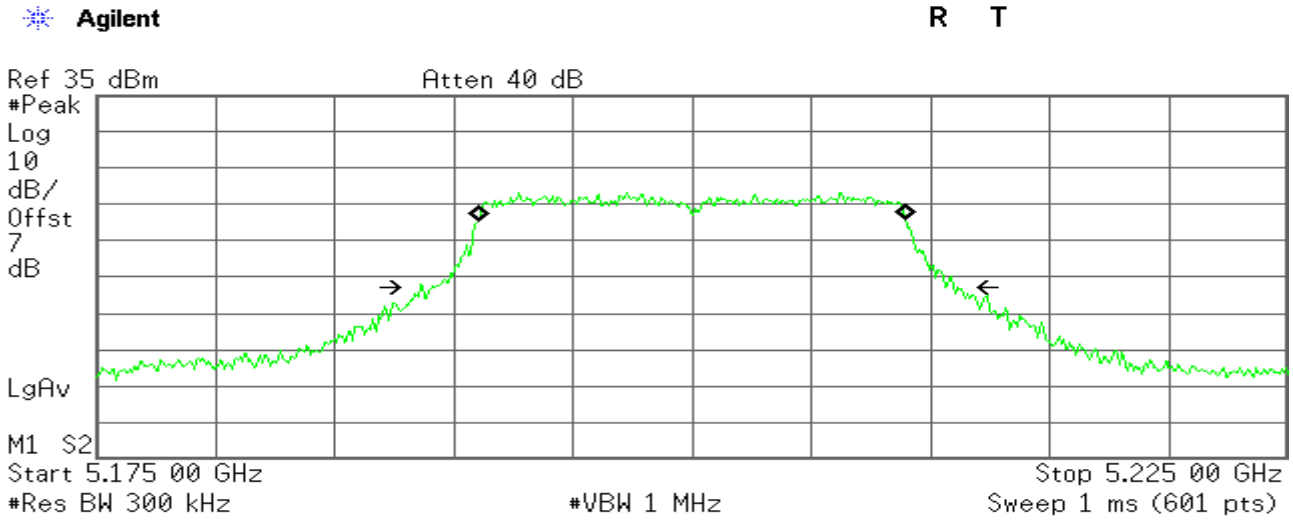


Occupied Bandwidth
17.8759 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 46.804 kHz
x dB Bandwidth 21.956 MHz

CH Mid



Occupied Bandwidth
17.8577 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 7.227 kHz
x dB Bandwidth 22.613 MHz

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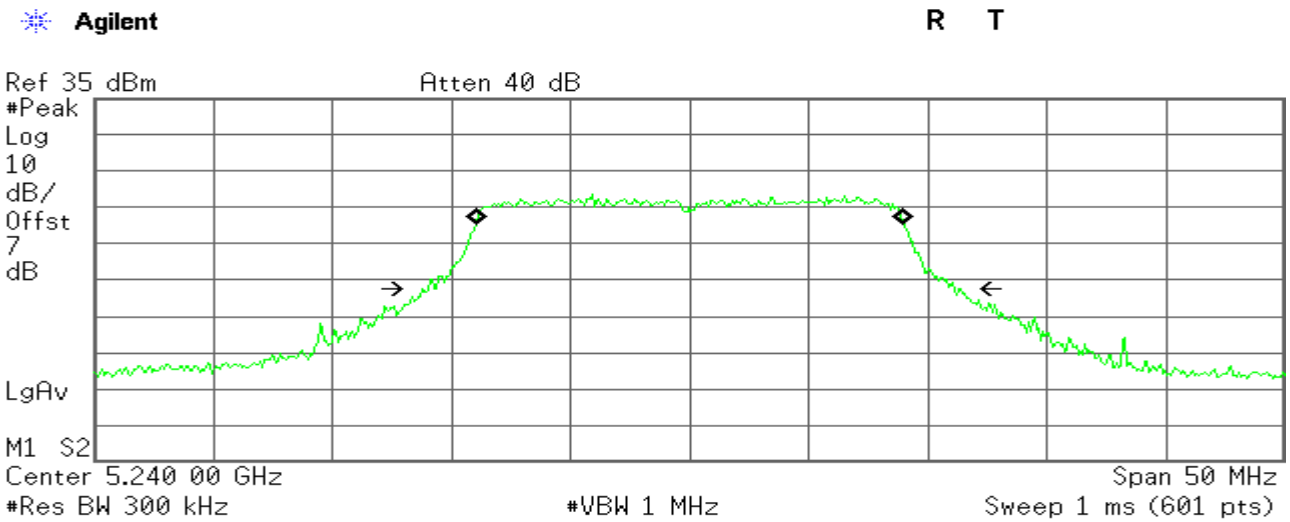
CH High



Occupied Bandwidth
17.8639 MHz

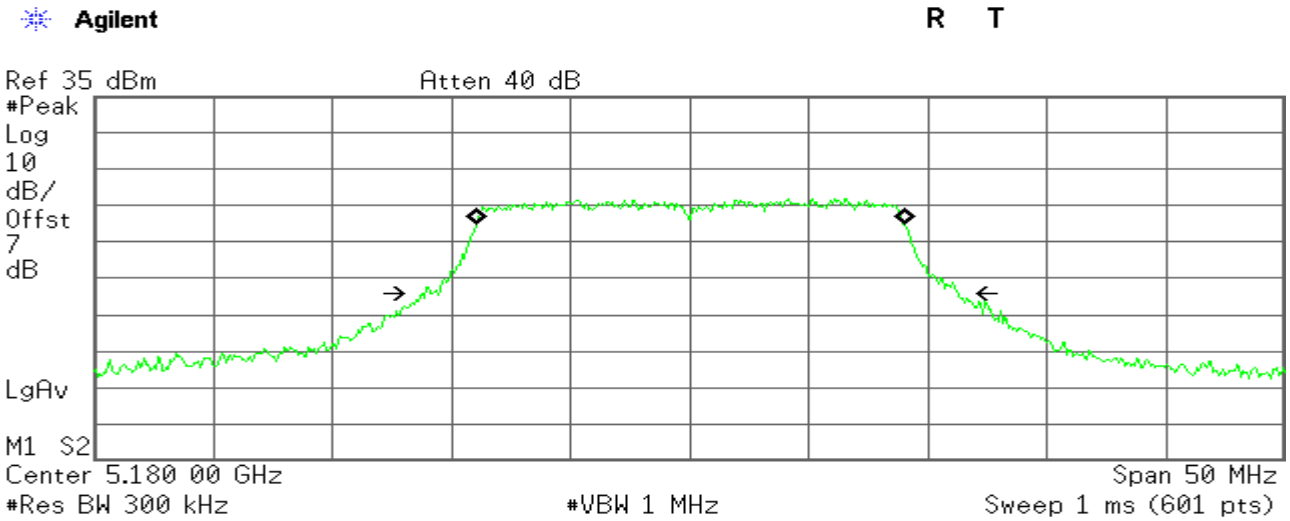
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 22.272 kHz
x dB Bandwidth 22.701 MHz

draft 802.11ac Standard-20 MHz Channel mode / Chain 1

5150~5250MHz

CH Low



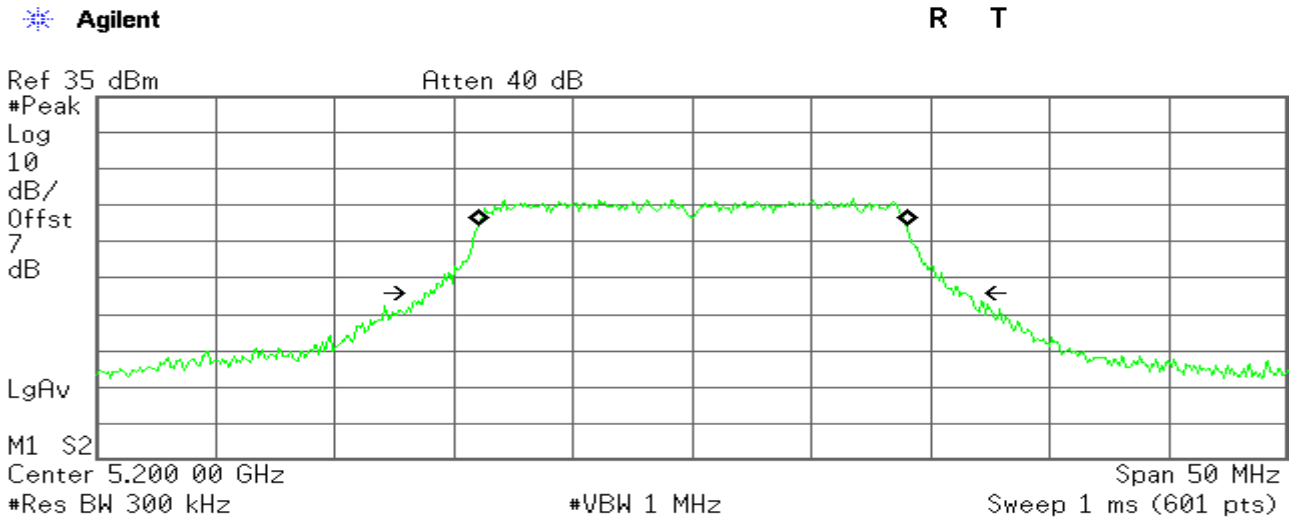
Occupied Bandwidth
17.9083 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 51.409 kHz
x dB Bandwidth 22.415 MHz

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc.

CH Mid

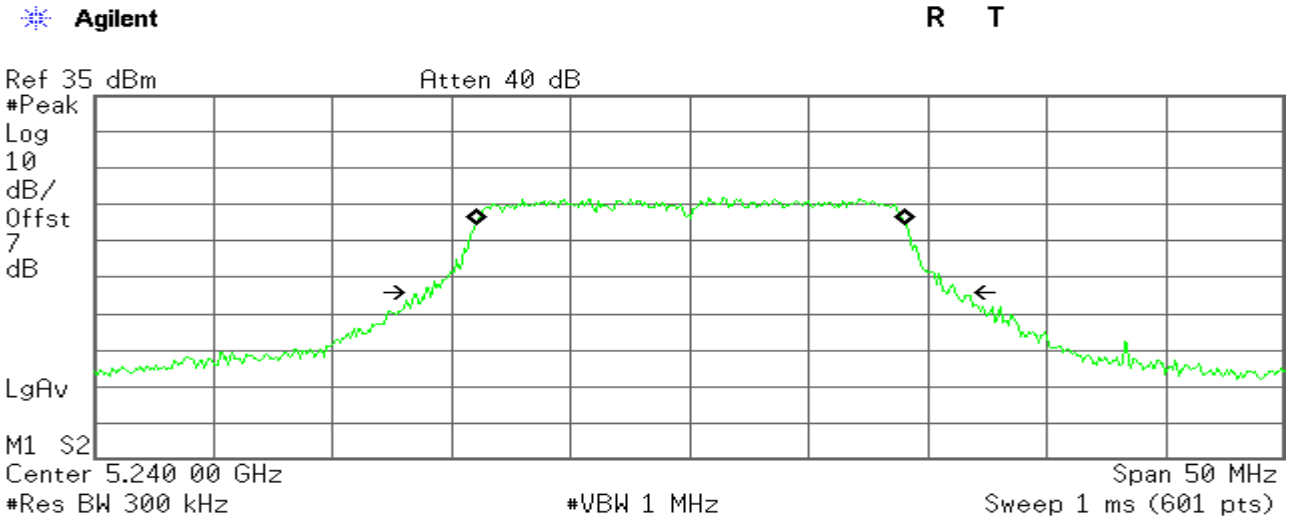


Occupied Bandwidth
17.8759 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 20.528 kHz
x dB Bandwidth 22.782 MHz

CH High



Occupied Bandwidth
17.9404 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 40.620 kHz
x dB Bandwidth 22.324 MHz

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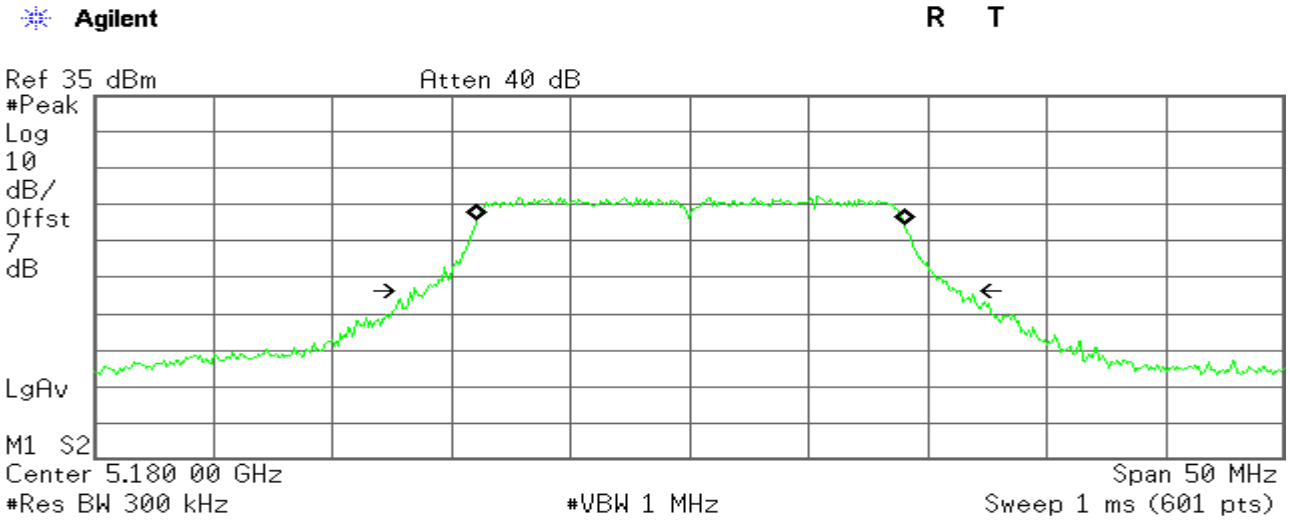
draft 802.11ac Standard-20 MHz Channel mode / Chain 2
5150~5250MHz

CH Low

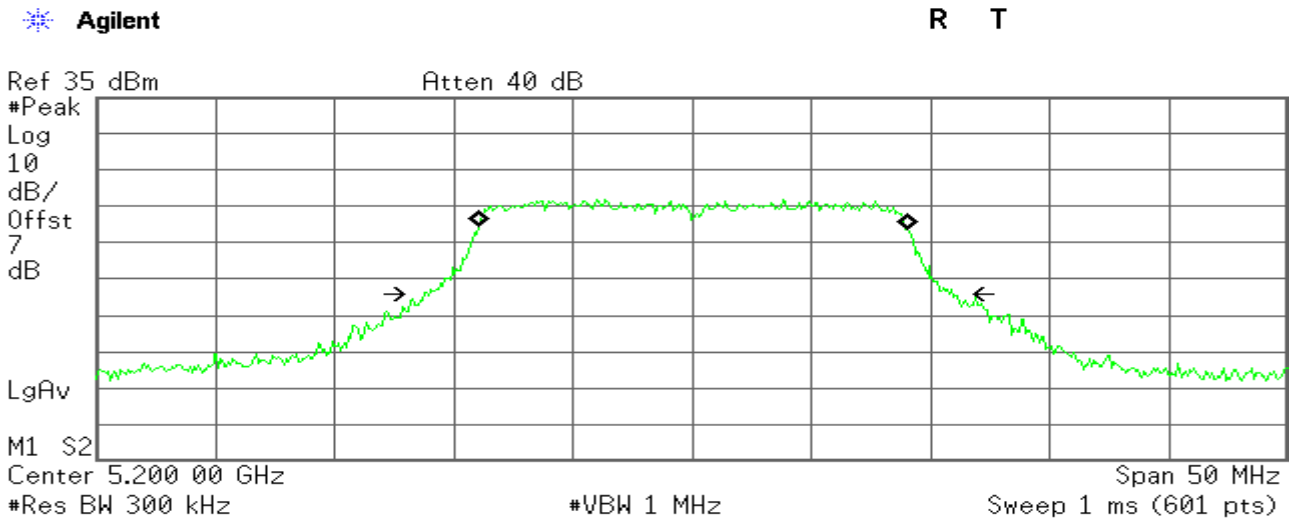


Occupied Bandwidth
17.8688 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 24.193 kHz
x dB Bandwidth 23.032 MHz

CH Mid



Occupied Bandwidth
17.8871 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 15.544 kHz
x dB Bandwidth 22.239 MHz

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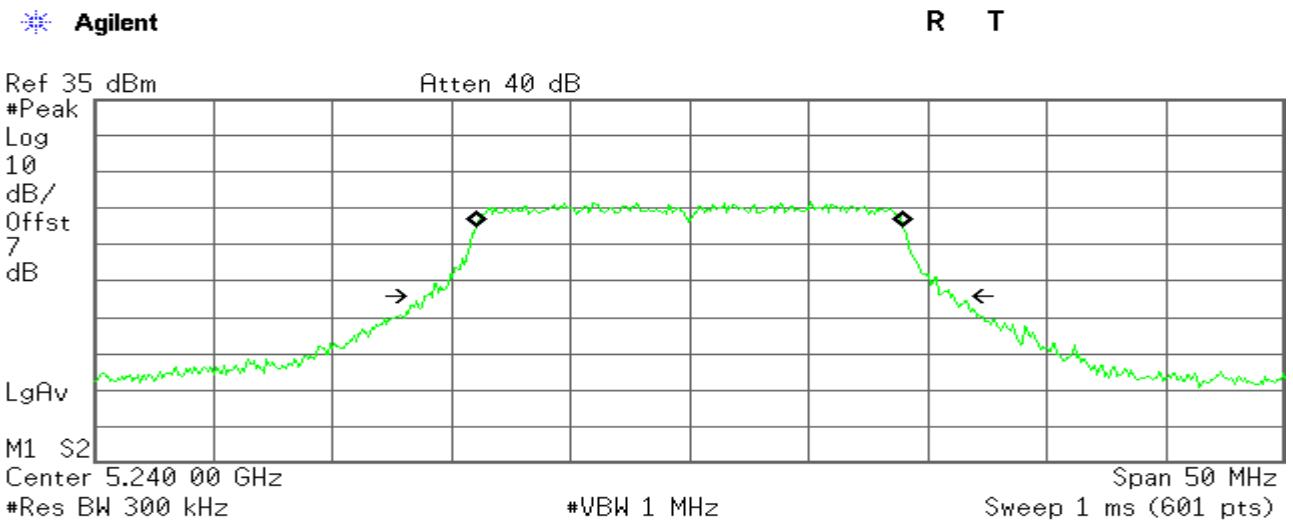
CH High



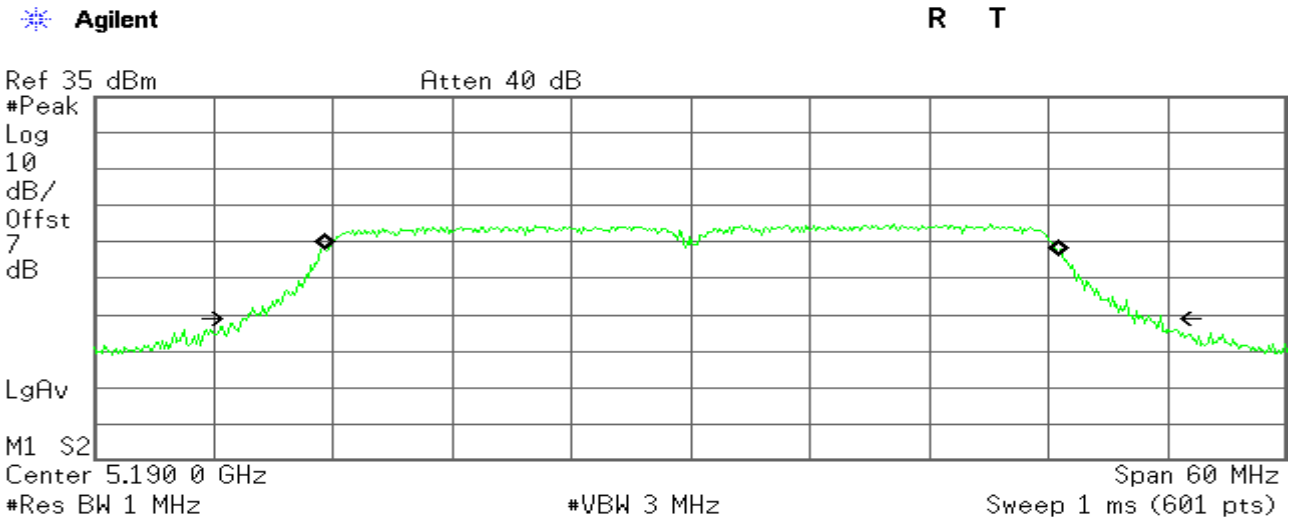
Occupied Bandwidth
17.8443 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -1.584 kHz
x dB Bandwidth 22.177 MHz

draft 802.11ac Wide-40 MHz Channel mode / Chain 0
5150~5250MHz

CH Low



Occupied Bandwidth
36.8476 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 29.873 kHz
x dB Bandwidth 46.168 MHz

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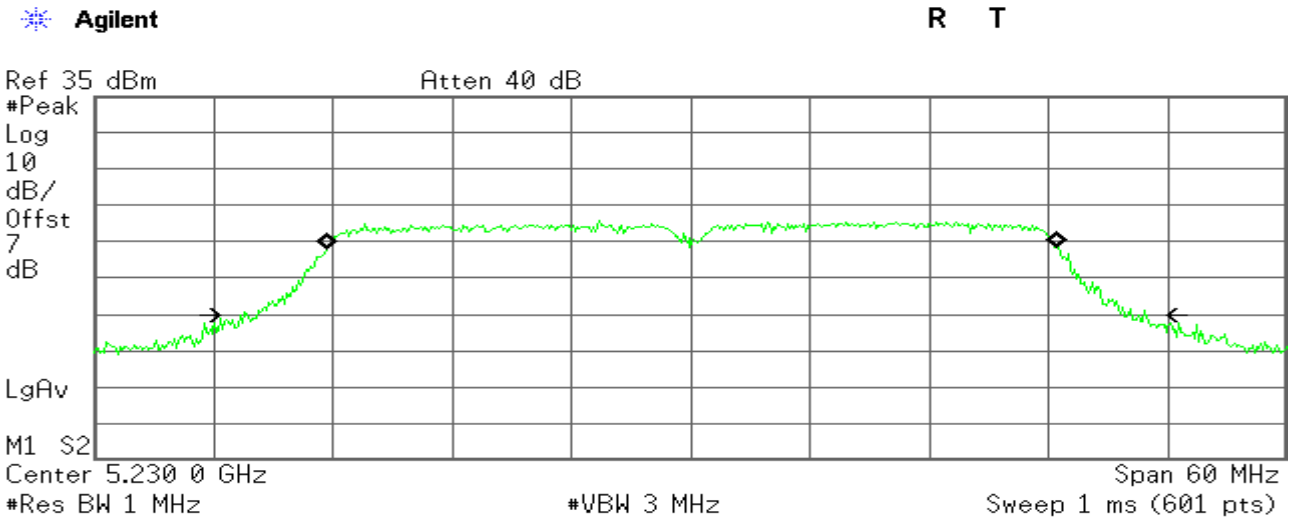
CH High



Occupied Bandwidth
36.6830 MHz

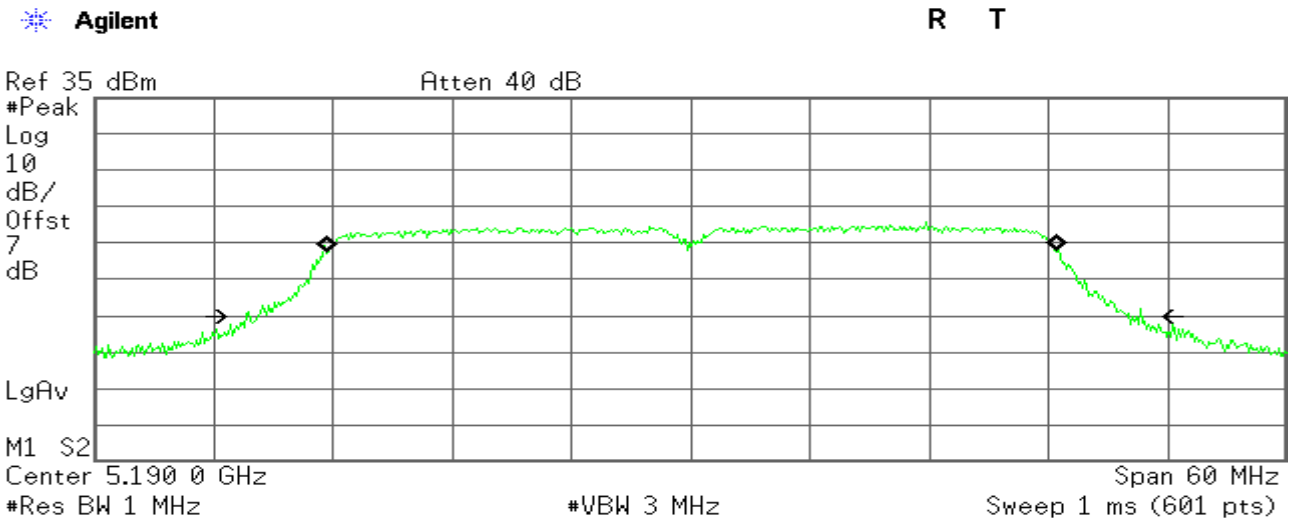
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 72.139 kHz
x dB Bandwidth 45.469 MHz

draft 802.11ac Wide-40 MHz Channel mode / Chain 1

5150~5250MHz

CH Low



Occupied Bandwidth
36.7384 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 46.988 kHz
x dB Bandwidth 45.006 MHz

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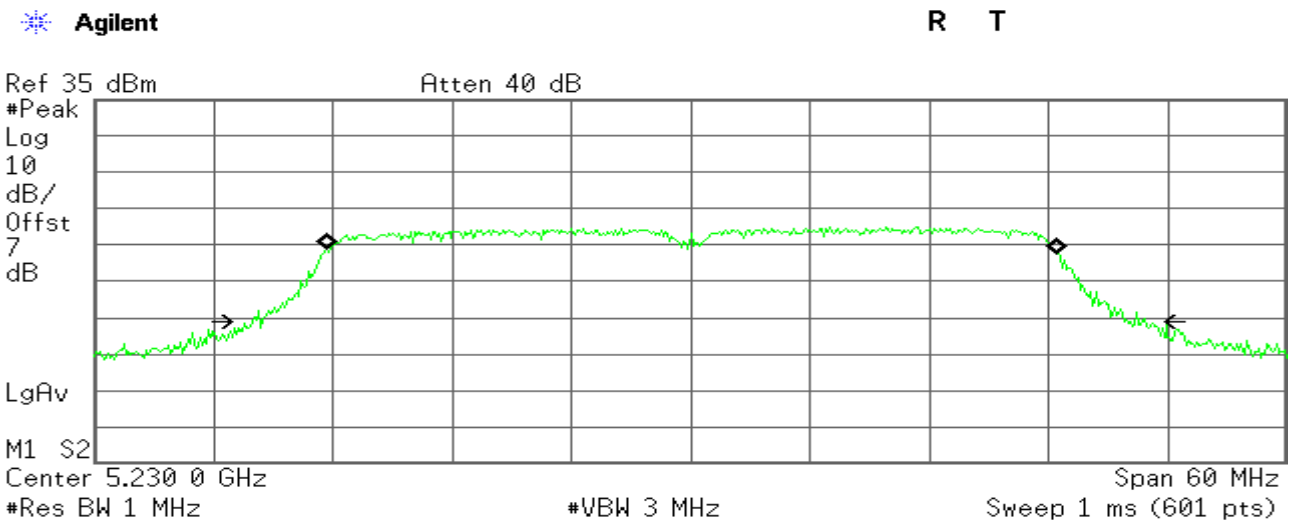
CH High



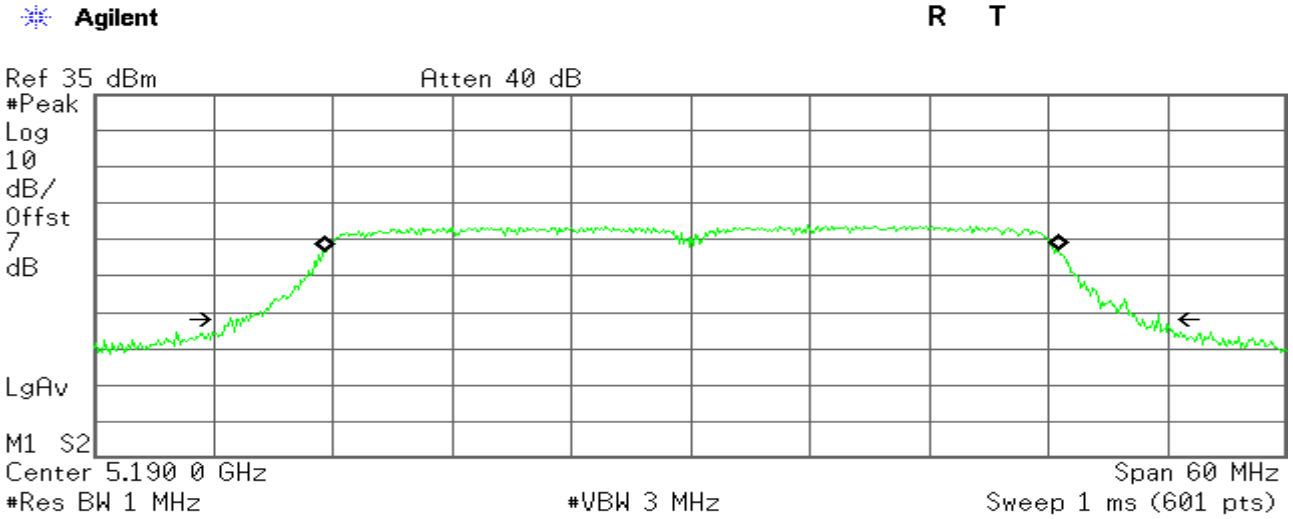
Occupied Bandwidth
36.7260 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 34.464 kHz
x dB Bandwidth 44.853 MHz

draft 802.11ac Wide-40 MHz Channel mode / Chain 2
5150~5250MHz

CH Low



Occupied Bandwidth
36.8209 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 57.985 kHz
x dB Bandwidth 46.671 MHz

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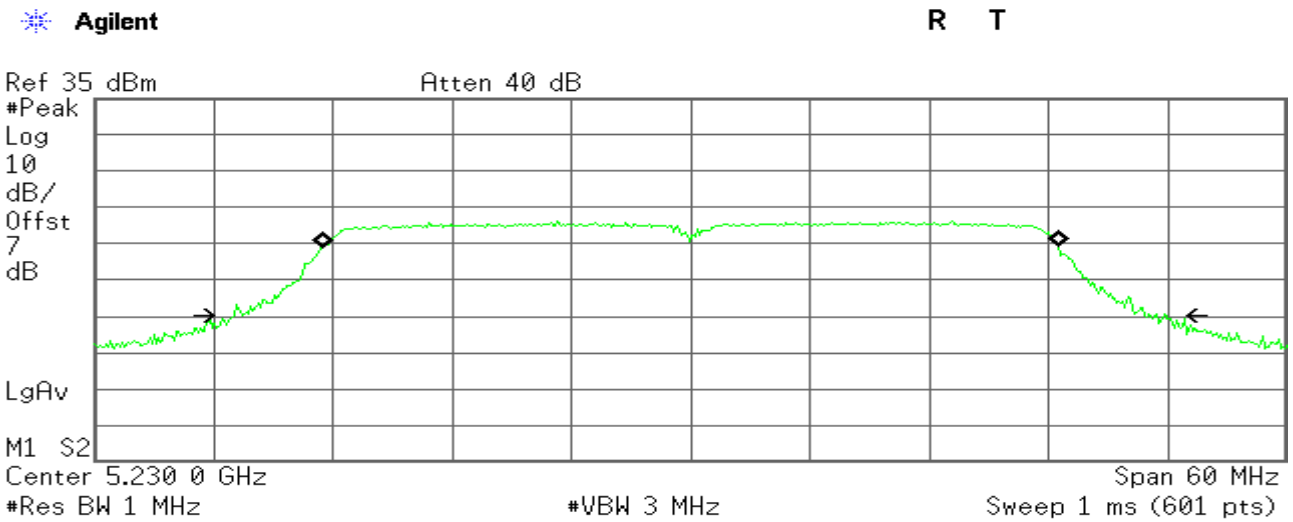
CH High

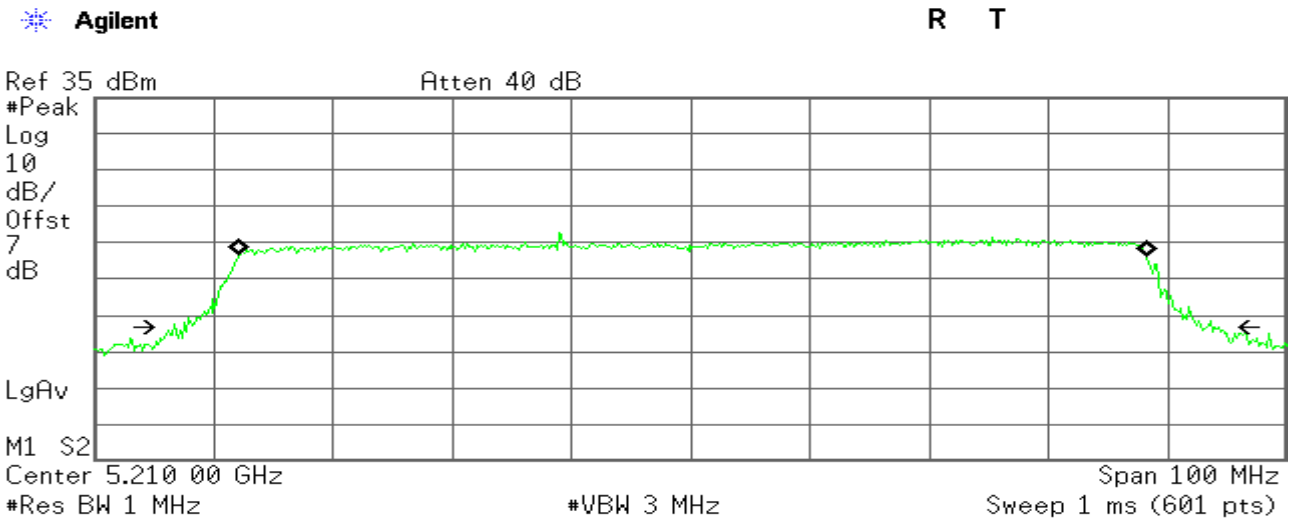


Occupied Bandwidth
36.9884 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 2.128 kHz
x dB Bandwidth 46.786 MHz

draft 802.11ac Wide-80 MHz Channel mode / Chain 0
5150~5250MHz



Occupied Bandwidth
75.8826 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 170.458 kHz
x dB Bandwidth 87.795 MHz

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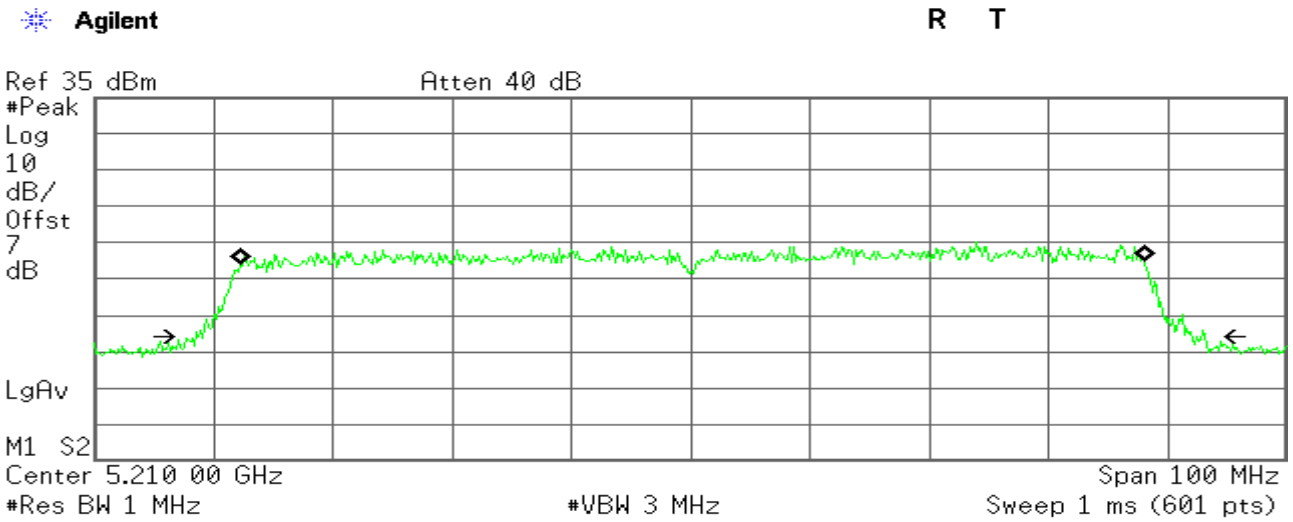
draft 802.11ac Wide-80 MHz Channel mode / Chain 1

5150~5250MHz



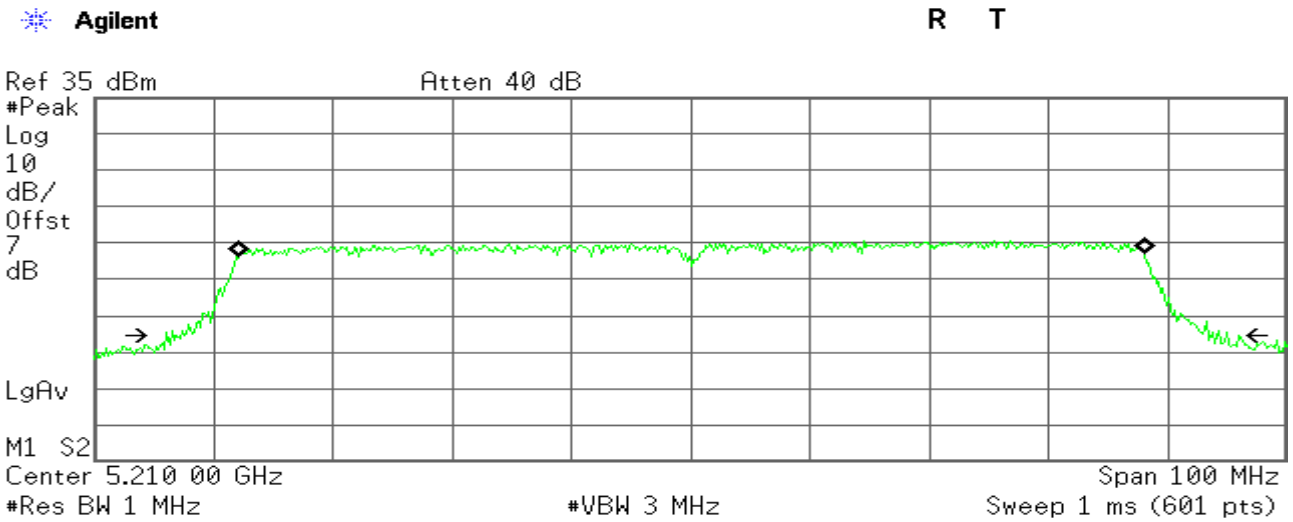
Occupied Bandwidth
75.6285 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 116.747 kHz
x dB Bandwidth 84.757 MHz

draft 802.11ac Wide-80 MHz Channel mode / Chain 2

5150~5250MHz



Occupied Bandwidth
75.7559 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 80.221 kHz
x dB Bandwidth 89.092 MHz

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7.2 MAXIMUM CONDUCTED OUTPUT POWER

LIMIT

According to §15.407(a),

(1) For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10log B, where B is the 26 dB emission bandwidth in MHz.

The smallest 26dB bandwidth for all channels is 21.347 MHz. The maximum conducted output power is calculated as 4dBm+10*log(21.347MHz) = 17.29dBm > 17 dBm.

(2) 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 + 10log B, where B is the 26 dB emission bandwidth in MHz.

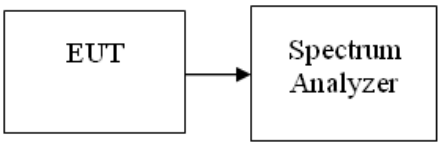
If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

The peak power shall not exceed the limit as follow:

Test Configuration

The EUT was connected to a spectrum analyzer through a 50Ω RF cable.

TEST PROCEDURE



Set span to encompass the entire emission bandwidth (EBW) of the signal.

Set RBW = 1 MHz / Set VBW = 3 MHz. Detector RMS

Trace average 100 traces in power averaging mode. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

TEST RESULTS

No non-compliance noted

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Test Data

Test mode: IEEE 802.11a mode

5150~5250MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	10.00	9.76	10.14	14.74	17.00
Mid	5200	10.36	10.20	10.23	15.04	17.00
High	5240	10.49	10.09	9.57	14.84	17.00

Test mode: draft 802.11n Standard-20 MHz Channel mode
5150~5250MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	9.75	9.72	10.04	14.61	17.00
Mid	5200	10.13	10.14	10.19	14.92	17.00
High	5240	9.78	9.94	9.54	14.53	17.00

Test mode: draft 802.11n Wide-40 MHz Channel mode
5150~5250MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5190	11.78	11.58	11.81	16.50	17.00
High	5230	11.63	11.75	11.36	16.35	17.00

Test mode: draft 802.11ac Standard-20 MHz Channel mode
5150~5250MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	9.40	9.23	9.46	14.14	17.00
Mid	5200	9.91	9.59	9.69	14.50	17.00
High	5240	9.38	9.45	8.99	14.05	17.00

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Test mode: draft 802.11ac Wide-40 MHz Channel mode
5150~5250MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5190	11.69	11.43	11.75	16.40	17.00
High	5230	11.60	11.37	11.36	16.22	17.00

Test mode: draft 802.11ac Wide-80 MHz Channel mode
5150~5250MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Mid	5210	11.36	11.43	11.16	16.09	17.00

Remark：Maximum Conducted Output Power(dBm)=10log(10^(chain0 outputpower/10)+ 10^(chain1 outputpower/10)+ 10^(chain2 outputpower/10))

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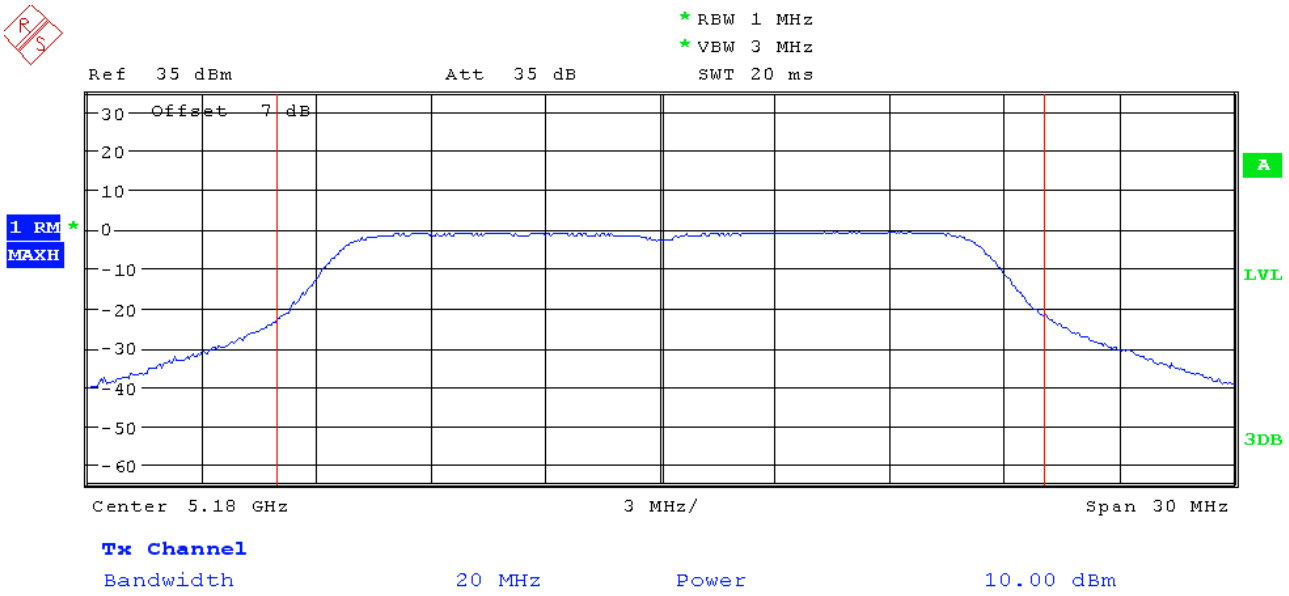
Test Plot

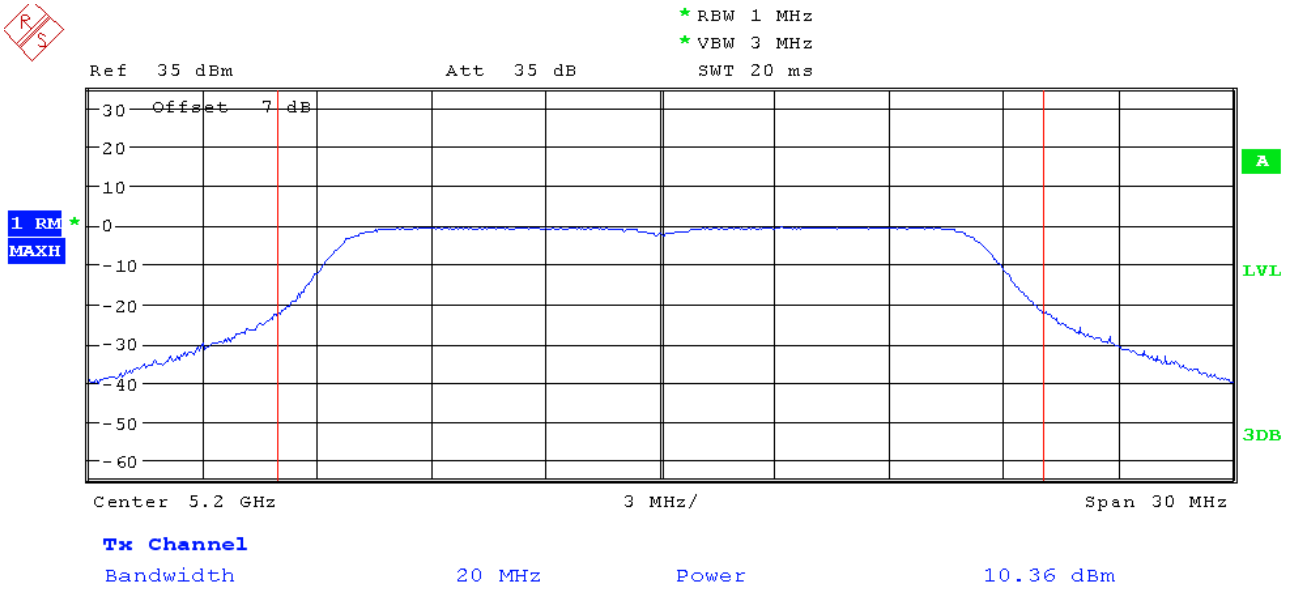
IEEE 802.11a mode/chain 0:

5150~5250MHz

CH Low



CH Mid



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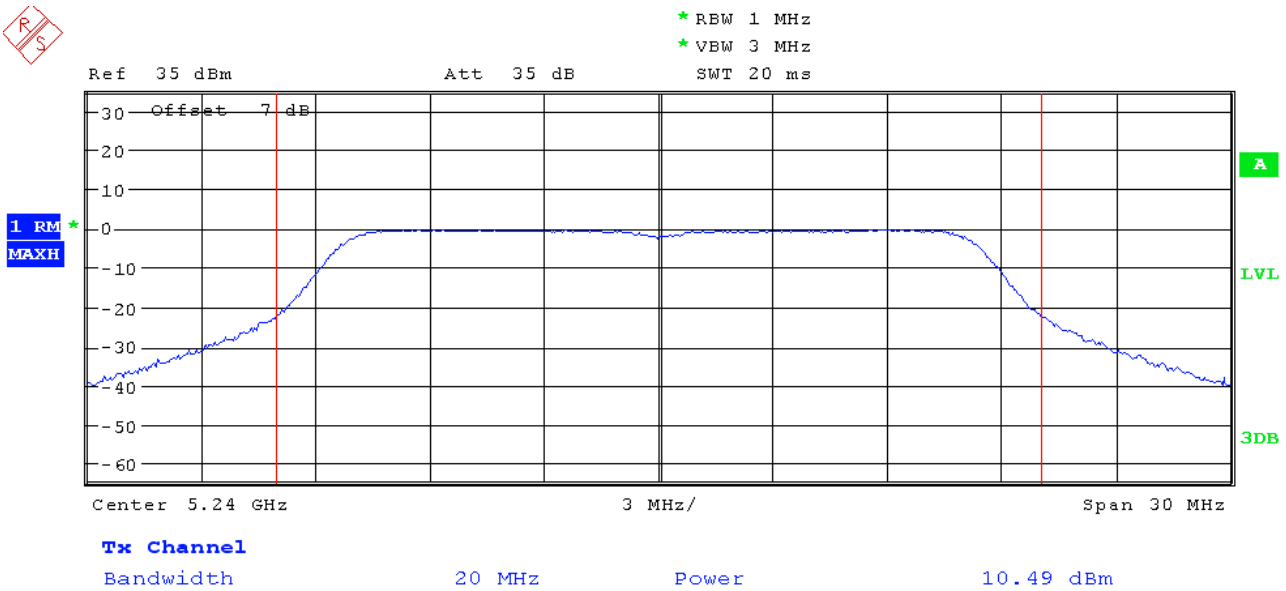
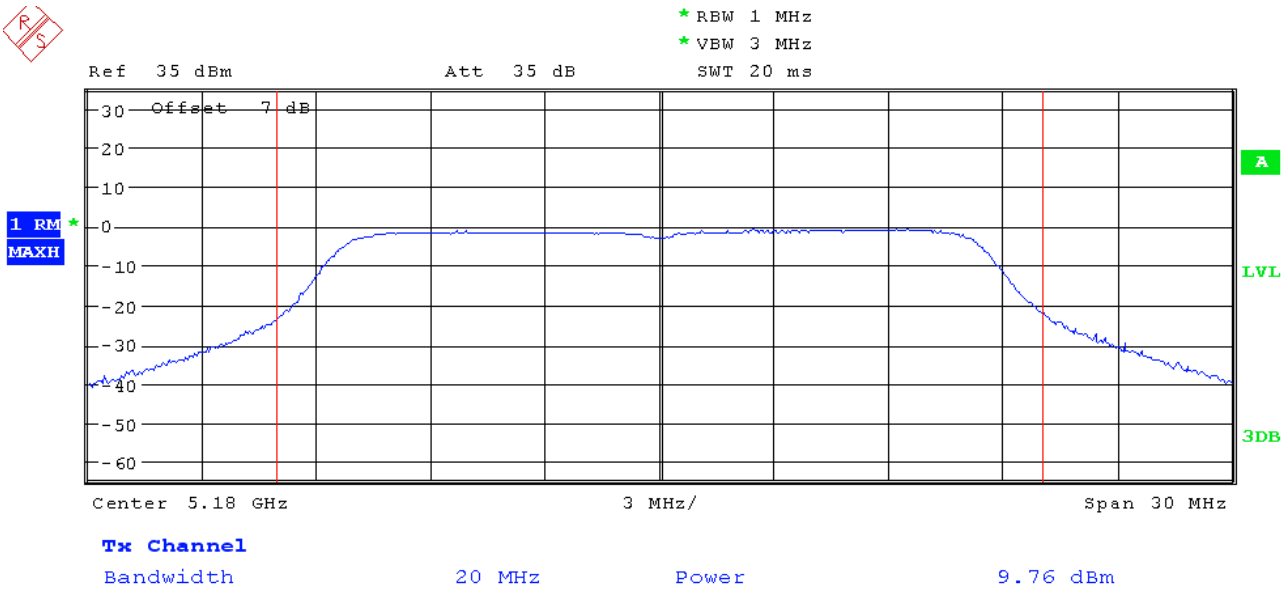
CH High



IEEE 802.11a mode/chain 1:
5150~5250MHz

CH Low



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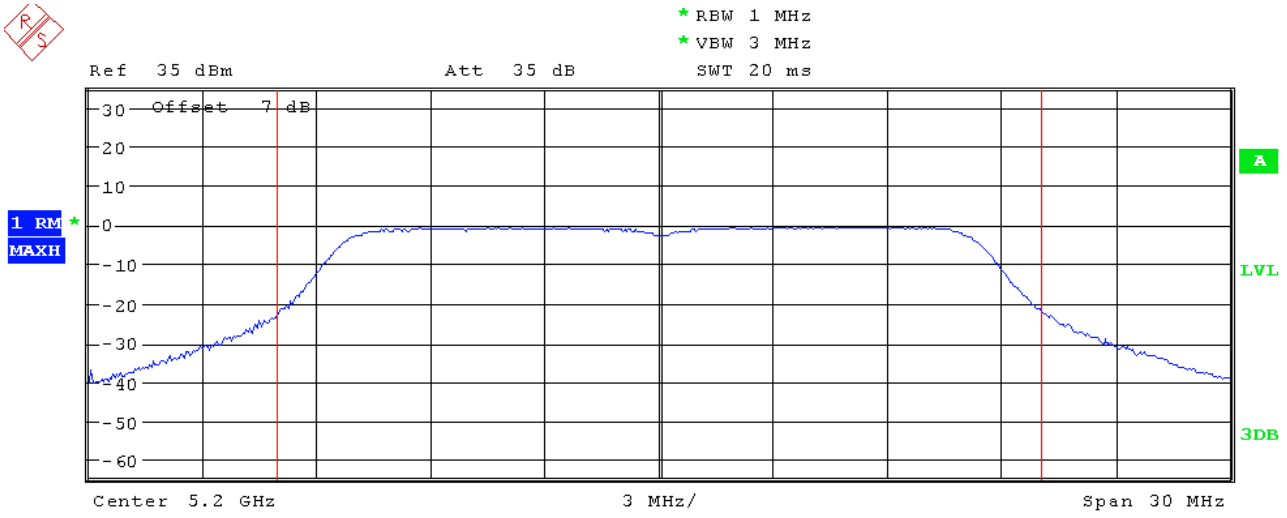
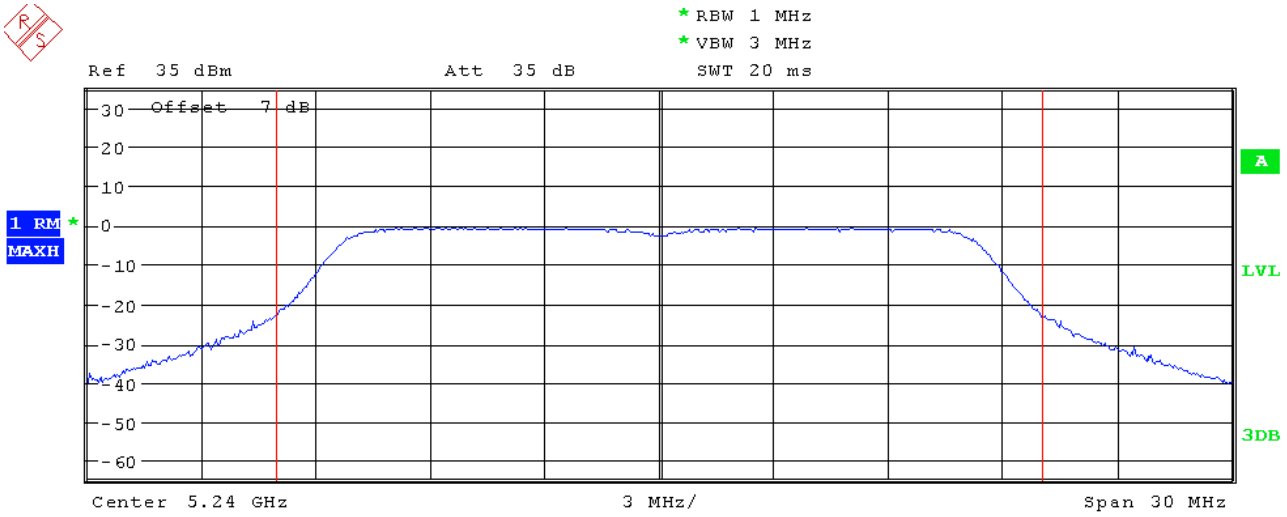
CH Mid



Tx Channel

Bandwidth 20 MHz Power 10.20 dBm

CH High



Tx Channel

Bandwidth 20 MHz Power 10.09 dBm

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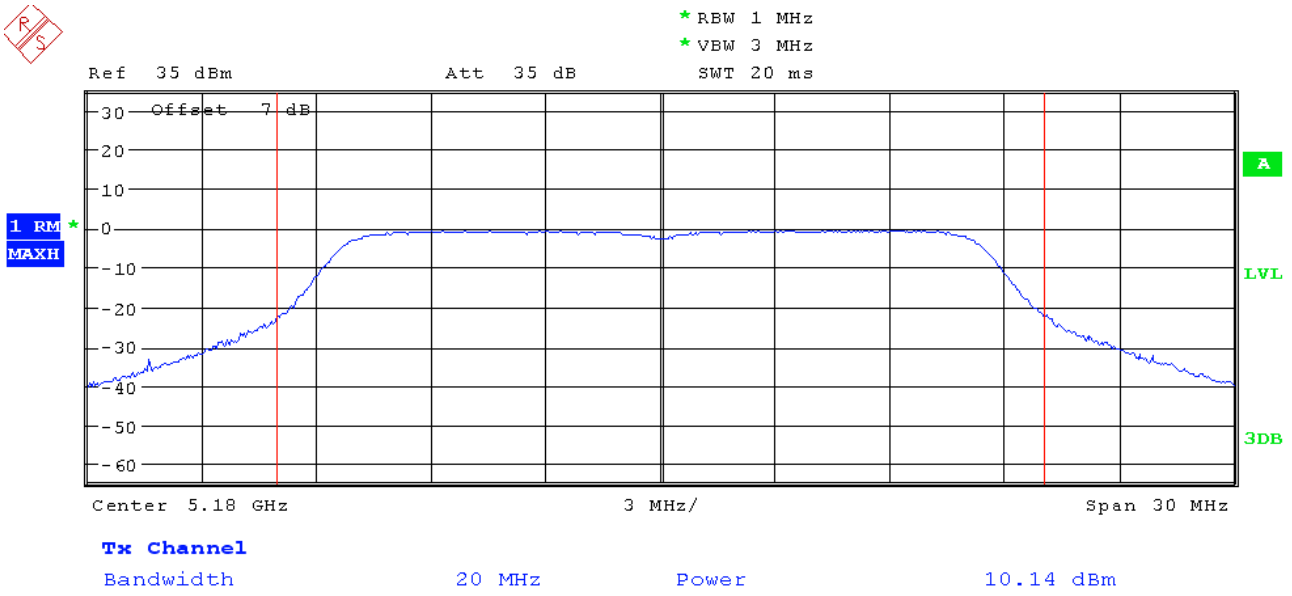
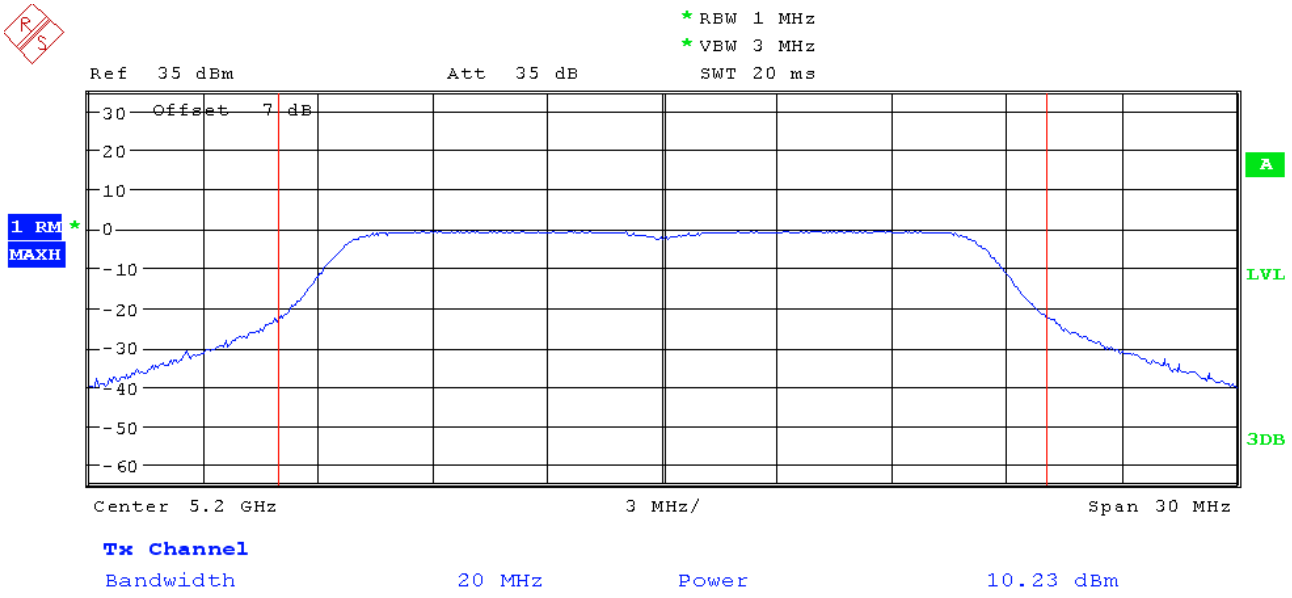
IEEE 802.11a mode/chain 2:

5150~5250MHz

CH Low



CH Mid



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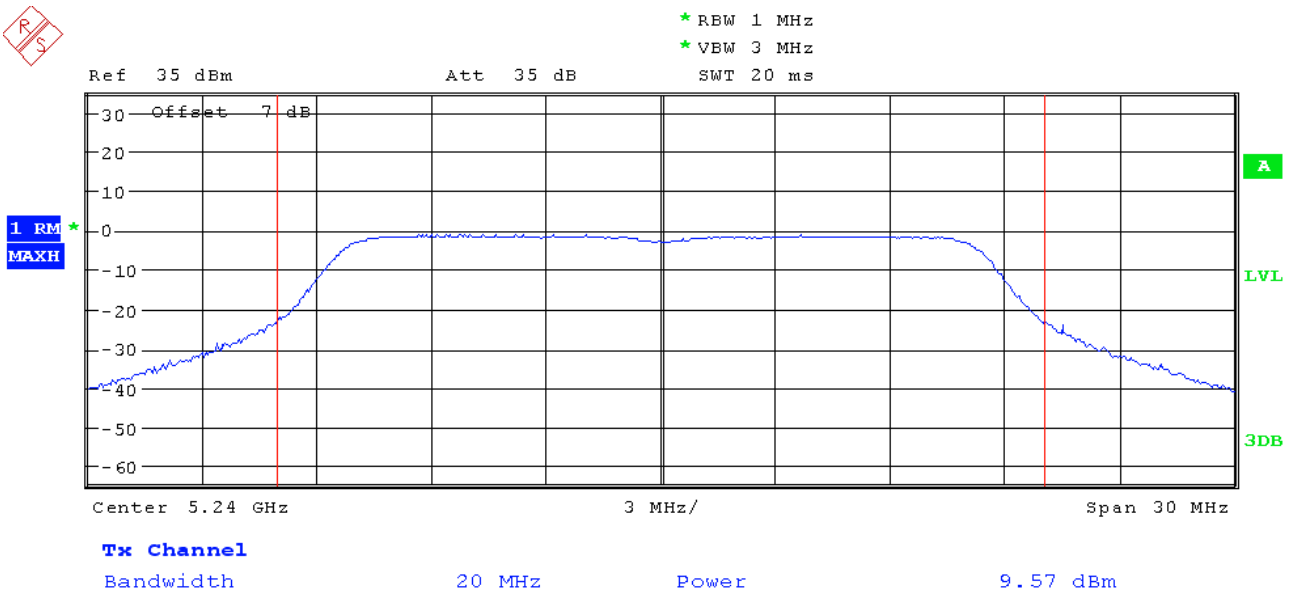
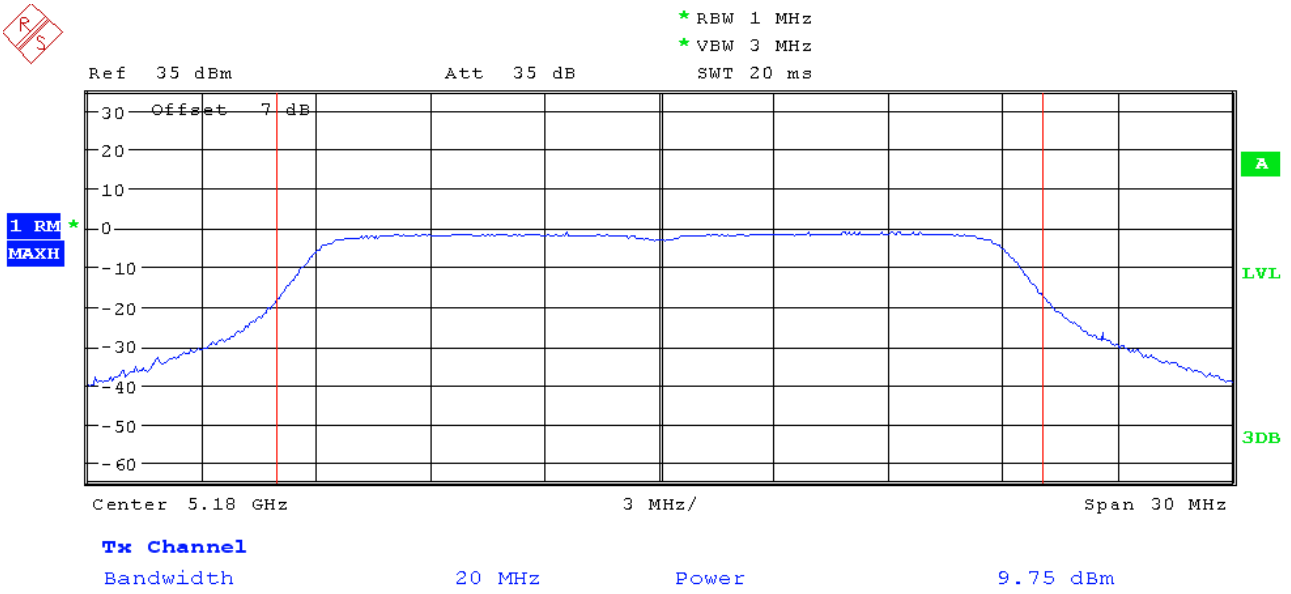
CH High



draft 802.11n Standard-20 MHz Channel mode / Chain 0

5150~5250MHz

CH Low



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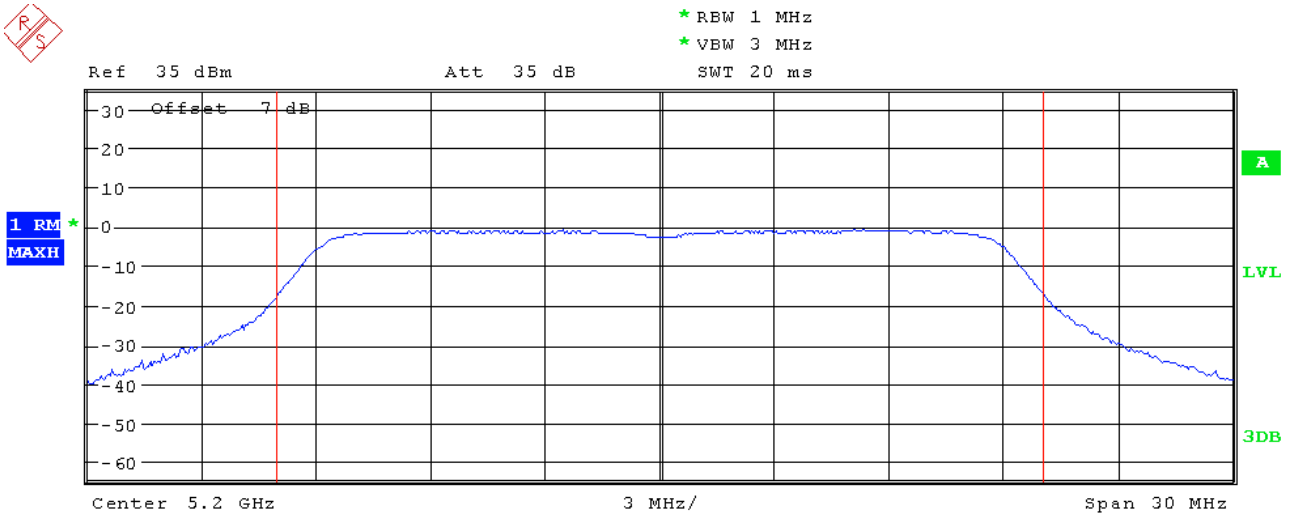
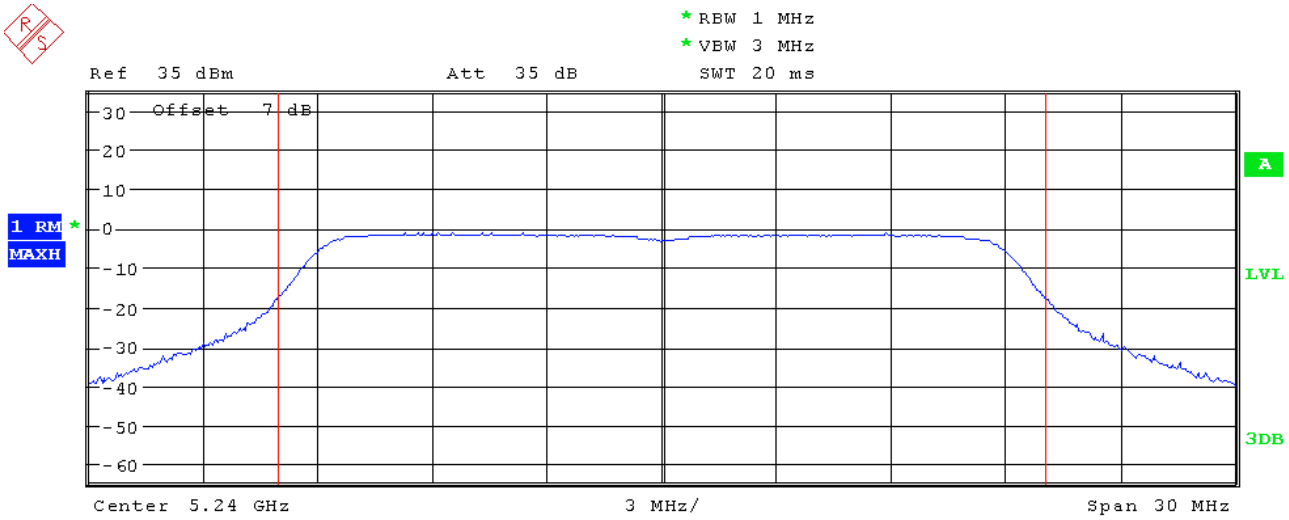
CH Mid



Tx Channel

Bandwidth 20 MHz Power 10.13 dBm

CH High



Tx Channel

Bandwidth 20 MHz Power 9.78 dBm

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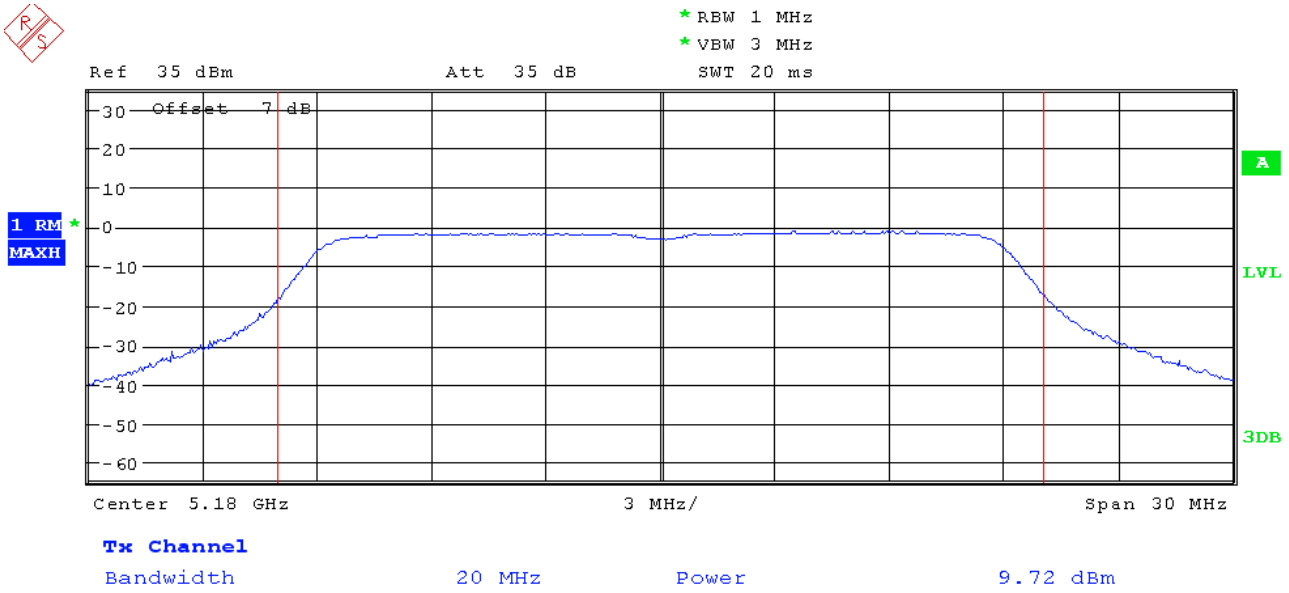
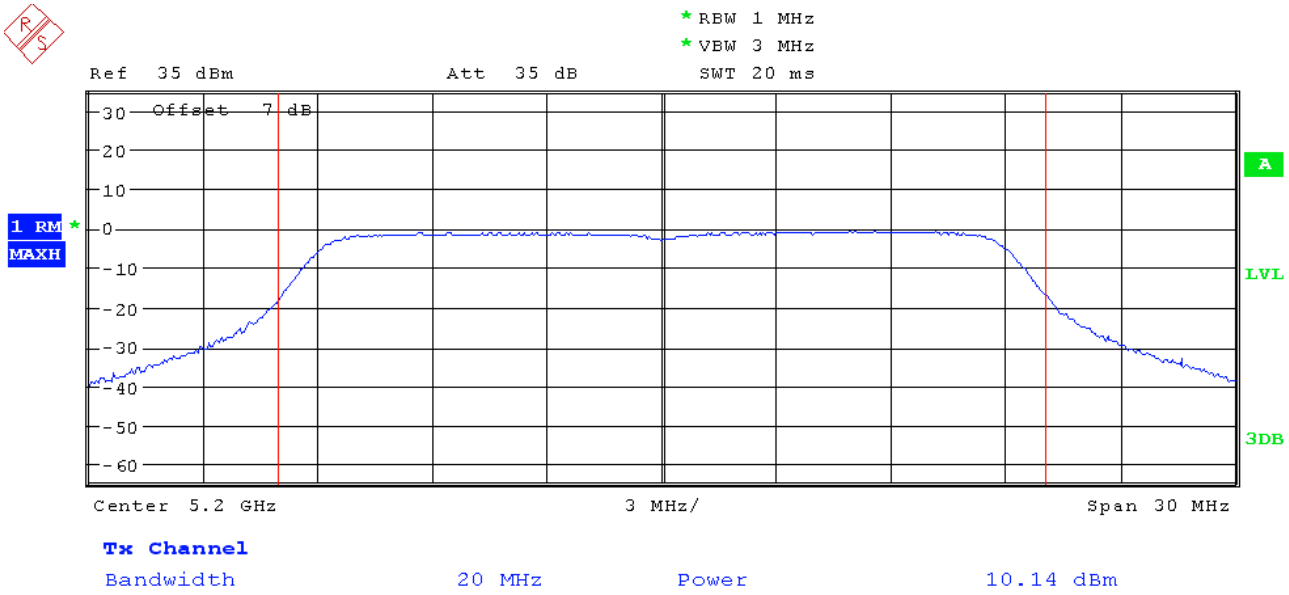
draft 802.11n Standard-20 MHz Channel mode / Chain 1

5150~5250MHz

CH Low



CH Mid



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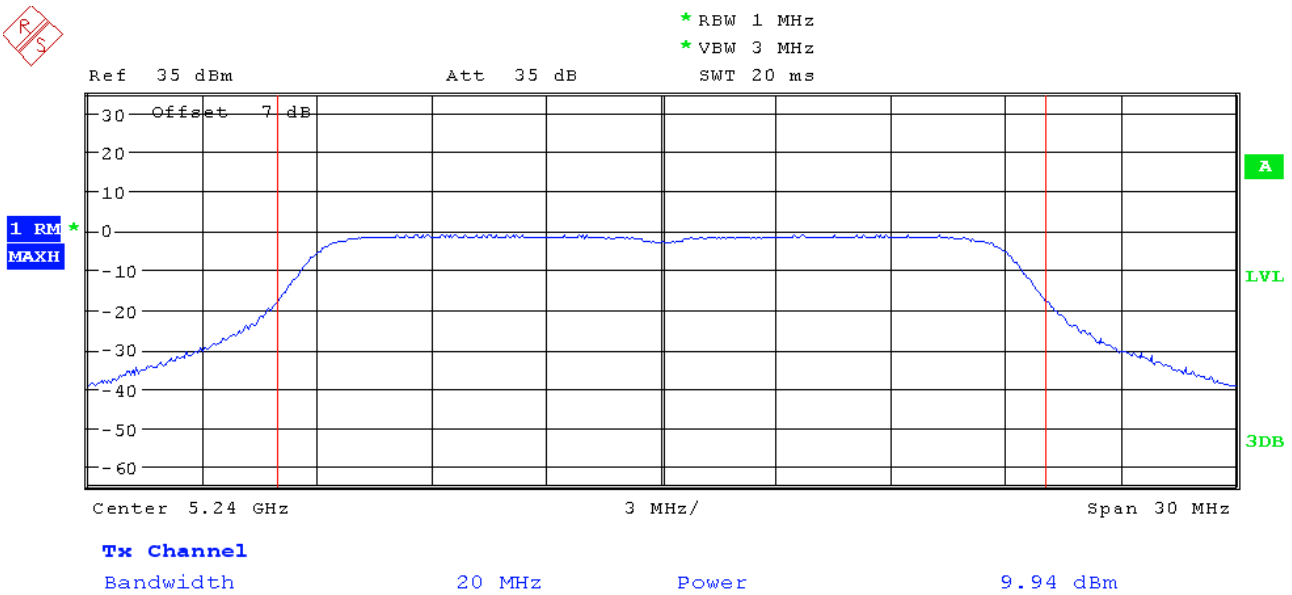
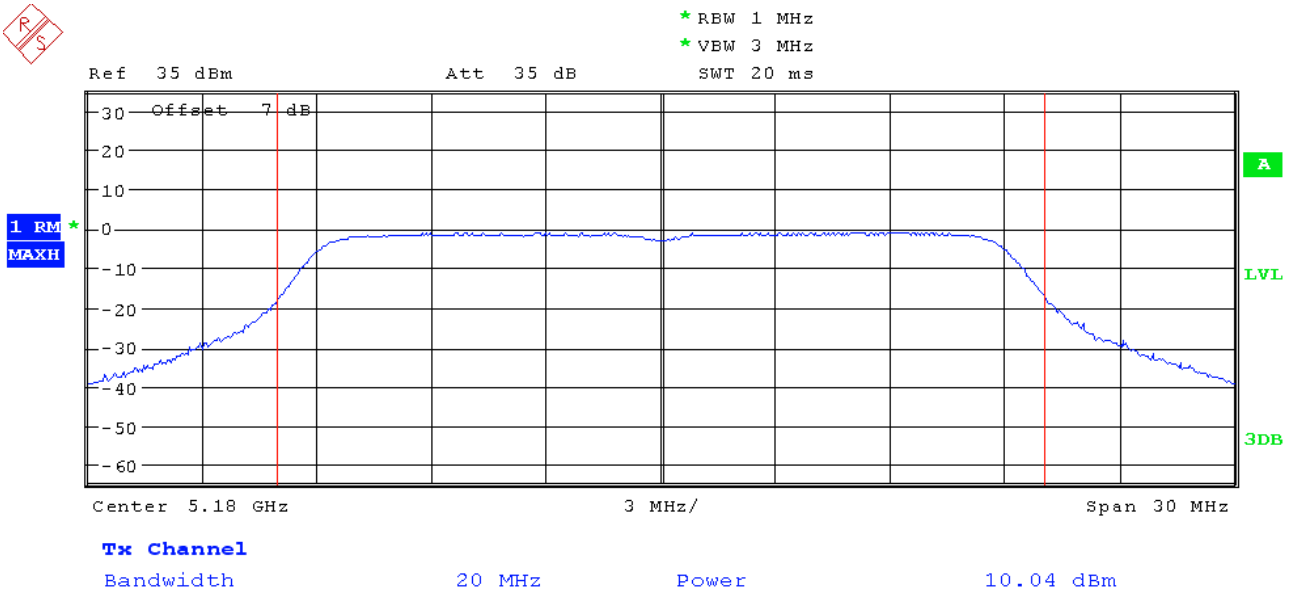
CH High



draft 802.11n Standard-20 MHz Channel mode / Chain 2

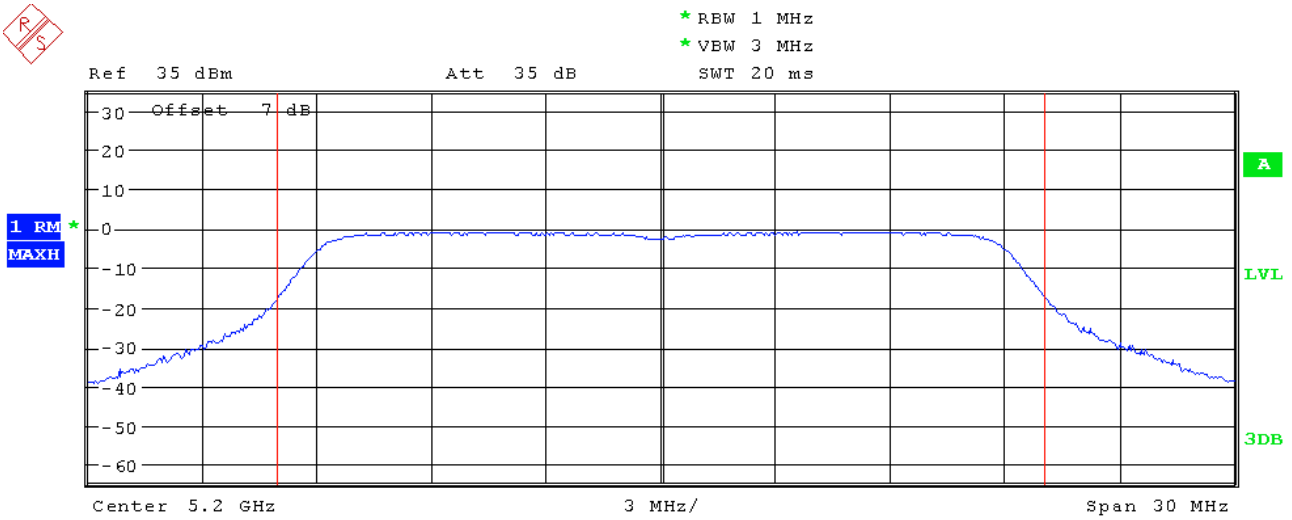
5150~5250MHz

CH Low



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc.

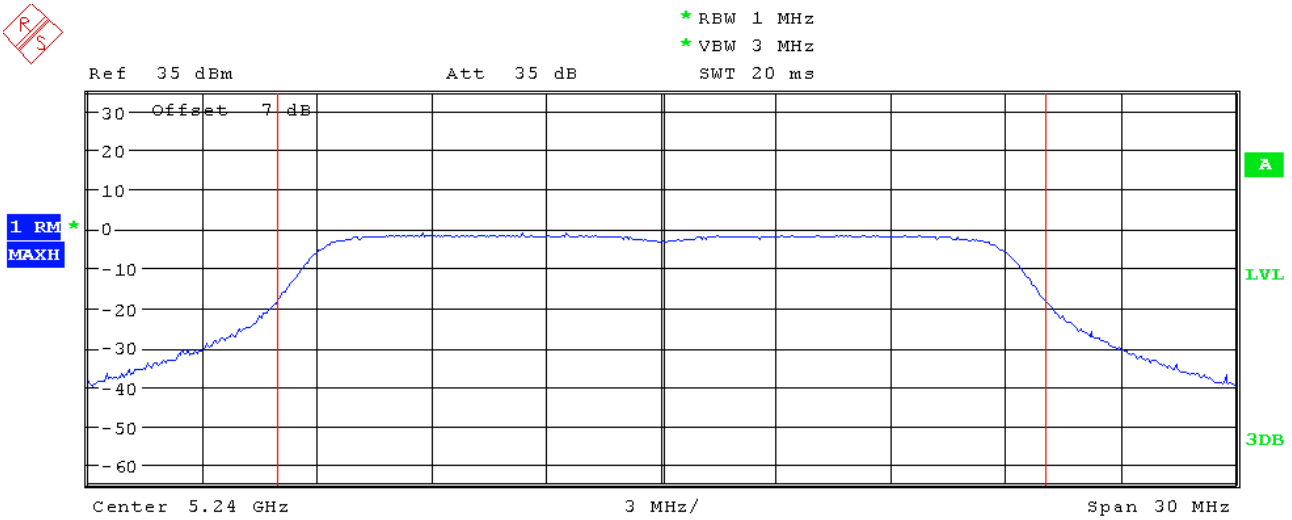
CH Mid



Tx Channel

Bandwidth 20 MHz Power 10.19 dBm

CH High



Tx Channel

Bandwidth 20 MHz Power 9.54 dBm

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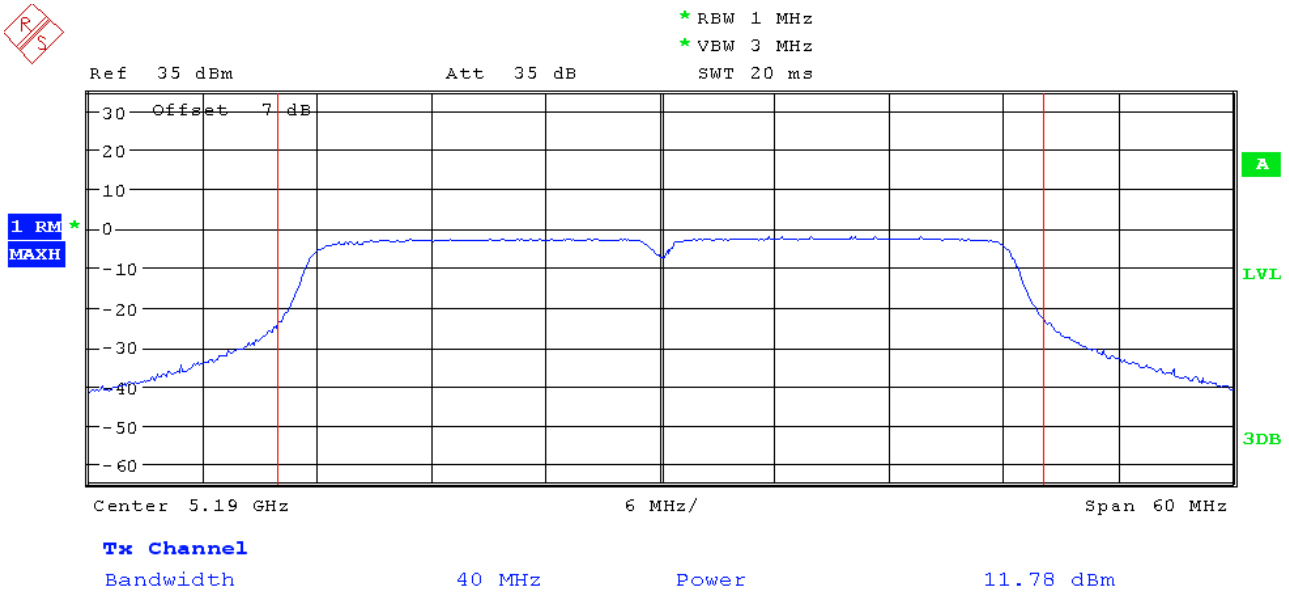
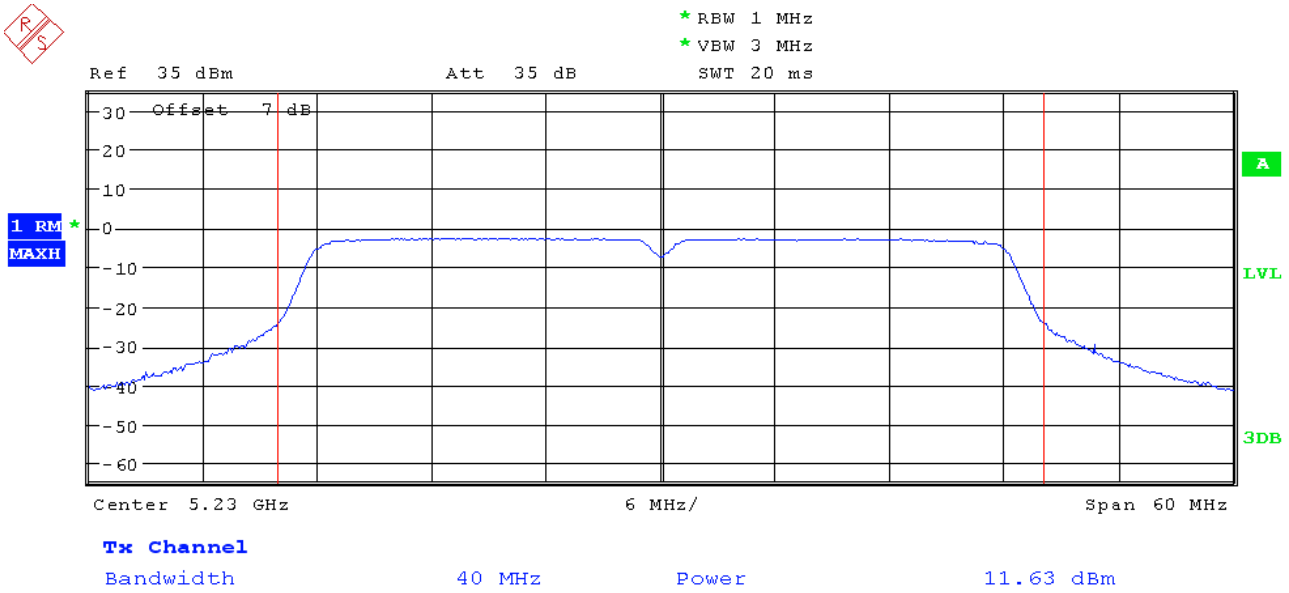
draft 802.11n Wide-40 MHz Channel mode / Chain 0

5150~5250MHz

CH Low



CH High



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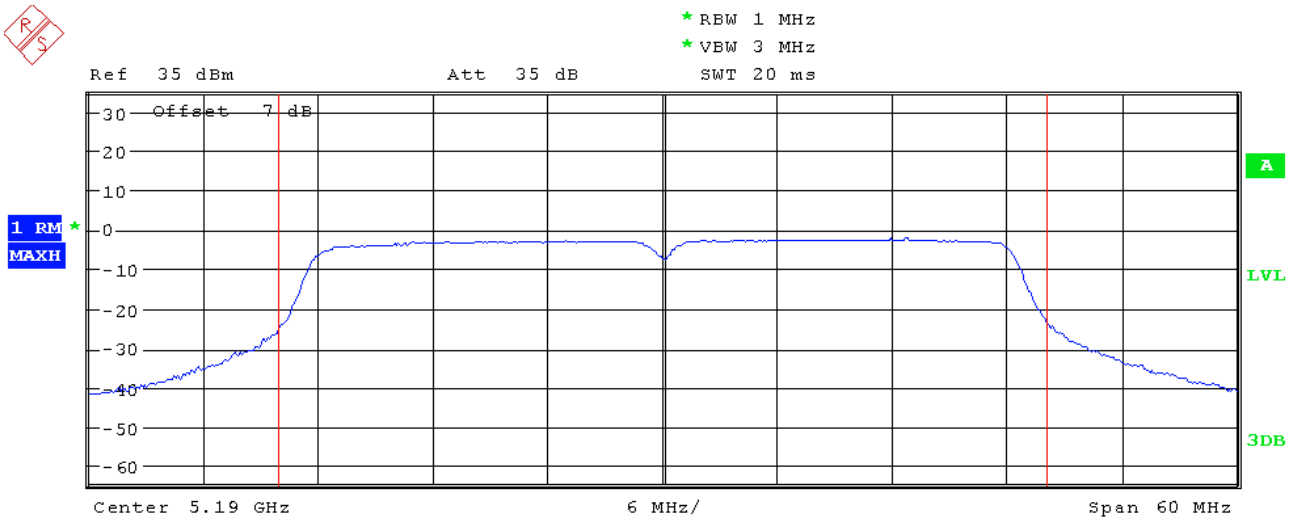
draft 802.11n Wide-40 MHz Channel mode / Chain 1

5150~5250MHz

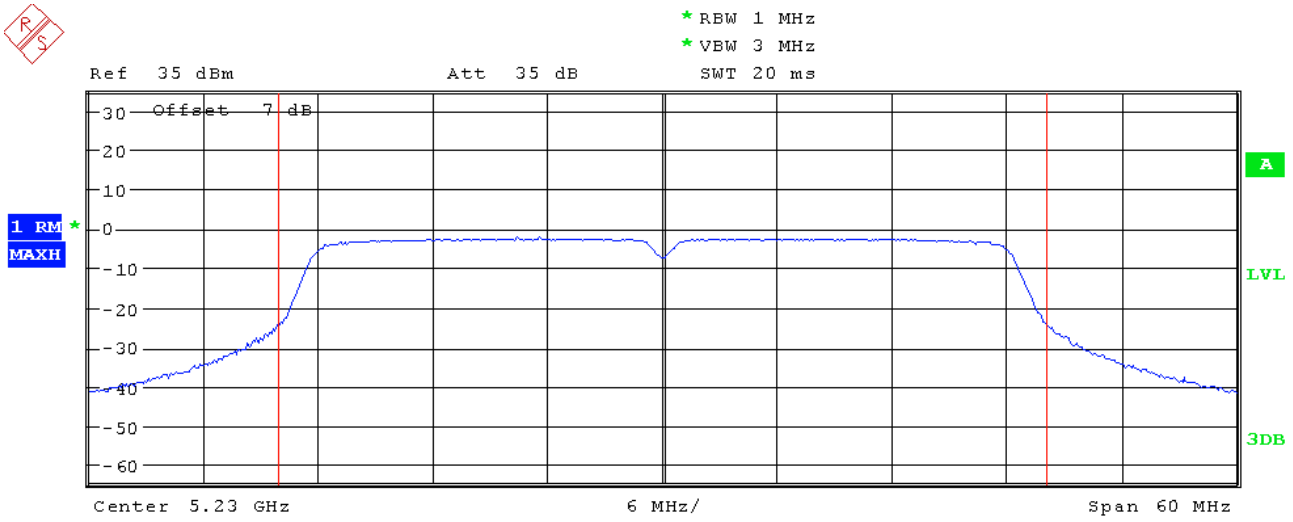
CH Low



Tx Channel

Bandwidth 40 MHz Power 11.58 dBm

CH High



Tx Channel

Bandwidth 40 MHz Power 11.75 dBm

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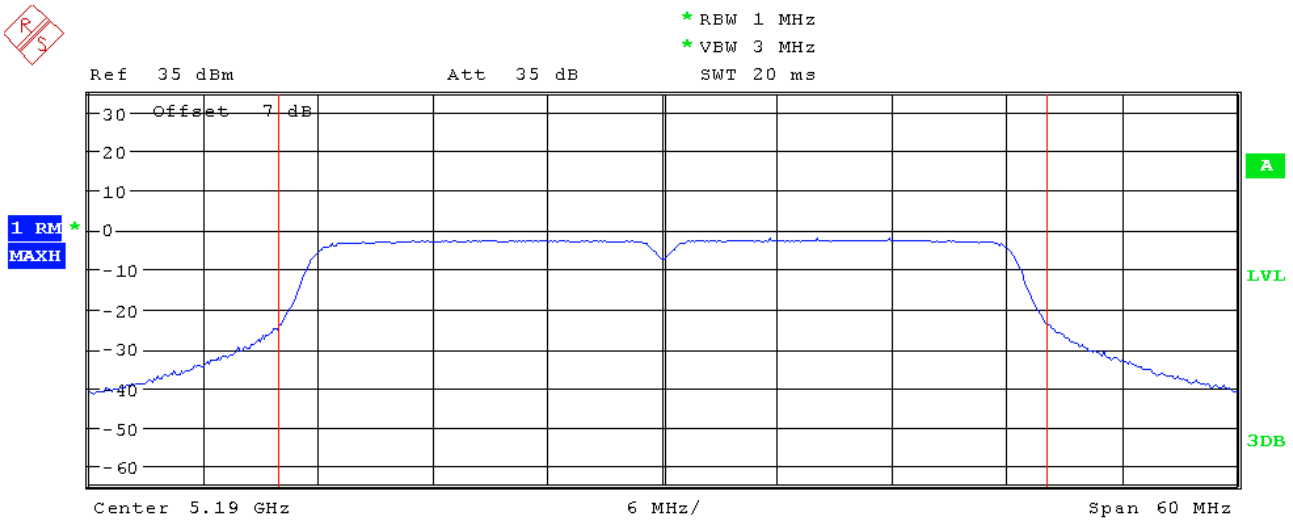
draft 802.11n Wide-40 MHz Channel mode / Chain 2

5150~5250MHz

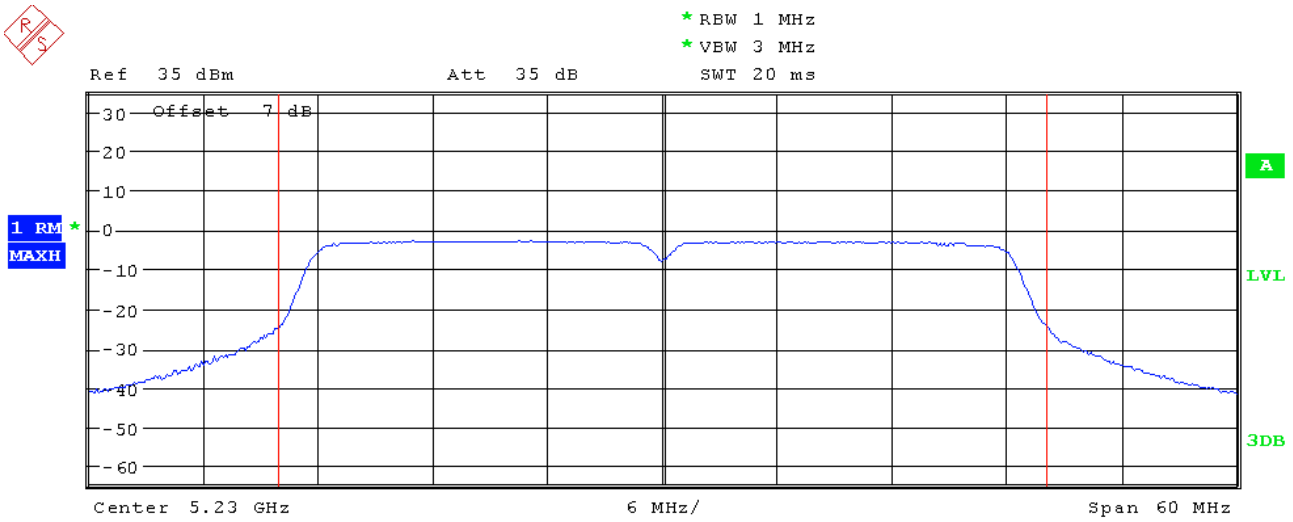
CH Low



Tx Channel

Bandwidth 40 MHz Power 11.81 dBm

CH High



Tx Channel

Bandwidth 40 MHz Power 11.36 dBm

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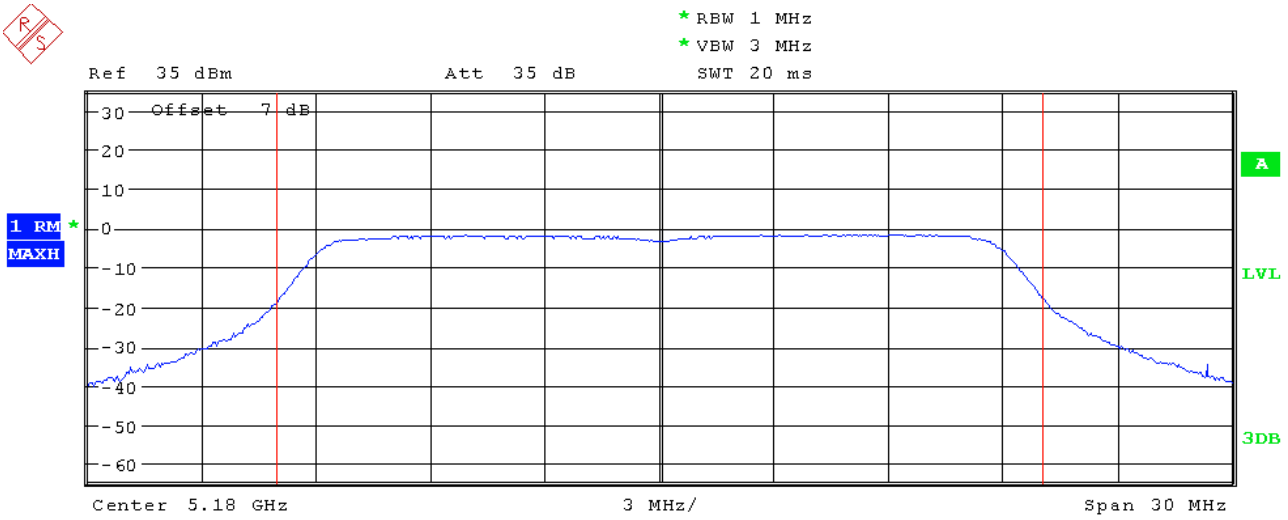
draft 802.11ac Standard-20 MHz Channel mode / Chain 0

5150~5250MHz

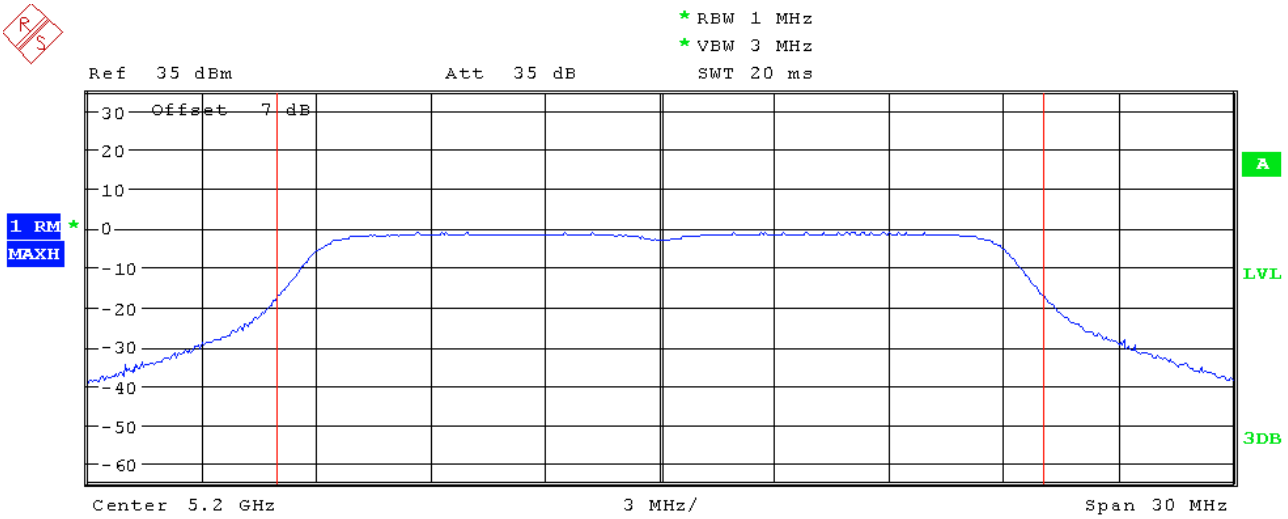
CH Low



Tx Channel

Bandwidth 20 MHz Power 9.40 dBm

CH Mid



Tx Channel

Bandwidth 20 MHz Power 9.91 dBm

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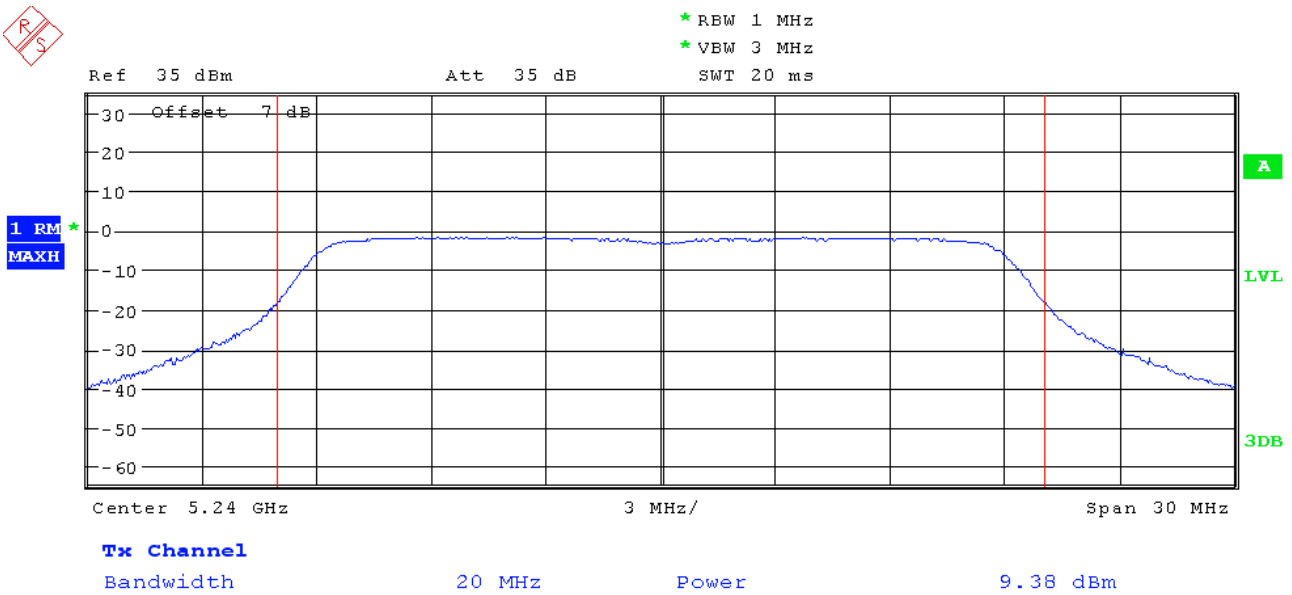
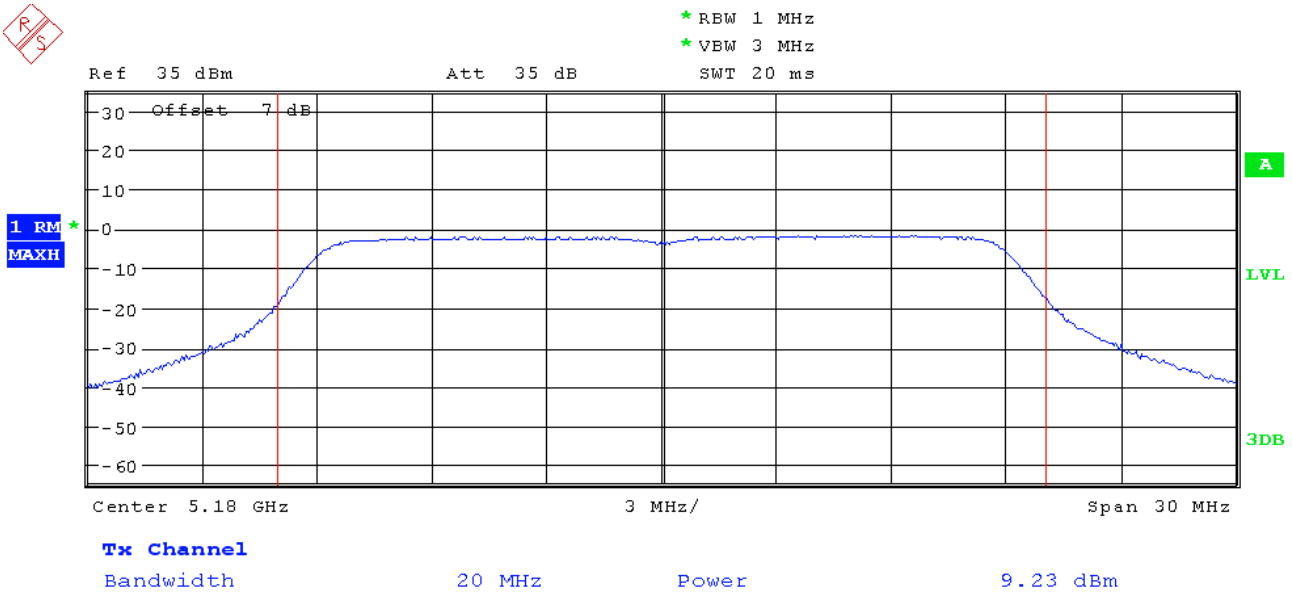
CH High



draft 802.11ac Standard-20 MHz Channel mode / Chain 1

5150~5250MHz

CH Low



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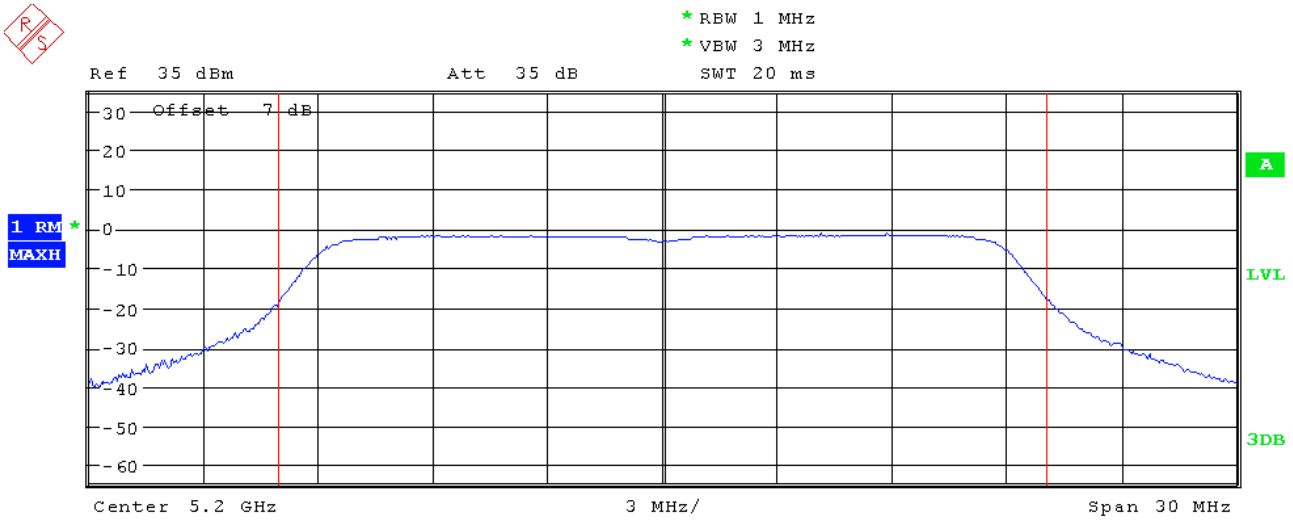
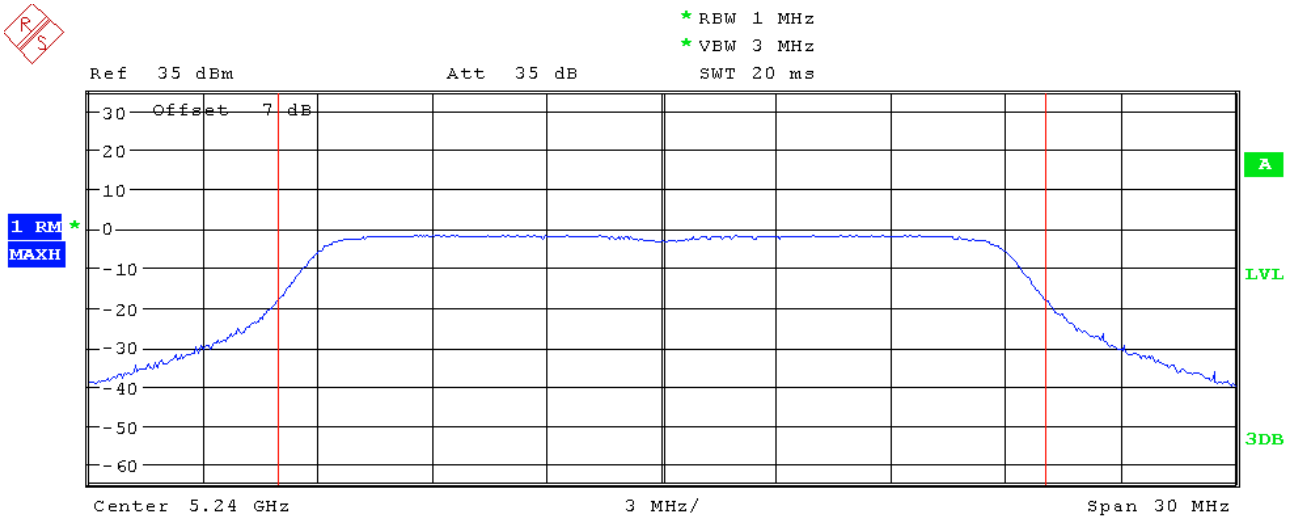
CH Mid



Tx Channel

Bandwidth 20 MHz Power 9.59 dBm

CH High



Tx Channel

Bandwidth 20 MHz Power 9.45 dBm

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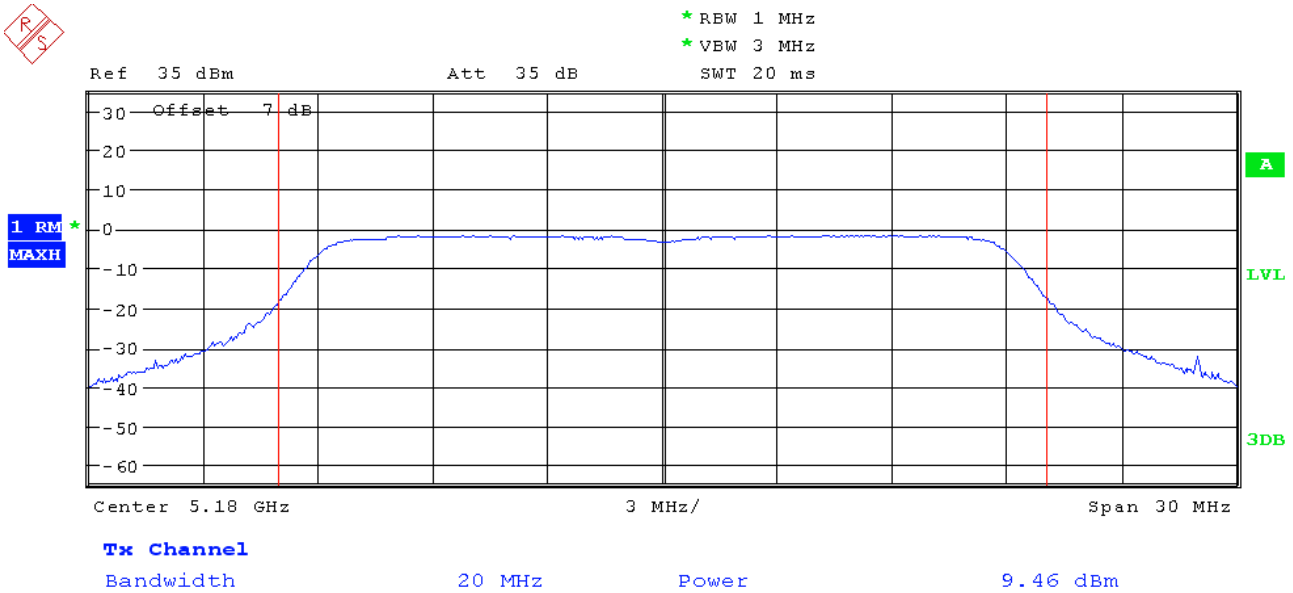
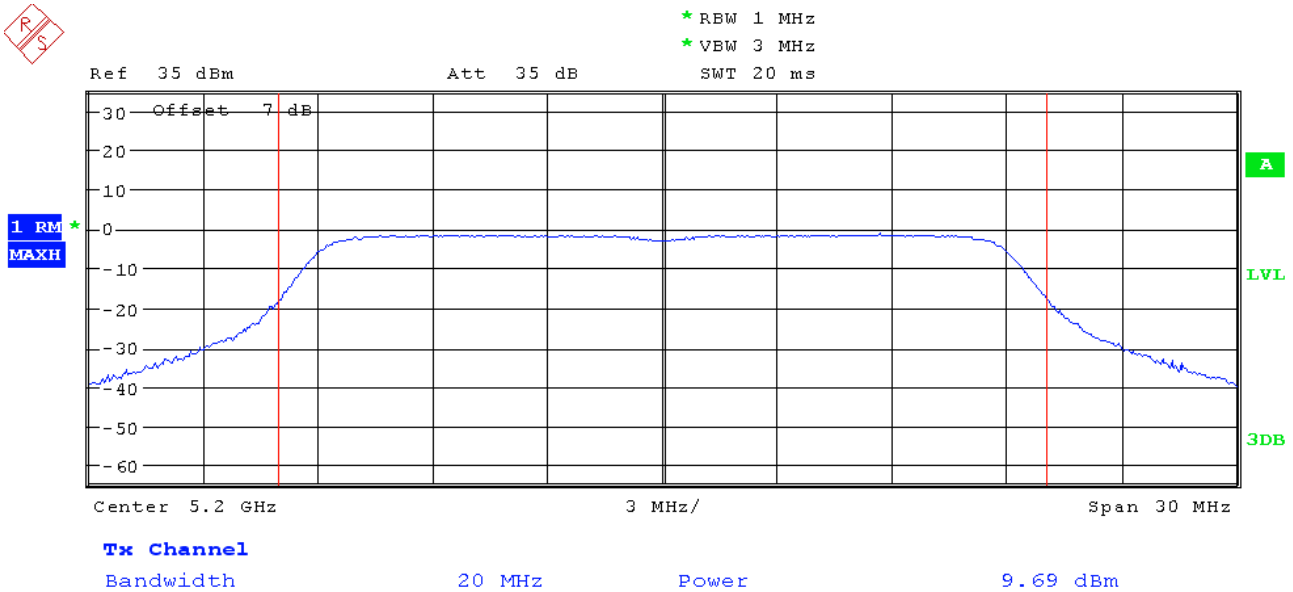
draft 802.11ac Standard-20 MHz Channel mode / Chain 2

5150~5250MHz

CH Low



CH Mid



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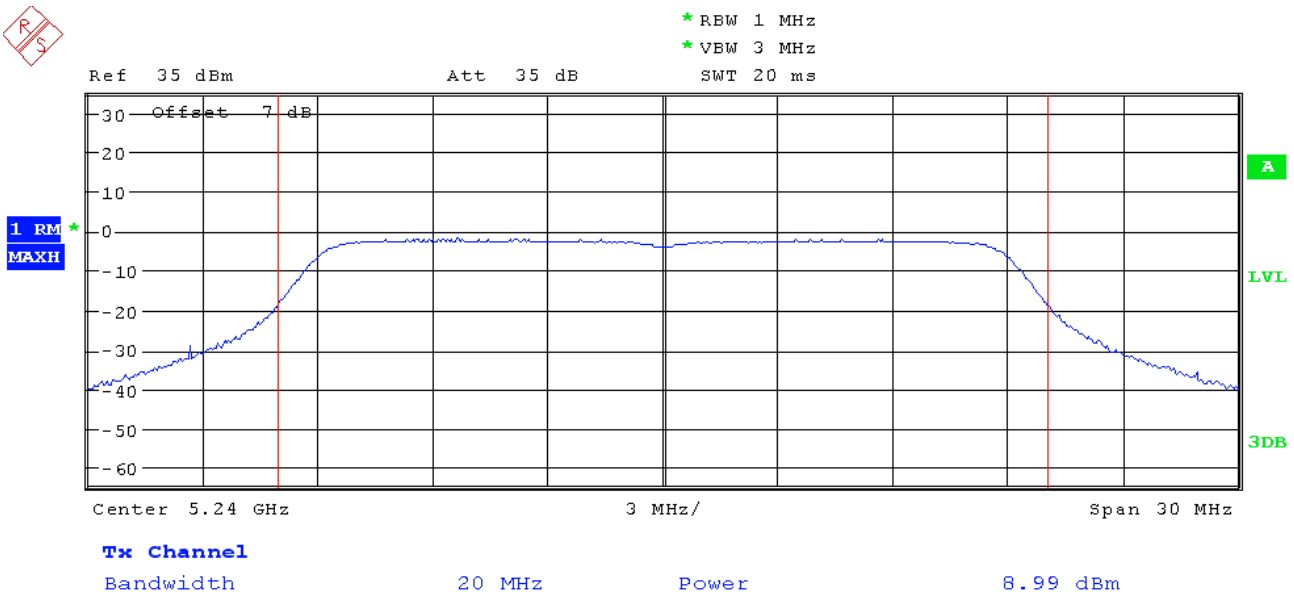
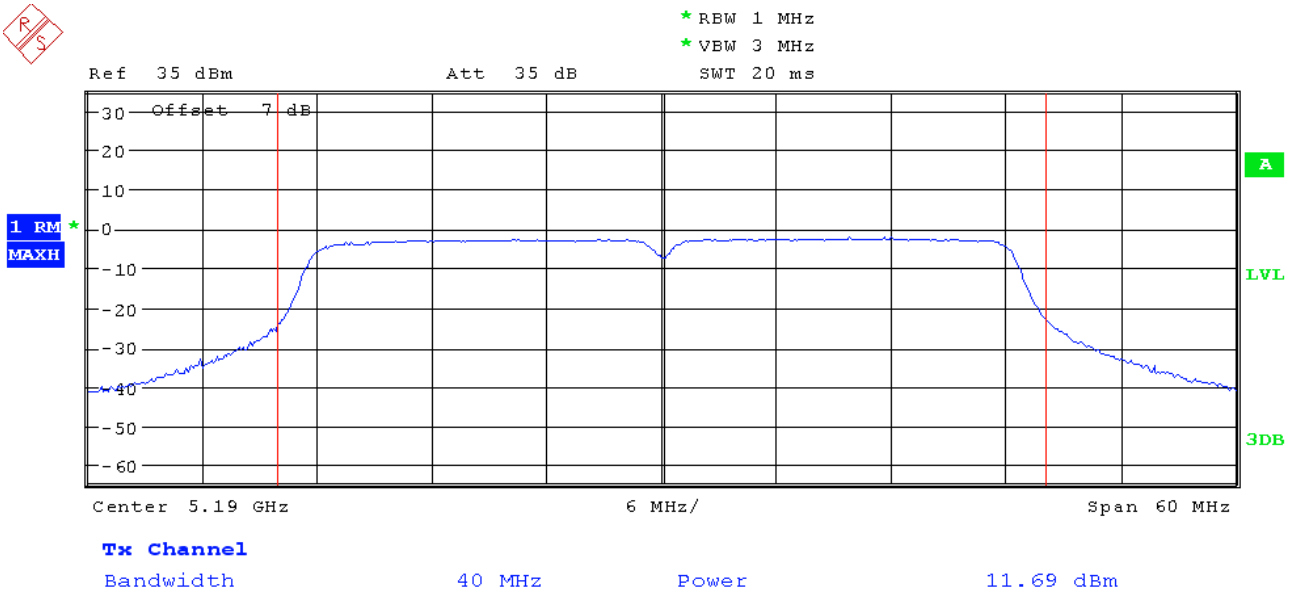
CH High



draft 802.11ac Wide-40 MHz Channel mode / Chain 0

5150~5250MHz

CH Low



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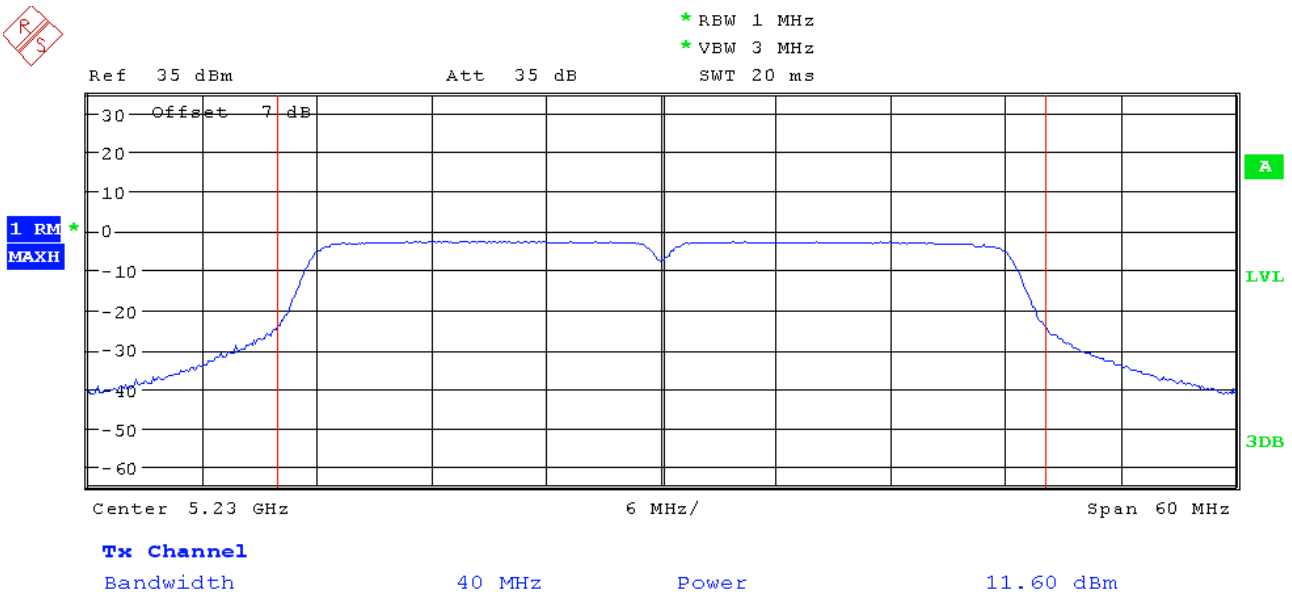
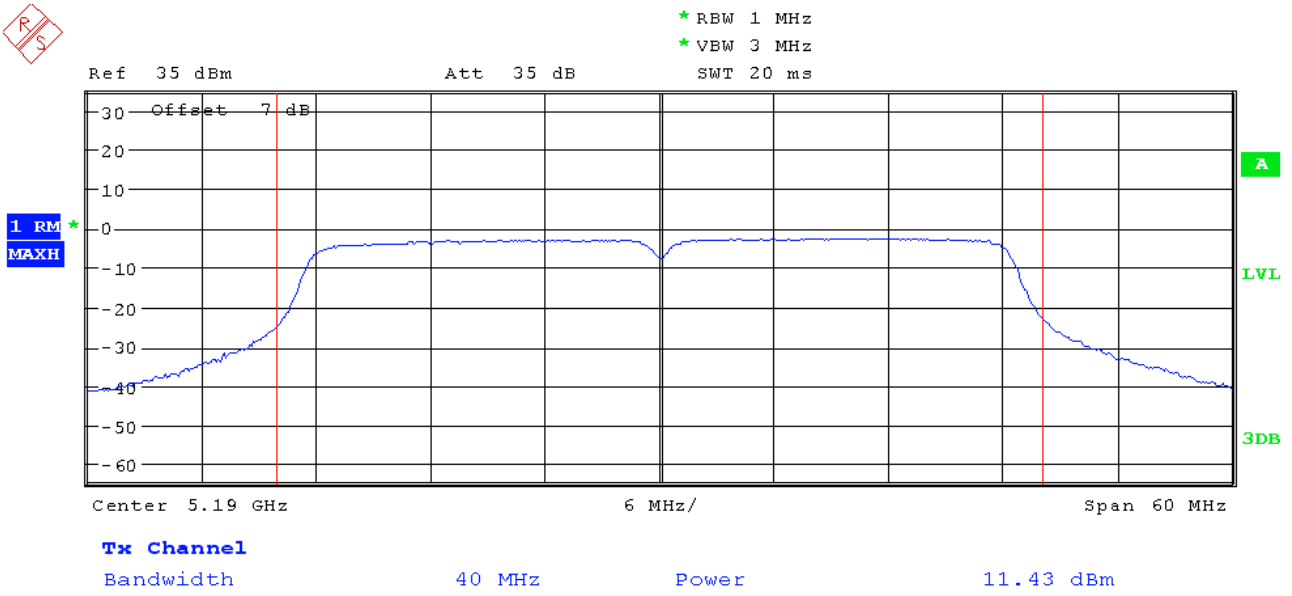
CH High



draft 802.11ac Wide-40 MHz Channel mode / Chain 1

5150~5250MHz

CH Low



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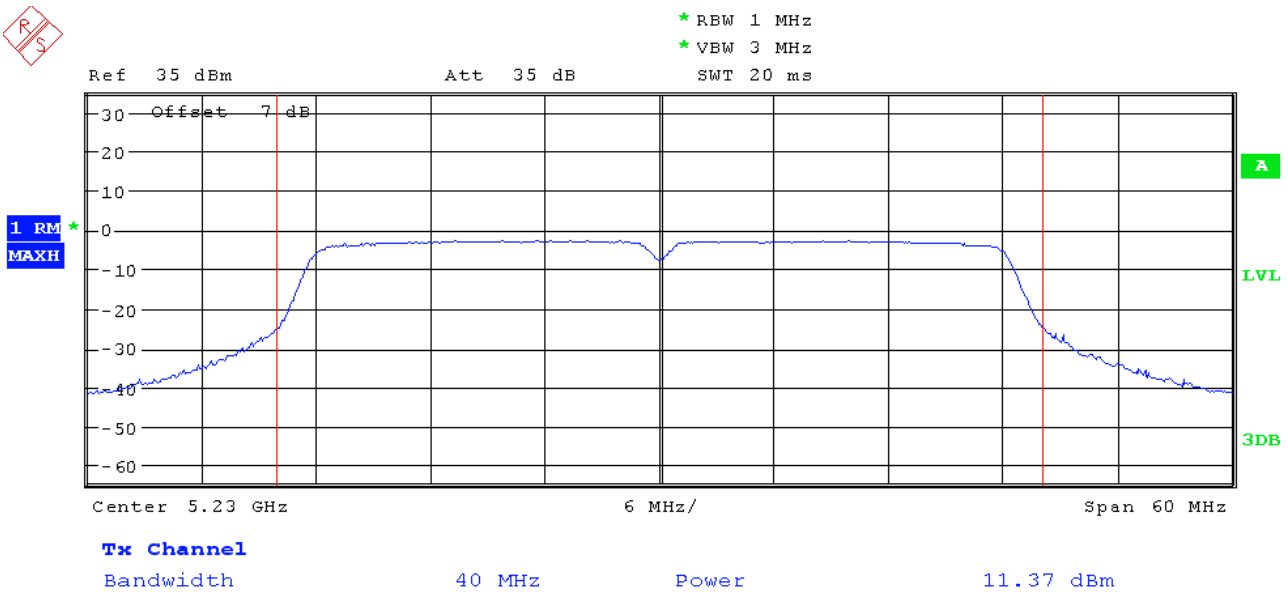
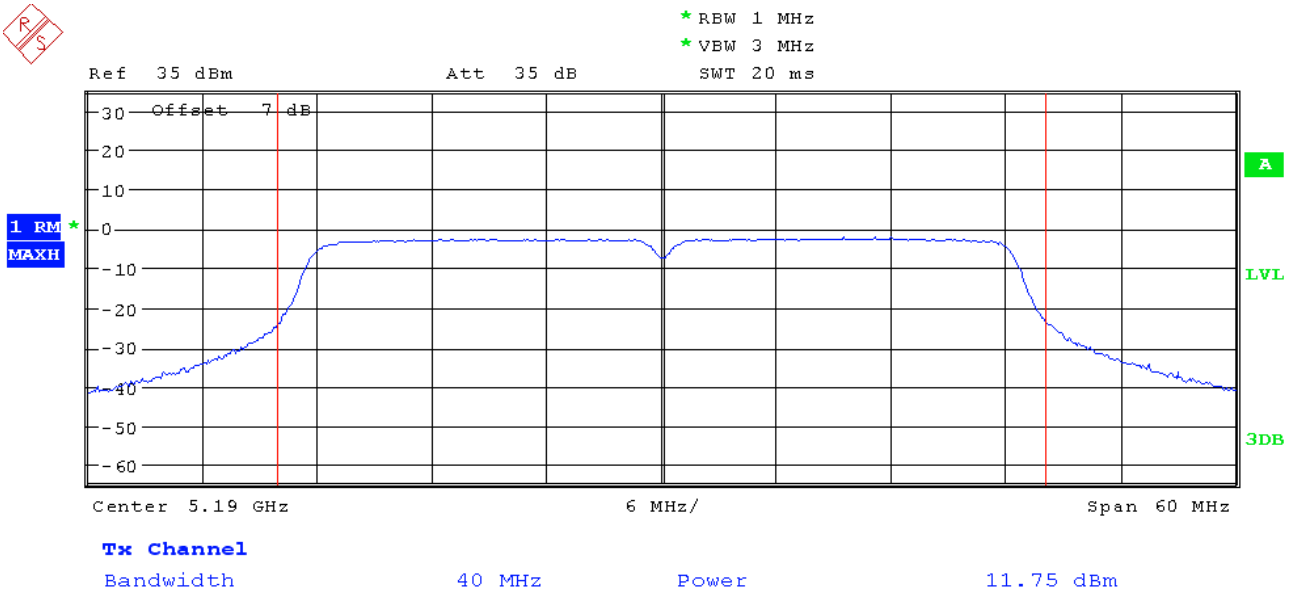
CH High



draft 802.11ac Wide-40 MHz Channel mode / Chain 2

5150~5250MHz

CH Low



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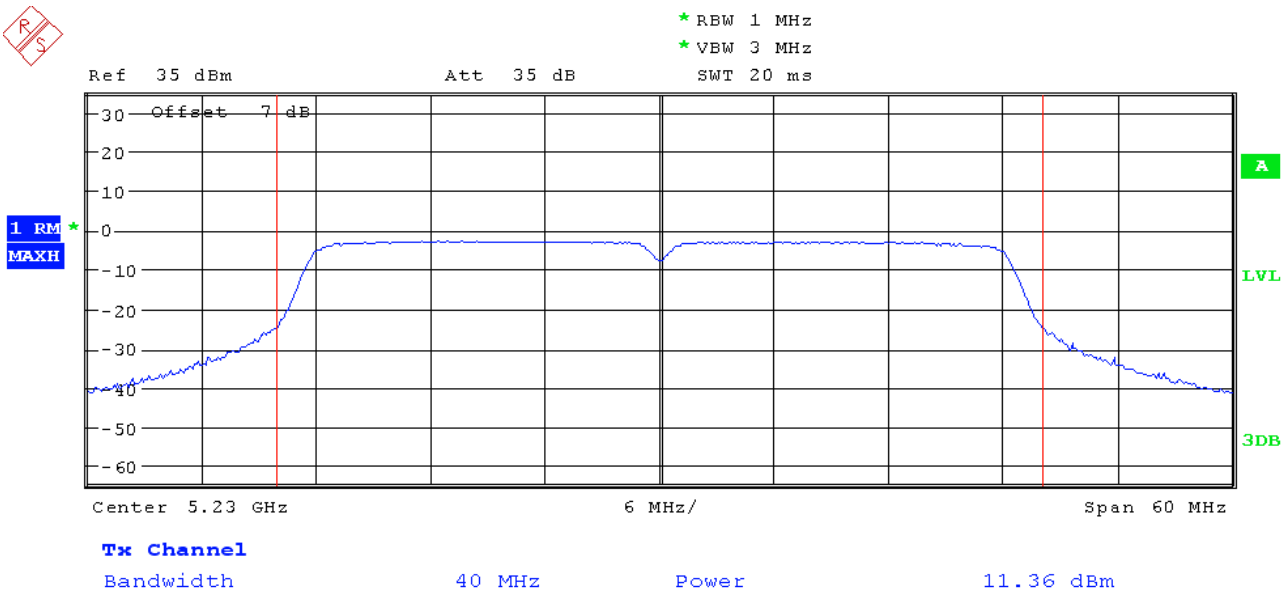
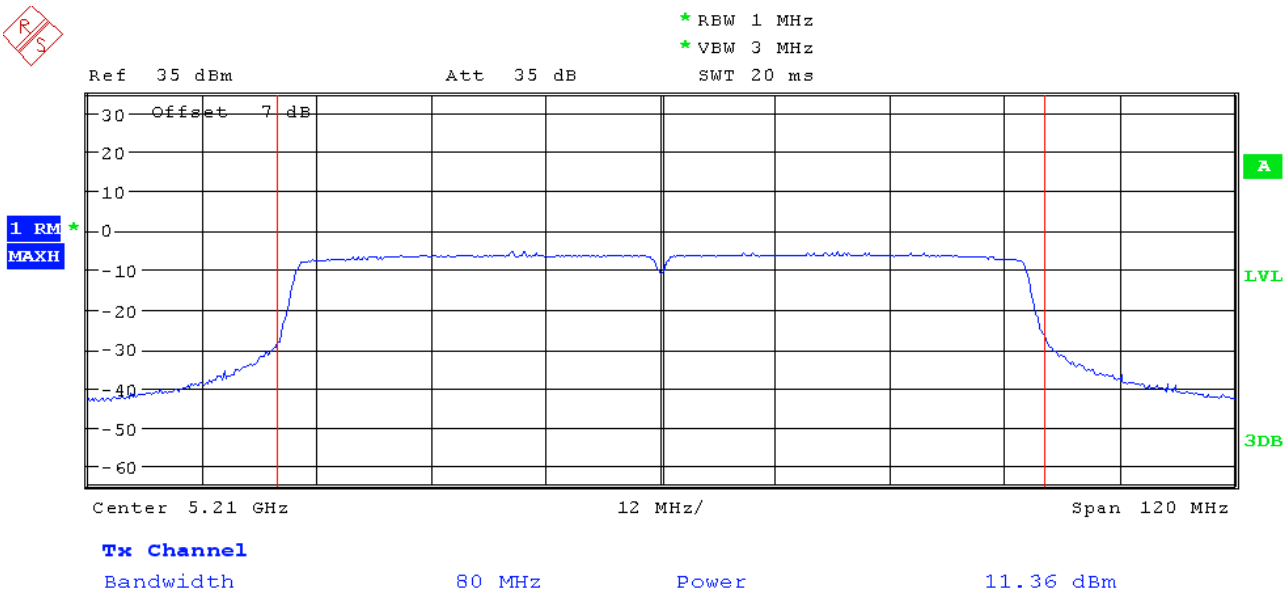
CH High



draft 802.11ac Wide-80 MHz Channel mode / Chain 0

5150~5250MHz



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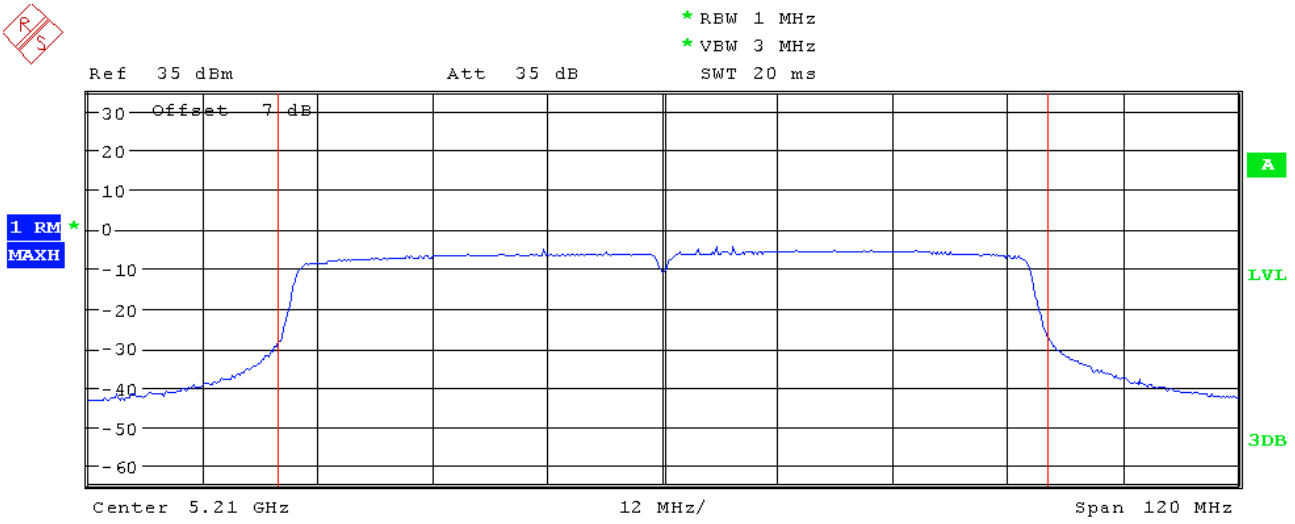
draft 802.11ac Wide-80 MHz Channel mode / Chain 1

5150~5250MHz

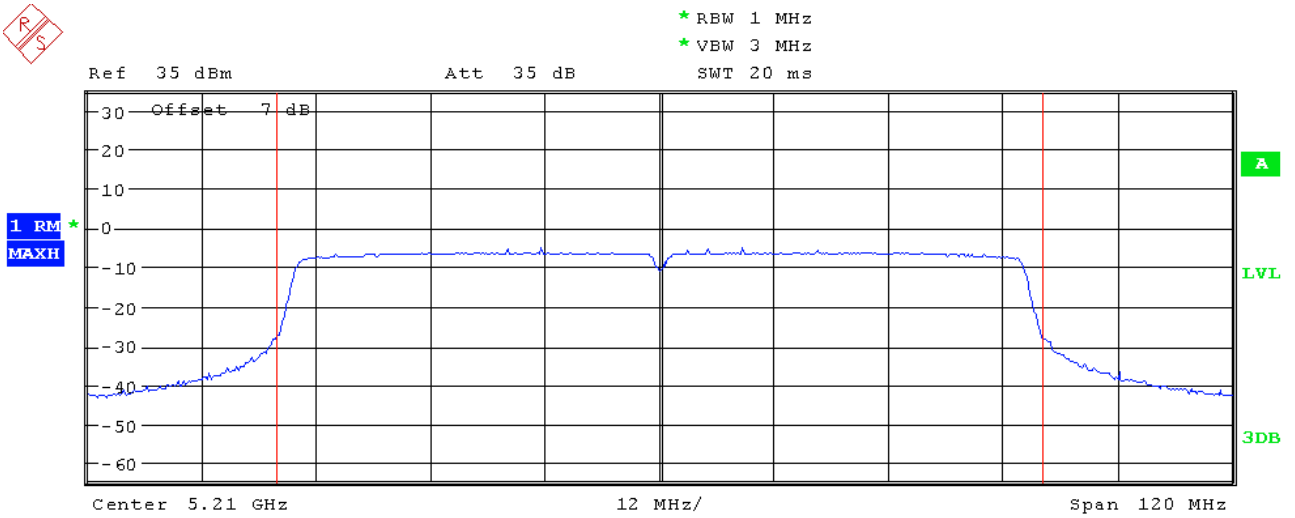


Tx Channel

Bandwidth 80 MHz Power 11.43 dBm

draft 802.11ac Wide-80 MHz Channel mode / Chain 2

5150~5250MHz



Tx Channel

Bandwidth 80 MHz Power 11.16 dBm

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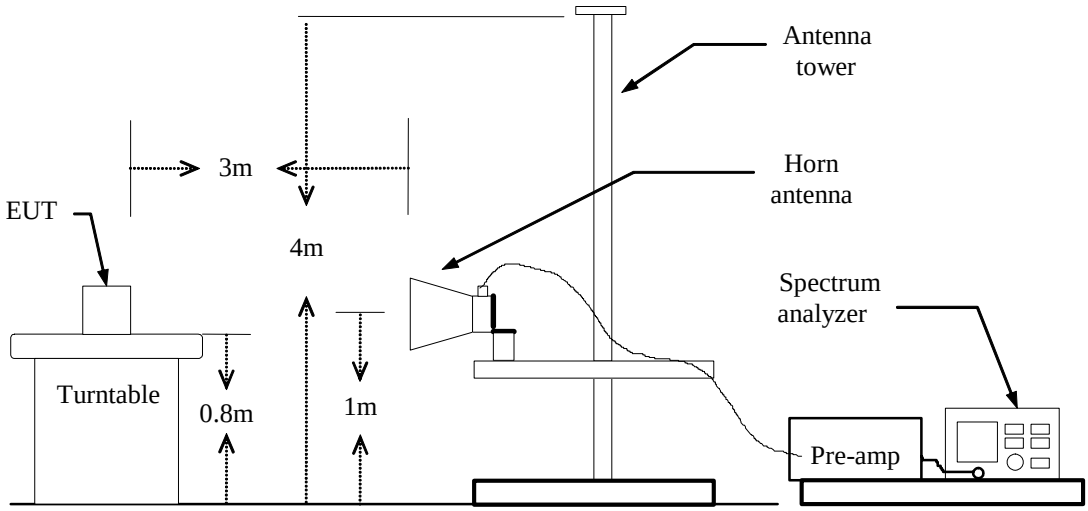
7.3 BAND EDGES MEASUREMENT

LIMIT

According to §15.407(b),
(1) The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.
(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

Test Configuration



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
   (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
   (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

TEST RESULTS

Refer to attach spectrum analyzer data chart.

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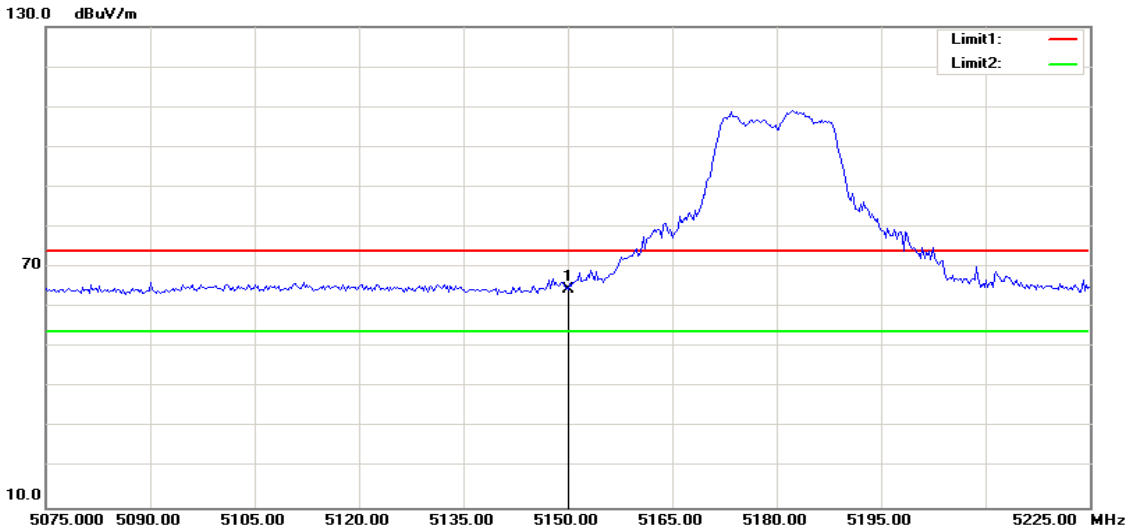
Band Edges (draft 802.11a mode)

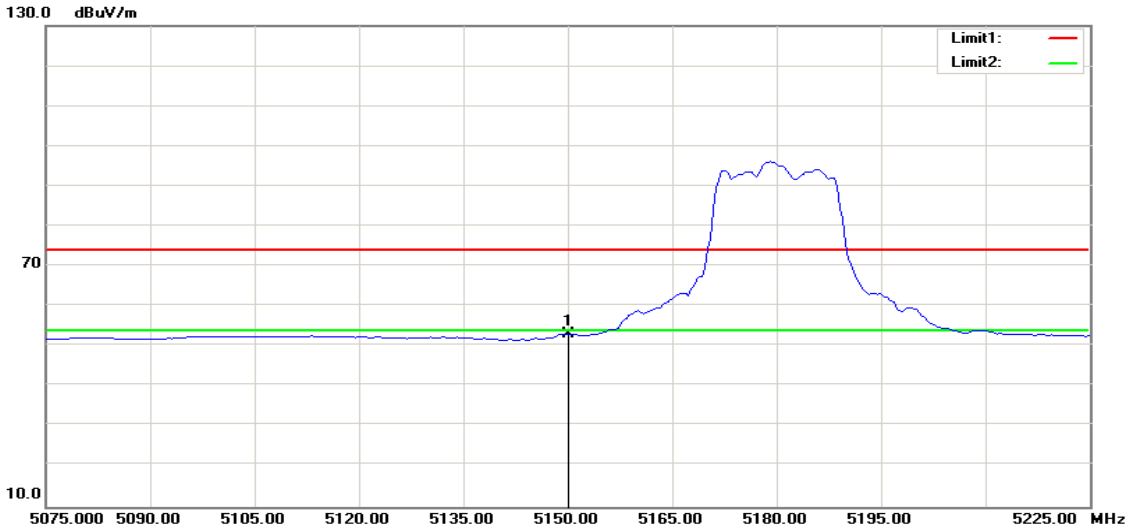
5180MHz

Detector mode: Peak **Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	71.91	-7.33	64.58	74.00	-9.42	100	276	peak

Detector mode: Average **Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	60.41	-7.33	53.08	54.00	-0.92	100	276	AVG

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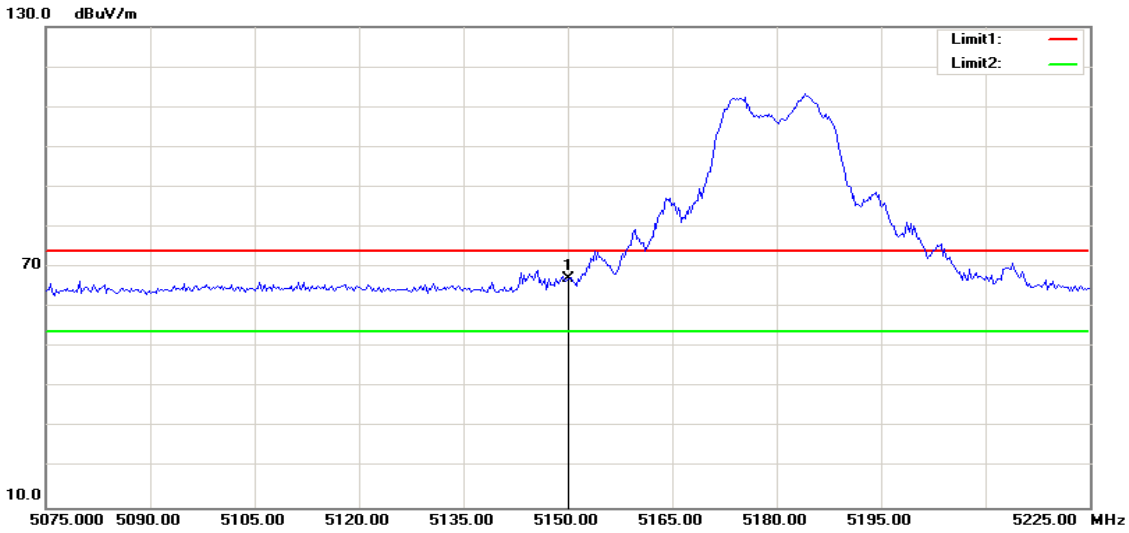
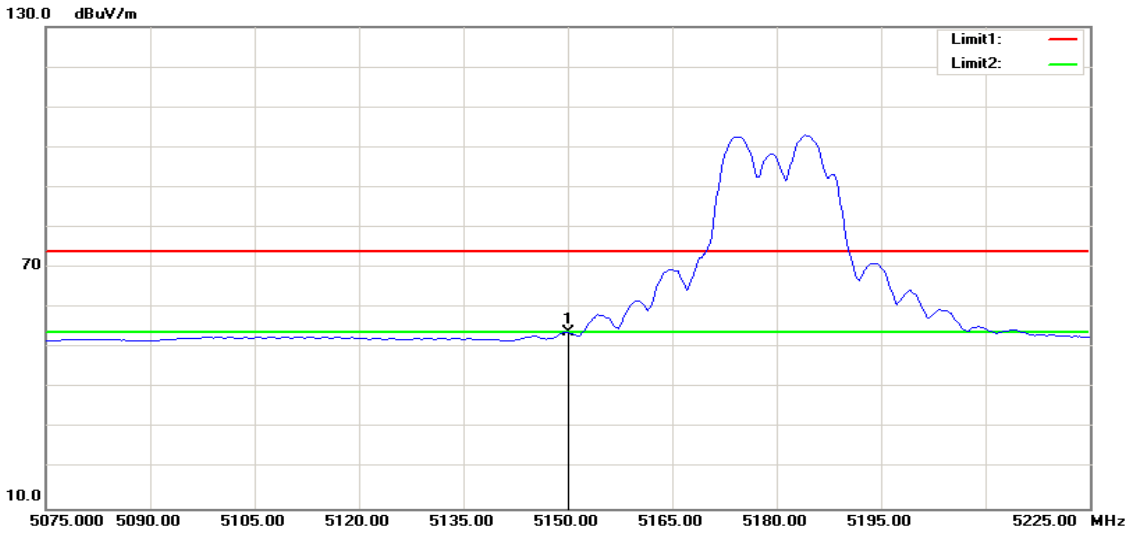
Detector mode: Peak **Polarity: Horizontal**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	74.44	-7.33	67.11	74.00	-6.89	100	263	peak

Detector mode: Average **Polarity: Horizontal**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	61.27	-7.33	53.94	54.00	-0.06	100	331	AVG

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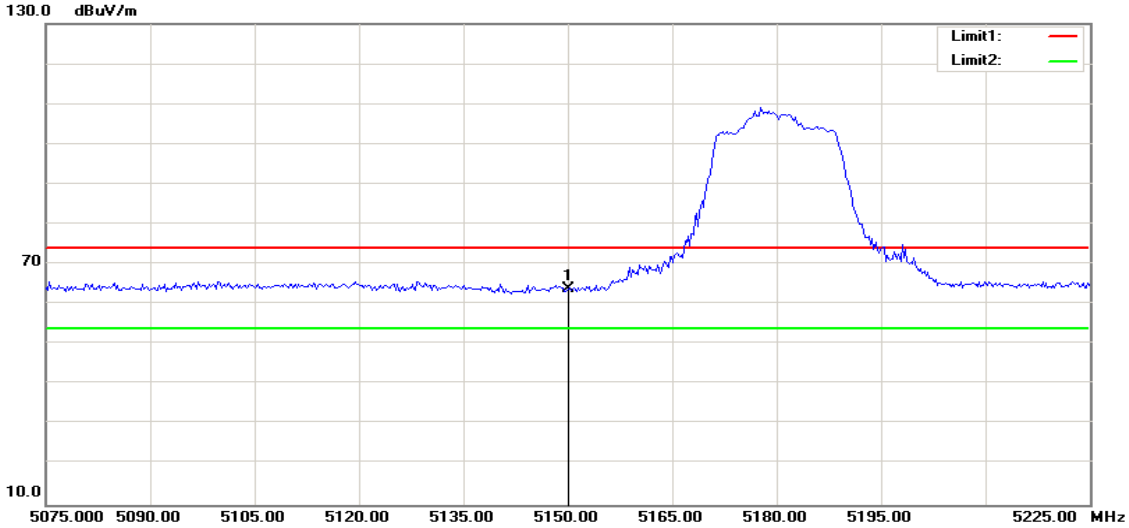
Band Edges (draft 802.11n Standard-20 MHz Channel mode)

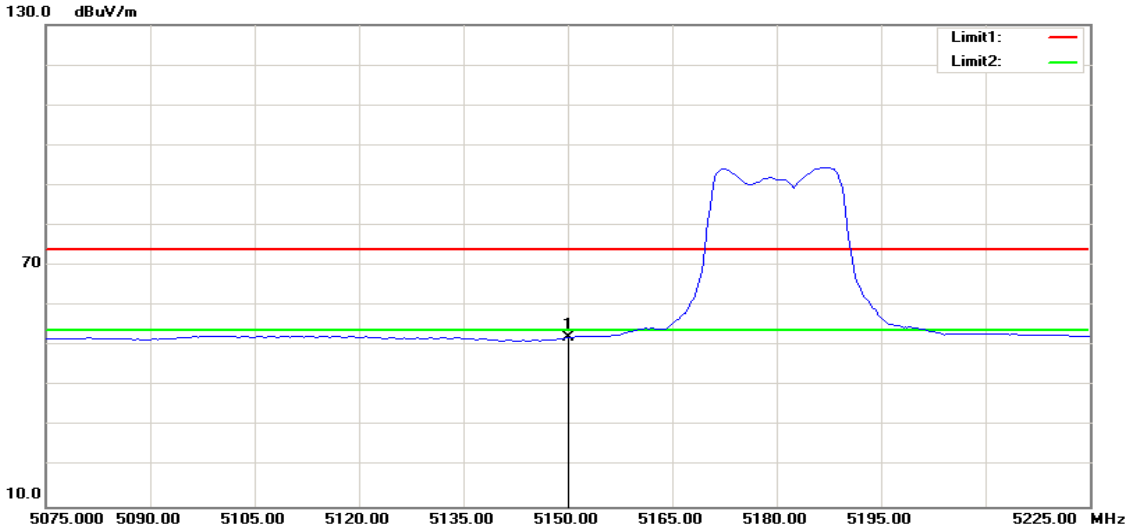
5180MHz

Detector mode: Peak **Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	71.15	-7.33	63.82	74.00	-10.18	100	266	peak

Detector mode: Average **Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	59.41	-7.33	52.08	54.00	-1.92	100	266	AVG

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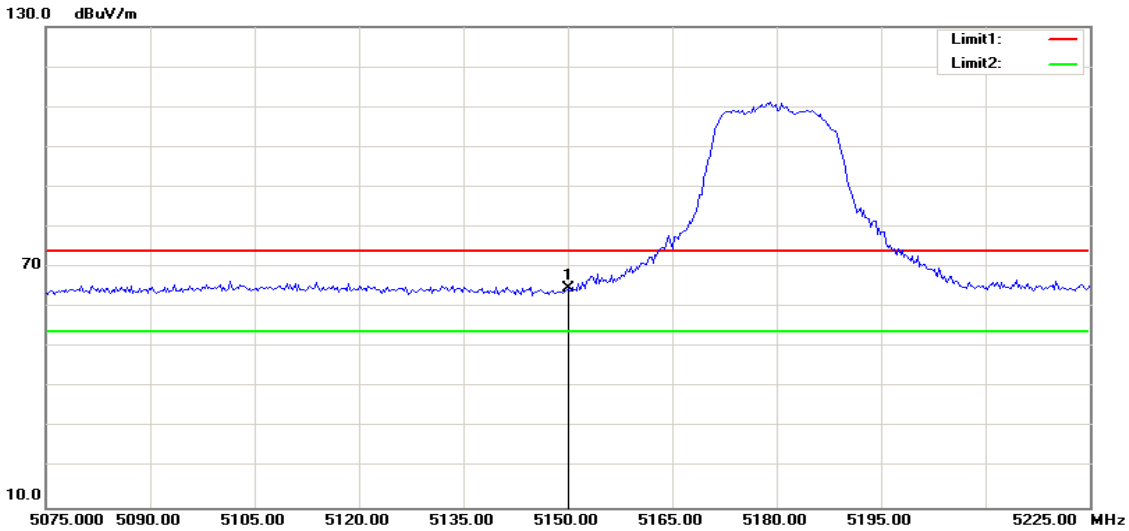
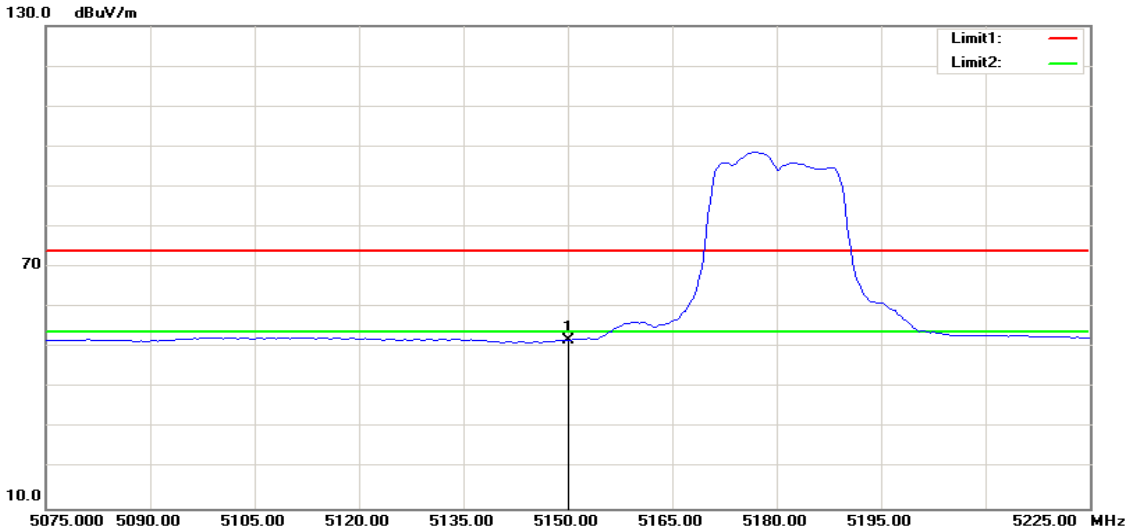
Detector mode: Peak **Polarity: Horizontal**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	72.18	-7.33	64.85	74.00	-9.15	100	266	peak

Detector mode: Average **Polarity: Horizontal**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	59.25	-7.33	51.92	54.00	-2.08	100	266	AVG

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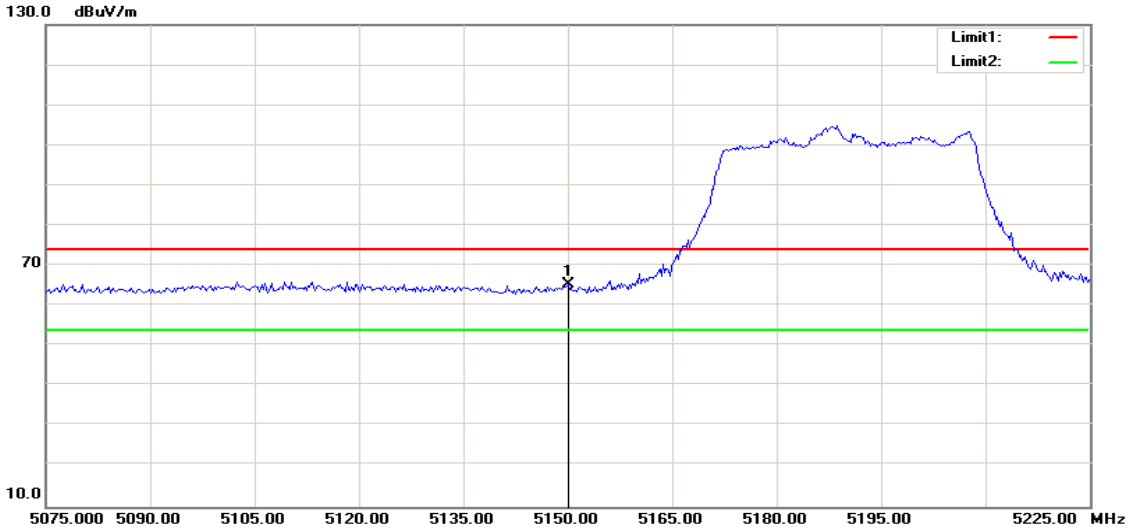
Band Edges (draft 802.11n Wide-40 MHz Channel mode)

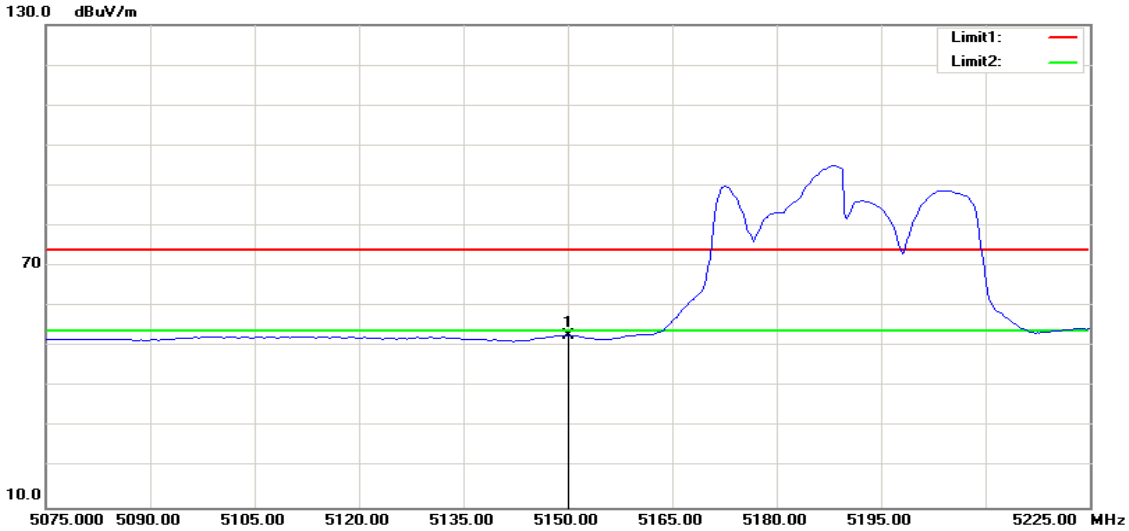
5190MHz

Detector mode: Peak **Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	72.83	-7.33	65.50	74.00	-8.50	100	185	peak

Detector mode: Average **Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	60.05	-7.33	52.72	74.00	-21.28	100	185	peak

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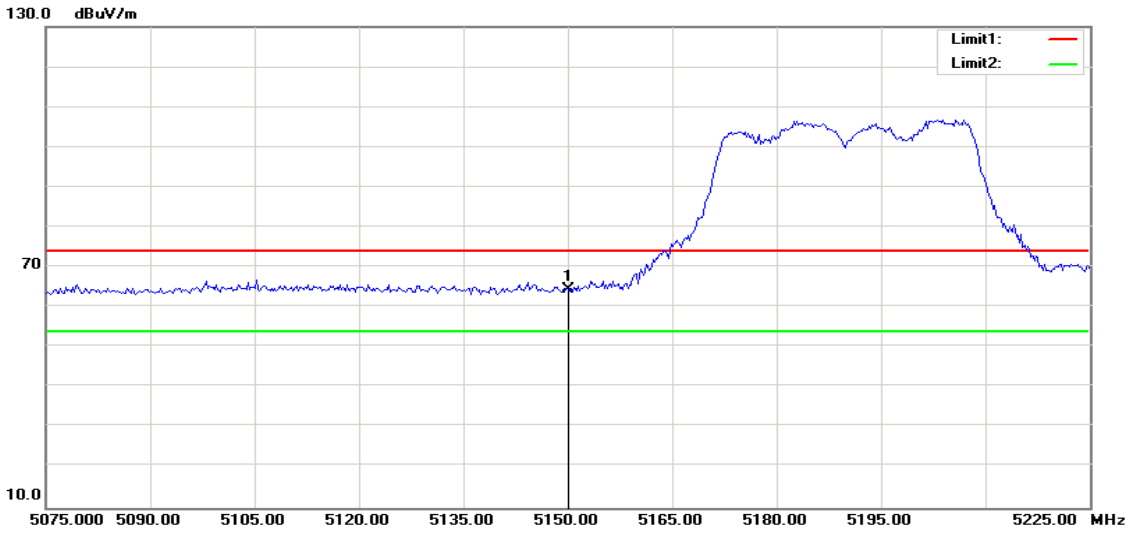
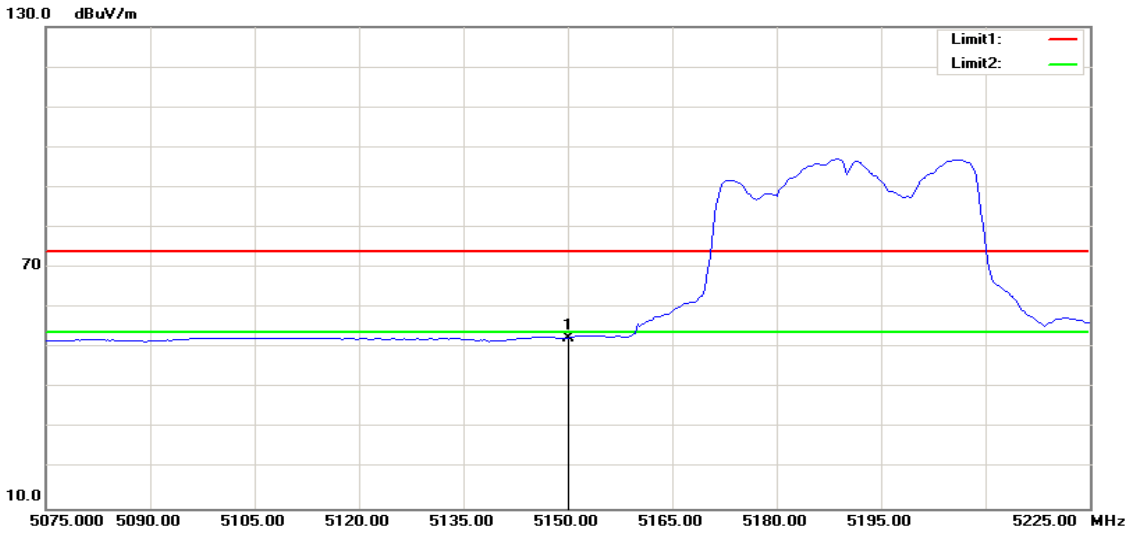
Detector mode: Peak **Polarity: Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5150.000	71.75	-7.33	64.42	74.00	-9.58	100	334	peak

Detector mode: Average **Polarity: Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5150.000	59.91	-7.33	52.58	74.00	-21.42	100	266	peak

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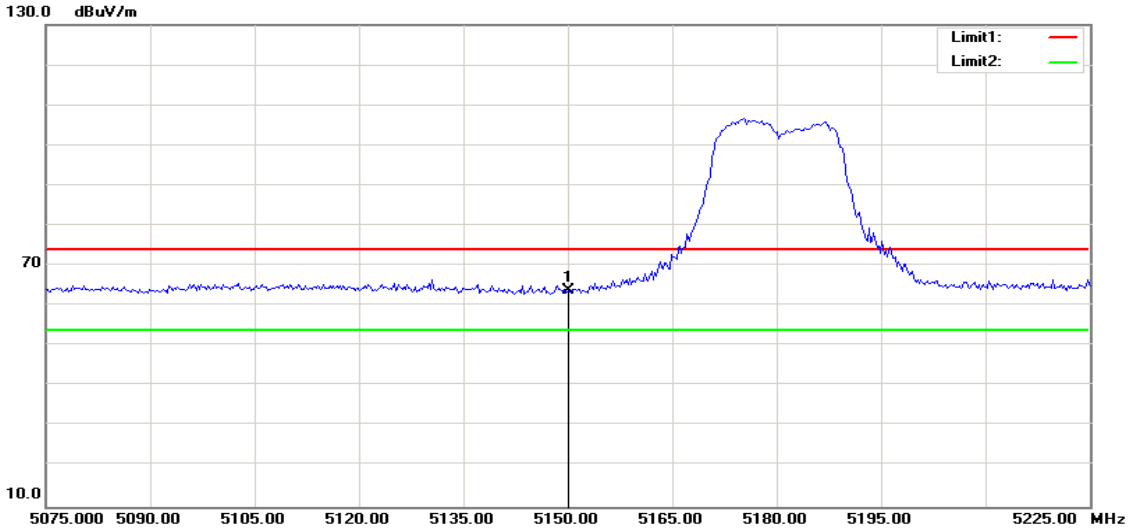
Band Edges (draft 802.11ac Standard-20 MHz Channel mode)

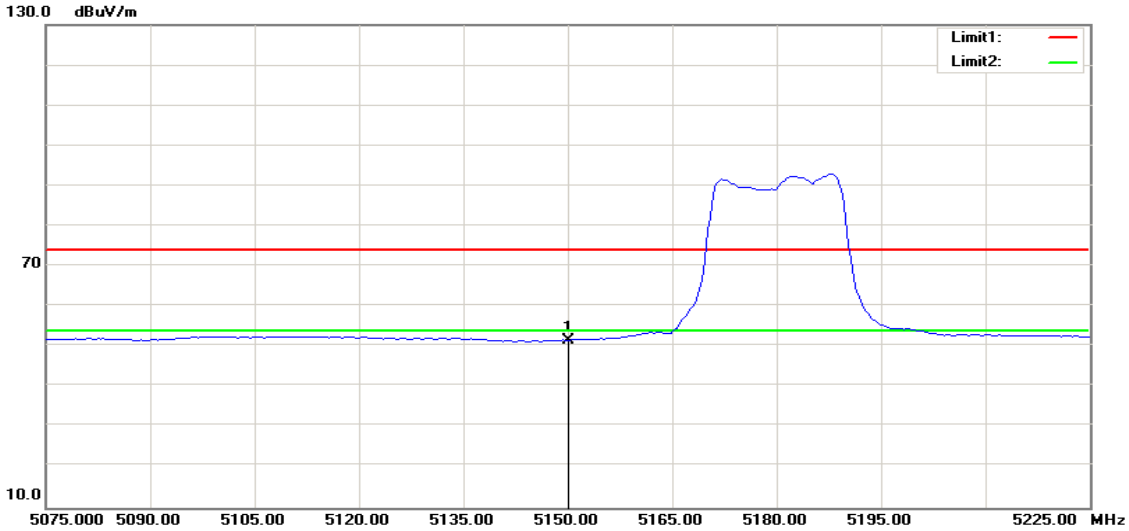
5180MHz

Detector mode: Peak **Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	71.06	-7.33	63.73	74.00	-10.27	100	294	peak

Detector mode: Average **Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	58.97	-7.33	51.64	54.00	-2.36	100	294	AVG

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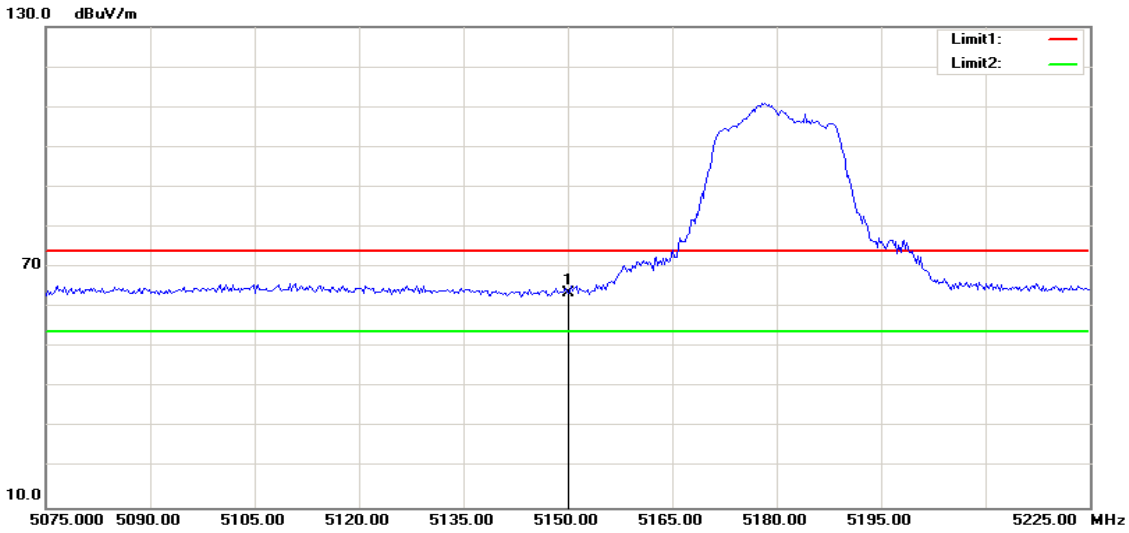
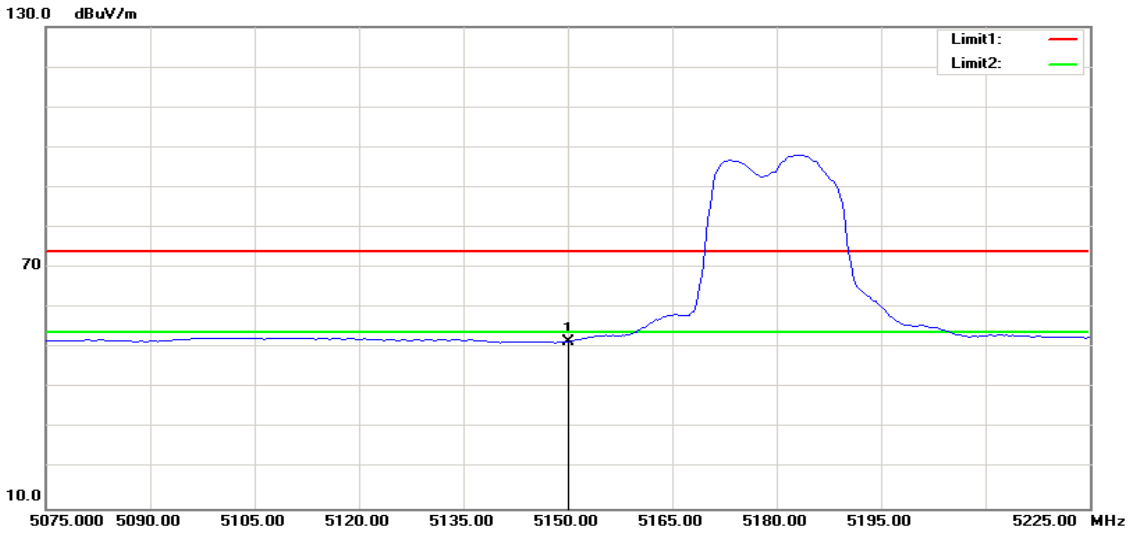
Detector mode: Peak **Polarity: Horizontal**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	70.98	-7.33	63.65	74.00	-10.35	100	294	peak

Detector mode: Average **Polarity: Horizontal**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	58.90	-7.33	51.57	54.00	-2.43	100	294	AVG

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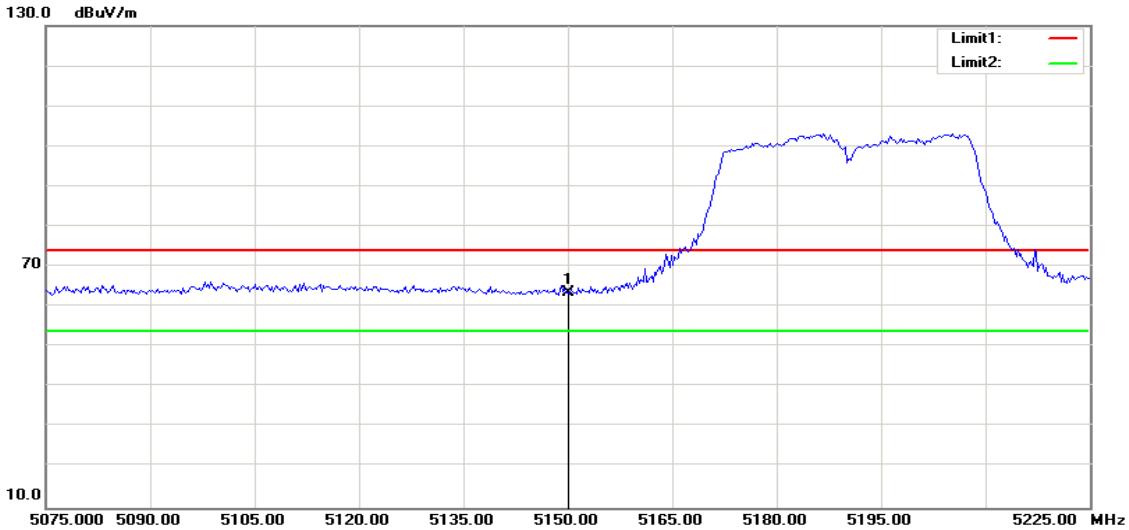
Band Edges (draft 802.11ac Wide-40 MHz Channel mode)

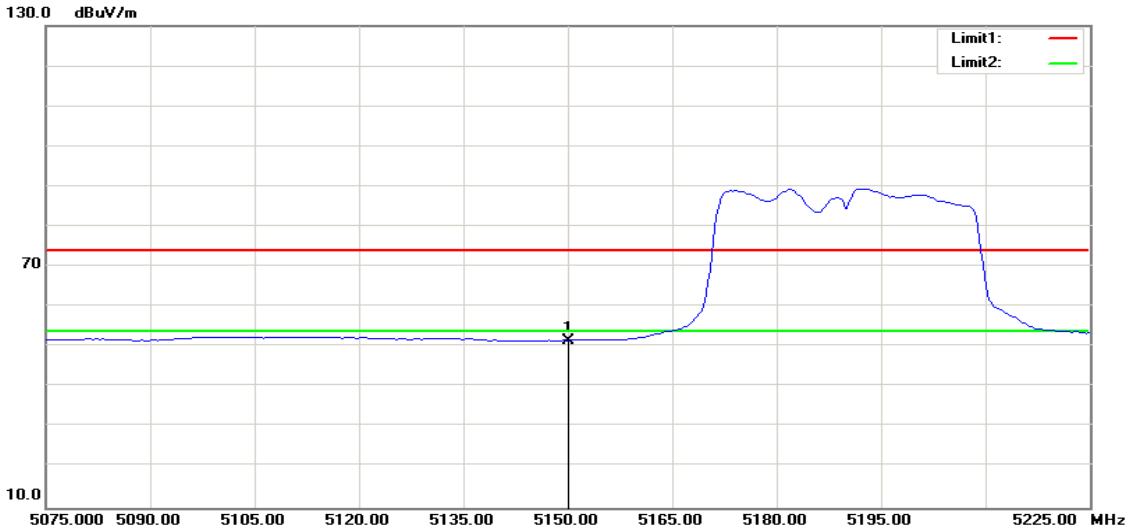
5190MHz

Detector mode: Peak **Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	71.00	-7.33	63.67	74.00	-10.33	100	223	peak

Detector mode: Average **Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	58.99	-7.33	51.66	54.00	-2.34	100	223	AVG

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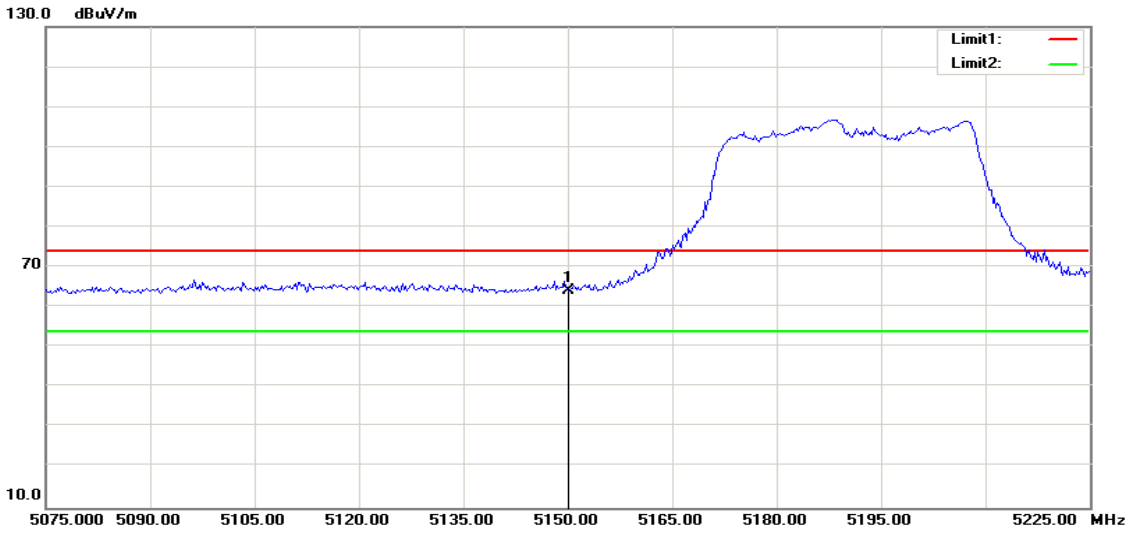
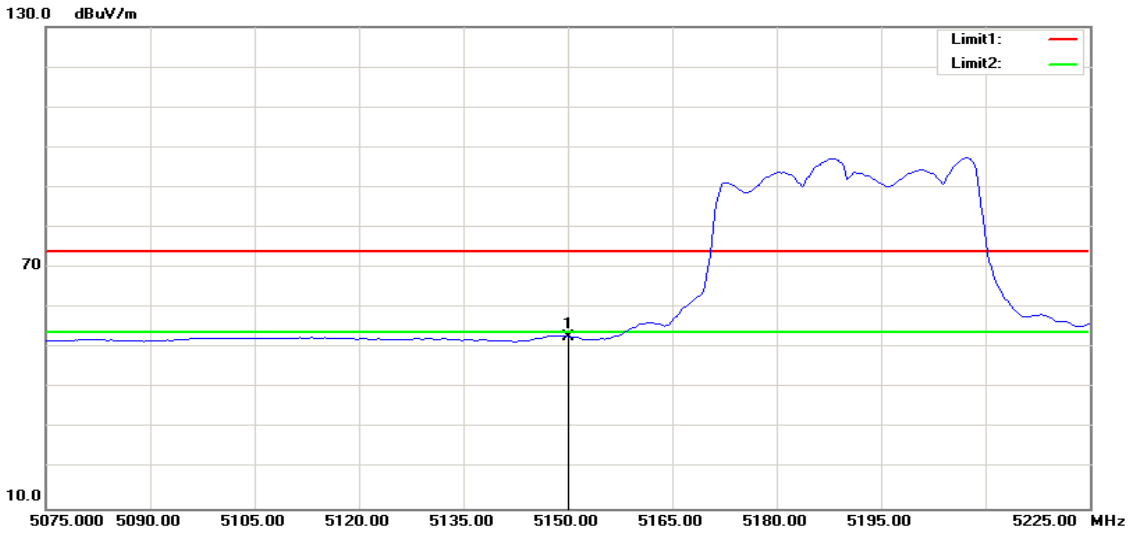
Detector mode: Peak **Polarity: Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5150.000	71.56	-7.33	64.23	74.00	-9.77	100	223	peak

Detector mode: Average **Polarity: Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5150.000	60.17	-7.33	52.84	54.00	-1.16	100	223	AVG

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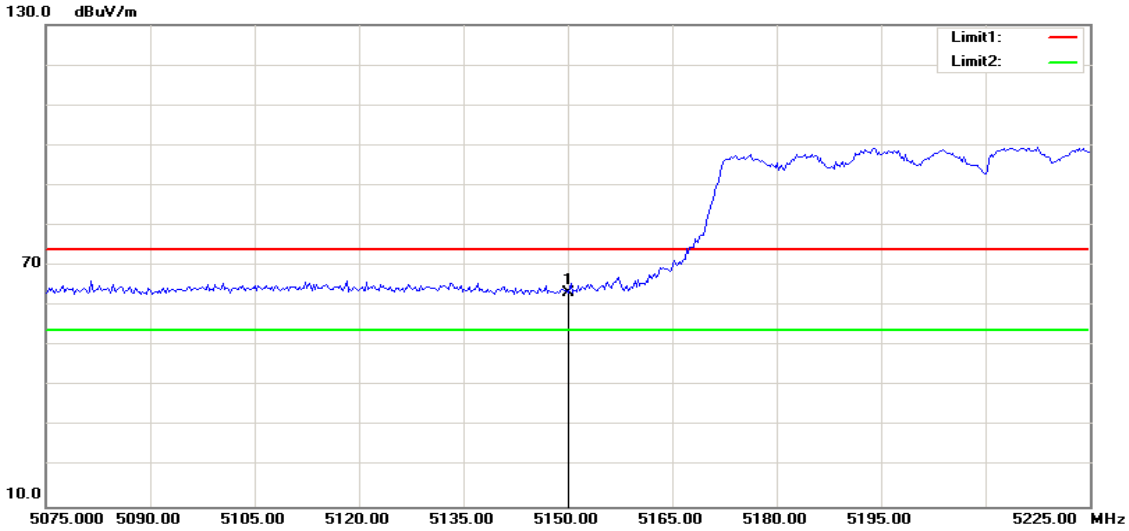
Band Edges (draft 802.11ac wide-80 MHz Channel mode)

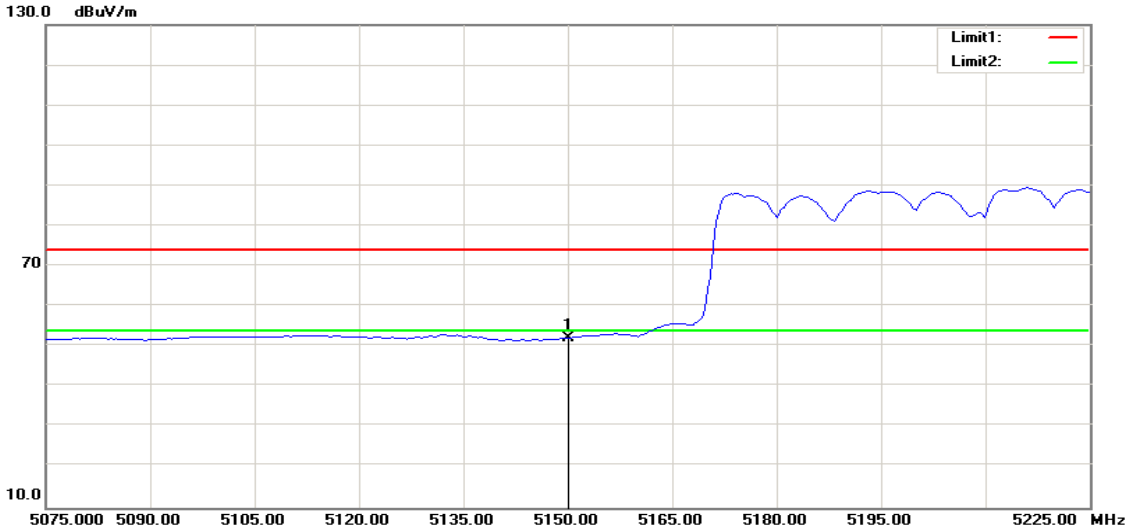
5210MHz

Detector mode: Peak **Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	70.58	-7.33	63.25	74.00	-10.75	100	265	peak

Detector mode: Average **Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	59.45	-7.33	52.12	54.00	-1.88	100	265	AVG

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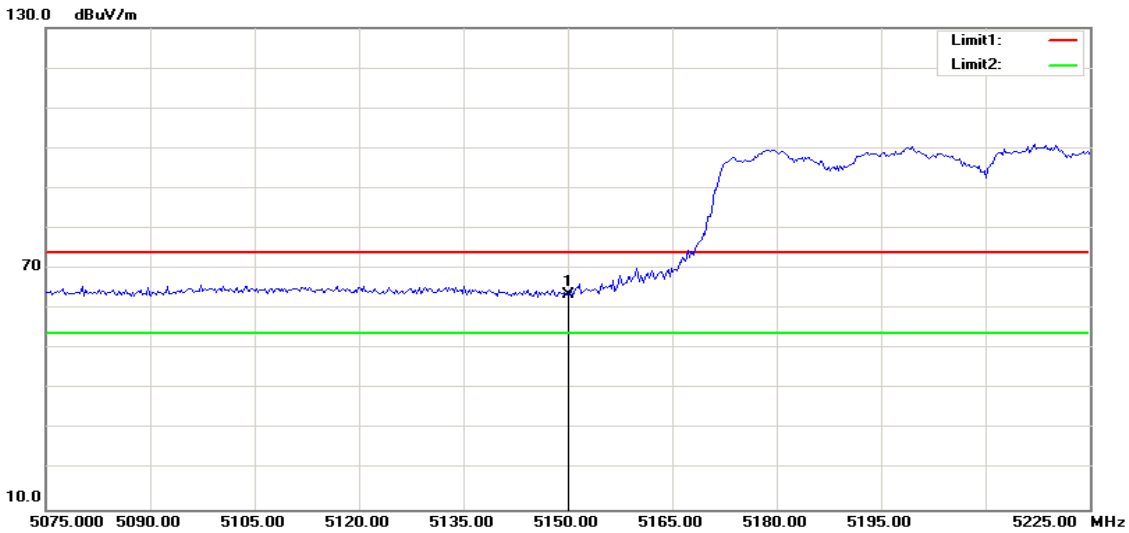
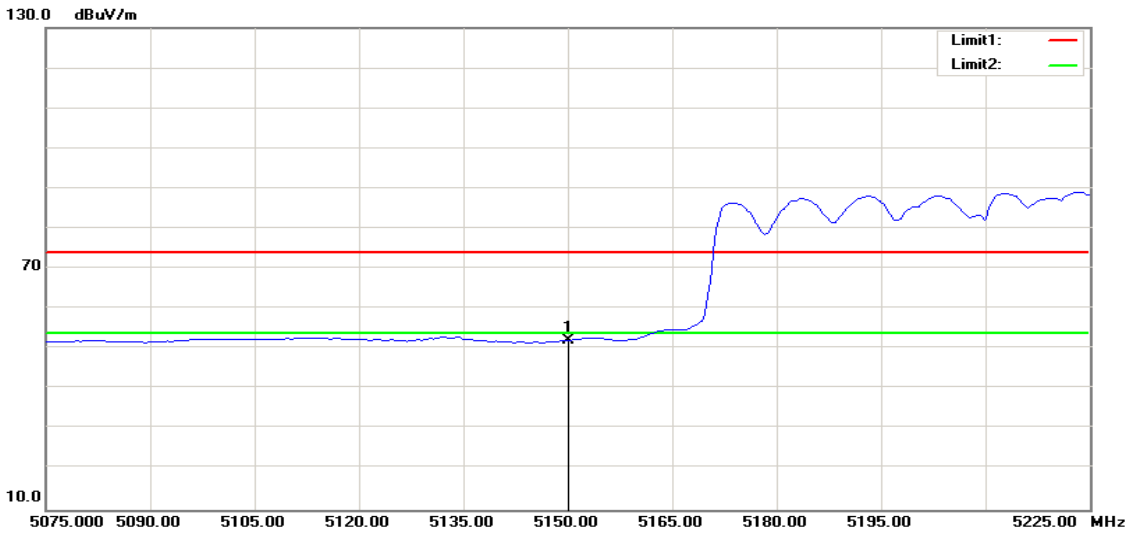
Detector mode: Peak **Polarity: Horizontal**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	70.84	-7.33	63.51	74.00	-10.49	100	341	peak

Detector mode: Average **Polarity: Horizontal**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5150.000	59.44	-7.33	52.11	54.00	-1.89	100	341	AVG

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7.4 PEAK POWER SPECTRAL DENSITY

LIMIT

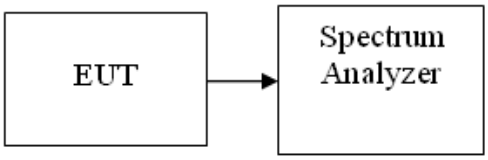
According to §15.407(a),

For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4dBm in any 1MHz band.

For the band 5.25-5.35 GHz and 5.47-5.725 GHz, the peak power spectral density shall not exceed 11dBm in any 1MHz band.

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
   Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 1MHz, VBW = 3MHz, Span must be greater than 26dB bandwidth, adjust as necessary, Sweep= auto, Detector RMS
3. Record the max. reading.

TEST RESULTS

No non-compliance noted

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Test Data

Test mode: IEEE 802.11a mode

5150~5250MHz

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Result
Low	5180	-0.76	-0.84	-0.77	3.98	4.00	PASS
Mid	5200	-0.69	-0.67	-1.02	3.98	4.00	PASS
High	5240	-0.70	-0.64	-1.22	3.93	4.00	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode

5150~5250MHz

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Result
Low	5180	-1.25	-1.43	-1.00	3.55	4.00	PASS
Mid	5200	-0.79	-0.84	-1.11	3.86	4.00	PASS
High	5240	-1.17	-1.07	-1.60	3.50	4.00	PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode

5150~5250MHz

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Result
Low	5190	-2.29	-2.48	-2.51	2.35	4.00	PASS
High	5230	-2.66	-2.67	-3.03	1.99	4.00	PASS

Test mode: draft 802.11ac Standard-20 MHz Channel mode

5150~5250MHz

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Result
Low	5180	-1.63	-1.72	-1.56	3.14	4.00	PASS
Mid	5200	-1.46	-1.32	-1.65	3.30	4.00	PASS
High	5240	-1.49	-1.69	-2.23	2.98	4.00	PASS

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Test mode: draft 802.11ac Wide-40 MHz Channel mode

5150~5250MHz

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Result
Low	5190	-2.59	-2.34	-2.42	2.32	4.00	PASS
High	5230	-2.66	-2.22	-2.96	2.17	4.00	PASS

Test mode: draft 802.11ac Wide-80 MHz Channel mode

5150~5250MHz

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Result
Mid	5210	-4.39	-5.44	-5.29	-0.24	4.00	PASS

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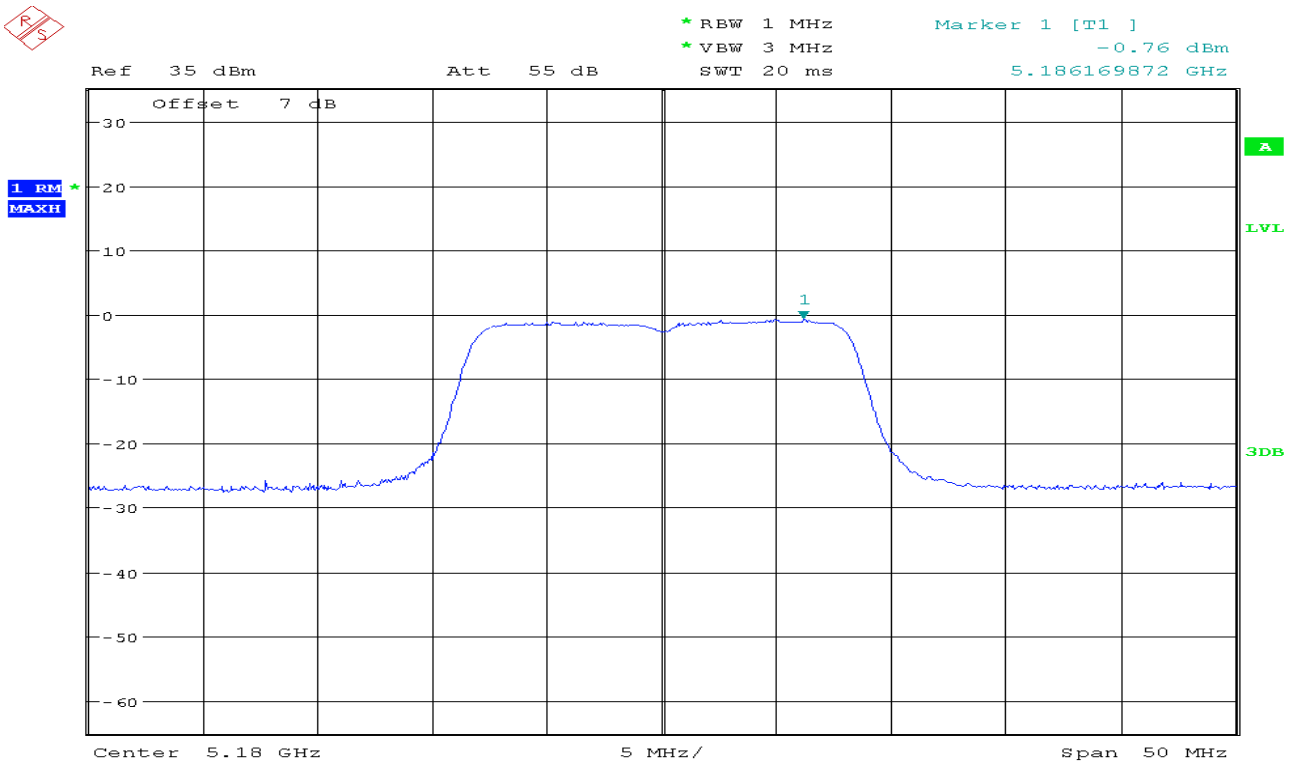
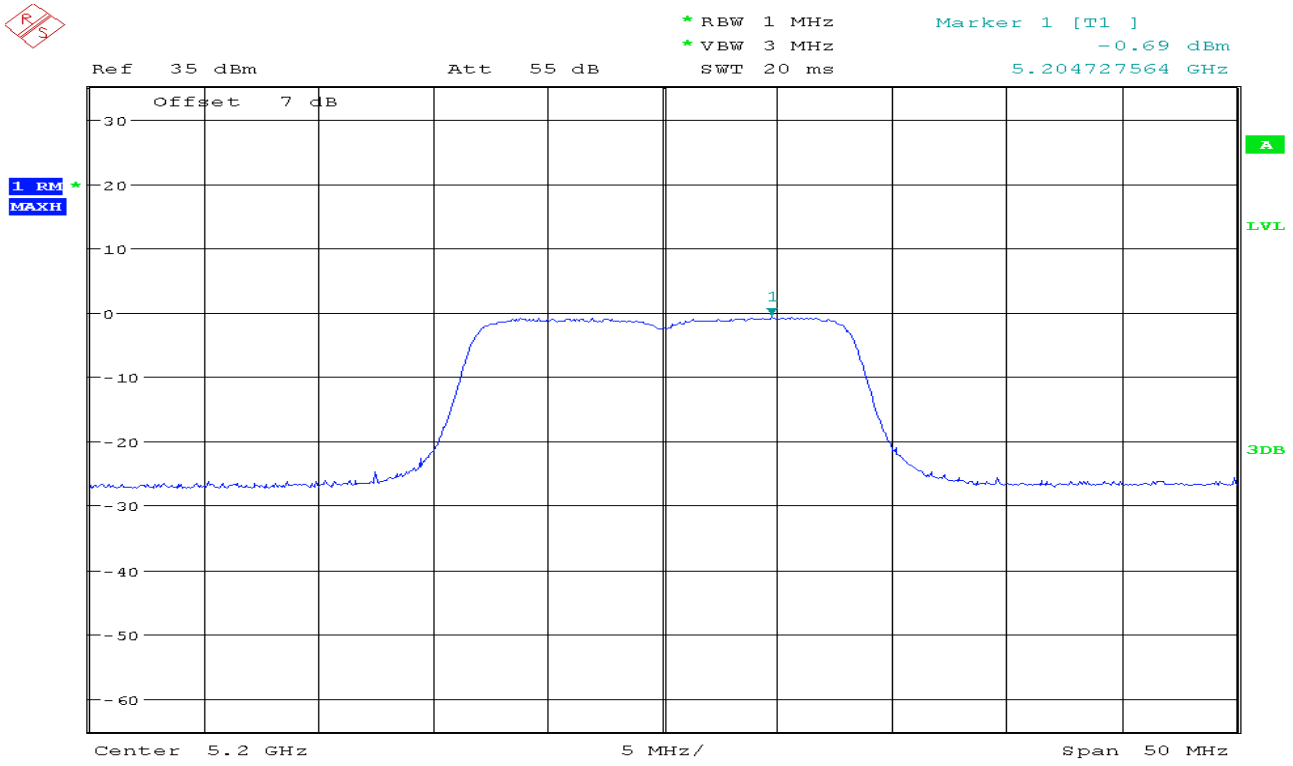
Test Plot
IEEE 802.11a mode/chain 0:

5150~5250MHz

CH Low



CH Mid



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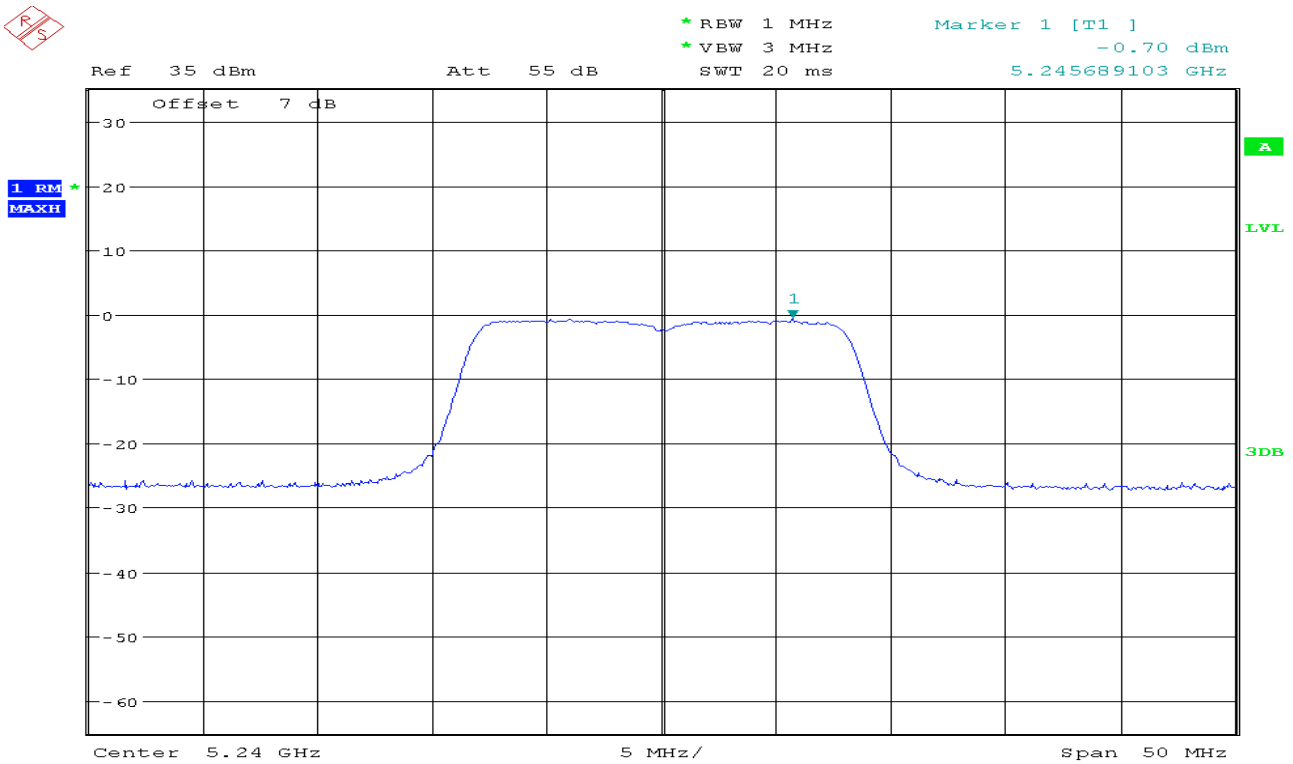
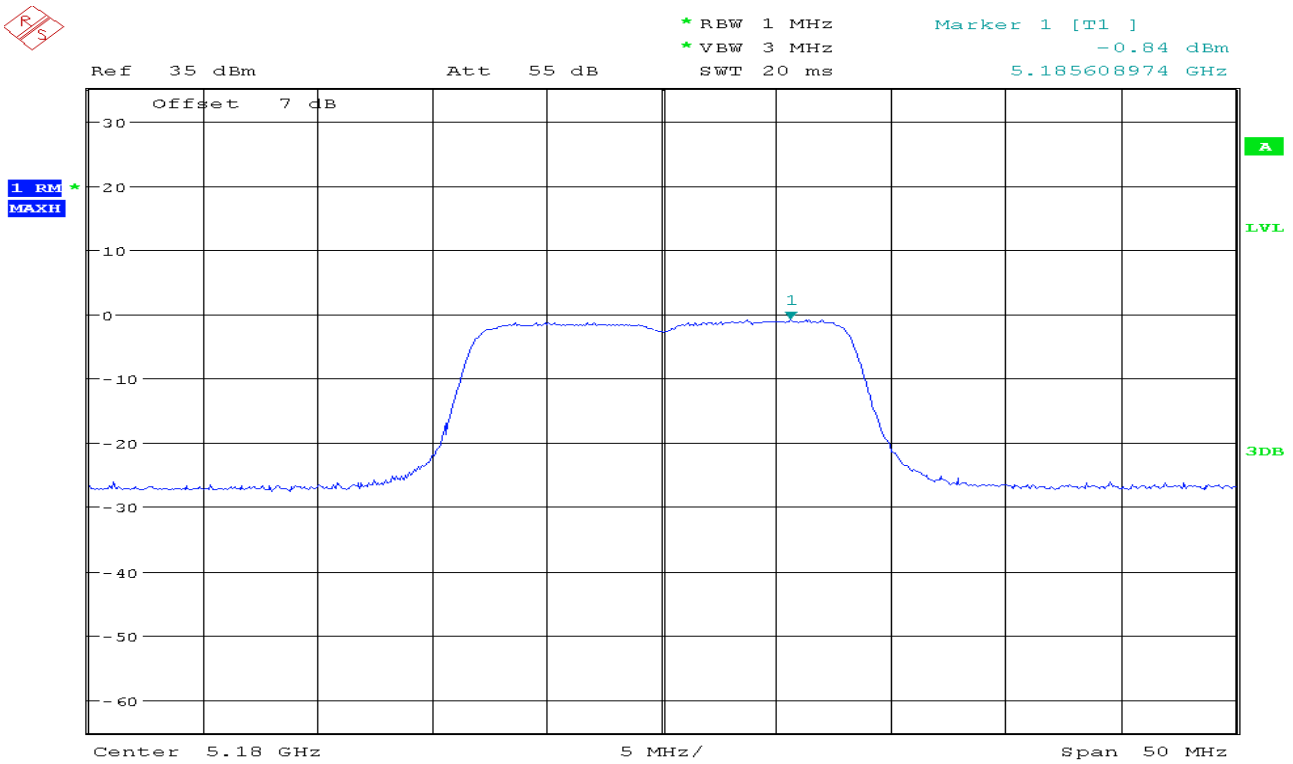
CH High



IEEE 802.11a mode/chain 1:

5150~5250MHz

CH Low



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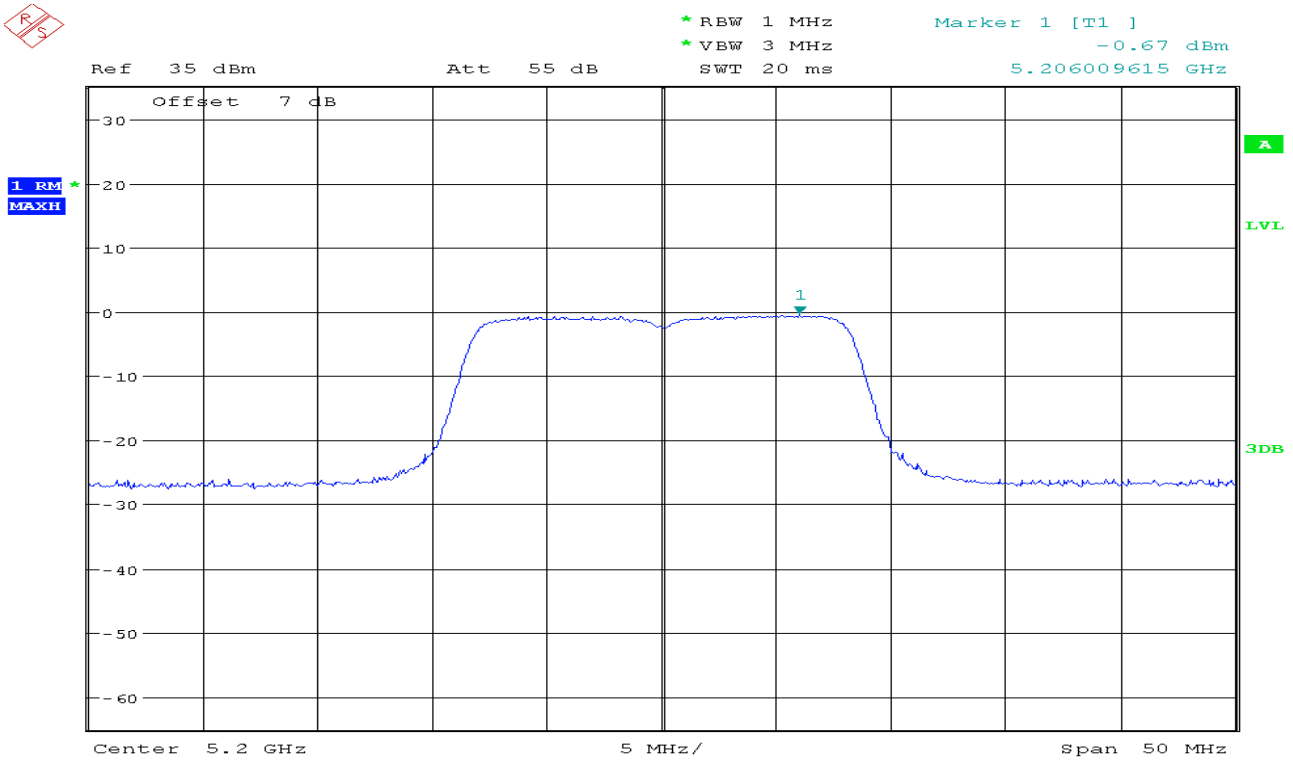
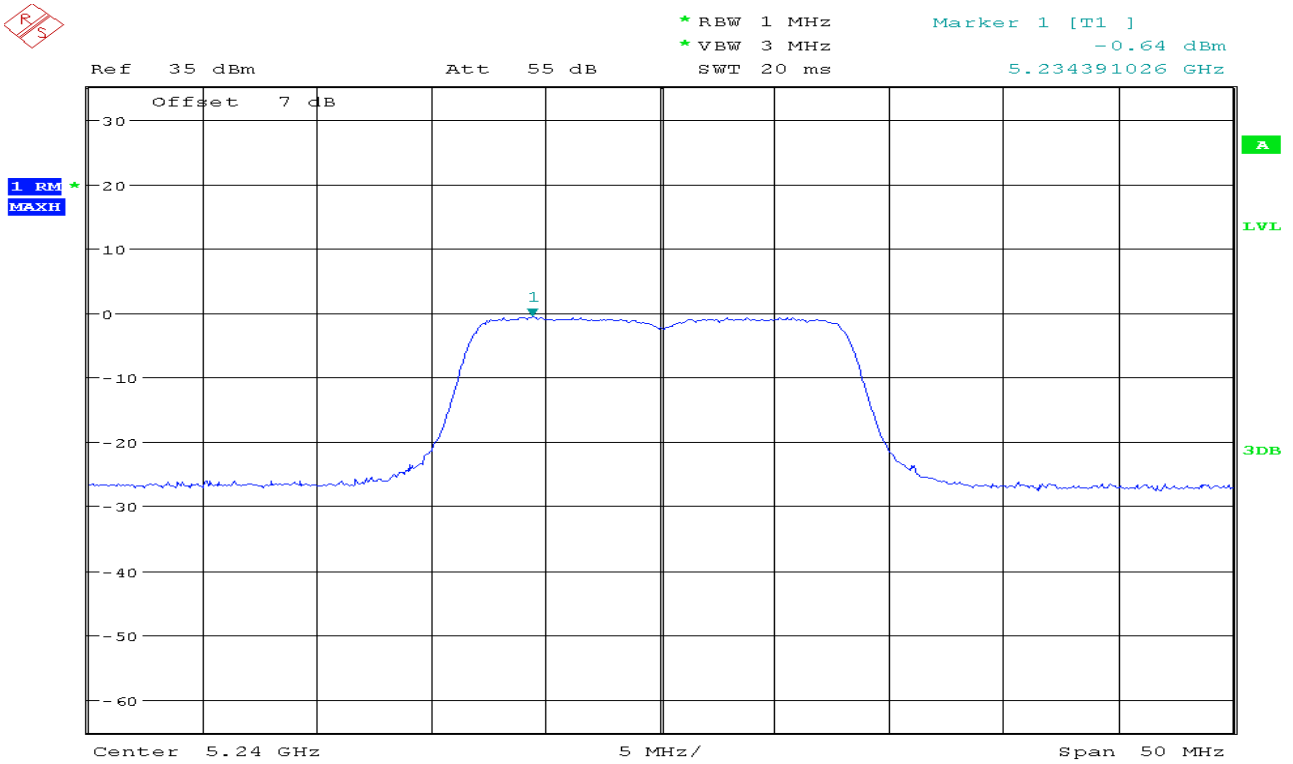
CH Mid



CH High



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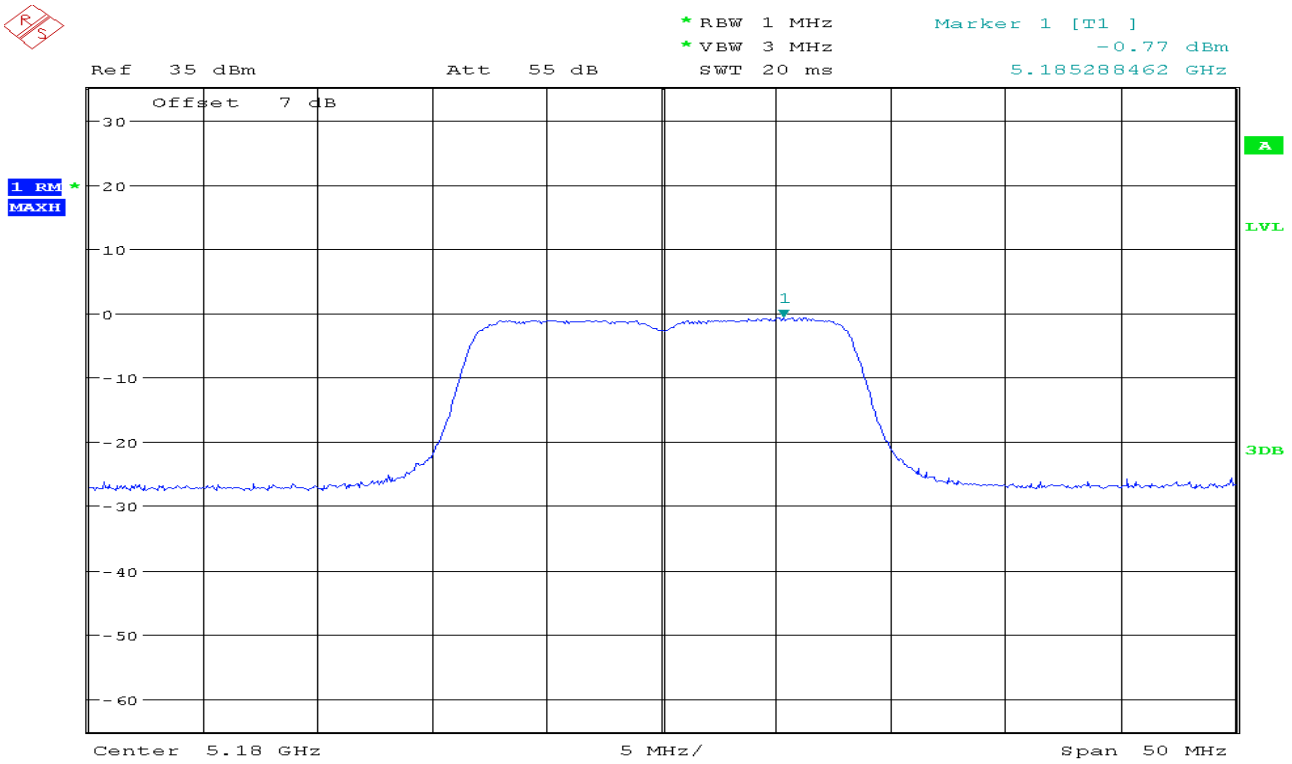
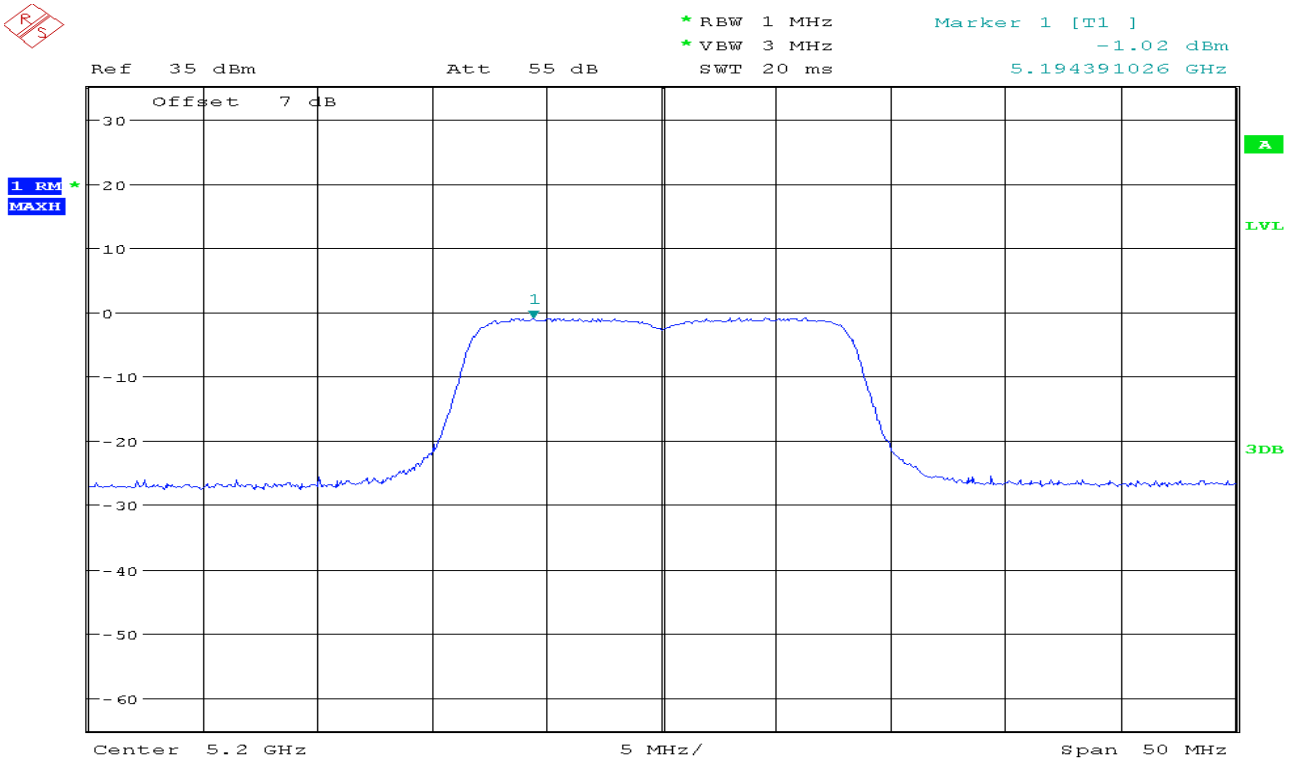
IEEE 802.11a mode/chain 2:

5150~5250MHz

CH Low



CH Mid



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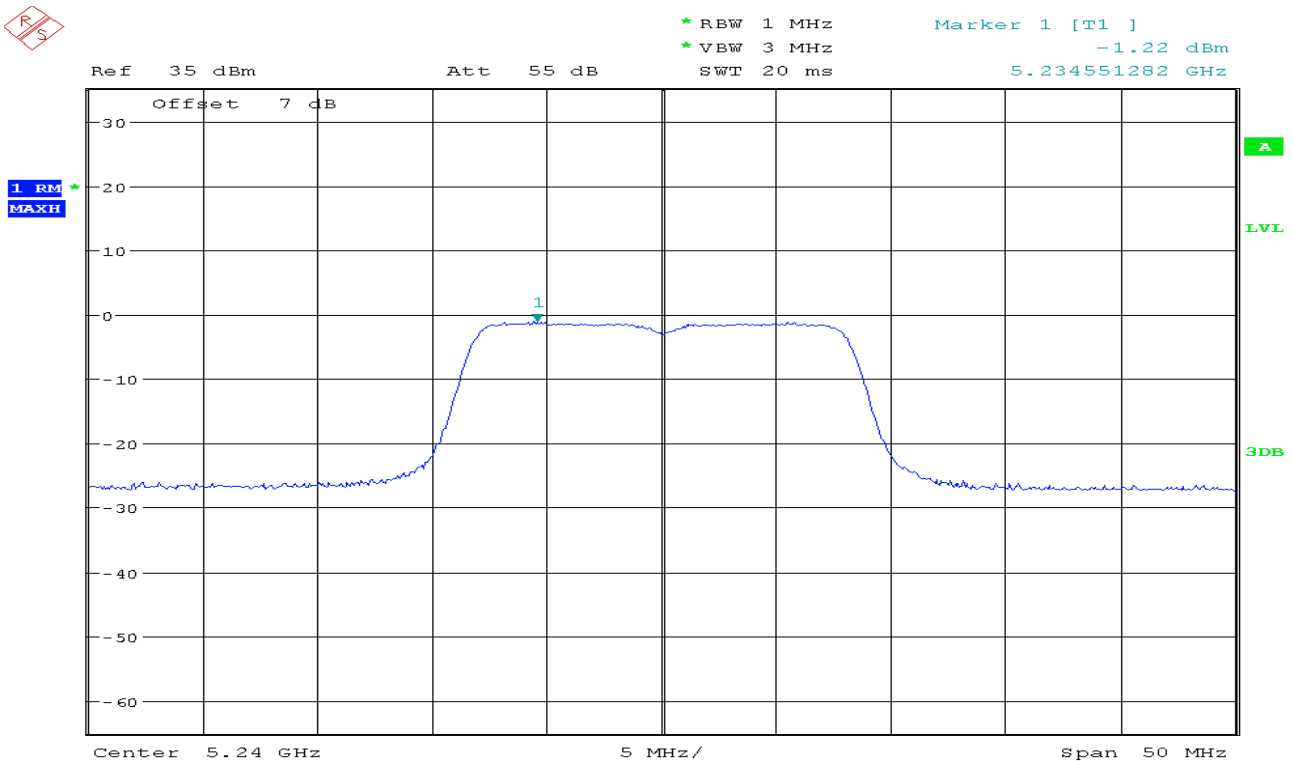
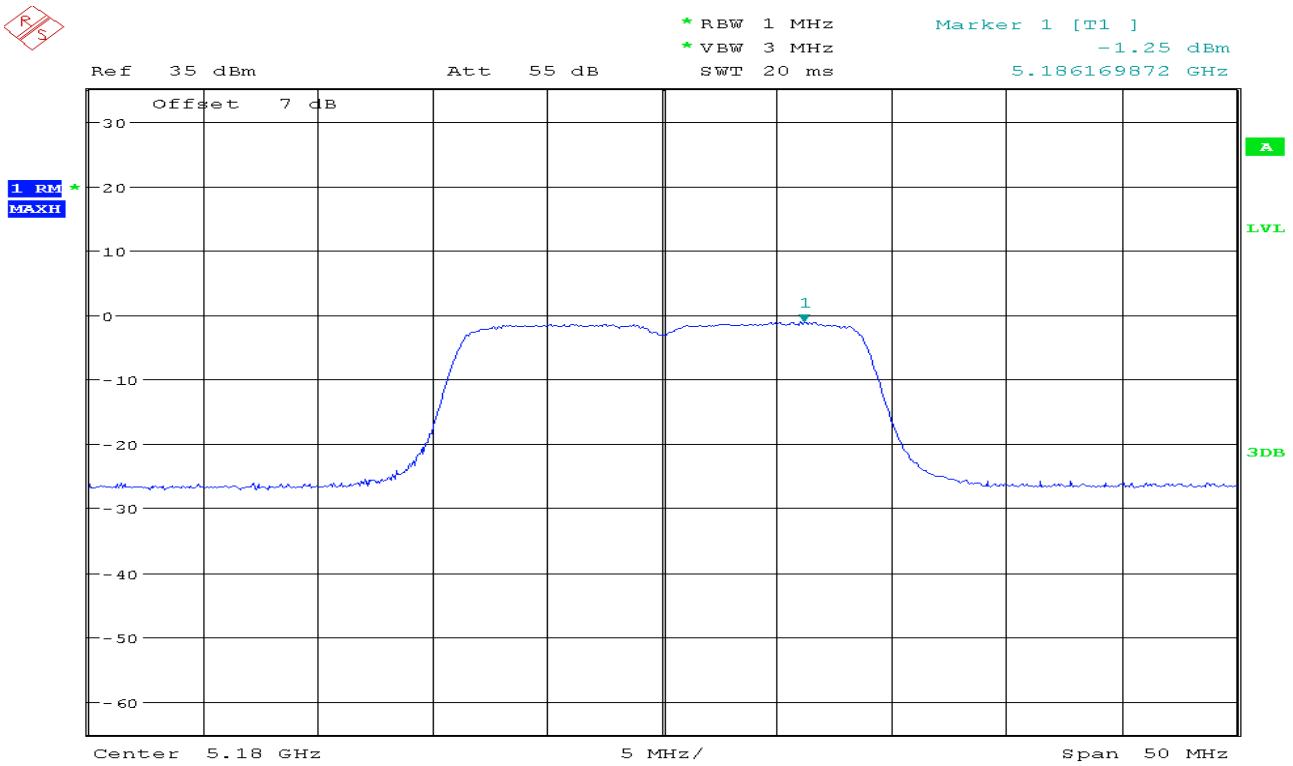
CH High



draft 802.11n Standard-20 MHz Channel mode / Chain 0

5150~5250MHz

CH Low



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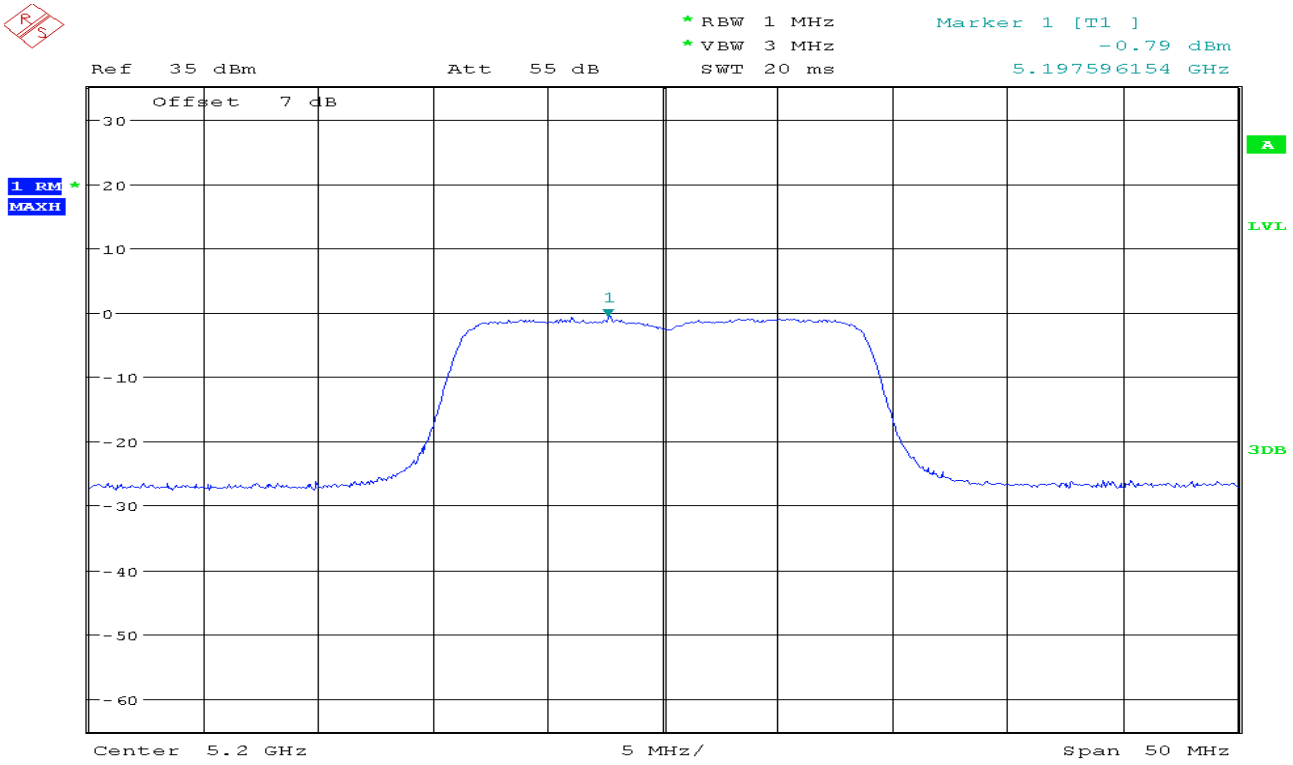
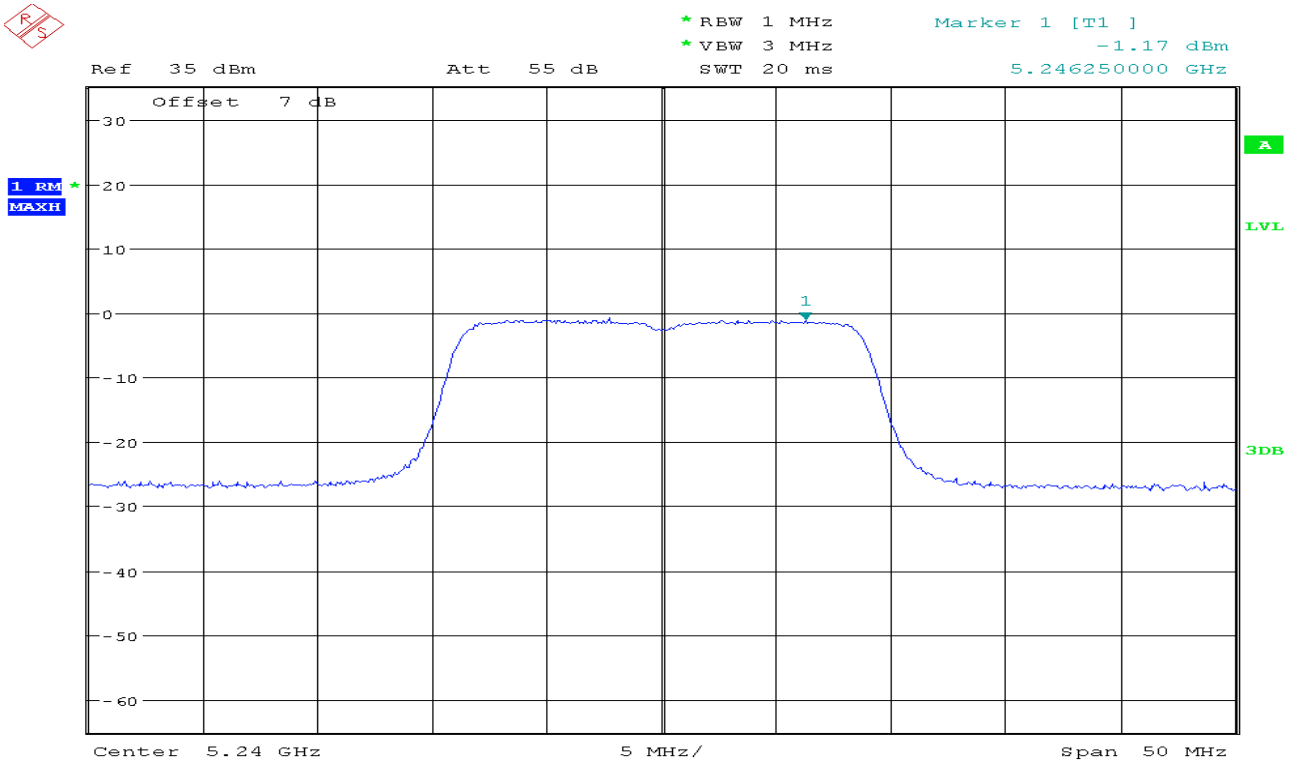
CH Mid



CH High



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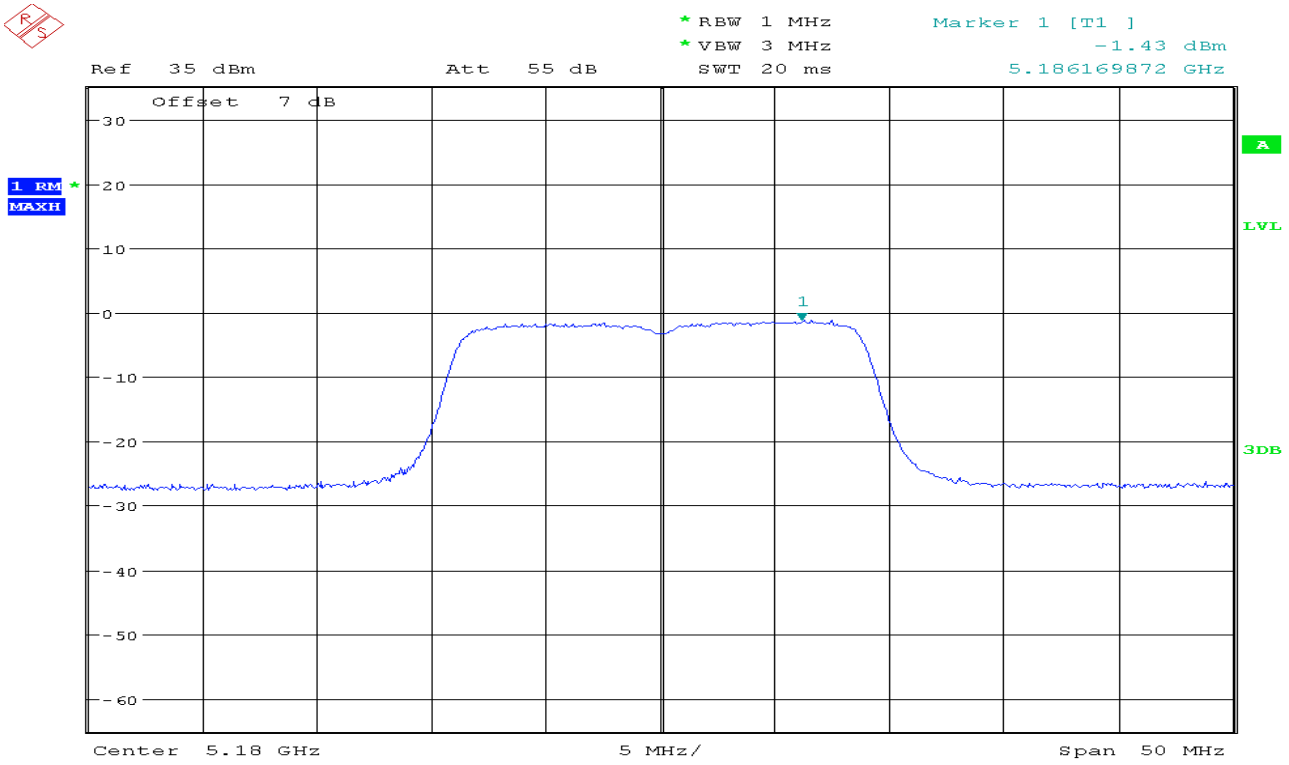
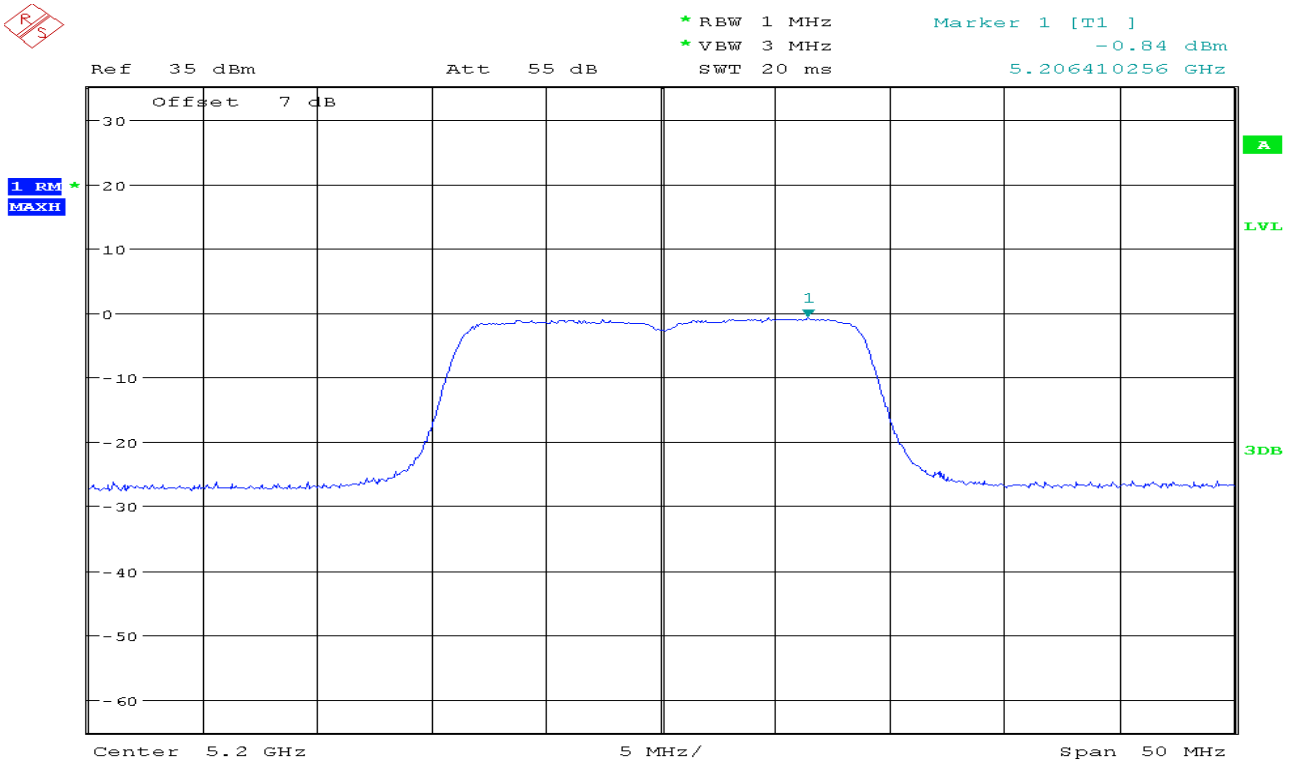
draft 802.11n Standard-20 MHz Channel mode / Chain 1

5150~5250MHz

CH Low



CH Mid



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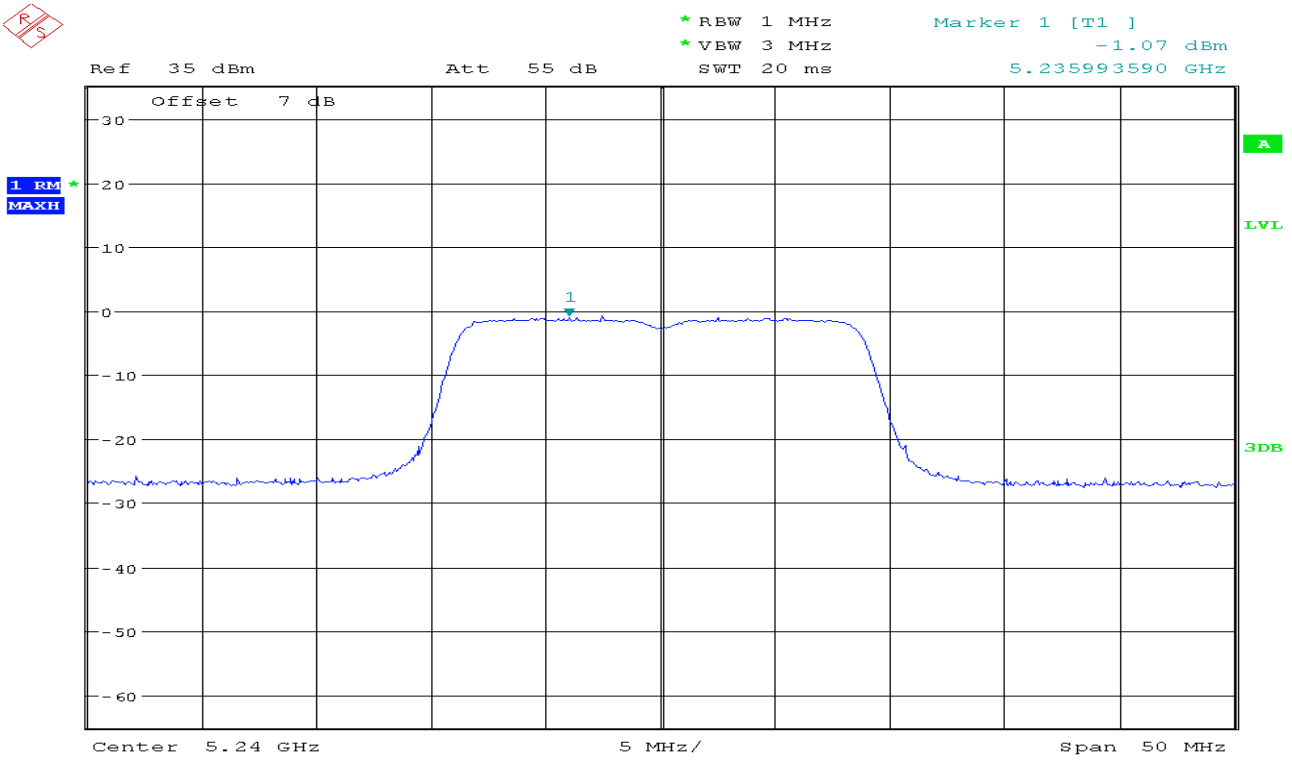
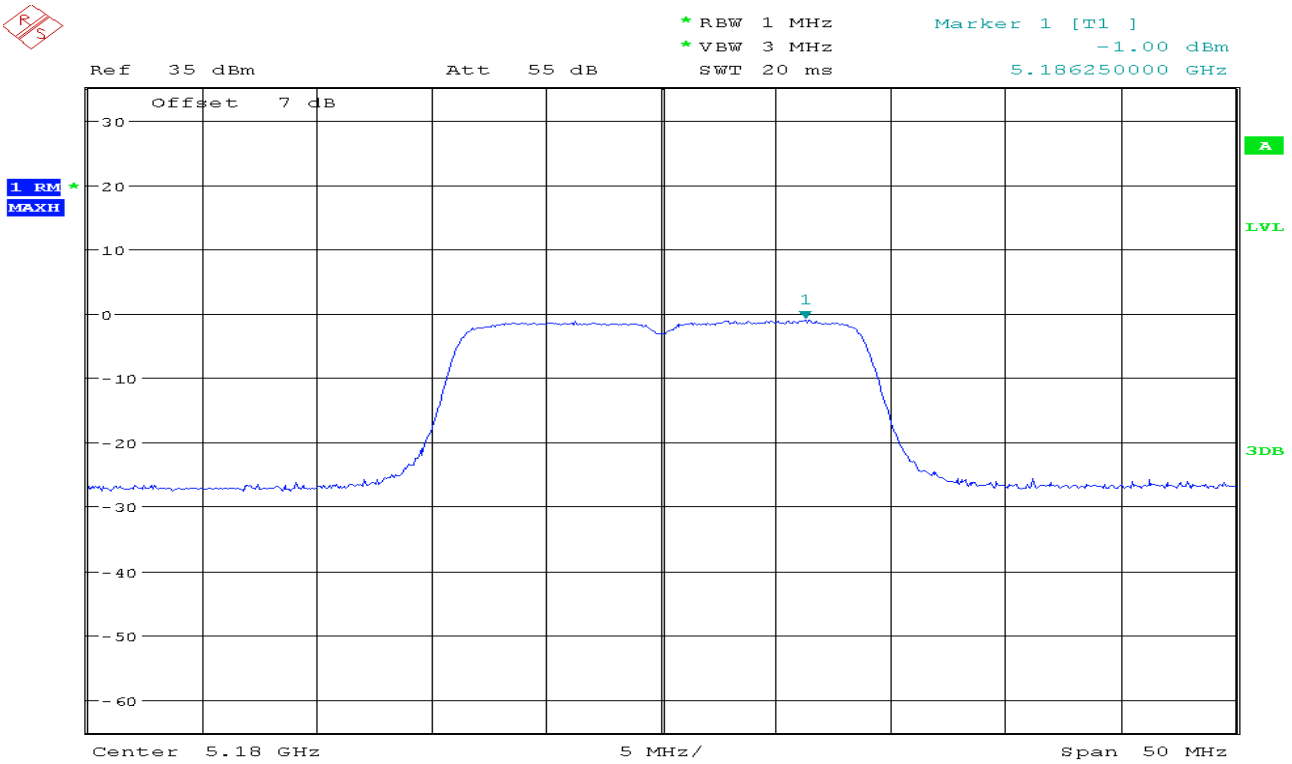
CH High



draft 802.11n Standard-20 MHz Channel mode / Chain 2

5150~5250MHz

CH Low



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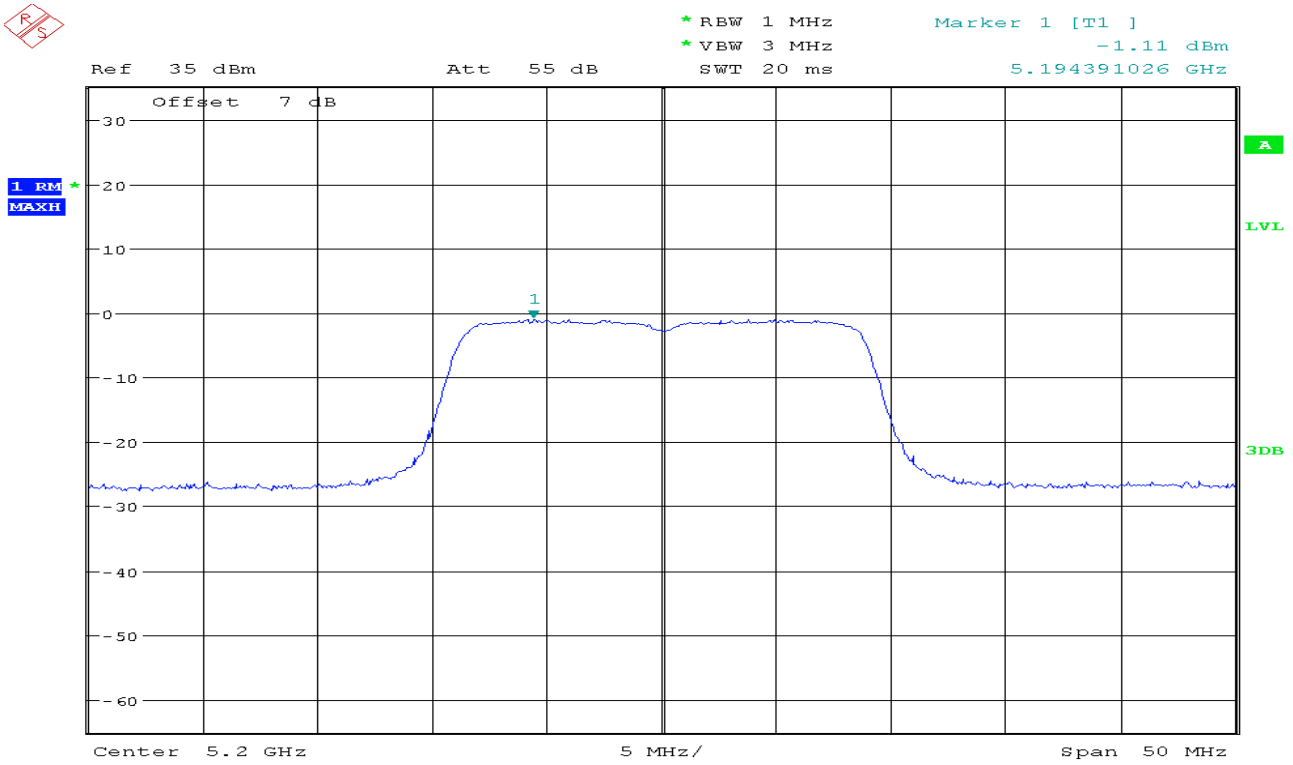
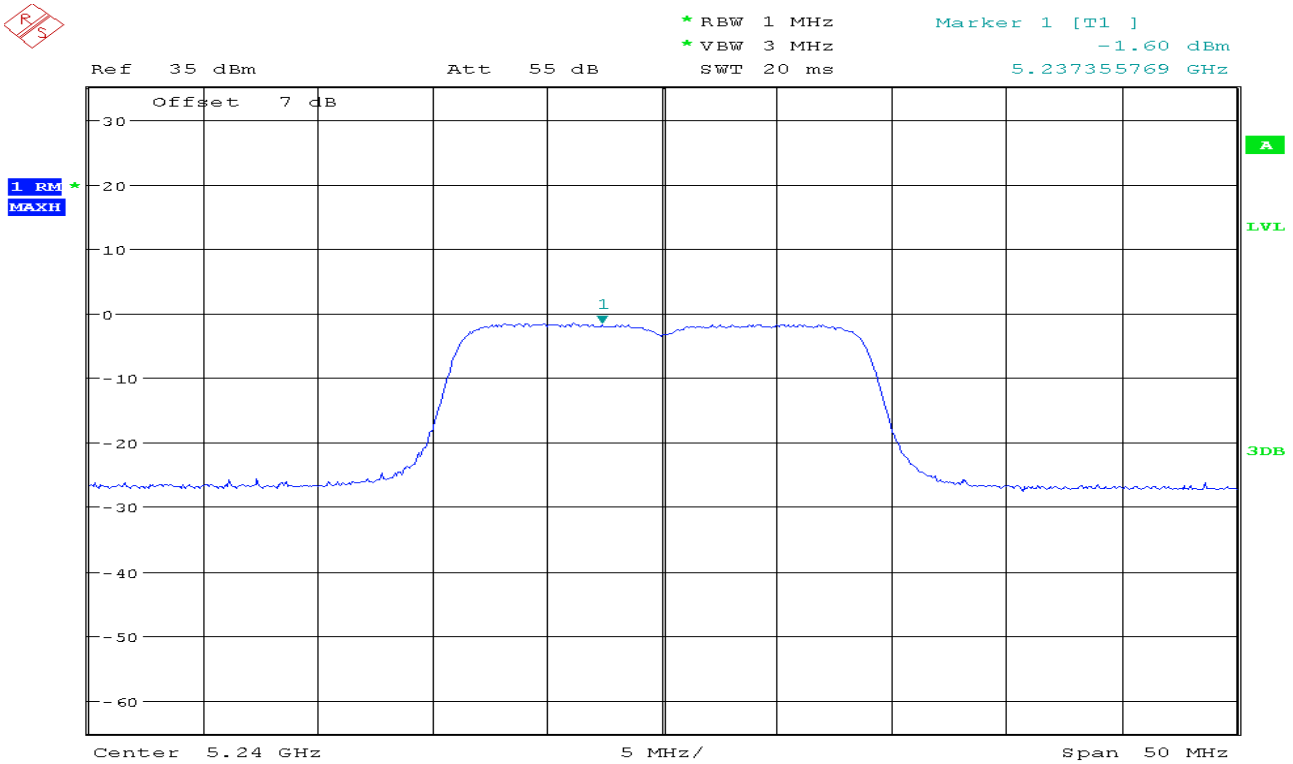
CH Mid



CH High



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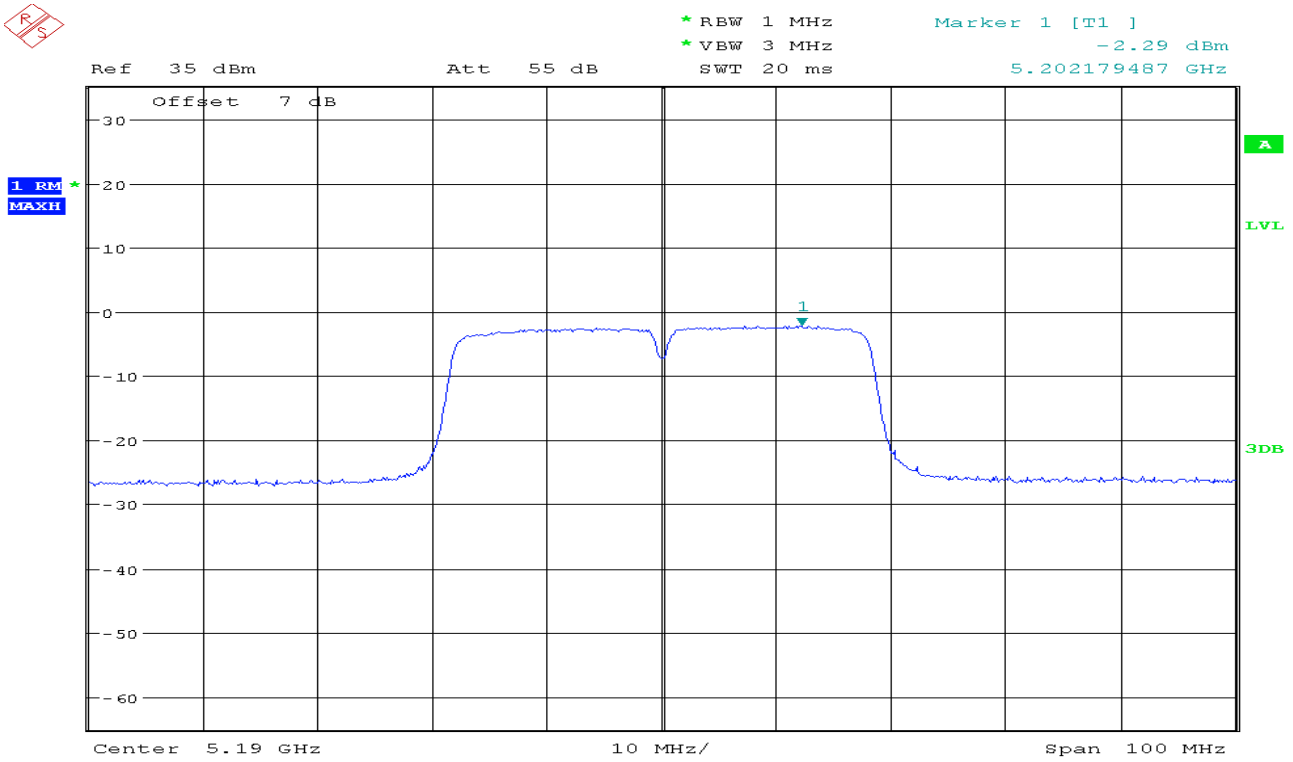
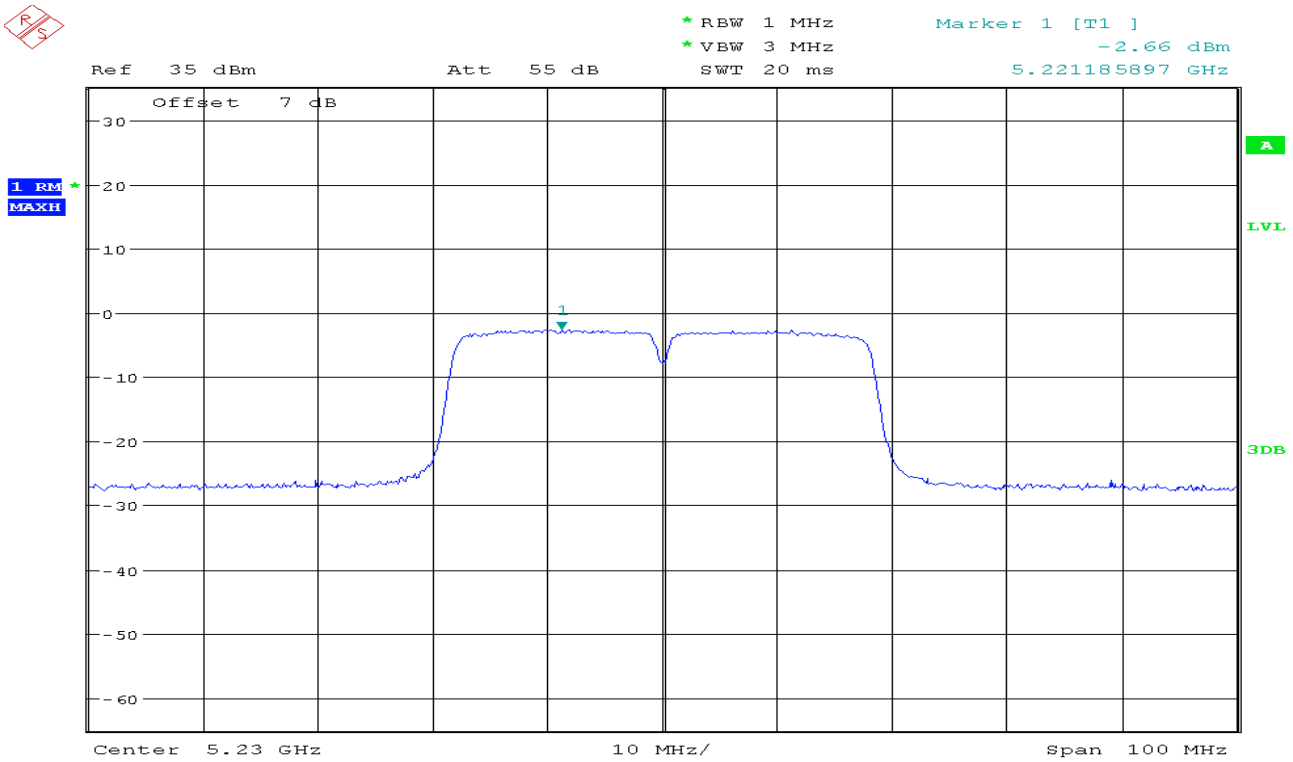
draft 802.11n Wide-40 MHz Channel mode / Chain 0

5150~5250MHz

CH Low



CH High



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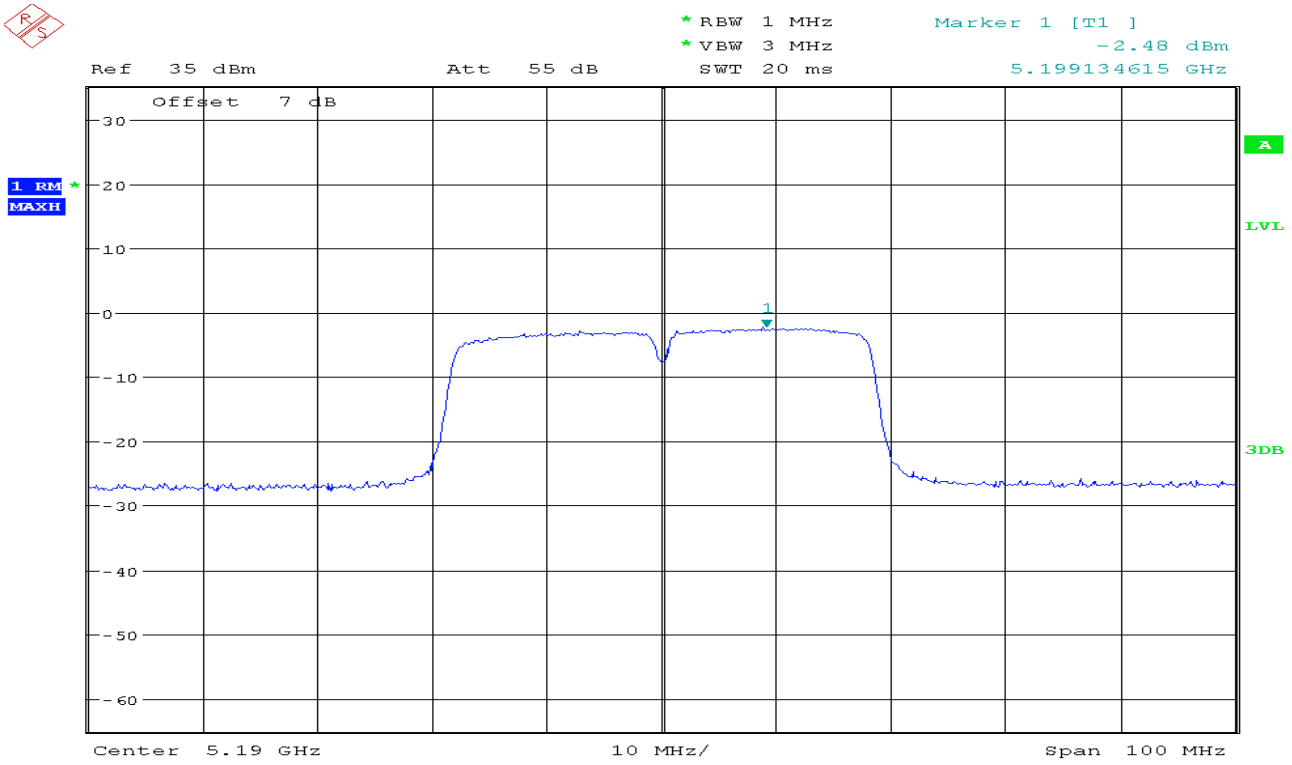
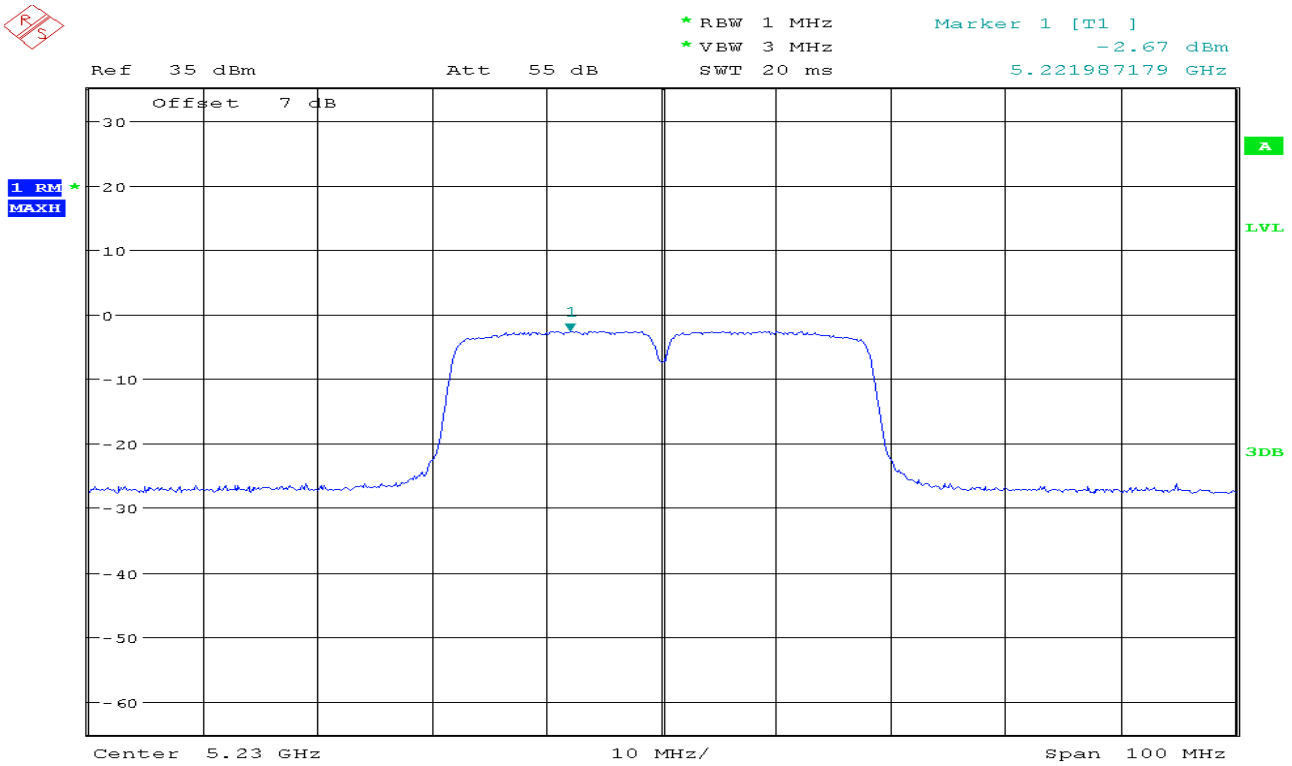
draft 802.11n Wide-40 MHz Channel mode / Chain 1

5150~5250MHz

CH Low



CH High



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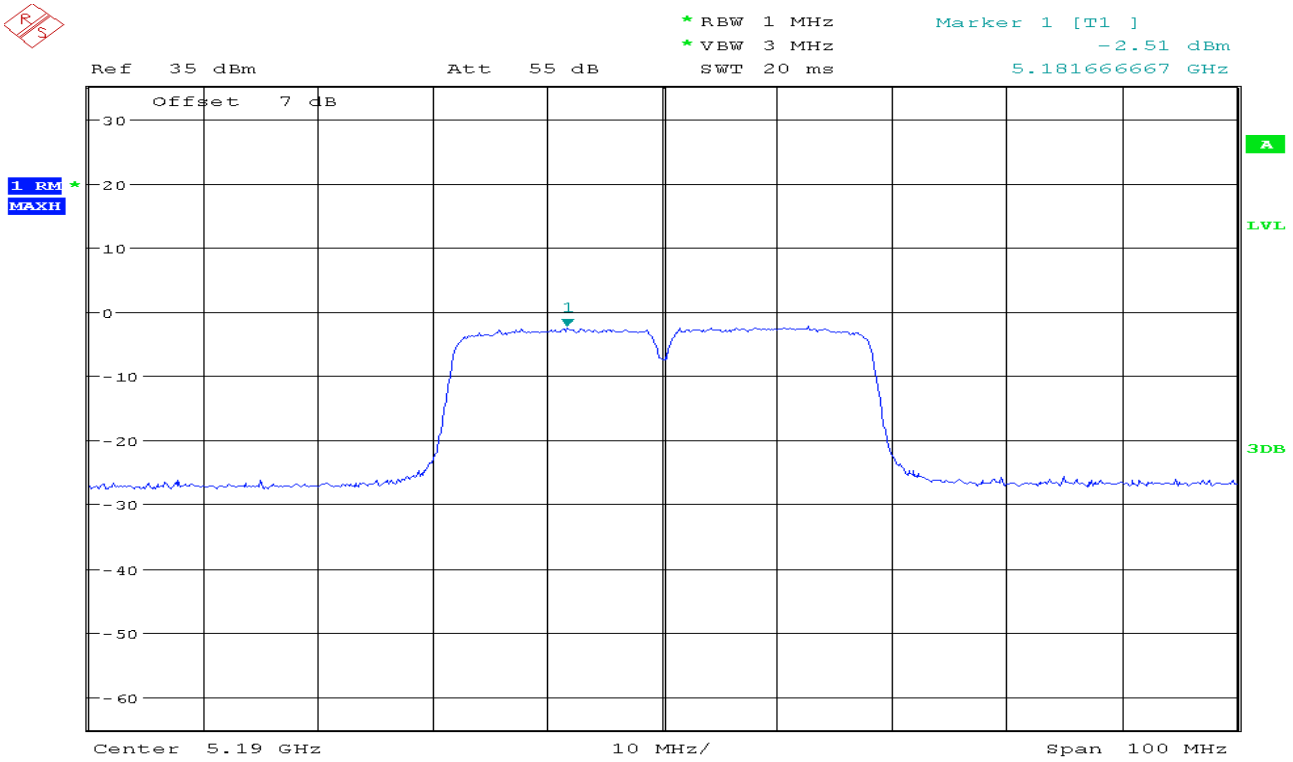
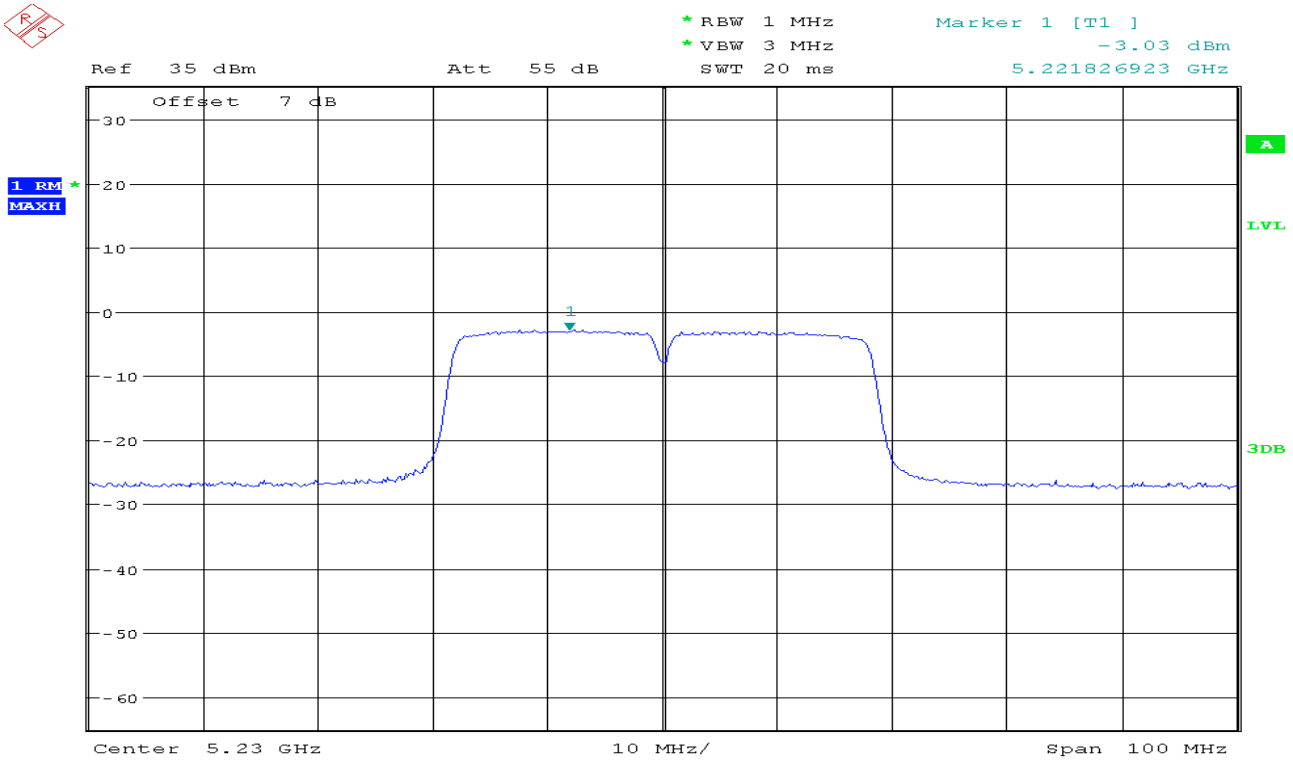
draft 802.11n Wide-40 MHz Channel mode / Chain 2

5150~5250MHz

CH Low



CH High



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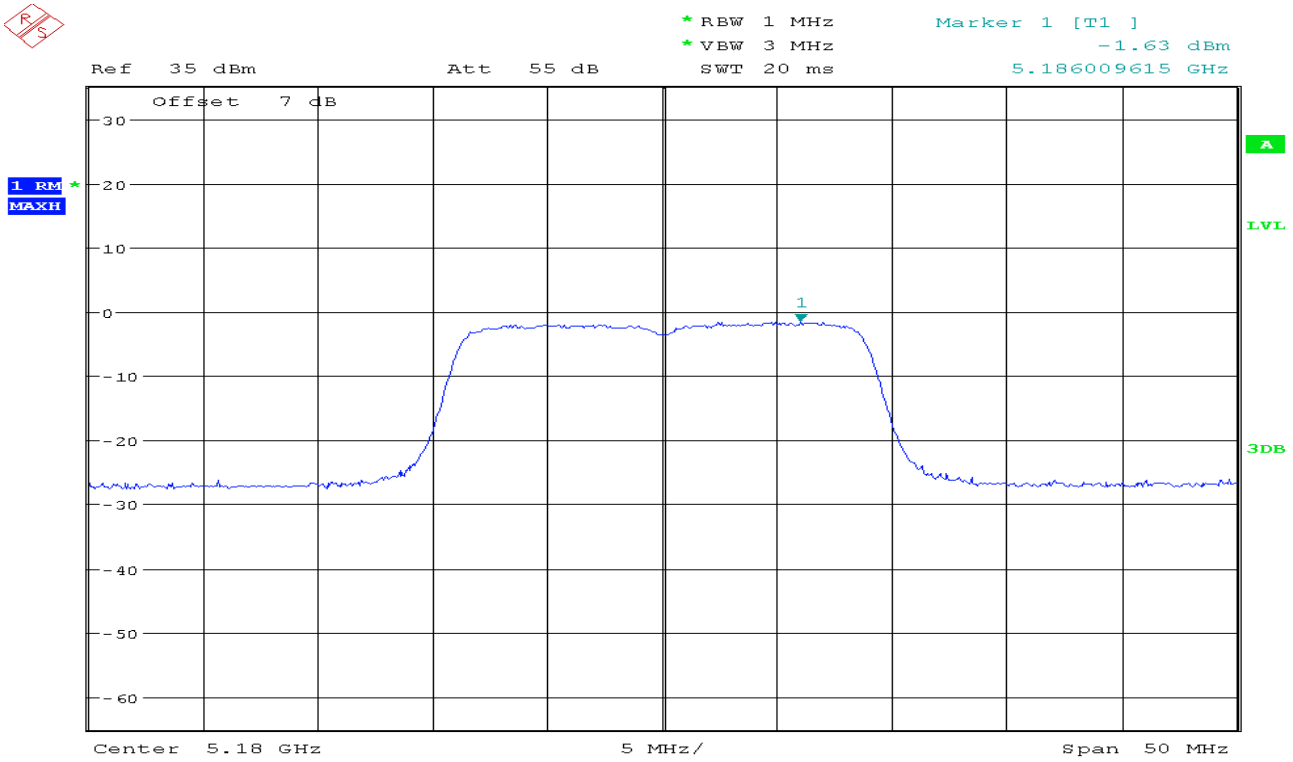
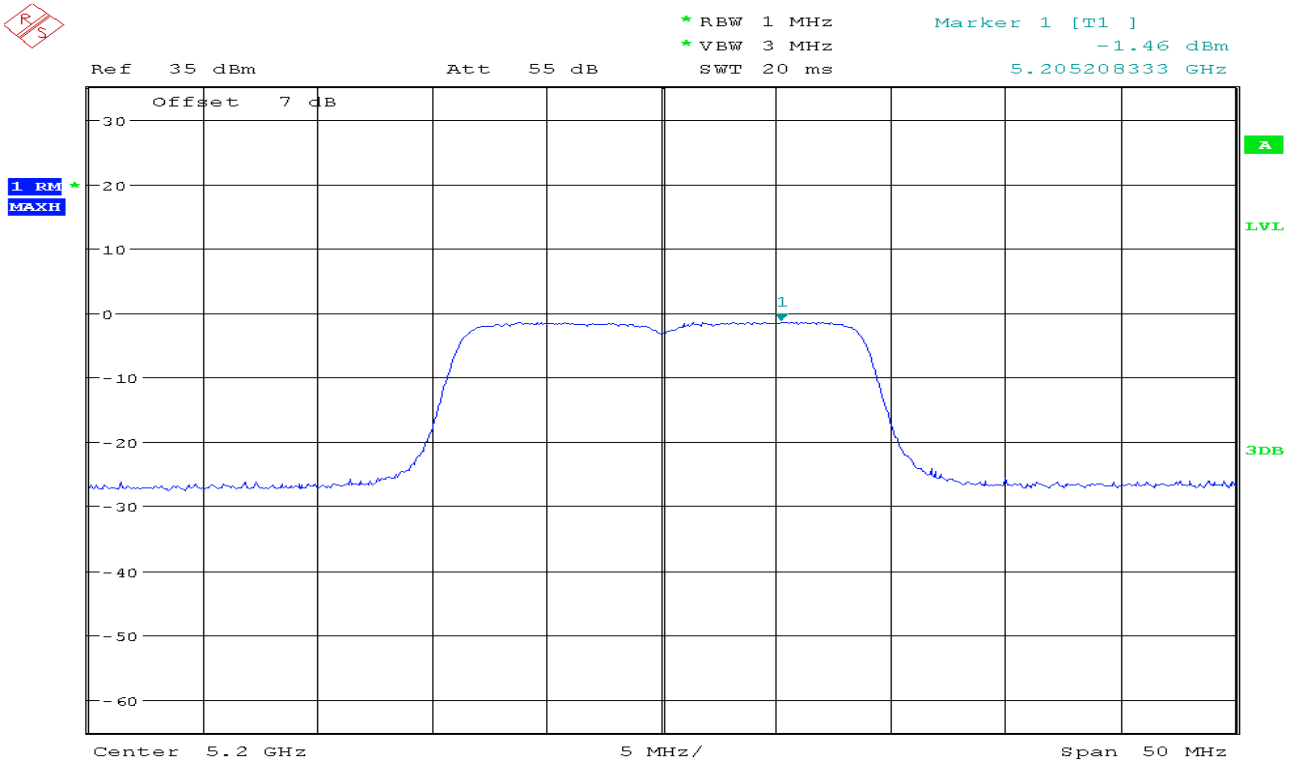
draft 802.11ac Standard-20 MHz Channel mode / Chain 0

5150~5250MHz

CH Low



CH Mid



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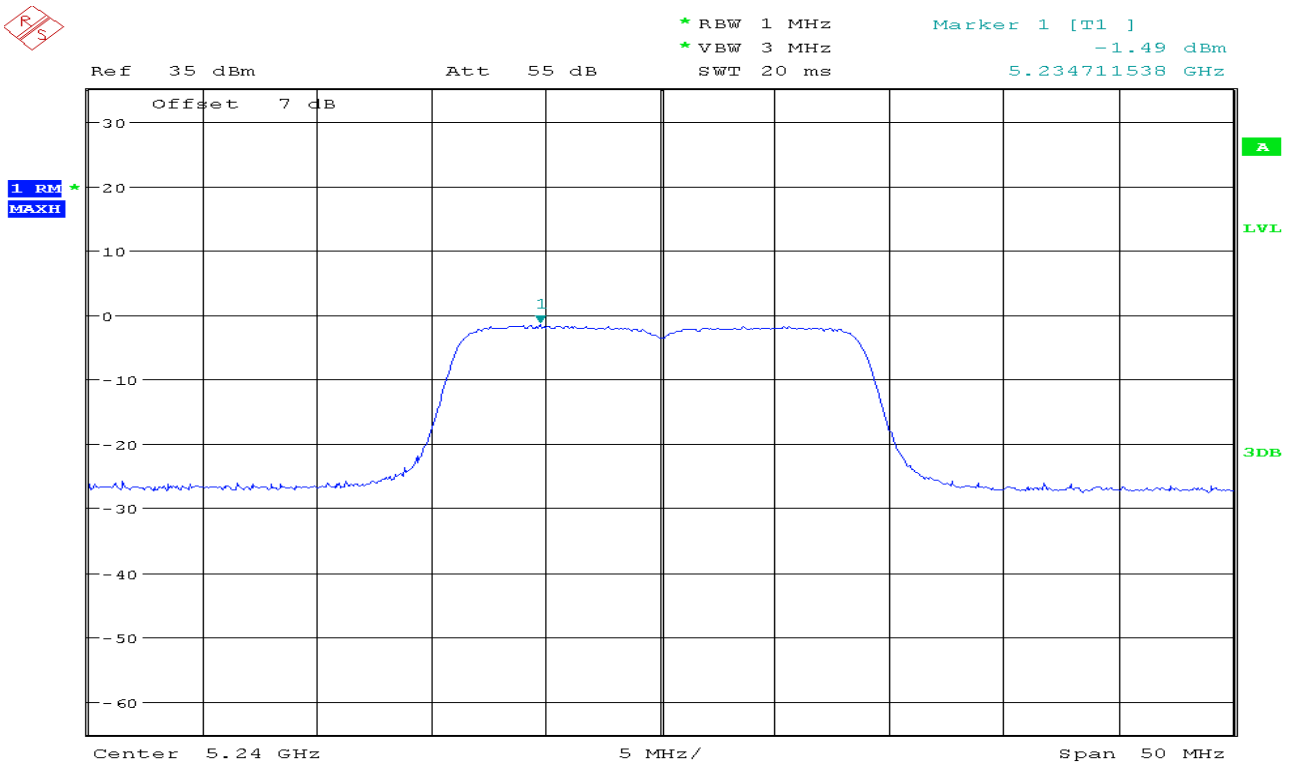
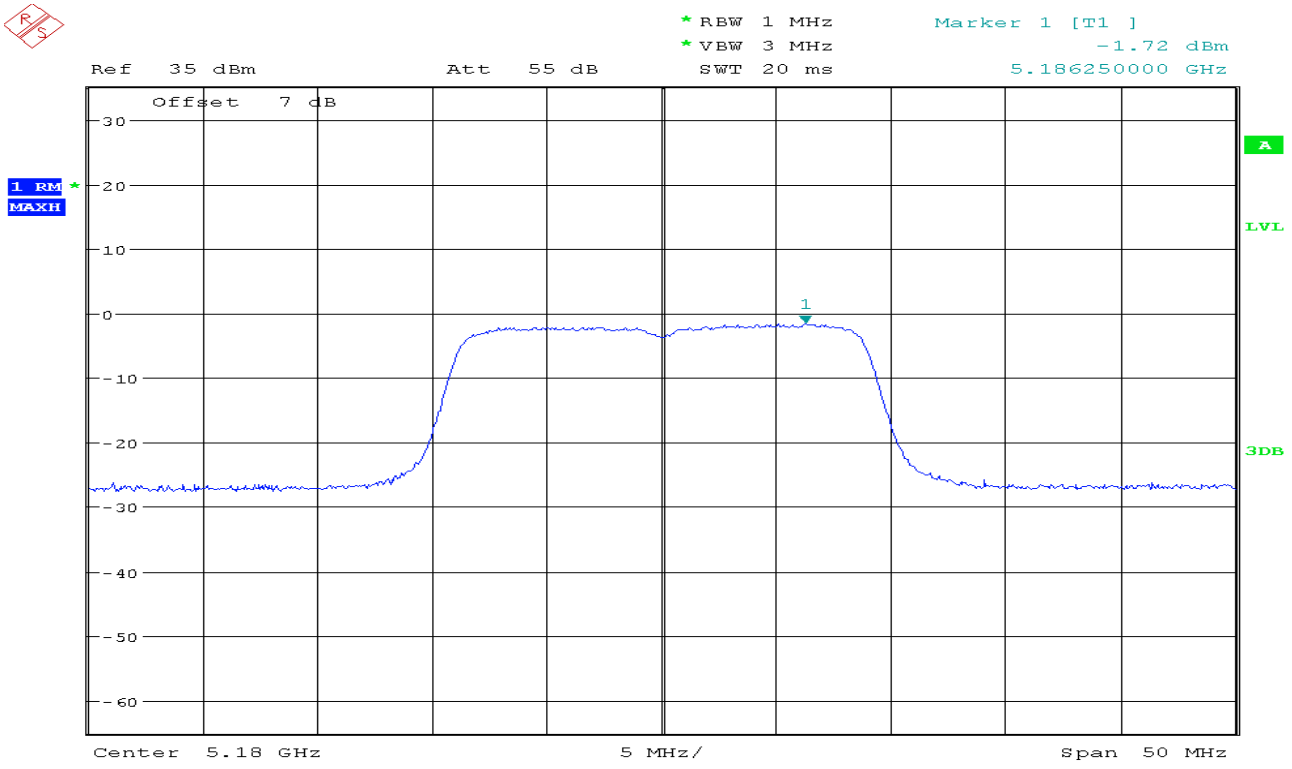
CH High



draft 802.11ac Standard-20 MHz Channel mode / Chain 1

5150~5250MHz

CH Low



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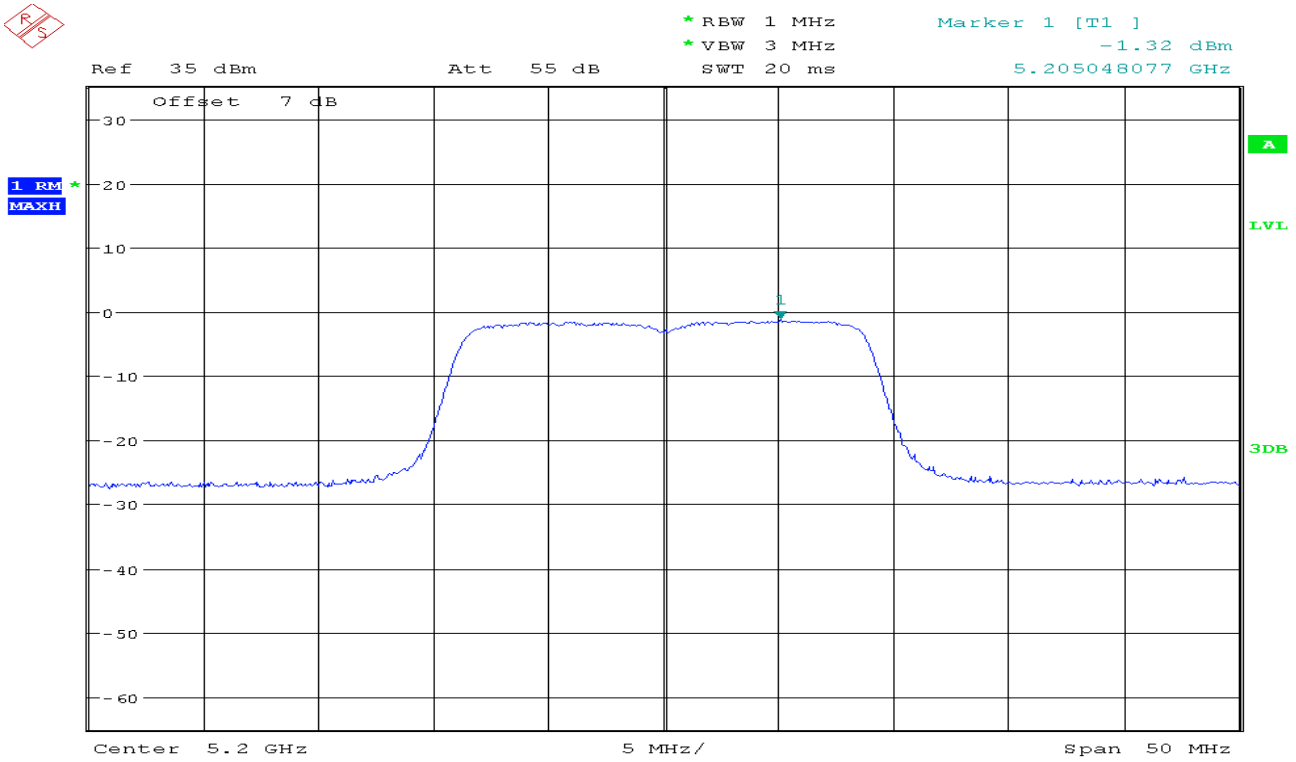
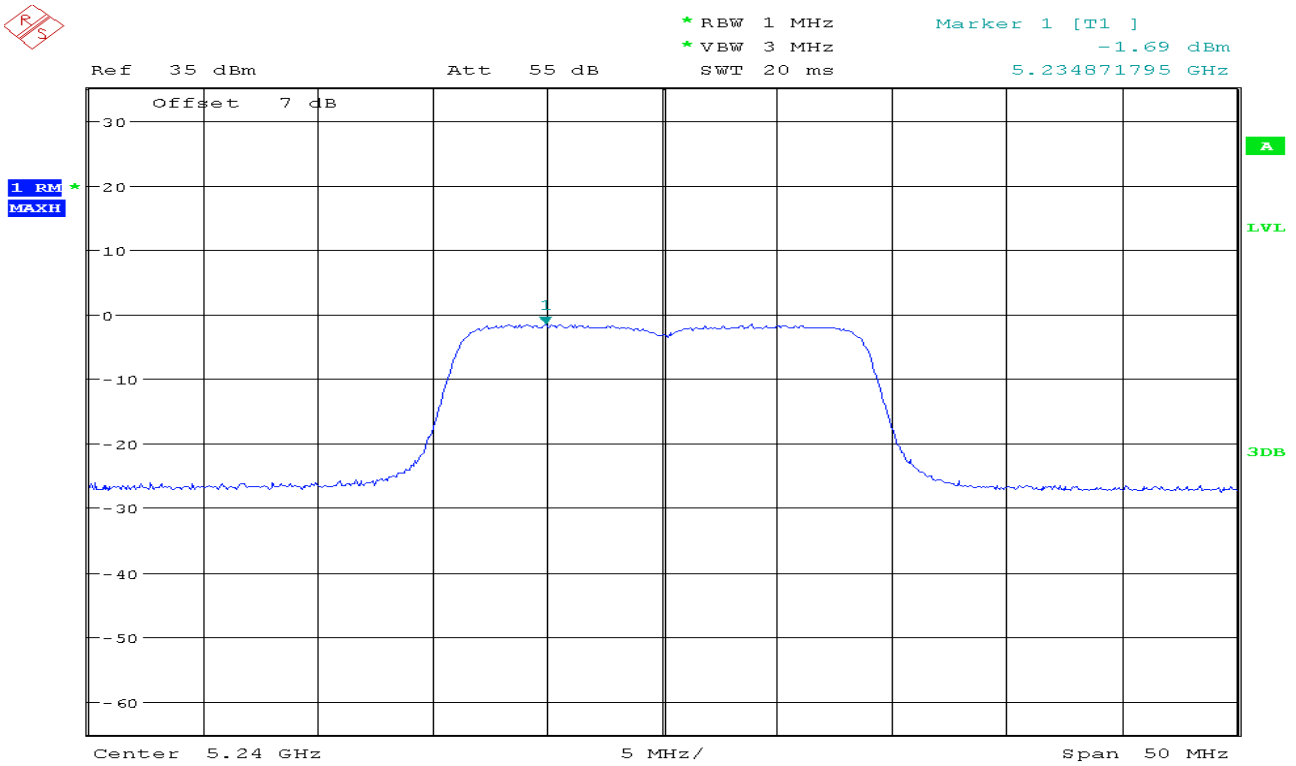
CH Mid



CH High



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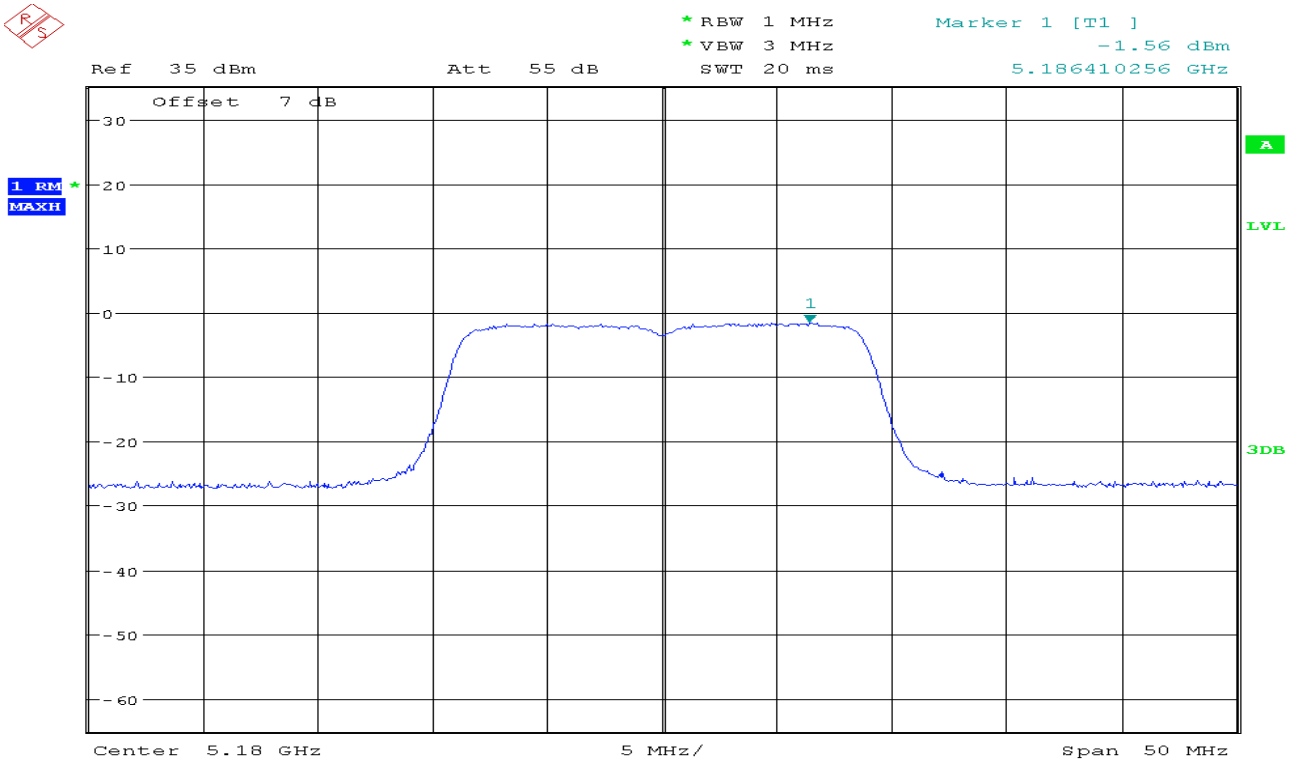
draft 802.11ac Standard-20 MHz Channel mode / Chain 2

5150~5250MHz

CH Low



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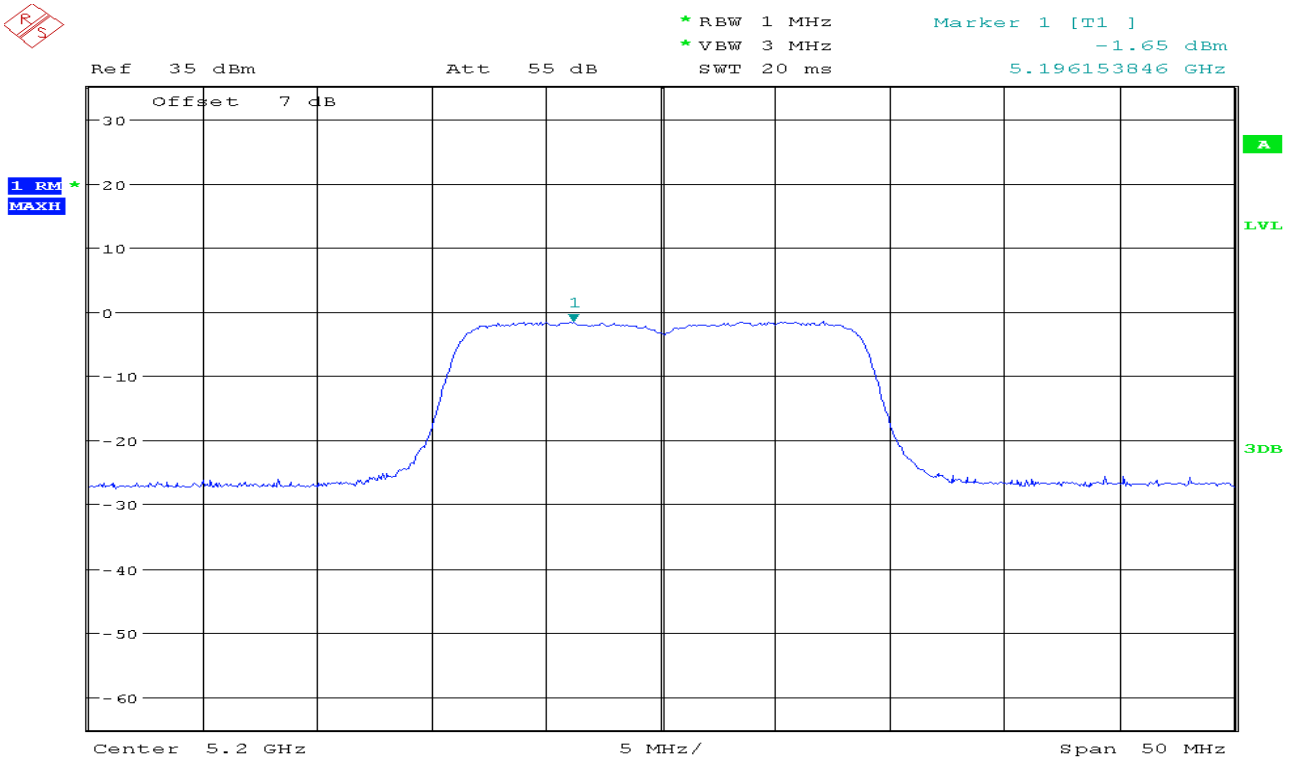

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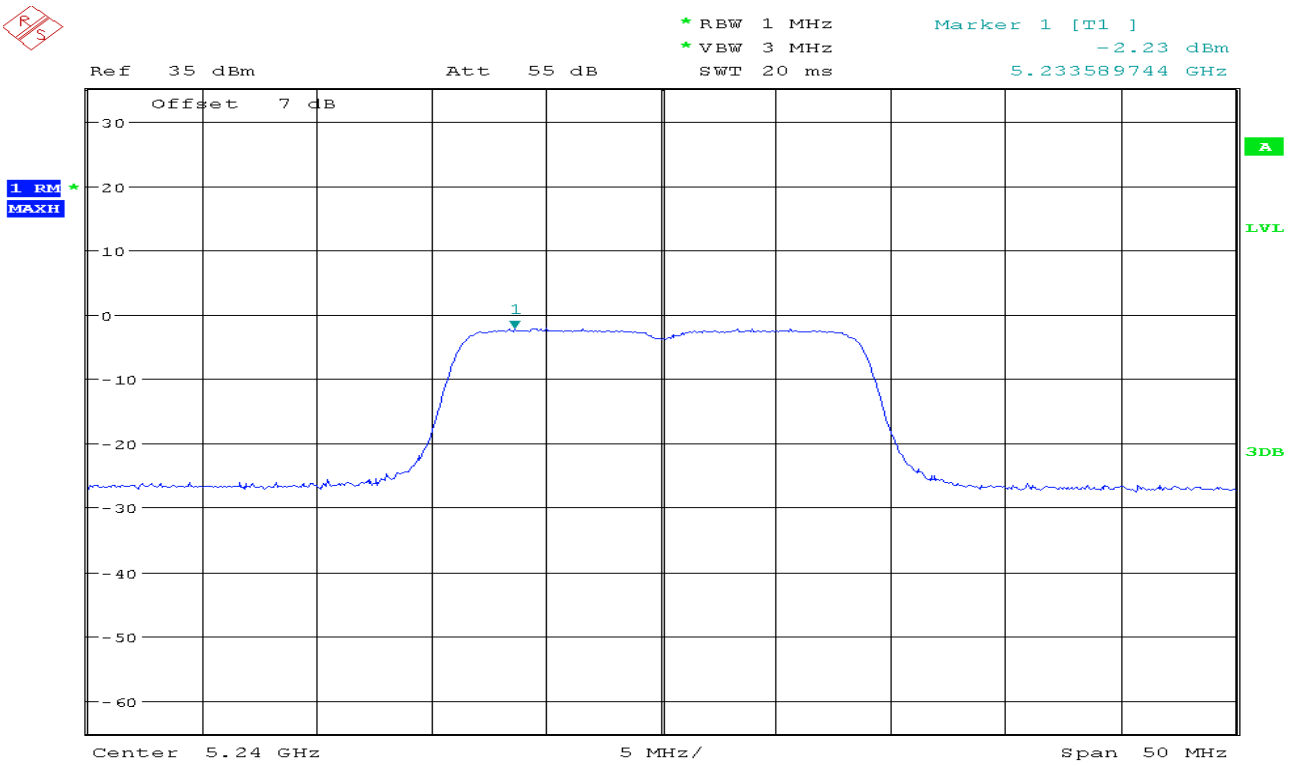
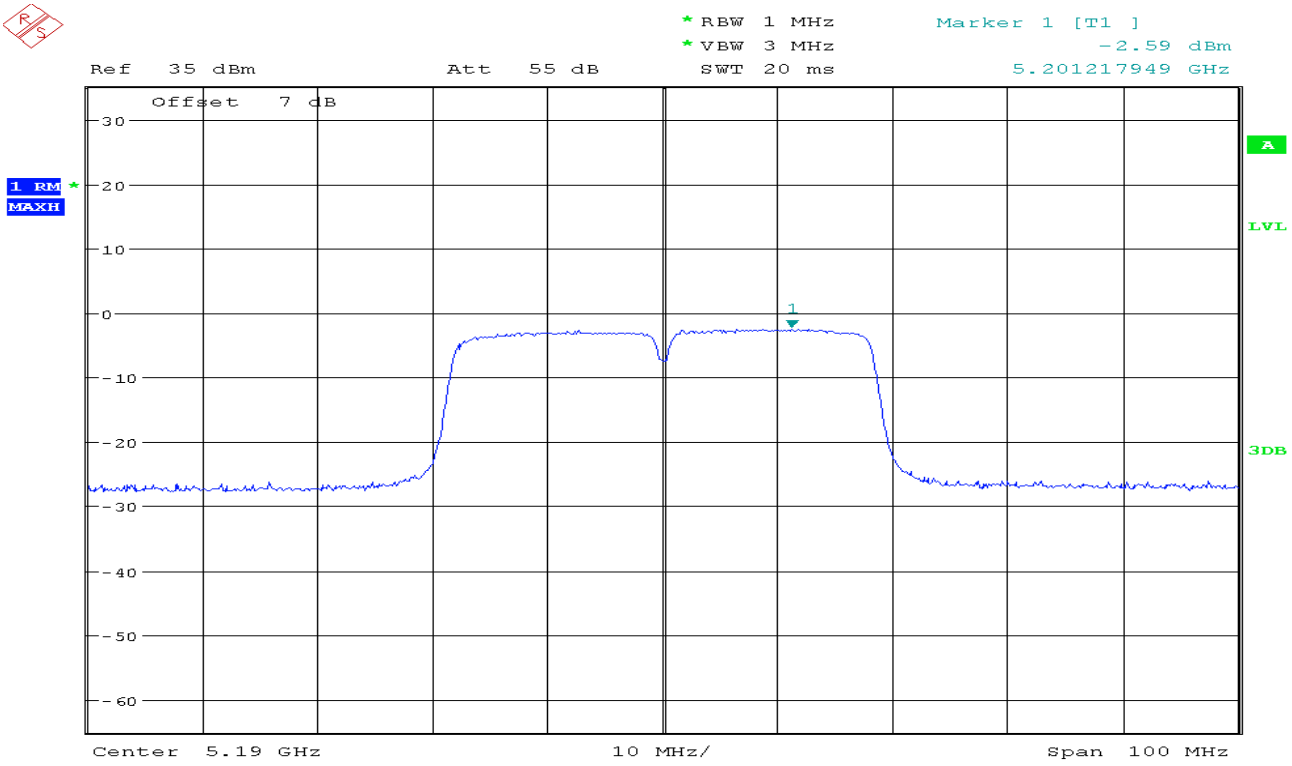
CH High



draft 802.11ac Wide-40 MHz Channel mode / Chain 0

5150~5250MHz

CH Low



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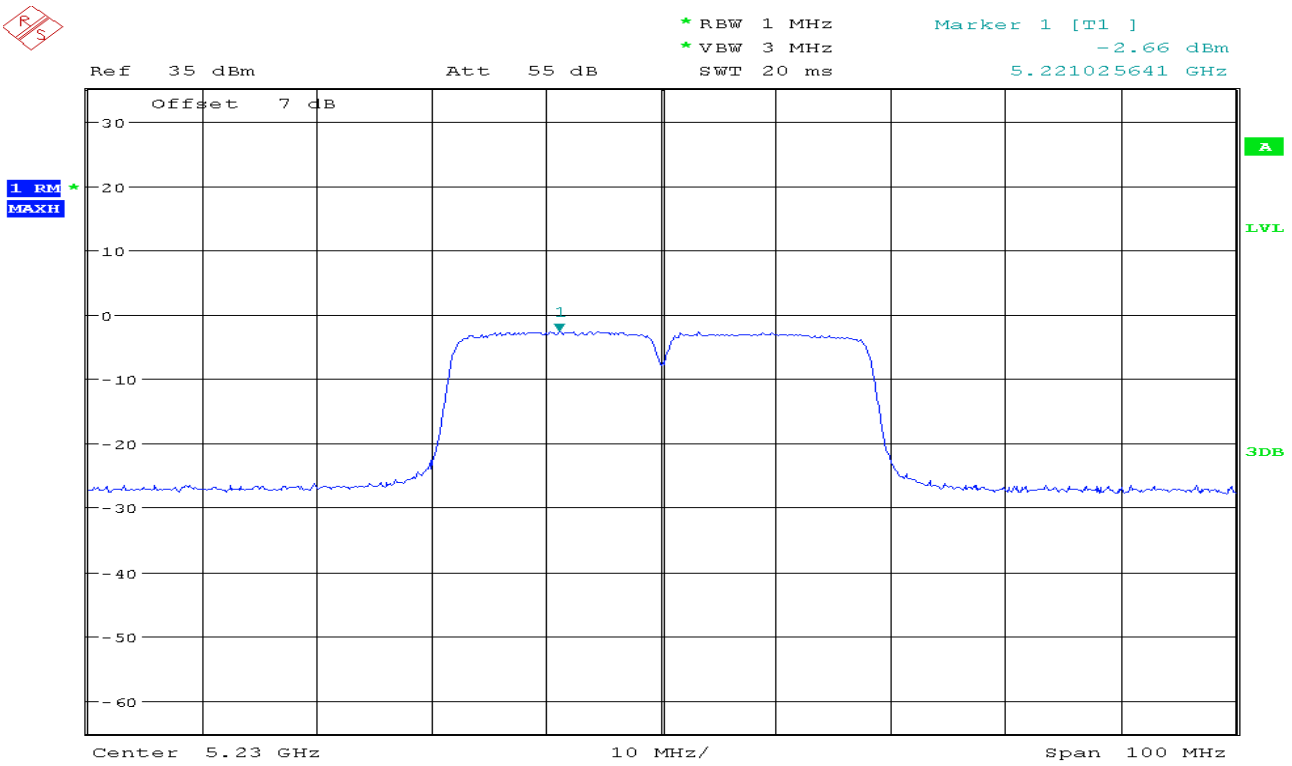
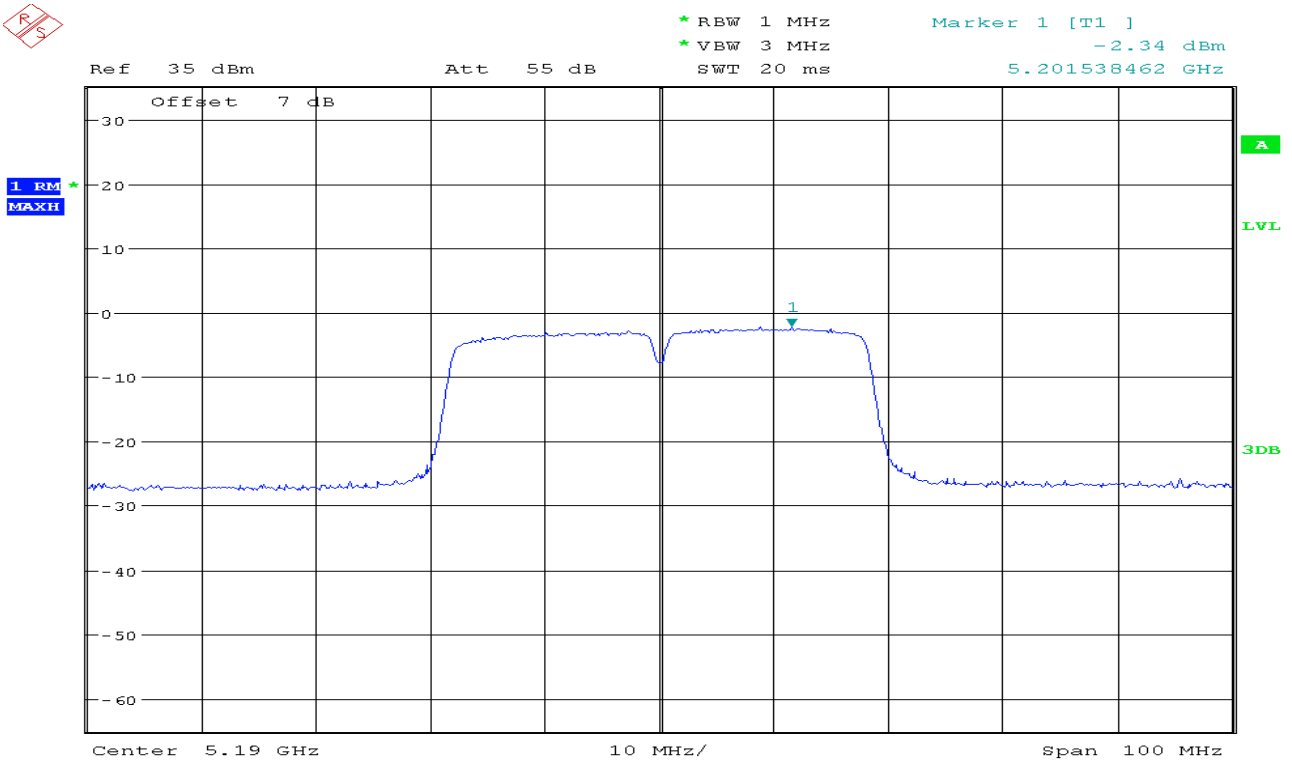
CH High



draft 802.11ac Wide-40 MHz Channel mode / Chain 1

5150~5250MHz

CH Low



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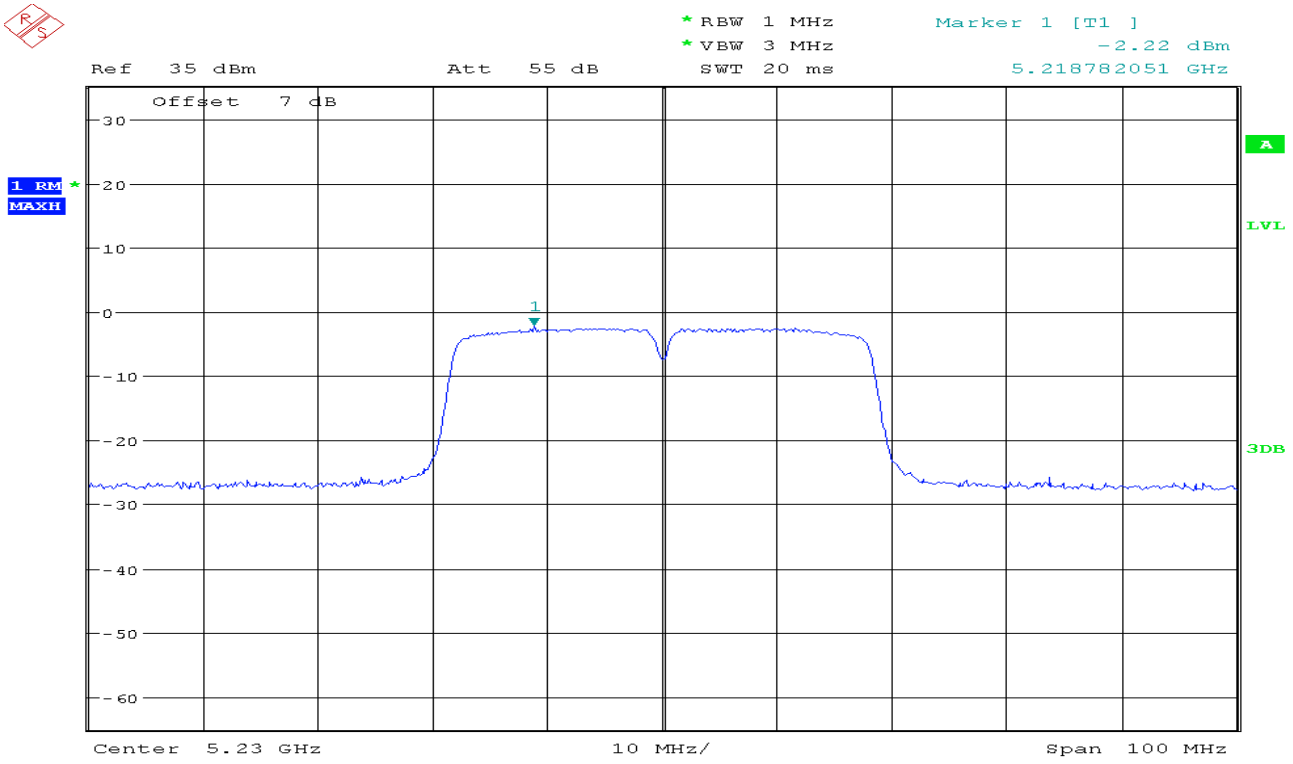
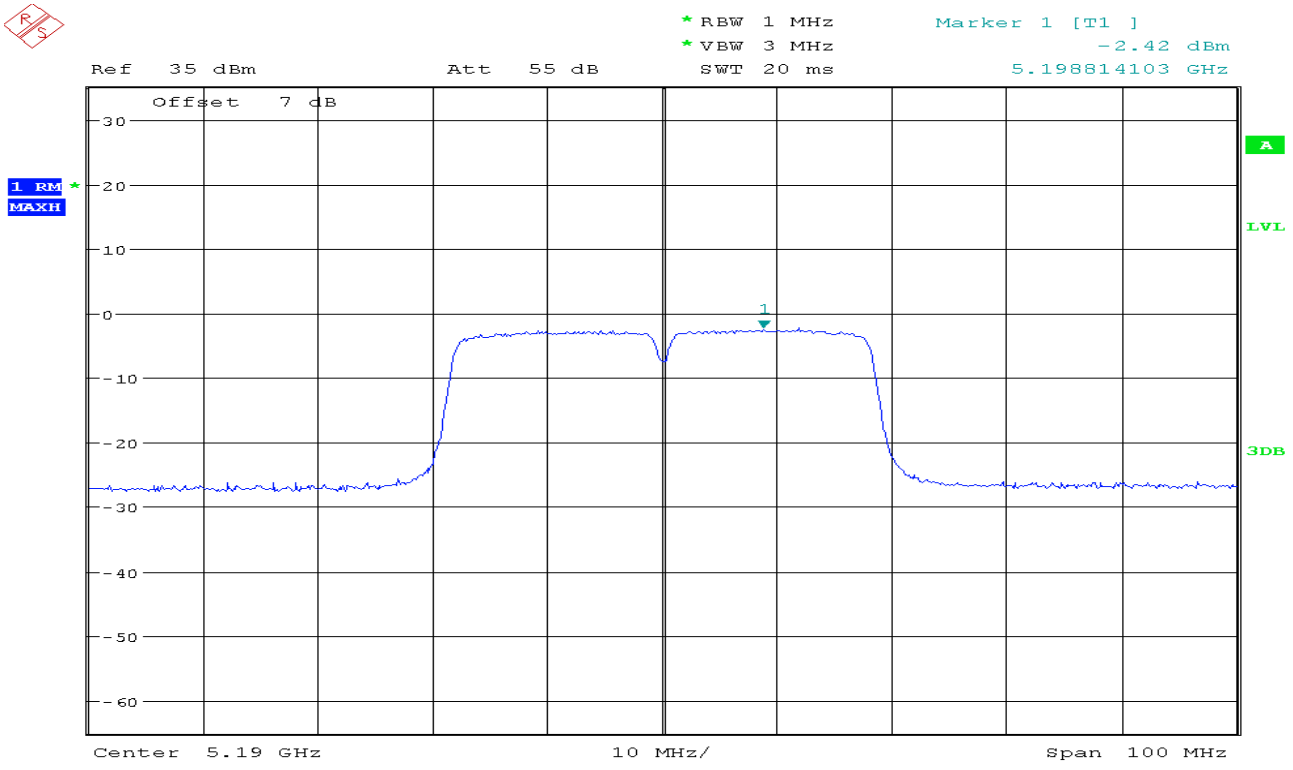
CH High



draft 802.11ac Wide-40 MHz Channel mode / Chain 2

5150~5250MHz

CH Low



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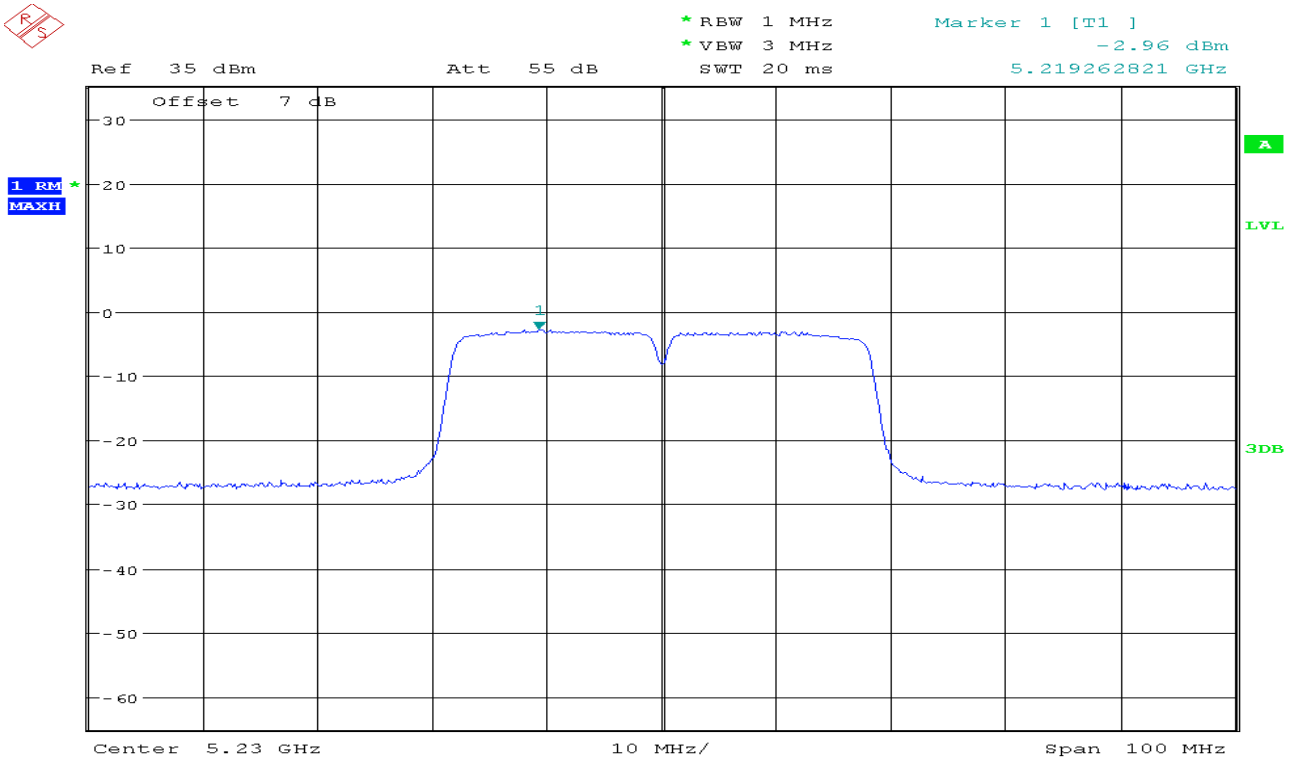
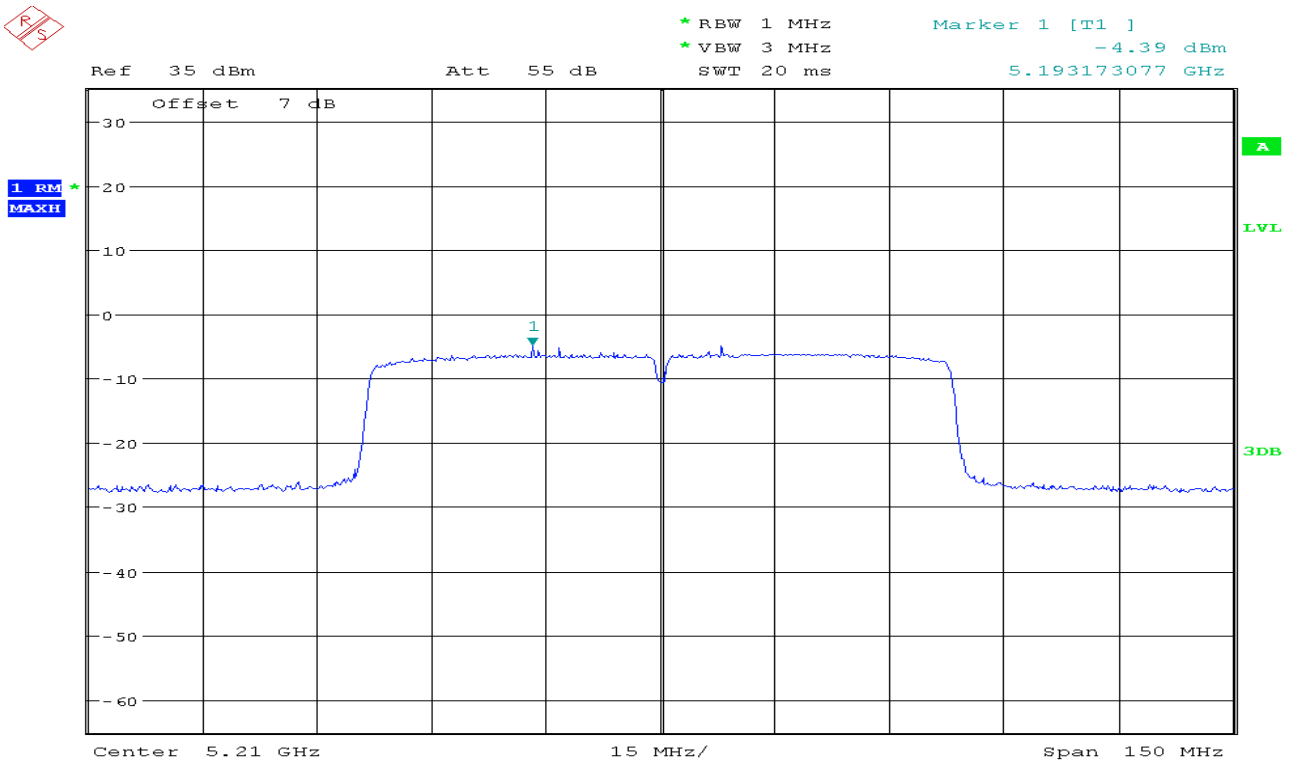
CH High



draft 802.11ac Wide-80 MHz Channel mode / Chain 0

5150~5250MHz



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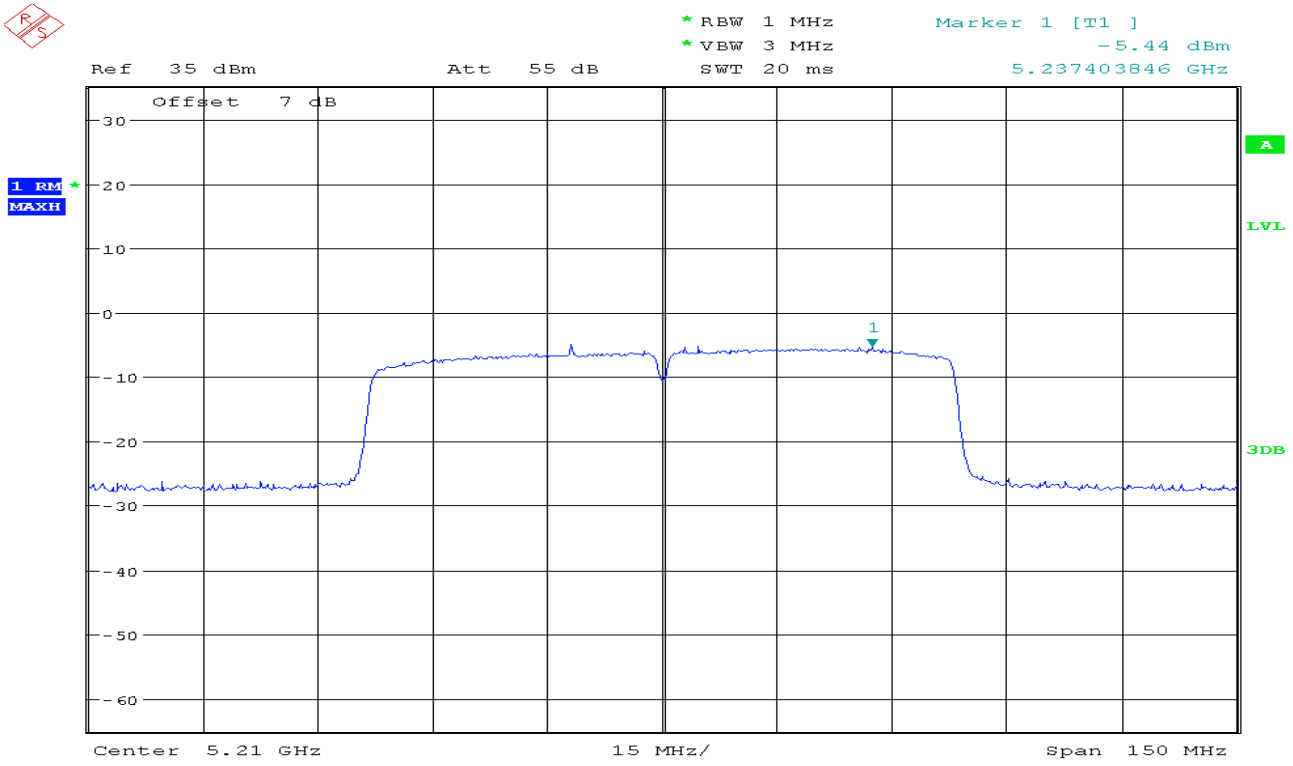
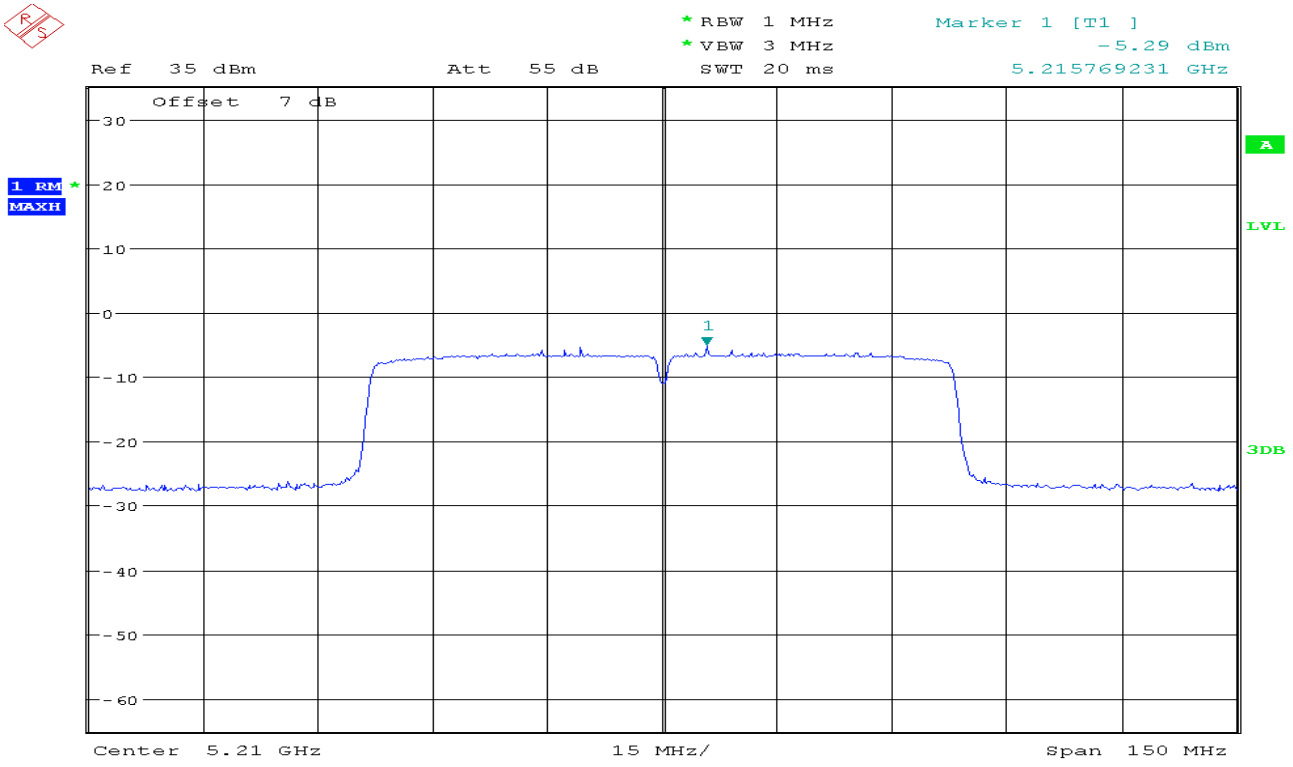
draft 802.11ac Wide-80 MHz Channel mode / Chain 1

5150~5250MHz



draft 802.11ac Wide-80 MHz Channel mode / Chain 2

5150~5250MHz



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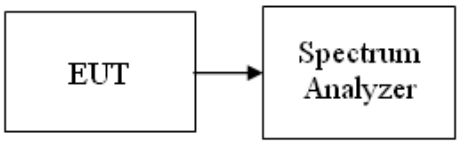
7.5 PEAK EXCURSION

LIMIT

According to §15.407(a)(6), the ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

Test Configuration



TEST PROCEDURE

The test is performed in accordance with <FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices> – Part 15, Subpart E, August 2002.

1 Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum.
3. Trace A peak detector, Set RBW =1MHz, VBW = 3MHz, Span >26dB bandwidth, Max. hold.
4. Delta Mark trace A Maximum frequency and trace B same frequency.
5. Repeat the above procedure until measurements for all frequencies were complete.

TEST RESULTS

No non-compliance noted

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Test Data

Test mode: IEEE 802.11a mode/chain 0

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Low	5180	7.10	13.00	PASS
Mid	5200	7.40	13.00	PASS
High	5240	7.89	13.00	PASS

Test mode: IEEE 802.11a mode/chain 1

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Low	5180	7.41	13.00	PASS
Mid	5200	7.62	13.00	PASS
High	5240	8.01	13.00	PASS

Test mode: IEEE 802.11a mode/chain 2

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Low	5180	8.15	13.00	PASS
Mid	5200	7.82	13.00	PASS
High	5240	7.24	13.00	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 0

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Low	5180	7.38	13.00	PASS
Mid	5200	7.60	13.00	PASS
High	5240	7.33	13.00	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 1

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Low	5180	7.54	13.00	PASS
Mid	5200	6.83	13.00	PASS
High	5240	6.65	13.00	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 2

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Low	5180	7.21	13.00	PASS
Mid	5200	6.94	13.00	PASS
High	5240	7.27	13.00	PASS

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Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Low	5190	7.63	13.00	PASS
High	5230	7.46	13.00	PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 1

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Low	5190	7.58	13.00	PASS
High	5230	6.99	13.00	PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 2

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Low	5190	7.50	13.00	PASS
High	5230	8.07	13.00	PASS

Test mode: draft 802.11ac Standard-20 MHz Channel mode / Chain 0

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Low	5180	7.45	13.00	PASS
Mid	5200	7.85	13.00	PASS
High	5240	7.33	13.00	PASS

Test mode: draft 802.11ac Standard-20 MHz Channel mode / Chain 1

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Low	5180	7.19	13.00	PASS
Mid	5200	7.39	13.00	PASS
High	5240	7.44	13.00	PASS

Test mode: draft 802.11ac Standard-20 MHz Channel mode / Chain 2

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Low	5180	7.07	13.00	PASS
Mid	5200	7.46	13.00	PASS
High	5240	7.07	13.00	PASS

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Test mode: draft 802.11ac Wide-40 MHz Channel mode / Chain 0

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Low	5190	7.95	13.00	PASS
High	5230	7.45	13.00	PASS

Test mode: draft 802.11ac Wide-40 MHz Channel mode / Chain 1

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Low	5190	7.43	13.00	PASS
High	5230	7.48	13.00	PASS

Test mode: draft 802.11ac Wide-40 MHz Channel mode / Chain 2

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Low	5190	7.21	13.00	PASS
High	5230	7.16	13.00	PASS

Test mode: draft 802.11ac Wide-80 MHz Channel mode / Chain 0

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Mid	5210	6.50	13.00	PASS

Test mode: draft 802.11ac Wide-80 MHz Channel mode / Chain 1

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Mid	5210	6.23	13.00	PASS

Test mode: draft 802.11ac Wide-80 MHz Channel mode / Chain 2

5150~5250MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Result
Mid	5210	5.92	13.00	PASS

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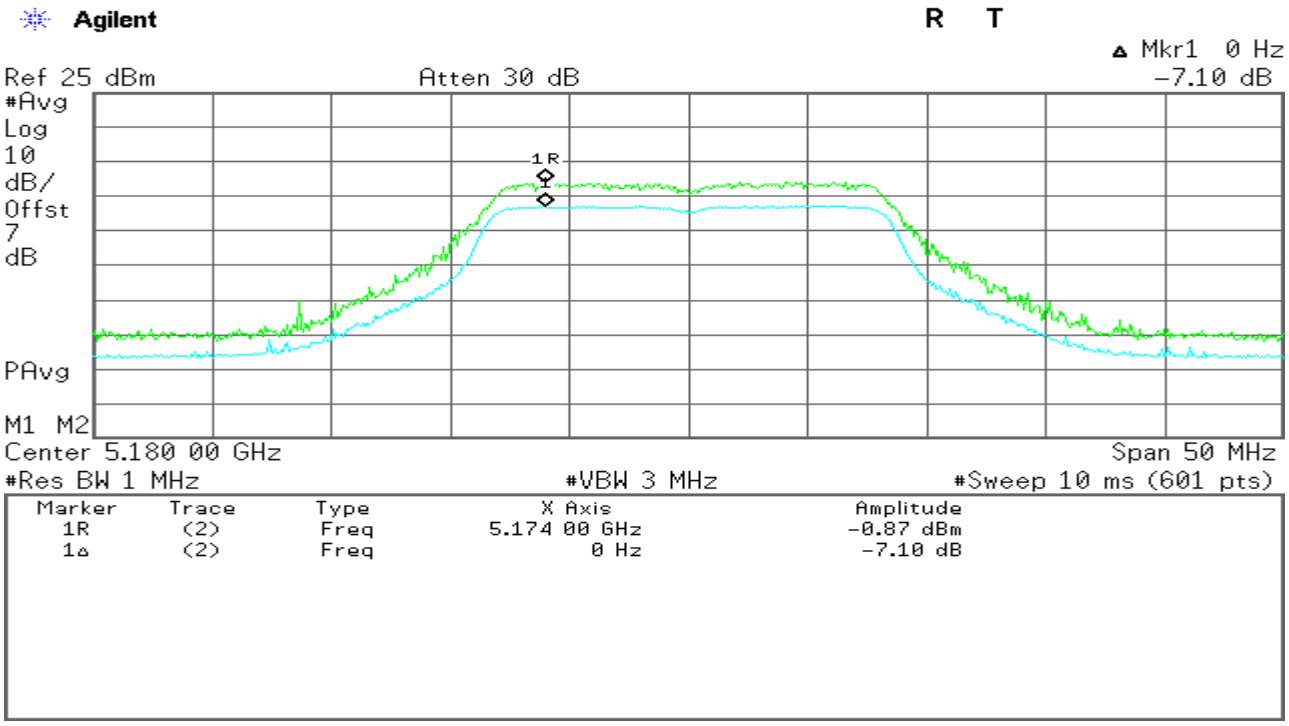
Test Plots

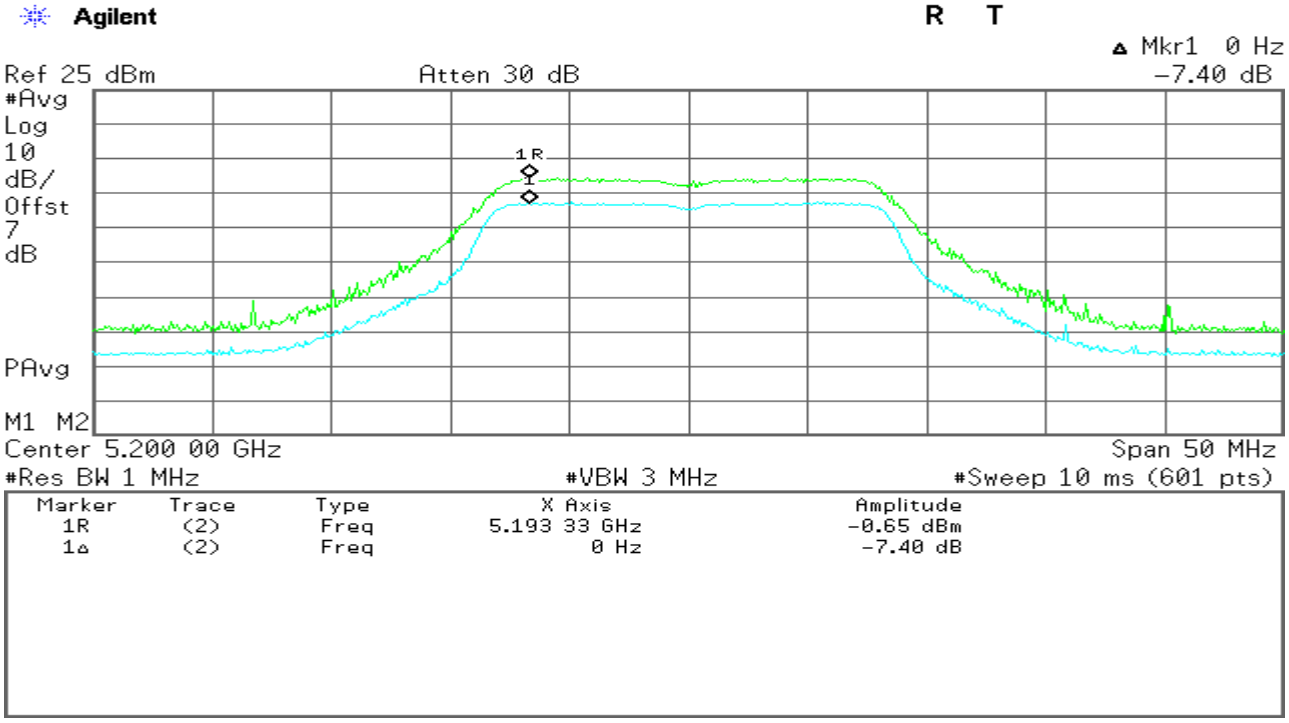
IEEE 802.11a mode/chain 0

5150-5250MHz

CH Low



CH Mid



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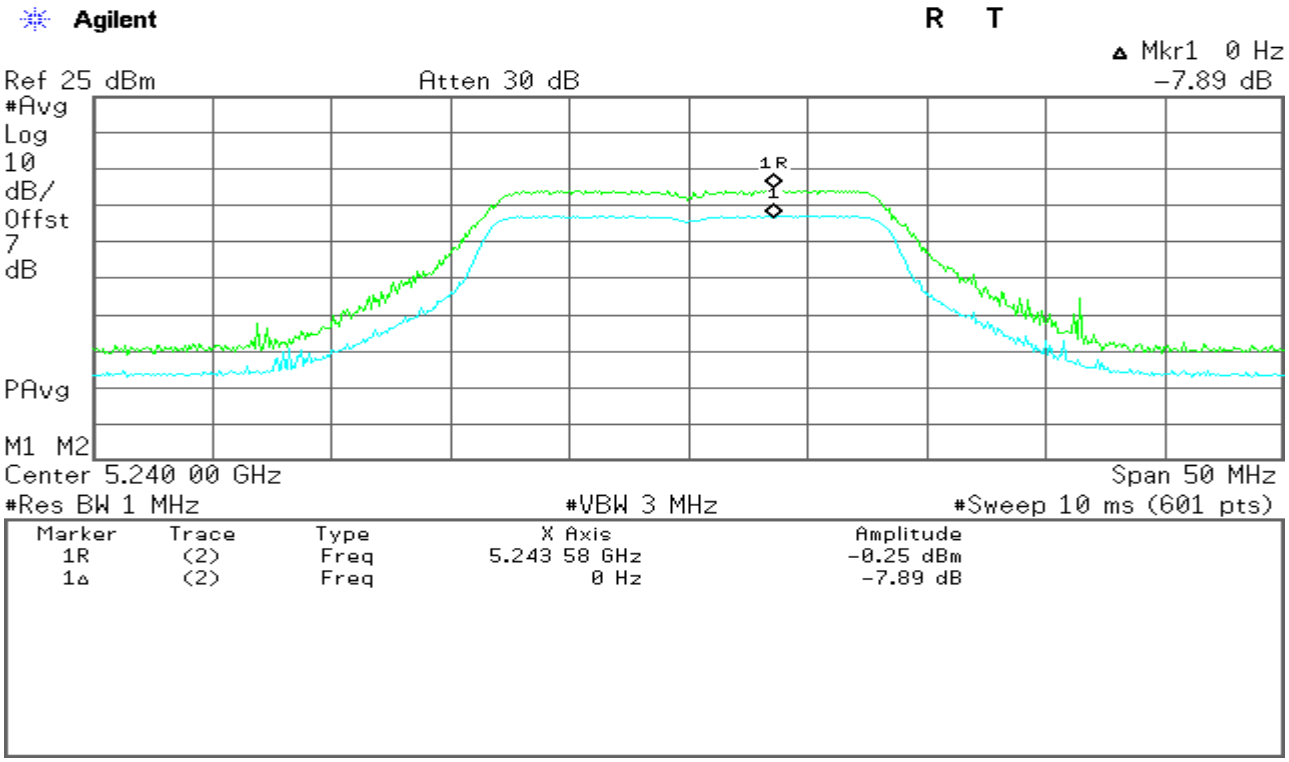
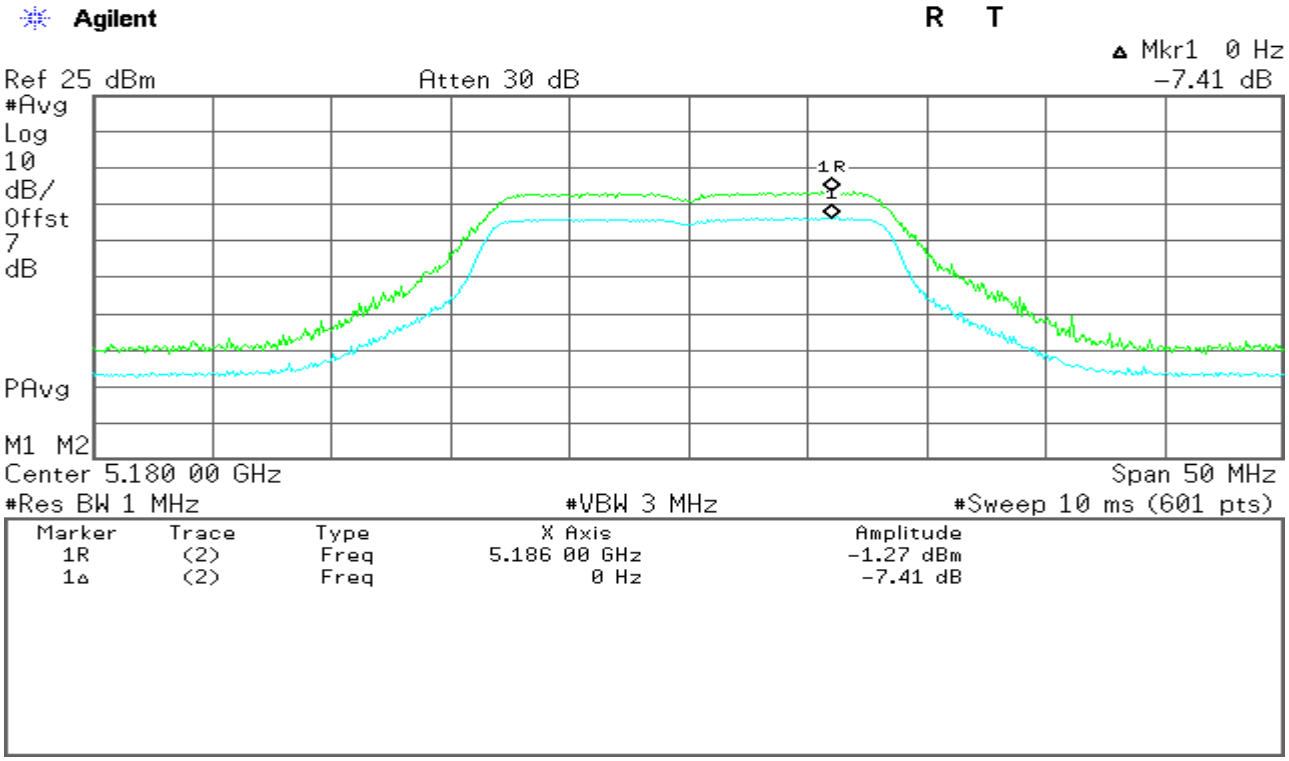
CH High



IEEE 802.11a mode/chain 1

5150-5250MHz

CH Low



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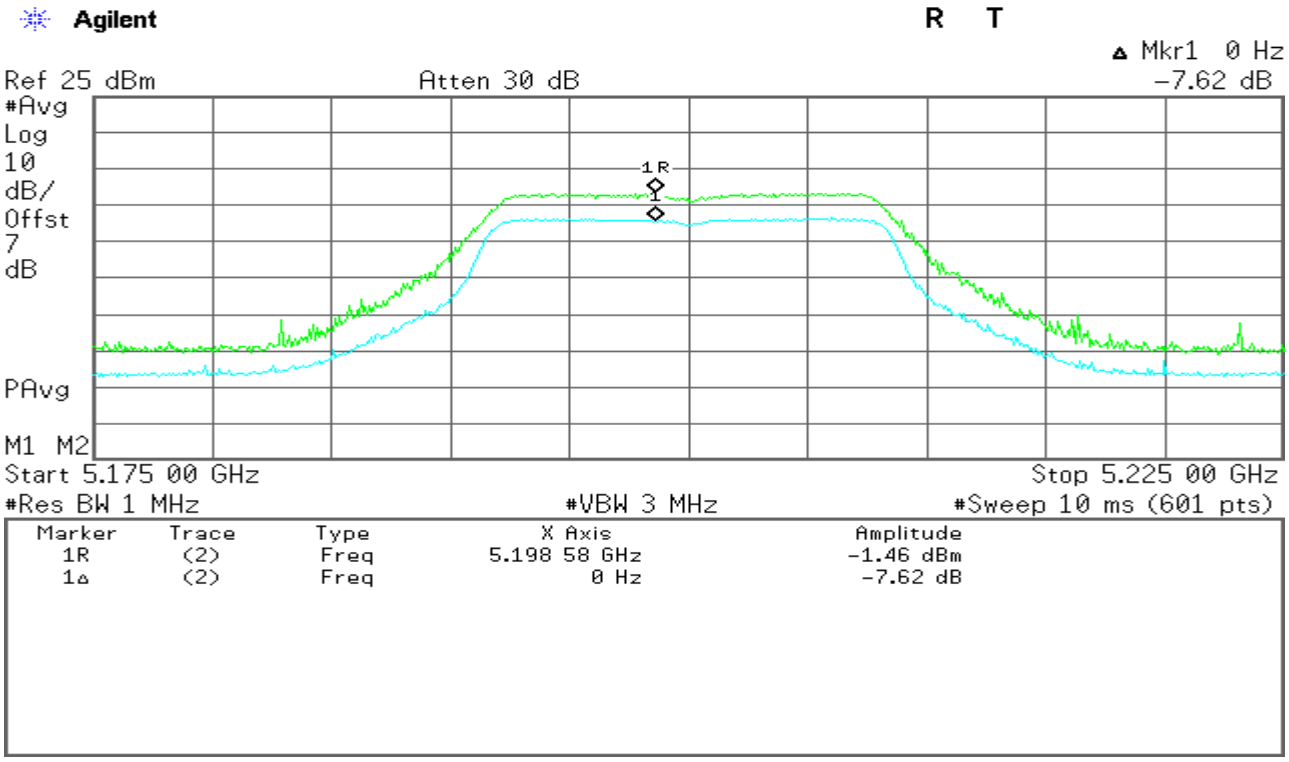
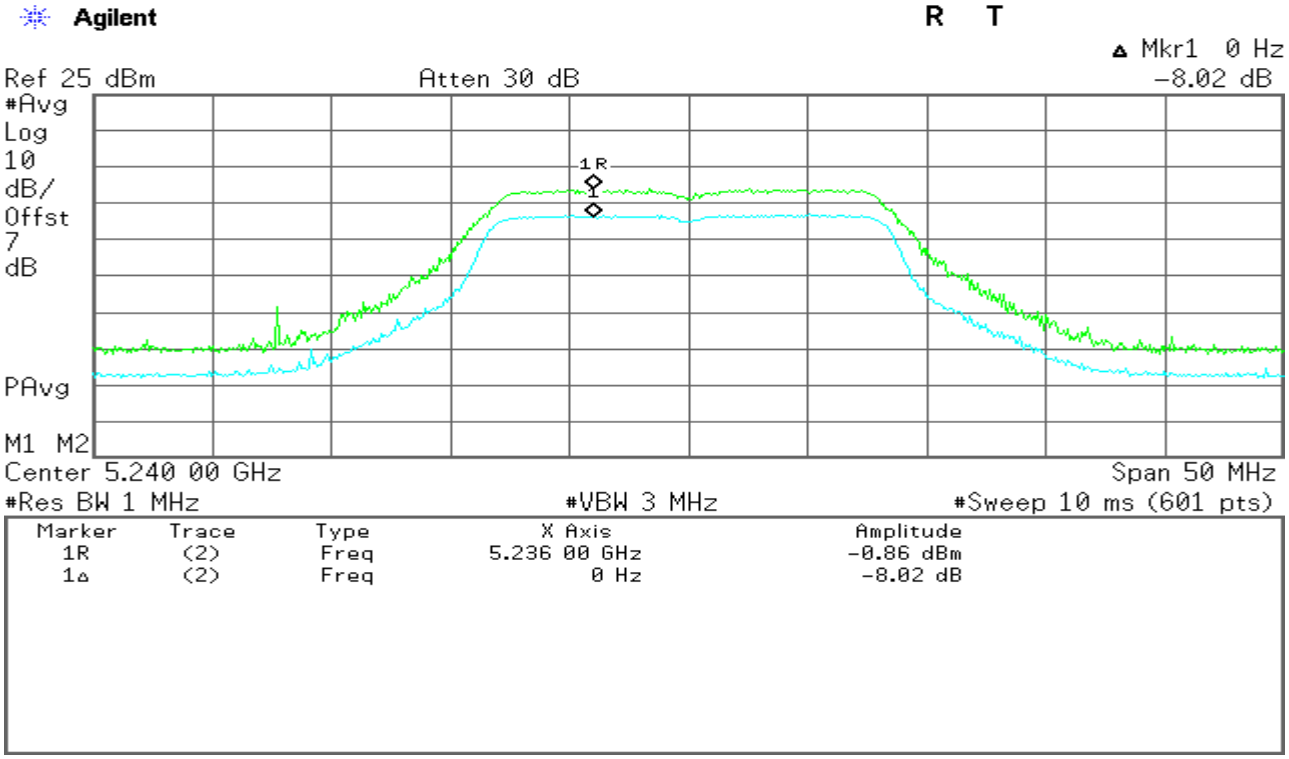
CH Mid



CH High



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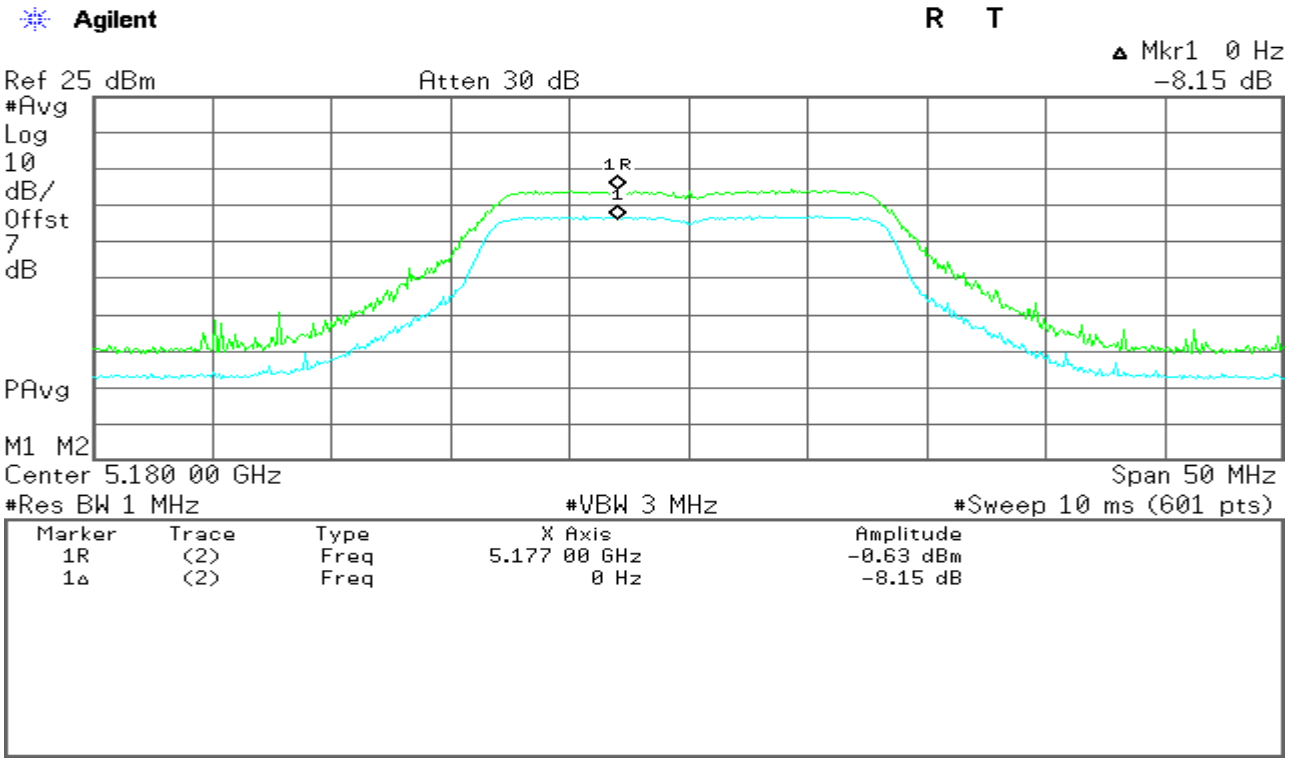
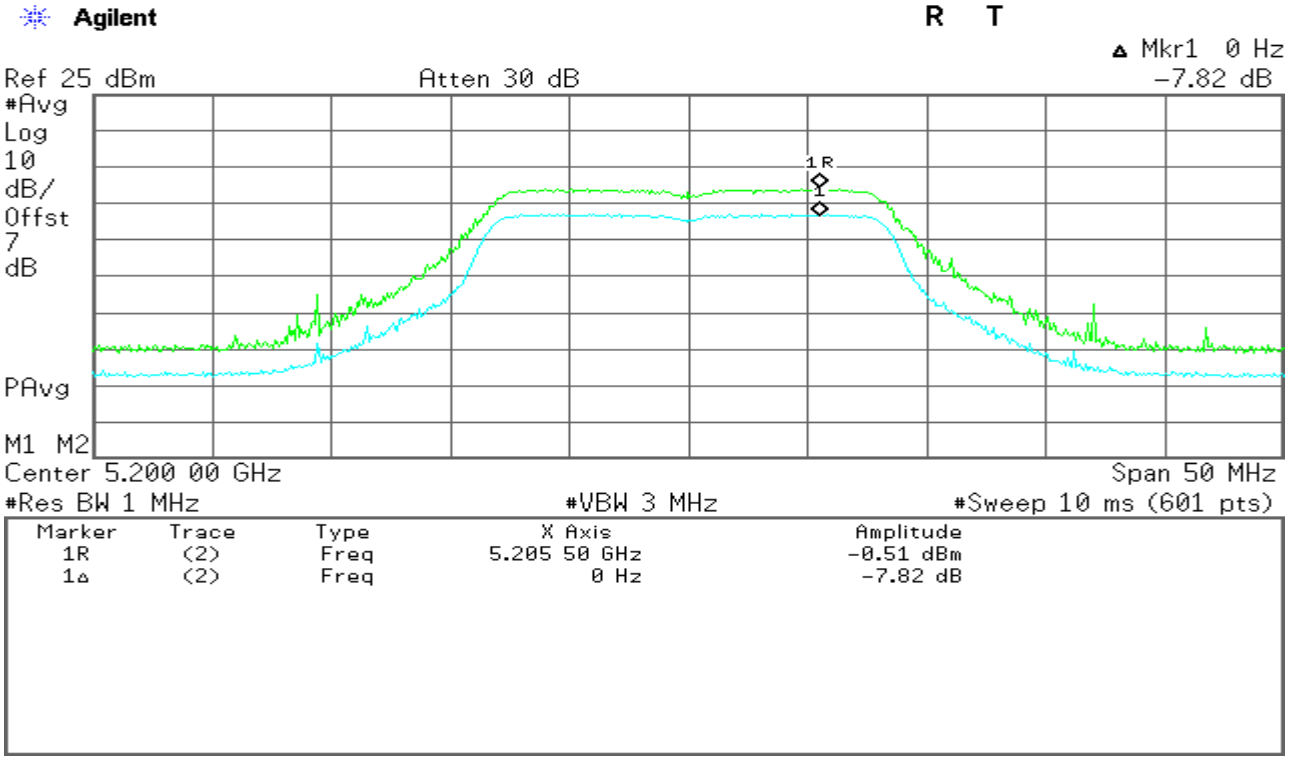
IEEE 802.11a mode/chain 2

5150-5250MHz

CH Low



CH Mid



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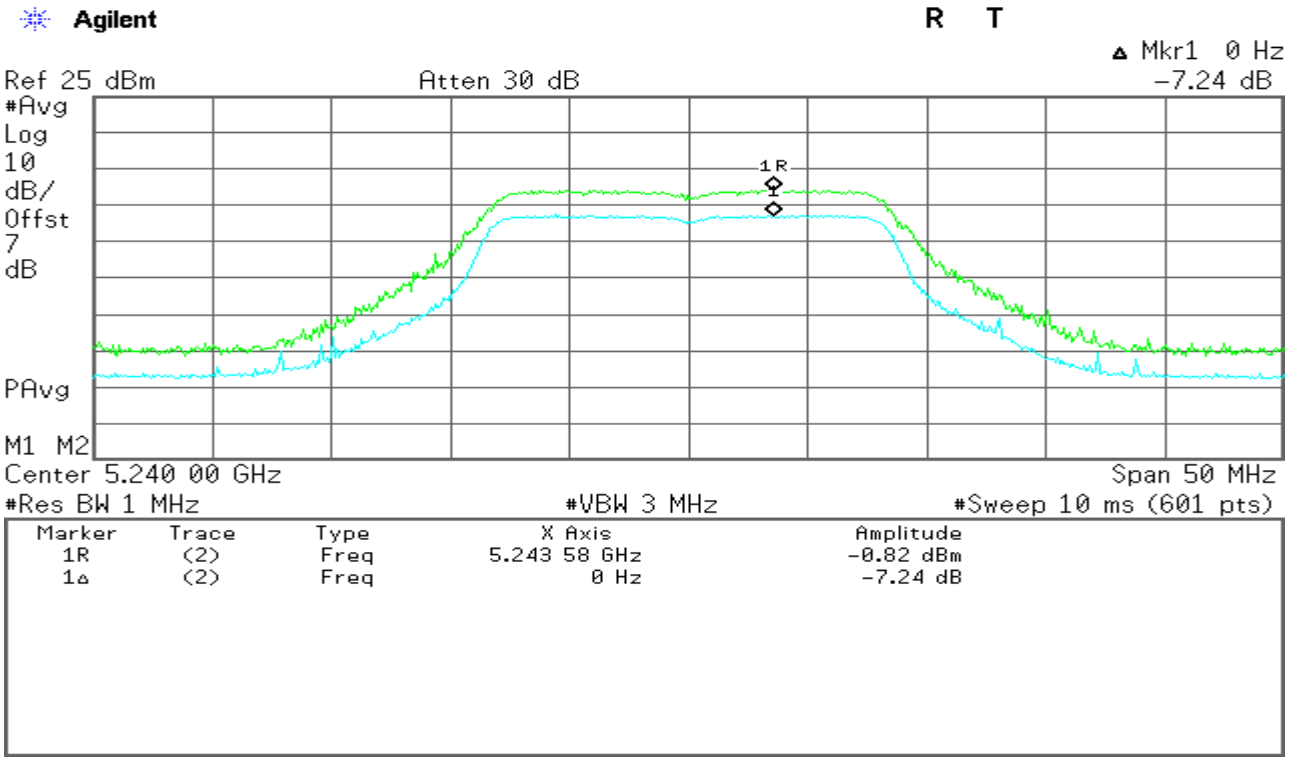
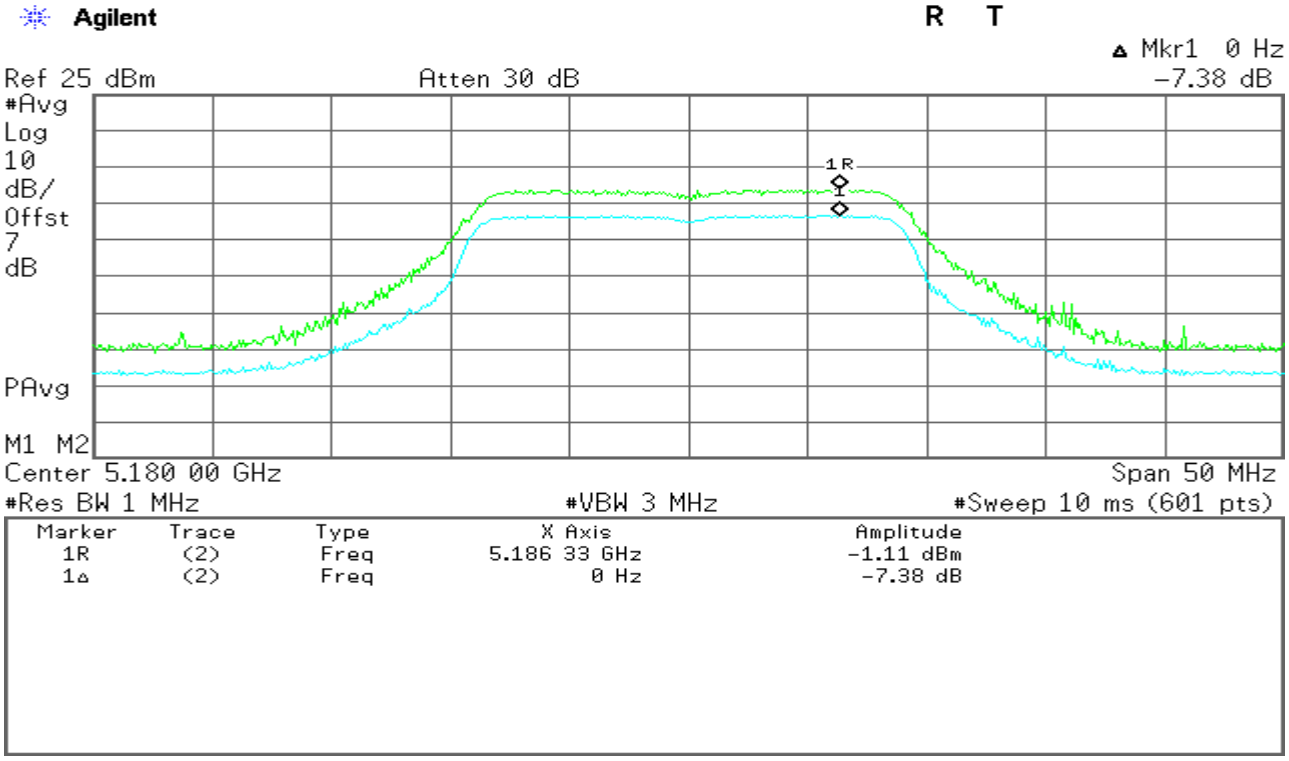
CH High



draft 802.11n Standard-20 MHz Channel mode / Chain 0

5150-5250MHz

CH Low



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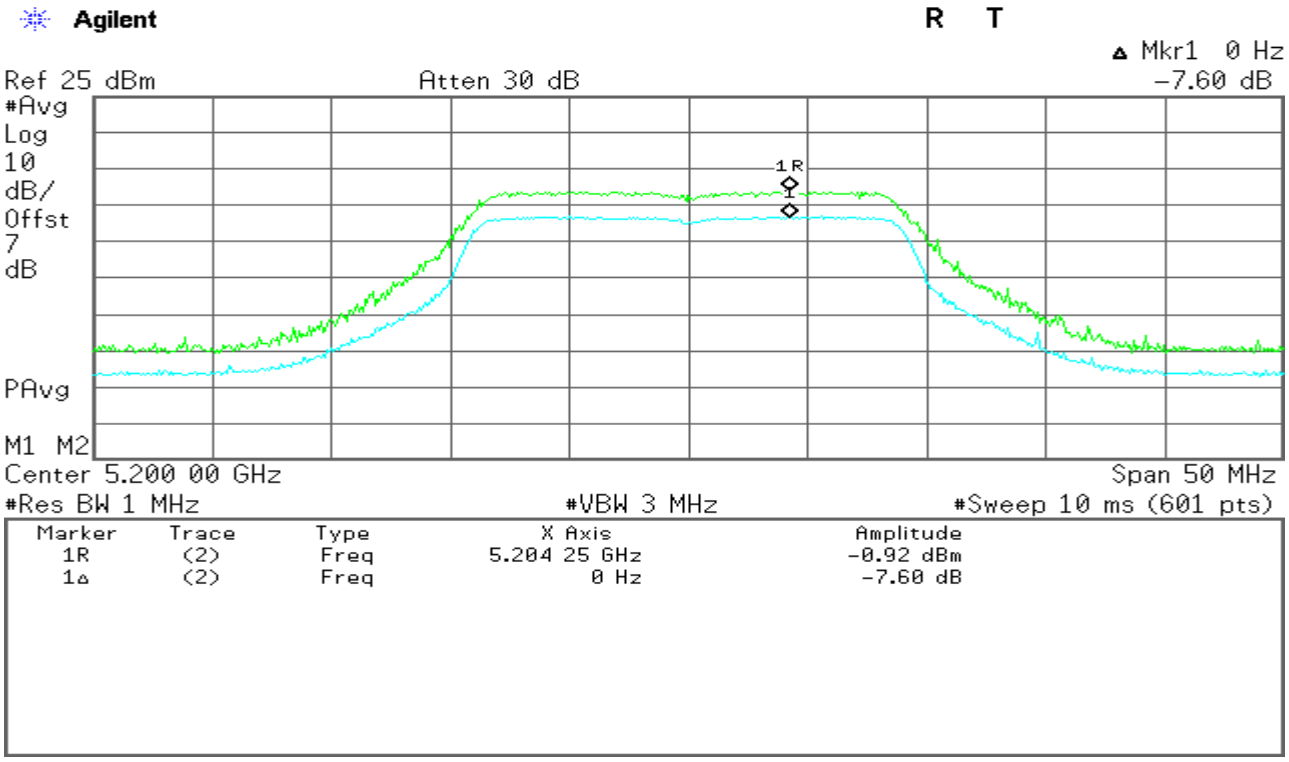
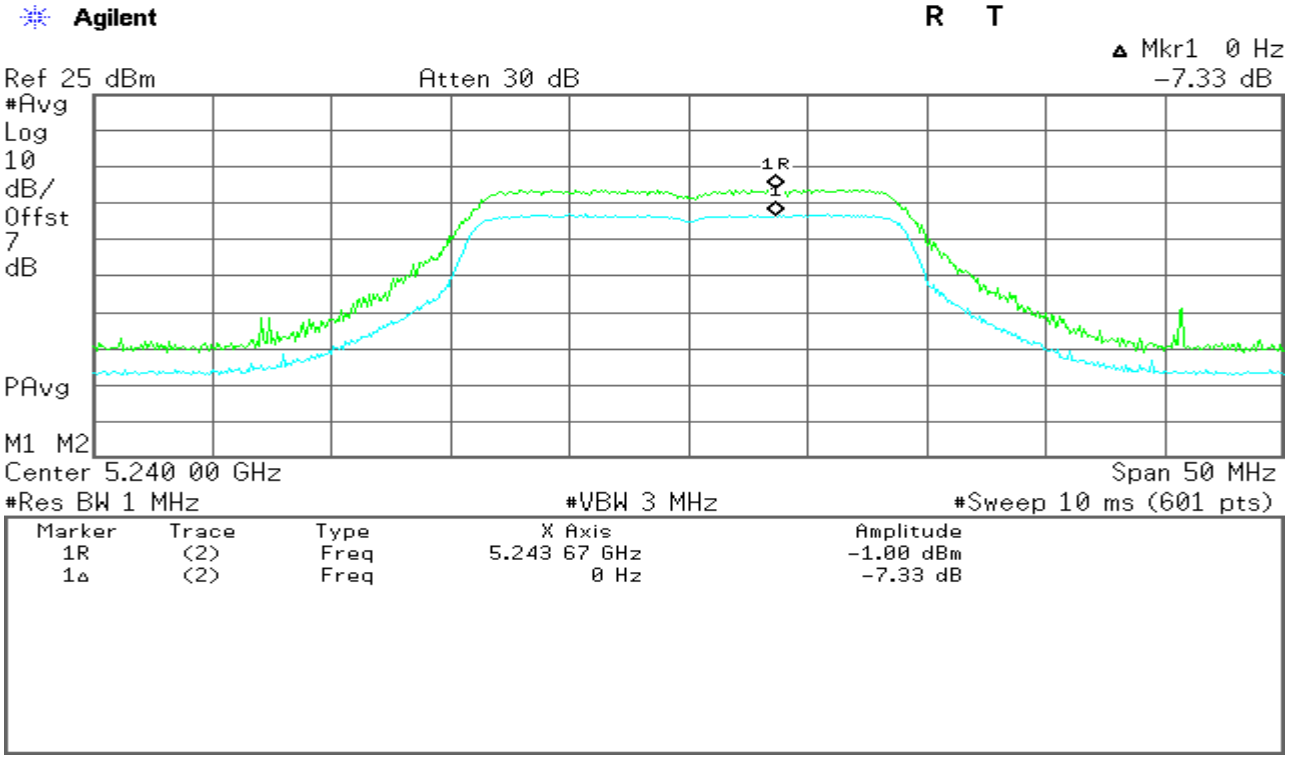
CH Mid



CH High



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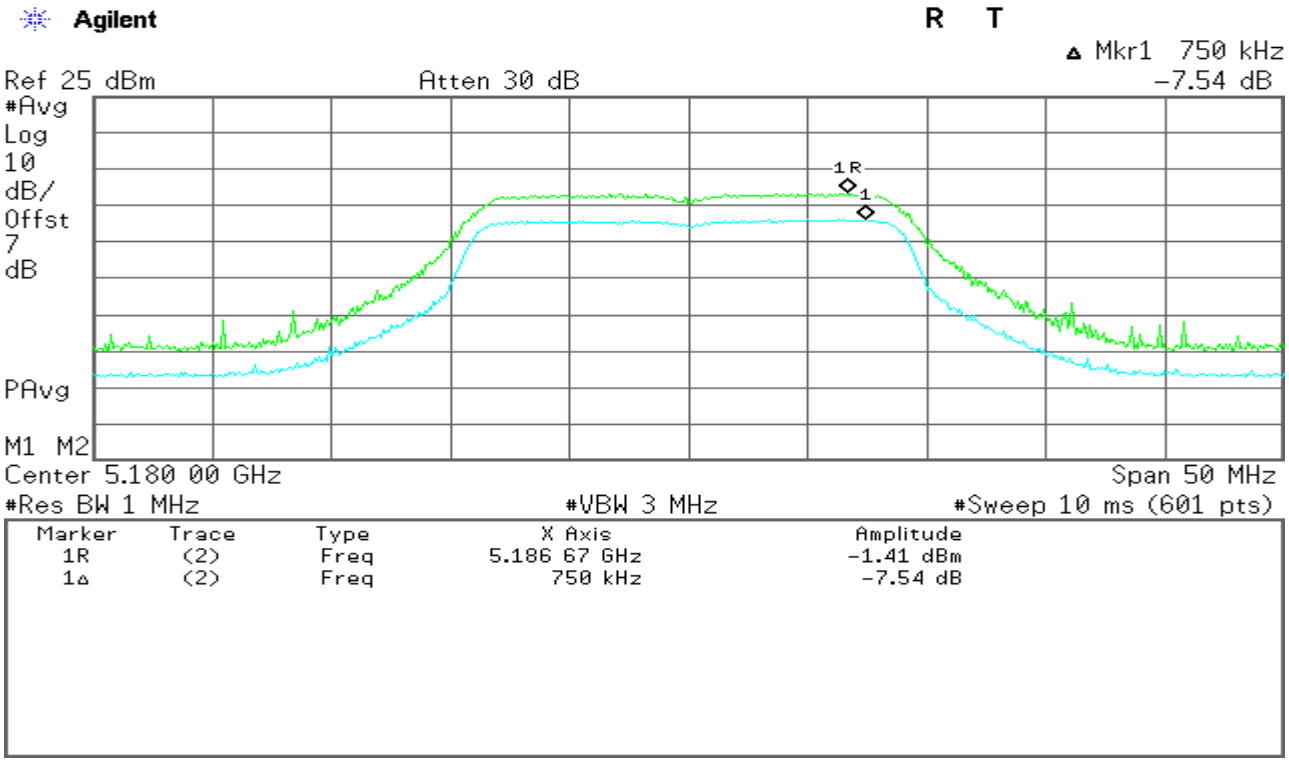
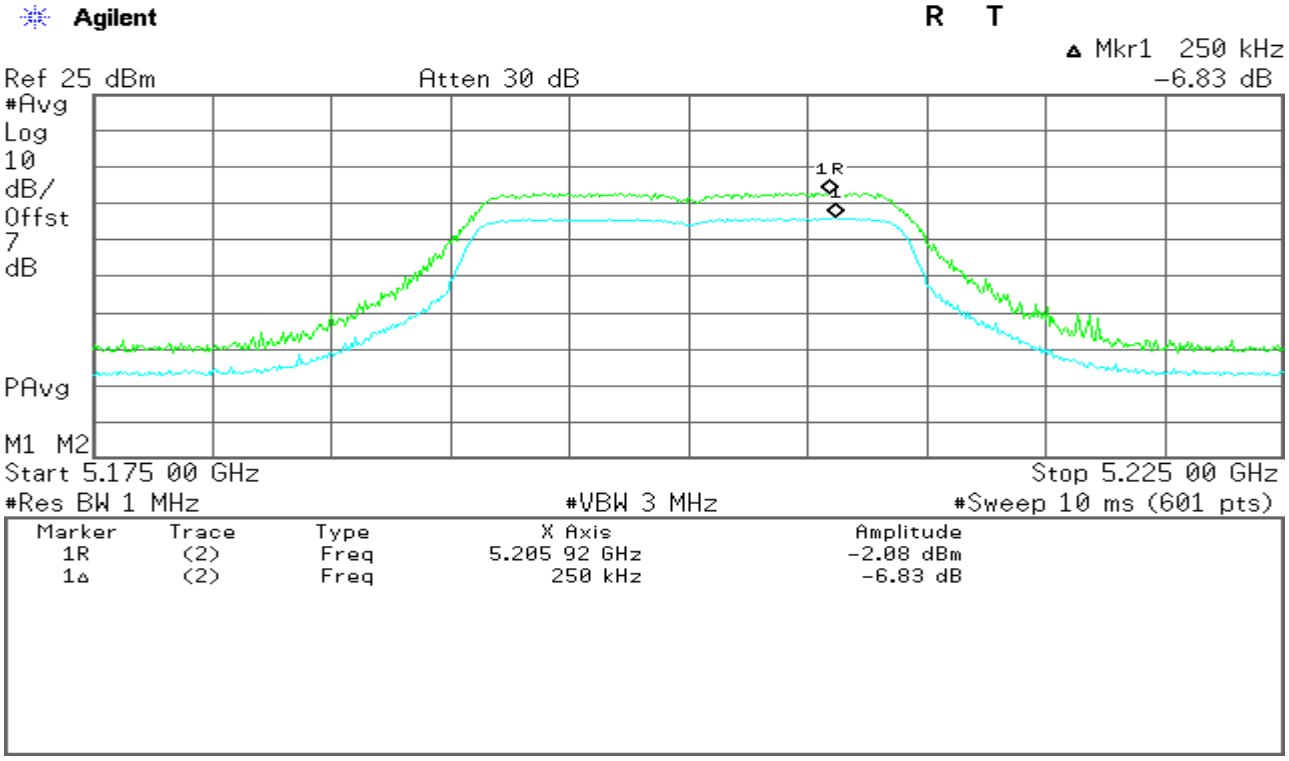
draft 802.11n Standard-20 MHz Channel mode / Chain 1

5150-5250MHz

CH Low



CH Mid



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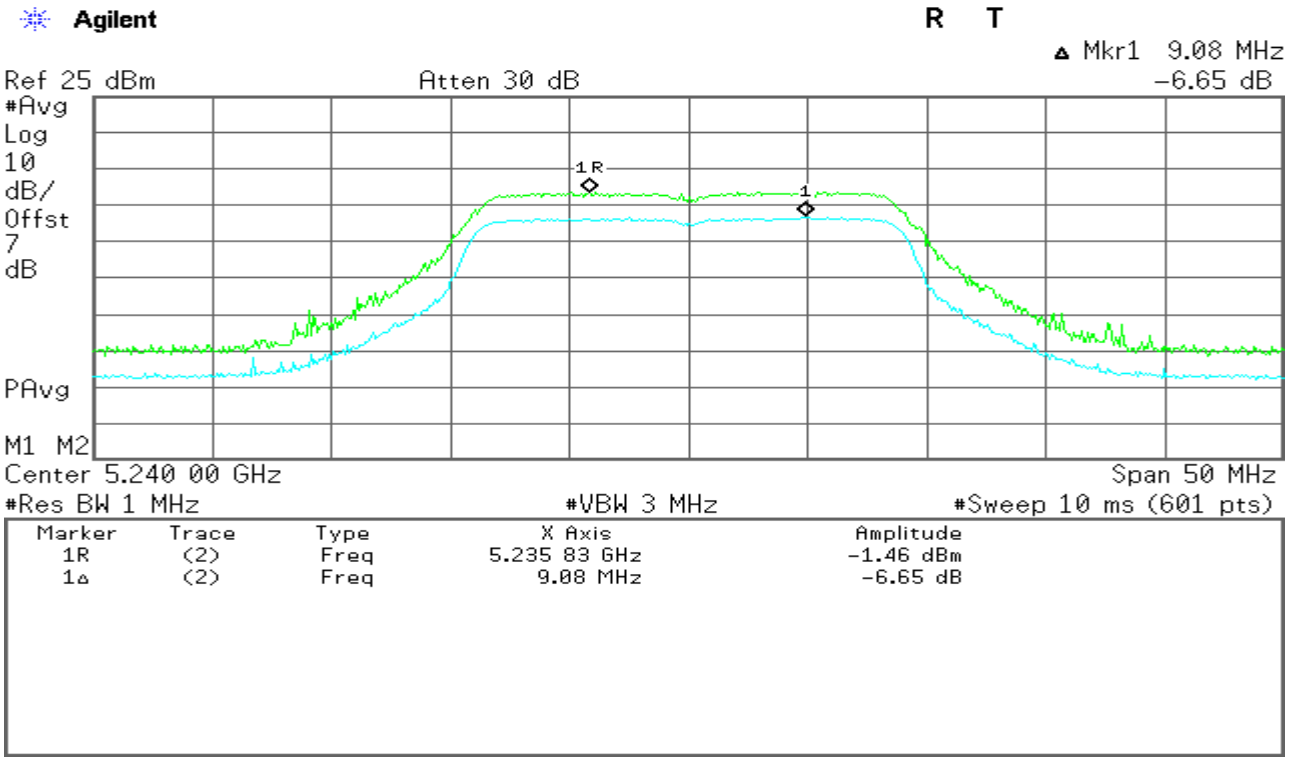
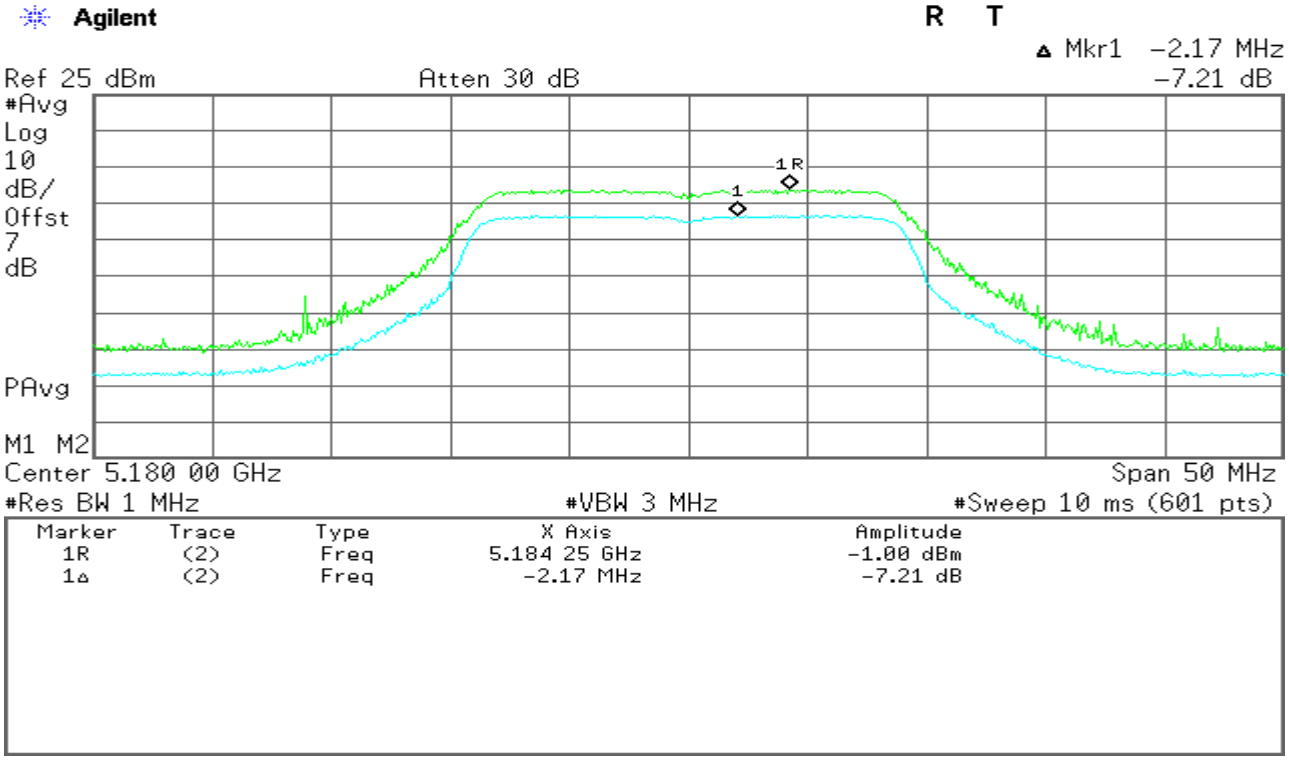
CH High



draft 802.11n Standard-20 MHz Channel mode / Chain 2

5150-5250MHz

CH Low



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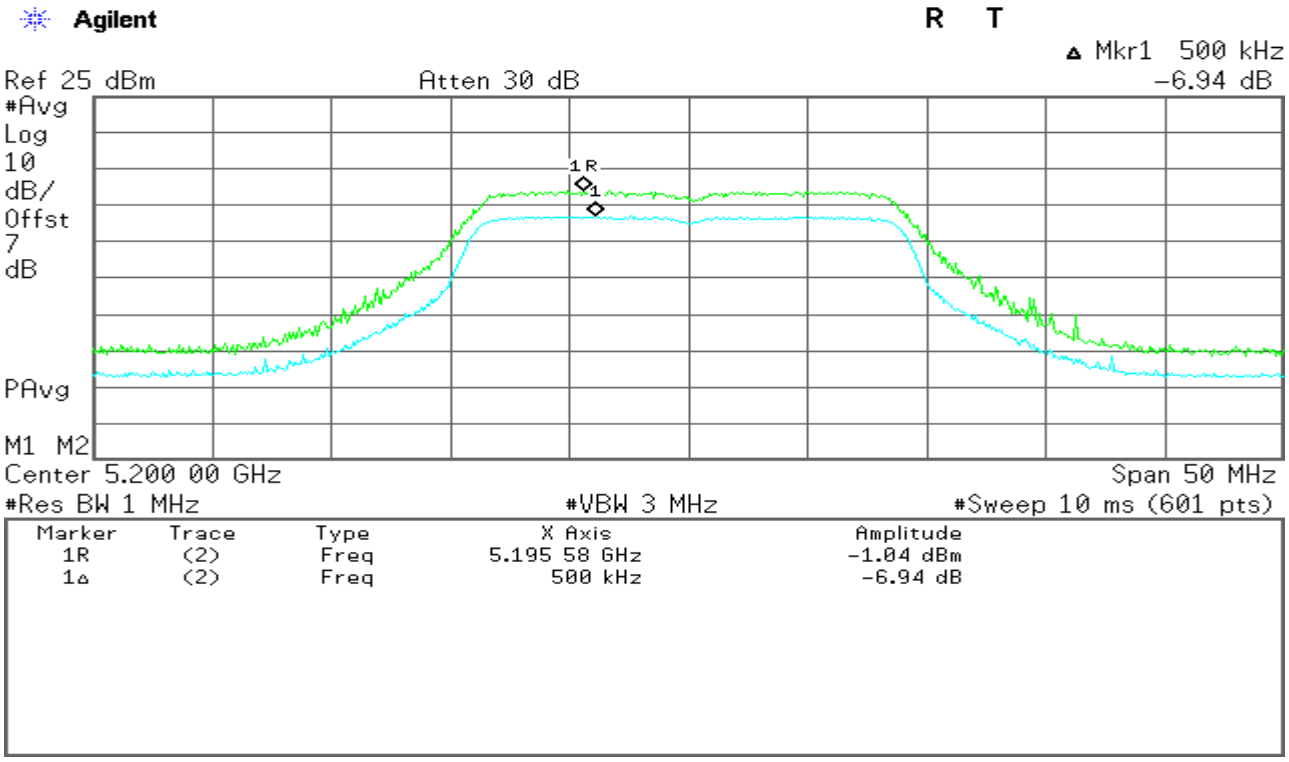
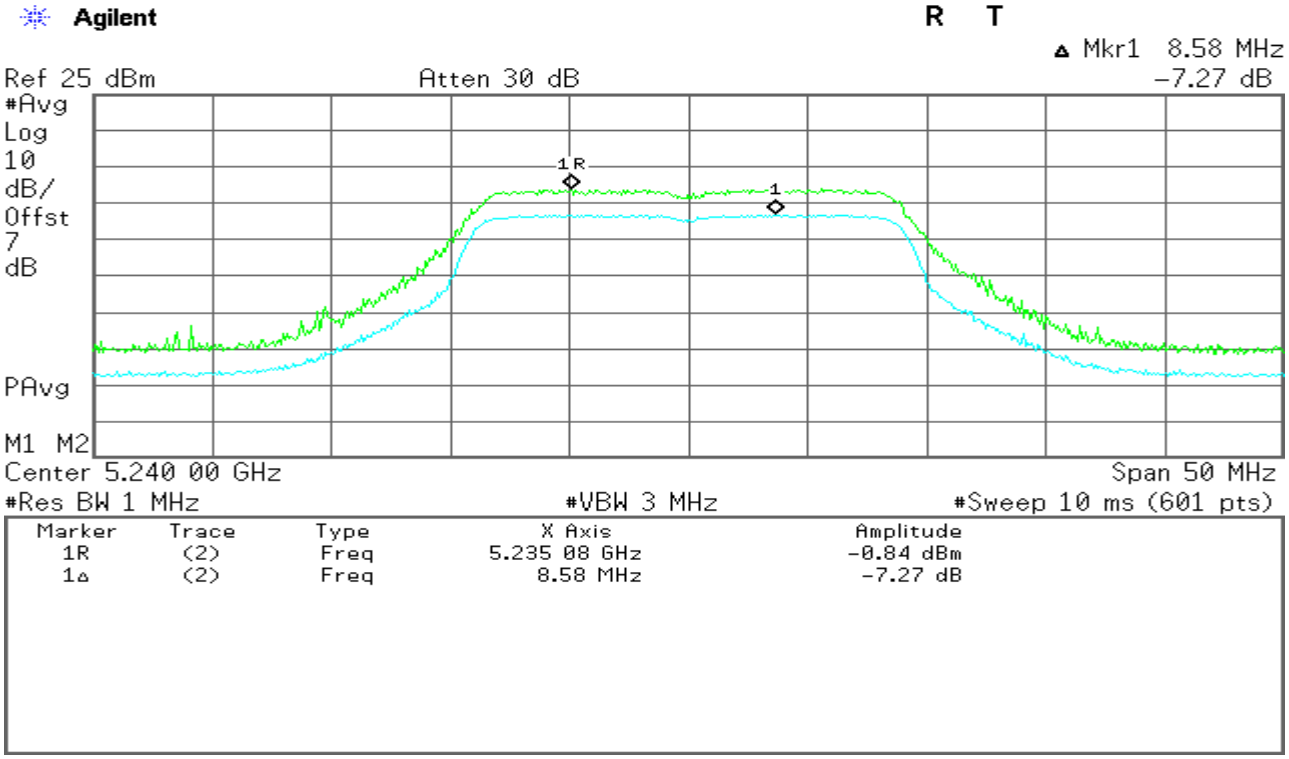
CH Mid



CH High



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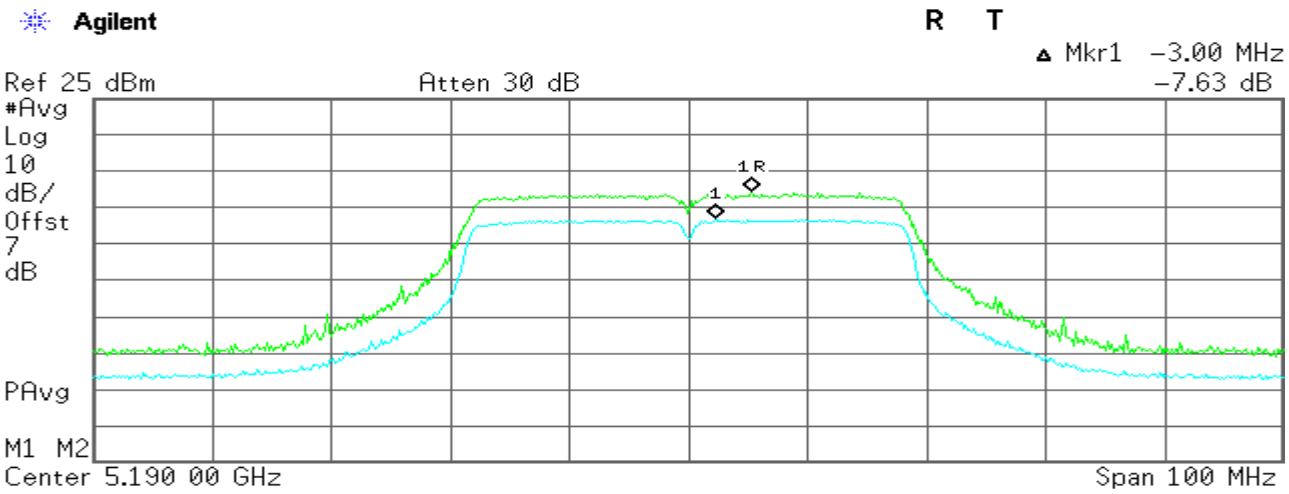
draft 802.11n Wide-40 MHz Channel mode / Chain 0

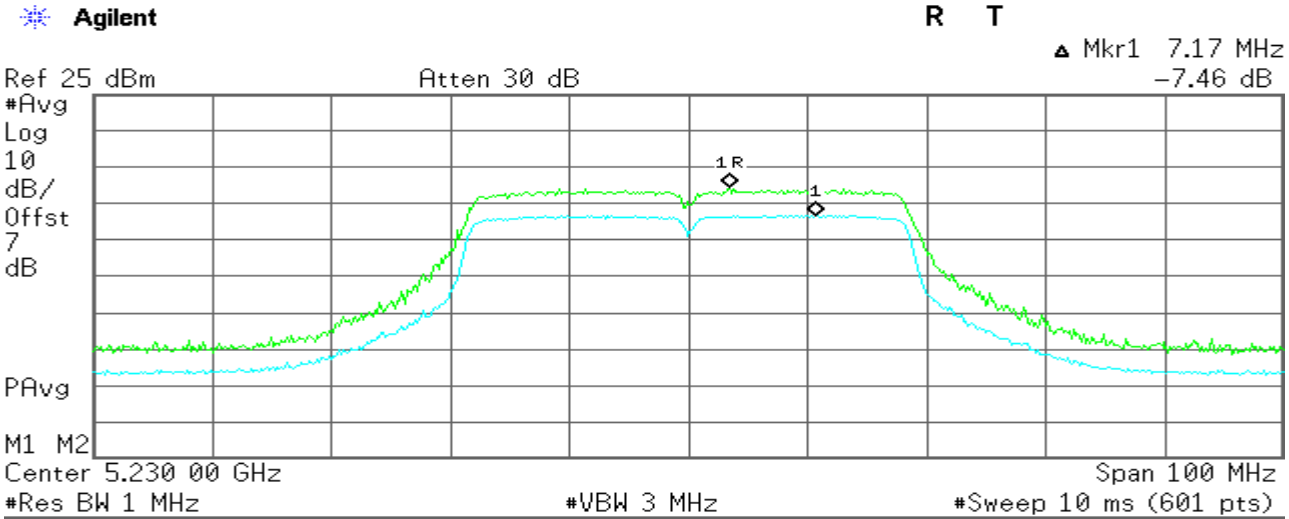
5150-5250MHz

CH Low



Marker	Trace	Type	X Axis	Amplitude
1R	(2)	Freq	5.195 33 GHz	-0.47 dBm
1Δ	(2)	Freq	-3.00 MHz	-7.63 dB

CH High



Marker	Trace	Type	X Axis	Amplitude
1R	(2)	Freq	5.233 50 GHz	-0.75 dBm
1Δ	(2)	Freq	7.17 MHz	-7.46 dB

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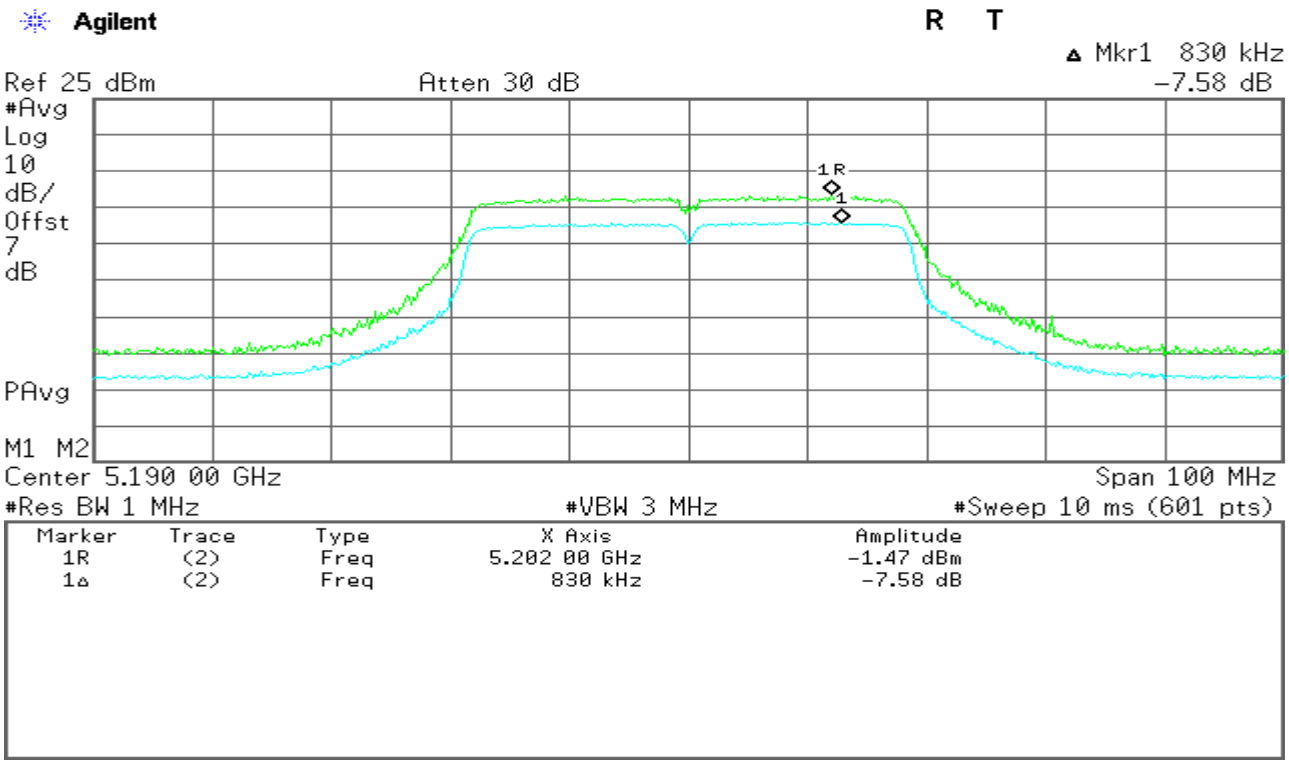
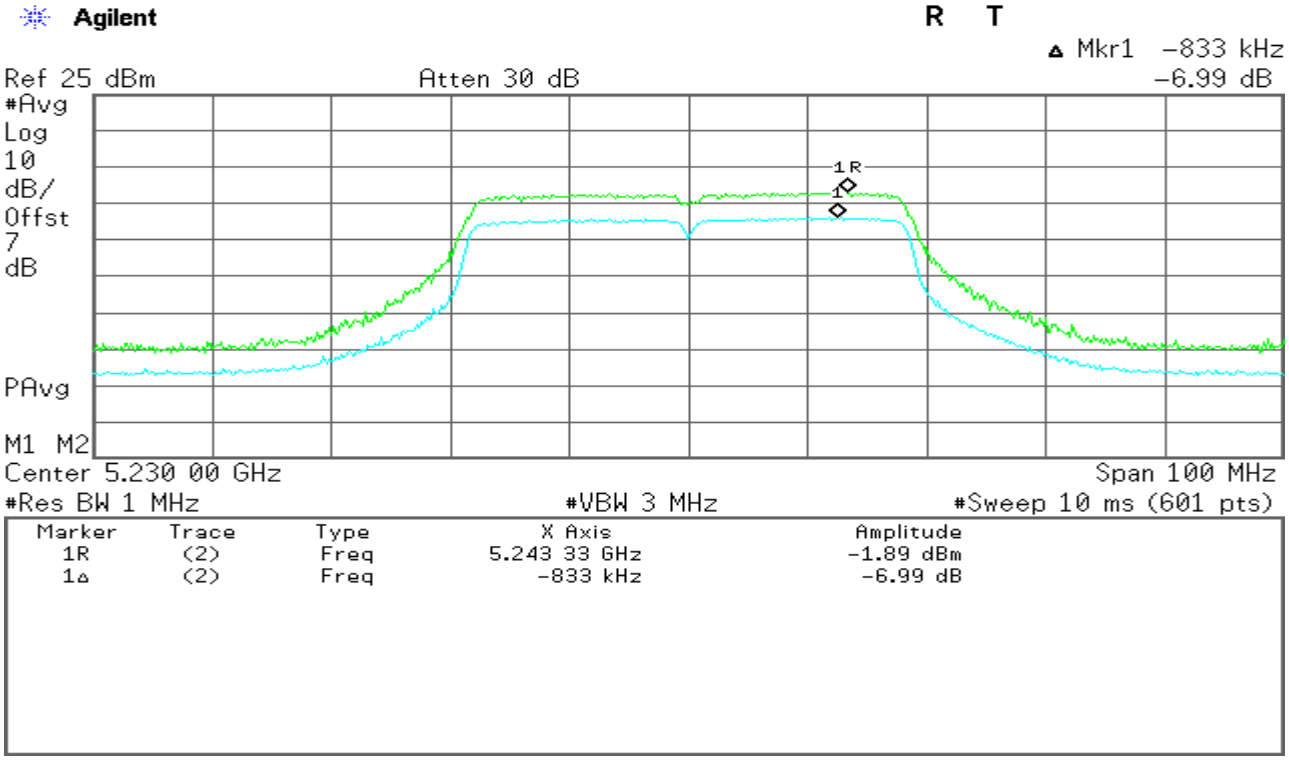
draft 802.11n Wide-40 MHz Channel mode / Chain 1

5150-5250MHz

CH Low



CH High



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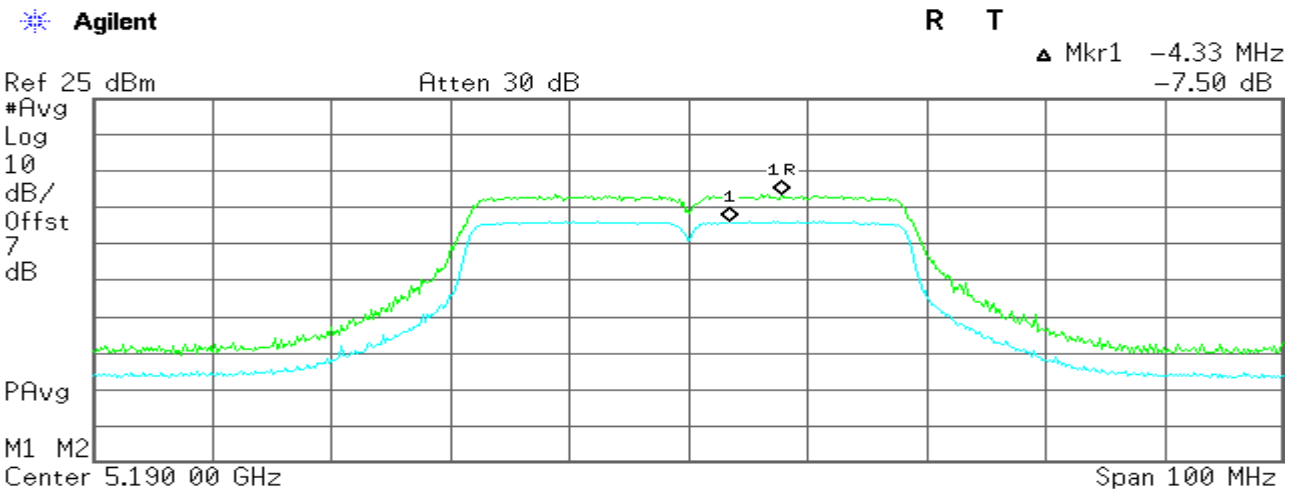
draft 802.11n Wide-40 MHz Channel mode / Chain 2

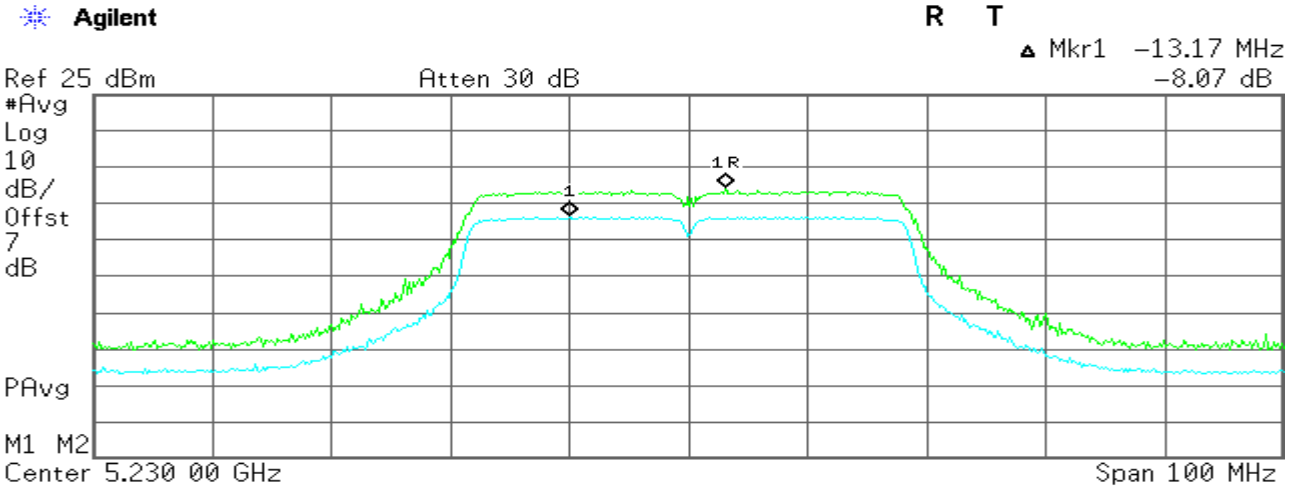
5150-5250MHz

CH Low



Marker	Trace	Type	X Axis	Amplitude
1R	(2)	Freq	5.197 83 GHz	-1.26 dBm
1Δ	(2)	Freq	-4.33 MHz	-7.50 dB

CH High



Marker	Trace	Type	X Axis	Amplitude
1R	(2)	Freq	5.233 17 GHz	-0.46 dBm
1Δ	(2)	Freq	-13.17 MHz	-8.07 dB

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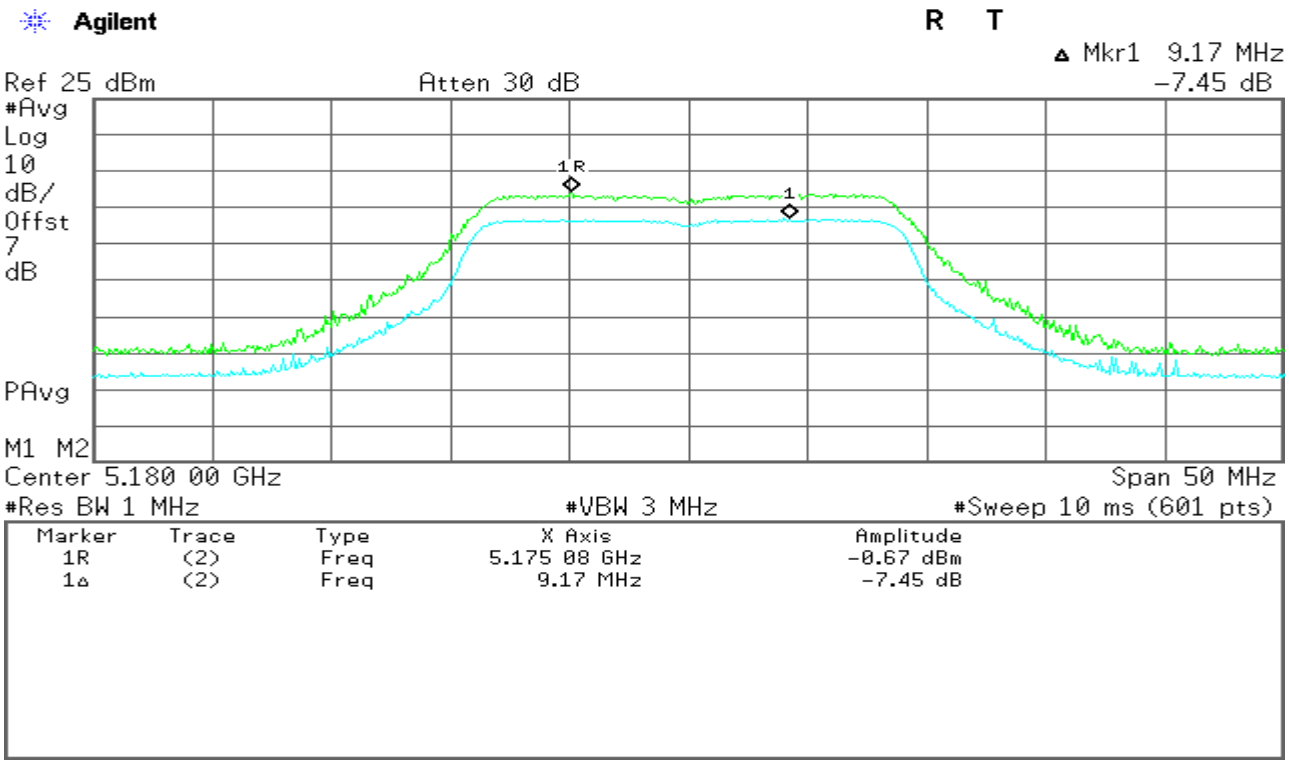
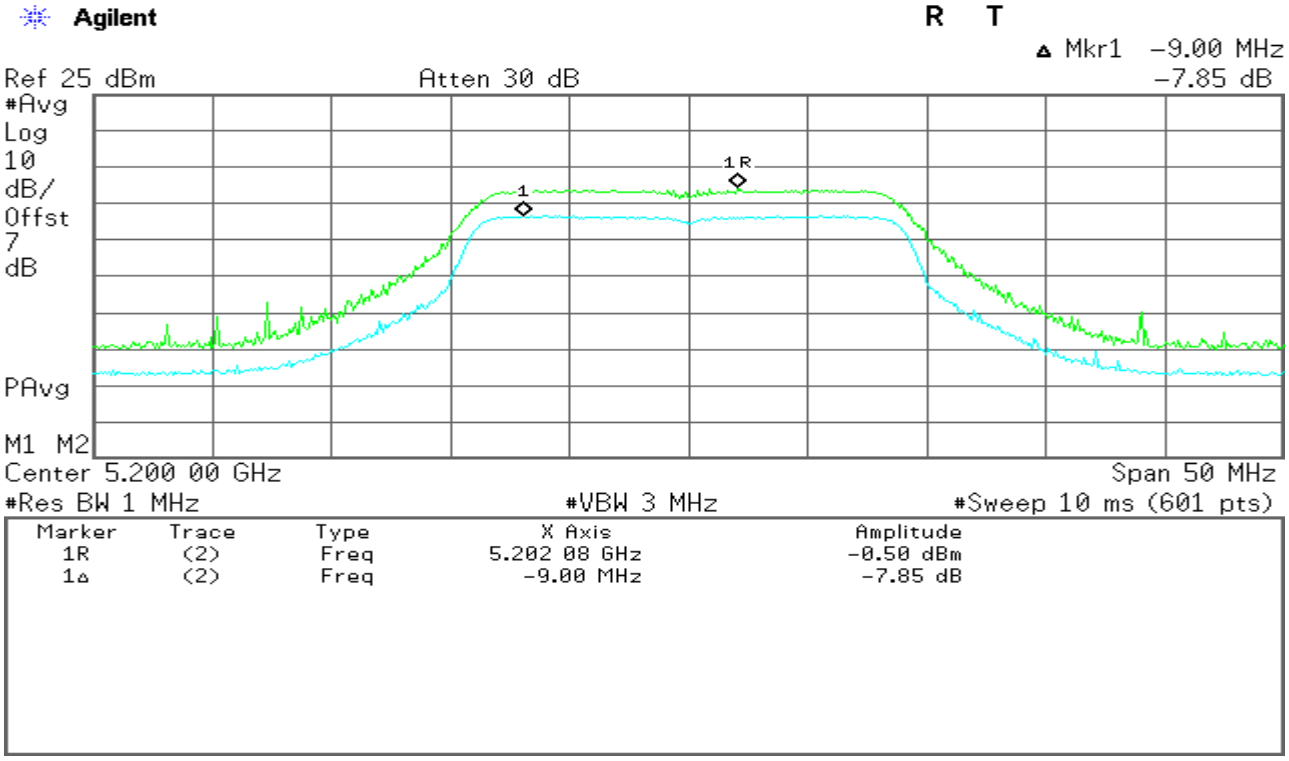
draft 802.11ac Standard-20 MHz Channel mode / Chain 0

5150-5250MHz

CH Low



CH Mid



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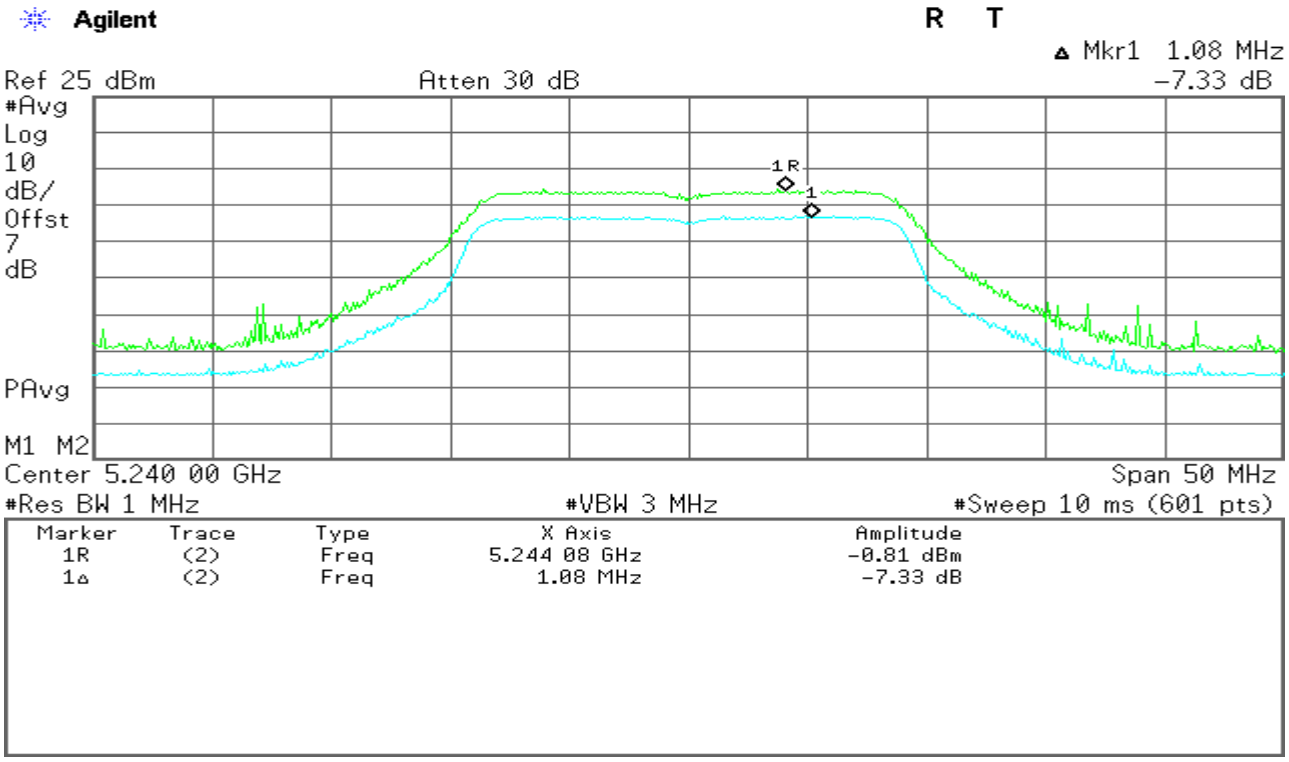
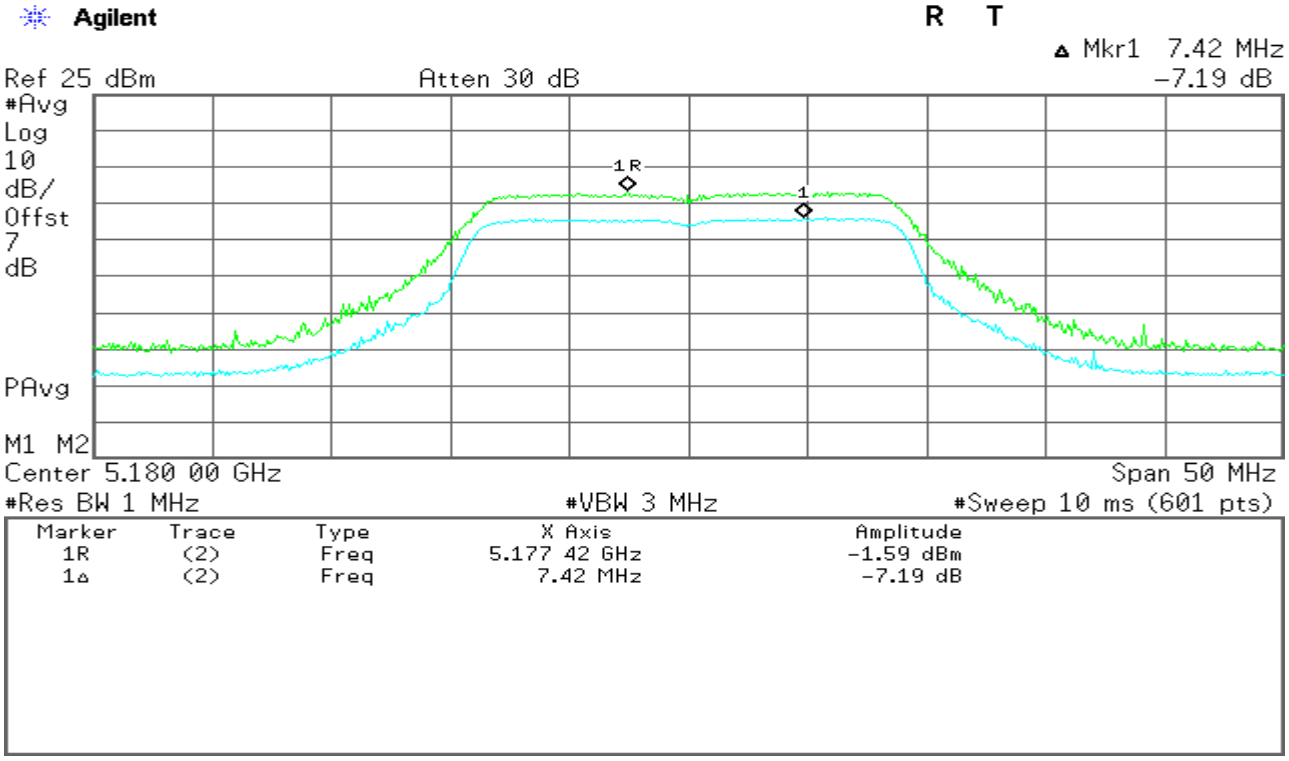
CH High



draft 802.11ac Standard-20 MHz Channel mode / Chain 1

5150-5250MHz

CH Low



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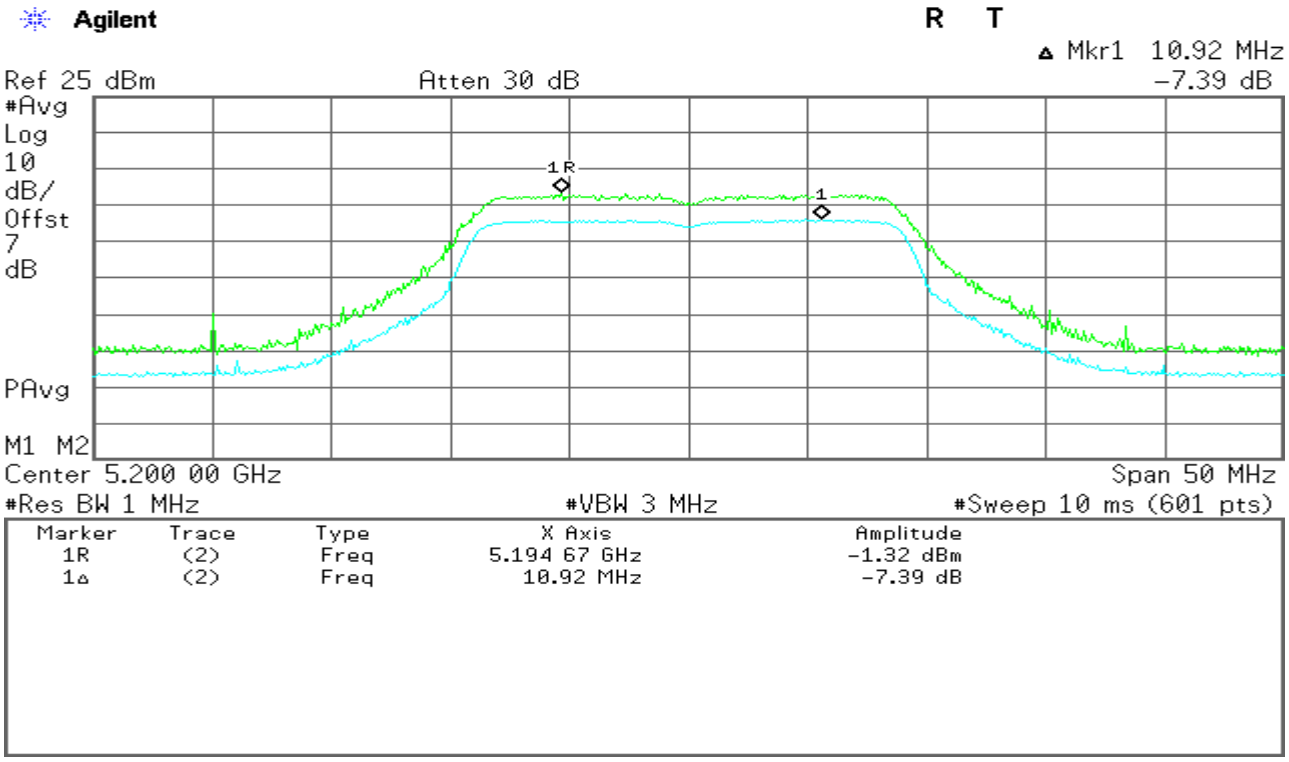
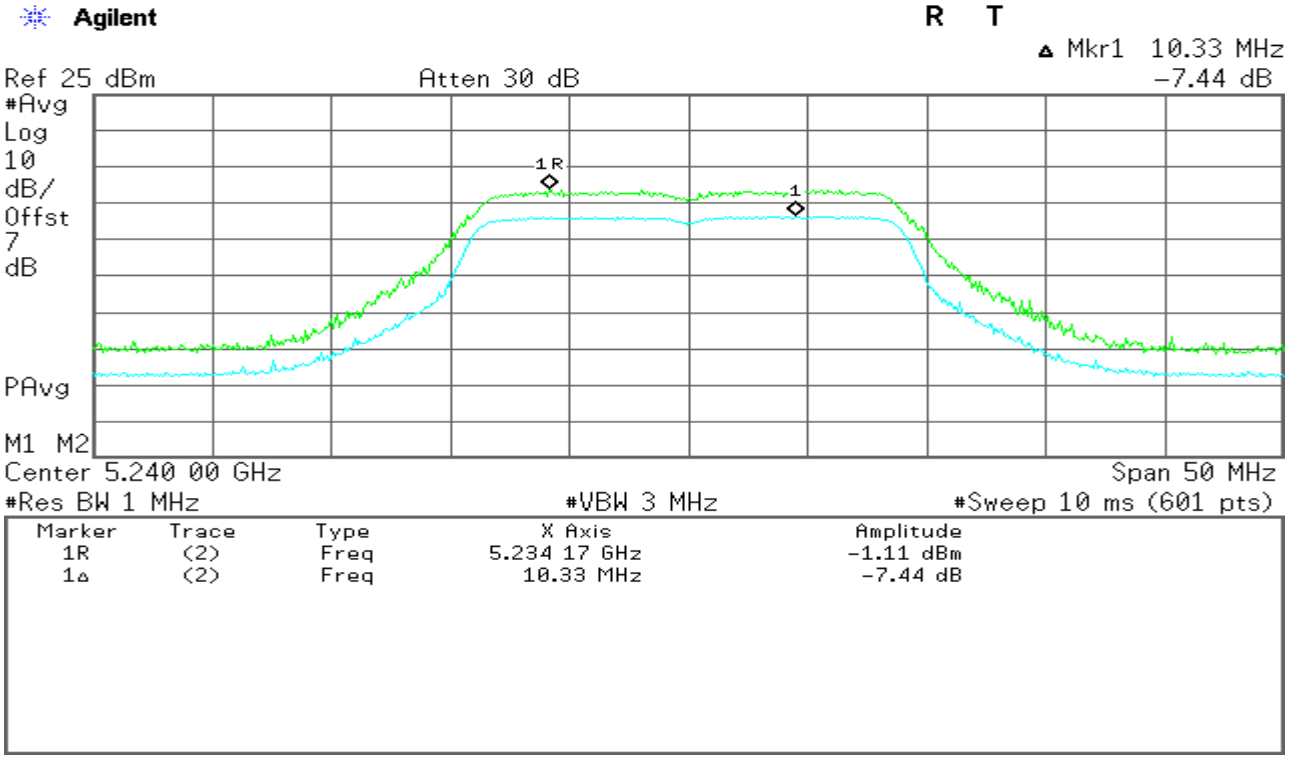
CH Mid



CH High



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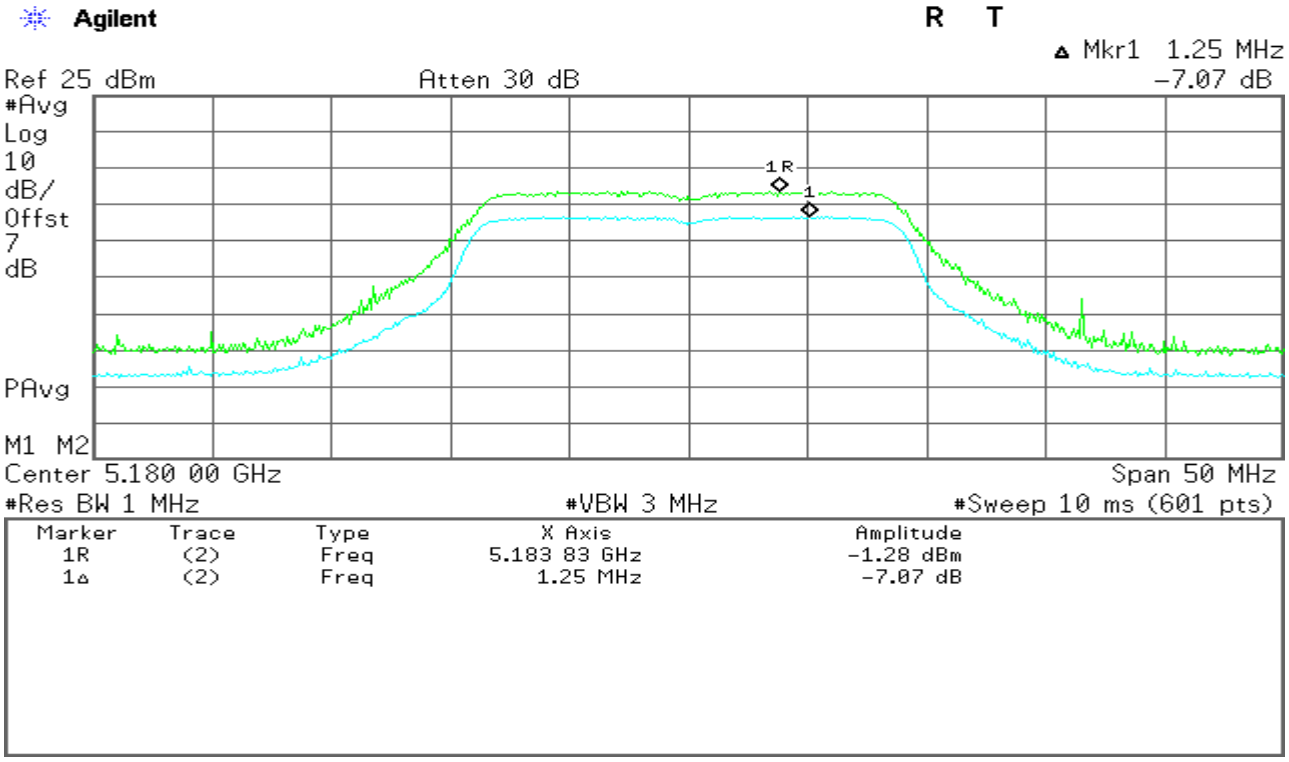
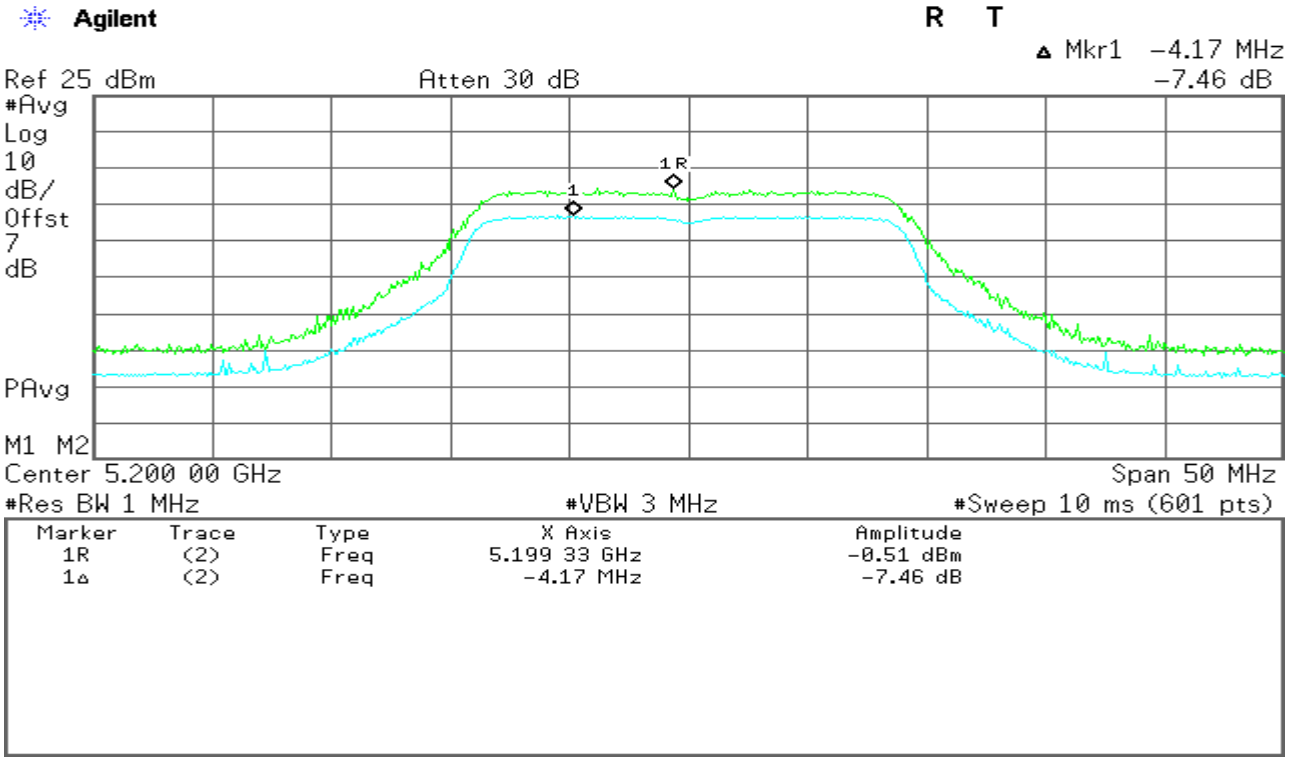
draft 802.11ac Standard-20 MHz Channel mode / Chain 2

5150-5250MHz

CH Low



CH Mid



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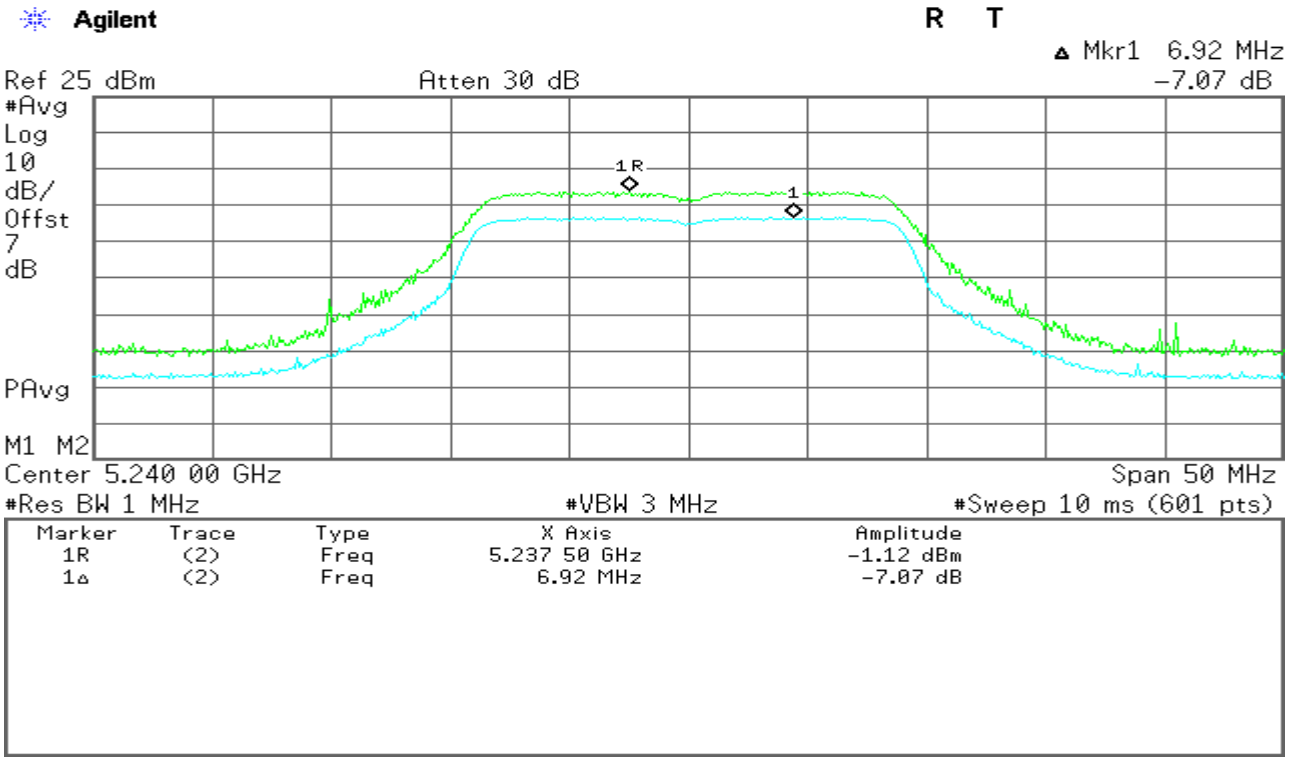
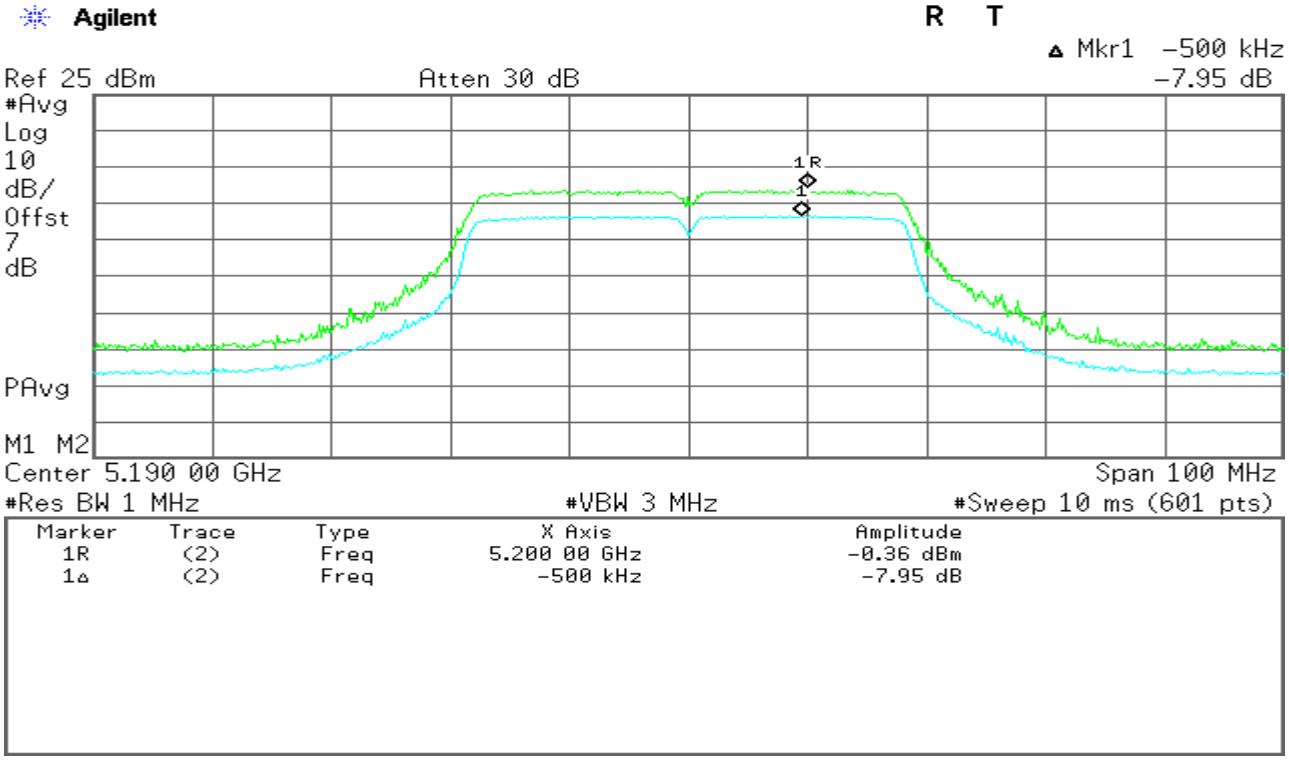
CH High



draft 802.11ac Wide-40 MHz Channel mode / Chain 0

5150-5250MHz

CH Low



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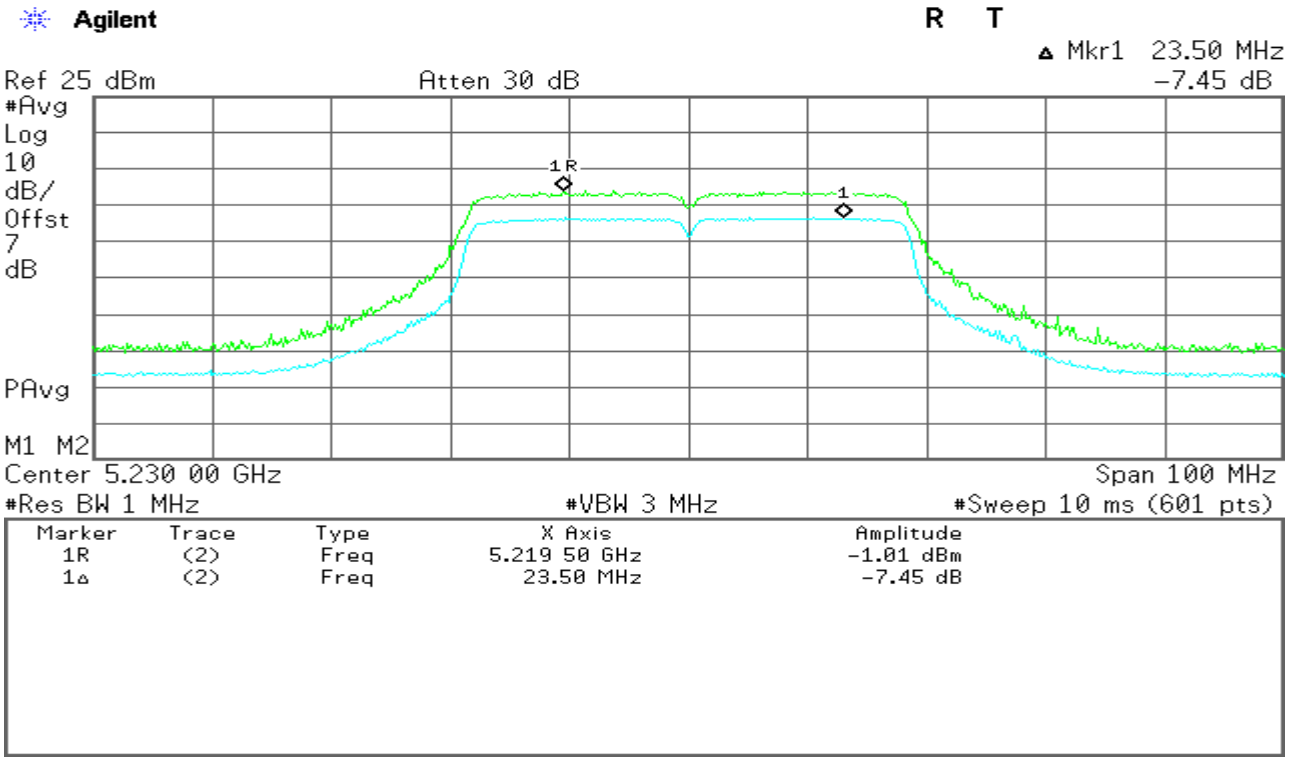
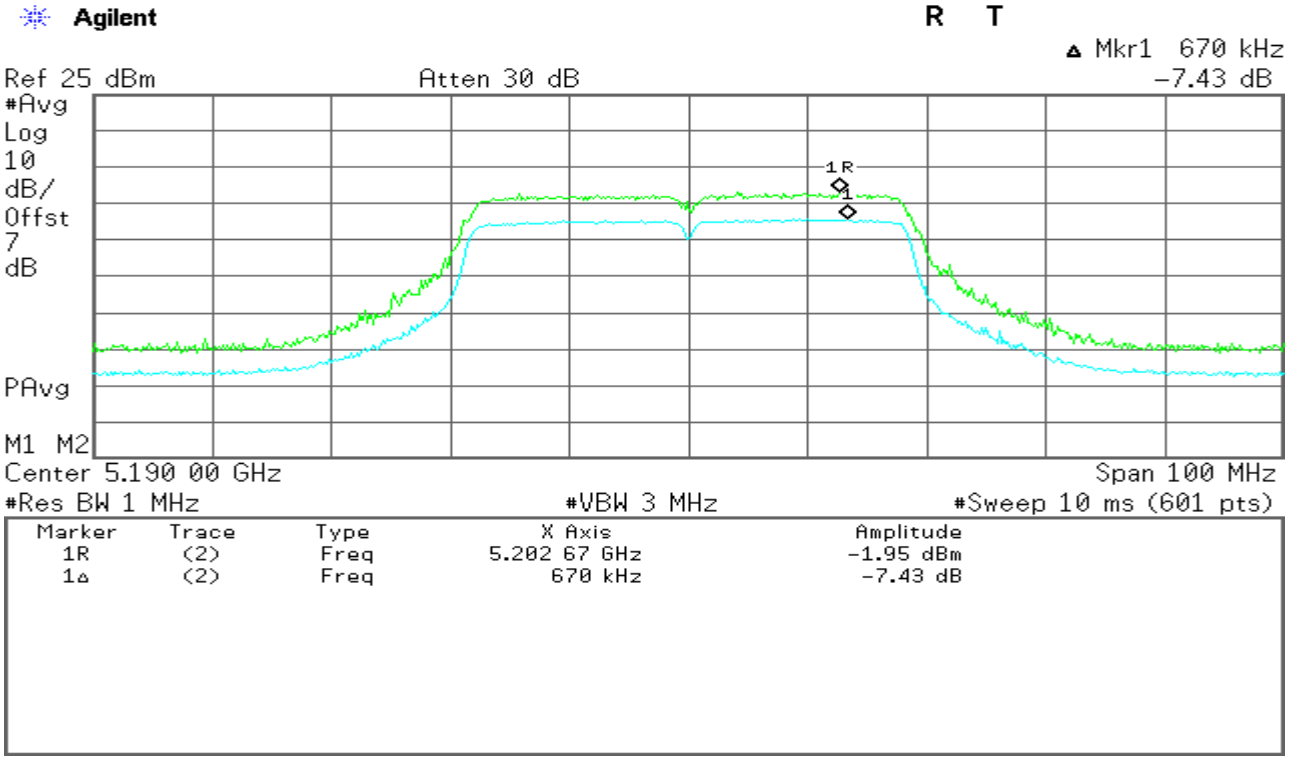
CH High



draft 802.11ac Wide-40 MHz Channel mode / Chain 1

5150-5250MHz

CH Low



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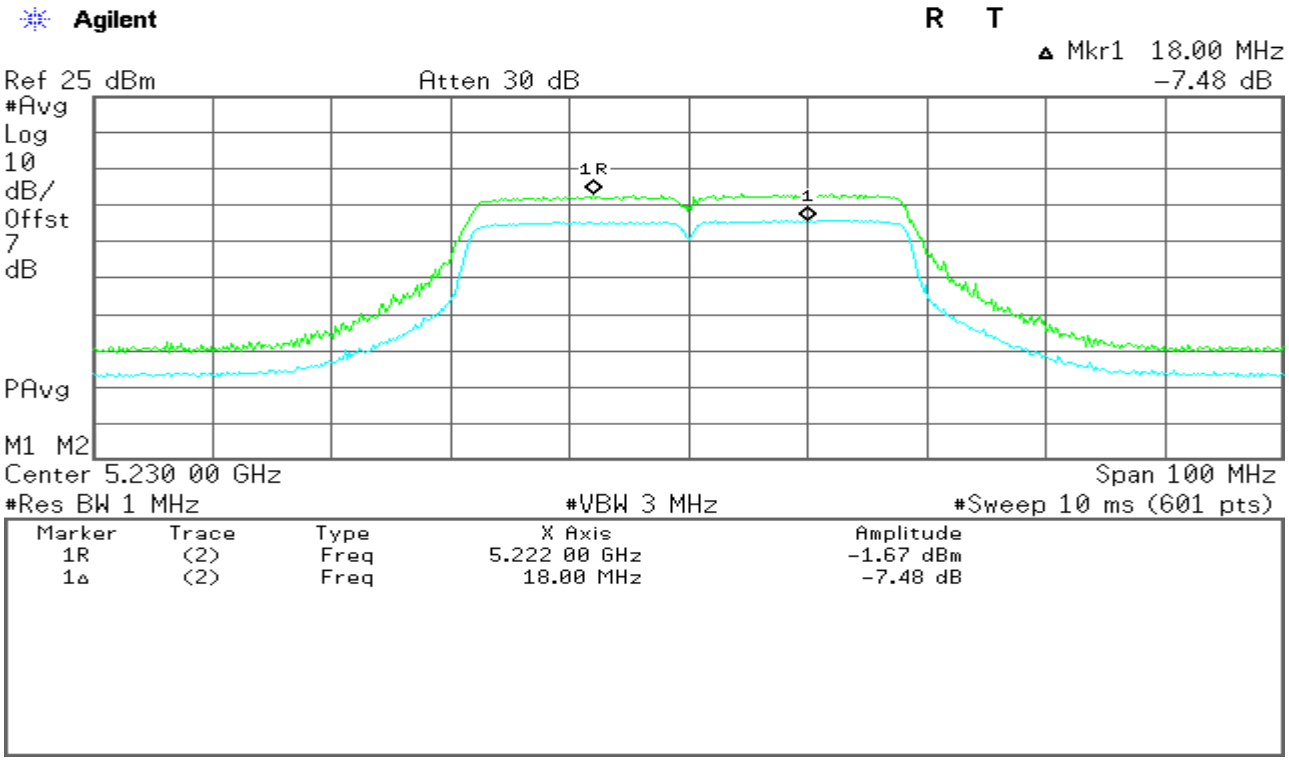
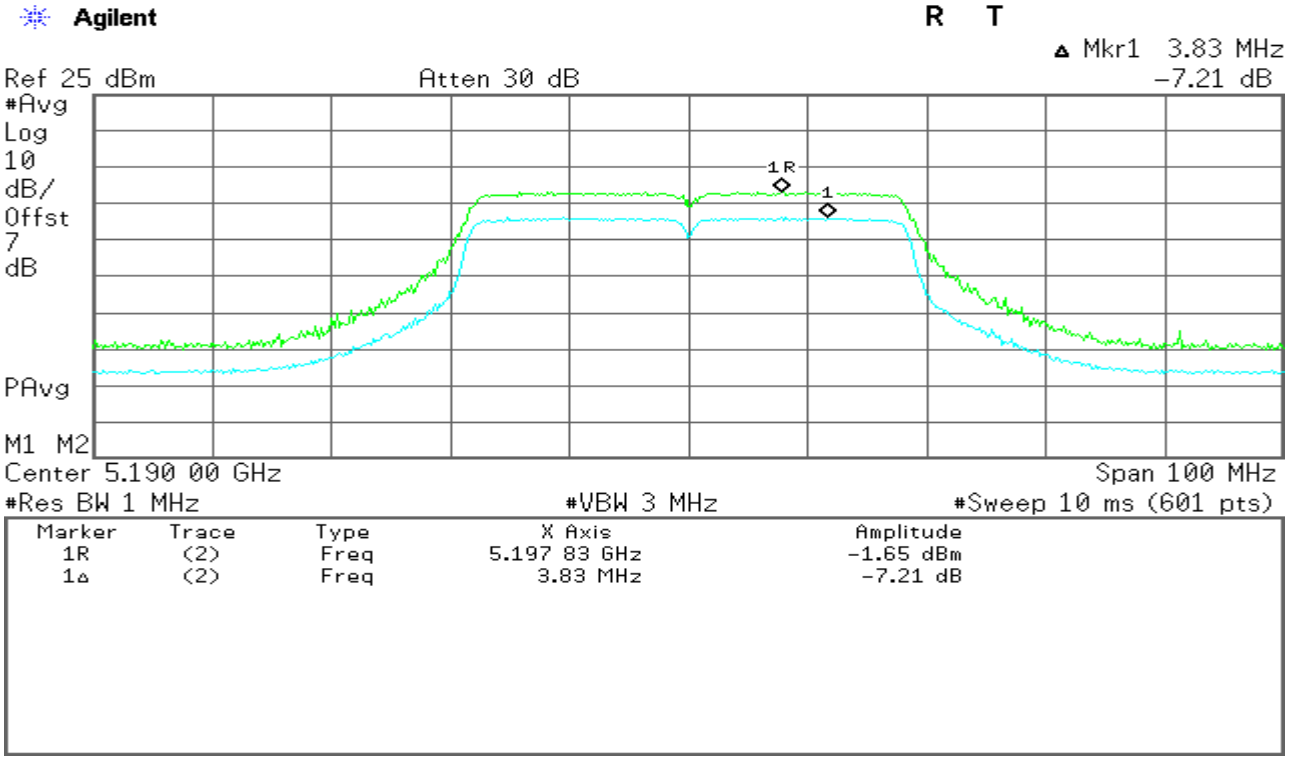
CH High



draft 802.11ac Wide-40 MHz Channel mode / Chain 2

5150-5250MHz

CH Low



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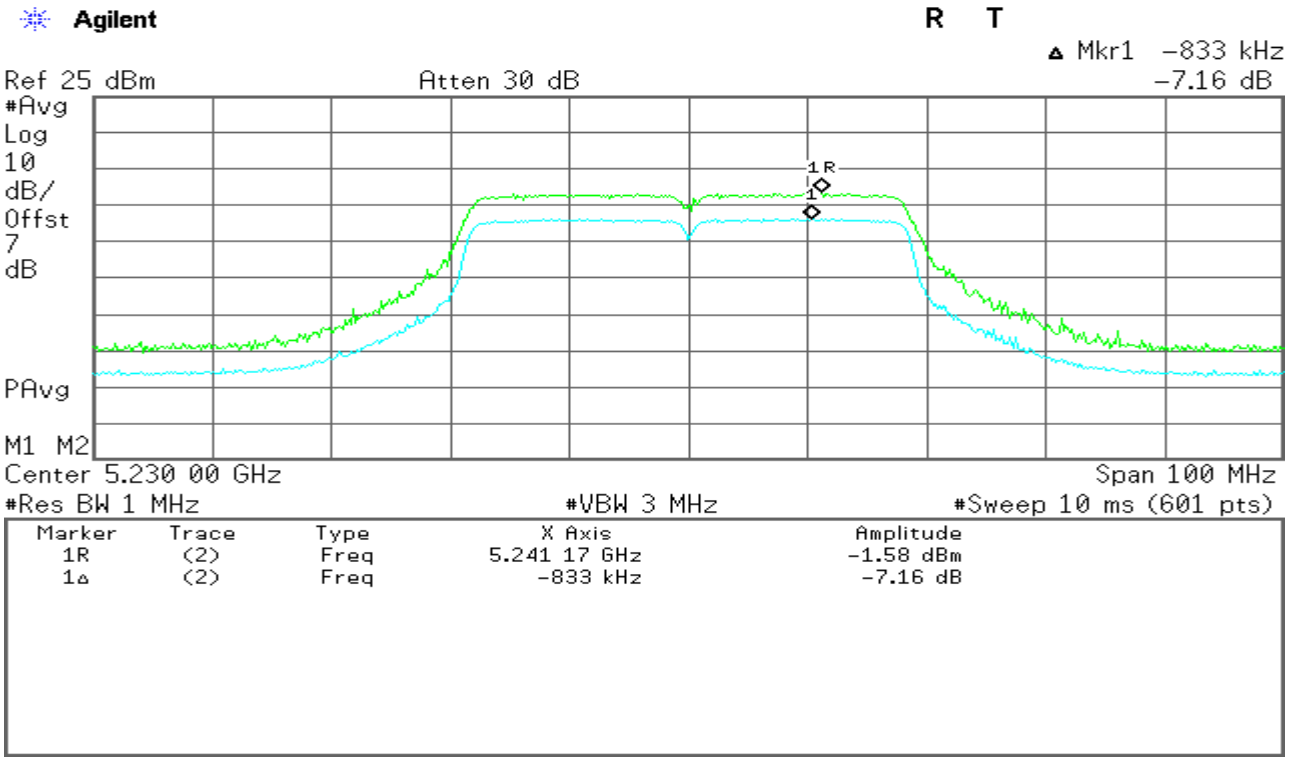
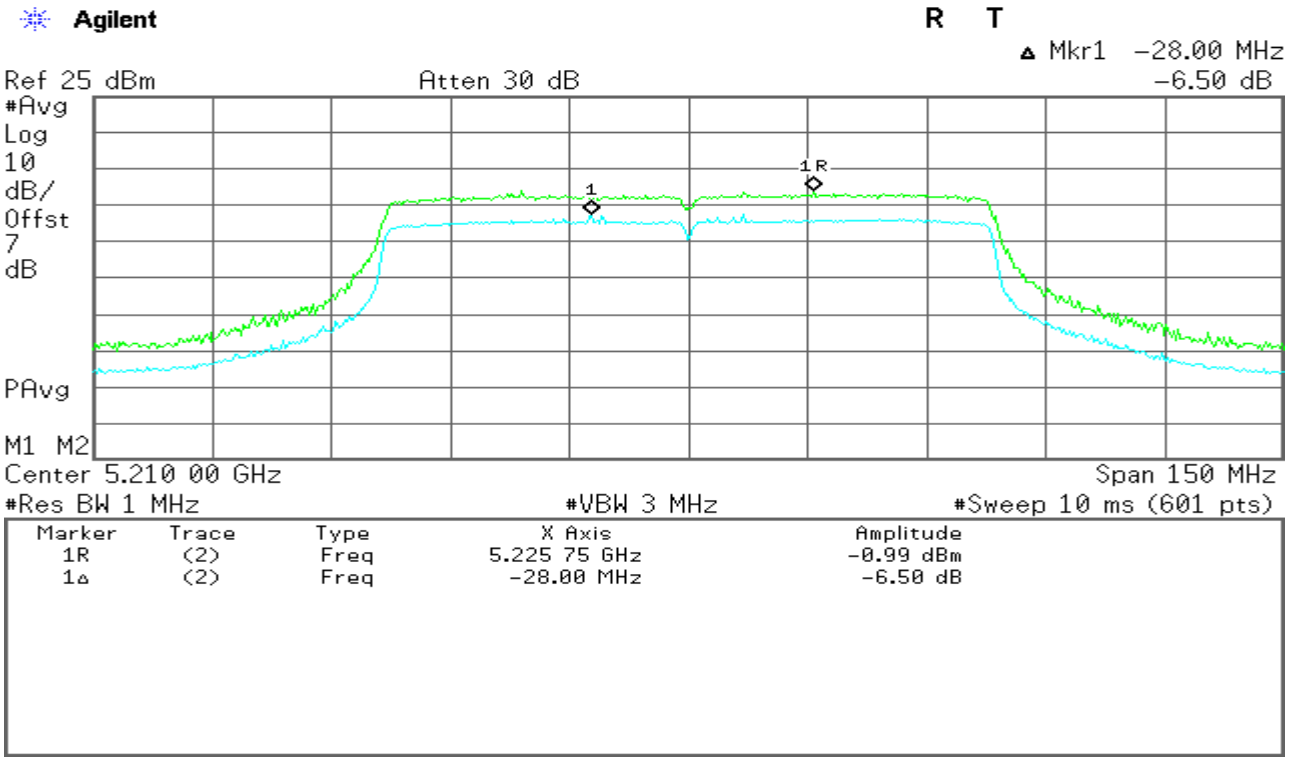
CH High



draft 802.11ac Wide-80 MHz Channel mode / Chain 0

5150-5250MHz



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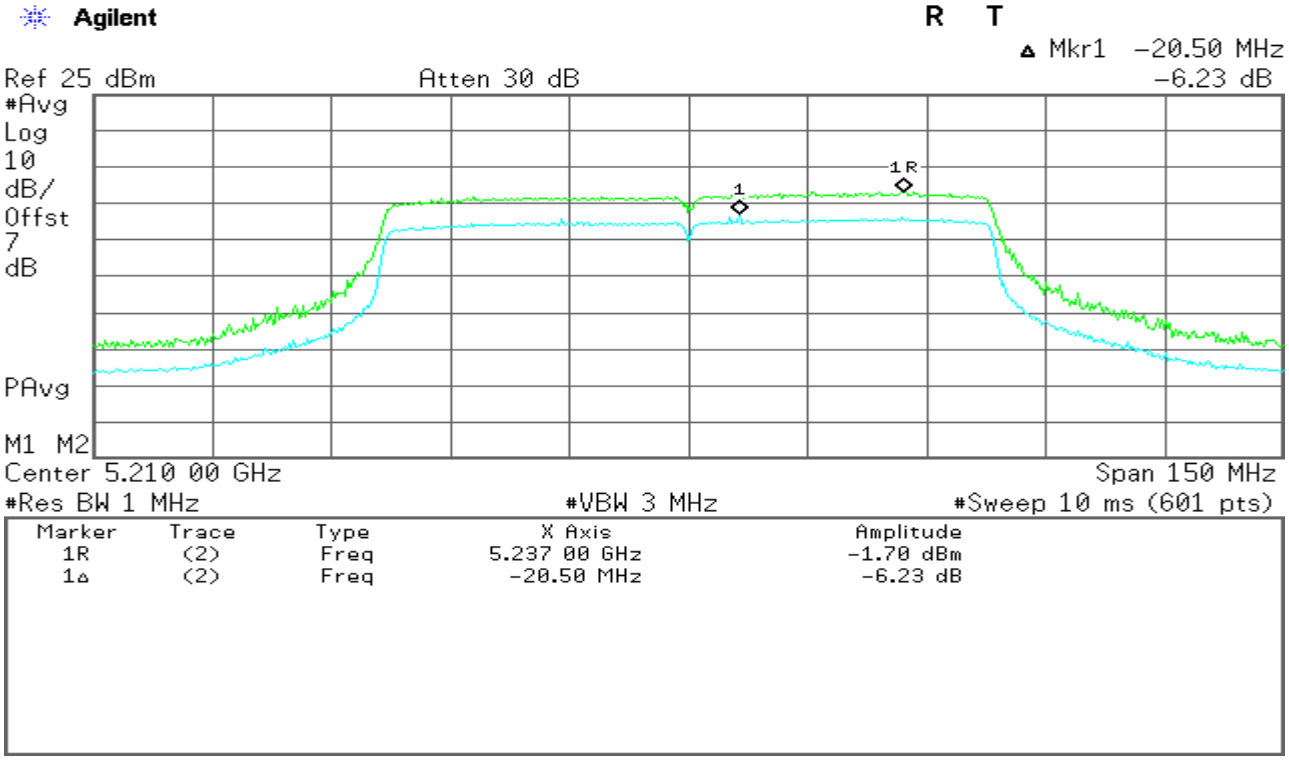
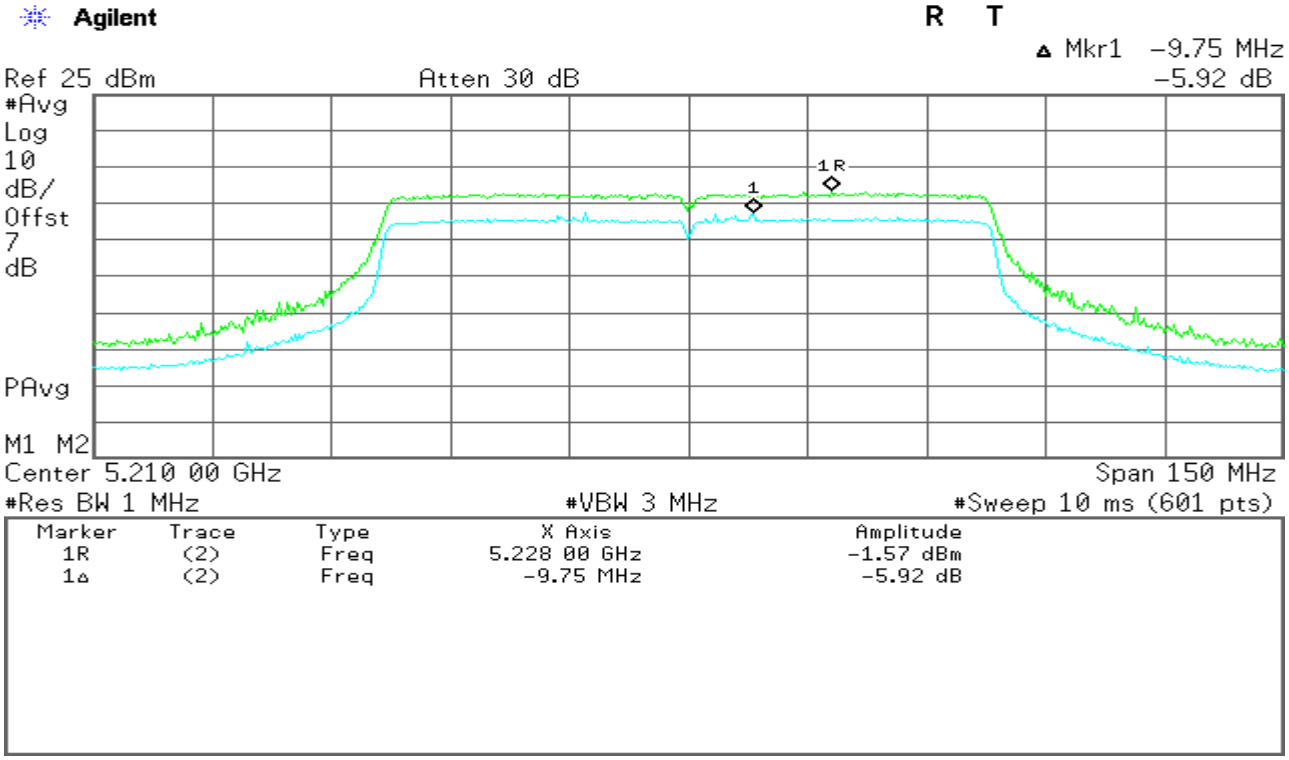
draft 802.11ac Wide-80 MHz Channel mode / Chain 1

5150-5250MHz



draft 802.11ac Wide-80 MHz Channel mode / Chain 2

5150-5250MHz



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7.6 RADIATED UNDESIRABLE EMISSION

LIMIT

Radiated emissions from 9 kHz to 25 GHz were measured according to the methods defines in ANSI C63.4-2009. The EUT was placed, 0.8 meter above the ground plane, as shown in section 5.6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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

Remark: *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.*

2.In the emission table above, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength (µV/m at 3-meter)	Field Strength (dBµV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Test Configuration

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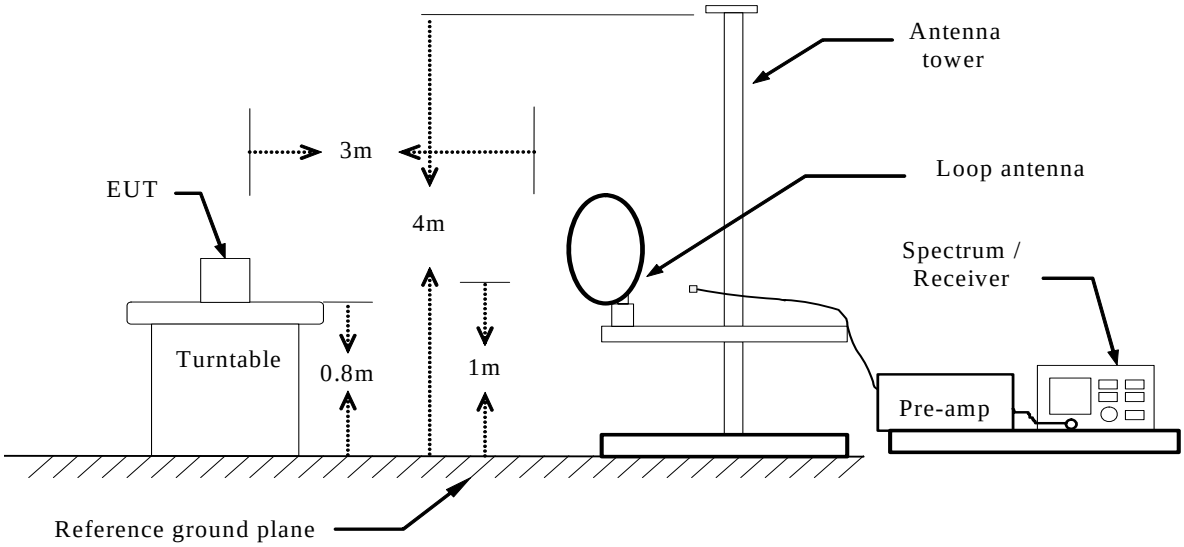
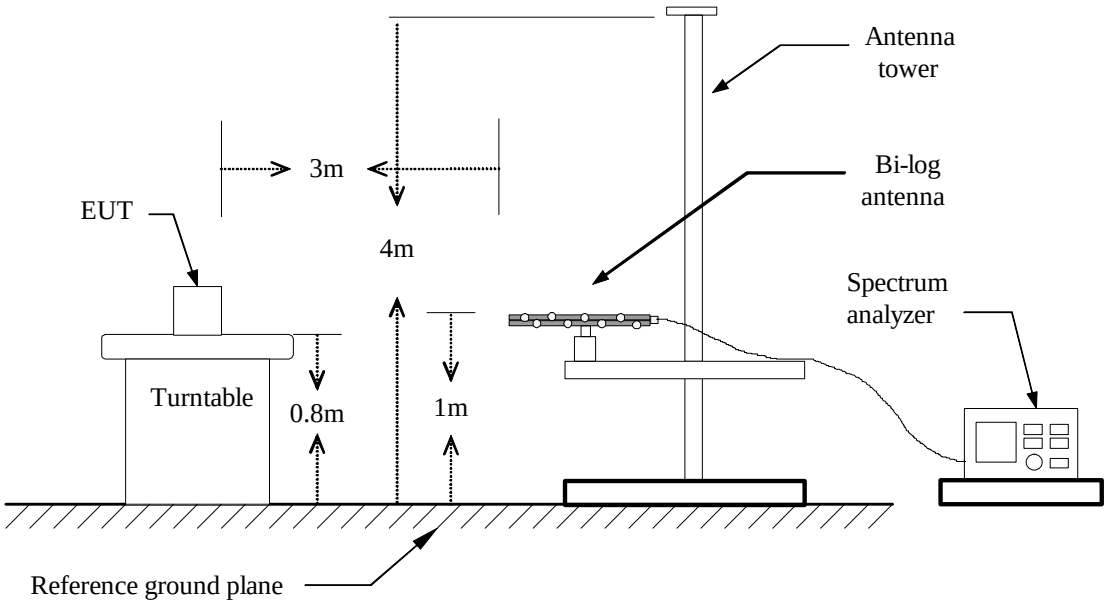
Below 30MHz



Below 1 GHz



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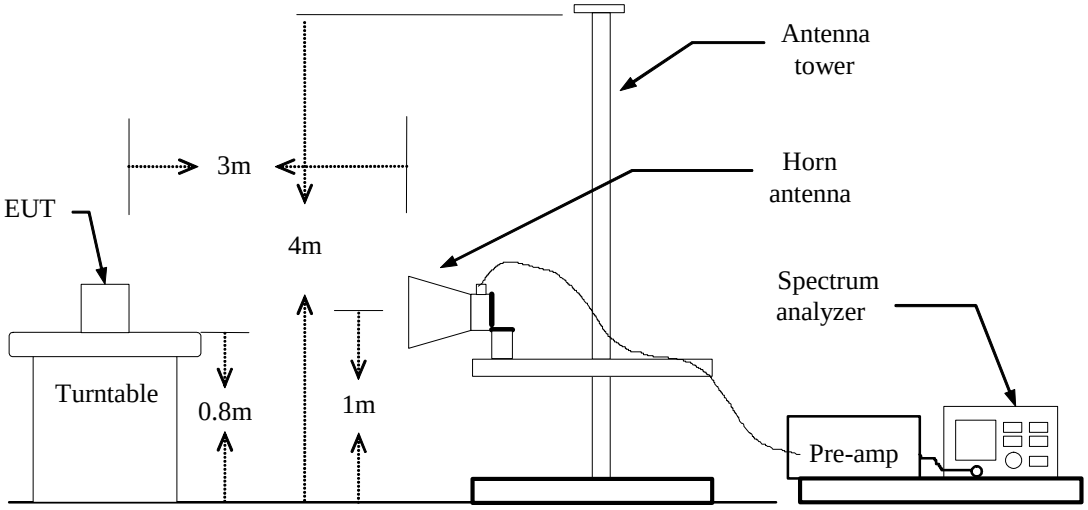
Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

   Below 1GHz:

   RBW=100kHz / VBW=300kHz / Sweep=AUTO

   Above 1GHz:

   (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

   (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

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TEST RESULTS

Below 1 GHz

Operation Mode:	Normal Link	**Test Date:**	2013-12-22
Temperature:	25°C	Tested by:	Blent.Wang
Humidity:	48% RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
44.5500	V	20.91	12.48	33.39	40.00	-6.61	Peak
58.1300	V	28.12	8.09	36.21	40.00	-3.79	Peak
156.1000	V	17.27	13.48	30.75	43.50	-12.75	Peak
375.3200	V	21.47	17.45	38.92	46.00	-7.08	Peak
625.5800	V	17.07	21.39	38.46	46.00	-7.54	Peak
828.3100	V	13.48	24.69	38.17	46.00	-7.83	Peak
58.1300	H	28.42	8.09	36.51	40.00	-3.49	Peak
219.1500	H	19.23	13.33	32.56	46.00	-13.44	Peak
293.8400	H	21.76	14.94	36.70	46.00	-9.30	Peak
625.5800	H	15.04	21.39	36.43	46.00	-9.57	Peak
832.1900	H	14.48	24.82	39.30	46.00	-6.70	Peak
935.9800	H	15.10	25.30	40.40	46.00	-5.60	Peak

Remark:

1. Measuring frequencies from 30 MHz to the 1GHz.(no emission found from the lowest internal used/generated frequency to 30MHz)
2. Radiated emissions measured were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).

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Above 1 GHz

Operation Mode:	Tx / IEEE 802.11a mode CH Low	**Test Date:**	December 22, 2013
Temperature:	25°C	**Tested by:**	Blent.Wang
Humidity:	55% RH	**Polarity:**	Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5168.269	61.71	-7.28	54.43	74.00	-19.57	106	360	peak
2	5169.334	48.53	-7.22	41.31	54.00	-12.69	100	345	AVG
3	10344.551	46.36	4.56	50.92	74.00	-23.08	100	151	peak
4	14621.795	41.88	9.31	51.19	74.00	-22.81	100	249	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5168.269	60.92	-7.28	53.64	74.00	-20.36	100	275	peak
2	10371.795	56.35	4.73	61.08	74.00	-12.92	100	67	peak
3	10371.823	44.79	4.73	49.52	54.00	-4.48	100	74	AVG
4	11298.077	44.47	6.49	50.96	74.00	-23.04	100	24	peak
N/A									

Operation Mode:	Tx / IEEE 802.11a mode CH Mid	**Test Date:**	December 22, 2013
Temperature:	25°C	**Tested by:**	Blent.Wang
Humidity:	55% RH	**Polarity:**	Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5195.513	57.34	-7.20	50.14	74.00	-23.86	100	276	peak
2	5522.436	58.78	-6.79	51.99	74.00	-22.01	100	343	peak
3	10399.039	47.14	4.91	52.05	74.00	-21.95	100	146	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5522.436	61.86	-6.79	55.07	74.00	-18.93	100	297	peak
2	5522.624	49.16	-6.79	42.37	54.00	-11.63	100	290	AVG
3	10399.039	55.98	4.91	60.89	74.00	-13.11	100	78	peak
4	10399.247	40.31	4.91	45.22	54.00	-8.78	100	120	AVG
5	14567.308	41.95	9.23	51.18	74.00	-22.82	100	250	peak
N/A									

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Operation Mode:	Tx / IEEE 802.11a mode CH High	**Test Date:**	December 22, 2013
Temperature:	25°C	**Tested by:**	Blent.Wang
Humidity:	55% RH	**Polarity:**	Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5522.436	57.93	-6.79	51.14	74.00	-22.86	100	212	peak
2	10480.769	48.48	4.68	53.16	74.00	-20.84	100	145	peak
3	14512.820	42.24	8.56	50.80	74.00	-23.20	201	242	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5549.680	61.26	-6.71	54.55	74.00	-19.45	100	291	peak
2	5549.731	55.59	-6.71	48.88	54.00	-5.12	100	291	AVG
3	10480.769	53.38	4.68	58.06	74.00	-15.94	100	79	peak
4	10480.654	41.67	4.68	46.35	54.00	-7.65	100	84	AVG
5	14594.551	42.21	9.56	51.77	74.00	-22.23	100	54	peak
N/A									

Operation Mode:	TX / draft 802.11n Standard-20 MHz Channel mode /CH Low	**Test Date:**	December 22, 2013
Temperature:	25°C	**Tested by:**	Blent.Wang
Humidity:	55% RH	**Polarity:**	Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5495.192	56.48	-6.86	49.62	74.00	-24.38	100	341	peak
2	10371.795	44.07	4.73	48.80	74.00	-25.20	100	145	peak
3	14594.551	41.42	9.56	50.98	74.00	-23.02	103	0	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5495.192	57.68	-6.86	50.82	74.00	-23.18	100	295	peak
2	10371.795	52.45	4.73	57.18	74.00	-16.82	100	108	peak
3	10371.638	42.63	4.73	47.36	54.00	-6.64	100	112	AVG
4	14594.551	41.14	9.56	50.70	74.00	-23.30	97	360	peak
N/A									

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Operation Mode:	TX / draft 802.11n Standard-20 MHz Channel mode /CH Mid	**Test Date:**	December 22, 2013
Temperature:	25°C	**Tested by:**	Blent.Wang
Humidity:	55% RH	**Polarity:**	Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5522.436	56.29	-6.79	49.50	74.00	-24.50	100	340	peak
2	10399.039	44.76	4.91	49.67	74.00	-24.33	100	149	peak
3	11625.000	42.79	6.59	49.38	74.00	-24.62	100	352	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5522.436	56.79	-6.79	50.00	74.00	-24.00	100	321	peak
2	10399.039	52.41	4.91	57.32	74.00	-16.68	100	68	peak
3	10399.221	43.80	4.93	48.73	54.00	-5.27	100	71	AVG
4	11107.372	42.67	7.43	50.10	74.00	-23.90	100	317	peak
N/A									

Operation Mode:	TX / draft 802.11n Standard-20 MHz Channel mode /CH High	**Test Date:**	December 22, 2013
Temperature:	25°C	**Tested by:**	Blent.Wang
Humidity:	55% RH	**Polarity:**	Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5549.680	56.49	-6.71	49.78	74.00	-24.22	100	337	peak
2	9990.385	44.88	3.43	48.31	74.00	-25.69	100	324	peak
3	10862.180	43.66	5.79	49.45	74.00	-24.55	100	215	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	10480.769	49.61	4.68	54.29	74.00	-19.71	100	70	peak
2	10480.685	41.69	4.64	46.33	54.00	-7.67	100	83	AVG
3	11052.885	42.40	6.83	49.23	74.00	-24.77	100	40	peak
4	14594.551	41.41	9.56	50.97	74.00	-23.03	100	210	peak
N/A									

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Operation Mode:	TX / draft 802.11n Wide-40 MHz Channel mode/CH Low	**Test Date:**	December 22, 2013
Temperature:	25°C	**Tested by:**	Blent.Wang
Humidity:	55% RH	**Polarity:**	Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5495.192	55.45	-6.86	48.59	74.00	-25.41	100	335	peak
2	11189.103	42.59	6.86	49.45	74.00	-24.55	100	264	peak
3	14621.795	41.55	9.31	50.86	74.00	-23.14	100	176	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	10399.039	48.81	4.91	53.72	74.00	-20.28	100	81	peak
2	11625.000	43.58	6.59	50.17	74.00	-23.83	100	187	peak
3	14567.308	41.07	9.23	50.30	74.00	-23.70	100	222	peak
N/A									

Operation Mode:	TX / draft 802.11n Wide-40 MHz Channel mode /CH High	**Test Date:**	December 22, 2013
Temperature:	25°C	**Tested by:**	Blent.Wang
Humidity:	55% RH	**Polarity:**	Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5549.680	53.32	-6.71	46.61	74.00	-27.39	100	336	peak
2	10889.423	43.42	6.06	49.48	74.00	-24.52	100	140	peak
3	14485.577	42.44	8.38	50.82	74.00	-23.18	99	0	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	10480.769	46.32	4.68	51.00	74.00	-23.00	100	85	peak
2	11298.077	42.84	6.49	49.33	74.00	-24.67	121	360	peak
3	14594.551	41.09	9.56	50.65	74.00	-23.35	100	249	peak
N/A									

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Operation Mode:	TX / draft 802.11ac Standard-20 MHz Channel mode /CH Low	**Test Date:**	December 22, 2013
Temperature:	25°C	**Tested by:**	Blent.Wang
Humidity:	55% RH	**Polarity:**	Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5495.192	55.79	-6.86	48.93	74.00	-25.07	100	204	peak
2	10862.180	44.09	5.79	49.88	74.00	-24.12	115	360	peak
3	14594.551	41.95	9.56	51.51	74.00	-22.49	100	94	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5495.192	58.98	-6.86	52.12	74.00	-21.88	100	297	peak
2	10371.795	52.23	4.73	56.96	74.00	-17.04	100	85	peak
3	10371.722	41.25	4.73	45.98	54.00	-8.02	100	110	AVG
4	14567.308	41.82	9.23	51.05	74.00	-22.95	100	360	peak
N/A									

Operation Mode:	TX / draft 802.11ac Standard-20 MHz Channel mode/ CH Mid	**Test Date:**	December 22, 2013
Temperature:	25°C	**Tested by:**	Blent.Wang
Humidity:	55% RH	**Polarity:**	Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5522.436	57.00	-6.79	50.21	74.00	-23.79	100	207	peak
2	11052.885	43.03	6.83	49.86	74.00	-24.14	100	21	peak
3	14594.551	41.22	9.56	50.78	74.00	-23.22	100	129	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5522.436	58.90	-6.79	52.11	74.00	-21.89	100	295	peak
2	10399.039	52.31	4.91	57.22	74.00	-16.78	100	69	peak
3	10399.142	39.96	4.91	44.87	54.00	-9.13	100	124	AVG
4	14567.308	42.54	9.23	51.77	74.00	-22.23	100	234	peak
N/A									

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Operation Mode:	TX / draft 802.11ac Standard-20 MHz Channel mode /CH High	**Test Date:**	December 22, 2013
Temperature:	25°C	**Tested by:**	Blent.Wang
Humidity:	55% RH	**Polarity:**	Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5522.436	56.35	-6.79	49.56	74.00	-24.44	100	353	peak
2	10862.180	43.48	5.79	49.27	74.00	-24.73	100	139	peak
3	14594.551	41.86	9.56	51.42	74.00	-22.58	100	179	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5549.680	58.57	-6.71	51.86	74.00	-22.14	100	295	peak
2	11025.641	42.89	6.45	49.34	74.00	-24.66	100	199	peak
3	14594.551	40.90	9.56	50.46	74.00	-23.54	106	0	peak
N/A									

Operation Mode:	TX / draft 802.11ac Wide-40 MHz Channel mode /CH Low	**Test Date:**	December 22, 2013
Temperature:	25°C	**Tested by:**	Blent.Wang
Humidity:	55% RH	**Polarity:**	Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5658.654	54.09	-6.48	47.61	74.00	-26.39	100	331	peak
2	11298.077	43.23	6.49	49.72	74.00	-24.28	100	219	peak
3	14567.308	41.54	9.23	50.77	74.00	-23.23	97	360	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5522.436	55.50	-6.79	48.71	74.00	-25.29	100	298	peak
2	11298.077	43.29	6.49	49.78	74.00	-24.22	97	0	peak
3	13886.218	43.15	7.82	50.97	74.00	-23.03	100	248	peak
N/A									

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Operation Mode:	TX / draft 802.11ac Wide-40 MHz Channel mode /CH High	**Test Date:**	December 22, 2013
Temperature:	25°C	**Tested by:**	Blent.Wang
Humidity:	55% RH	**Polarity:**	Ver. / Hor.

Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5549.680	52.56	-6.71	45.85	74.00	-28.15	100	360	peak
2	11298.077	42.96	6.49	49.45	74.00	-24.55	100	179	peak
3	14594.551	41.23	9.56	50.79	74.00	-23.21	100	351	peak
N/A									

Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5576.923	56.98	-6.63	50.35	74.00	-23.65	100	291	peak
2	11243.590	43.30	6.65	49.95	74.00	-24.05	100	212	peak
3	14567.308	41.76	9.23	50.99	74.00	-23.01	100	123	peak
N/A									

Operation Mode:	TX / draft 802.11ac wide-80 MHz Channel mode	**Test Date:**	December 22, 2013
Temperature:	25°C	**Tested by:**	Blent.Wang
Humidity:	55% RH	**Polarity:**	Ver. / Hor.

Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5522.436	54.02	-6.79	47.23	74.00	-26.77	100	341	peak
2	11298.077	42.84	6.49	49.33	74.00	-24.67	100	156	peak
3	14567.308	41.35	9.23	50.58	74.00	-23.42	100	65	peak
N/A									

Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	5549.680	55.68	-6.71	48.97	74.00	-25.03	100	298	peak
2	11052.885	42.90	6.83	49.73	74.00	-24.27	100	0	peak
3	14594.551	41.27	9.56	50.83	74.00	-23.17	97	0	peak
N/A									

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Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2.Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3.Average test would be performed if the peak result were greater than the average limit.
4.Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5.Measurements above show only up to 3 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6.Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

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7.7 CONDUCTED UNDESIRABLE EMISSION

LIMIT

According to 15.407(b),

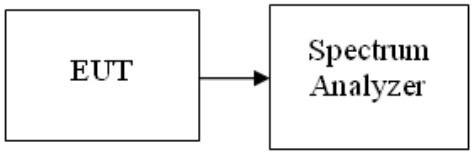
(1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

(3) For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.

The provisions of §15.205 apply to intentional radiators operating under this section.

Test Configuration



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

No non-compliance noted

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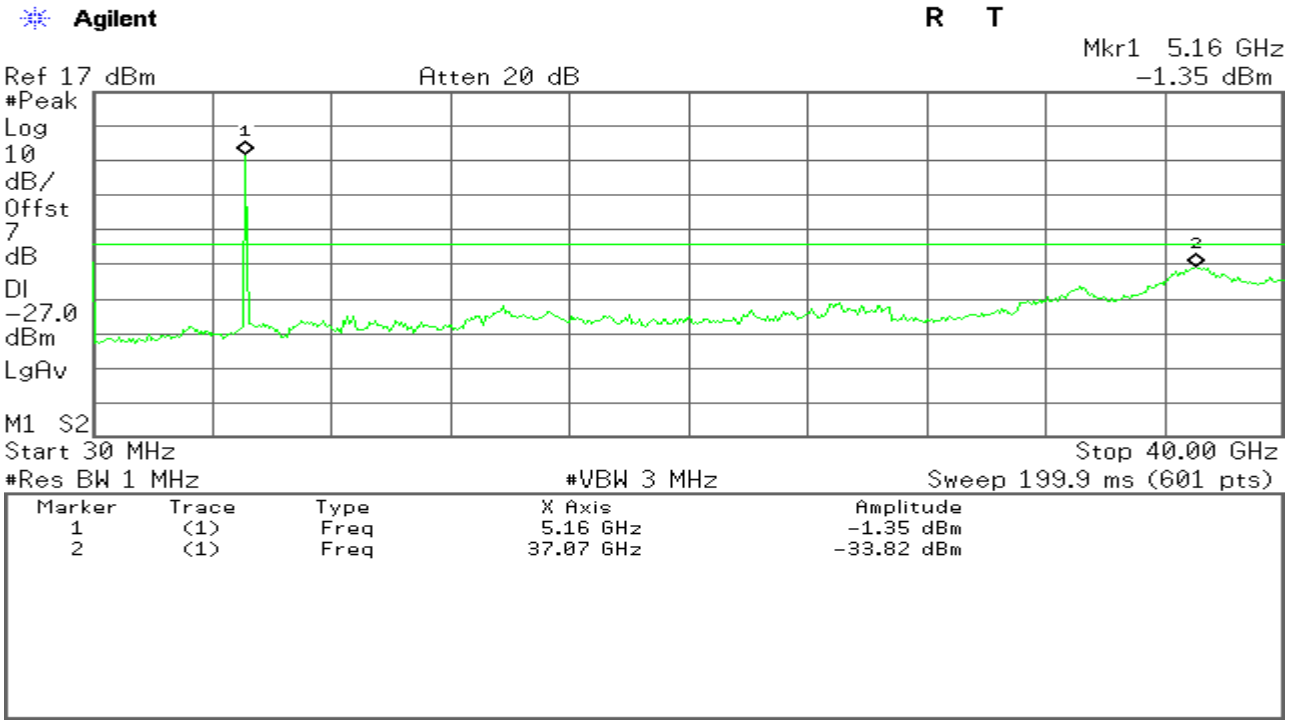
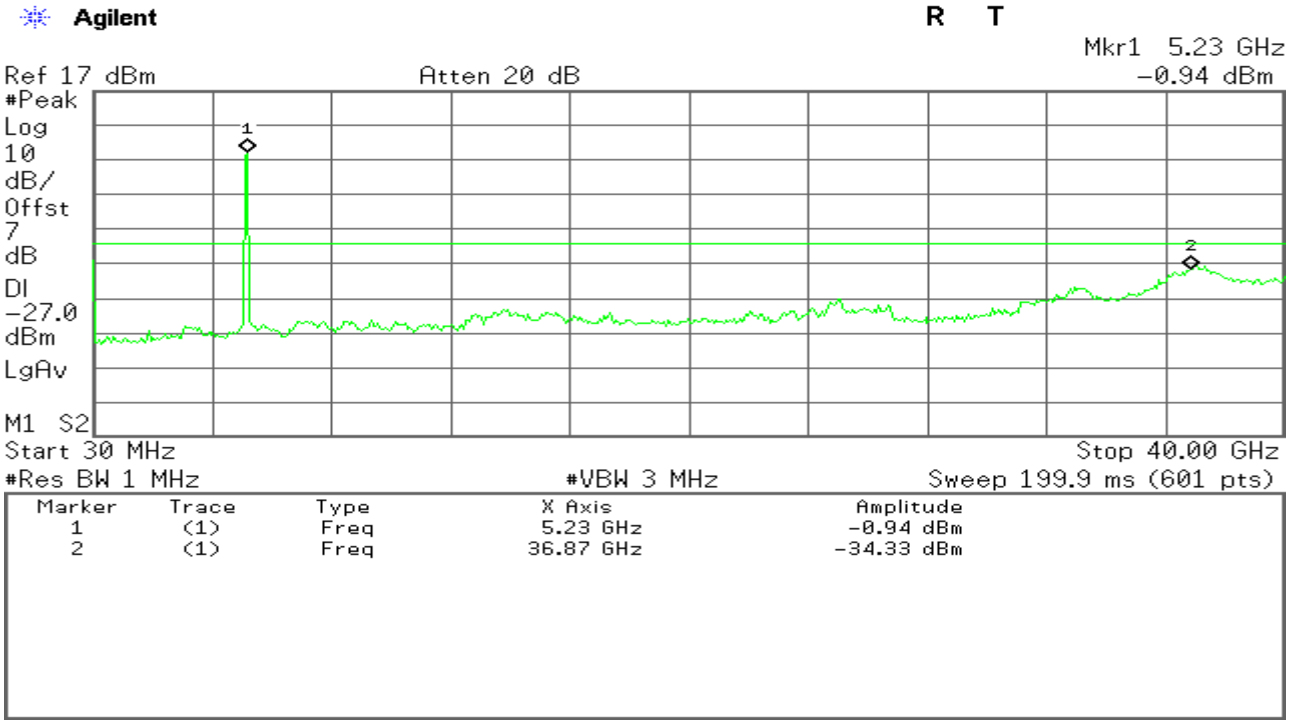
Test Plot
IEEE 802.11a mode/chain 0:

5150~5250MHz

CH Low



CH Mid



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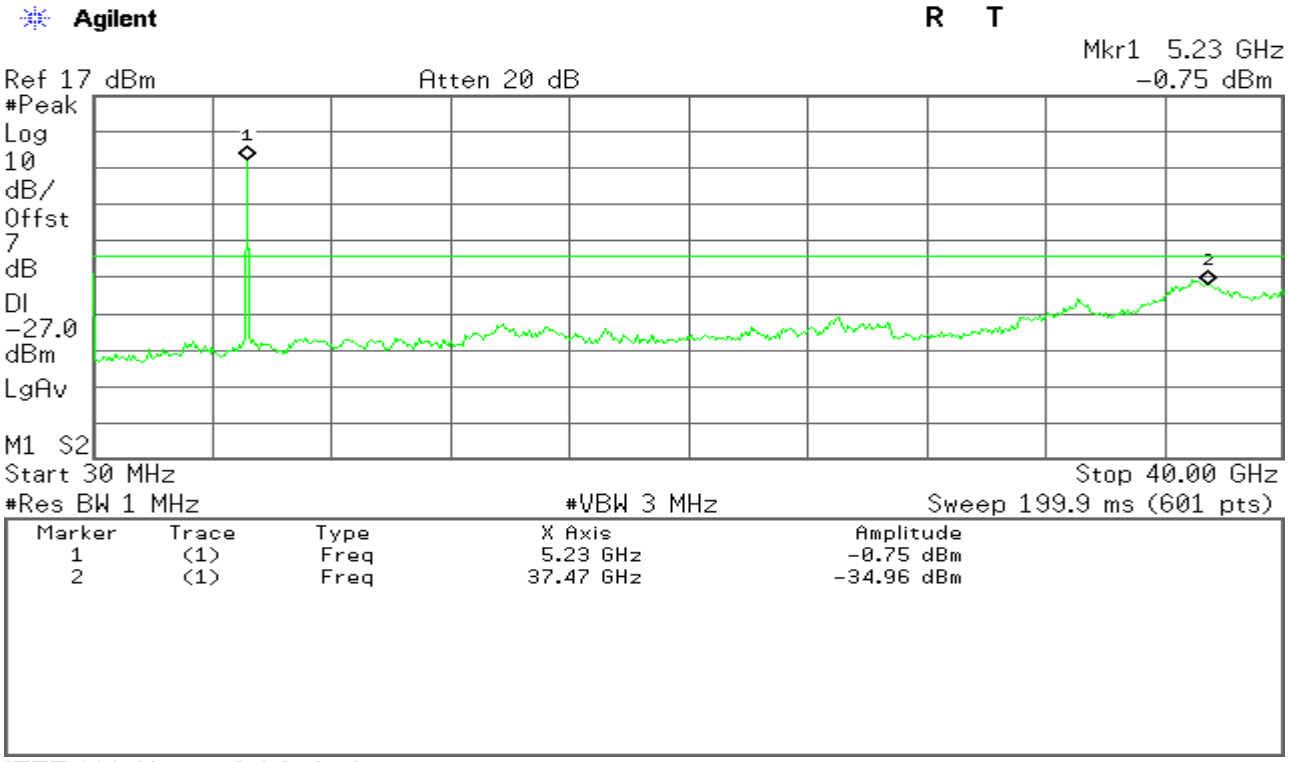
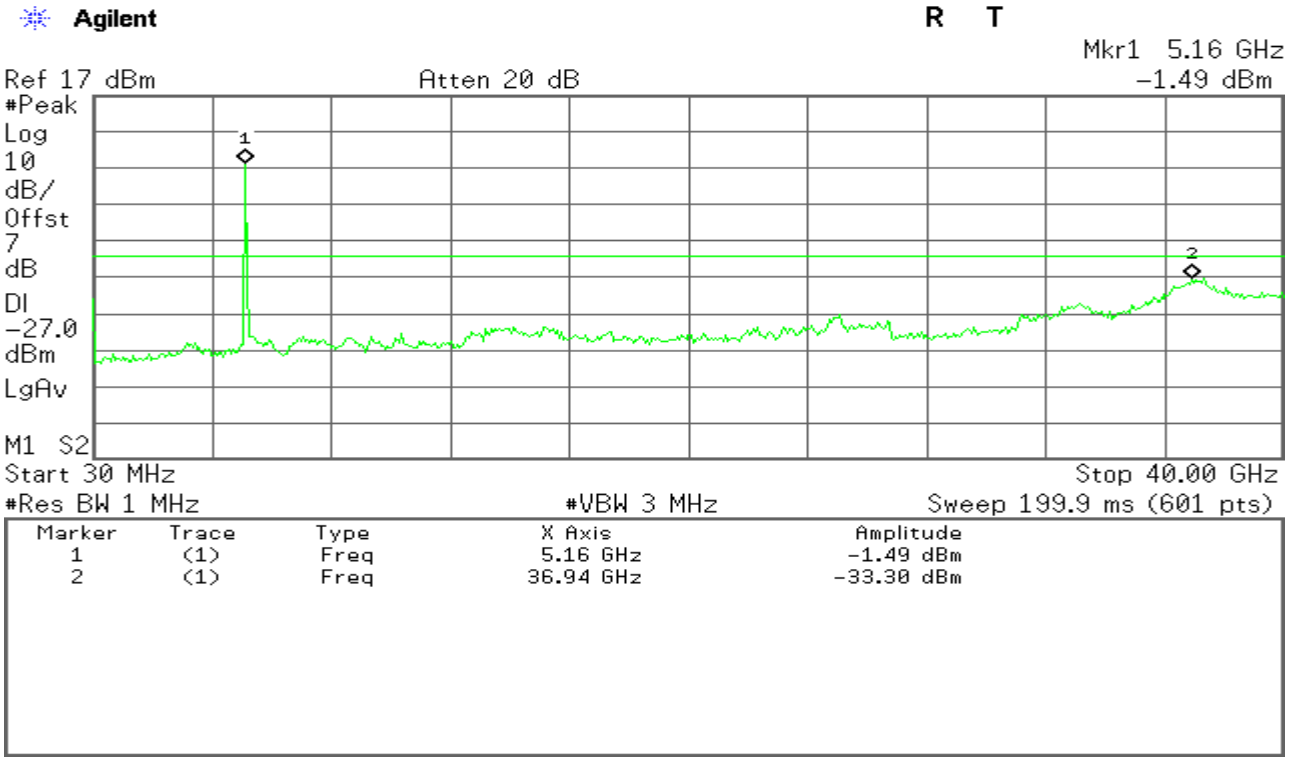
CH High



IEEE 802.11a mode/chain 1:

5150~5250MHz

CH Low



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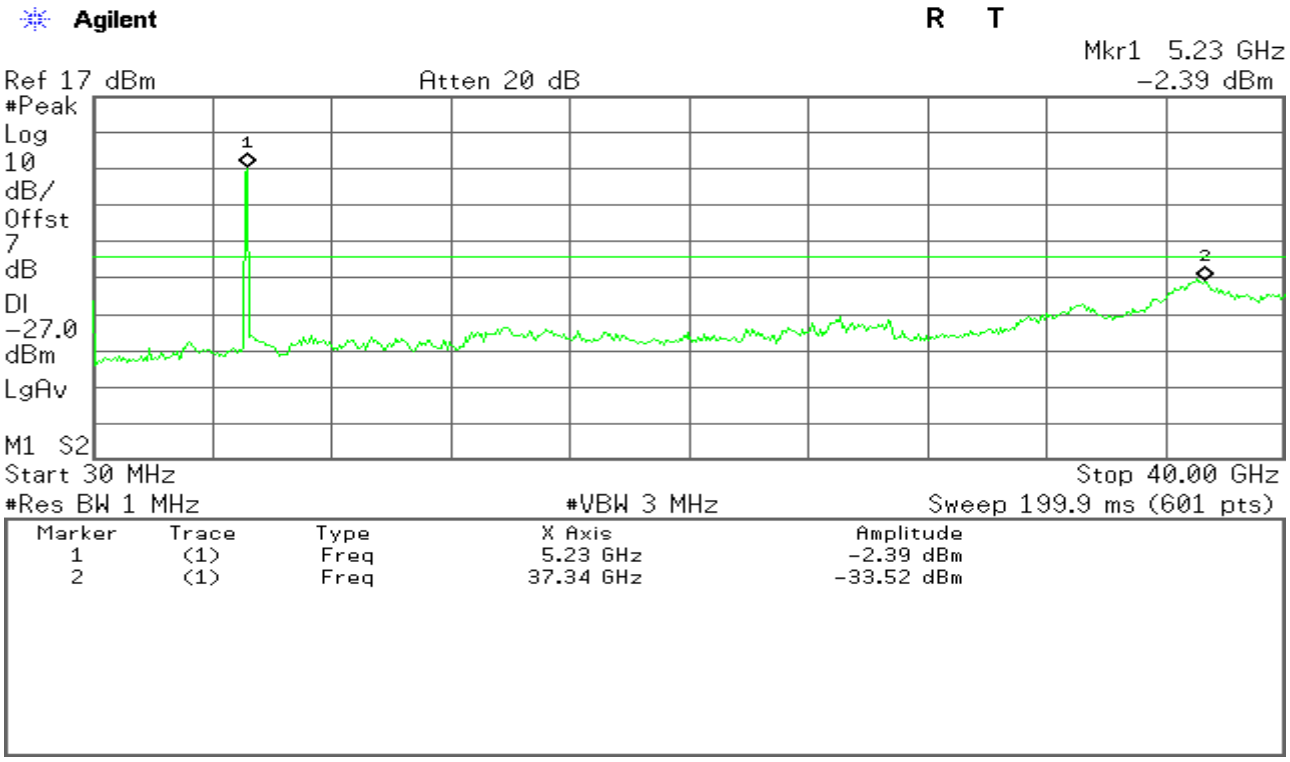
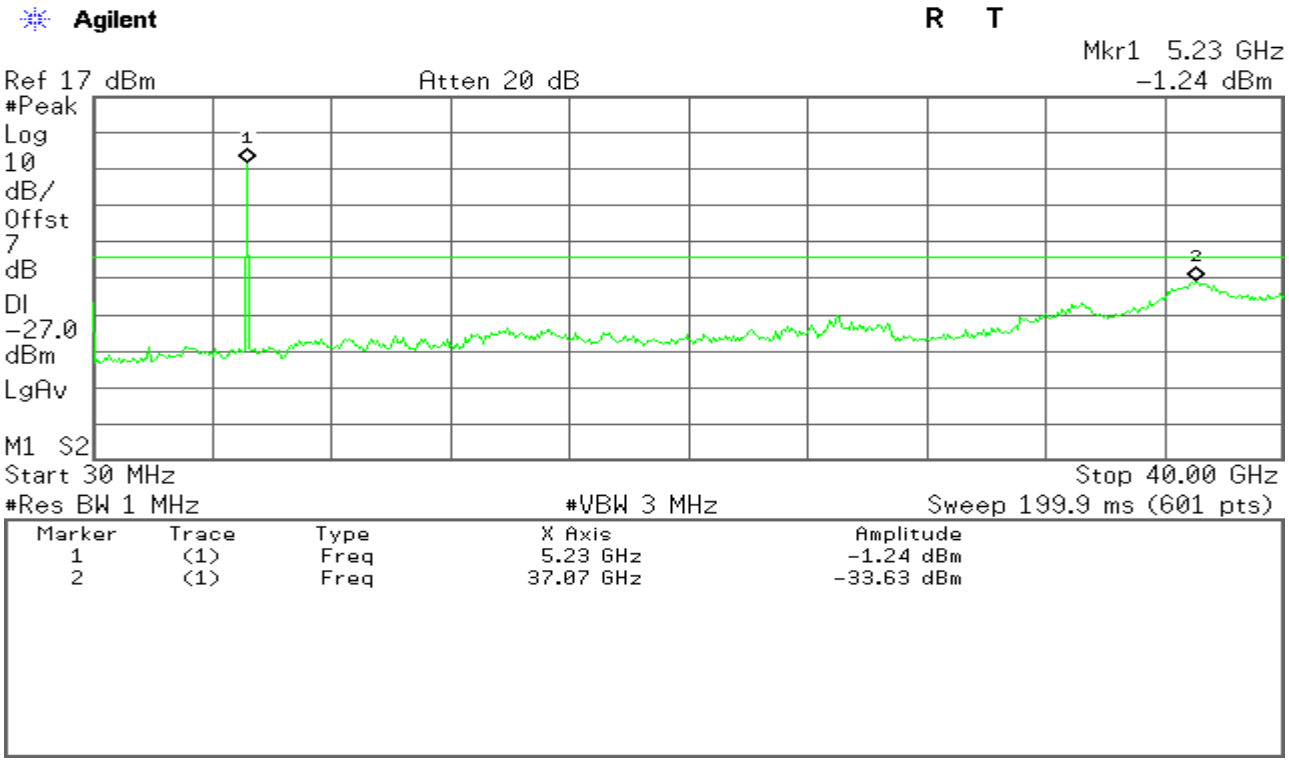
CH Mid



CH High



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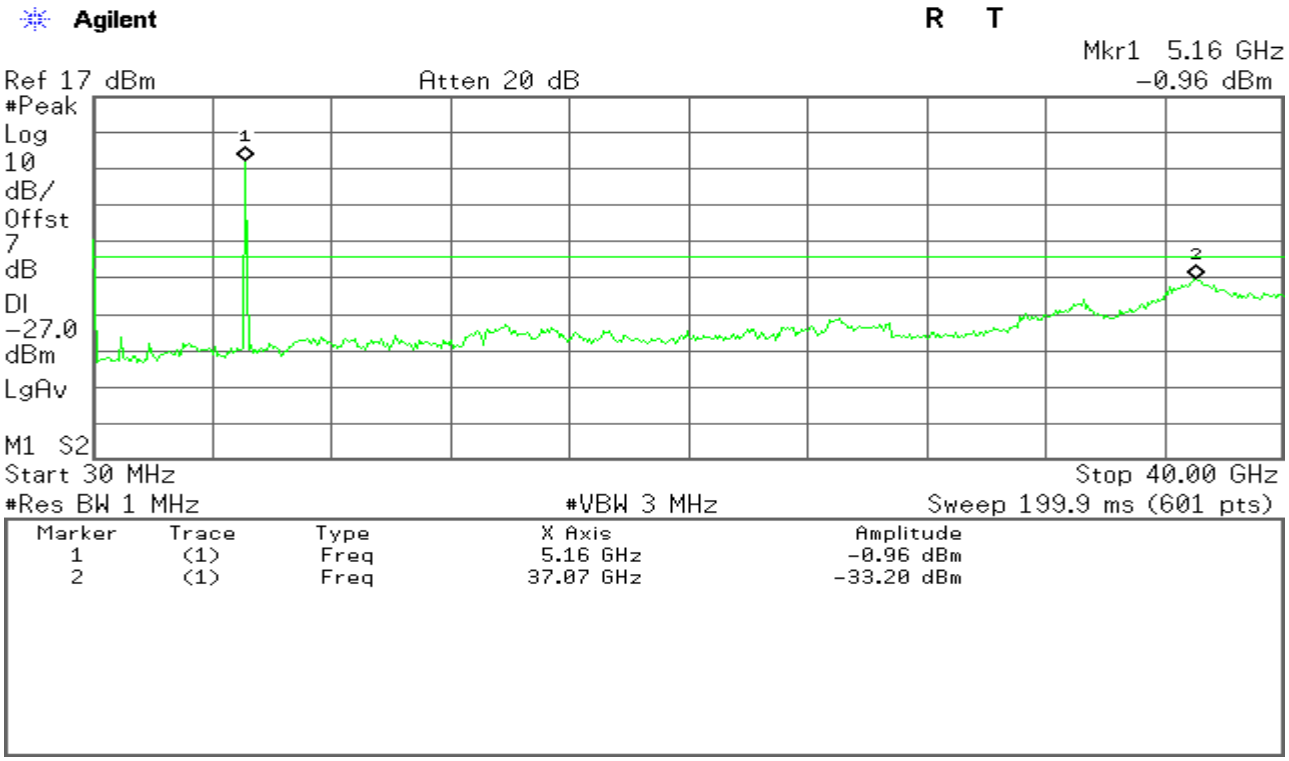
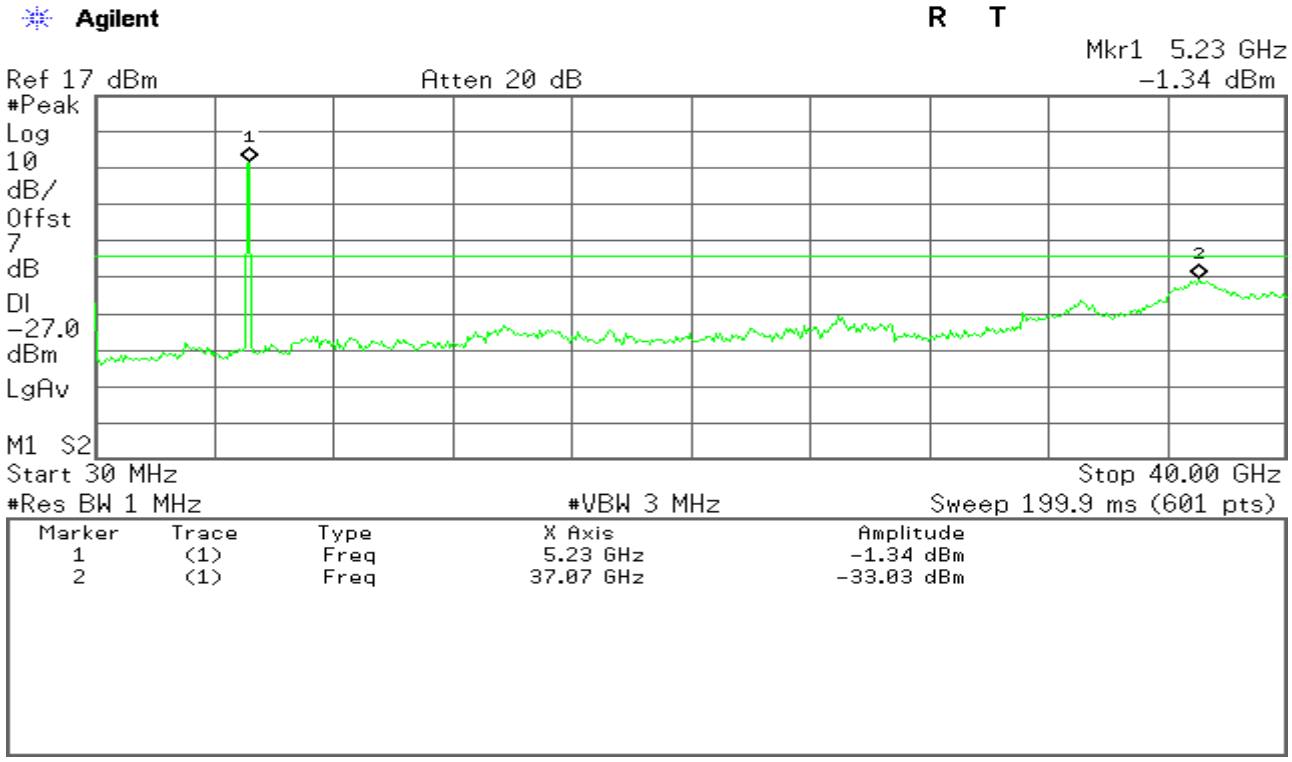
IEEE 802.11a mode/chain 2:

5150~5250MHz

CH Low



CH Mid



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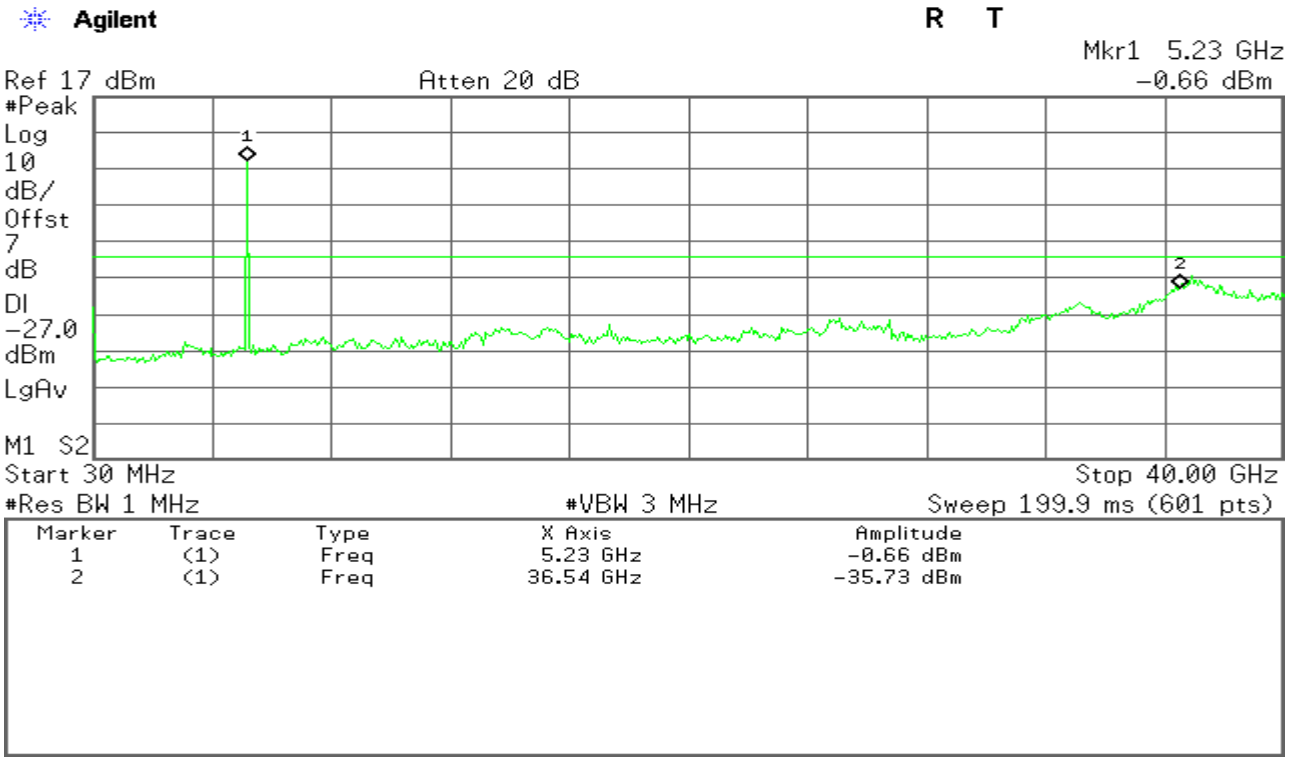
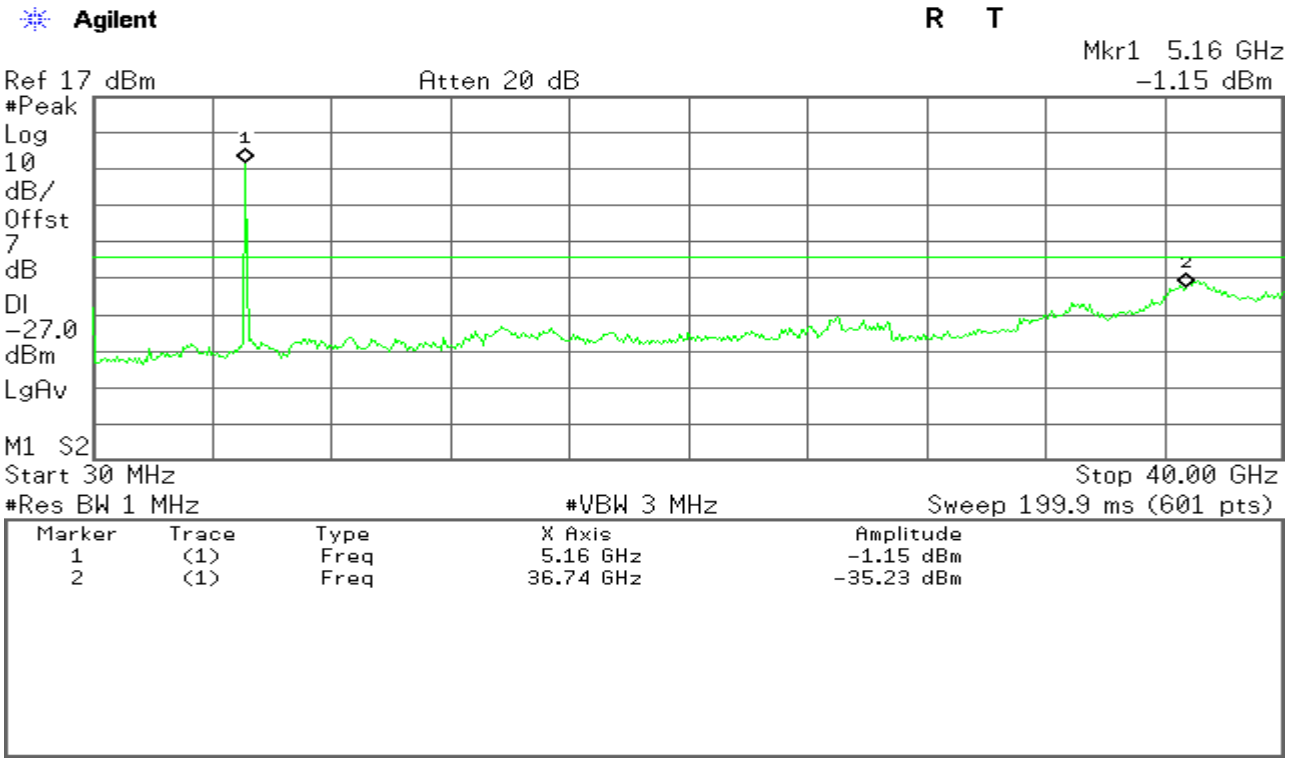
CH High



draft 802.11n Standard-20 MHz Channel mode / Chain 0

5150~5250MHz

CH Low



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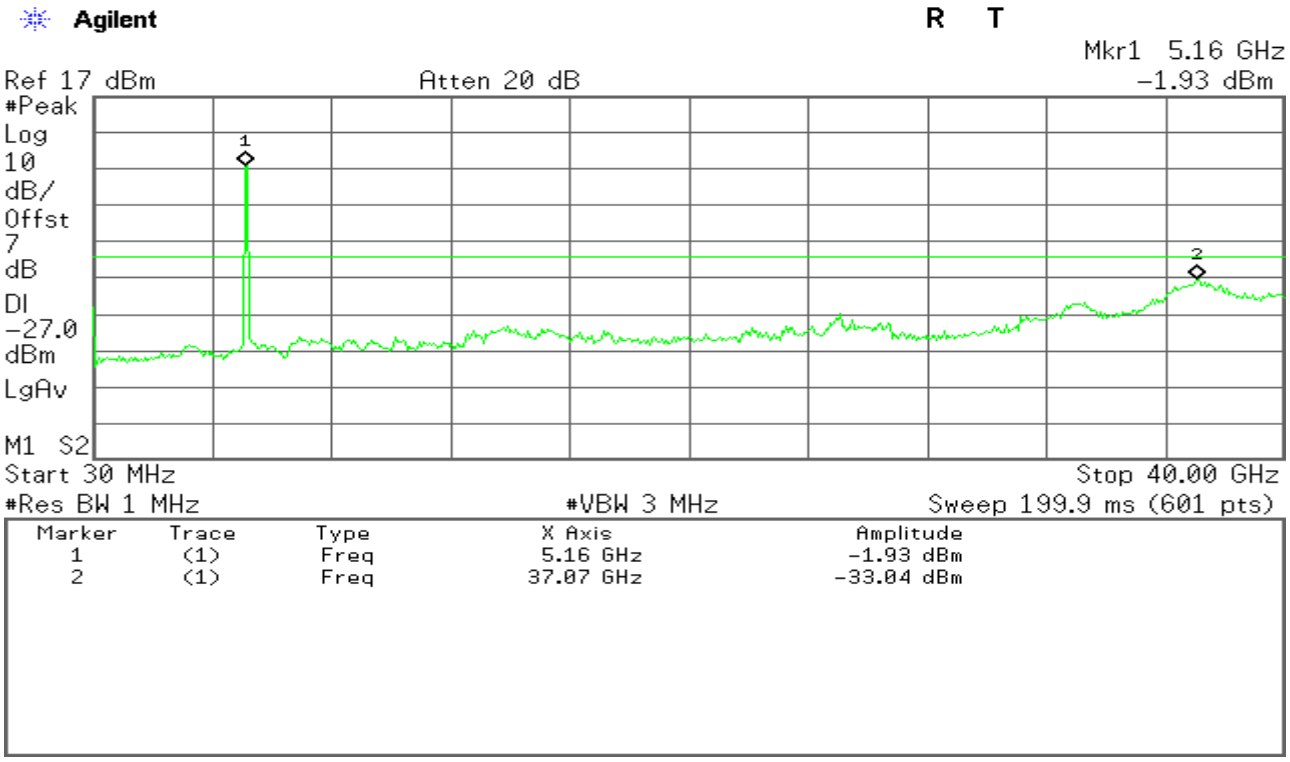
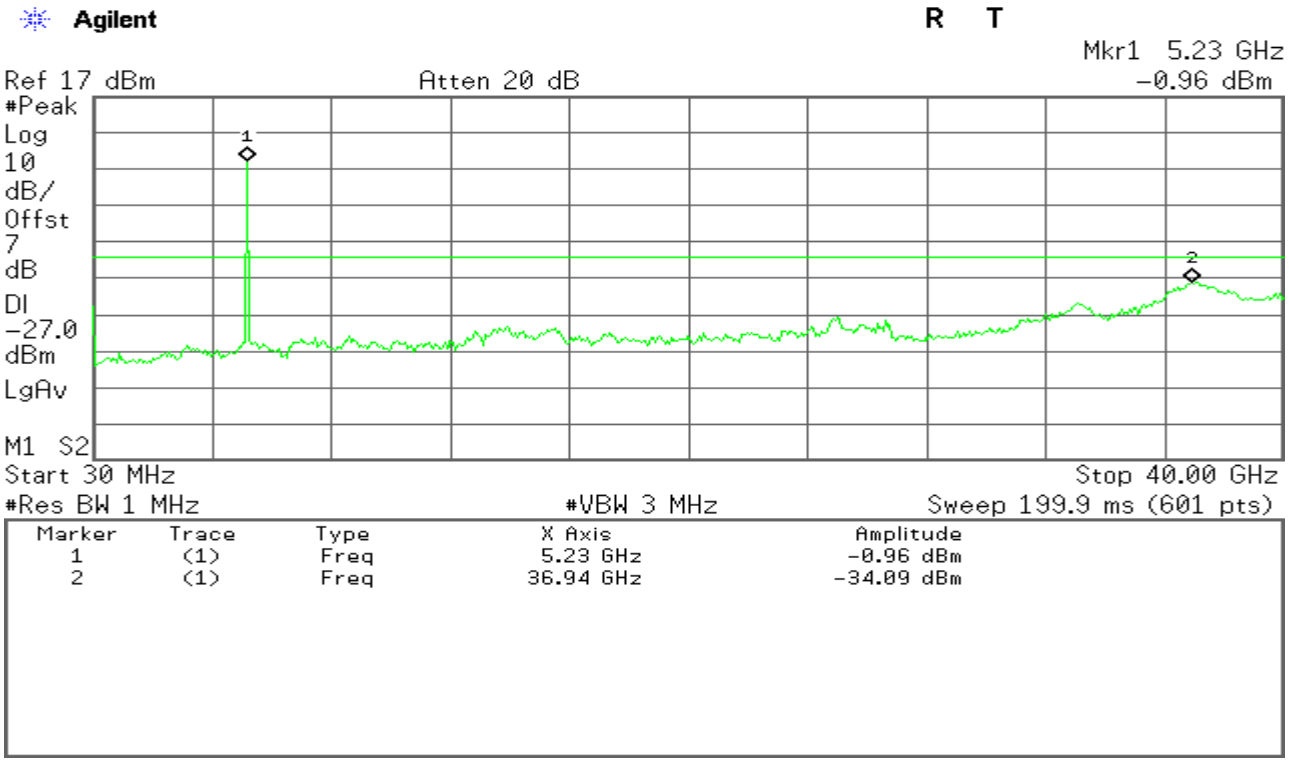
CH Mid



CH High



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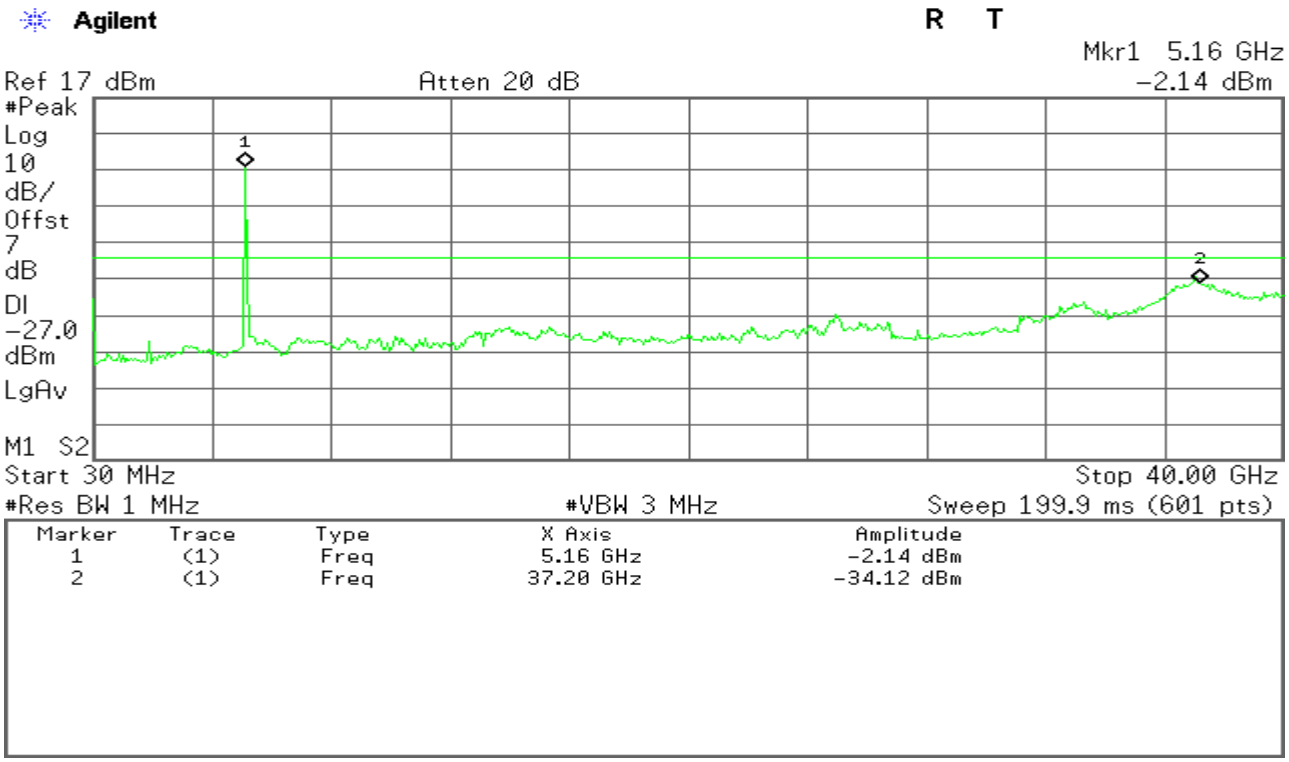
draft 802.11n Standard-20 MHz Channel mode / Chain 1

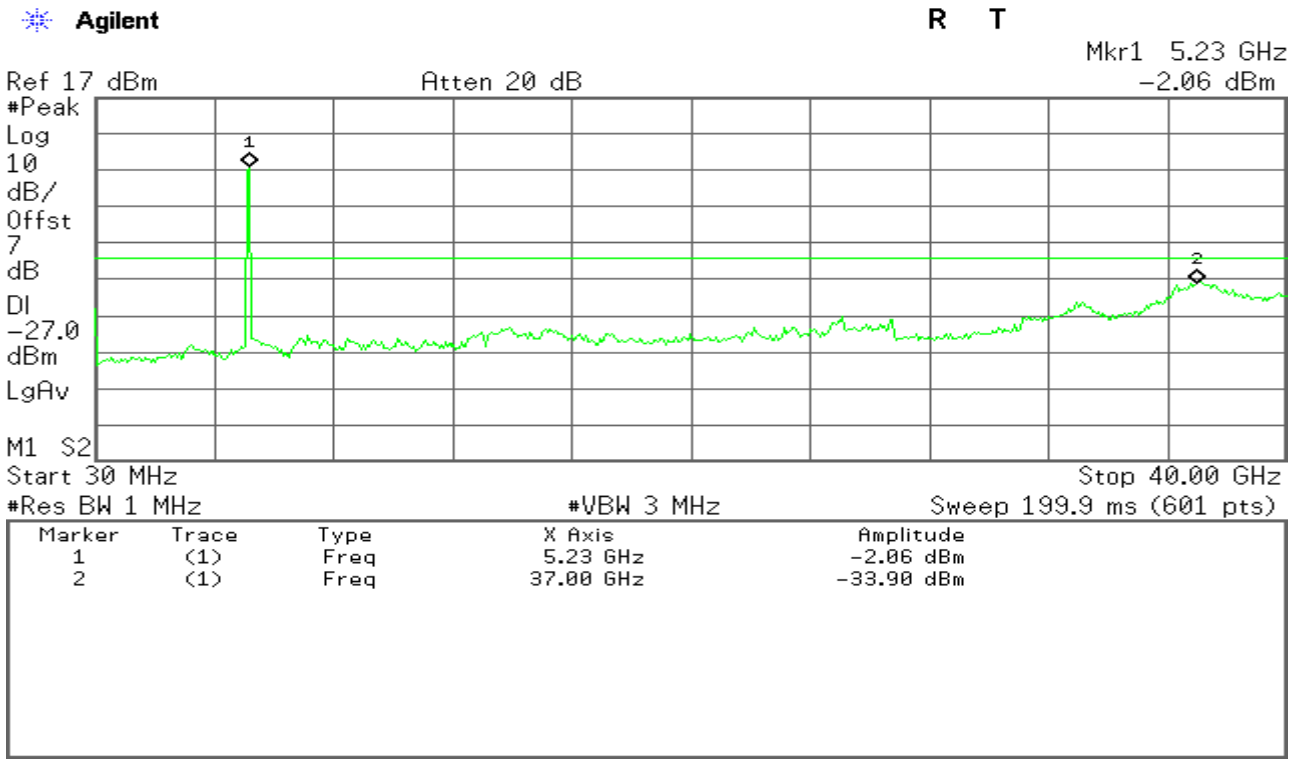
5150~5250MHz

CH Low



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.16 GHz	-2.14 dBm
2	(1)	Freq	37.20 GHz	-34.12 dBm

CH Mid



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.23 GHz	-2.06 dBm
2	(1)	Freq	37.00 GHz	-33.90 dBm

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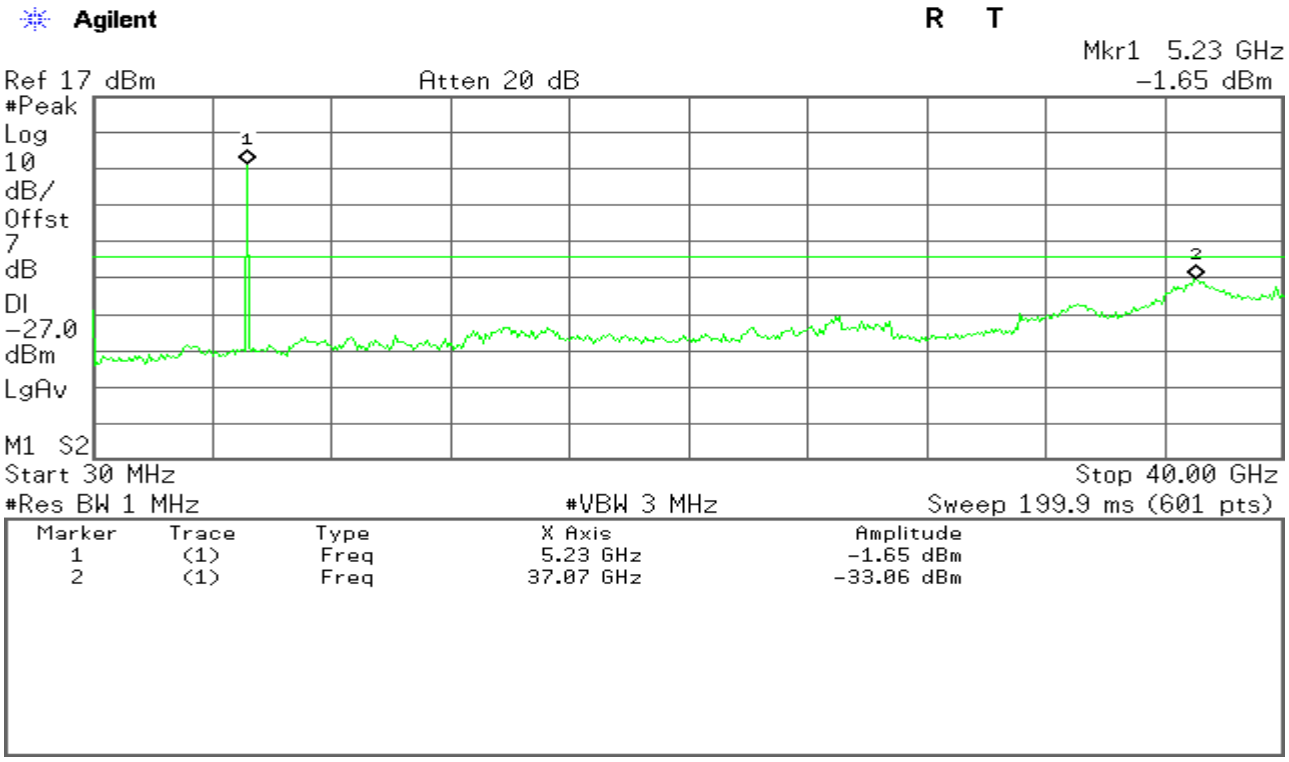
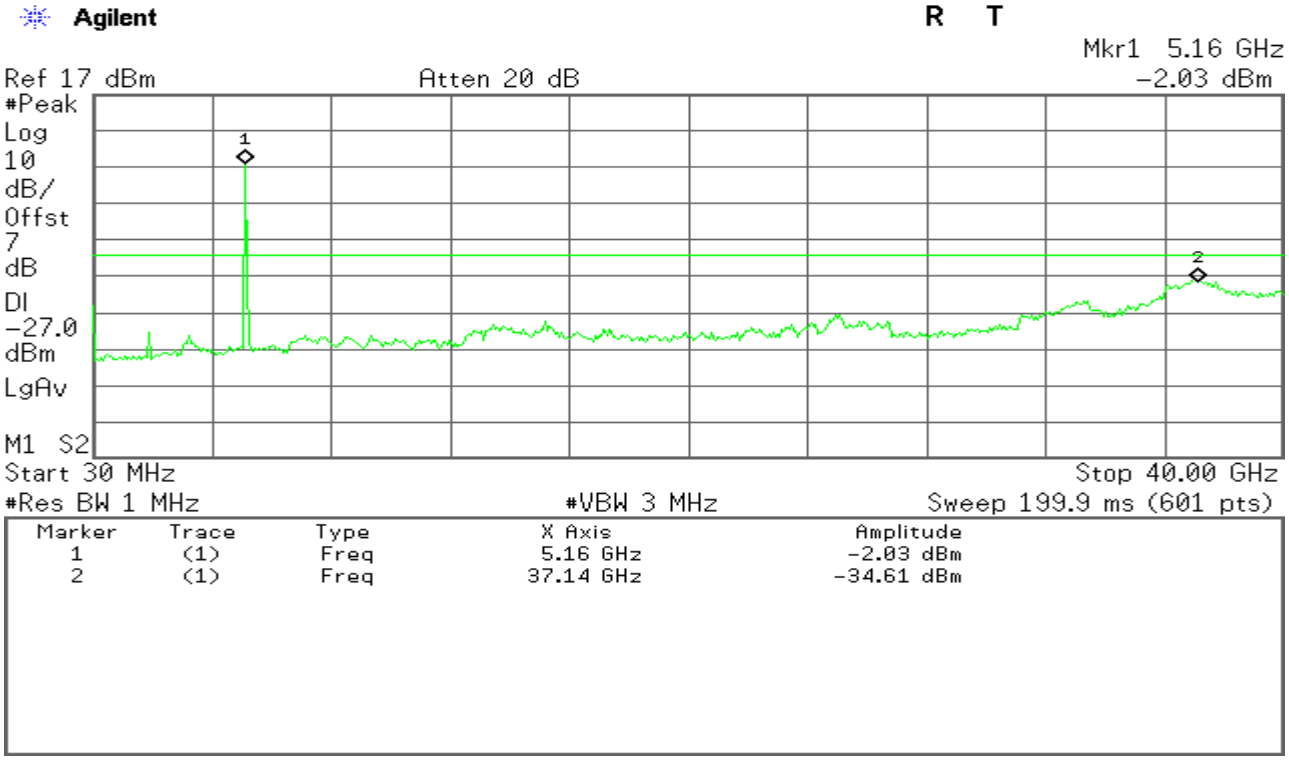
CH High



draft 802.11n Standard-20 MHz Channel mode / Chain 2

5150~5250MHz

CH Low



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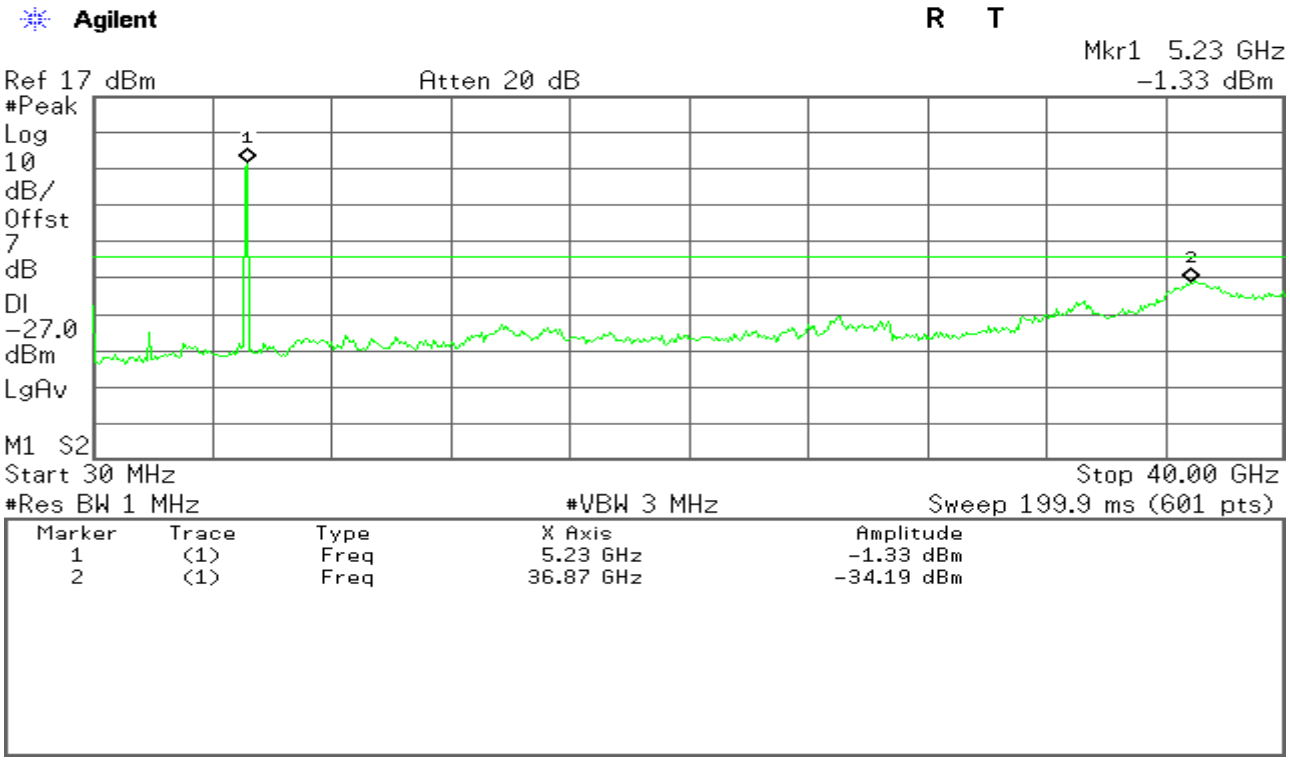
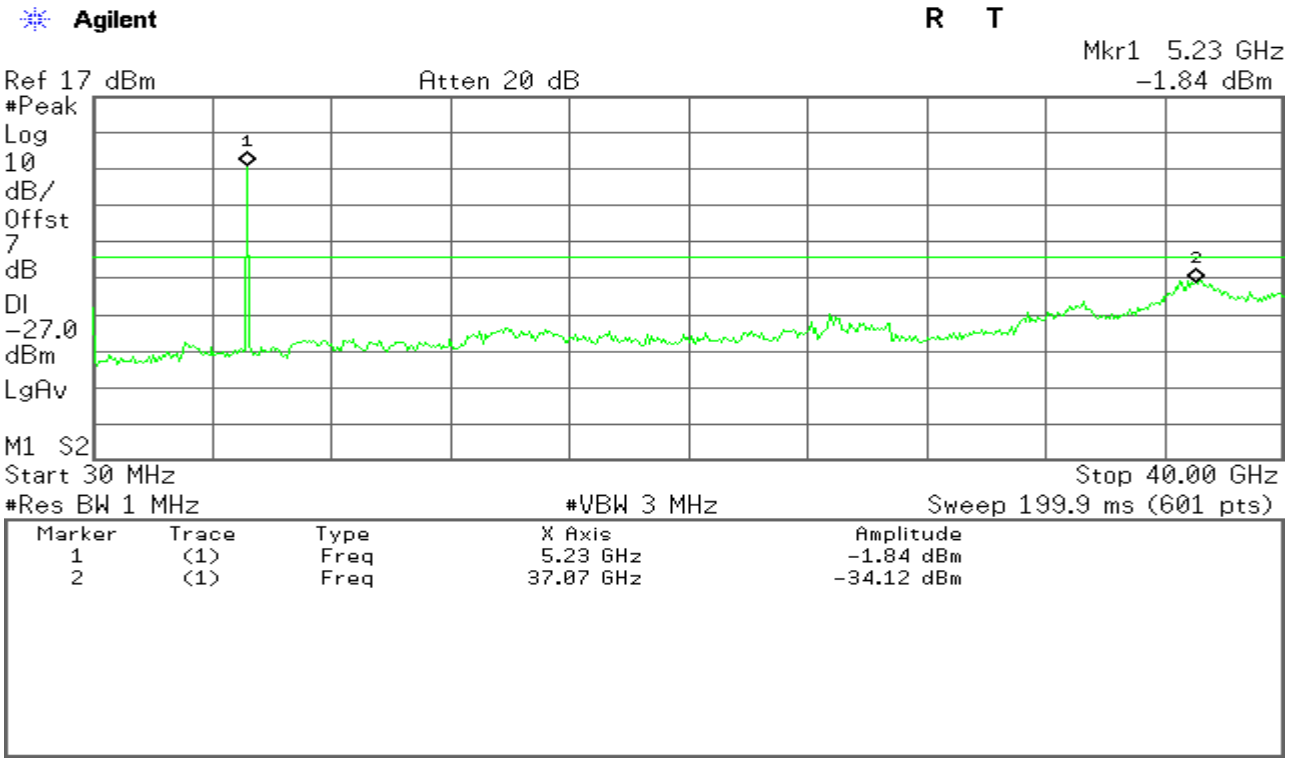
CH Mid



CH High



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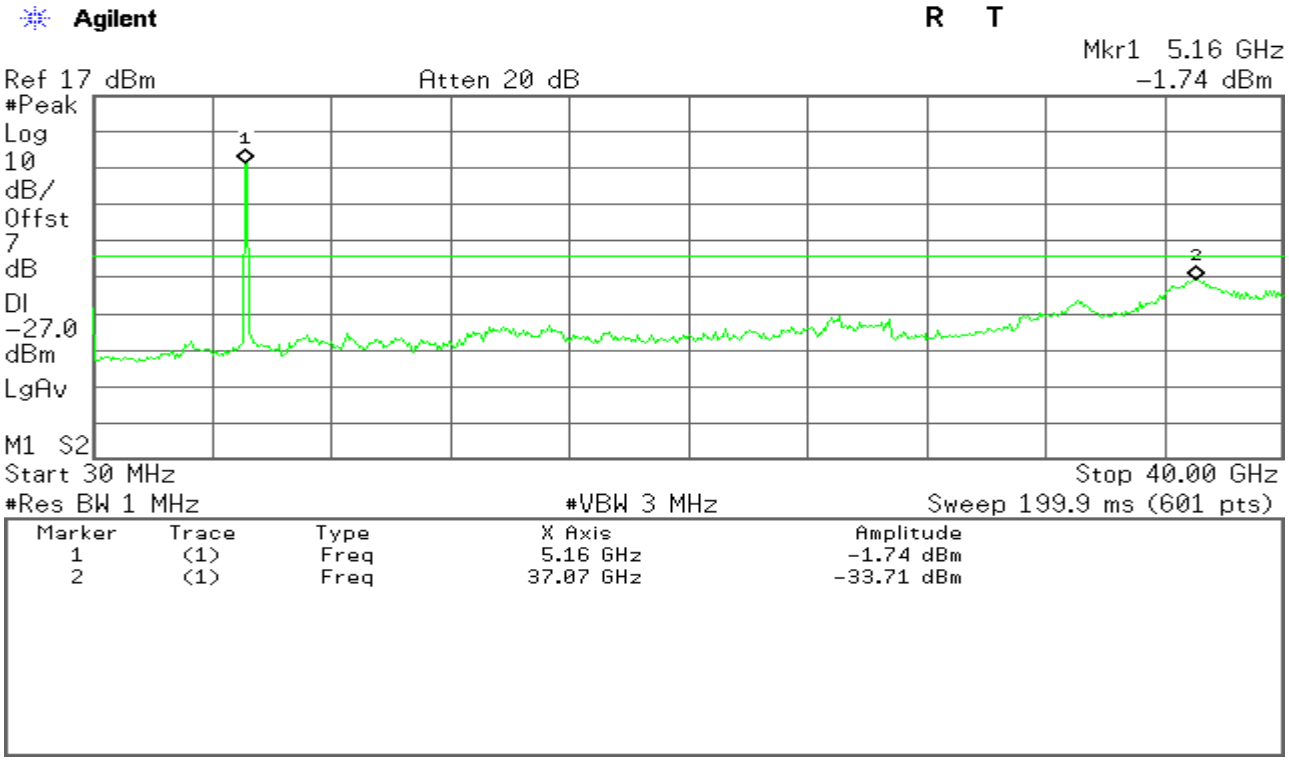
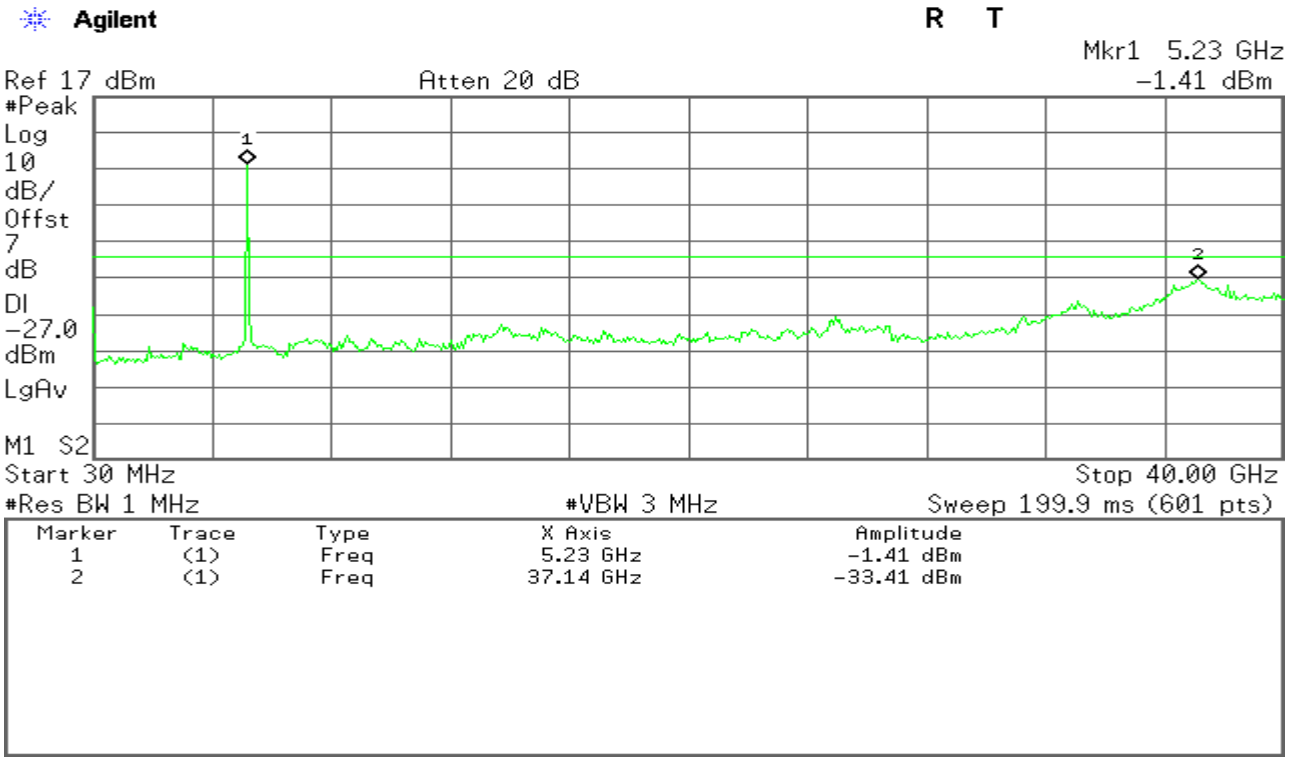
draft 802.11n Wide-40 MHz Channel mode / Chain 0

5150~5250MHz

CH Low



CH High



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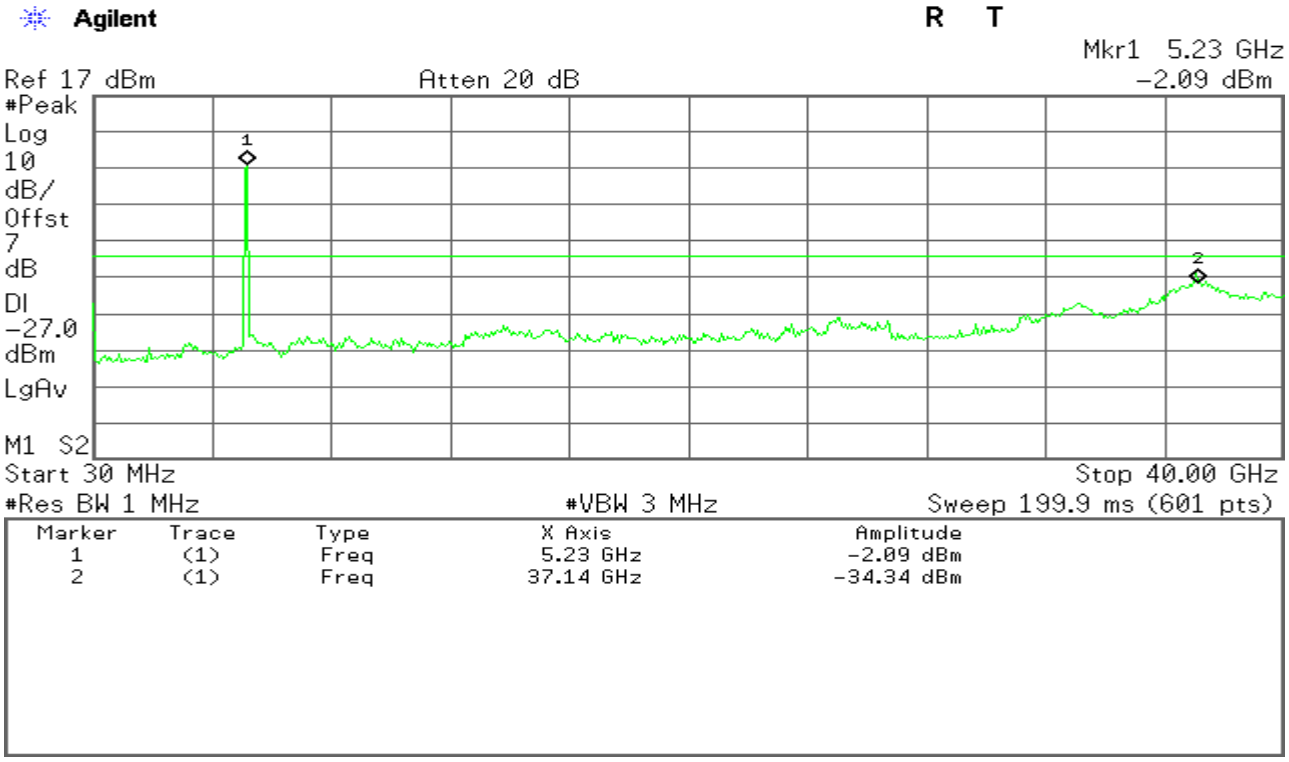
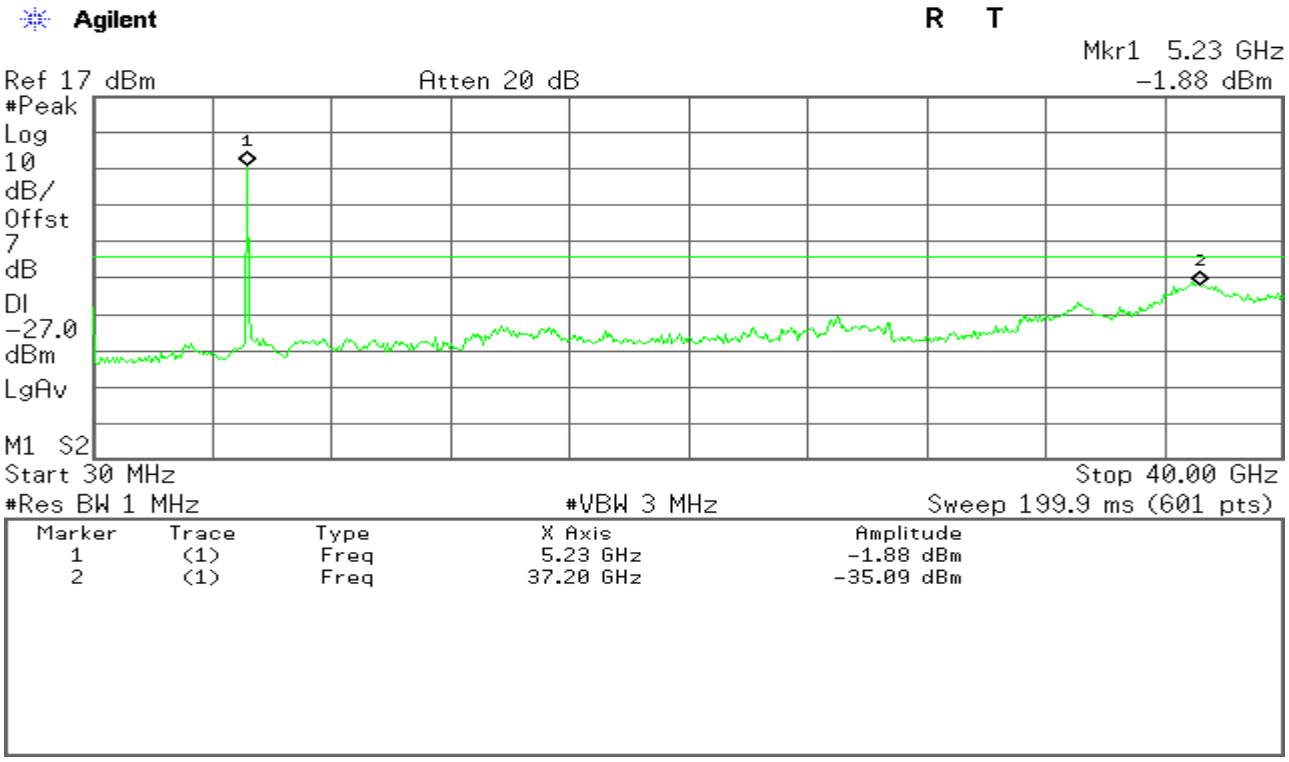
draft 802.11n Wide-40 MHz Channel mode / Chain 1

5150~5250MHz

CH Low



CH High



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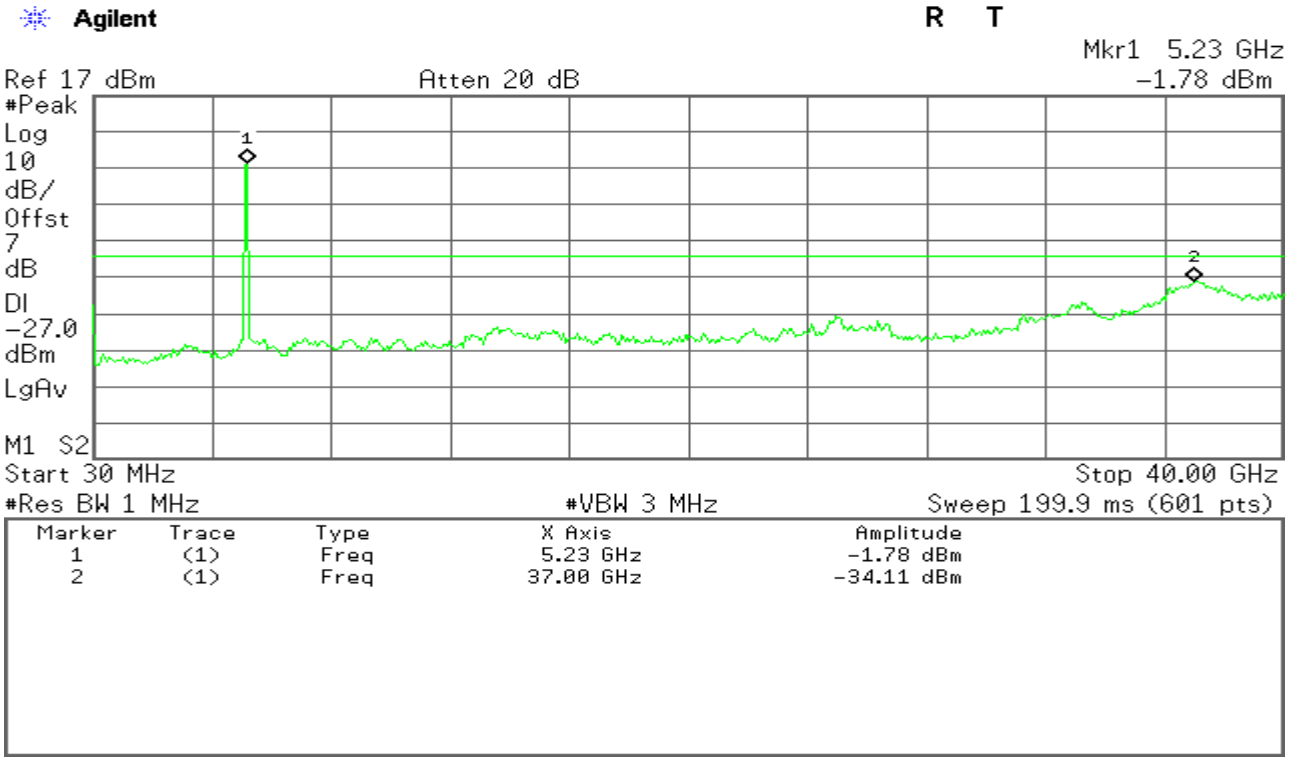
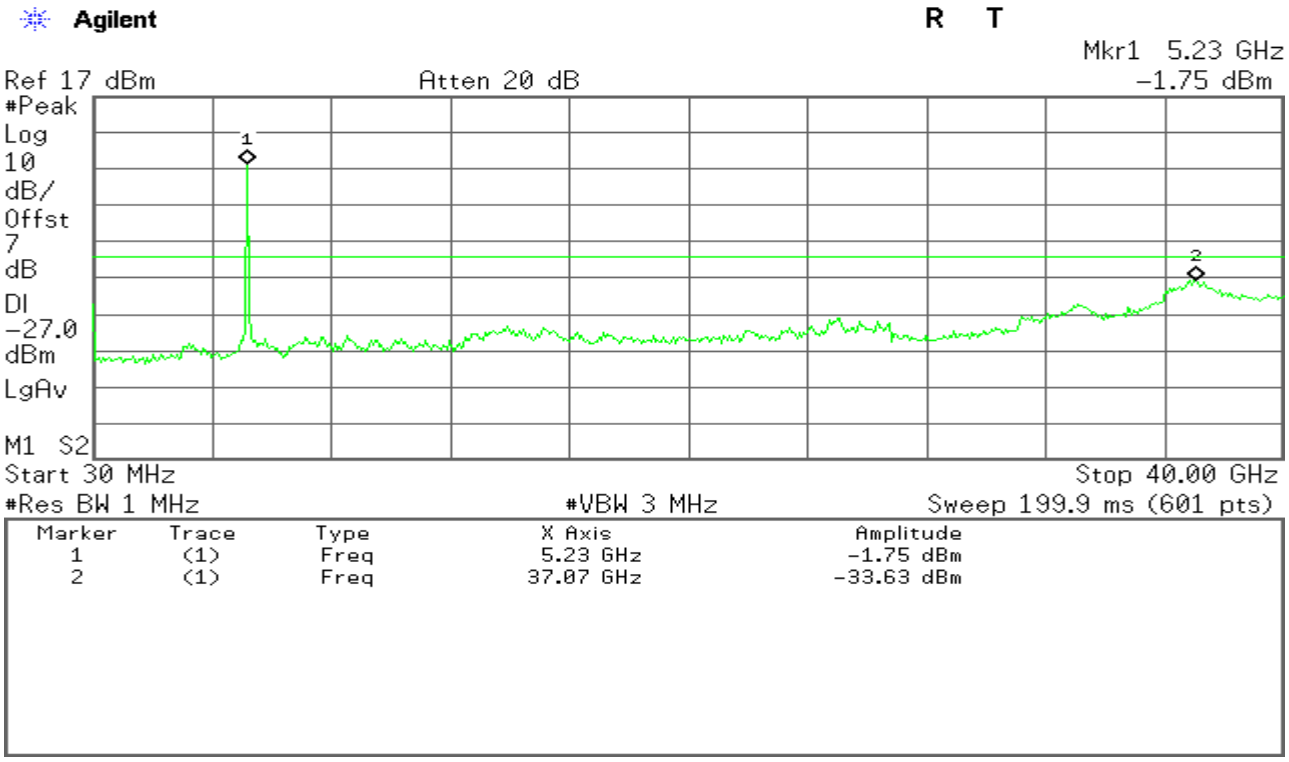
draft 802.11n Wide-40 MHz Channel mode / Chain 2

5150~5250MHz

CH Low



CH High



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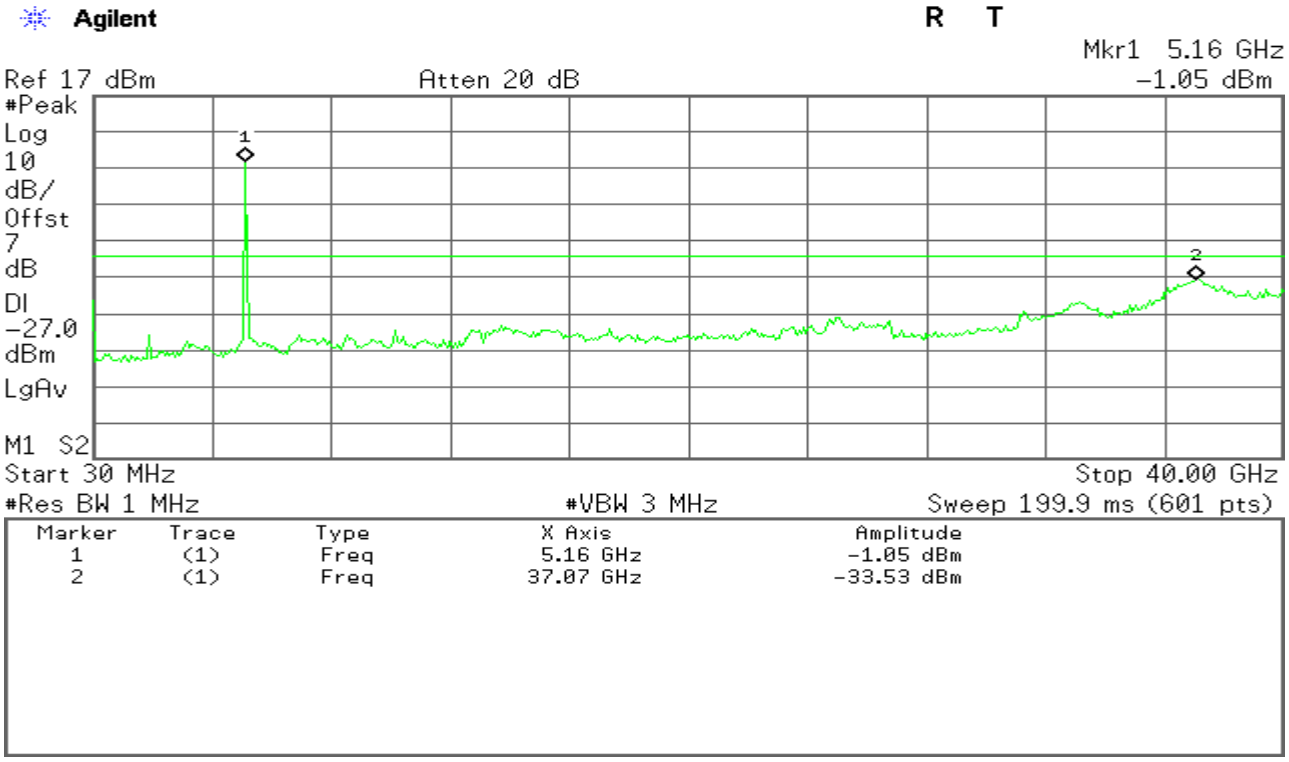
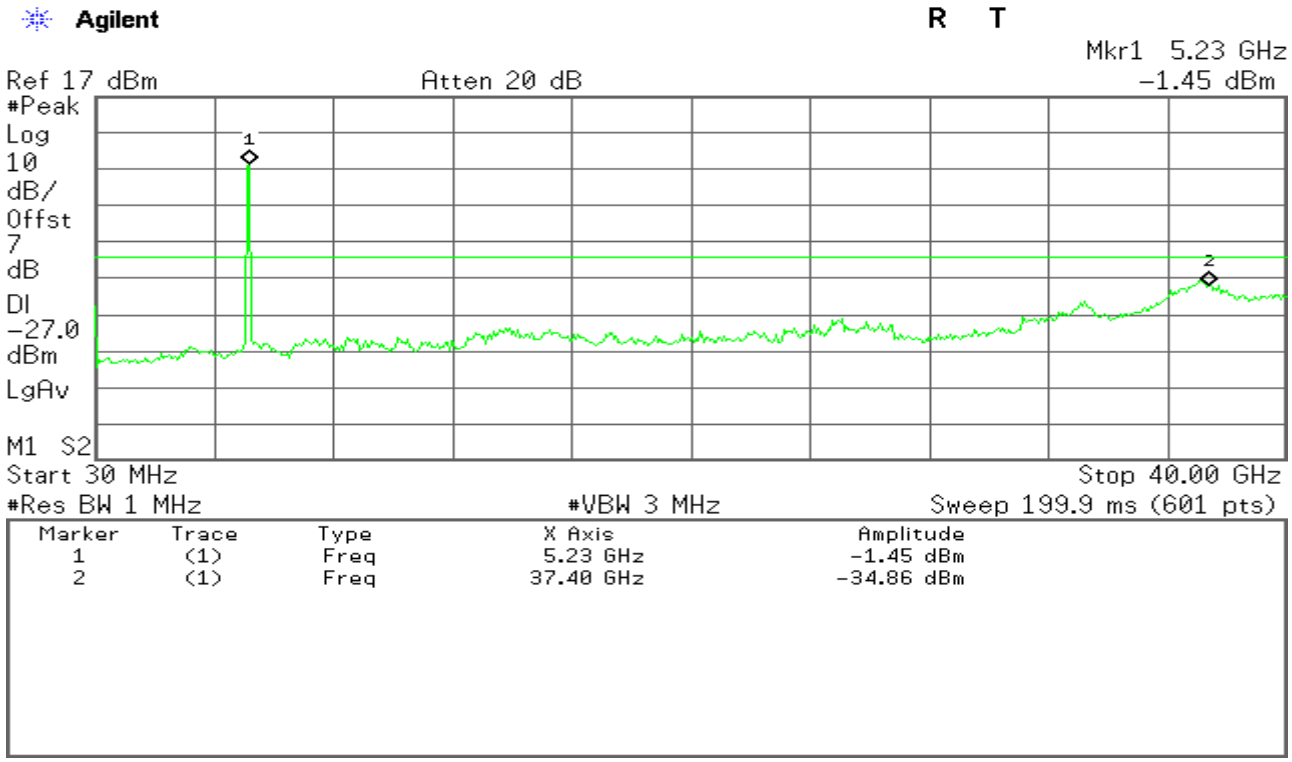
draft 802.11ac Standard-20 MHz Channel mode / Chain 0

5150~5250MHz

CH Low



CH Mid



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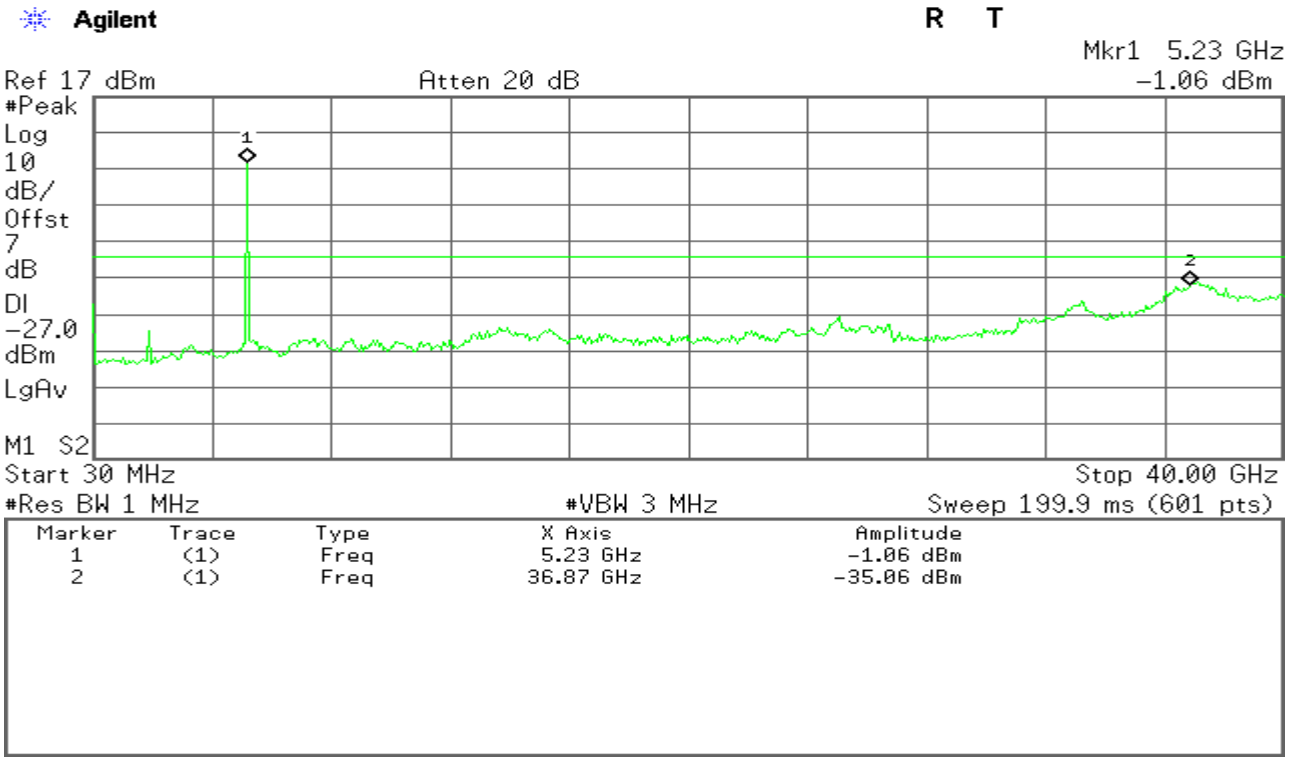
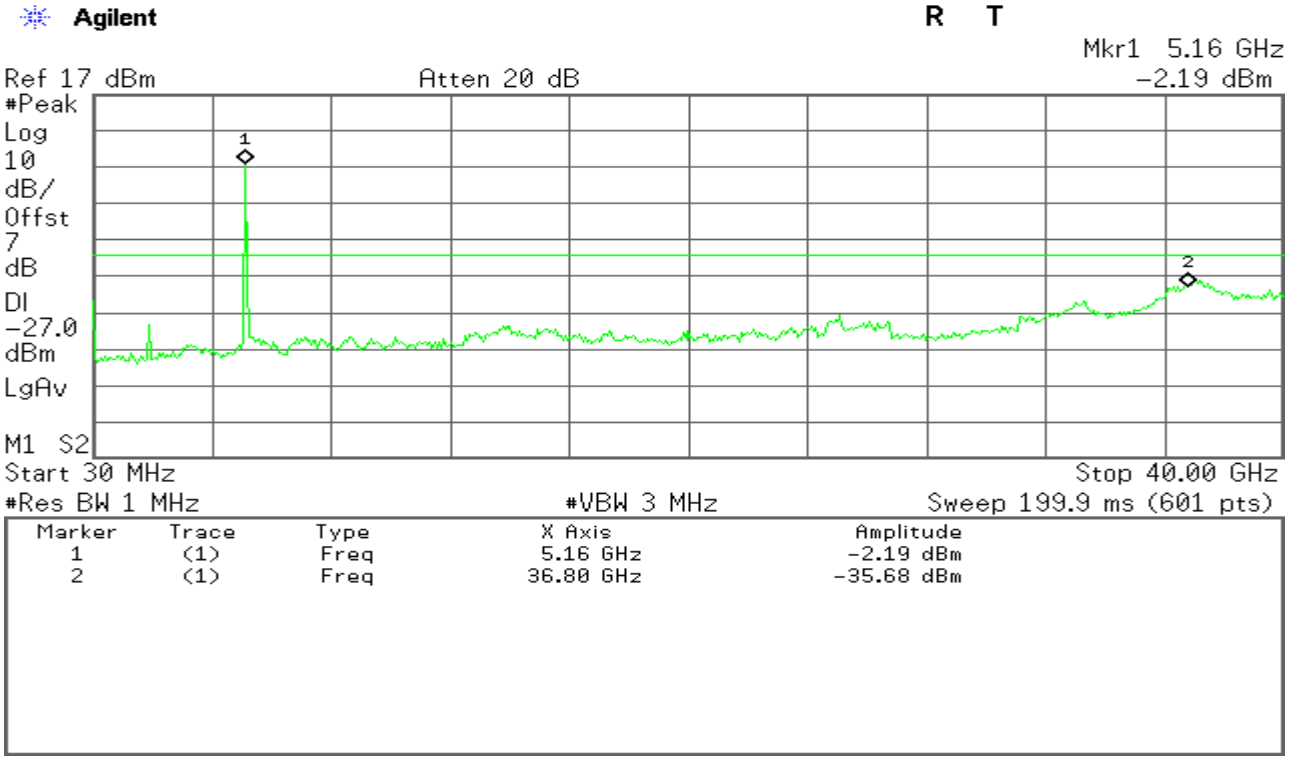
CH High



draft 802.11ac Standard-20 MHz Channel mode / Chain 1

5150~5250MHz

CH Low



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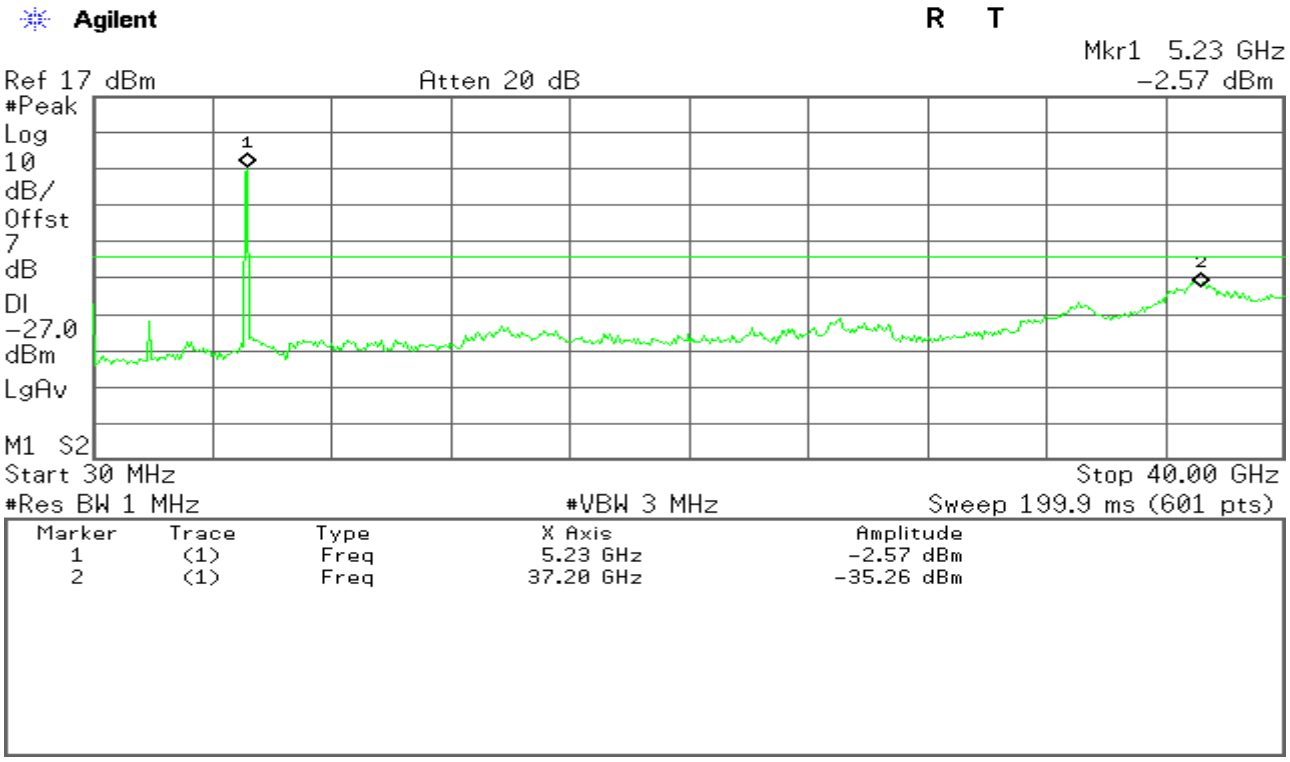
CH Mid



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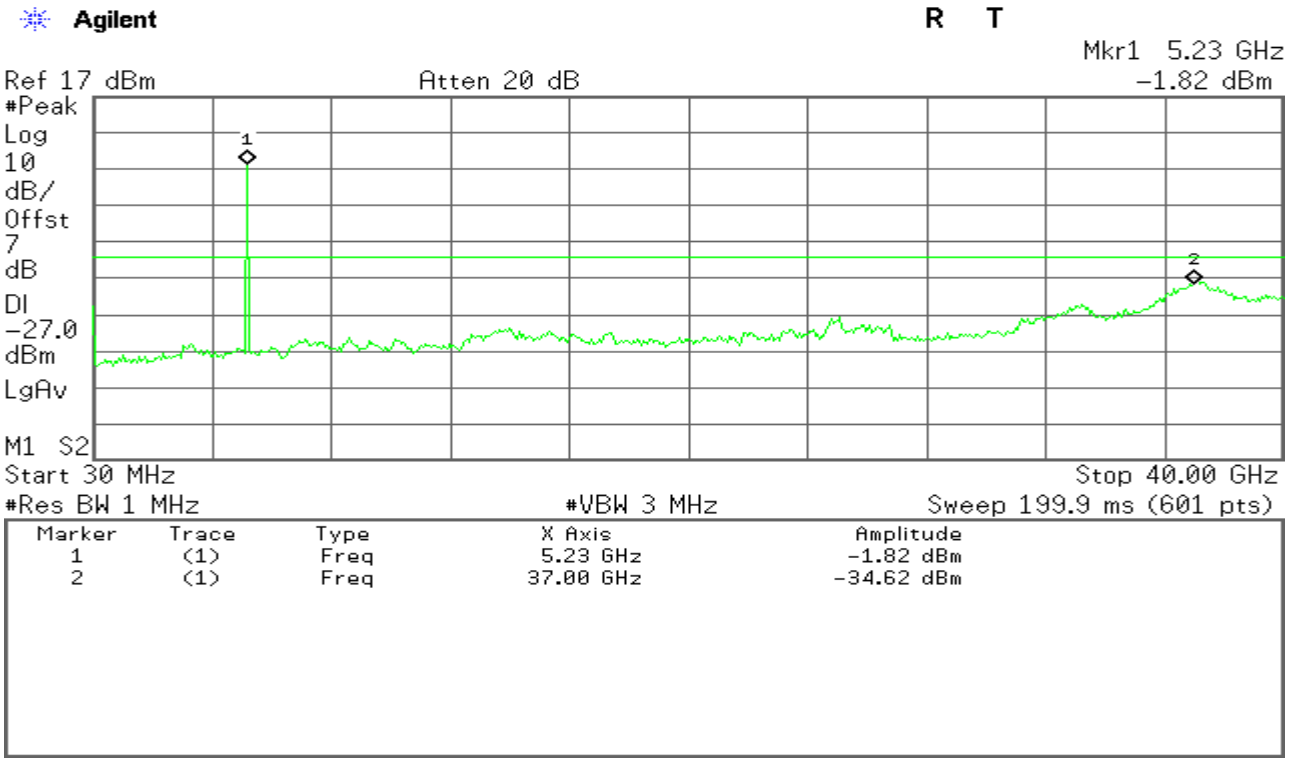

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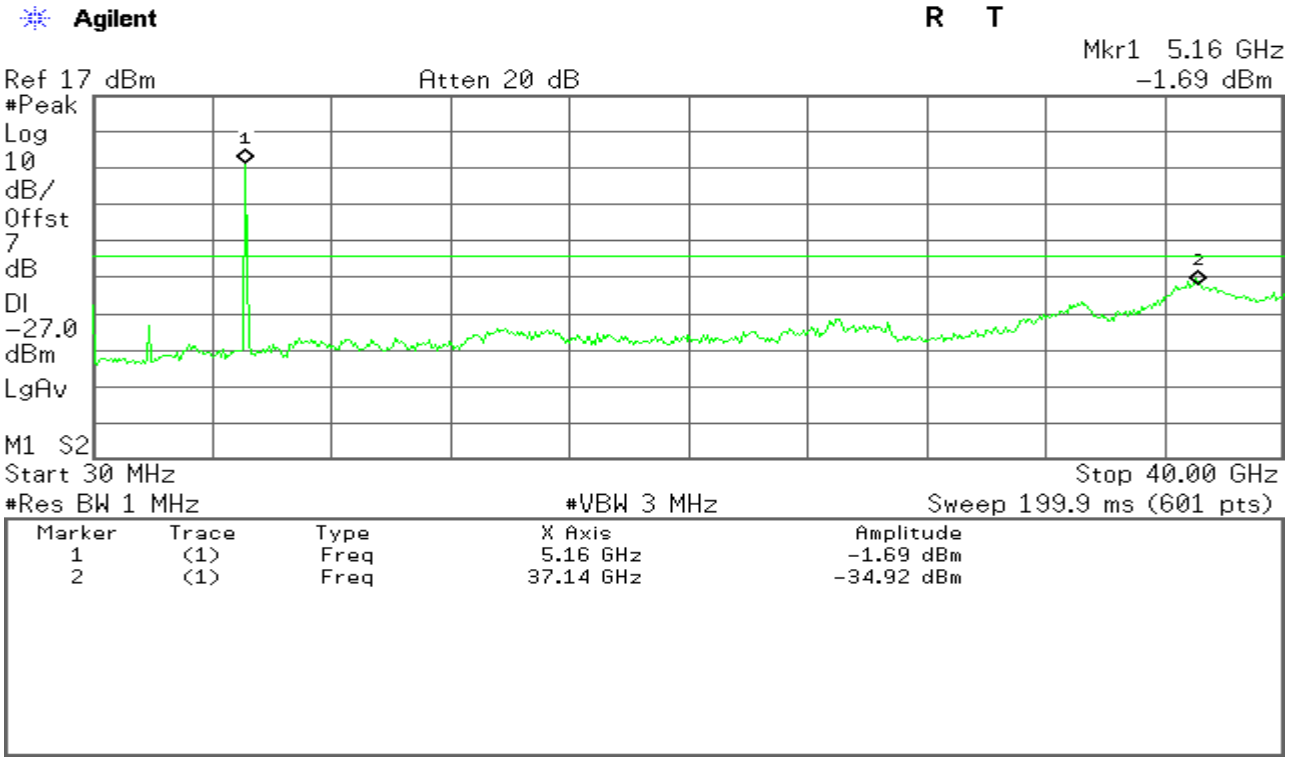
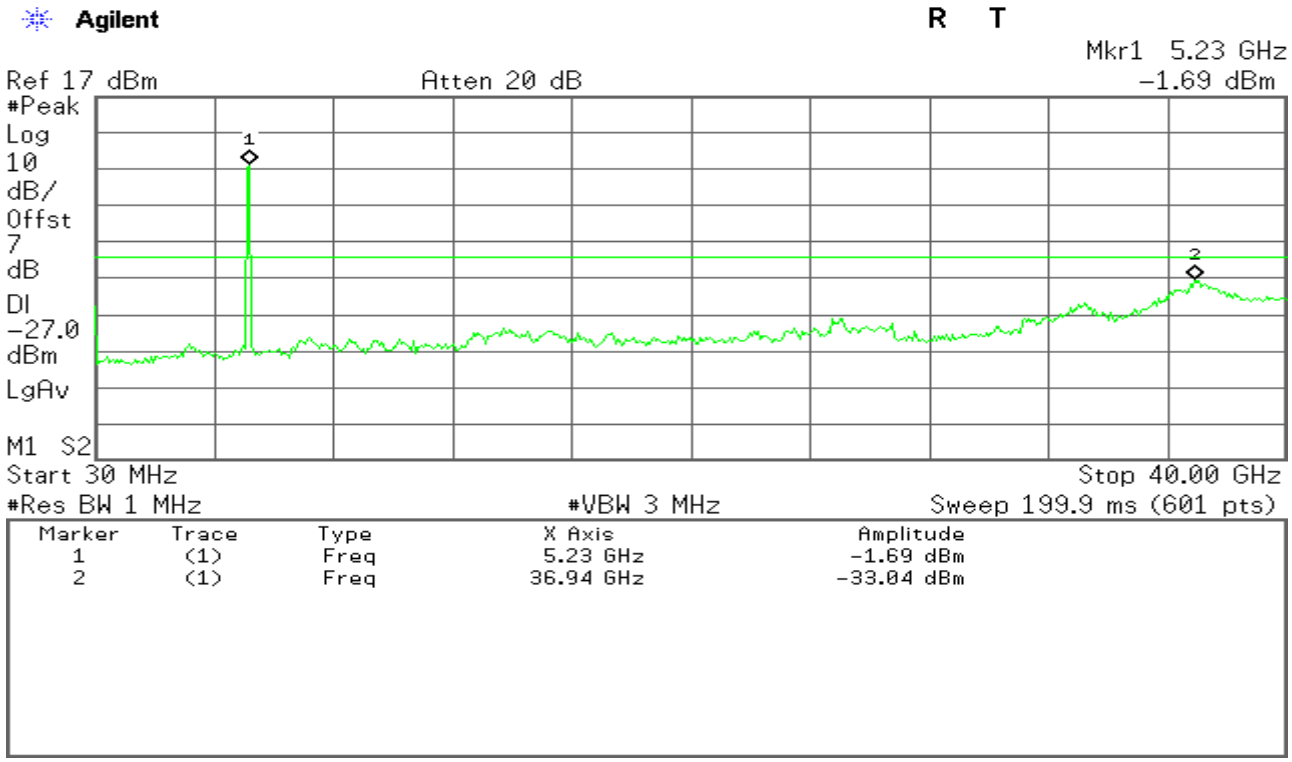
draft 802.11ac Standard-20 MHz Channel mode / Chain 2

5150~5250MHz

CH Low



CH Mid



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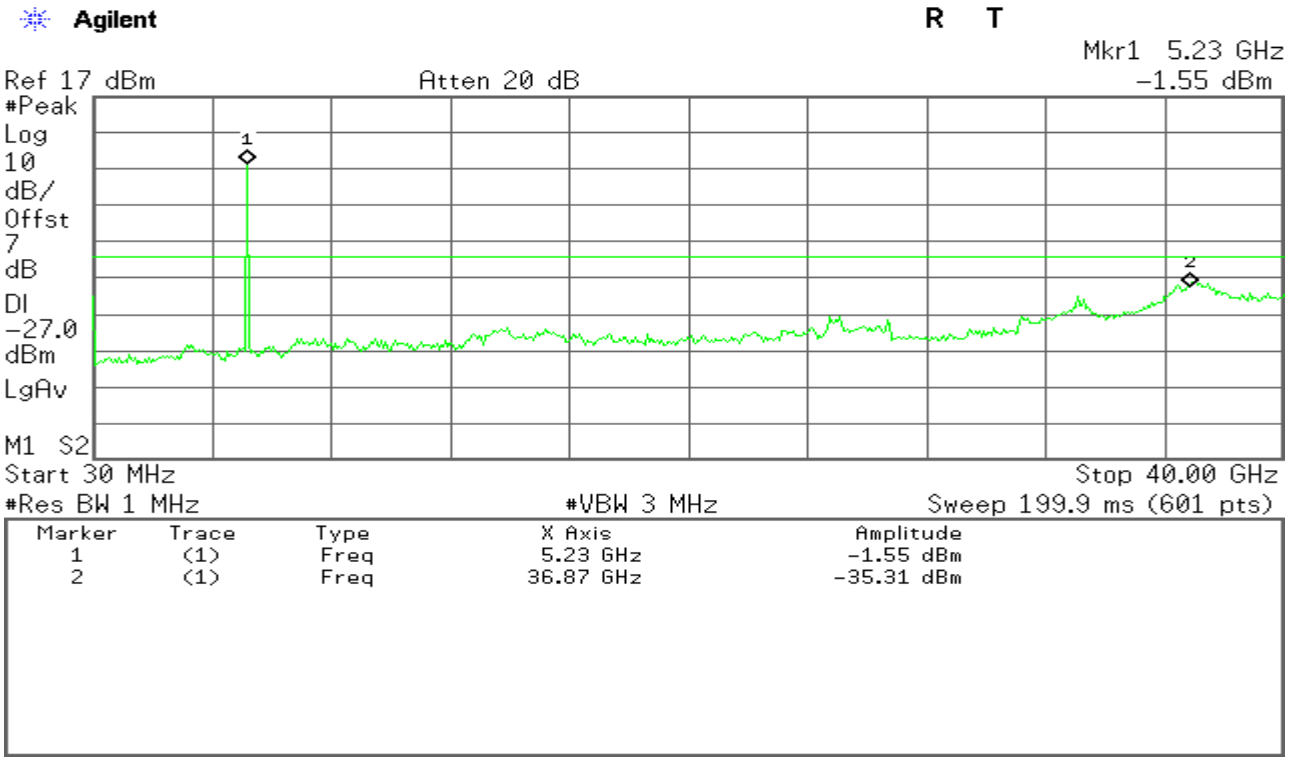
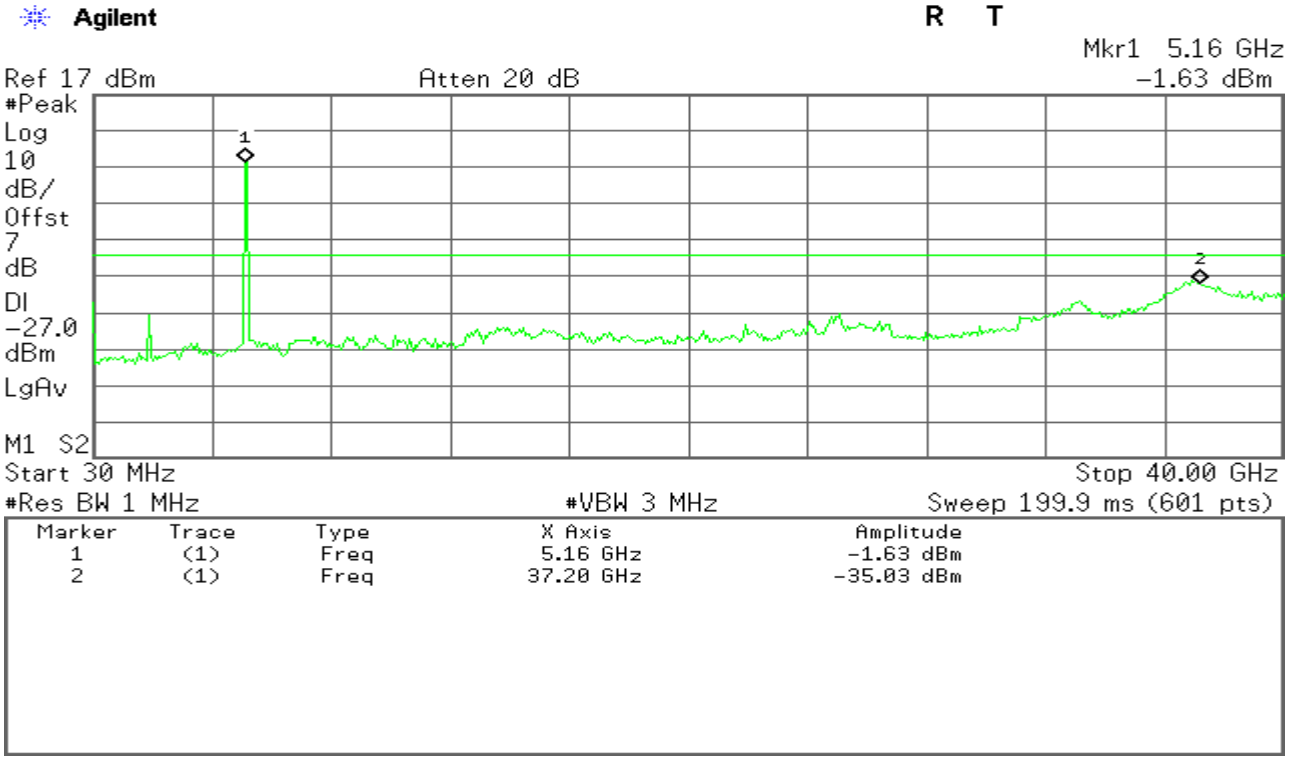
CH High



draft 802.11ac Wide-40 MHz Channel mode / Chain 0

5150~5250MHz

CH Low



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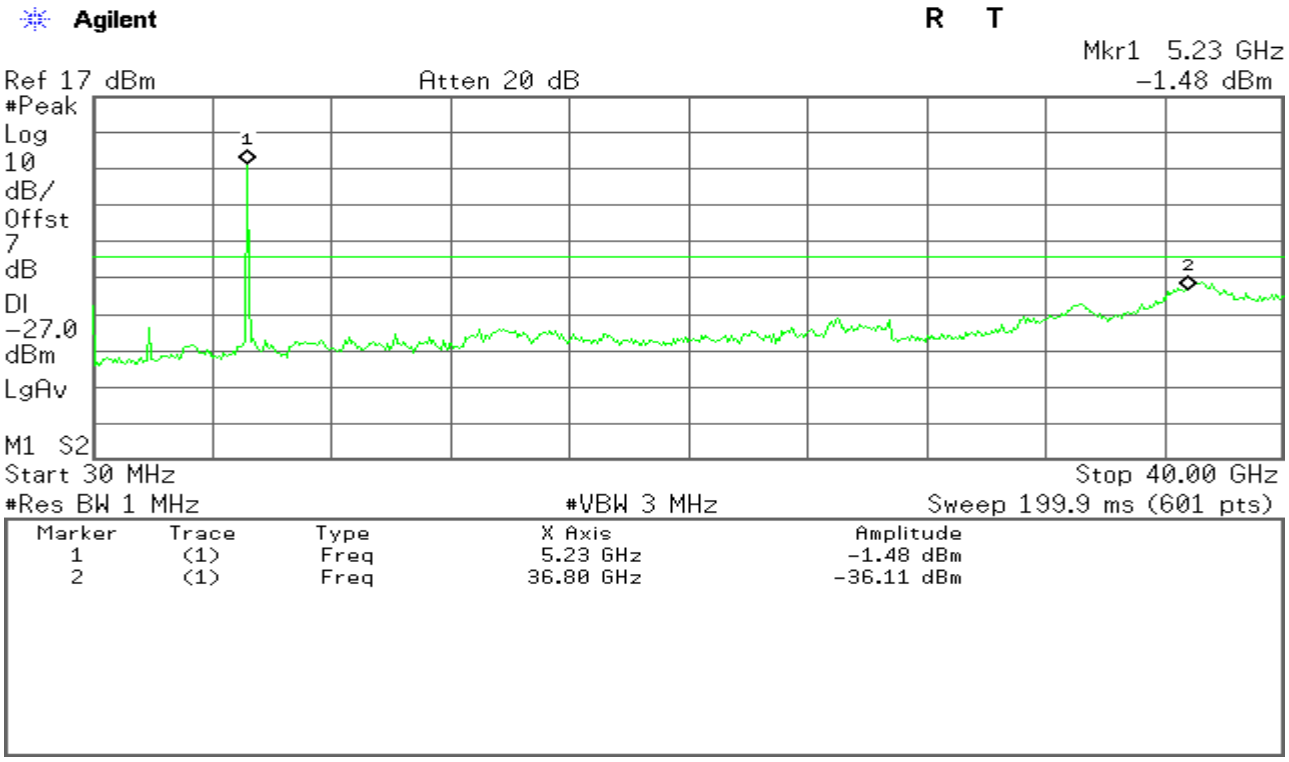
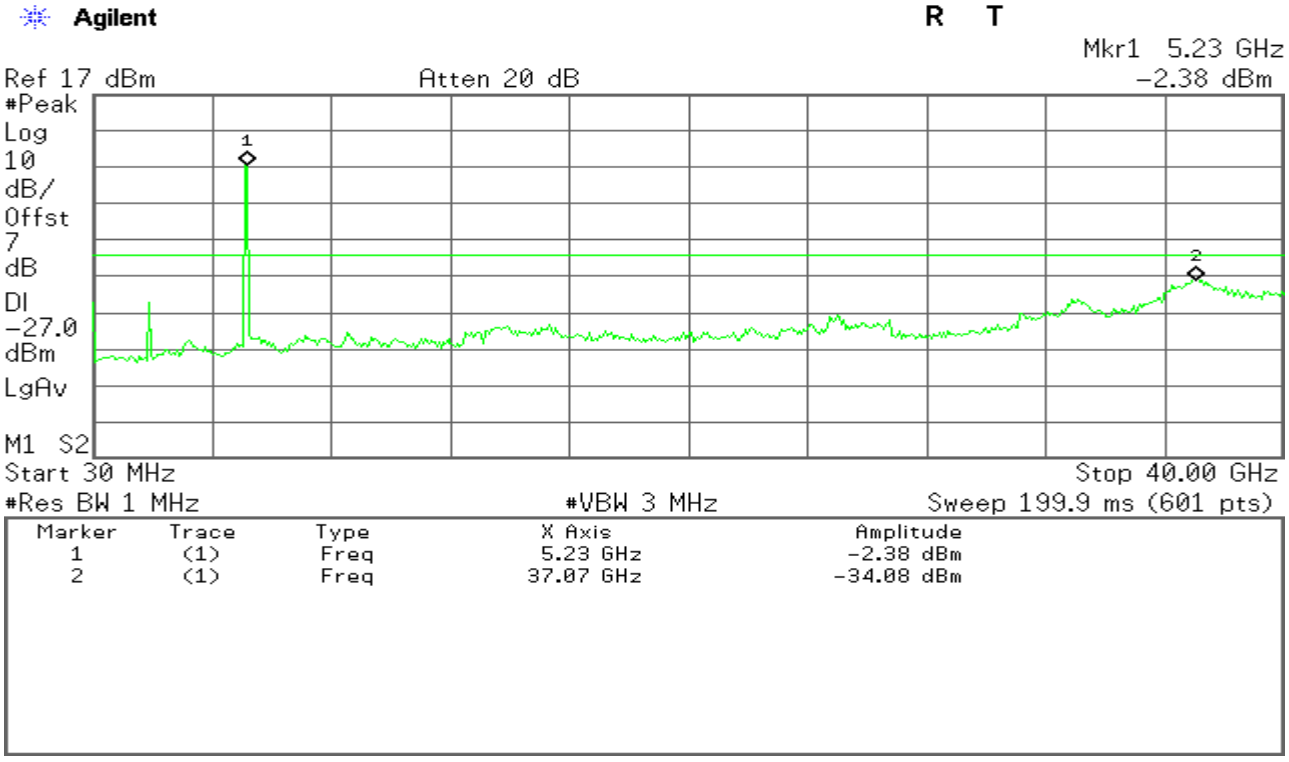
CH High



draft 802.11ac Wide-40 MHz Channel mode / Chain 1

5150~5250MHz

CH Low



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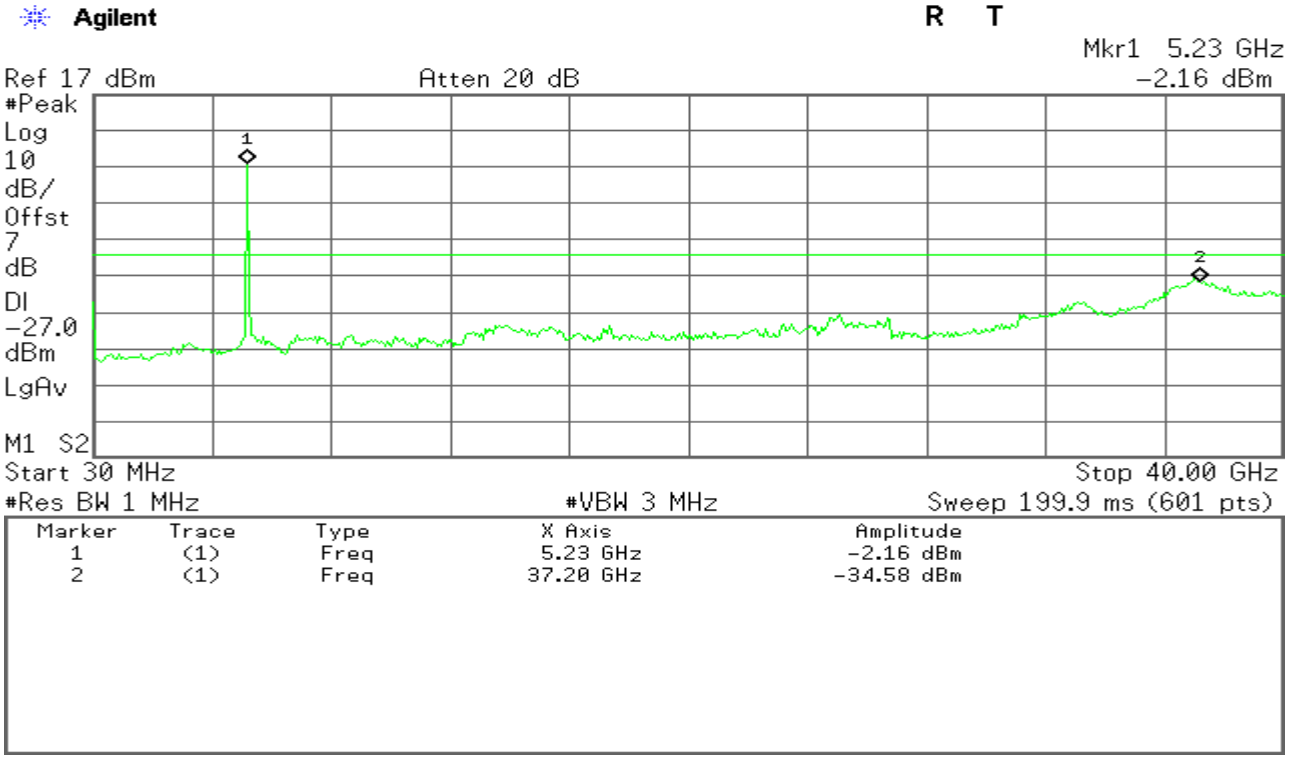
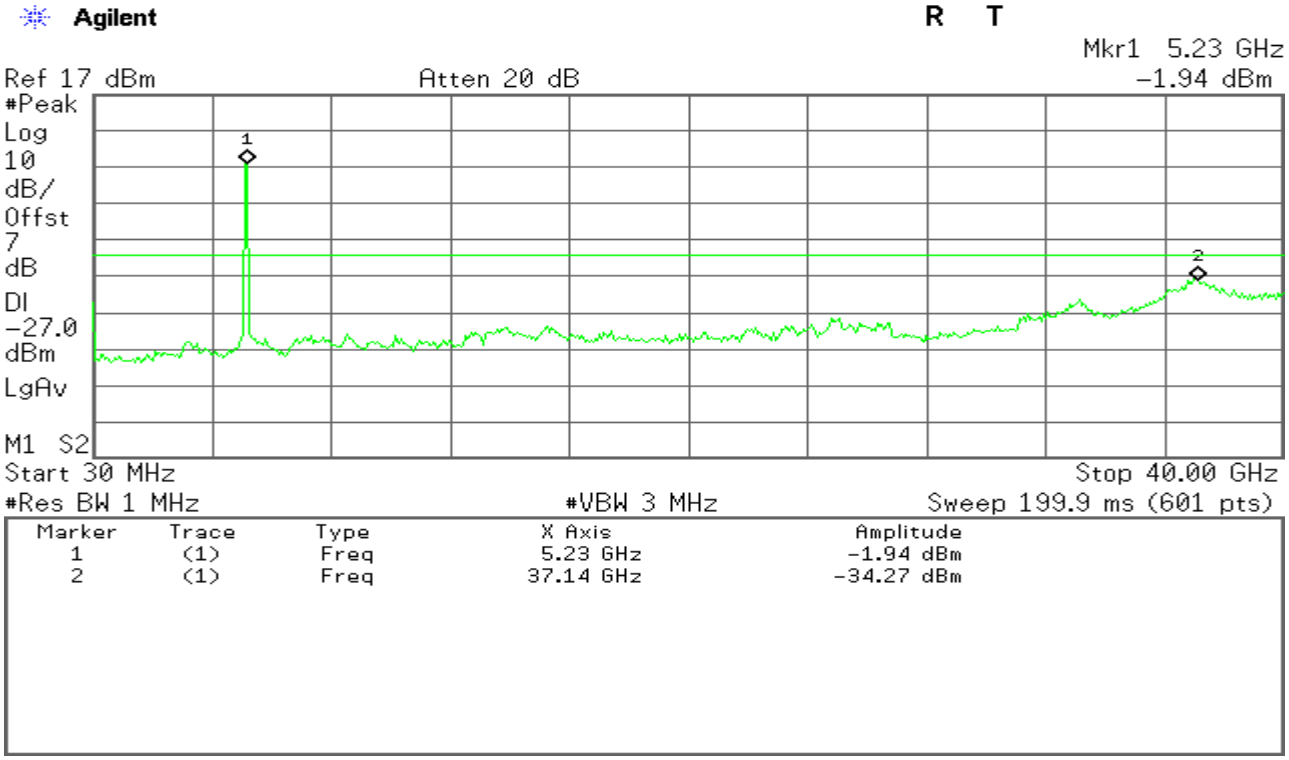
CH High



draft 802.11ac Wide-40 MHz Channel mode / Chain 2

5150~5250MHz

CH Low



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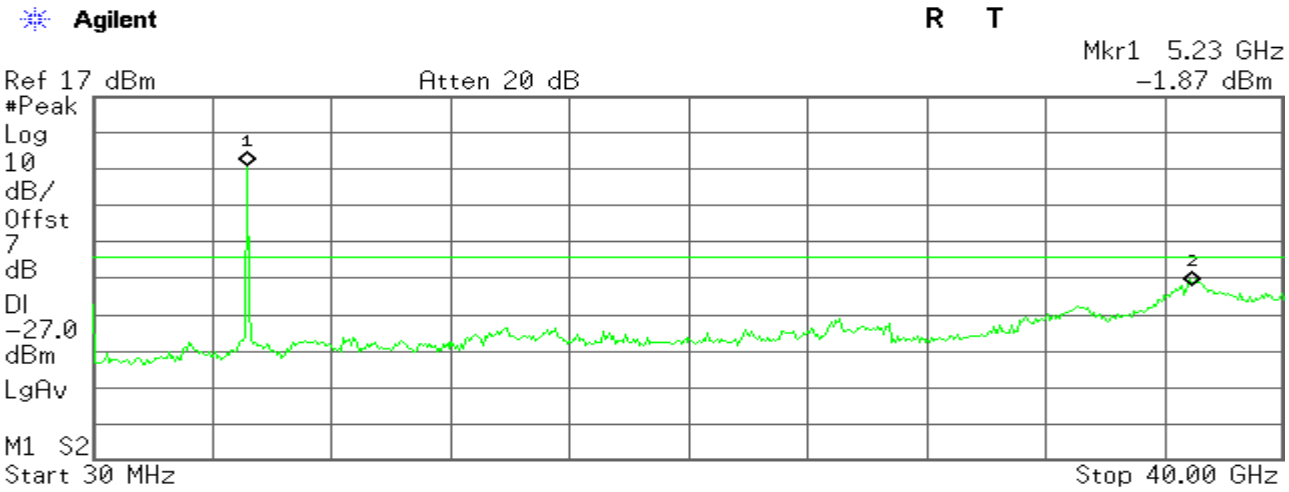
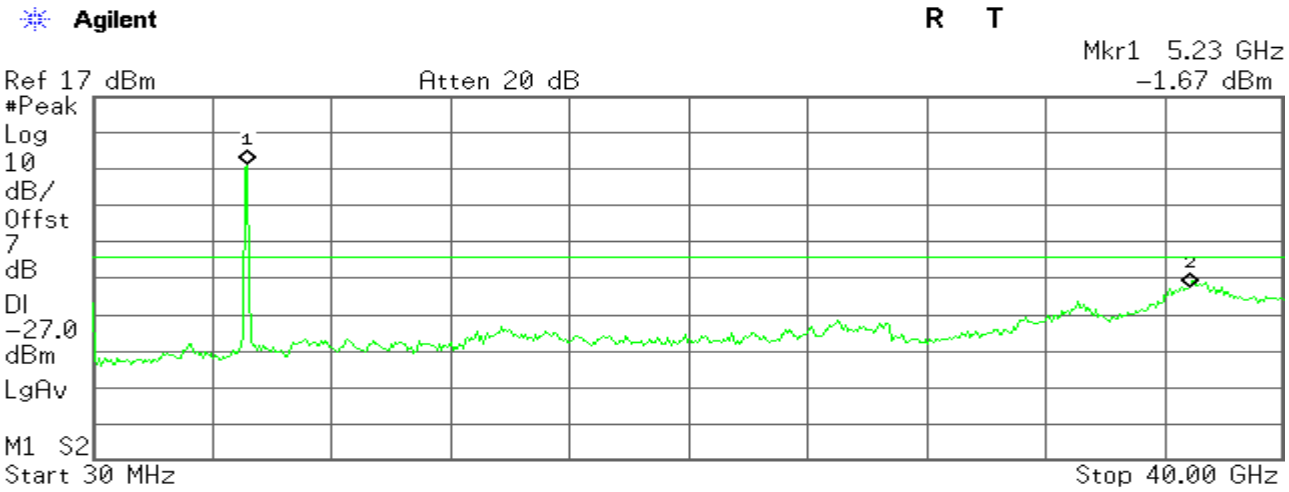
CH High



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.23 GHz	-1.87 dBm
2	(1)	Freq	36.94 GHz	-34.91 dBm

draft 802.11ac Wide-80 MHz Channel mode / Chain 0

5150~5250MHz



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.23 GHz	-1.67 dBm
2	(1)	Freq	36.87 GHz	-35.40 dBm

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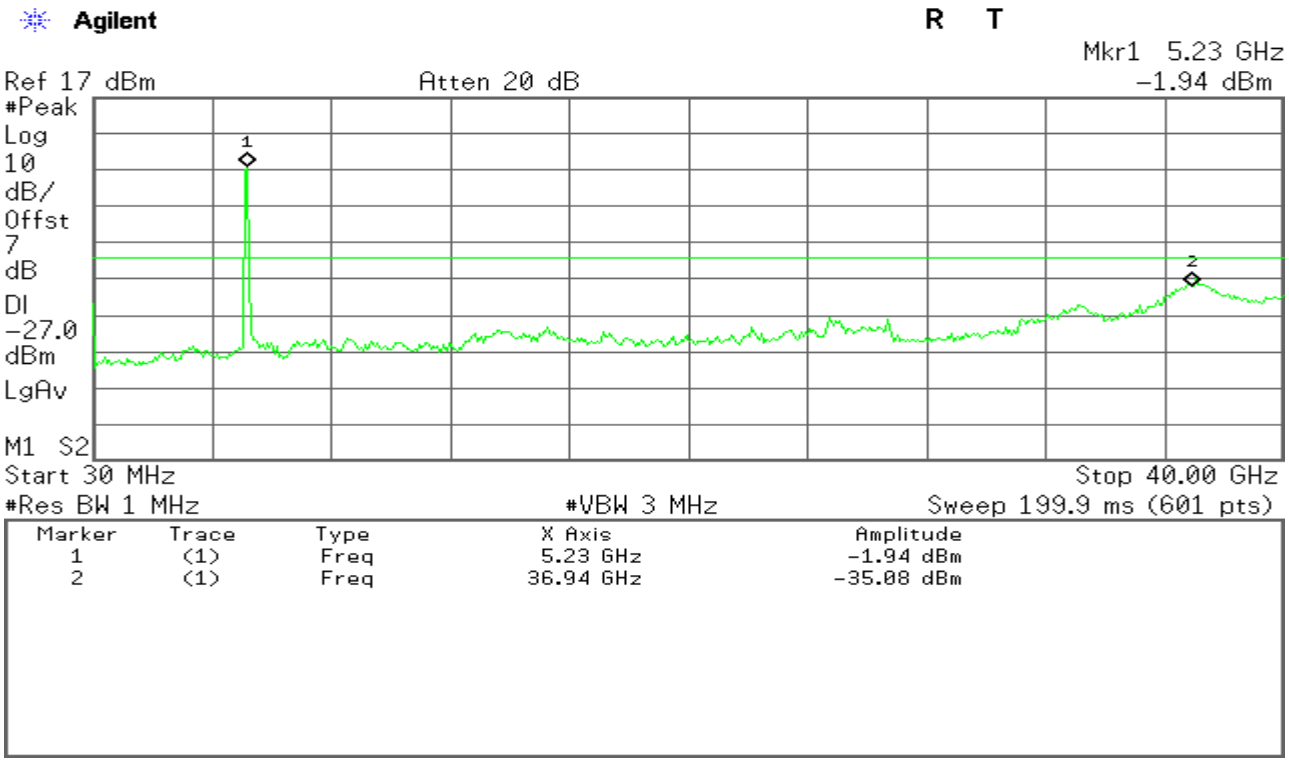
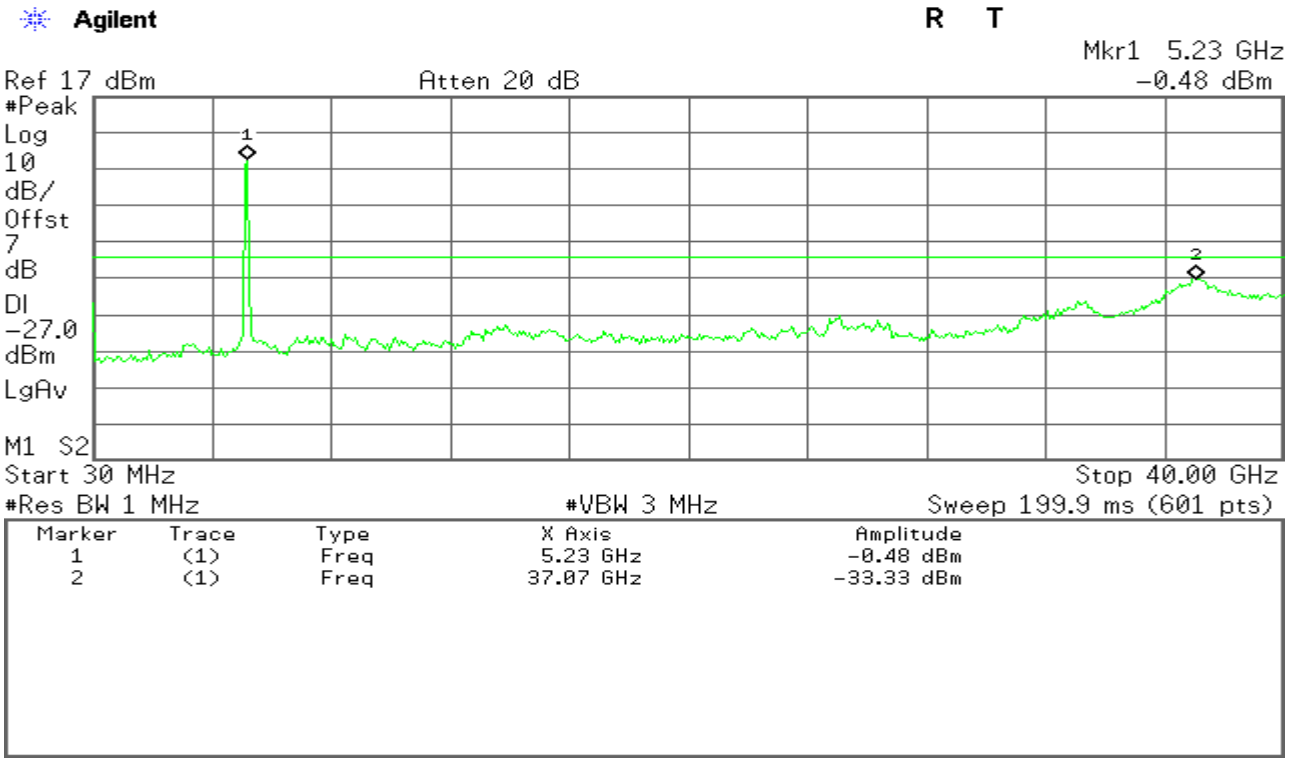
draft 802.11ac Wide-80 MHz Channel mode / Chain 1

5150~5250MHz



draft 802.11ac Wide-80 MHz Channel mode / Chain 2

5150~5250MHz



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7.8 POWERLINE CONDUCTED EMISSIONS

LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dBµV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

** Decreases with the logarithm of the frequency.*

TEST CONFIGURATION

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

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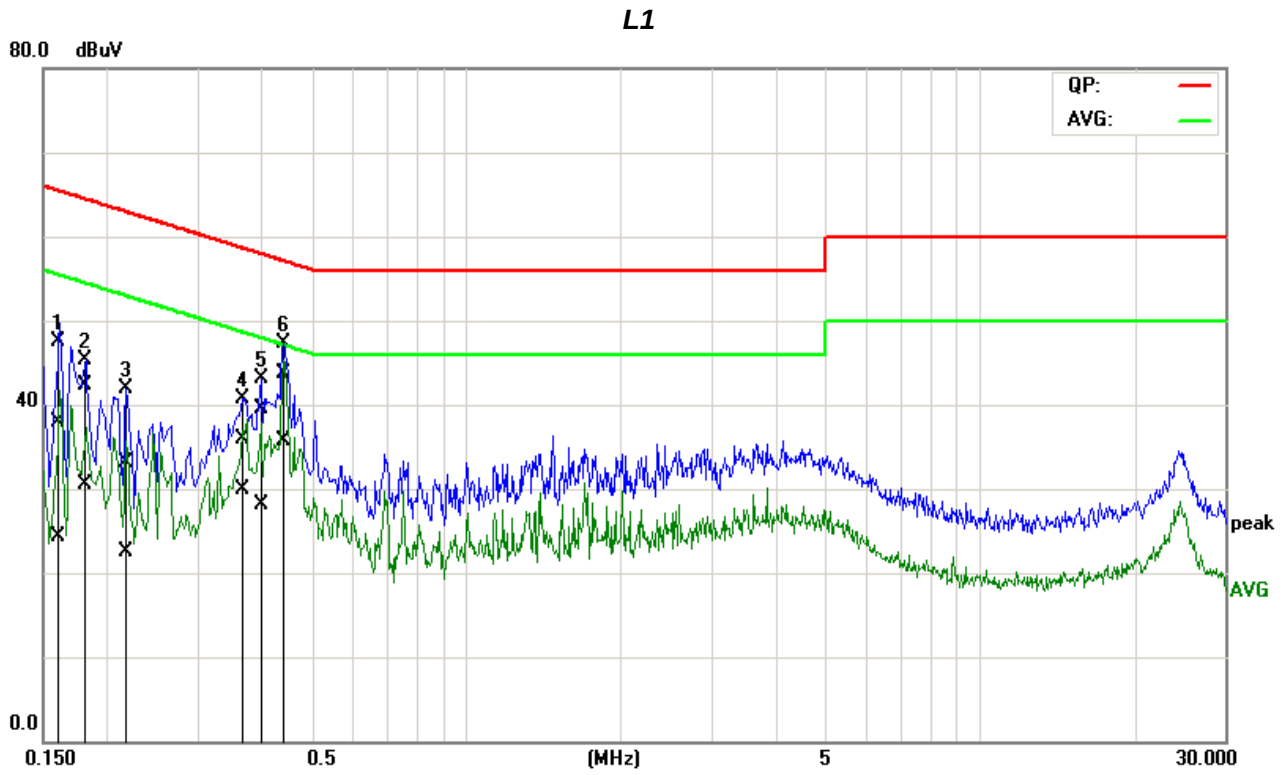
Test Data

Job No.:	C140220R01	Date:	2013-12-29
Model No.:	TG1682G	Time:	15:32:29
Standard:	FCC Class B	Temp.(C)/Hum.(%):	22(C)/48%
Test item:	Conduction test	Test By:	Blent.Wang
Line:	L1	Test Voltage:	AC 120V/60Hz
Model:		Description:	



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.1585	18.16	4.56	19.77	37.93	24.33	65.54	55.54	-27.61	-31.21	Pass
2	0.1813	22.62	10.75	19.68	42.30	30.43	64.43	54.43	-22.13	-24.00	Pass
3	0.2197	13.55	2.80	19.62	33.17	22.42	62.83	52.83	-29.66	-30.41	Pass
4	0.3662	16.26	10.22	19.73	35.99	29.95	58.59	48.59	-22.60	-18.64	Pass
5*	0.3983	19.82	8.32	19.75	39.57	28.07	57.89	47.89	-18.32	-19.82	Pass
6	0.4388	23.84	15.85	19.78	43.62	35.63	57.08	47.08	-13.46	-11.45	Pass

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

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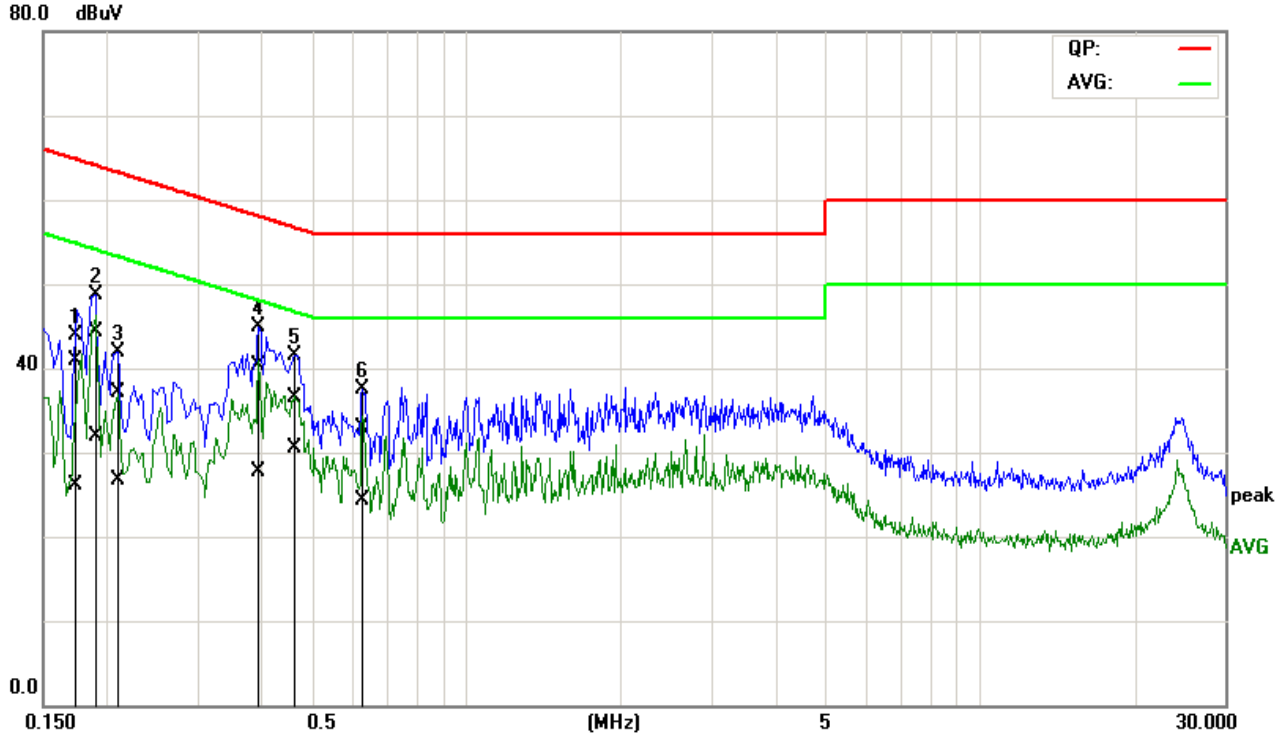
Job No.:	C140220R01	Date:	2013-12-29
Model No.:	TG1682G	Time:	15:36:59
Standard:	FCC Class B	Temp.(C)/Hum.(%):	22(C)/48%
Test item:	Conduction test	Test By:	Blent.Wang
Line:	L2	Test Voltage:	AC 120V/60Hz
Model:		Description:	

L2



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.1704	21.25	6.49	19.69	40.94	26.18	64.94	54.94	-24.00	-28.76	Pass
2	0.1894	24.67	12.23	19.66	44.33	31.89	64.06	54.06	-19.73	-22.17	Pass
3	0.2087	17.45	7.13	19.65	37.10	26.78	63.26	53.26	-26.16	-26.48	Pass
4	0.3930	20.54	7.94	19.78	40.32	27.72	58.00	48.00	-17.68	-20.28	Pass
5*	0.4634	16.63	10.71	19.82	36.45	30.53	56.63	46.63	-20.18	-16.10	Pass
6	0.6233	13.00	4.49	19.84	32.84	24.33	56.00	46.00	-23.16	-21.67	Pass

END OF REPORT

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