TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 15.407

TEST REPORT

For

QUANTUM NETWORKS (SG) PTE.LTD.

8 UBI ROAD 2 #08-10 ZERVEX SINGAPORE(408538)，SINGAPORE，Singapore

FCC ID: 2AMQU-QN-H-220

Report Type:	**Product Name:**
Original Report	High Performance 802.11ac (2x2) Wave 2 Indoor(Room) Access Point

Report Number:	RDG191126003-00C
Report Date:	2020-01-19
Reviewed By:	Ivan Cao Assistant manager
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	High Performance 802.11ac (2x2) Wave 2 Indoor(Room) Access Point
EUT Model:	QN-H-220
Operation Frequency:	5180-5240(802.11a/n ht20/ac vht20) 5190-5230 MHz(802.11n ht40/ac vht40) 5210 MHz(802.11ac vht80) 5745-5825(802.11a/n ht20/ac vht20) 5755-5795 MHz(802.11n ht40/ac vht40) 5775 MHz(802.11ac vht80)
Maximum Output Power (Conducted):	5150-5250 MHz:22.15 dBm 5725-5850 MHz:21.68 dBm
Modulation Type:	OFDM
Rated Input Voltage:	DC 12V from DC adapter or DC 48V from PoE Adapter
Serial Number:	RDG191126003-RF-S1
EUT Received Date:	2019.11.26
EUT Received Status:	Good

Objective

This type approval report is prepared on behalf of the Applicant in accordance with Part 2-Subpart J, Part 15-Subparts A, and E of the Federal Communications Commission's rules.

The tests were performed in order to determine compliance with FCC Rules Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: 2AMQU-QN-H-220

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices. And KDB 789033 D02 General U-NII Test Procedures New Rules v02r01.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	30M~200MHz: 4.55 dB,200M~1GHz: 5.92 dB,1G~6GHz: 4.98 dB, 6G~18GHz: 5.89 dB,18G~26.5G:5.47 dB,26.5G~40G:5.63 dB
Unwanted Emissions,conducted	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "△ ". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk "★".

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

The system support 802.11a/n ht20/n ht40/ac vht20/ac vht40/ac vht80, the vht20/vht40 were reduced since the identical parameters with 802.11n ht20 and ht40

For 5150~5250 MHz band, 7 channels are provided:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
38	5190	46	5230
40	5200	48	5240
42	5210	/	/

For 802.11a, 802.11n ht20, channel 36, 40 and 48 was tested, for 802.11n ht40 channel 38, 46 were tested, for 802.11ac vht80, channel 42 was tested.

For 5725~5850MHz band, 8 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	157	5785
151	5755	159	5795
153	5765	161	5805
155	5775	165	5825

For 802.11a, 802.11n ht20, channel 149, 157 and 165 was tested, for 802.11n ht40 channel 151, 159 were tested, for 802.11ac vht80, channel 155 was tested.

The device supports SISO and MIMO at 802.11n and ac mode, per pre-test, MIMO 2TX mode was the worst and reported.

Equipment Modifications

No modification was made to the EUT.

EUT Exercise Software

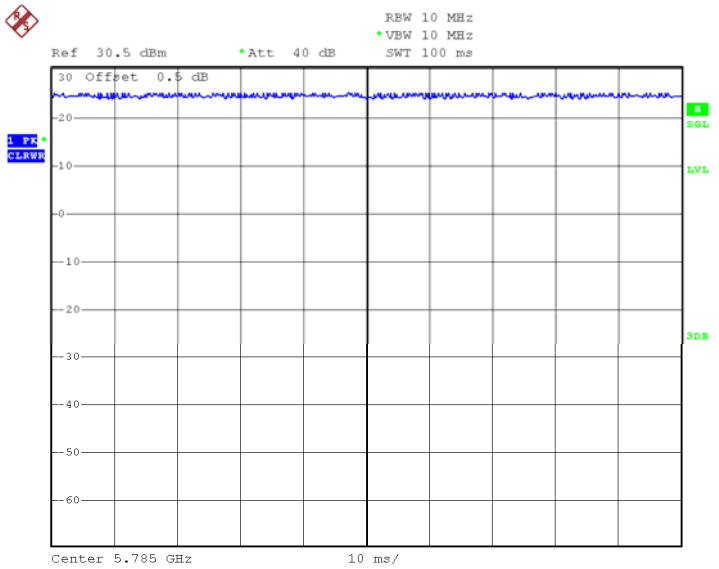
The software “QRCT” was used for testing, the QRCT command was provided by manufacturer. The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates, bandwidths, and modulations. The maximum power was configured as below table, that provided by the manufacturer:

Band	Mode	Channel	Frequency (MHz)	Data rate	Power level Setting
5150 - 5250 MHz	802.11a	Low	5180	6Mbps	27
		Middle	5200	6Mbps	27
		High	5240	6Mbps	27
	802.11n ht20	Low	5180	MCS8	22
		Middle	5200	MCS8	22
		High	5240	MCS8	22
	802.11n ht 40	Low	5190	MCS8	21
		High	5230	MCS8	21
	802.11ac vht80	Middle	5210	MCS8	19
5725 - 5850 MHz	802.11a	Low	5745	6Mbps	27
		Middle	5785	6Mbps	25
		High	5825	6Mbps	23
	802.11n ht20	Low	5745	MCS8	21
		Middle	5785	MCS8	19
		High	5825	MCS8	18
	802.11n ht 40	Low	5755	MCS8	18
		High	5795	MCS8	19
	802.11ac vht80	Middle	5775	MCS8	14

The duty cycle as below:

Mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle(x) (%)
802.11 a	100	100	100
802.11n ht20	100	100	100
802.11n ht40	100	100	100
802.11ac vht80	0.422	0.476	88.66

802.11a



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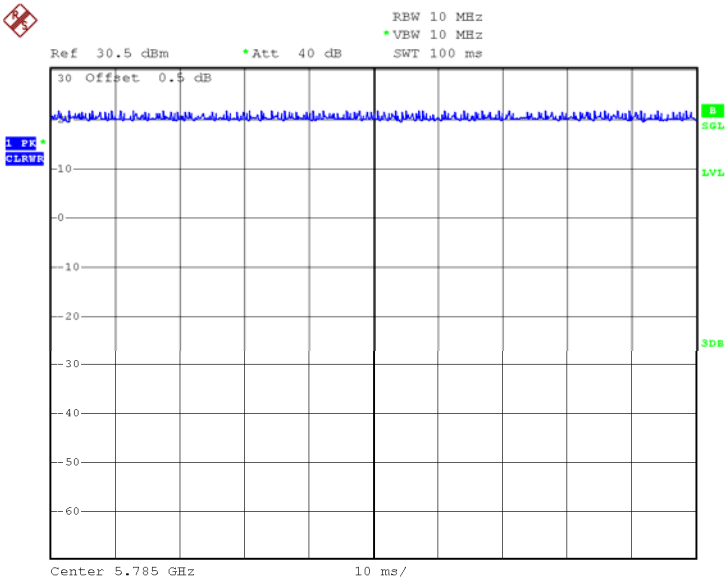
802.11n ht20



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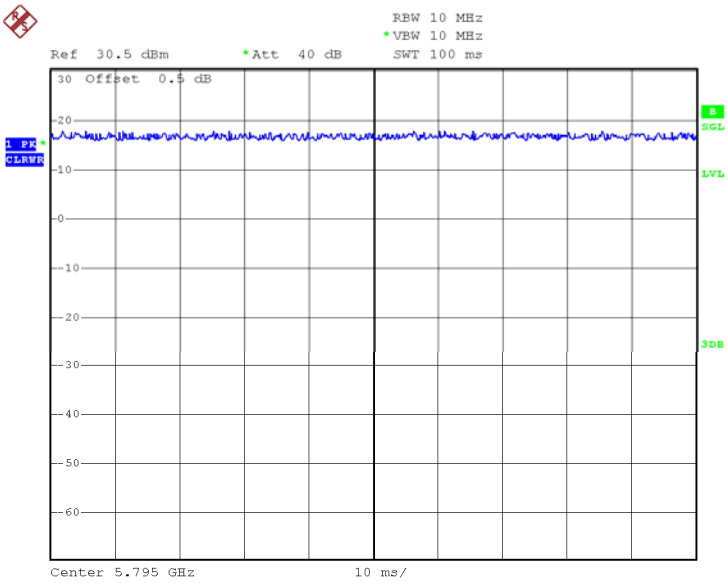
802.11n ht40



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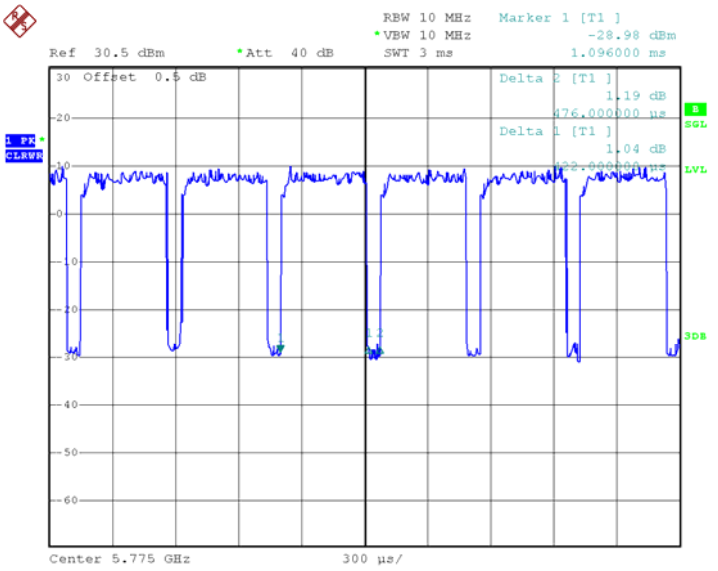
802.11ac ht80



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Local Support Equipment List and Details

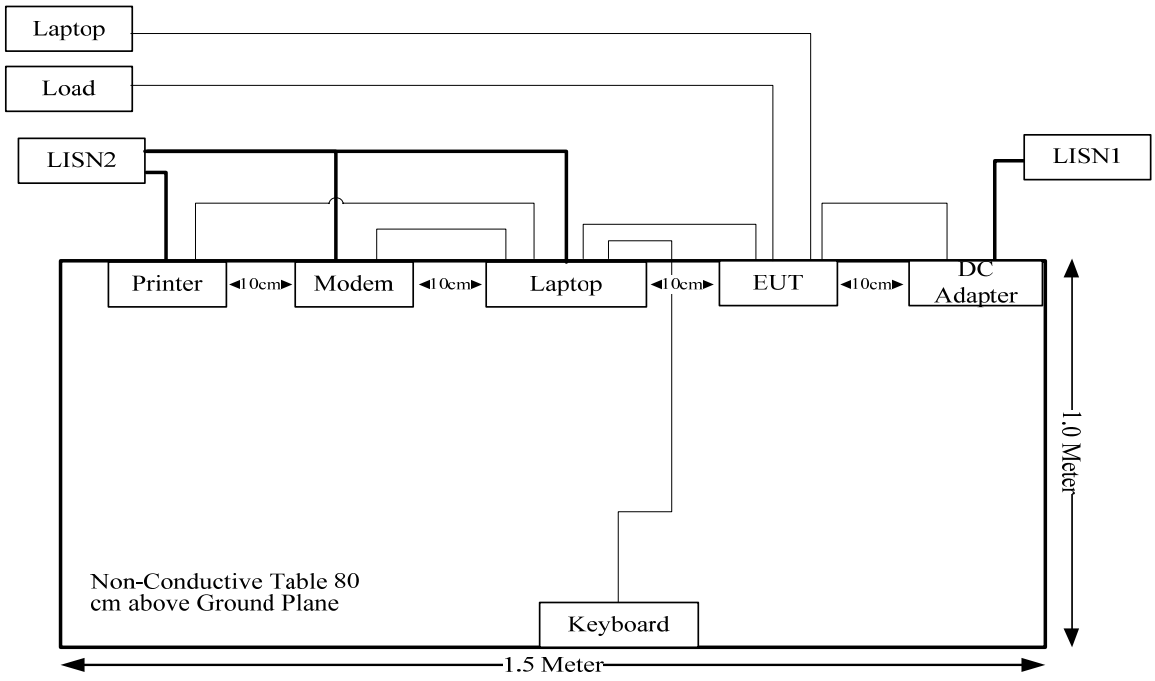
Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1232
DELL	Laptop	PP11L	QDS-BRCM1017
HP	Printer	C3941A	JPTVOB2337
DELL	Keyboard	L100	CNORH656658907BL05DC
SAST	Modem	AEM-2100	293
Unknown	RJ45 Resistance Dummy Load	/	/
Huawei	POE Adapter	PoE35-54A	/
QUANTUM	AC/DC Adapter	GM85-480200-F	1312127102

Support Cable List and Details

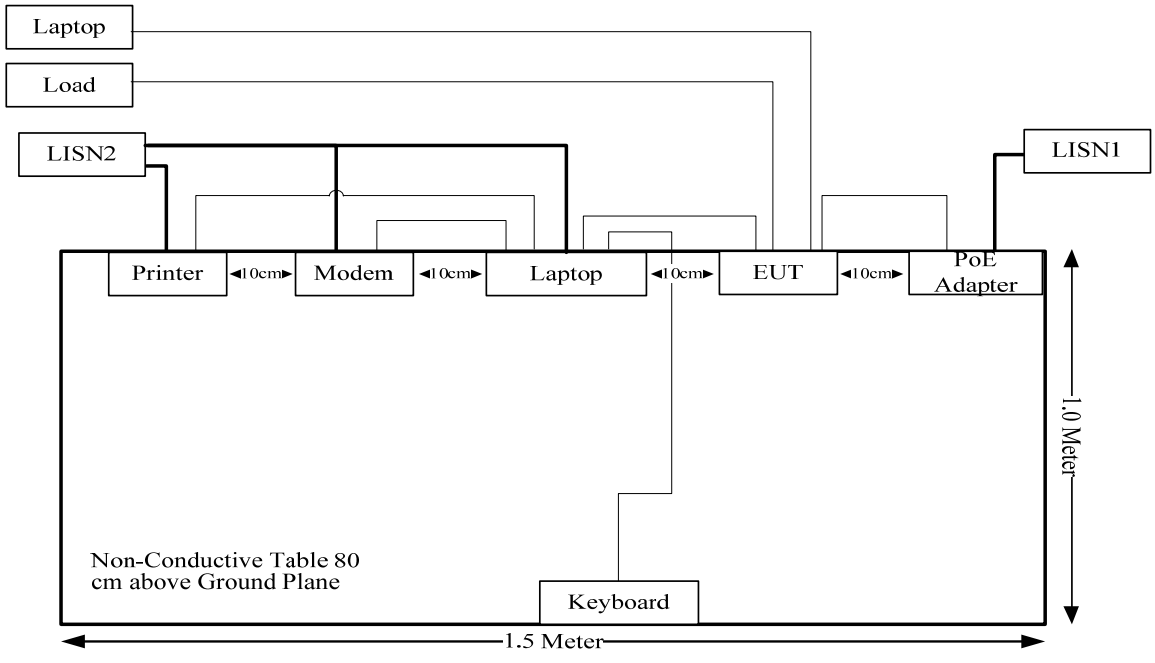
Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Adapter Cable	No	No	1.2	AC/DC Adapter	EUT
RJ45 Cable	Yes	No	1.0	EUT	Laptop
RJ45 Cable	Yes	No	10	EUT/PoE Adapter	Laptop
RJ45 Cable*4	No	No	10	EUT	Load
RJ45 Cable	Yes	No	1.0	PoE Adapter	EUT

Configuration of Test Setup

AC/DC Adapter Power mode:



PoE Power Mode:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.407 (f) & §1.1310 & §2.1091	Maximum Permissable Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b)(6)& §15.207(a)	Conducted Emissions	Compliance
§15.205& §15.209 &§15.407(b)	Undesirable Emission& Restricted Bands	Compliance
§15.407(a)(e)	Emission Bandwidth	Compliance
§15.407(a)	Conducted Transmitter Output Power	Compliance
§15.407 (a)	Power Spectral Density	Compliance

FCC §15.407 (f) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.407(f)and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculation formula:

Prediction of power density at the distance of the applicable MPE limit
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculation formula:

Prediction of power density at the distance of the applicable MPE limit
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

Mode	Frequency (MHz)	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
WLAN	2412-2462	3	2.00	25	316.23	20.00	0.13	1.0
WLAN	5150-5250	3	2.00	23	199.53	20.00	0.08	1.0
WLAN	5725-5850	3	2.00	22	158.49	20.00	0.06	1.0

The WLAN 2.4G and 5G can transmit simultaneously:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$=S_{2.4}/S_{limit\text{-}2.4}+ S_5/S_{limit\text{-}5}$

$=0.13/1+0.08/1$

$=0.21$

< 1.0

Result: The device meet FCC MPE at 20 cm distance

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Antenna Connector Construction

The EUT has 2 internal antenna for 2.4G WLAN and 2 internal antenna for 5G WLAN, fulfill the requirement of this section. Please refer to the EUT photos and below information:

Antenna	Antenna Type	input impedance (Ohm)	Antenna Gain /Frequency Range
2.4G Chain 0	FPC	50	3 dBi/2.4-2.5GHz
2.4G Chain 1	FPC	50	3 dBi/2.4-2.5GHz
5G Chain 0	FPC	50	3 dBi/5.15-5.85GHz
5G Chain 1	FPC	50	3 dBi/5.15-5.85GHz

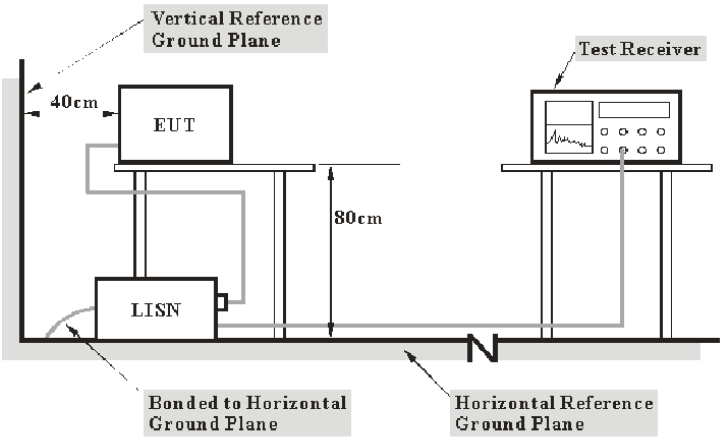
Result: Compliance.

FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a), §15.407(b) (6)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to the main lisn with a 120 V/60 Hz AC power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$
$C_f = A_C + VDF$

Herein,
V_C (cord. Reading): corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN
C_f: Correction Factor

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2019-09-05	2020-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2019-12-10	2020-12-10
R&S	EMI Test Receiver	ESPI	100120	2019-05-09	2020-05-09
R&S	L.I.S.N	ESH2-Z5	892107/021	2019-09-19	2020-09-19

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

During the conducted emission test, the adapter was connected to the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Data

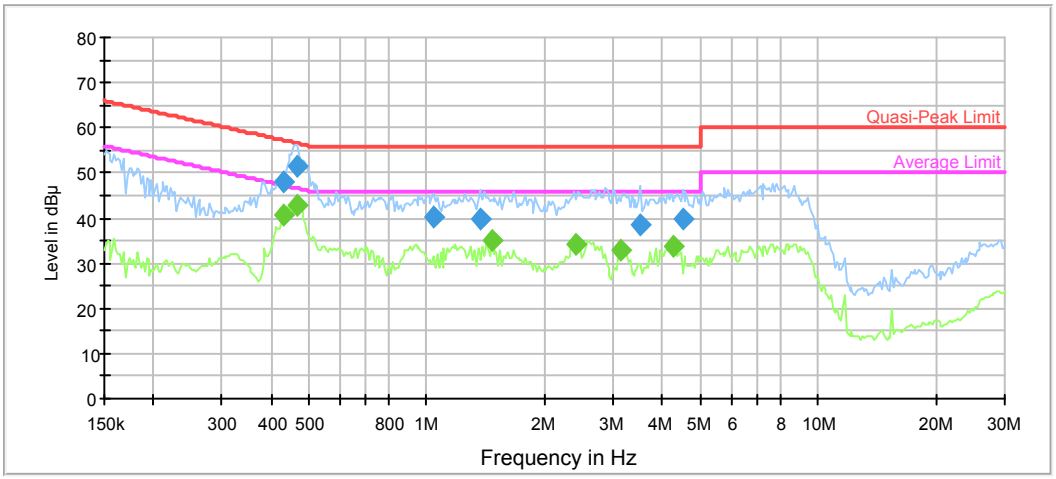
Environmental Conditions

Temperature:	23.9 °C
Relative Humidity:	42%
ATM Pressure:	100.9 kPa
Test by:	Sern Xiang
Test Date:	2019-12-02

Test Mode: Transmitting (802.11a chain 0 5825MHz was the worst)

AC/DC Adapter Mode:

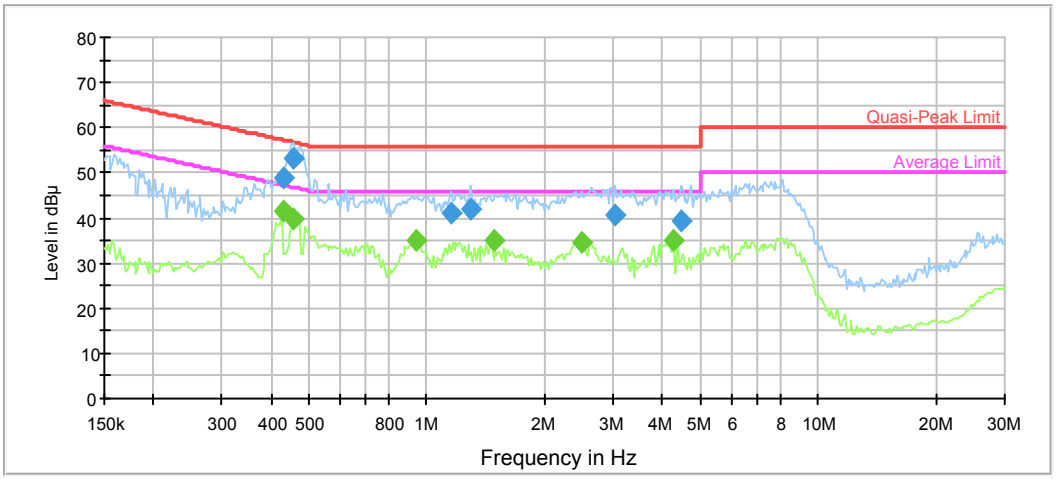
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.430682	48.0	9.000	L1	9.9	9.2	57.2
0.466367	51.7	9.000	L1	9.9	4.9	56.6
1.044142	40.1	9.000	L1	9.8	15.9	56.0
1.365955	39.8	9.000	L1	9.8	16.2	56.0
3.515338	38.6	9.000	L1	9.8	17.4	56.0
4.508181	40.0	9.000	L1	9.8	16.0	56.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.430682	40.6	9.000	L1	9.9	6.6	47.2
0.466367	42.7	9.000	L1	9.9	3.9	46.6
1.464489	35.0	9.000	L1	9.8	11.0	46.0
2.408545	34.0	9.000	L1	9.8	12.0	46.0
3.150880	32.9	9.000	L1	9.8	13.1	46.0
4.289380	33.7	9.000	L1	9.8	12.3	46.0

AC120 V, 60 Hz, Neutral:

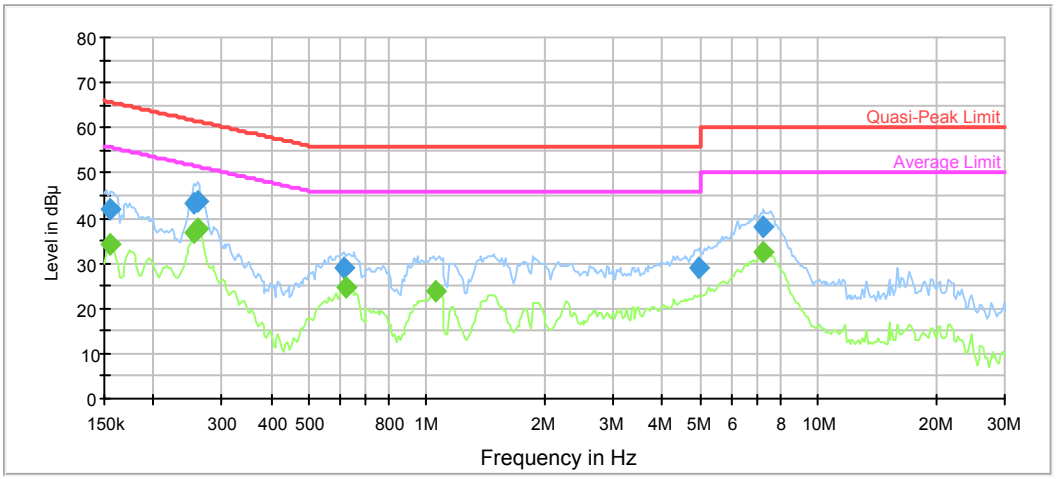


Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.430682	48.7	9.000	N	9.9	8.5	57.2
0.457178	53.3	9.000	N	9.9	3.4	56.7
1.153382	41.2	9.000	N	9.8	14.8	56.0
1.299660	41.8	9.000	N	9.8	14.2	56.0
3.027934	40.6	9.000	N	9.8	15.4	56.0
4.463546	39.3	9.000	N	9.8	16.7	56.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.430682	41.6	9.000	N	9.9	5.6	47.2
0.457178	40.0	9.000	N	9.9	6.7	46.7
0.935889	35.1	9.000	N	9.8	10.9	46.0
1.493925	35.2	9.000	N	9.8	10.8	46.0
2.481527	34.5	9.000	N	9.8	11.5	46.0
4.289380	34.9	9.000	N	9.8	11.1	46.0

PoE Adapter Mode:

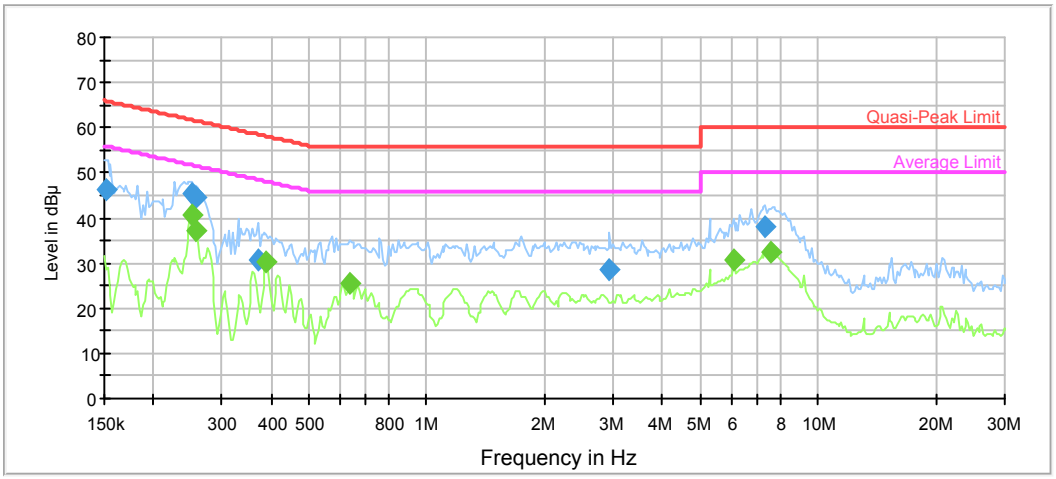
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.156091	41.8	9.000	L1	11.1	23.9	65.7
0.254170	43.3	9.000	L1	10.3	18.3	61.6
0.259279	43.7	9.000	L1	10.3	17.8	61.5
0.616207	29.0	9.000	L1	9.8	27.0	56.0
4.979837	29.1	9.000	L1	9.8	26.9	56.0
7.268208	38.0	9.000	L1	9.8	22.0	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.156091	34.1	9.000	L1	11.1	21.6	55.7
0.254170	36.7	9.000	L1	10.3	14.9	51.6
0.259279	37.8	9.000	L1	10.3	13.7	51.5
0.622369	24.5	9.000	L1	9.8	21.5	46.0
1.054583	23.7	9.000	L1	9.8	22.3	46.0
7.268208	32.5	9.000	L1	9.8	17.5	50.0

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.151500	46.2	9.000	N	11.1	19.8	65.9
0.251654	45.5	9.000	N	10.3	16.2	61.7
0.256712	44.4	9.000	N	10.3	17.1	61.5
0.370968	30.8	9.000	N	10.0	27.7	58.5
2.938883	28.4	9.000	N	9.8	27.6	56.0
7.340890	37.9	9.000	N	9.8	22.1	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.251654	40.7	9.000	N	10.3	11.0	51.7
0.256712	37.3	9.000	N	10.3	14.2	51.5
0.389891	30.1	9.000	N	10.0	18.0	48.1
0.634879	25.5	9.000	N	9.8	20.5	46.0
6.076347	30.5	9.000	N	9.8	19.5	50.0
7.563326	32.6	9.000	N	9.8	17.4	50.0

FCC §15.209, §15.205 & §15.407(b) –UNWANTED EMISSION

Applicable Standard

FCC §15.407; §15.209; §15.205;

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(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 e.i.r.p. 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 e.i.r.p. of −27 dBm/MHz.

(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 e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

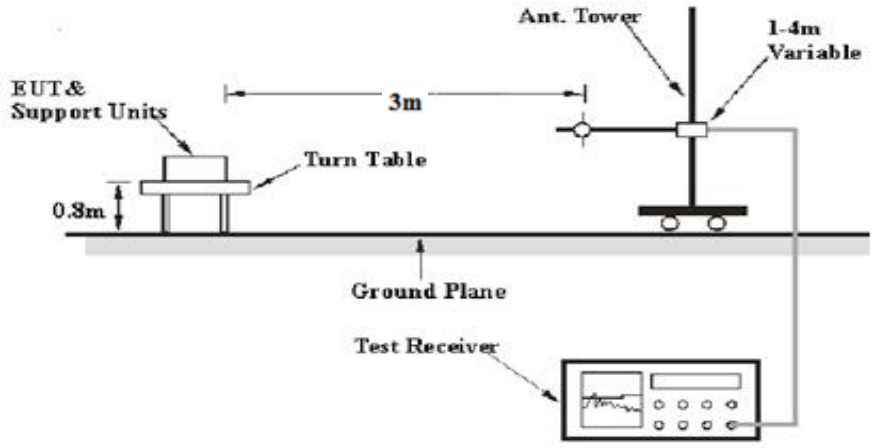
(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

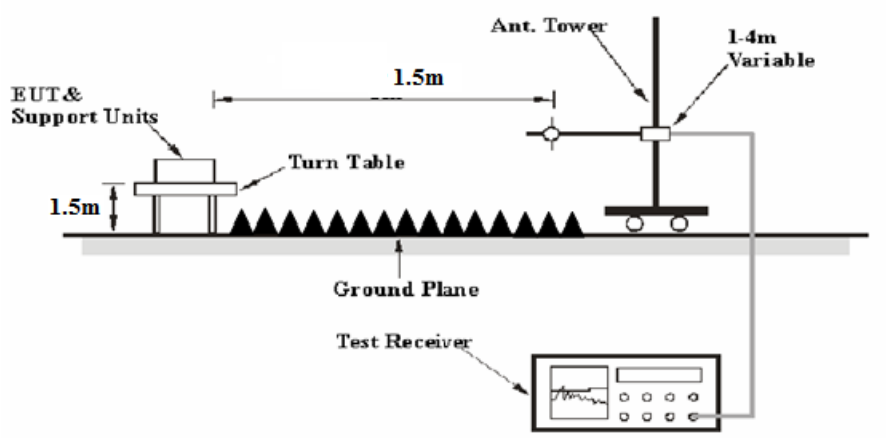
(7) The provisions of §15.205 apply to intentional radiators operating under this section.

EUT Setup

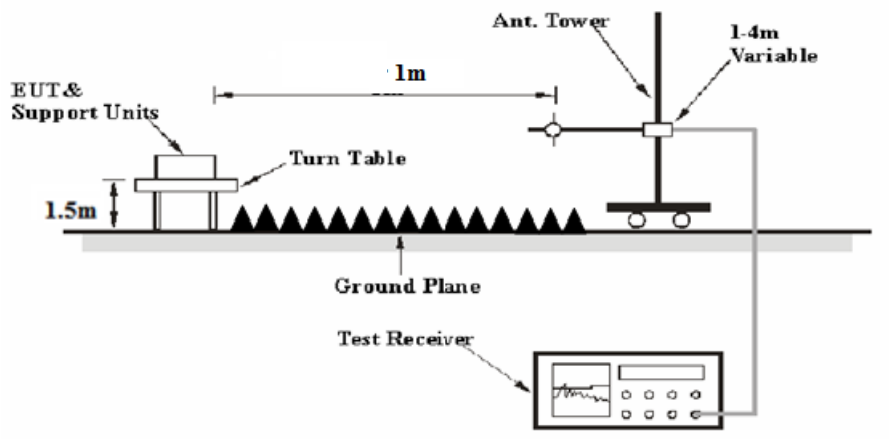
Below 1 GHz:



1-26.5 GHz:



26.5-40 GHz:



The radiated emission Below 1GHz tests were performed in the 10 meters chamber test site, above 1GHz tests were performed in the 3 meters chamber test site A, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.407 limits

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

30-1000MHz:

Measurement	RBW	Video B/W	IF B/W
QP	120 kHz	300 kHz	120kHz

1GHz- 40GHz:

Measurement	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
Ave.	>98%	1MHz	10 Hz
	<98%	1MHz	1/T

Note: T is minimum transmission duration

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

During the radiated emission test, the adapter was connected to the first AC floor outlet.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, emission shall be computed as: E [dBμV/m] = EIRP[dBm] + 95.2, for d = 3 meters.

According to C63.10, the above 1G test result shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade from 3m to 1.5m or 1m
Distance extrapolation factor =20 log (specific distance [3m]/test distance [1.5m]) dB= 6.02 dB
or
Distance extrapolation factor =20 log (specific distance [3m]/test distance [1m]) dB= 9.54 dB

All emissions under the average limit and under the noise floor have not recorded in the report.

Corrected Amplitude & Margin Calculation

For the range 30MHz-1GHz, the Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit - Corrected Amplitude

For the range 1GHz-40GHz, Test performed at 1.5m or 1m, the Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading and the Distance extrapolation factor. The basic equation is as follows:

Corrected Amplitude
= Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain-Distance extrapolation factor

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit- Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiation Below 1GHz					
R&S	EMI Test Receiver	ESCI	100035	2019-08-03	2020-08-03
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-2	2017-08-25	2020-08-25
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2019-09-24	2020-09-24
Sonoma	Amplifier	310N	185914	2019-10-13	2020-10-13
Radiation Above 1GHz					
R&S	Spectrum Analyzer	FSP 38	100478	2019-05-09	2020-05-09
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2019-11-18	2022-11-18
Ducommun Technolagies	Horn Antenna	ARH-2823-02	1007726-01 1302	2019-11-18	2022-11-18
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2019-09-05	2020-09-05
MICRO-COAX	Coaxial Cable	UFA147-1-2362-100100	64639 231029-001	2019-02-24	2020-02-24
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2019-09-05	2020-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2019-06-27	2020-06-27
Sinoscite	Bandstop Filters	BSF5150-5850MN-0899-003	0899003	2019-05-06	2020-05-06
Micro-tronics	High Pass Filter	HPM50111	S/N-G217	2019-06-16	2020-06-16

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

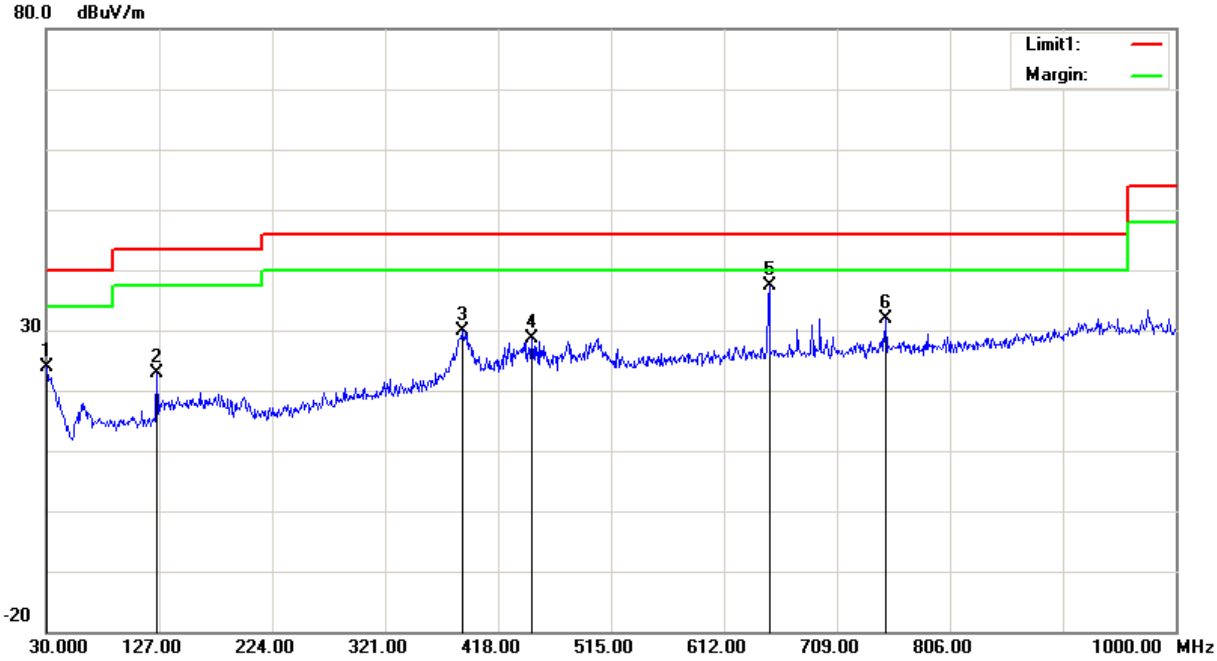
Test Items	Radiation Below 1GHz	Radiation Above 1GHz
Temperature:	22.9 °C	22.9 °C
Relative Humidity:	46%	46%
ATM Pressure:	100.9 kPa	100.9 kPa
Tester:	Ade Xiao	Ade Xiao
Test Date:	2019-12-02	2019-12-02

Test Mode: Transmitting

Below 1GHz (802.11n ht20, 5240 MHz was the worst):

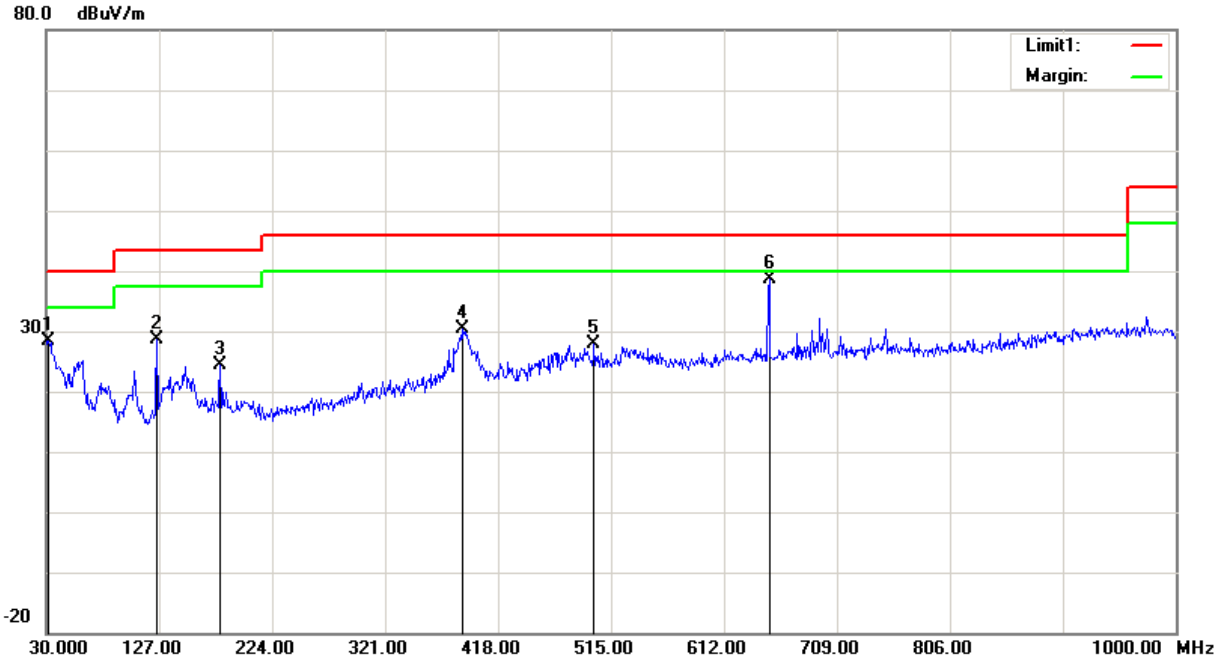
AC/DC adapter mode:

Horizontal



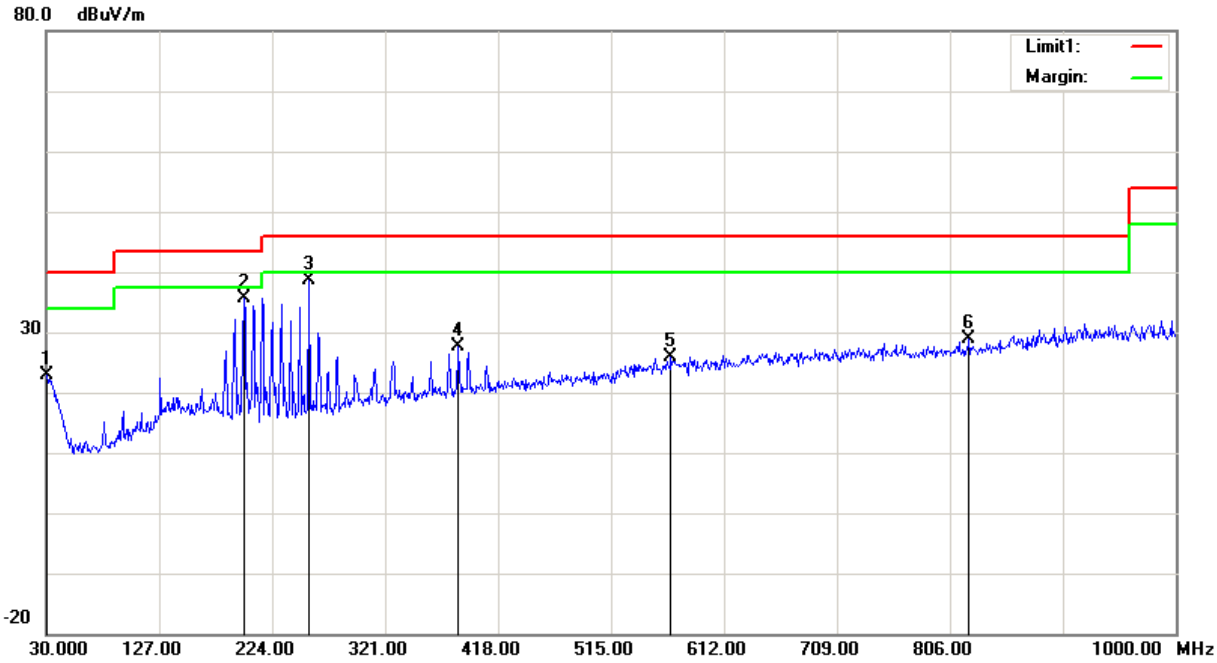
Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.9700	28.67	peak	-4.88	23.79	40.00	16.21
125.0600	34.17	peak	-11.41	22.76	43.50	20.74
386.9600	35.55	peak	-5.68	29.87	46.00	16.13
447.1000	32.95	peak	-4.35	28.60	46.00	17.40
650.8000	37.87	peak	-0.42	37.45	46.00	8.55
750.7100	31.26	peak	0.68	31.94	46.00	14.06

Vertical



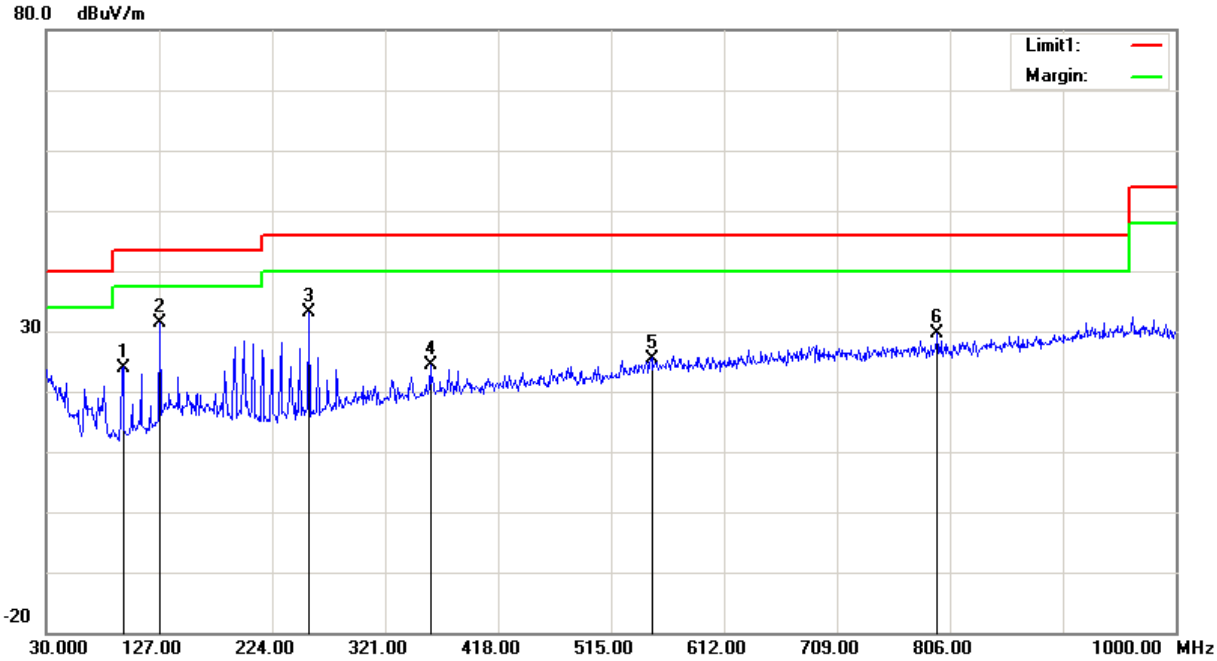
Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
31.9400	33.86	peak	-5.47	28.39	40.00	11.61
125.0600	40.12	peak	-11.41	28.71	43.50	14.79
179.3800	34.34	peak	-9.91	24.43	43.50	19.07
386.9600	35.99	peak	-5.68	30.31	46.00	15.69
500.4500	31.27	peak	-3.45	27.82	46.00	18.18
650.8000	39.02	peak	-0.42	38.60	46.00	7.40

PoE adapter mode:



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.9700	27.80	peak	-4.88	22.92	40.00	17.08
199.7500	45.06	peak	-9.39	35.67	43.50	7.83
256.0100	48.17	peak	-9.63	38.54	46.00	7.46
384.0500	33.40	peak	-5.76	27.64	46.00	18.36
566.4100	27.37	peak	-1.53	25.84	46.00	20.16
822.4900	27.46	peak	1.51	28.97	46.00	17.03

Vertical



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
95.9600	38.58	peak	-14.58	24.00	43.50	19.50
127.0000	42.14	peak	-10.82	31.32	43.50	12.18
256.0100	42.74	peak	-9.63	33.11	46.00	12.89
359.8000	30.28	peak	-6.00	24.28	46.00	21.72
549.9200	27.29	peak	-1.79	25.50	46.00	20.50
795.3300	28.38	peak	1.13	29.51	46.00	16.49

1GHz-40GHz(PoE adapter mode was the worst):

5150-5250MHz

802.11a (Chain 0)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5180 MHz										
5180.00	80.25	PK	H	33.59	3.58	0.00	117.42	111.4	N/A	N/A
5180.00	69.54	AV	H	33.59	3.58	0.00	106.71	100.69	N/A	N/A
5180.00	75.21	PK	V	33.59	3.58	0.00	112.38	106.36	N/A	N/A
5180.00	63.87	AV	V	33.59	3.58	0.00	101.04	95.02	N/A	N/A
5150.00	34.07	PK	H	33.54	3.56	0.00	71.17	65.15	74.00	8.85
5150.00	18.12	AV	H	33.54	3.56	0.00	55.22	49.2	54.00	4.80
10360.00	51.50	PK	H	38.17	6.29	25.46	70.50	64.48	68.20	3.72
15540.00	45.44	PK	H	38.06	8.85	24.27	68.08	62.06	74.00	11.94
15540.00	29.00	AV	H	38.06	8.85	24.27	51.64	45.62	54.00	8.38
6906.00	49.94	PK	H	35.01	5.10	25.37	64.68	58.66	68.20	9.54
Middle Channel: 5200 MHz										
5200.00	81.10	PK	H	33.62	3.60	0.00	118.32	112.3	N/A	N/A
5200.00	70.00	AV	H	33.62	3.60	0.00	107.22	101.2	N/A	N/A
5200.00	75.90	PK	V	33.62	3.60	0.00	113.12	107.1	N/A	N/A
5200.00	63.47	AV	V	33.62	3.60	0.00	100.69	94.67	N/A	N/A
10400.00	54.24	PK	H	38.18	6.32	25.46	73.28	67.26	68.20	0.94
15600.00	45.50	PK	H	38.00	8.83	24.31	68.02	62	74.00	12.00
15600.00	27.54	AV	H	38.00	8.83	24.31	50.06	44.04	54.00	9.96
6933.00	50.93	PK	H	35.07	5.12	25.38	65.74	59.72	68.20	8.48
High Channel: 5240 MHz										
5240.00	81.54	PK	H	33.68	3.52	0.00	118.74	112.72	N/A	N/A
5240.00	70.22	AV	H	33.68	3.52	0.00	107.42	101.4	N/A	N/A
5240.00	76.21	PK	V	33.68	3.52	0.00	113.41	107.39	N/A	N/A
5240.00	63.87	AV	V	33.68	3.52	0.00	101.07	95.05	N/A	N/A
5350.00	28.01	PK	H	33.86	3.52	0.00	65.39	59.37	74.00	14.63
5350.00	14.40	AV	H	33.86	3.52	0.00	51.78	45.76	54.00	8.24
10480.00	53.91	PK	H	38.20	6.37	25.47	73.01	66.99	68.20	1.21
15720.00	45.86	PK	H	37.88	8.79	24.39	68.14	62.12	74.00	11.88
15720.00	27.81	AV	H	37.88	8.79	24.39	50.09	44.07	54.00	9.93
6986.00	50.75	PK	H	35.17	5.17	25.39	65.70	59.68	68.20	8.52

802.11a (Chain 1)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5180 MHz										
5180.00	75.04	PK	H	33.59	3.58	0.00	112.21	106.19	N/A	N/A
5180.00	63.69	AV	H	33.59	3.58	0.00	100.86	94.84	N/A	N/A
5180.00	80.54	PK	V	33.59	3.58	0.00	117.71	111.69	N/A	N/A
5180.00	68.13	AV	V	33.59	3.58	0.00	105.30	99.28	N/A	N/A
5150.00	27.64	PK	V	33.54	3.56	0.00	64.74	58.72	74.00	15.28
5150.00	14.65	AV	V	33.54	3.56	0.00	51.75	45.73	54.00	8.27
10360.00	45.12	PK	V	38.17	6.29	25.46	64.12	58.1	68.20	10.1
15540.00	36.50	PK	V	38.06	8.85	24.27	59.14	53.12	74.00	20.88
15540.00	30.00	AV	V	38.06	8.85	24.27	52.64	46.62	54.00	7.38
6906.00	49.45	PK	V	35.01	5.10	25.37	64.19	58.17	68.20	10.03
Middle Channel: 5200 MHz										
5200.00	75.20	PK	H	33.62	3.60	0.00	112.42	106.4	N/A	N/A
5200.00	63.20	AV	H	33.62	3.60	0.00	100.42	94.4	N/A	N/A
5200.00	80.24	PK	V	33.62	3.60	0.00	117.46	111.44	N/A	N/A
5200.00	67.71	AV	V	33.62	3.60	0.00	104.93	98.91	N/A	N/A
10400.00	43.74	PK	V	38.18	6.32	25.46	62.78	56.76	68.20	11.44
15600.00	37.20	PK	V	38.00	8.83	24.31	59.72	53.7	74.00	20.30
15600.00	27.54	AV	V	38.00	8.83	24.31	50.06	44.04	54.00	9.96
6933.00	48.43	PK	V	35.07	5.12	25.38	63.24	57.22	68.20	10.98
High Channel: 5240 MHz										
5240.00	76.00	PK	H	33.68	3.52	0.00	113.20	107.18	N/A	N/A
5240.00	64.41	AV	H	33.68	3.52	0.00	101.61	95.59	N/A	N/A
5240.00	81.00	PK	V	33.68	3.52	0.00	118.20	112.18	N/A	N/A
5240.00	68.67	AV	V	33.68	3.52	0.00	105.87	99.85	N/A	N/A
5350.00	26.67	PK	V	33.86	3.52	0.00	64.05	58.03	74.00	15.97
5350.00	14.35	AV	V	33.86	3.52	0.00	51.73	45.71	54.00	8.29
10480.00	43.97	PK	V	38.20	6.37	25.47	63.07	57.05	68.20	11.15
15720.00	38.90	PK	V	37.88	8.79	24.39	61.18	55.16	74.00	18.84
15720.00	27.86	AV	V	37.88	8.79	24.39	50.14	44.12	54.00	9.88
6986.00	51.50	PK	V	35.17	5.17	25.39	66.45	60.43	68.20	7.77

802.11n ht20(2Tx was the worst)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5180 MHz										
5180.00	83.87	PK	H	33.59	3.58	0.00	121.04	115.02	N/A	N/A
5180.00	72.66	AV	H	33.59	3.58	0.00	109.83	103.81	N/A	N/A
5180.00	81.50	PK	V	33.59	3.58	0.00	118.67	112.65	N/A	N/A
5180.00	70.21	AV	V	33.59	3.58	0.00	107.38	101.36	N/A	N/A
5150.00	36.67	PK	H	33.54	3.56	0.00	73.77	67.75	74.00	6.25
5150.00	20.00	AV	H	33.54	3.56	0.00	57.10	51.08	54.00	2.92
10360.00	51.87	PK	H	38.17	6.29	25.46	70.87	64.85	68.20	3.35
15540.00	41.27	PK	H	38.06	8.85	24.27	63.91	57.89	74.00	16.11
15540.00	26.43	AV	H	38.06	8.85	24.27	49.07	43.05	54.00	10.95
6906.00	49.07	PK	H	35.01	5.10	25.37	63.81	57.79	68.20	10.41
Middle Channel: 5200 MHz										
5200.00	83.89	PK	H	33.62	3.60	0.00	121.11	115.09	N/A	N/A
5200.00	72.71	AV	H	33.62	3.60	0.00	109.93	103.91	N/A	N/A
5200.00	82.00	PK	V	33.62	3.60	0.00	119.22	113.2	N/A	N/A
5200.00	70.07	AV	V	33.62	3.60	0.00	107.29	101.27	N/A	N/A
10400.00	52.57	PK	H	38.18	6.32	25.46	71.61	65.59	68.20	2.61
15600.00	40.31	PK	H	38.00	8.83	24.31	62.83	56.81	74.00	17.19
15600.00	26.13	AV	H	38.00	8.83	24.31	48.65	42.63	54.00	11.37
6933.00	48.63	PK	V	35.07	5.12	25.38	63.44	57.42	68.20	10.78
High Channel: 5240 MHz										
5240.00	83.95	PK	H	33.68	3.52	0.00	121.15	115.13	N/A	N/A
5240.00	71.93	AV	H	33.68	3.52	0.00	109.13	103.11	N/A	N/A
5240.00	82.69	PK	V	33.68	3.52	0.00	119.89	113.87	N/A	N/A
5240.00	70.34	AV	V	33.68	3.52	0.00	107.54	101.52	N/A	N/A
5350.00	26.61	PK	H	33.86	3.52	0.00	63.99	57.97	74.00	16.03
5350.00	14.34	AV	H	33.86	3.52	0.00	51.72	45.7	54.00	8.30
10480.00	51.48	PK	H	38.20	6.37	25.47	70.58	64.56	68.20	3.64
15720.00	41.00	PK	H	37.88	8.79	24.39	63.28	57.26	74.00	16.74
15720.00	26.31	AV	H	37.88	8.79	24.39	48.59	42.57	54.00	11.43
6986.00	49.18	PK	V	35.17	5.17	25.39	64.13	58.11	68.20	10.09

802.11n ht40(2Tx was the worst)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5190 MHz										
5190.00	78.30	PK	H	33.60	3.59	0.00	115.49	109.47	N/A	N/A
5190.00	69.32	AV	H	33.60	3.59	0.00	106.51	100.49	N/A	N/A
5190.00	76.24	PK	V	33.60	3.59	0.00	113.43	107.41	N/A	N/A
5190.00	65.12	AV	V	33.60	3.59	0.00	102.31	96.29	N/A	N/A
5150.00	36.60	PK	H	33.54	3.56	0.00	73.70	67.68	74.00	6.32
5150.00	21.57	AV	H	33.54	3.56	0.00	58.67	52.65	54.00	1.35
10380.00	45.92	PK	H	38.18	6.31	25.46	64.95	58.93	68.2	9.27
15570.00	37.23	PK	H	38.03	8.84	24.29	59.81	53.79	74.00	20.21
15570.00	23.53	AV	H	38.03	8.84	24.29	46.11	40.09	54.00	13.91
6919.00	49.27	PK	H	35.04	5.11	25.38	64.04	58.02	68.20	10.18
High Channel: 5230 MHz										
5230.00	78.82	PK	H	33.67	3.54	0.00	116.03	110.01	N/A	N/A
5230.00	68.67	AV	H	33.67	3.54	0.00	105.88	99.86	N/A	N/A
5230.00	76.30	PK	V	33.67	3.54	0.00	113.51	107.49	N/A	N/A
5230.00	64.68	AV	V	33.67	3.54	0.00	101.89	95.87	N/A	N/A
5350.00	27.40	PK	H	33.86	3.52	0.00	64.78	58.76	74.00	15.24
5350.00	14.72	AV	H	33.86	3.52	0.00	52.10	46.08	54.00	7.92
10460.00	46.60	PK	H	38.19	6.36	25.47	65.68	59.66	68.20	8.54
15690.00	36.87	PK	H	37.91	8.80	24.37	59.21	53.19	74.00	20.81
15690.00	23.12	AV	H	37.91	8.80	24.37	45.46	39.44	54.00	14.56
6973.00	50.00	PK	H	35.15	5.16	25.39	64.92	58.9	68.20	9.30

802.11ac ht80(2Tx was the worst)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5210 MHz										
5210.00	72.15	PK	H	33.64	3.58	0.00	109.37	103.35	N/A	N/A
5210.00	62.77	AV	H	33.64	3.58	0.00	99.99	93.97	N/A	N/A
5210.00	71.49	PK	V	33.64	3.58	0.00	108.71	102.69	N/A	N/A
5210.00	59.91	AV	V	33.64	3.58	0.00	97.13	91.11	N/A	N/A
5150.00	38.54	PK	H	33.54	3.56	0.00	75.64	69.62	74.00	4.38
5150.00	20.53	AV	H	33.54	3.56	0.00	57.63	51.61	54.00	2.39
5350.00	26.85	PK	H	33.86	3.52	0.00	64.23	58.21	74.00	15.79
5350.00	15.39	AV	H	33.86	3.52	0.00	52.77	46.75	54.00	7.25
10420.00	42.80	PK	H	38.18	6.33	25.47	61.84	55.82	68.20	12.38
15630.00	33.20	PK	H	37.97	8.82	24.33	55.66	49.64	74.00	24.36
15630.00	24.20	AV	H	37.97	8.82	24.33	46.66	40.64	54.00	13.36
6946.00	50.74	PK	H	35.09	5.13	25.38	65.58	59.56	68.20	8.64

5725-5850MHz
802.11a (Chain 0)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5745 MHz										
5745.00	77.24	PK	H	34.20	3.69	0.00	115.13	109.11	N/A	N/A
5745.00	66.29	AV	H	34.20	3.69	0.00	104.18	98.16	N/A	N/A
5745.00	74.46	PK	V	34.20	3.69	0.00	112.35	106.33	N/A	N/A
5745.00	63.11	AV	V	34.20	3.69	0.00	101.00	94.98	N/A	N/A
5725.00	29.93	PK	H	34.19	3.69	0.00	67.81	61.79	122.20	60.41
5720.00	26.76	PK	H	34.19	3.69	0.00	64.64	58.62	110.80	52.18
5700.00	27.65	PK	H	34.18	3.68	0.00	65.51	59.49	105.20	45.71
5650.00	28.53	PK	H	34.16	3.63	0.00	66.32	60.3	68.20	7.90
11490.00	39.98	PK	H	38.99	6.59	25.51	60.05	54.03	74.00	19.97
11490.00	27.31	AV	H	38.99	6.59	25.51	47.38	41.36	54.00	12.64
17235.00	44.37	PK	H	41.56	8.78	23.72	70.99	64.97	68.20	3.23
7660.00	43.56	PK	H	36.60	4.45	25.95	58.66	52.64	74.00	21.36
7660.00	41.09	AV	H	36.60	4.45	25.95	56.19	50.17	54.00	3.83
Middle Channel: 5785 MHz										
5785.00	76.44	PK	H	34.21	3.71	0.00	114.36	108.34	N/A	N/A
5785.00	66.88	AV	H	34.21	3.71	0.00	104.80	98.78	N/A	N/A
5785.00	73.37	PK	V	34.21	3.71	0.00	111.29	105.27	N/A	N/A
5785.00	63.87	AV	V	34.21	3.71	0.00	101.79	95.77	N/A	N/A
11570.00	44.70	PK	H	39.00	6.61	25.46	64.85	58.83	74.00	15.17
11570.00	31.72	AV	H	39.00	6.61	25.46	51.87	45.85	54.00	8.15
17355.00	43.82	PK	H	42.26	8.81	23.60	71.29	65.27	68.20	2.93
7716.00	41.85	PK	H	36.63	4.50	25.97	57.01	50.99	74.00	23.01
7716.00	37.73	AV	H	36.63	4.50	25.97	52.89	46.87	54.00	7.13
High Channel: 5825 MHz										
5825.00	79.37	PK	H	34.23	3.73	0.00	117.33	111.31	N/A	N/A
5825.00	69.94	AV	H	34.23	3.73	0.00	107.90	101.88	N/A	N/A
5825.00	76.15	PK	V	34.23	3.73	0.00	114.11	108.09	N/A	N/A
5825.00	66.62	AV	V	34.23	3.73	0.00	104.58	98.56	N/A	N/A
5850.00	31.25	PK	H	34.24	3.75	0.00	69.24	63.22	122.20	58.98
5855.00	29.07	PK	H	34.24	3.75	0.00	67.06	61.04	110.80	49.76
5875.00	27.97	PK	H	34.25	3.77	0.00	65.99	59.97	105.20	45.23
5925.00	26.81	PK	H	34.27	3.80	0.00	64.88	58.86	68.20	9.34
11650.00	45.23	PK	H	39.00	6.64	25.41	65.46	59.44	74.00	14.56
11650.00	32.60	AV	H	39.00	6.64	25.41	52.83	46.81	54.00	7.19
17475.00	45.37	PK	H	42.96	8.84	23.48	73.69	67.67	68.20	0.53
7772.00	42.19	PK	H	36.66	4.55	25.98	57.42	51.4	68.20	16.80

802.11a (Chain 1)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5745 MHz										
5745.00	80.28	PK	H	34.20	3.69	0.00	118.17	112.15	N/A	N/A
5745.00	70.12	AV	H	34.20	3.69	0.00	108.01	101.99	N/A	N/A
5745.00	74.85	PK	V	34.20	3.69	0.00	112.74	106.72	N/A	N/A
5745.00	64.97	AV	V	34.20	3.69	0.00	102.86	96.84	N/A	N/A
5725.00	36.62	PK	H	34.19	3.69	0.00	74.50	68.48	122.20	53.72
5720.00	31.32	PK	H	34.19	3.69	0.00	69.20	63.18	110.80	47.62
5700.00	30.63	PK	H	34.18	3.68	0.00	68.49	62.47	105.20	42.73
5650.00	28.49	PK	H	34.16	3.63	0.00	66.28	60.26	68.20	7.94
11490.00	40.78	PK	H	38.99	6.59	25.51	60.85	54.83	74.00	19.17
11490.00	27.98	AV	H	38.99	6.59	25.51	48.05	42.03	54.00	11.97
17235.00	45.93	PK	H	41.56	8.78	23.72	72.55	66.53	68.20	1.67
7660.00	42.40	PK	H	36.60	4.45	25.95	57.50	51.48	74.00	22.52
7660.00	39.52	AV	H	36.60	4.45	25.95	54.62	48.6	54.00	5.40
Middle Channel: 5785 MHz										
5785.00	83.46	PK	H	34.21	3.71	0.00	121.38	115.36	N/A	N/A
5785.00	73.48	AV	H	34.21	3.71	0.00	111.40	105.38	N/A	N/A
5785.00	78.17	PK	V	34.21	3.71	0.00	116.09	110.07	N/A	N/A
5785.00	67.89	AV	V	34.21	3.71	0.00	105.81	99.79	N/A	N/A
11570.00	42.70	PK	V	39.00	6.61	25.46	62.85	56.83	74.00	17.17
11570.00	31.06	AV	V	39.00	6.61	25.46	51.21	45.19	54.00	8.81
17355.00	39.61	PK	V	42.26	8.81	23.60	67.08	61.06	68.20	7.14
7716.00	41.58	PK	H	36.63	4.50	25.97	56.74	50.72	74.00	23.28
7716.00	37.96	AV	H	36.63	4.50	25.97	53.12	47.1	54.00	6.90
High Channel: 5825 MHz										
5825.00	82.72	PK	H	34.23	3.73	0.00	120.68	114.66	N/A	N/A
5825.00	72.52	AV	H	34.23	3.73	0.00	110.48	104.46	N/A	N/A
5825.00	78.65	PK	V	34.23	3.73	0.00	116.61	110.59	N/A	N/A
5825.00	68.48	AV	V	34.23	3.73	0.00	106.44	100.42	N/A	N/A
5850.00	35.51	PK	H	34.24	3.75	0.00	73.50	67.48	122.20	54.72
5855.00	30.70	PK	H	34.24	3.75	0.00	68.69	62.67	110.80	48.13
5875.00	28.03	PK	H	34.25	3.77	0.00	66.05	60.03	105.20	45.17
5925.00	25.80	PK	H	34.27	3.80	0.00	63.87	57.85	68.20	10.35
11650.00	42.91	PK	H	39.00	6.64	25.41	63.14	57.12	74.00	16.88
11650.00	30.25	AV	H	39.00	6.64	25.41	50.48	44.46	54.00	9.54
17475.00	35.47	PK	H	42.96	8.84	23.48	63.79	57.77	68.20	10.43
7772.00	42.26	PK	H	36.66	4.55	25.98	57.49	51.47	68.20	16.73

802.11n ht20(2Tx was the worst)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5745 MHz										
5745.00	78.49	PK	H	34.20	3.69	0.00	116.38	110.36	N/A	N/A
5745.00	69.19	AV	H	34.20	3.69	0.00	107.08	101.06	N/A	N/A
5745.00	75.17	PK	V	34.20	3.69	0.00	113.06	107.04	N/A	N/A
5745.00	65.58	AV	V	34.20	3.69	0.00	103.47	97.45	N/A	N/A
5725.00	31.11	PK	H	34.19	3.69	0.00	68.99	62.97	122.20	59.23
5720.00	29.15	PK	H	34.19	3.69	0.00	67.03	61.01	110.80	49.79
5700.00	27.08	PK	H	34.18	3.68	0.00	64.94	58.92	105.20	46.28
5650.00	27.73	PK	H	34.16	3.63	0.00	65.52	59.5	68.20	8.70
11490.00	47.12	PK	H	38.99	6.59	25.51	67.19	61.17	74.00	12.83
11490.00	32.89	AV	H	38.99	6.59	25.51	52.96	46.94	54.00	7.06
17235.00	38.62	PK	H	41.56	8.78	23.72	65.24	59.22	68.20	8.98
7660.00	42.54	PK	H	36.60	4.45	25.95	57.64	51.62	74.00	22.38
7660.00	39.68	AV	H	36.60	4.45	25.95	54.78	48.76	54.00	5.24
Middle Channel: 5785 MHz										
5785.00	76.77	PK	H	34.21	3.71	0.00	114.69	108.67	N/A	N/A
5785.00	67.29	AV	H	34.21	3.71	0.00	105.21	99.19	N/A	N/A
5785.00	73.69	PK	V	34.21	3.71	0.00	111.61	105.59	N/A	N/A
5785.00	64.27	AV	V	34.21	3.71	0.00	102.19	96.17	N/A	N/A
11570.00	46.81	PK	H	39.00	6.61	25.46	66.96	60.94	74.00	13.06
11570.00	32.30	AV	H	39.00	6.61	25.46	52.45	46.43	54.00	7.57
17355.00	37.64	PK	H	42.26	8.81	23.60	65.11	59.09	68.20	9.11
7716.00	41.56	PK	H	36.63	4.50	25.97	56.72	50.7	74.00	23.30
7716.00	39.23	AV	H	36.63	4.50	25.97	54.39	48.37	54.00	5.63
High Channel: 5825 MHz										
5825.00	78.61	PK	H	34.23	3.73	0.00	116.57	110.55	N/A	N/A
5825.00	67.86	AV	H	34.23	3.73	0.00	105.82	99.8	N/A	N/A
5825.00	75.87	PK	V	34.23	3.73	0.00	113.83	107.81	N/A	N/A
5825.00	64.69	AV	V	34.23	3.73	0.00	102.65	96.63	N/A	N/A
5850.00	30.53	PK	H	34.24	3.75	0.00	68.52	62.5	122.20	59.70
5855.00	27.61	PK	H	34.24	3.75	0.00	65.60	59.58	110.80	51.22
5875.00	27.20	PK	H	34.25	3.77	0.00	65.22	59.2	105.20	46.00
5925.00	25.93	PK	H	34.27	3.80	0.00	64.00	57.98	68.20	10.22
11650.00	43.86	PK	H	39.00	6.64	25.41	64.09	58.07	74.00	15.93
11650.00	29.31	AV	H	39.00	6.64	25.41	49.54	43.52	54.00	10.48
17475.00	35.49	PK	H	42.96	8.84	23.48	63.81	57.79	68.20	10.41
7772.00	41.13	PK	H	36.66	4.55	25.98	56.36	50.34	68.20	17.86

802.11n ht40(2Tx was the worst)

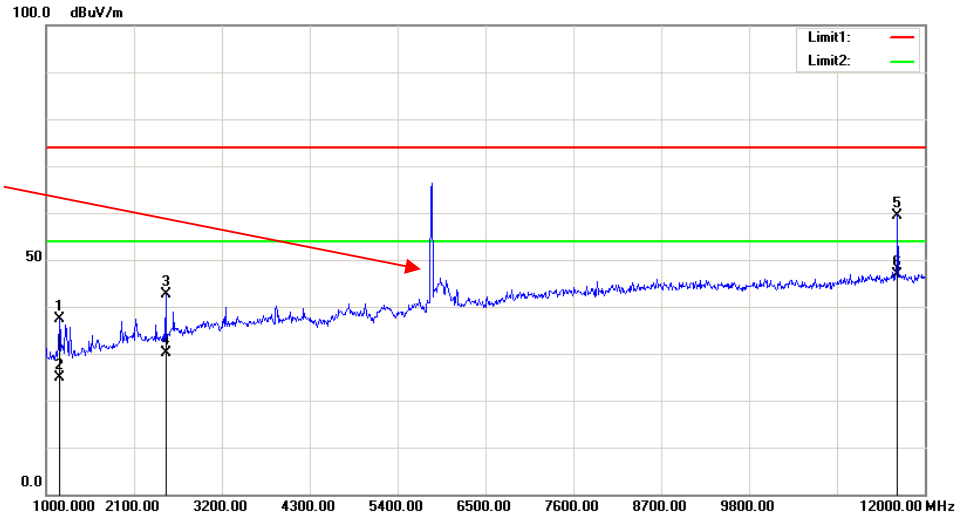
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5755 MHz										
5755.00	74.78	PK	H	34.20	3.70	0.00	112.68	106.66	N/A	N/A
5755.00	65.56	AV	H	34.20	3.70	0.00	103.46	97.44	N/A	N/A
5755.00	72.25	PK	V	34.20	3.70	0.00	110.15	104.13	N/A	N/A
5755.00	62.73	AV	V	34.20	3.70	0.00	100.63	94.61	N/A	N/A
5725.00	31.70	PK	H	34.19	3.69	0.00	69.58	63.56	122.20	58.64
5720.00	29.87	PK	H	34.19	3.69	0.00	67.75	61.73	110.80	49.07
5700.00	28.53	PK	H	34.18	3.68	0.00	66.39	60.37	105.20	44.83
5650.00	28.94	PK	H	34.16	3.63	0.00	66.73	60.71	68.20	7.49
11510.00	40.02	PK	H	39.00	6.59	25.50	60.11	54.09	74.00	19.91
11510.00	28.09	AV	H	39.00	6.59	25.50	48.18	42.16	54.00	11.84
17265.00	35.58	PK	H	41.74	8.79	23.69	62.42	56.4	68.20	11.80
7674.00	40.39	PK	H	36.60	4.47	25.96	55.50	49.48	74.00	24.52
7674.00	37.65	AV	H	36.60	4.47	25.96	52.76	46.74	54.00	7.26
High Channel: 5795 MHz										
5795.00	73.94	PK	H	34.22	3.71	0.00	111.87	105.85	N/A	N/A
5795.00	64.55	AV	H	34.22	3.71	0.00	102.48	96.46	N/A	N/A
5795.00	71.65	PK	V	34.22	3.71	0.00	109.58	103.56	N/A	N/A
5795.00	61.72	AV	V	34.22	3.71	0.00	99.65	93.63	N/A	N/A
5850.00	26.80	PK	H	34.24	3.75	0.00	64.79	58.77	122.20	63.43
5855.00	26.39	PK	H	34.24	3.75	0.00	64.38	58.36	110.80	52.44
5875.00	26.21	PK	H	34.25	3.77	0.00	64.23	58.21	105.20	46.99
5925.00	26.41	PK	H	34.27	3.80	0.00	64.48	58.46	68.20	9.74
11590.00	40.72	PK	H	39.00	6.62	25.45	60.89	54.87	74.00	19.13
11590.00	28.72	AV	H	39.00	6.62	25.45	48.89	42.87	54.00	11.13
17385.00	35.59	PK	H	42.43	8.82	23.57	63.27	57.25	68.20	10.95
7730.00	41.68	PK	H	36.64	4.52	25.97	56.87	50.85	74.00	23.15
7730.00	38.56	AV	H	36.64	4.52	25.97	53.75	47.73	54.00	6.27

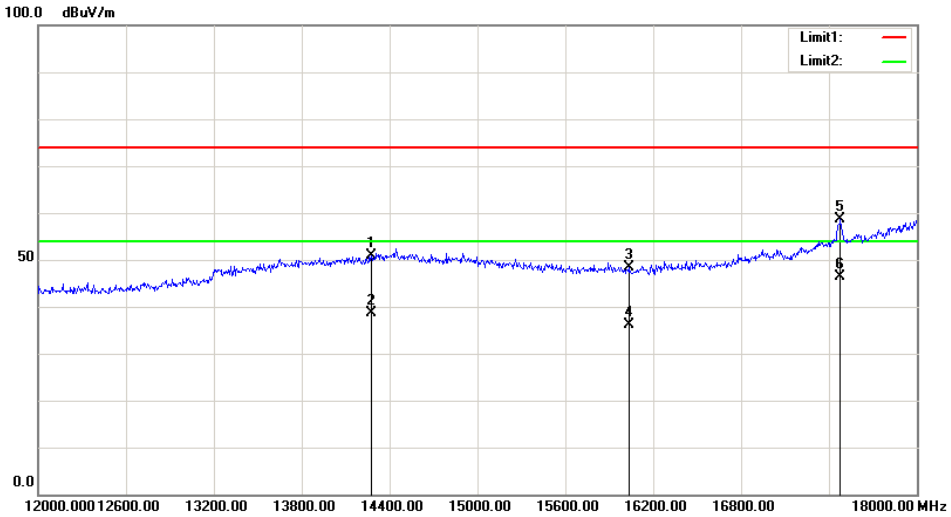
802.11ac ht80(2Tx was the worst)

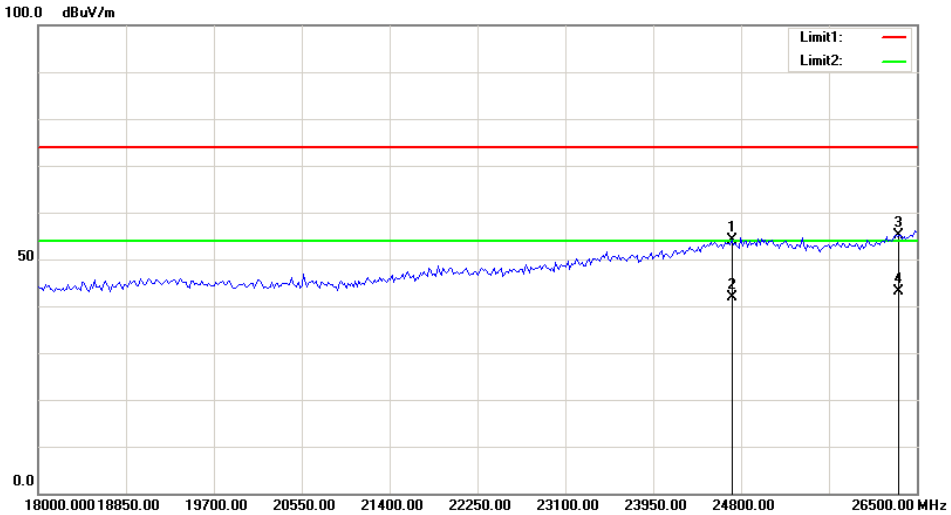
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5775 MHz										
5775.00	64.38	PK	H	34.21	3.70	0.00	102.29	96.27	N/A	N/A
5775.00	54.34	AV	H	34.21	3.70	0.00	92.25	86.23	N/A	N/A
5775.00	59.73	PK	V	34.21	3.70	0.00	97.64	91.62	N/A	N/A
5775.00	50.33	AV	V	34.21	3.70	0.00	88.24	82.22	N/A	N/A
5725.00	27.55	PK	H	34.19	3.69	0.00	65.43	59.41	122.20	62.79
5720.00	27.31	PK	H	34.19	3.69	0.00	65.19	59.17	110.80	51.63
5700.00	27.03	PK	H	34.18	3.68	0.00	64.89	58.87	105.20	46.33
5650.00	28.01	PK	H	34.16	3.63	0.00	65.80	59.78	68.20	8.42
5850.00	27.13	PK	H	34.24	3.75	0.00	65.12	59.1	122.20	63.10
5855.00	27.48	PK	H	34.24	3.75	0.00	65.47	59.45	110.80	51.35
5875.00	27.85	PK	H	34.25	3.77	0.00	65.87	59.85	105.20	45.35
5925.00	25.87	PK	H	34.27	3.80	0.00	63.94	57.92	68.20	10.28
11550.00	35.52	PK	H	39.00	6.61	25.48	55.65	49.63	74.00	24.37
11550.00	23.24	AV	H	39.00	6.61	25.48	43.37	37.35	54.00	16.65
17325.00	35.28	PK	H	42.09	8.80	23.63	62.54	56.52	68.20	11.68
7702.00	43.86	PK	H	36.62	4.49	25.96	59.01	52.99	74.00	21.01
7702.00	40.13	AV	H	36.62	4.49	25.96	55.28	49.26	54.00	4.74

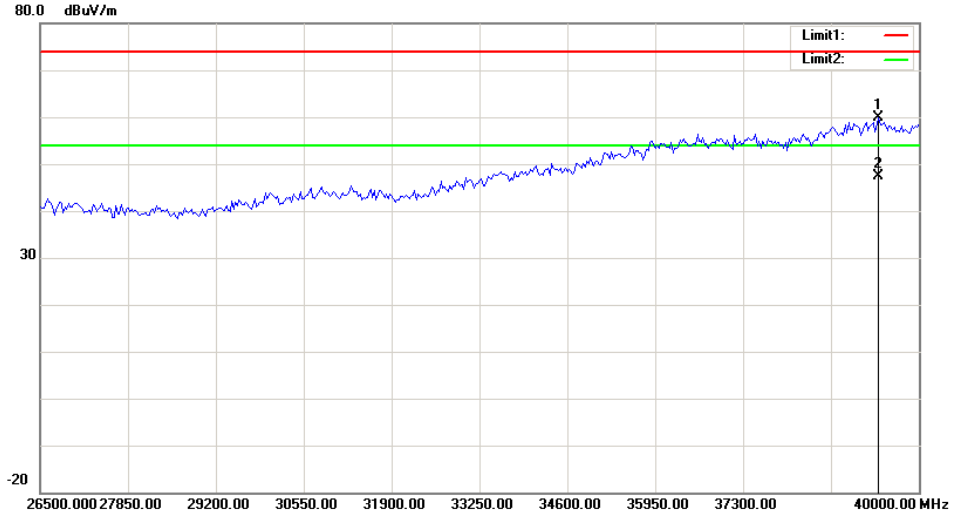
Test Plots(For worst mode 802.11a chain 0 5825MHz)
Horizontal

Fundamental Test with Band Rejection Filter



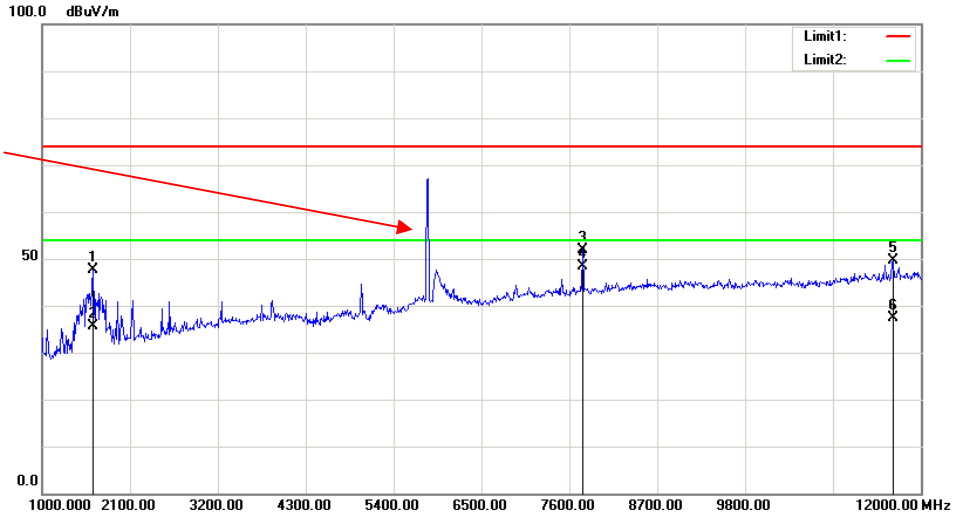


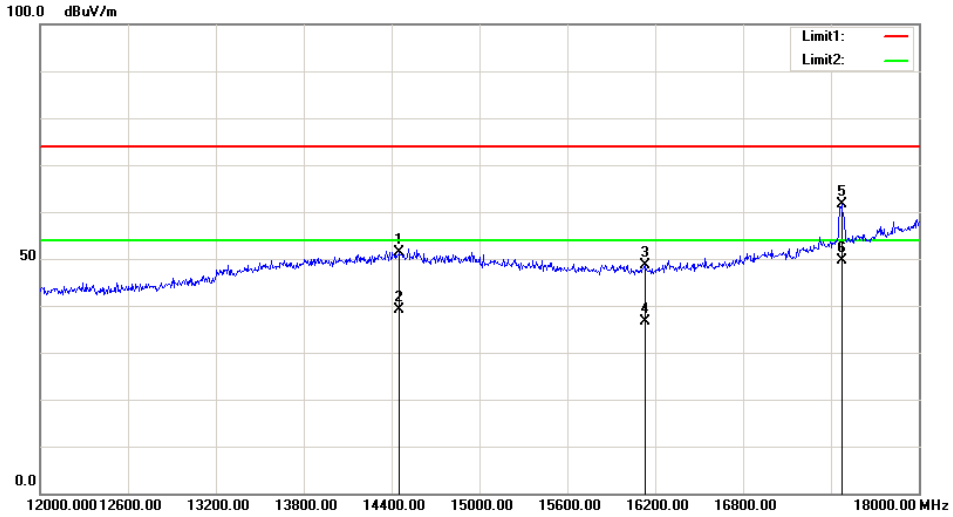


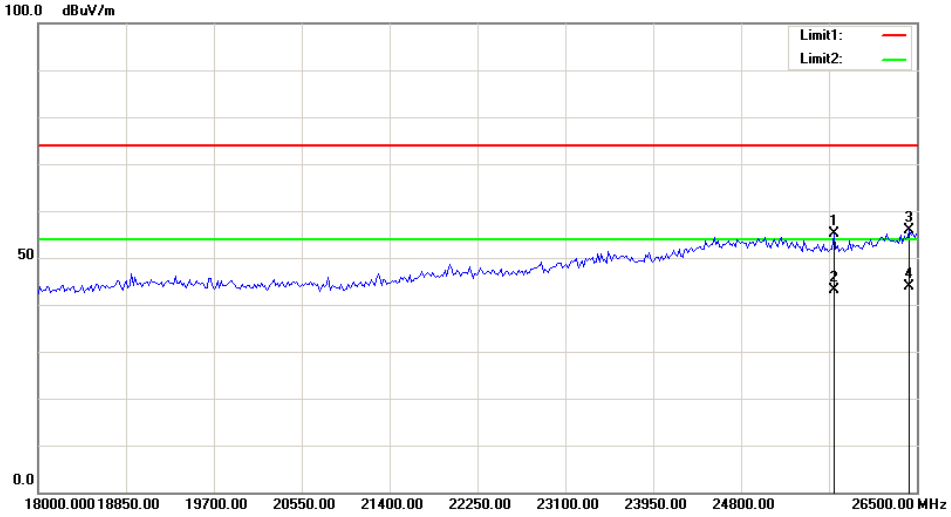


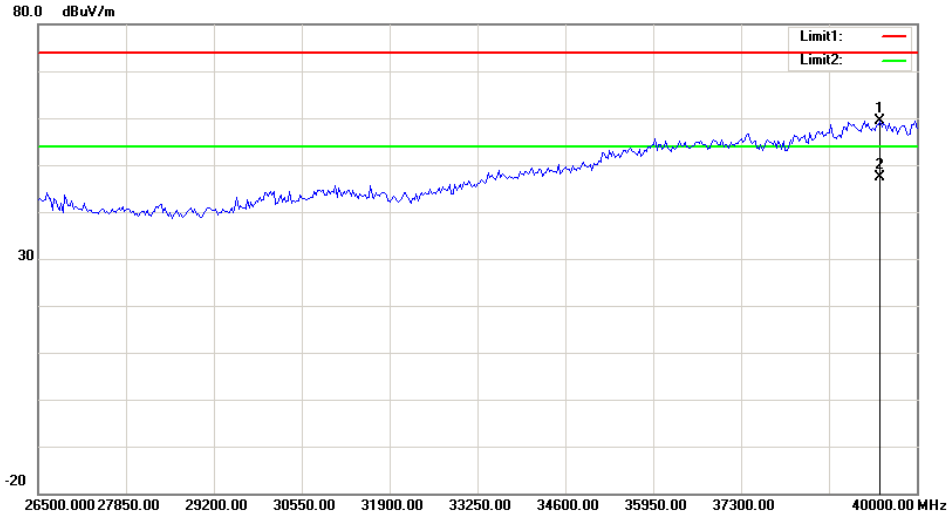
Vertical

Fundamental Test with Band Rejection Filter






100.0 dBuV/m
Limit1:
Limit2:
50
0.0
1
2
3
4
18000.000 18850.00 19700.00 20550.00 21400.00 22250.00 23100.00 23950.00 24800.00 26500.00 MHz


80.0 dBuV/m
Limit1:
Limit2:
30
-20
1
2
26500.000 27850.00 29200.00 30550.00 31900.00 33250.00 34600.00 35950.00 37300.00 40000.00 MHz

FCC §15.407(a)(e)–EMISSION BANDWIDTH AND OCCUPIED BANDWIDTH

Applicable Standard

15.407(a) (e)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2019-01-04	2020-01-04
R&S	Spectrum Analyzer	FSU 26	200256	2020-01-04	2021-01-04
Unknown	Coaxial Cable	C-SJ00-0010	C0010/31	Each time	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Test Data

Environmental Conditions

Temperature:	23.8～24.1 °C
Relative Humidity:	41～51 %
ATM Pressure:	101.4～102.1 kPa
Tester:	Lily Xie
Test Date:	2019-12-01～2020-01-14

Test Result: Pass.

Please refer to the following tables and plots.

Test mode: Transmitting (test was only performed at chain 0)

5150-5250MHz:

Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11 a	5180	23.040	16.800
	5200	23.840	16.880
	5240	23.840	16.880
802.11n ht20	5180	20.880	17.680
	5200	20.960	17.760
	5240	21.120	17.760
802.11n ht40	5190	39.200	36.000
	5230	39.360	35.840
802.11ac ht80	5210	83.840	76.160

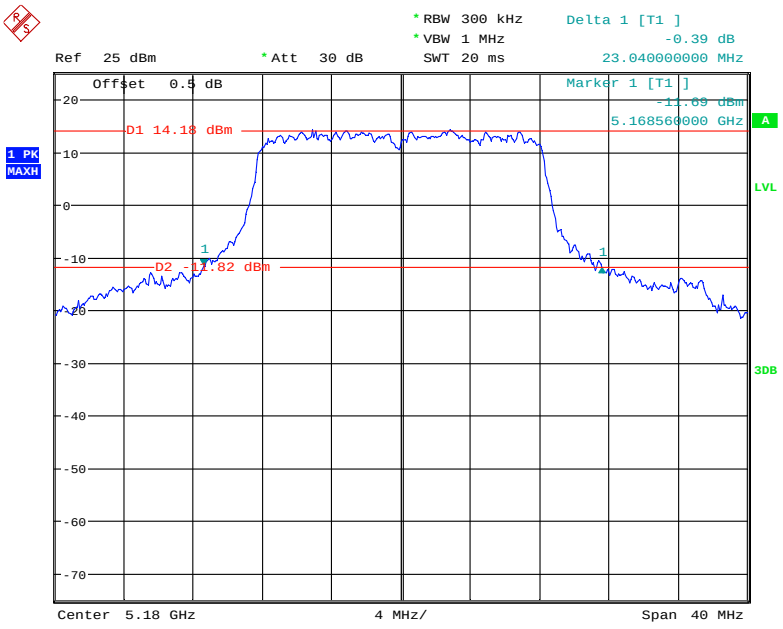
5725-5850MHz:

Mode	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11 a	5745	16.160	17.840
	5785	16.080	17.040
	5825	16.160	17.200
802.11n ht20	5745	17.680	18.080
	5785	17.760	18.080
	5825	17.760	18.160
802.11n ht40	5755	35.360	36.000
	5795	33.920	36.480
802.11ac ht80	5775	76.480	77.120

Note: the 99% Occupied Bandwidth have not fall into the band 5250-5350MHz or 5470-5725MHz, please refer to the test plots of 99% Occupied Bandwidth.

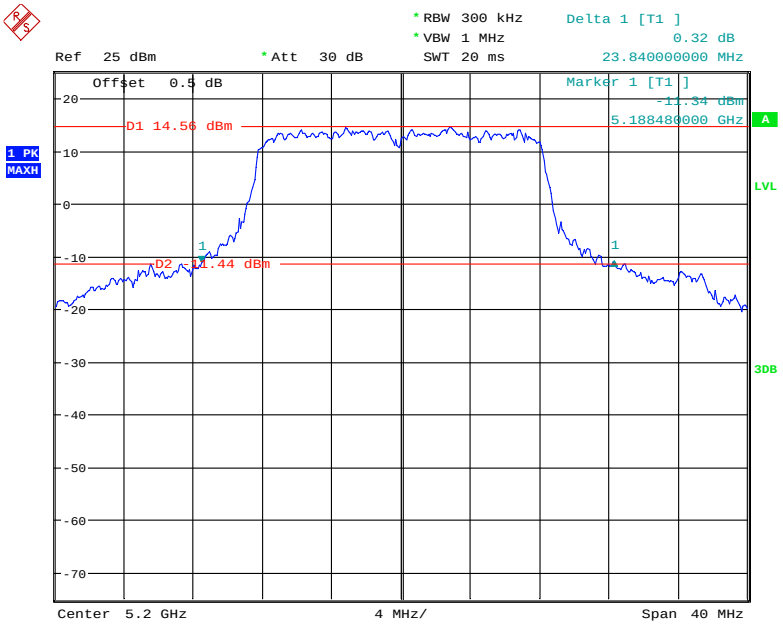
5150-5250MHz:
26dB Emission Bandwidth:

802.11a Low Channel



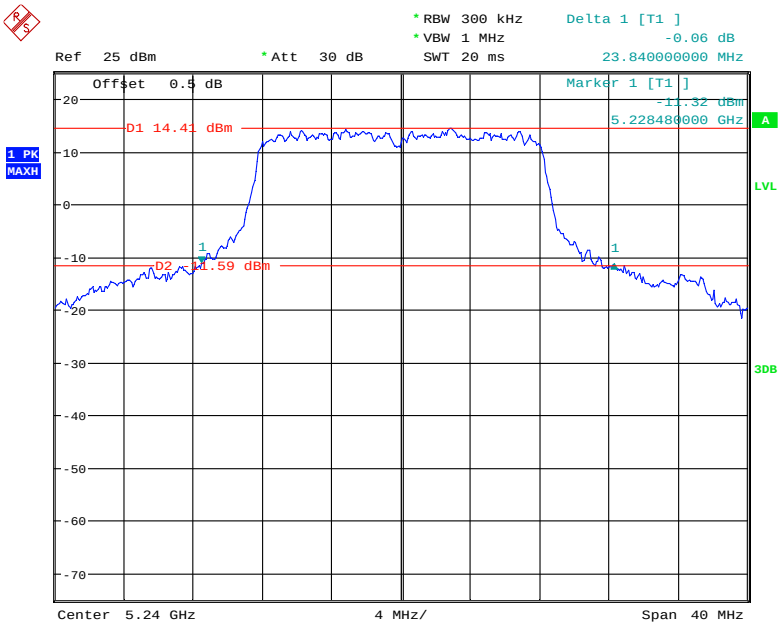
Date: 1.DEC.2019 17:22:59

802.11a Middle Channel



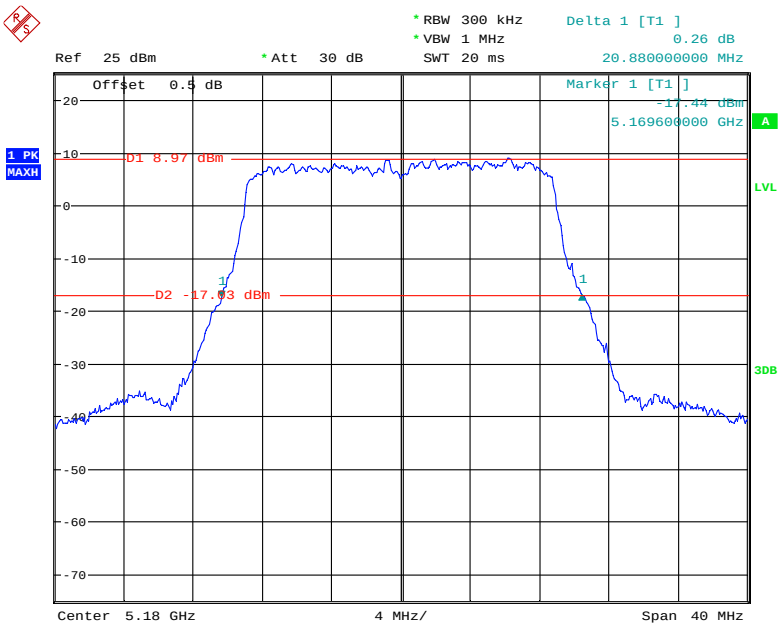
Date: 1.DEC.2019 17:24:37

802.11a High Channel



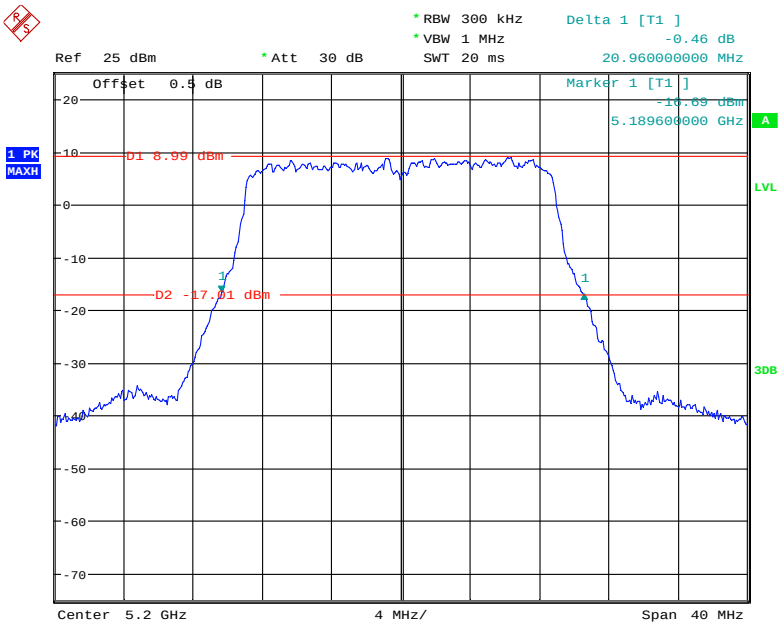
Date: 1.DEC.2019 17:26:58

802.11n ht20 Low Channel



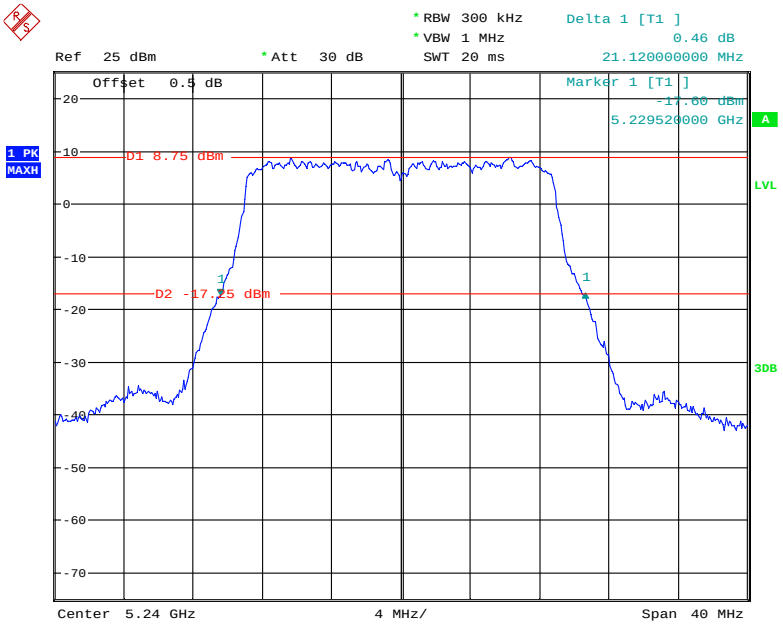
Date: 1.DEC.2019 17:28:56

802.11n ht20 Middle Channel



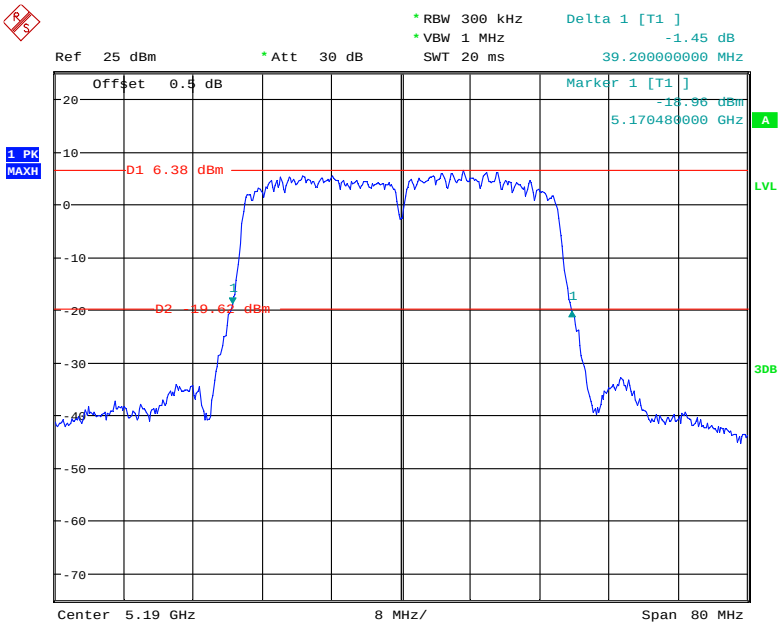
Date: 1.DEC.2019 17:29:41

802.11n ht20 High Channel



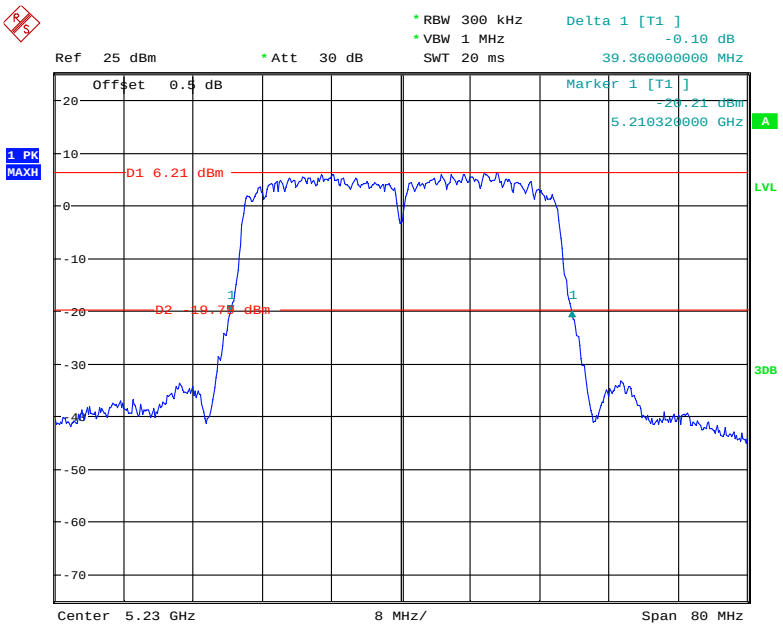
Date: 1.DEC.2019 17:30:31

802.11n ht40 Low Channel



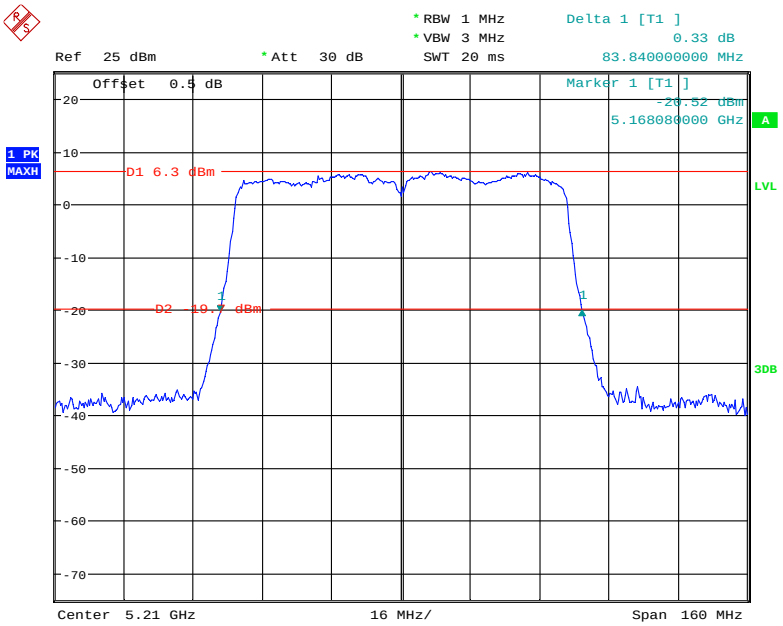
Date: 1.DEC.2019 17:33:57

802.11n ht40 High Channel



Date: 1.DEC.2019 17:35:10

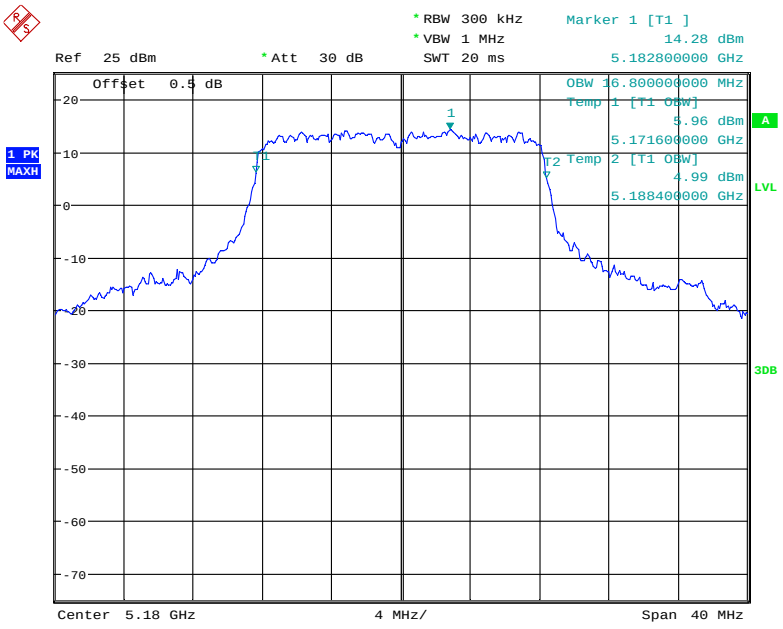
802.11ac vht80



Date: 1.DEC.2019 17:36:24

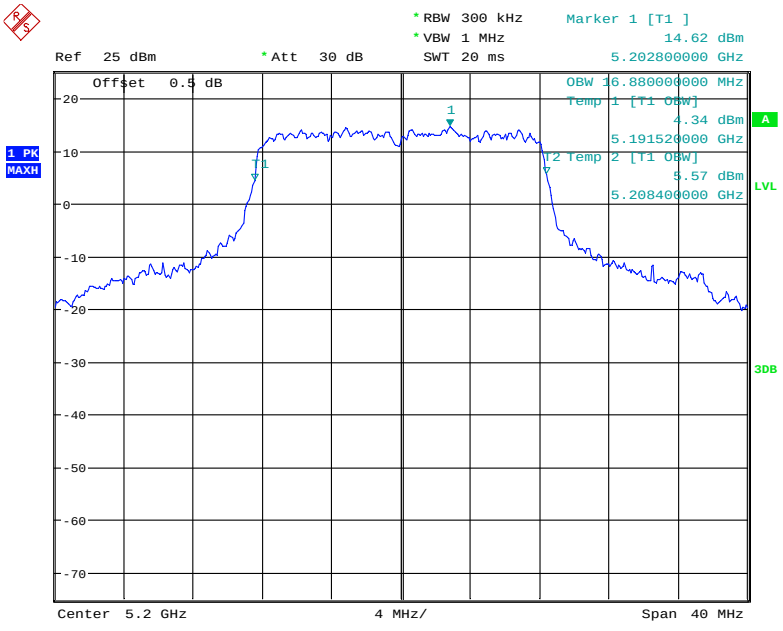
99% Occupied Bandwidth:

802.11a Low Channel



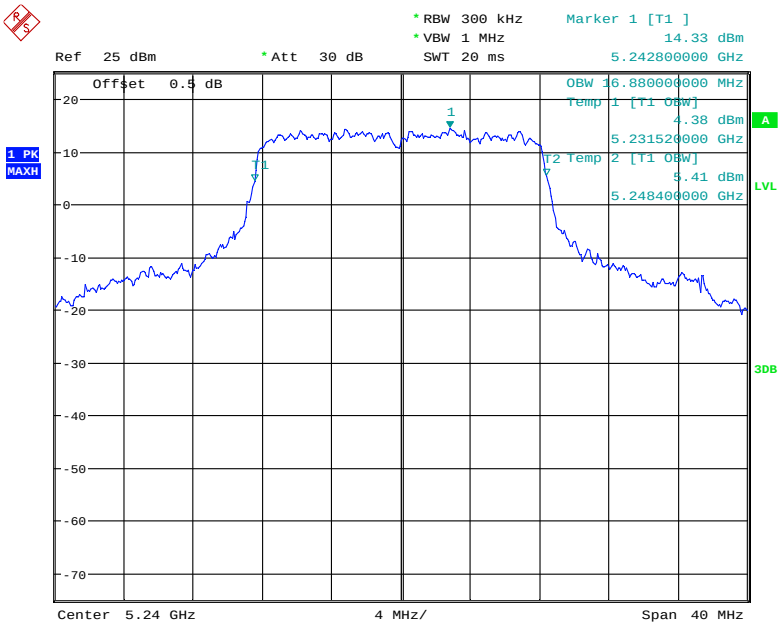
Date: 1.DEC.2019 17:23:12

802.11a Middle Channel



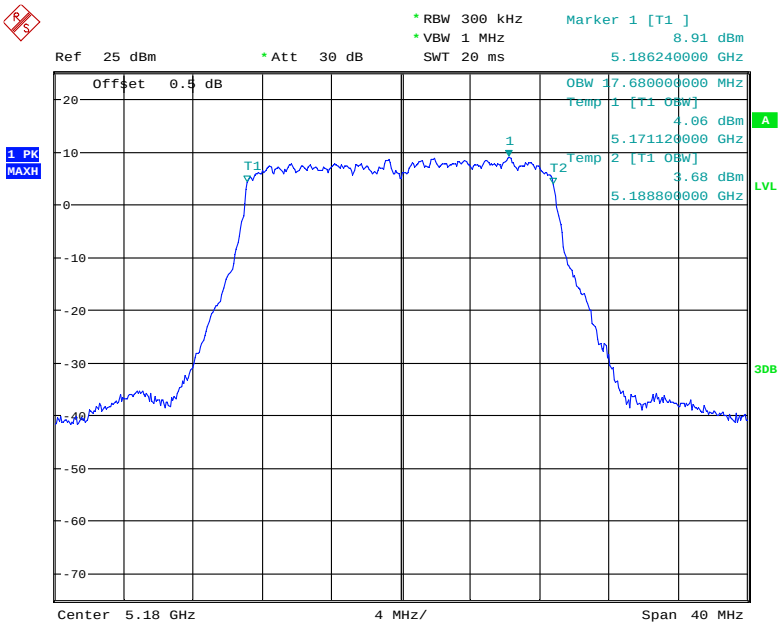
Date: 1.DEC.2019 17:24:50

802.11a High Channel



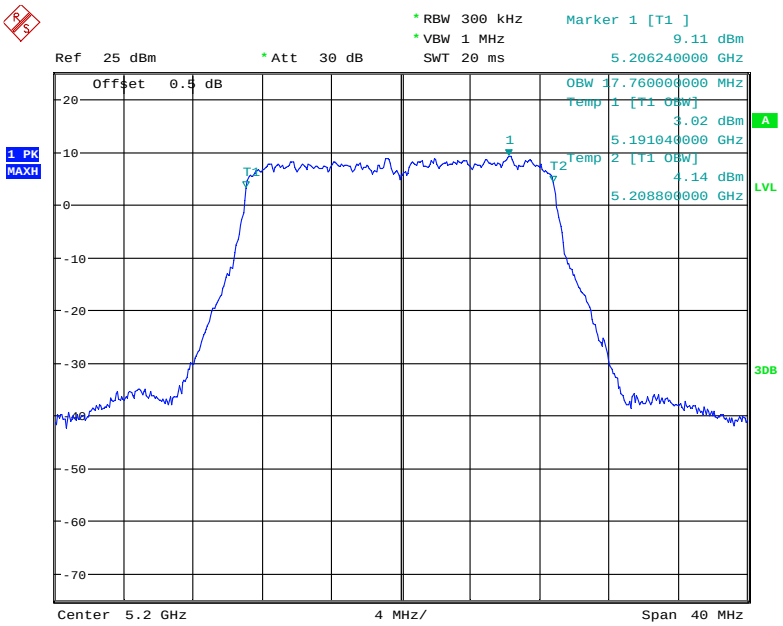
Date: 1.DEC.2019 17:25:55

802.11n ht20 Low Channel



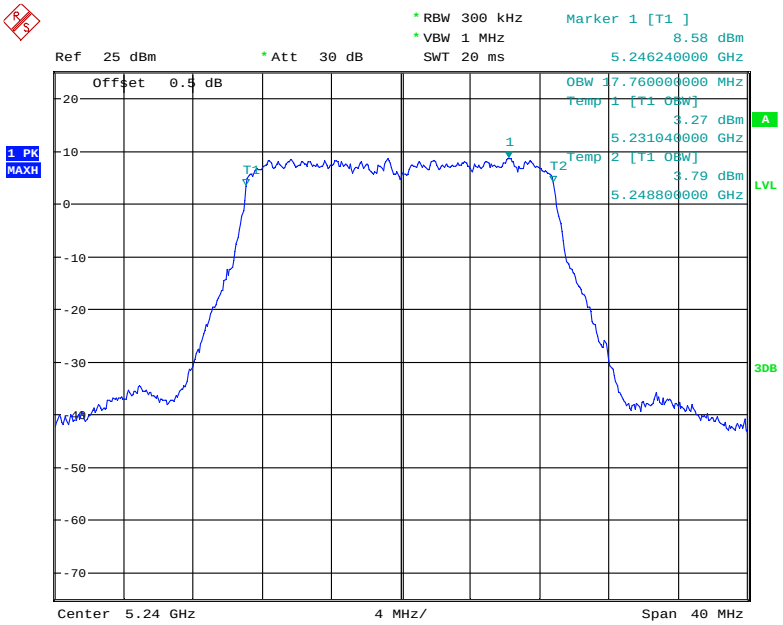
Date: 1.DEC.2019 17:29:09

802.11n ht20 Middle Channel



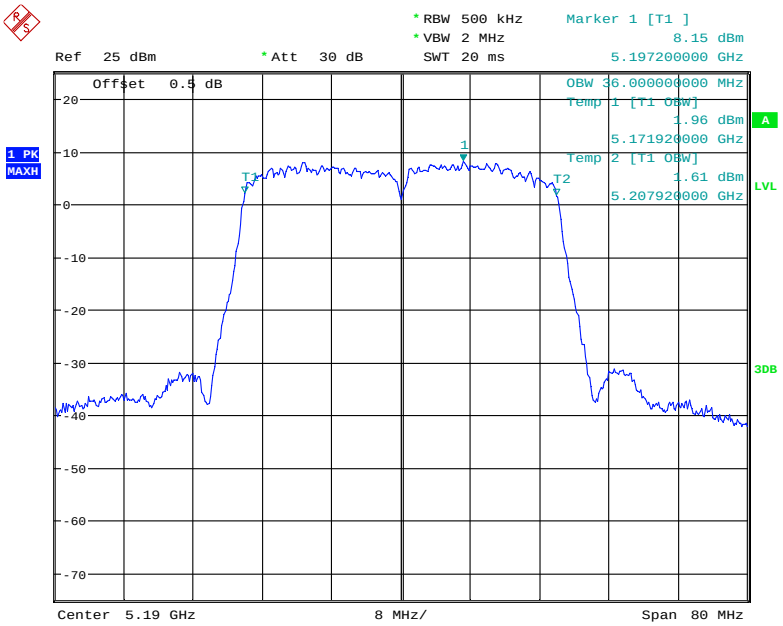
Date: 1.DEC.2019 17:29:53

802.11n ht20 High Channel



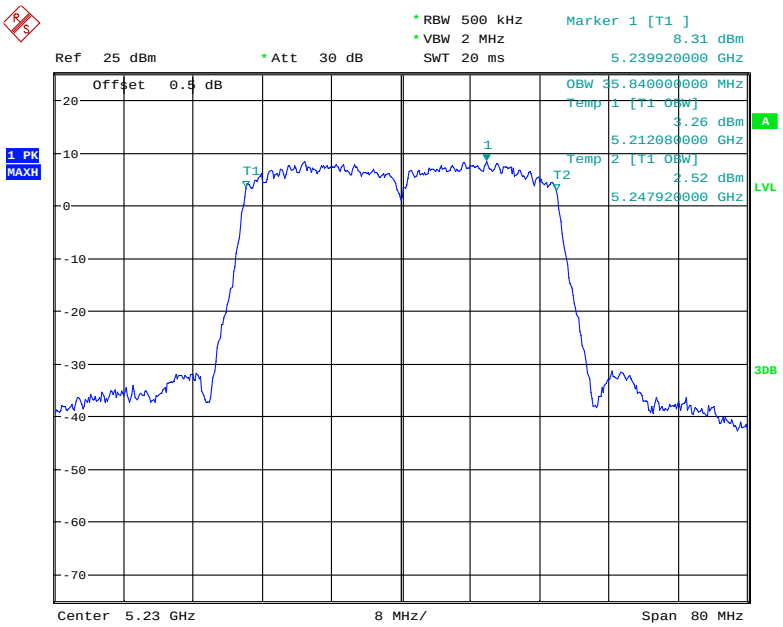
Date: 1.DEC.2019 17:30:43

802.11n ht40 Low Channel



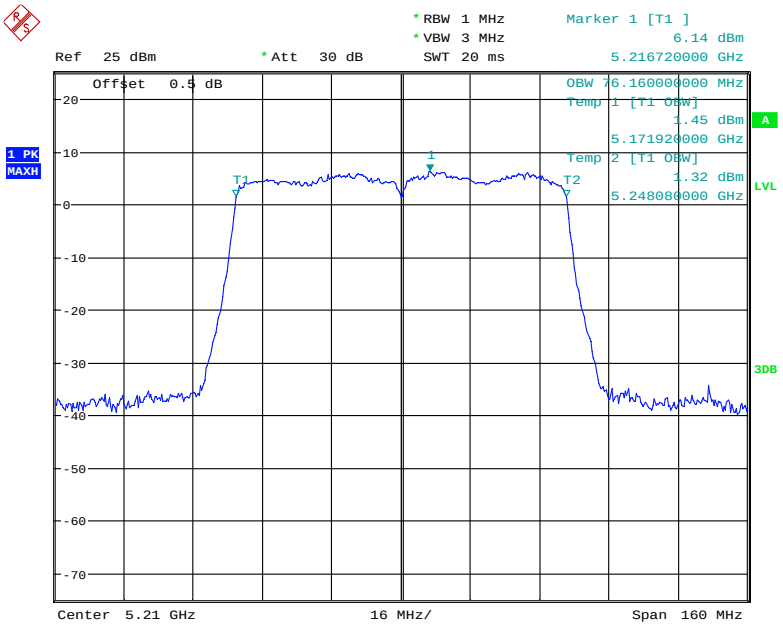
Date: 1.DEC.2019 17:34:10

802.11n ht40 High Channel



Date: 1.DEC.2019 17:35:22

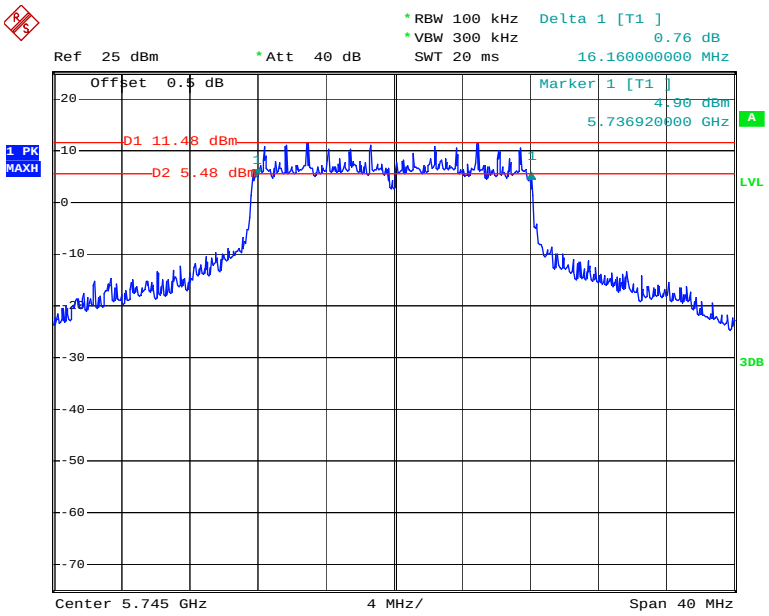
802.11ac ht80



Date: 1.DEC.2019 17:36:37

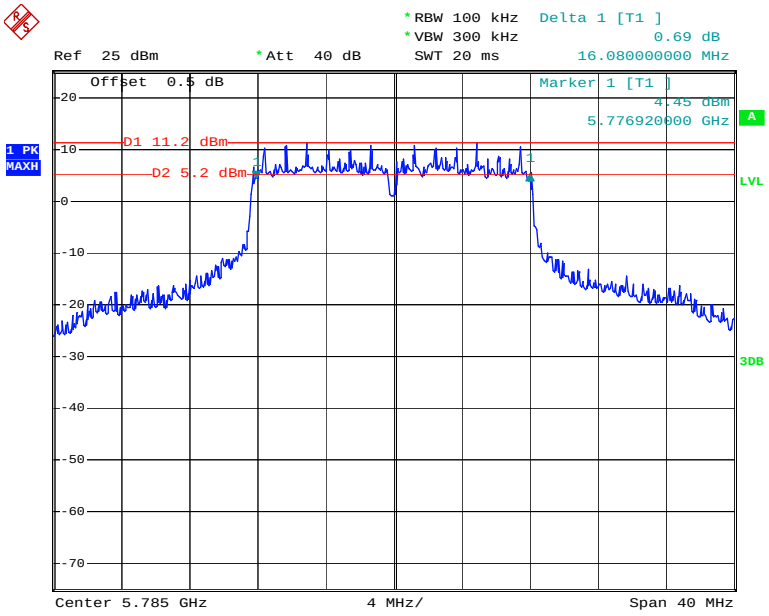
5725-5850MHz:
6dB Emission Bandwidth:

802.11a Low Channel



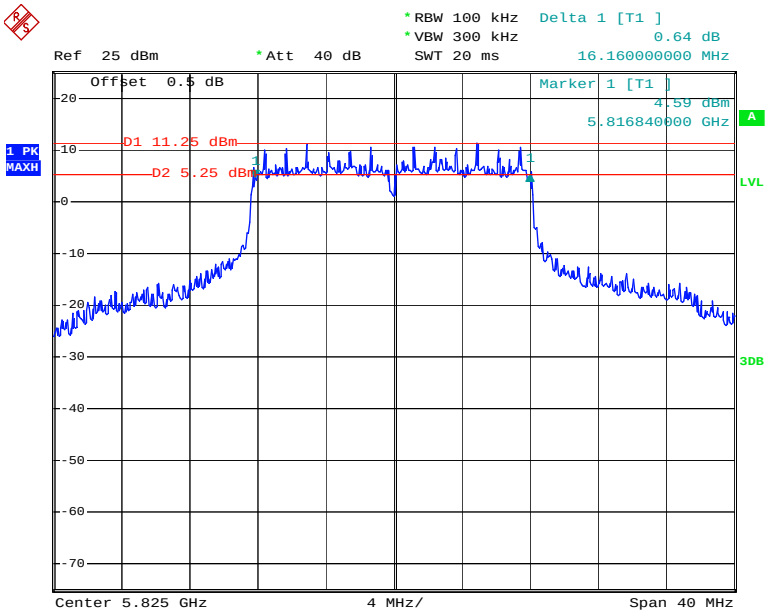
Date: 14.JAN.2020 14:40:47

802.11a Middle Channel



Date: 14.JAN.2020 14:41:43

802.11a High Channel



Date: 14.JAN.2020 14:43:12

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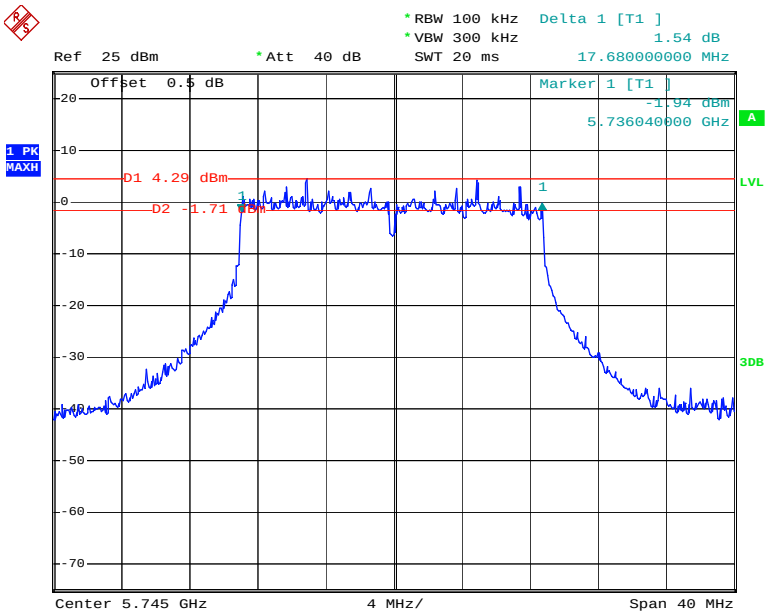
802.11n ht20 Low Channel



Date: 14.JAN.2020 14:36:22

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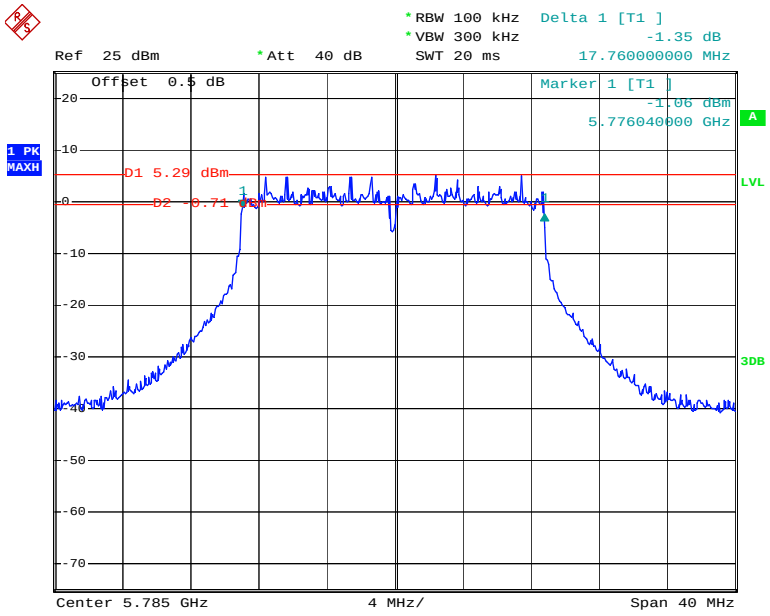
802.11n ht20 Middle Channel



Date: 14.JAN.2020 14:34:07

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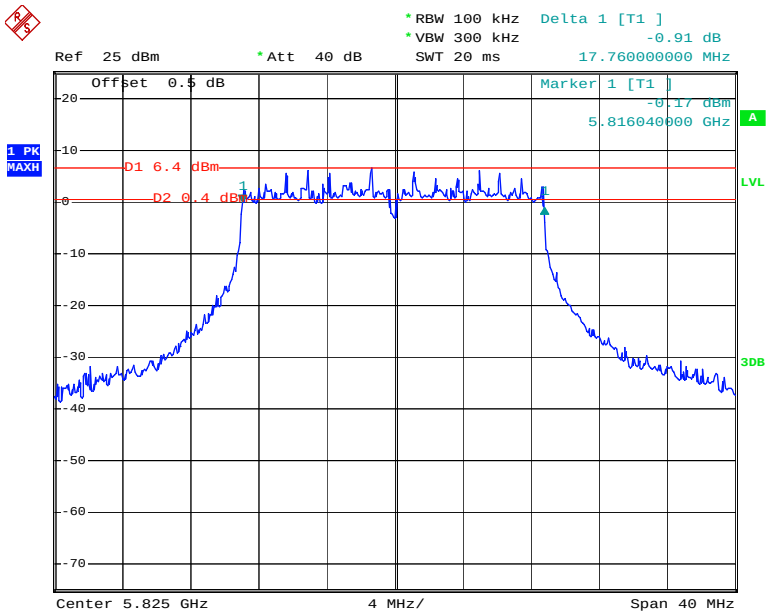
802.11n ht20 High Channel



Date: 14.JAN.2020 14:39:12

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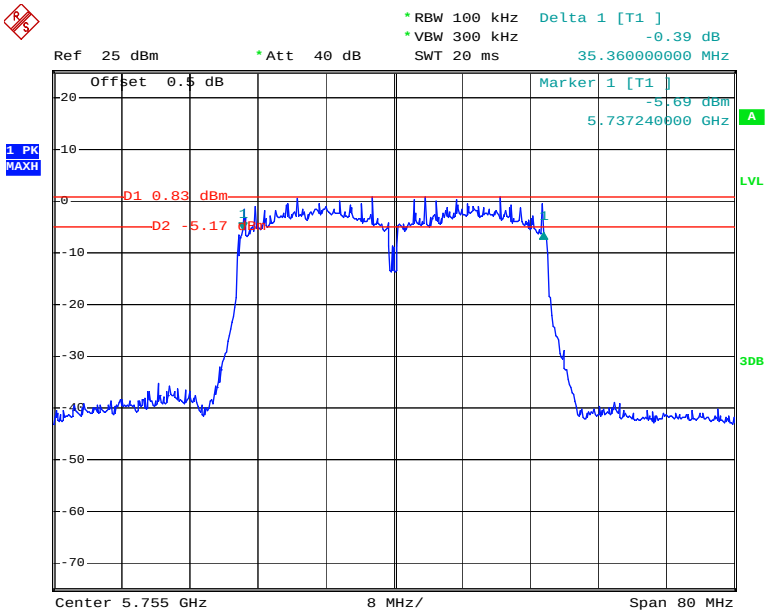
802.11n ht40 Low Channel



Date: 14.JAN.2020 14:28:51

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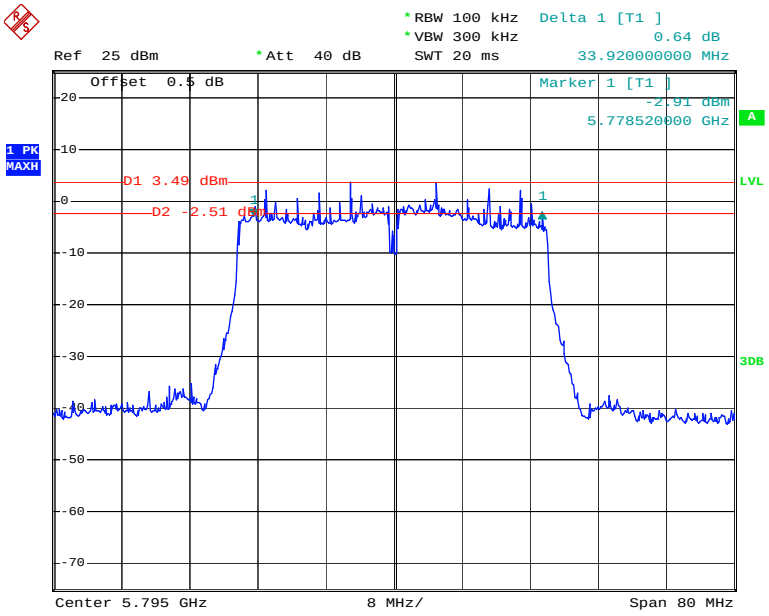
802.11n ht40 High Channel



Date: 14.JAN.2020 14:26:42

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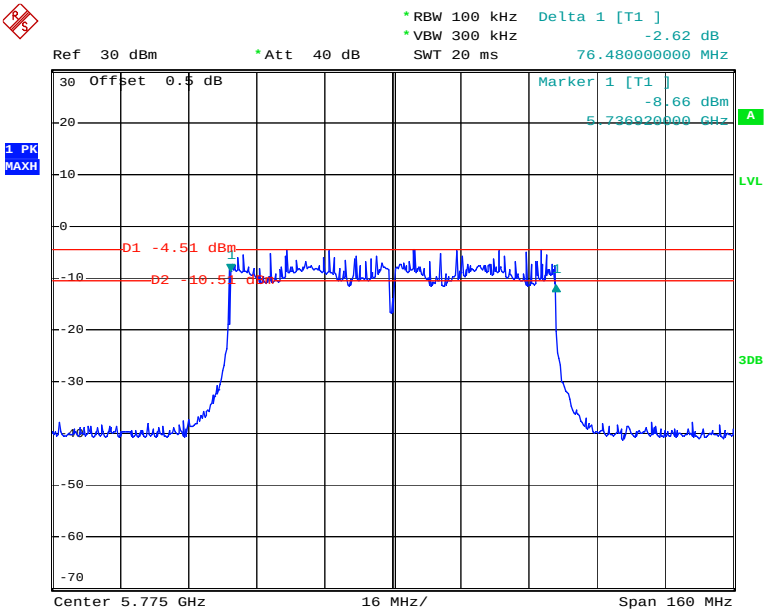
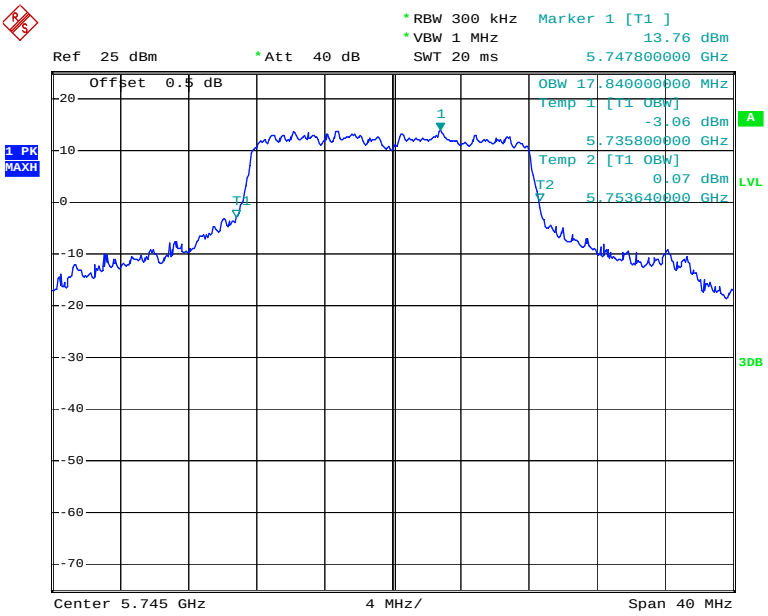
802.11ac vht80



Date: 14.JAN.2020 14:06:39

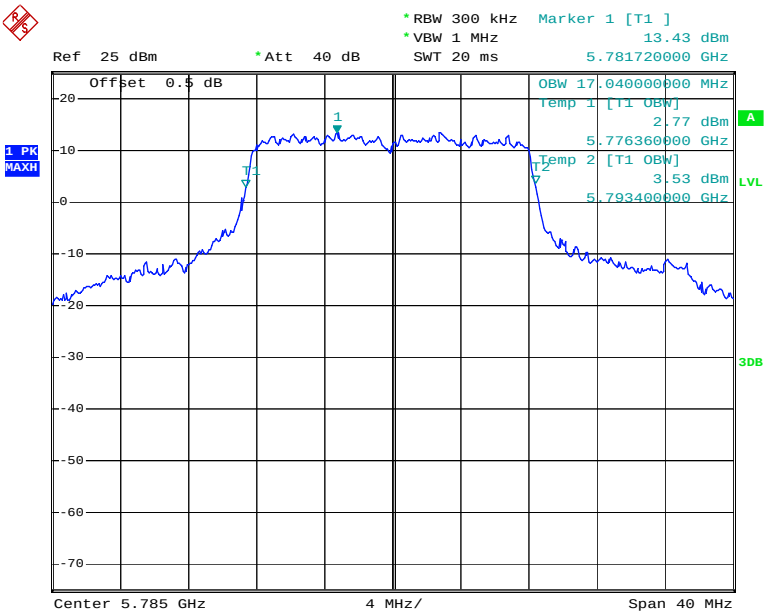
99% Occupied Bandwidth:

802.11a Low Channel



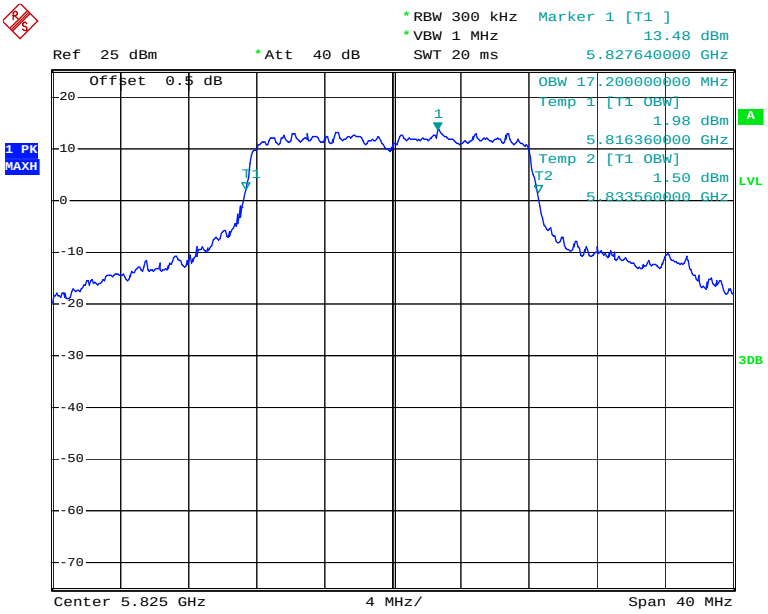
Date: 14.JAN.2020 14:41:00

802.11a Middle Channel



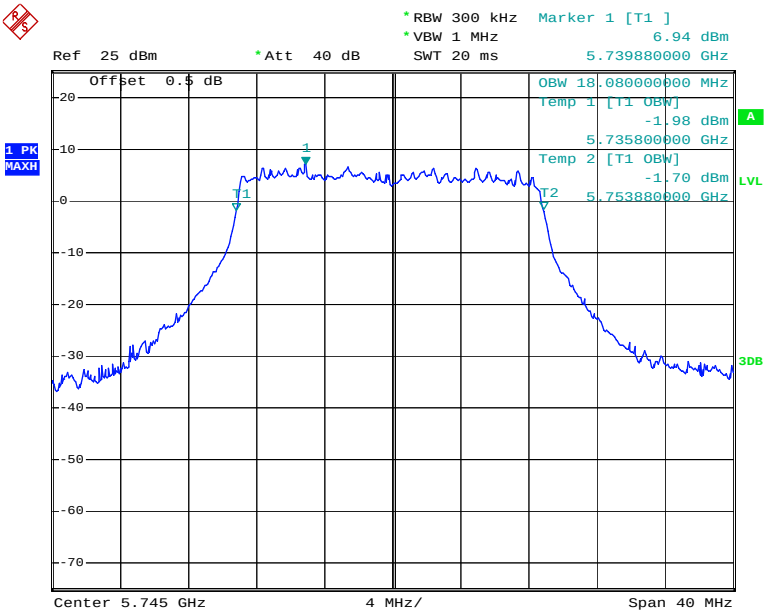
Date: 14.JAN.2020 14:41:56

802.11a High Channel



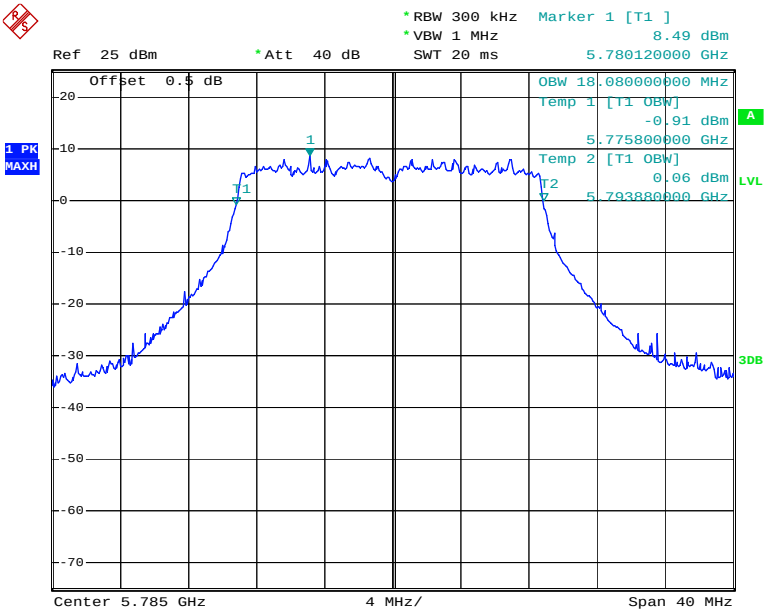
Date: 14.JAN.2020 14:43:25

802.11n ht20 Low Channel



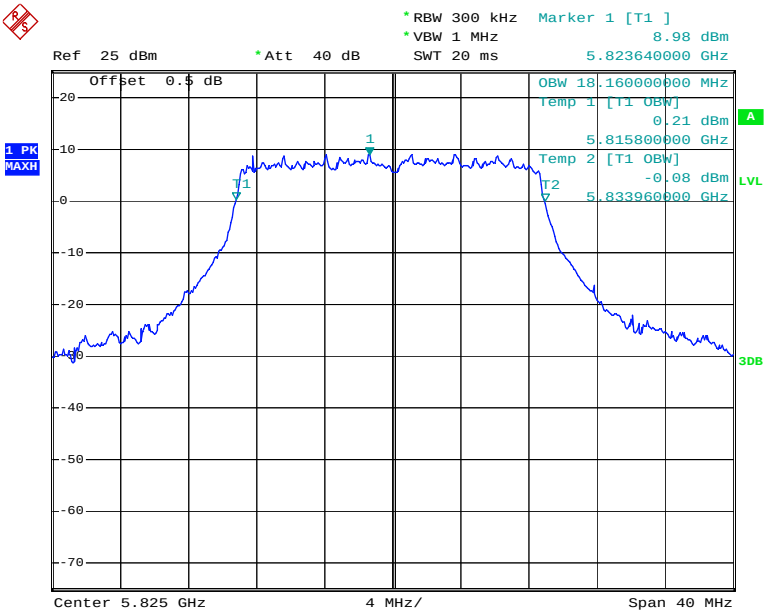
Date: 14.JAN.2020 14:36:35

802.11n ht20 Middle Channel



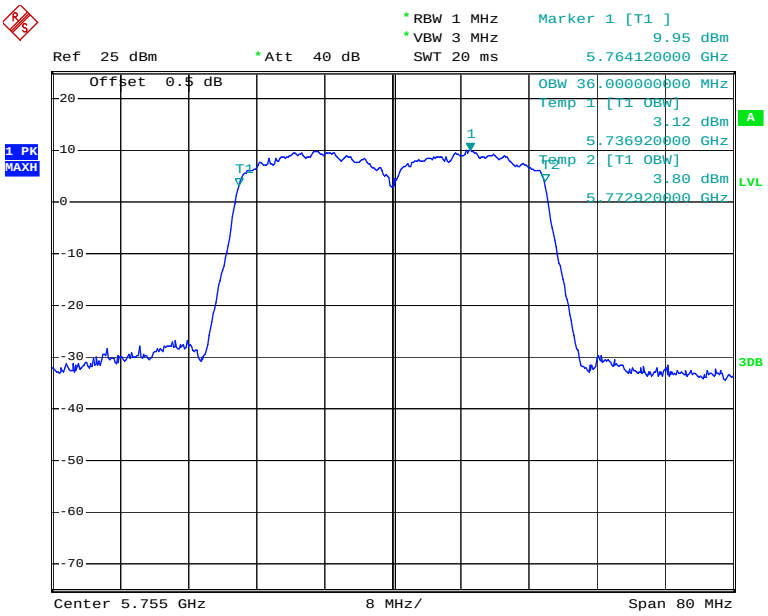
Date: 14.JAN.2020 14:34:20

802.11n ht20 High Channel



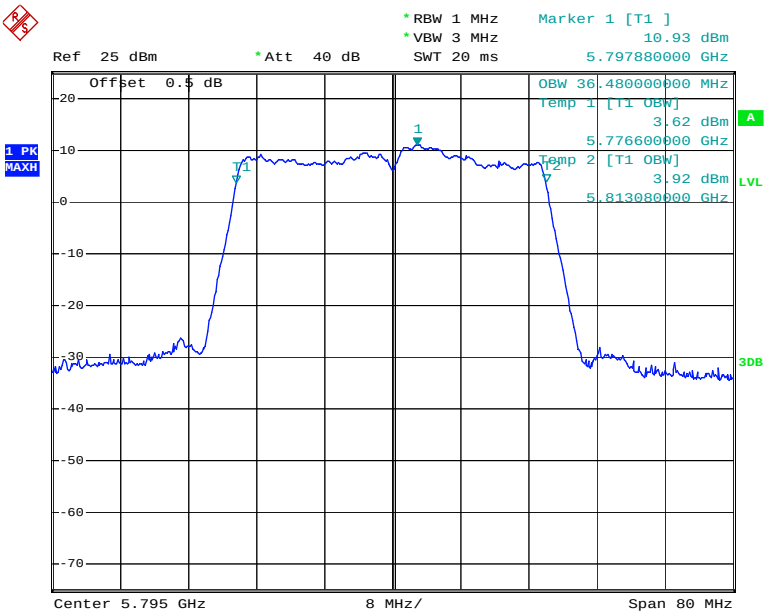
Date: 14.JAN.2020 14:39:25

802.11n ht40 Low Channel



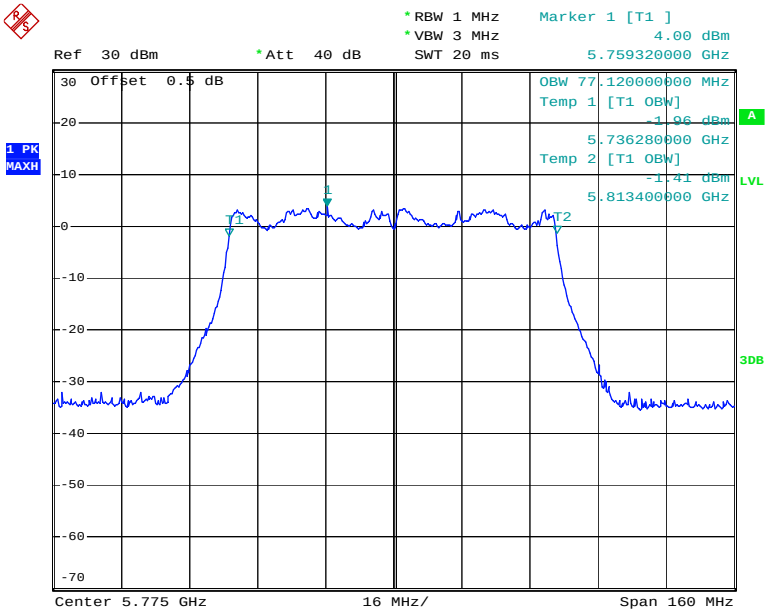
Date: 14.JAN.2020 14:29:04

802.11n ht40 High Channel



Date: 14.JAN.2020 14:26:55

802.11ac vht80



Date: 14.JAN.2020 14:06:52

FCC §15.407(a) –MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(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 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(4) The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	USB Wideband Power Sensor	U2022XA	MY5417006	2018-12-10	2019-12-10
Agilent	USB Wideband Power Sensor	U2022XA	MY5417006	2019-12-10	2020-12-10
Unknown	Coaxial Cable	C-SJ00-0010	C0010/31	Each time	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Test Data

Environmental Conditions

Temperature:	23.8～24.1 °C
Relative Humidity:	41～51 %
ATM Pressure:	101.4～102.1 kPa
Tester:	Lily Xie
Test Date:	2019-12-01～2020-01-14

Test Mode: Transmitting

Band	Mode	Frequency (MHz)	Conducted Average Output Power (dBm)			Limit (dBm)
			Chain 0	Chain 1	Total	
5150 - 5250 MHz	802.11 a	5180	21.97	21.81	/	30
		5200	22.12	21.88	/	30
		5240	22.15	21.92	/	30
	802.11n ht20	5180	15.02	14.72	17.88	30
		5200	15.14	14.61	17.89	30
		5240	15.07	14.85	17.97	30
	802.11n ht40	5190	14.11	14.18	17.16	30
		5230	14.23	13.98	17.12	30
	802.11ac ht80	5210	12.88	13.08	15.99	30
5725 - 5850 MHz	802.11 a	5745	21.68	21.31	/	30
		5785	21.46	21.21	/	30
		5825	21.24	21.27	/	30
	802.11n ht20	5745	12.98	15.27	17.28	30
		5785	15.11	13.13	17.24	30
		5825	16.16	11.94	17.55	30
	802.11n ht40	5755	13.79	12.45	16.18	30
		5795	14.78	12.73	16.89	30
	802.11ac ht80	5775	13.18	11.97	15.63	30

Note:
The device is an indoor AP.
The duty cycle factor has been calculated into the test data.
The maximum antenna gain is 3dBi in 5GHz band. The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices:

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

So:

Directional gain = G_{ANT} + Array Gain = 3dBi

FCC §15.407(a) - POWER SPECTRAL DENSITY

Applicable Standard

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(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 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output

power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2019-01-04	2020-01-04
R&S	Spectrum Analyzer	FSU 26	200256	2020-01-04	2021-01-04
Unknown	Coaxial Cable	C-SJ00-0010	C0010/31	Each time	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	23.8～24.1 °C
Relative Humidity:	41～51 %
ATM Pressure:	101.4～102.1 kPa
Tester:	Lily Xie
Test Date:	2019-12-01～2020-01-14

Test Mode: Transmitting

Test Result:Compliance.Please refer to the following table and plot.

5150-5250MHz

Mode	Frequency (MHz)	Result (dBm/MHz)			Limit (dBm/MHz)
		Chain 0	Chain 1	Total	
802.11a	5180	11.39	10.42	/	17
	5200	11.46	10.82	/	17
	5240	11.5	10.92	/	17
802.11n ht20	5180	6.4	5.24	8.87	17
	5200	6.36	6.04	9.21	17
	5240	6.16	5.6	8.9	17
802.11n ht40	5190	3.26	2.57	5.94	17
	5230	3.24	2.69	5.98	17
802.11ac vht80	5210	-1.9	-1.17	1.49	17

5725-5850MHz

Mode	Frequency (MHz)	Reading (dBm/300kHz)		Result (dBm/500kHz)			Limit (dBm/500kHz)
		Chain 0	Chain 1	Chain 0	Chain 1	Total	
802.11a	5745	7.41	7.36	9.63	9.58	/	30
	5785	7.13	7.78	9.35	10	/	30
	5825	7.08	7.38	9.3	9.6	/	30
802.11n ht20	5745	1.35	2.77	3.57	4.99	7.35	30
	5785	2.25	2.42	4.47	4.64	7.57	30
	5825	3.68	0.2	5.9	2.42	7.51	30
802.11n ht40	5755	-2.17	-2.91	0.05	-0.69	2.71	30
	5795	-1.8	-1.72	0.42	0.5	3.47	30
802.11ac vht80	5775	-8.40	-8.57	-6.18	-6.35	-3.25	30

Note:
The maximum antenna gain is 3.0dBi in 5GHz band. The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices:

Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

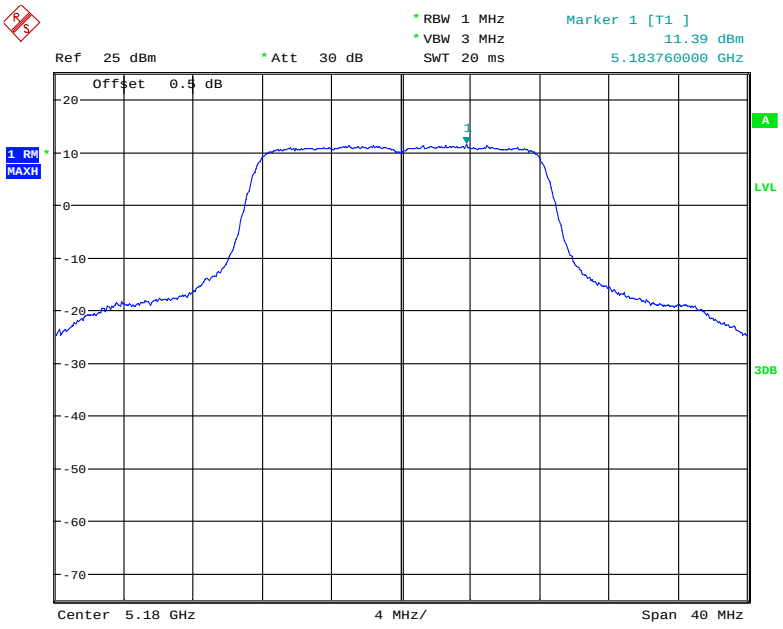
So:

Directional gain = G_{ANT} + Array Gain = 3.0dBi+10*log(2/1)=6dBi

For 5.8GHz band, If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
Method SA-3 in KDB 789033 D02 General UNII Test Procedures New Rules v02r01was used for PSD test.

5150-5250MHz
Chain 0:

802.11a Low Channel



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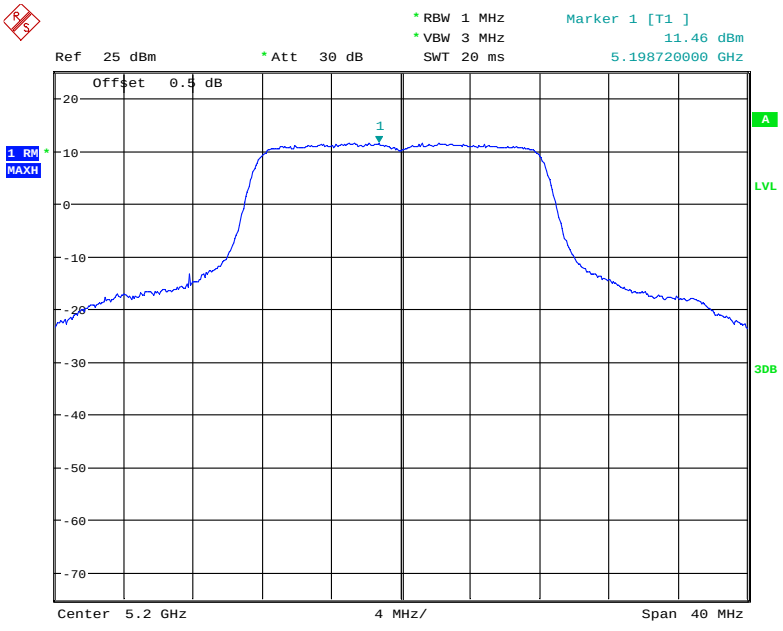
802.11a Middle Channel



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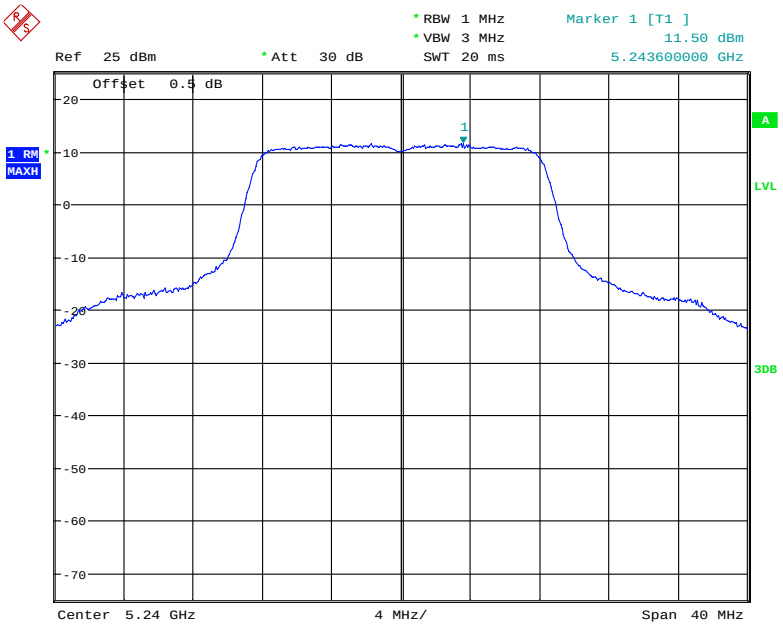
802.11a High Channel



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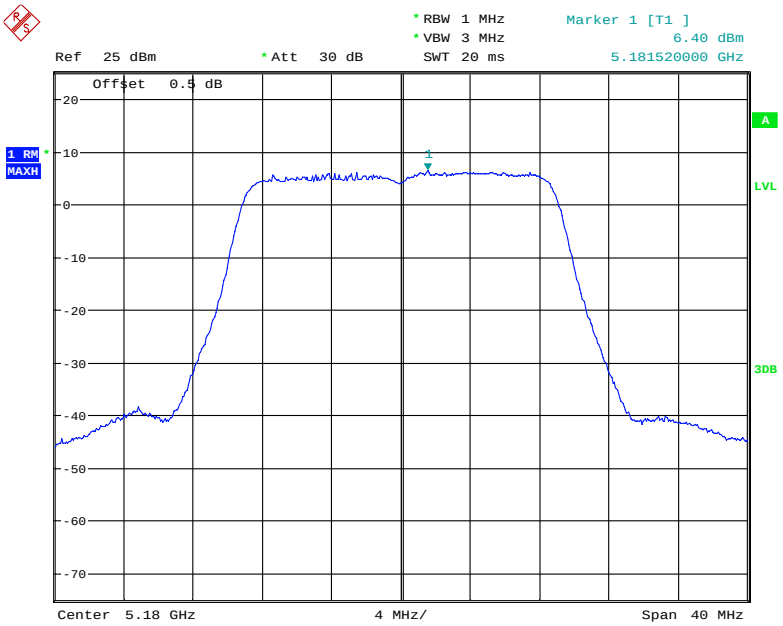

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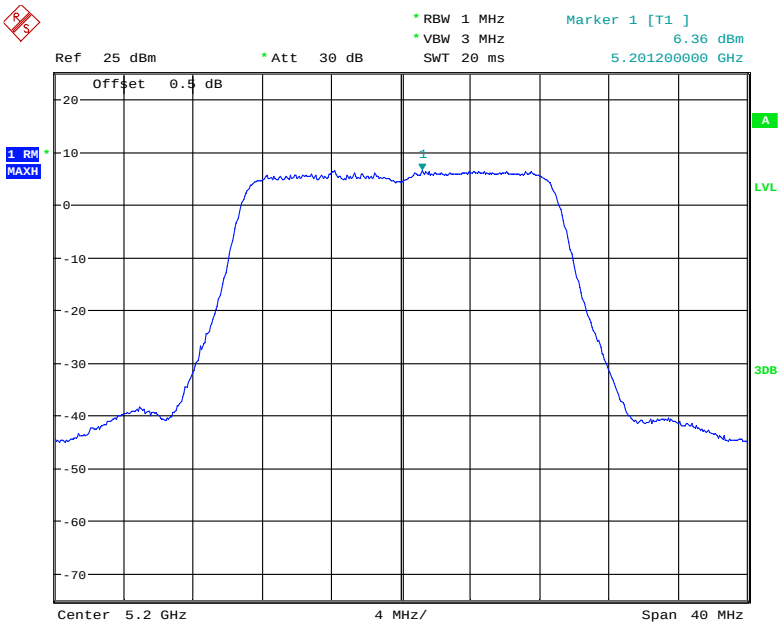

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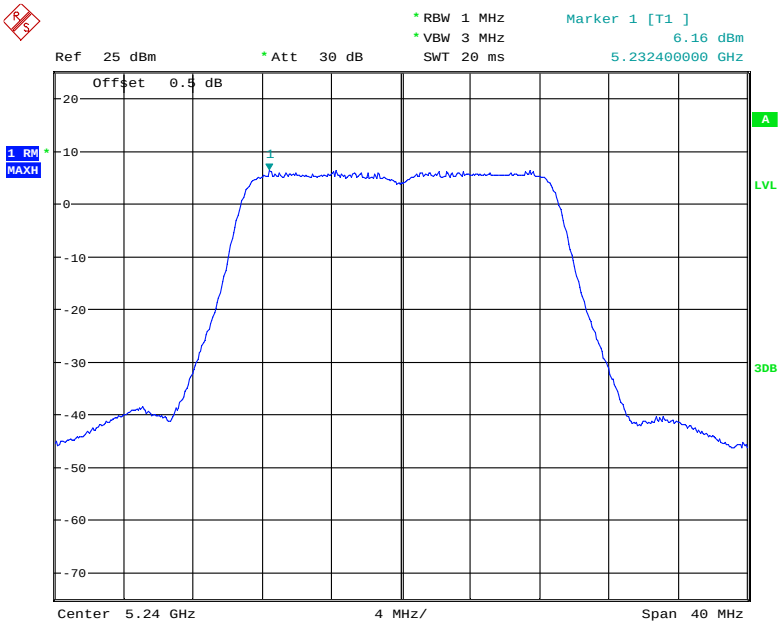

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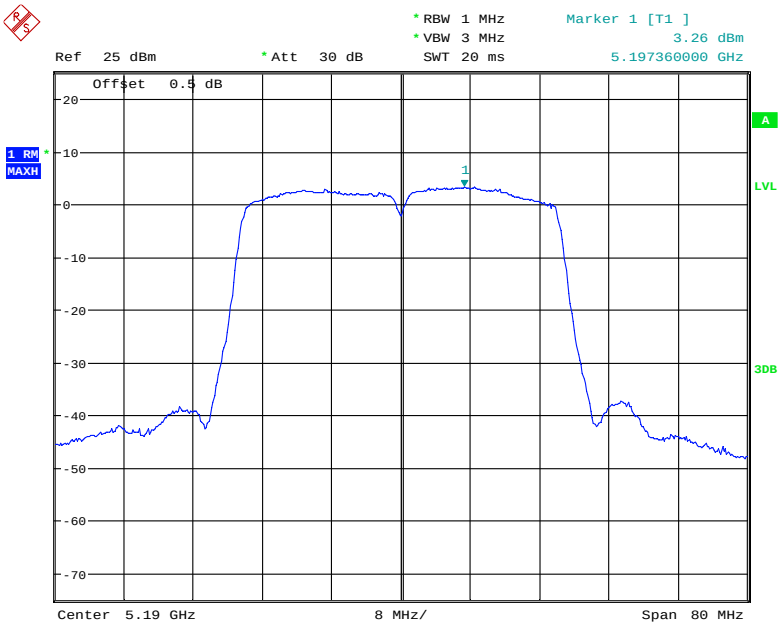
802.11n ht40 Low Channel



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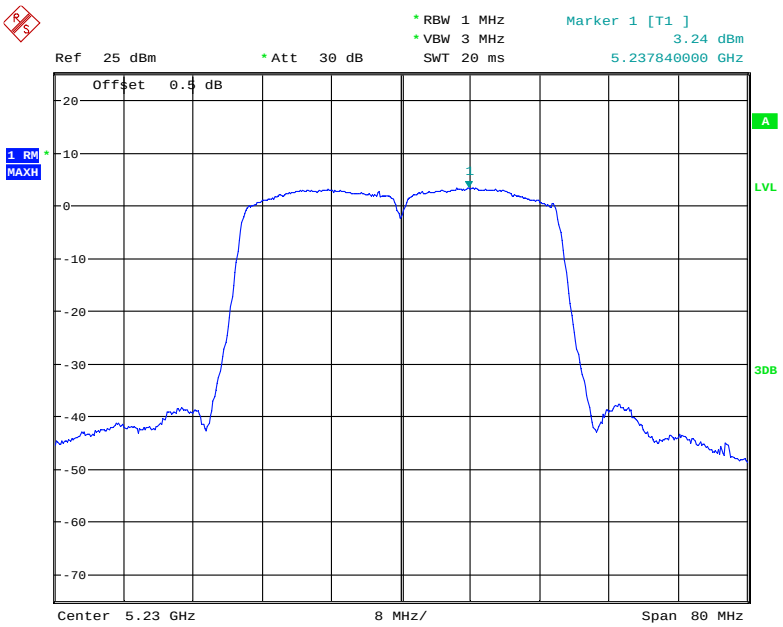
802.11n ht40 High Channel



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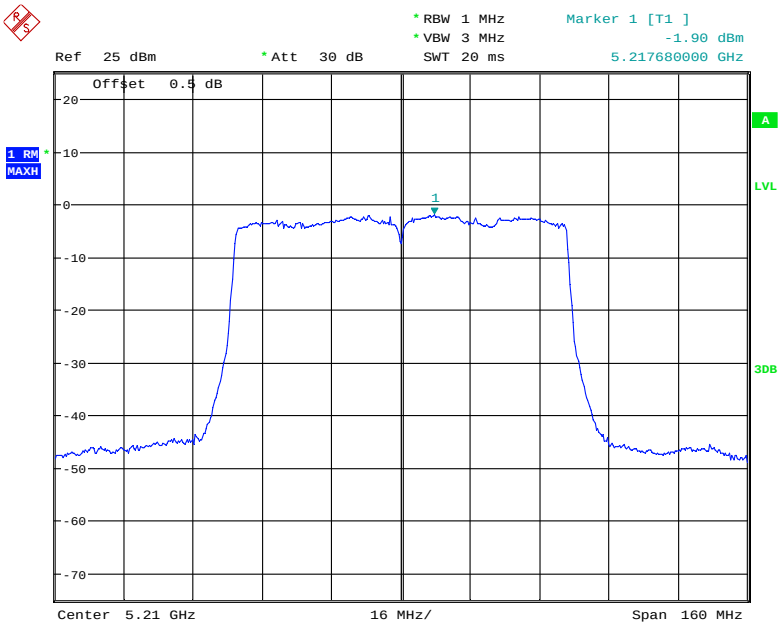
802.11ac ht80 Channel



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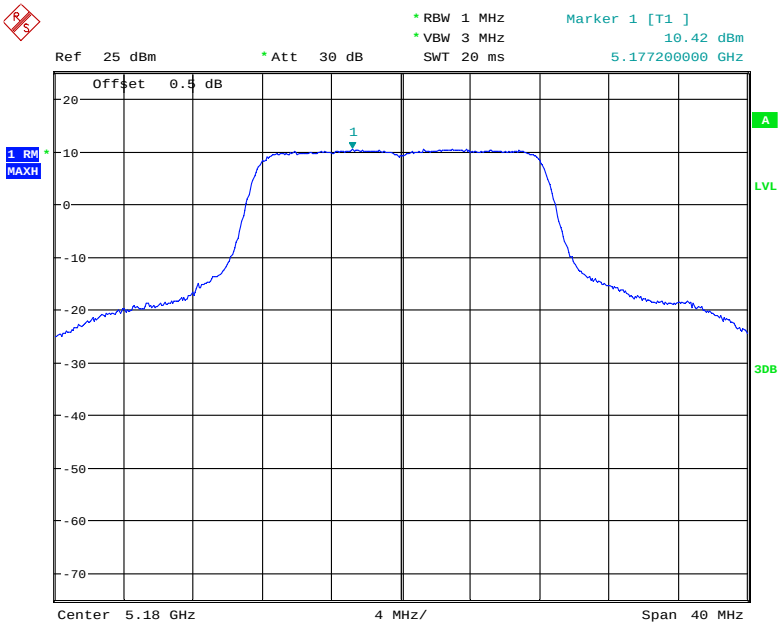
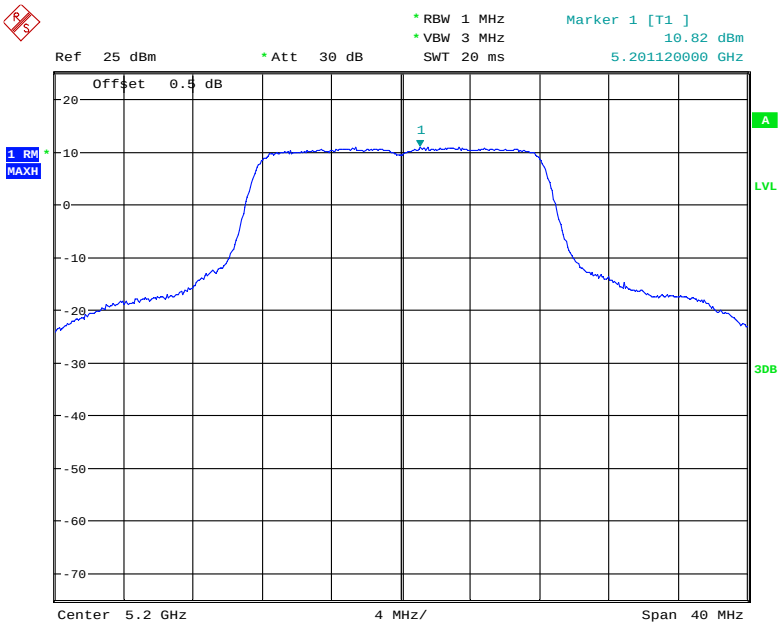
Chain 1:

802.11a Low Channel



Date: 1.DEC.2019 18:07:19

802.11a Middle Channel



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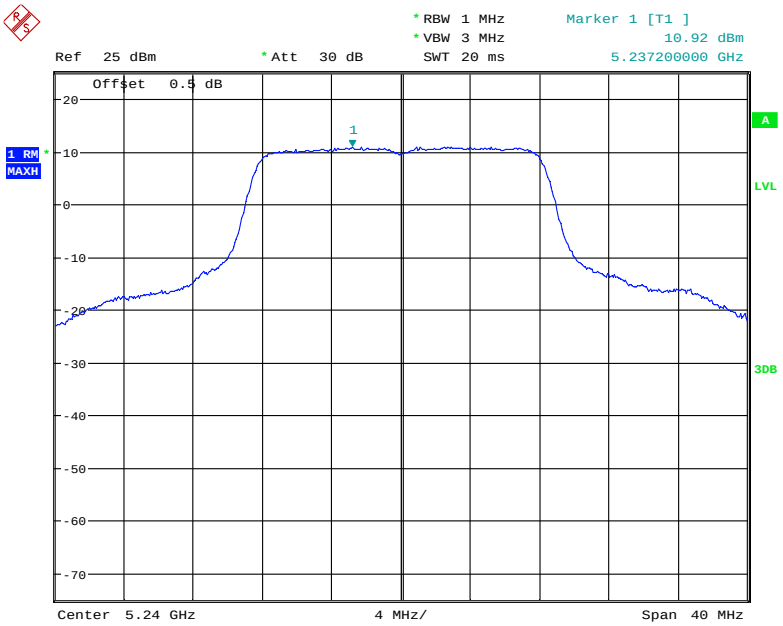
802.11a High Channel



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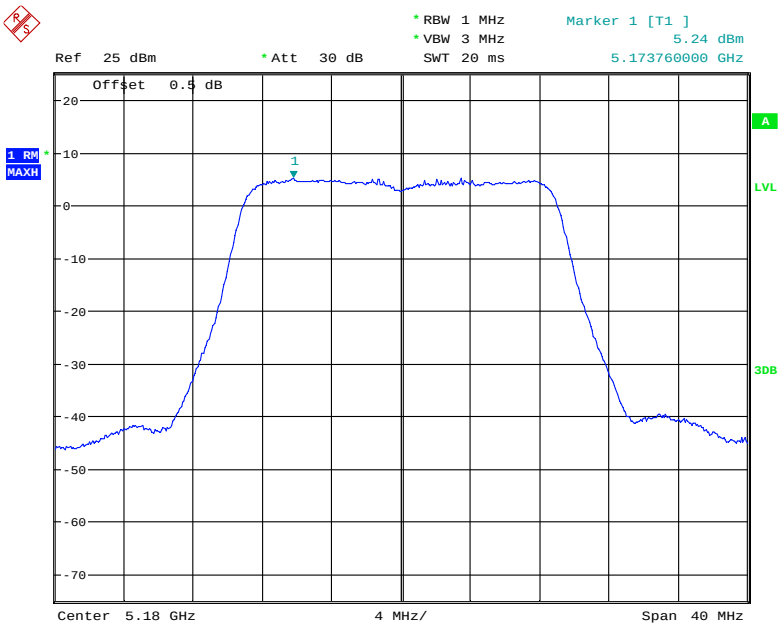
802.11n ht20 Low Channel



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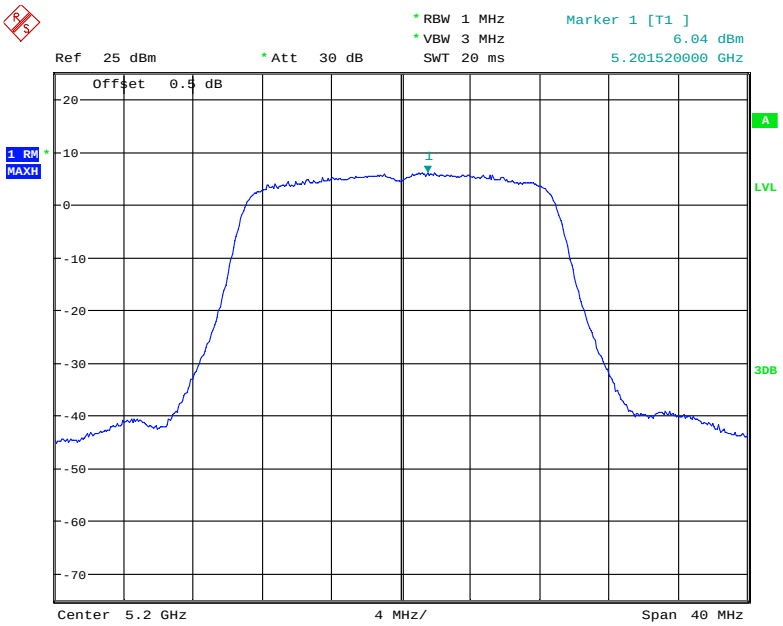
802.11n ht20 Middle Channel



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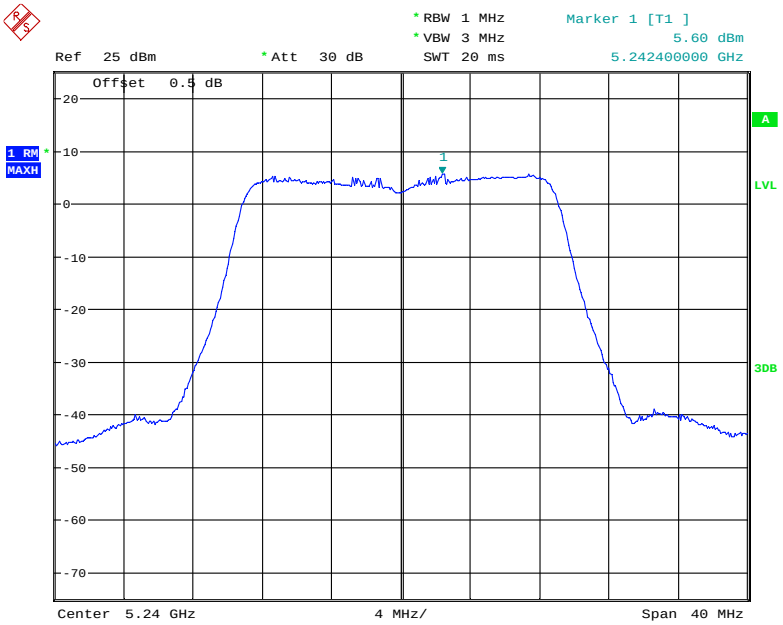

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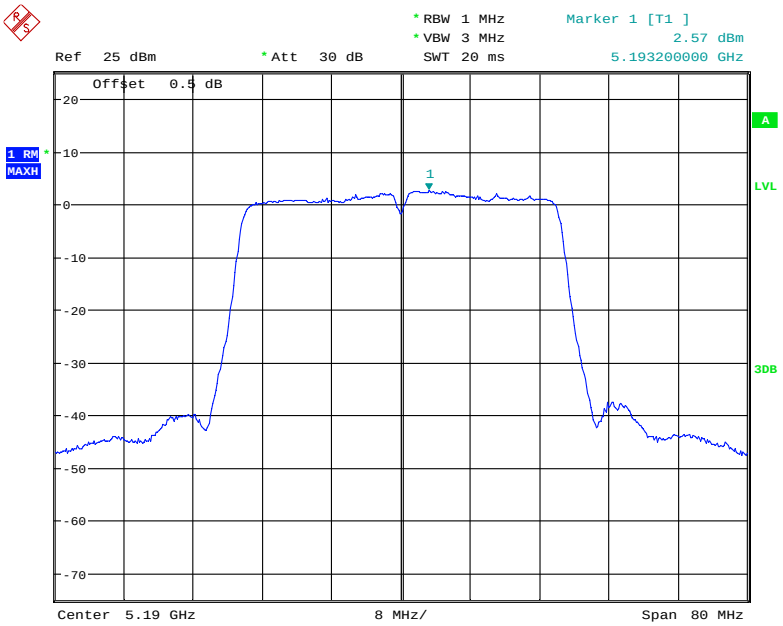
802.11n ht40 Low Channel



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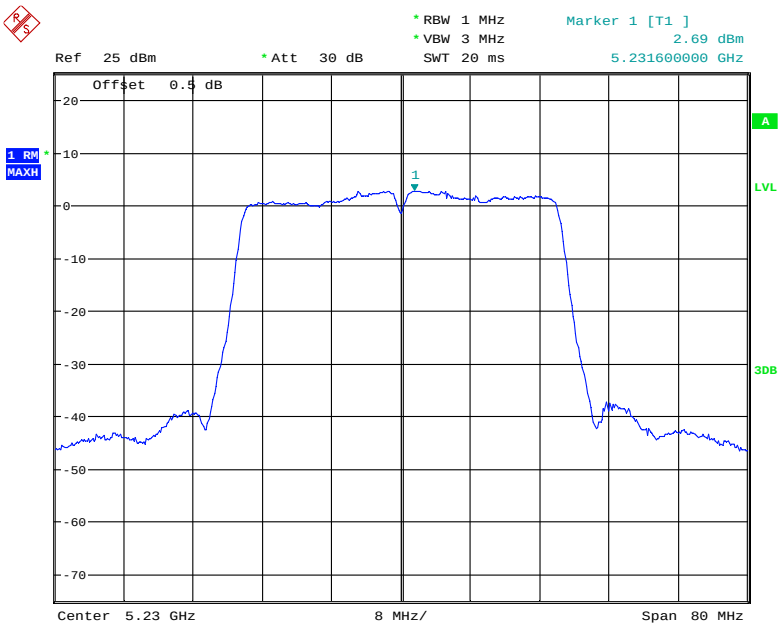
802.11n ht40 High Channel



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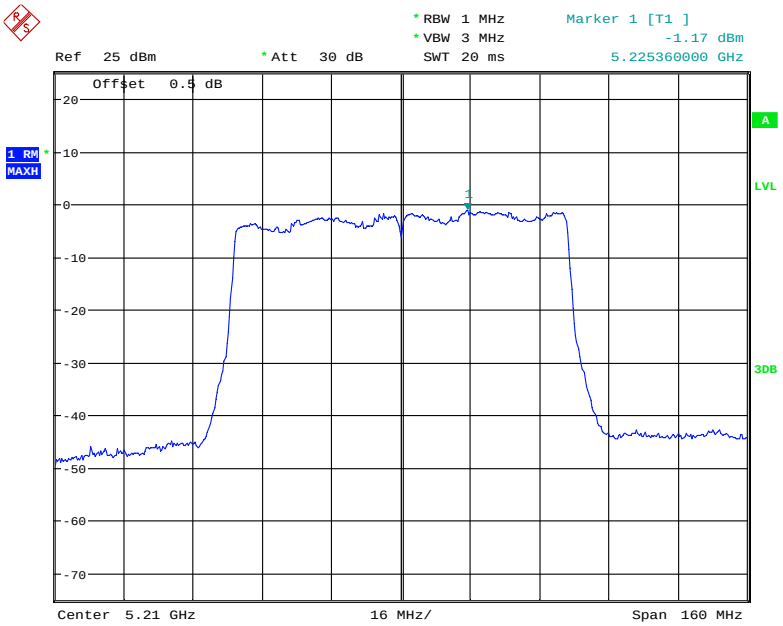
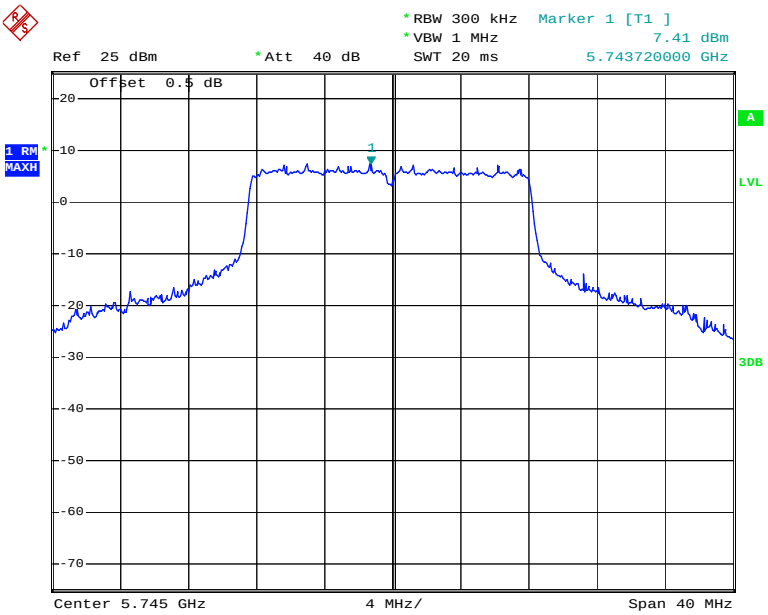
802.11ac ht80 Channel



Date: 1.DEC.2019 18:12:00

5725-5850MHz
Chain 0

802.11a Low Channel



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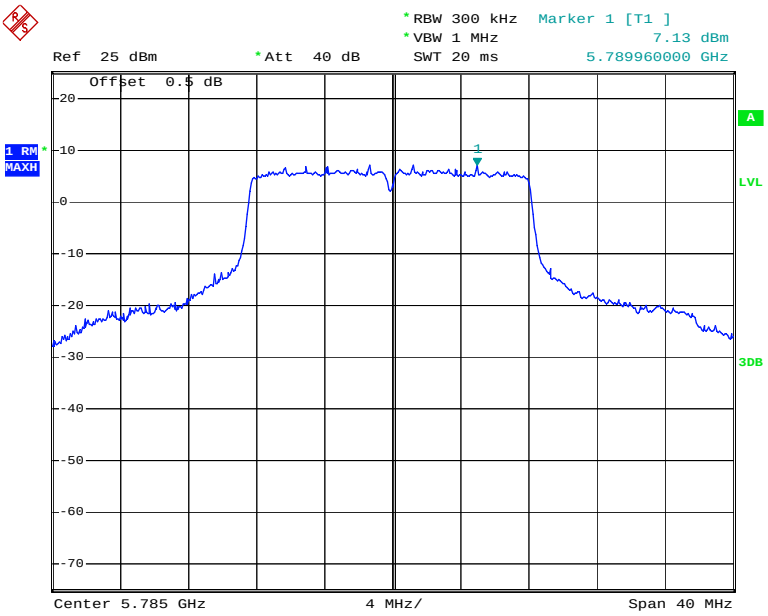
802.11a Middle Channel



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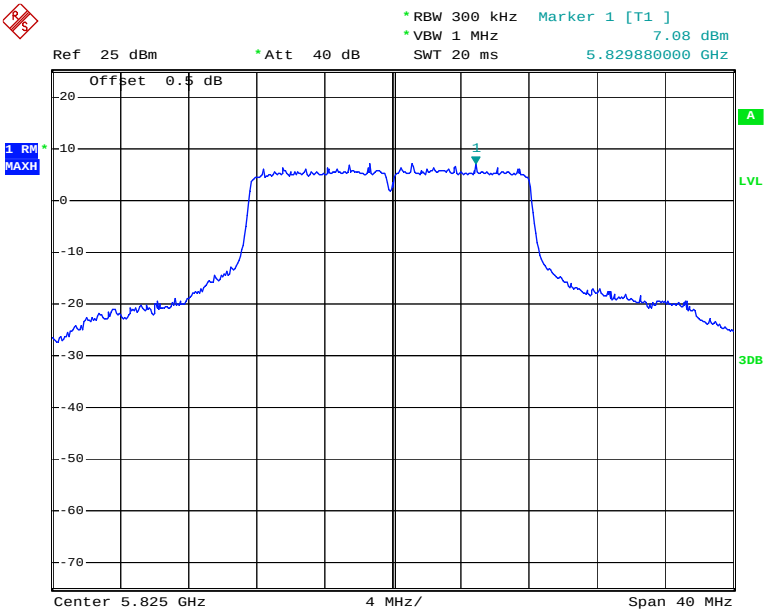
802.11a High Channel



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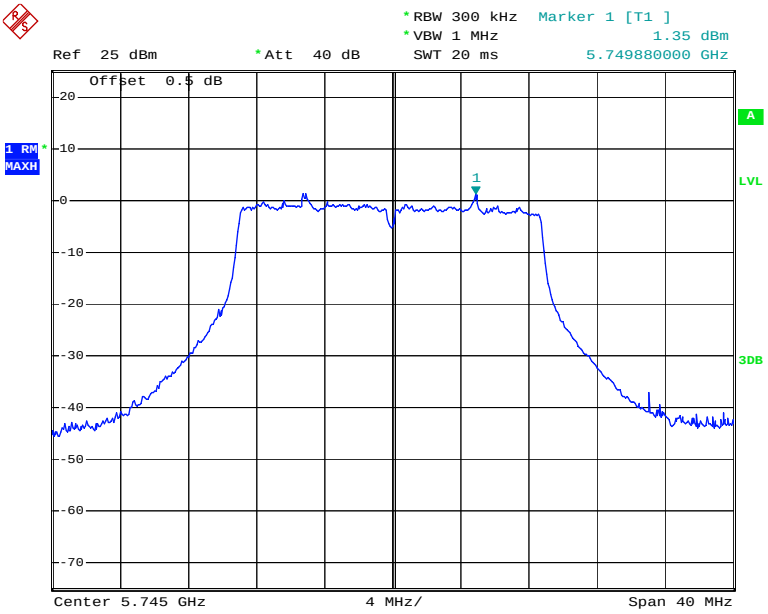
802.11n ht20 Low Channel



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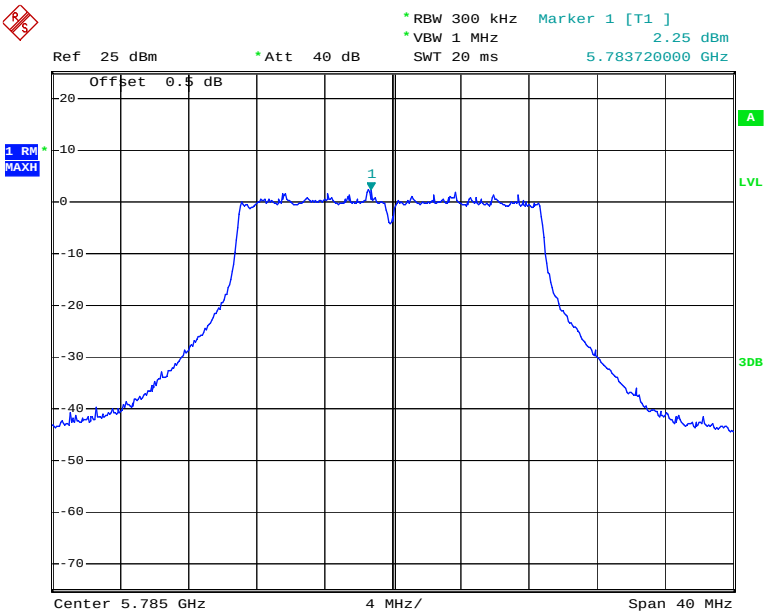
802.11n ht20 Middle Channel



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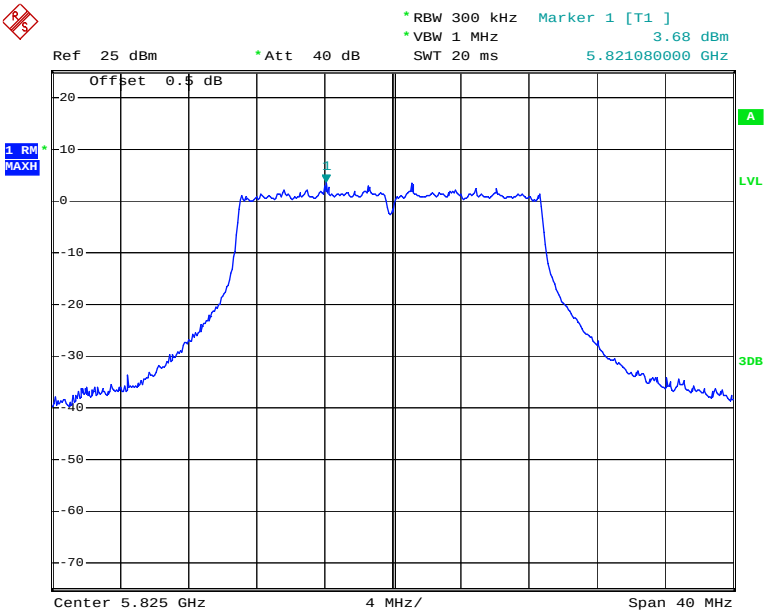
802.11n ht20 High Channel



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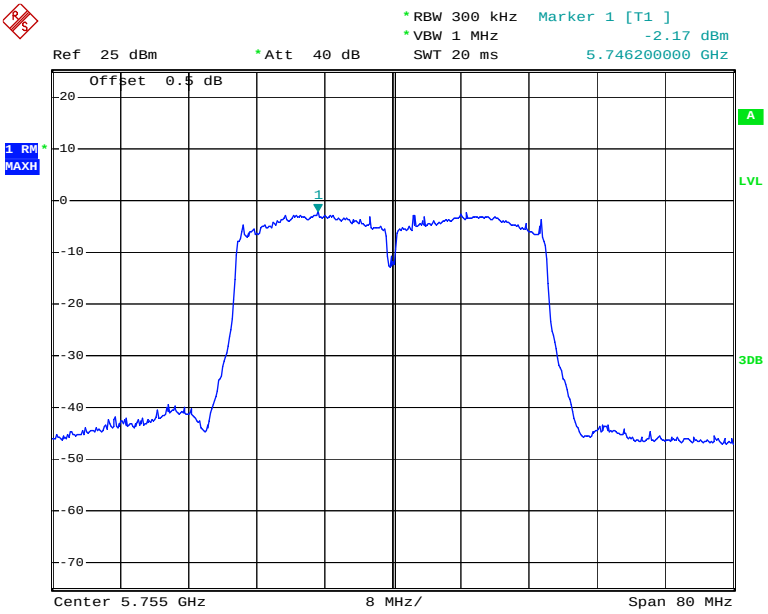

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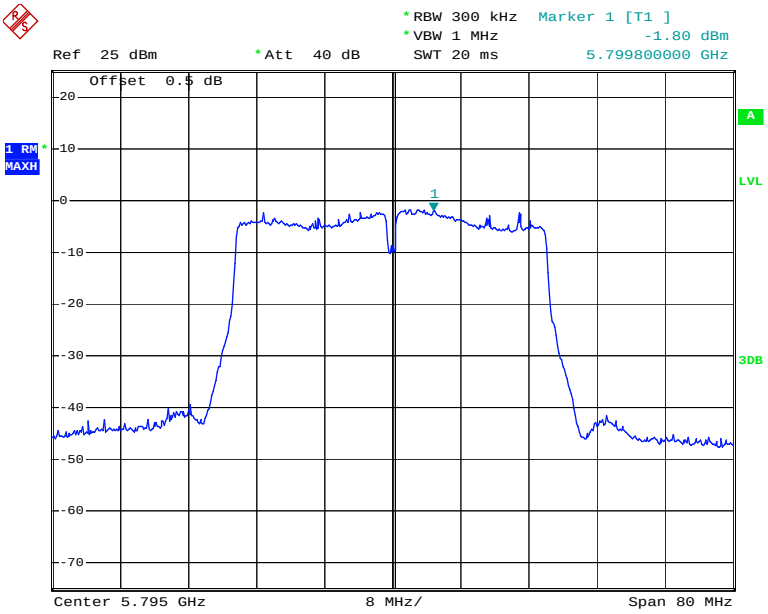

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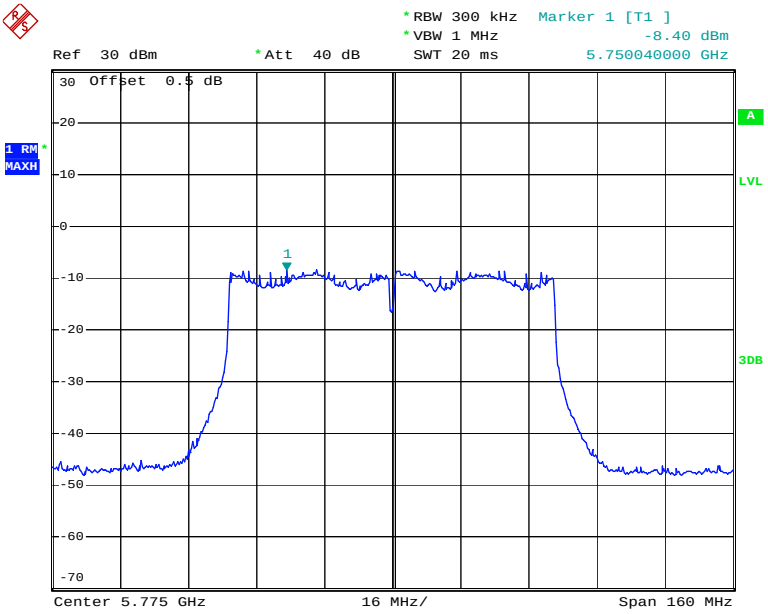
802.11ac ht80 Channel



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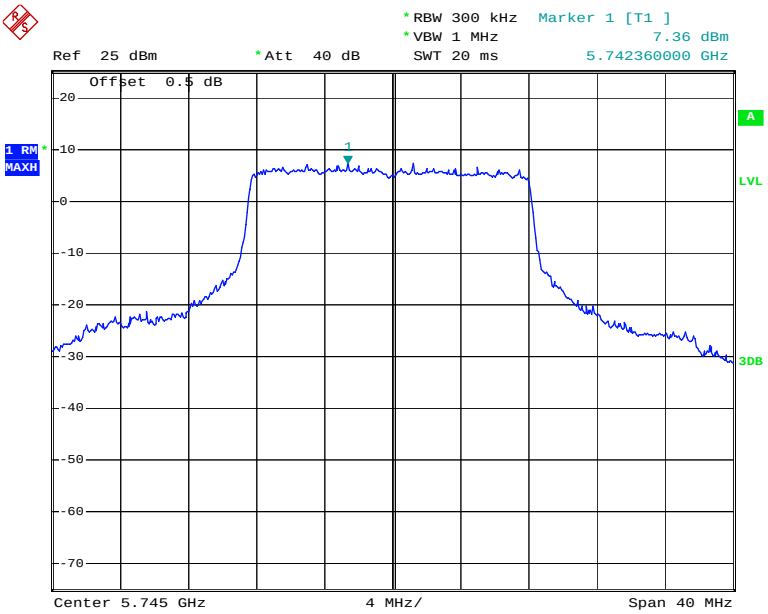
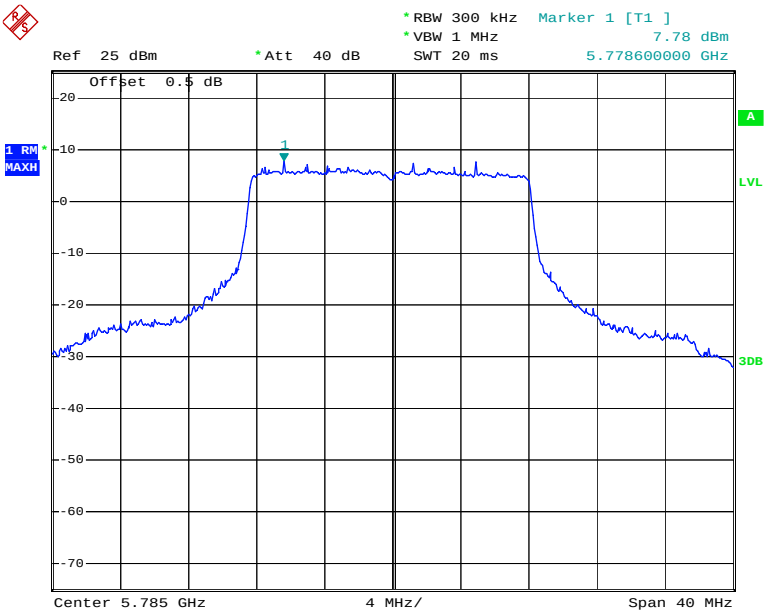
Chain 1

802.11a Low Channel



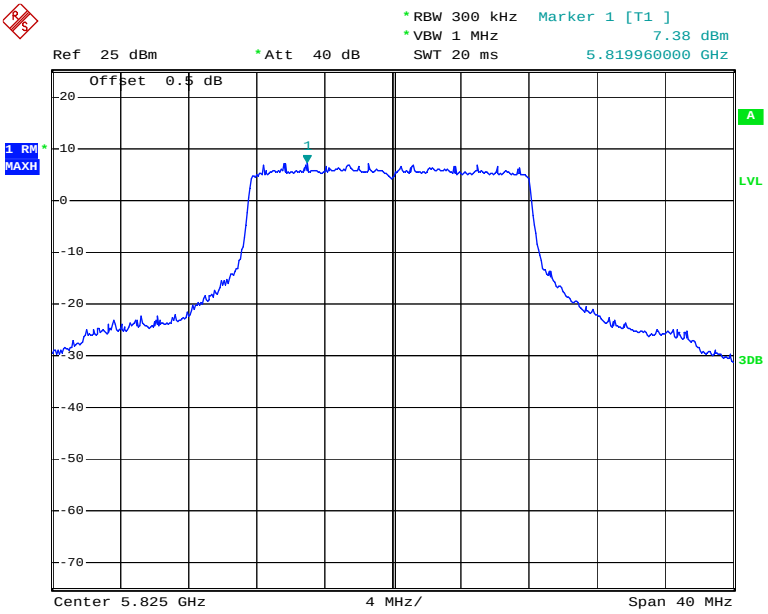
Date: 14.JAN.2020 14:46:22

802.11a Middle Channel



Date: 14.JAN.2020 14:46:03

802.11a High Channel



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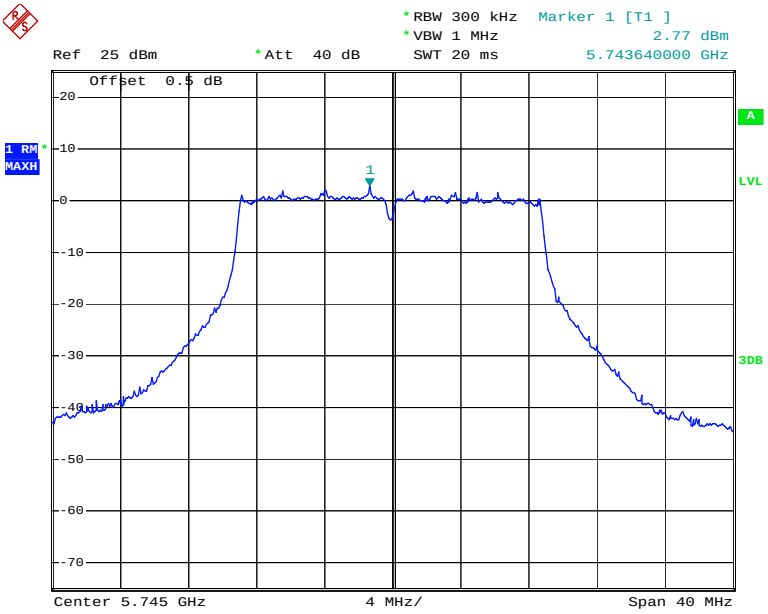
802.11n ht20 Low Channel



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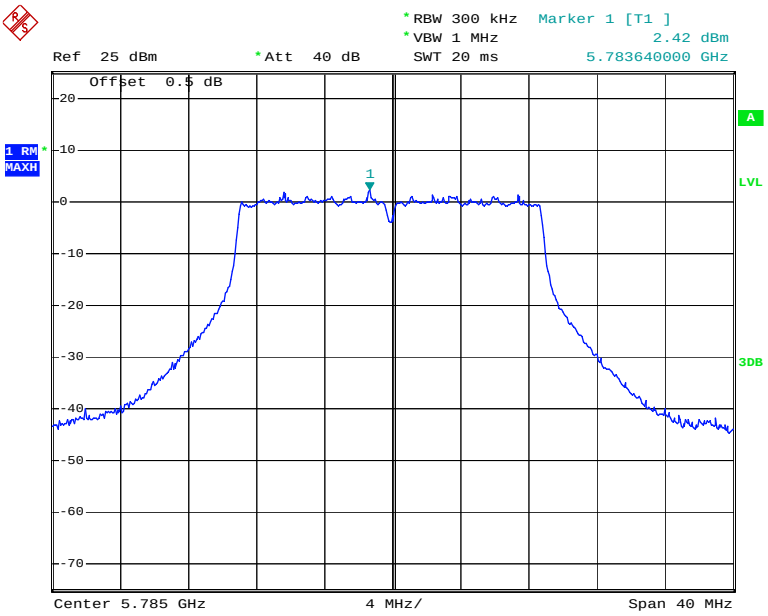
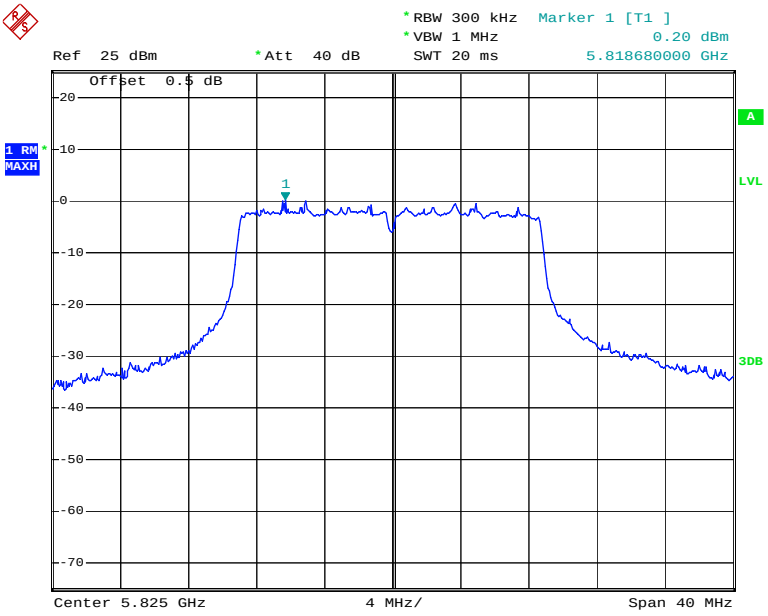
802.11n ht20 Middle Channel



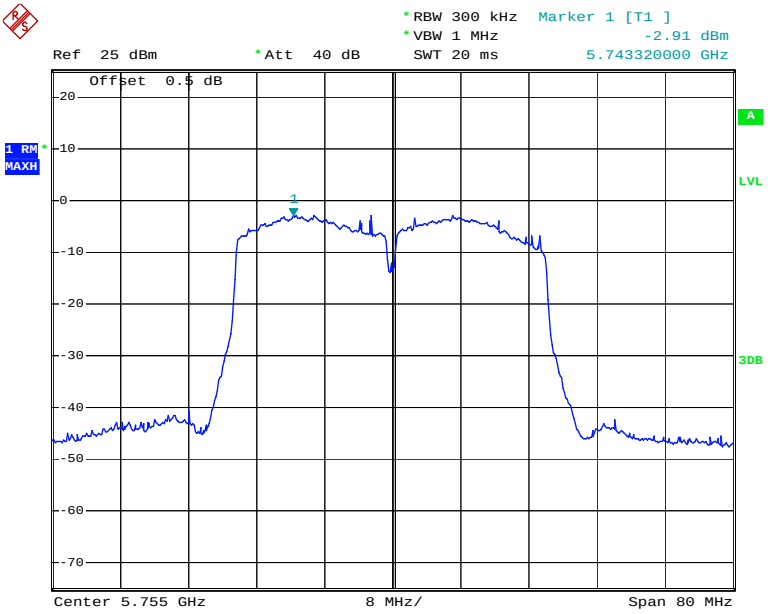
Date: 14.JAN.2020 14:35:17

802.11n ht20 High Channel



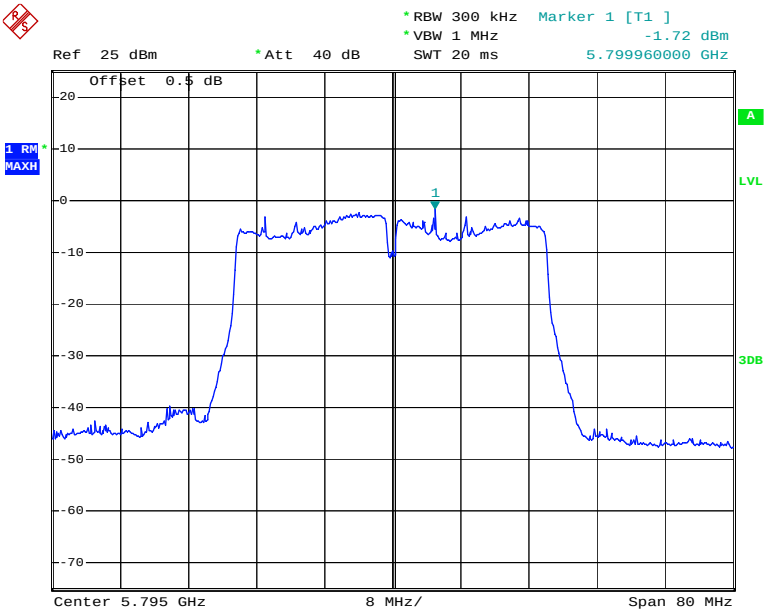
Date: 14.JAN.2020 14:38:30

802.11n ht40 Low Channel



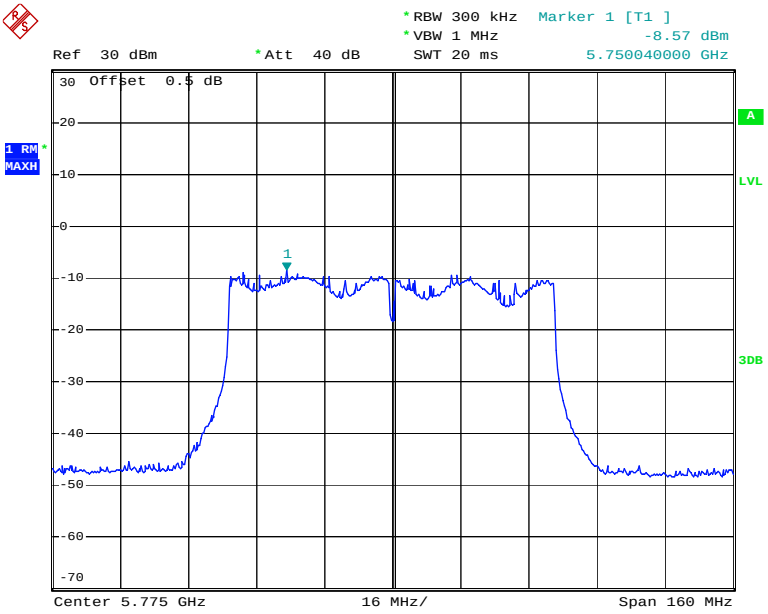
Date: 14.JAN.2020 14:29:53

802.11n ht40 High Channel



Date: 14.JAN.2020 14:25:55

802.11ac ht80 Channel



Date: 14.JAN.2020 14:07:58

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