TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 15.407

TEST REPORT

For

ZIONCOM ELECTRONICS (SHENZHEN) LTD.

Building A1-A2,Lantian Science and Technology Park,Xinyu Road, Xinqiao Henggang Block, Shajing Street,Baoan District.Shenzhen ,China

FCC ID: X7D-IP04338

Report Type: Original Report	**Product Name:** AC1200 Dual Band Smart Home Wi-Fi System

Report Number:	RDG190715003-00B
Report Date:	2019-09-16
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan). This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA* or any agency of the Federal Government. * This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*".

TABLE OF CONTENTS

GENERAL INFORMATION **4**
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) 4
OBJECTIVE 4
RELATED SUBMITTAL(S)/GRANT(S) 4
TEST METHODOLOGY 4
MEASUREMENT UNCERTAINTY 5
TEST FACILITY 5
SYSTEM TEST CONFIGURATION **6**
DESCRIPTION OF TEST CONFIGURATION 6
EUT EXERCISE SOFTWARE 6
EQUIPMENT MODIFICATIONS 10
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS 10
SUPPORT CABLE LIST AND DETAILS 10
BLOCK DIAGRAM OF TEST SETUP 10
SUMMARY OF TEST RESULTS **11**
FCC §15.407 (f) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE) **12**
APPLICABLE STANDARD 12
FCC §15.203 – ANTENNA REQUIREMENT **14**
APPLICABLE STANDARD 14
ANTENNA CONNECTOR CONSTRUCTION 14
FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS **15**
APPLICABLE STANDARD 15
EUT SETUP 15
EMI TEST RECEIVER SETUP 15
CORRECTED AMPLITUDE & MARGIN CALCULATION 15
TEST EQUIPMENT LIST AND DETAILS 16
TEST PROCEDURE 16
TEST DATA 16
FCC §15.209, §15.205 & §15.407(b) –UNWANTED EMISSION **19**
APPLICABLE STANDARD 19
EUT SETUP 20
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP 21
TEST PROCEDURE 21
CORRECTED AMPLITUDE & MARGIN CALCULATION 22
TEST EQUIPMENT LIST AND DETAILS 23
TEST DATA 23
FCC §15.407(a)(e)–EMISSION BANDWIDTH AND OCCUPIED BANDWIDTH **39**
APPLICABLE STANDARD 39
TEST EQUIPMENT LIST AND DETAILS 39
TEST PROCEDURE 39
TEST DATA 39
FCC §15.407(a) –MAXIMUM CONDUCTED OUTPUT POWER **59**
APPLICABLE STANDARD 59
TEST EQUIPMENT LIST AND DETAILS 60

TEST PROCEDURE 60
TEST DATA 60

FCC §15.407(a) - POWER SPECTRAL DENSITY 62

APPLICABLE STANDARD 62
TEST PROCEDURE 63
TEST EQUIPMENT LIST AND DETAILS.....63
TEST DATA 63

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		AC1200 Dual Band Smart Home Wi-Fi System
EUT Model:		T6
Multiple Models:		IP04338
Frequency Range:		5150-5250 MHz, 5725-5850 MHz
Maximum Output Power (Conducted):		5150-5250 MHz:19.83dBm 5725-5850 MHz:19.92dBm
Modulation Type:		OFDM
Rated Input Voltage:		DC 9V from Adapter
Adapter Information	**Model:**	DCP017C090800U
	Input:	DC100-240~50/60Hz 0.2AMax
	Output:	DC 9V—0.8A
External Dimension:		90mm(L) * 90mm(W) * 70mm(H)
Serial Number:		190715003-1
EUT Received Date:		2019.7.15

Notes: *Model T6 and IP04338 are identical, was selected for fully testing except radiation emission test both modes, the detailed information about the difference among IP04338 and model T6 can be referred to the declaration letter which was stated and guaranteed by the manufacturer.*

Objective

This type approval report is prepared on behalf of ***ZIONCOM ELECTRONICS (SHENZHEN) LTD...*** 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: X7D-IP04338.

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)

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.

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	/	/

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

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

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

The device supports SISO and MIMO at 802.11n ht20/n ht40/AC80 mode, per pre-test, MIMO 2TX mode was the worst and reported.

EUT Exercise Software

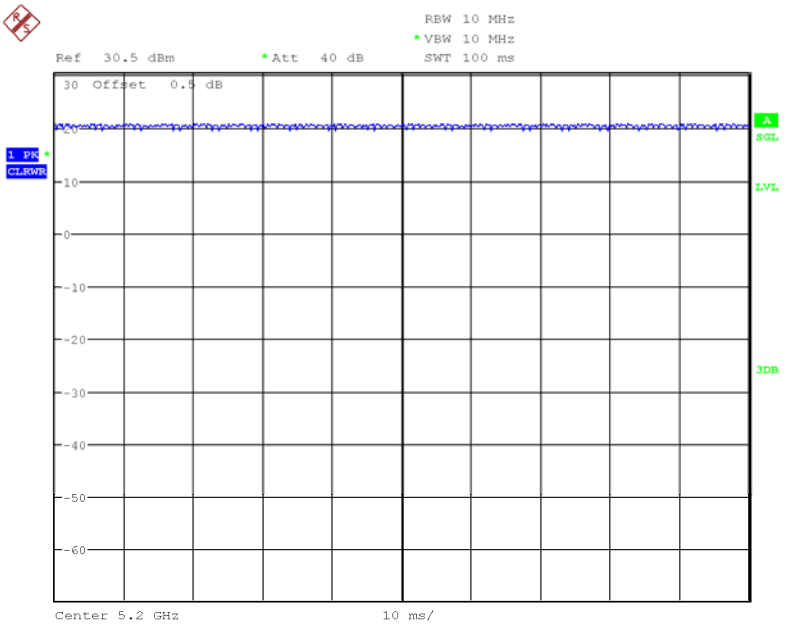
The software “MP_Test” was used for testing, which was provided by manufacturer. The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates, bandwidths, and modulations. The maximum power was configured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

Band	Mode	Frequency (MHz)	Data Rate	Power level Setting	
				Chain 0	Chain 1
5150 - 5250 MHz	802.11a	5180	6Mbps	32	28
		5200	6Mbps	32	30
		5240	6Mbps	30	30
	802.11n ht20	5180	MCS8	32	28
		5200	MCS8	32	29
		5240	MCS8	30	28
	802.11n ht 40	5190	MCS8	30	29
		5230	MCS8	31	29
	802.11ac vht80	5210	MCS8	29	30
5725 - 5850 MHz	802.11a	5745	6Mbps	28	29
		5785	6Mbps	27	29
		5825	6Mbps	26	27
	802.11n ht20	5745	MCS8	28	28
		5785	MCS8	28	28
		5825	MCS8	27	25
	802.11n ht 40	5755	MCS8	27	28
		5795	MCS8	27	28
	802.11ac vht80	5775	MCS8	26	28

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	100	100	100

802.11a



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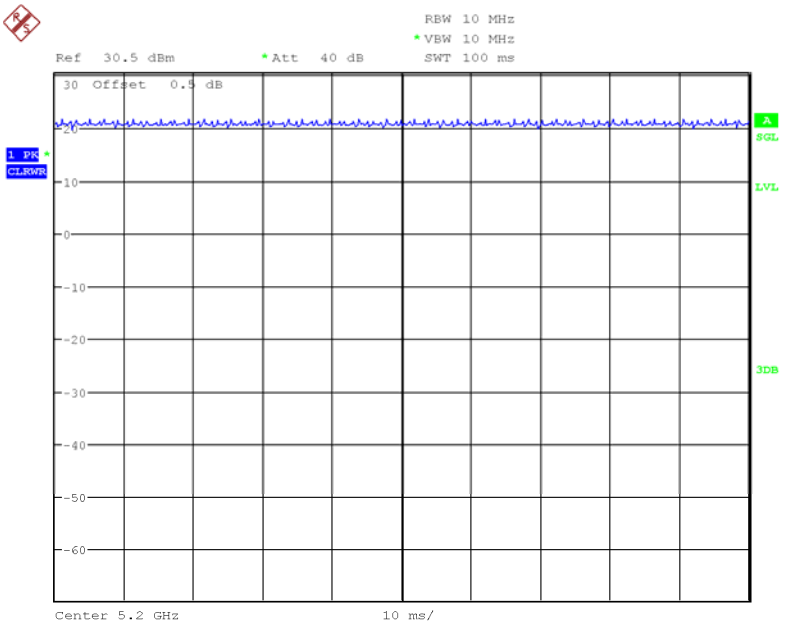
802.11n ht20



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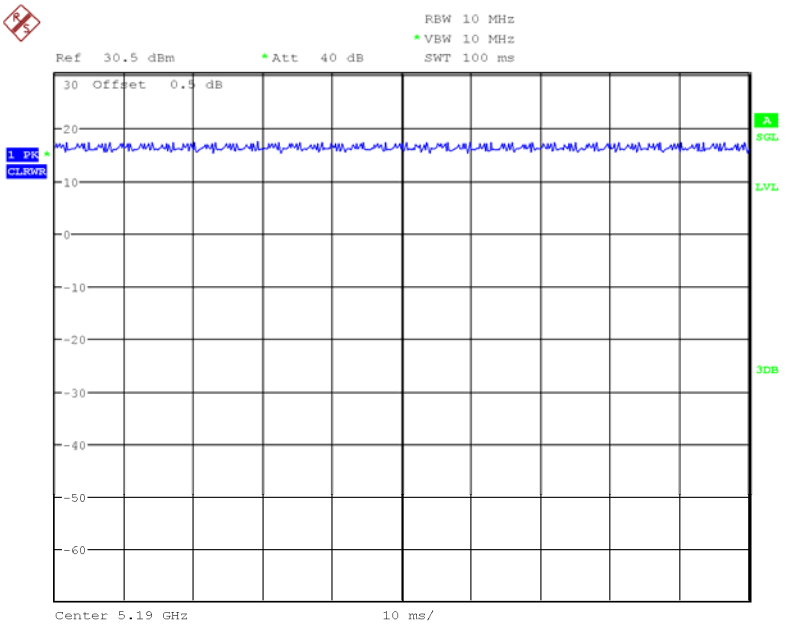
802.11n ht40



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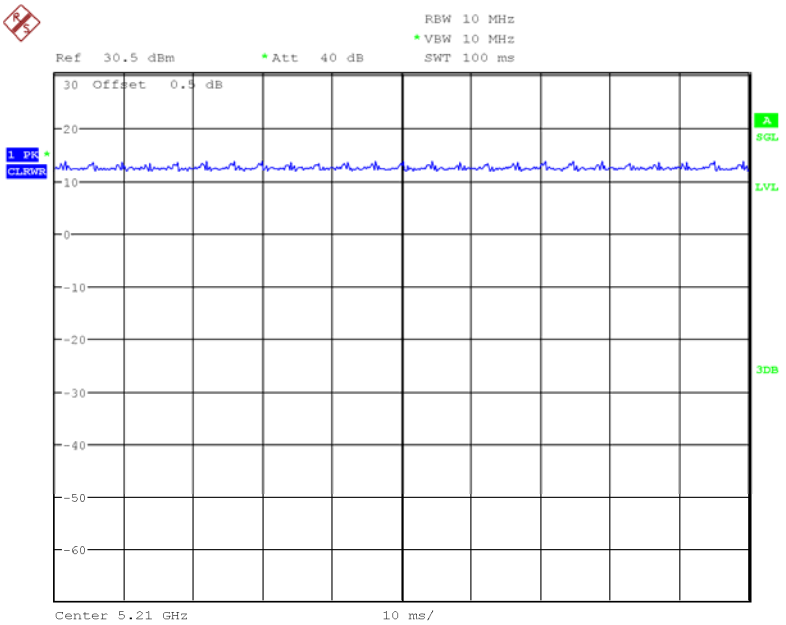
802.11ac vht80



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Equipment Modifications

No modification was made to the EUT.

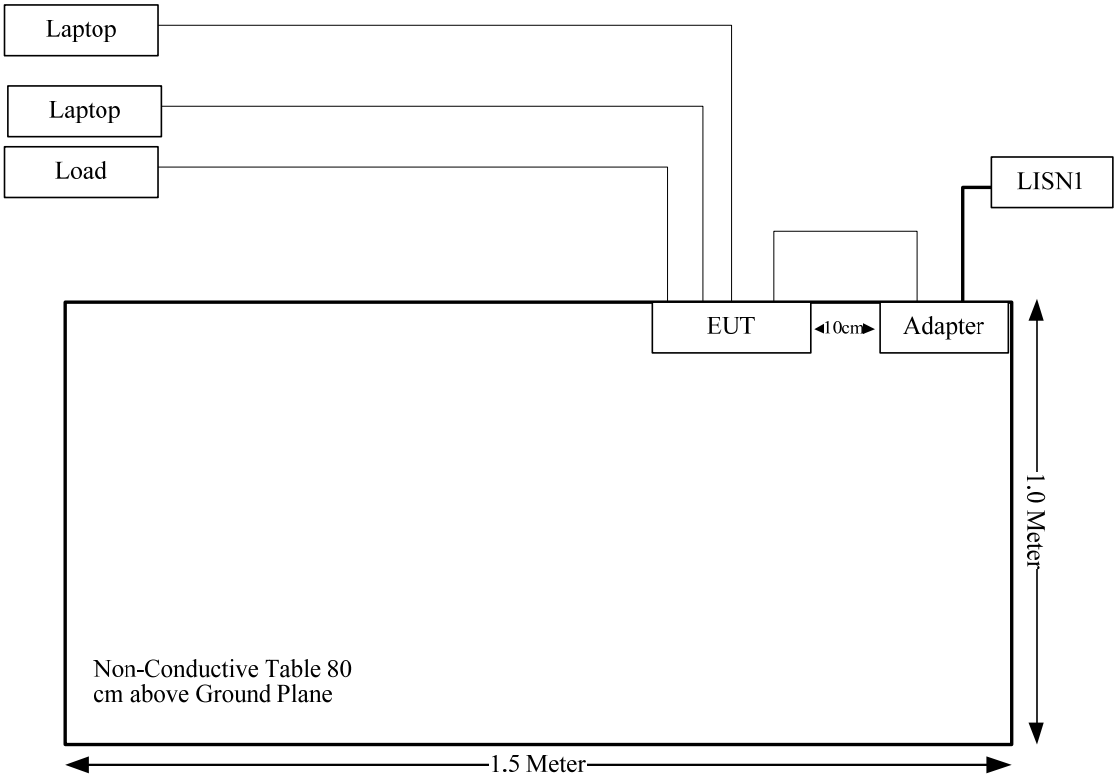
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	1CVM0C1
DELL	Laptop	PP11L	1CV0C23
Un-known	Load	Un-known	Un-known

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45 Cable	No	No	10	EUT	Load
RJ45 Cable	No	No	10	EUT	Laptop
RJ45 Cable	No	No	10	EUT	Laptop

Block Diagram of Test Setup



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	*($180/f^2$)	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);

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

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

Calculated Data:

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)			
2412-2462	2	1.58	28	631	20.00	0.199	1.0
5150-5250	2	1.58	20	100	20.00	0.032	1.0
5725-5850	2	1.58	20	100	20.00	0.032	1.0

The WLAN 2.4G and 5G can transmit simultaneously:

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

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

=0.199/1+0.032/1

=0.231

< 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 two antenna permanently attached to the unit, fulfill the requirement of this section. Please refer to the EUT photos.

Antenna Type	input impedance (Ohm)	Antenna Gain /Frequency Range
PCB	50	2.0 dBi/2.4~2.5GHz 2.0 dBi/5.15~5.85GHz

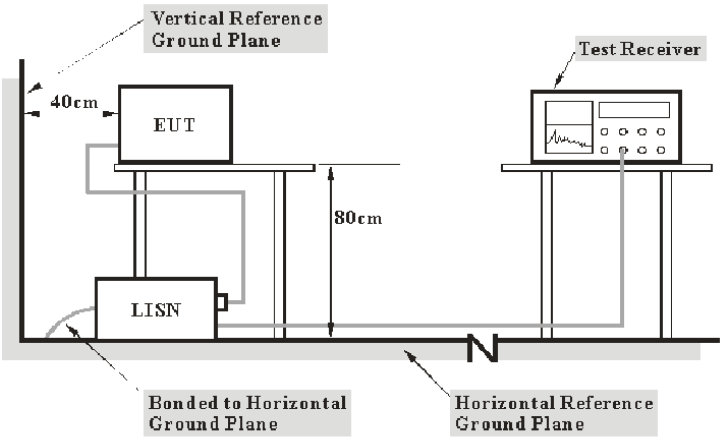
Result: Compliance.

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	2018-09-05	2019-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2018-12-10	2019-12-10
R&S	EMI Test Receiver	ESPI	100120	2019-05-09	2020-05-09

*** 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.

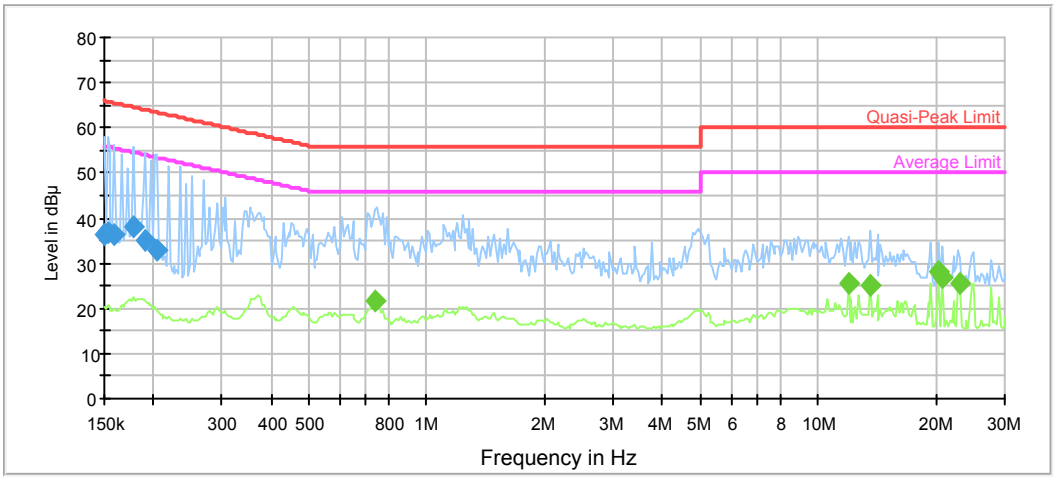
Test Data

Environmental Conditions

Temperature:	28.9 °C
Relative Humidity:	48 %
ATM Pressure:	99.7 kPa
Tester:	Lily Xie
Test Date:	2019-07-24

Test Mode: Transmitting (802.11n ht20 5745MHz 2Tx was the worst)

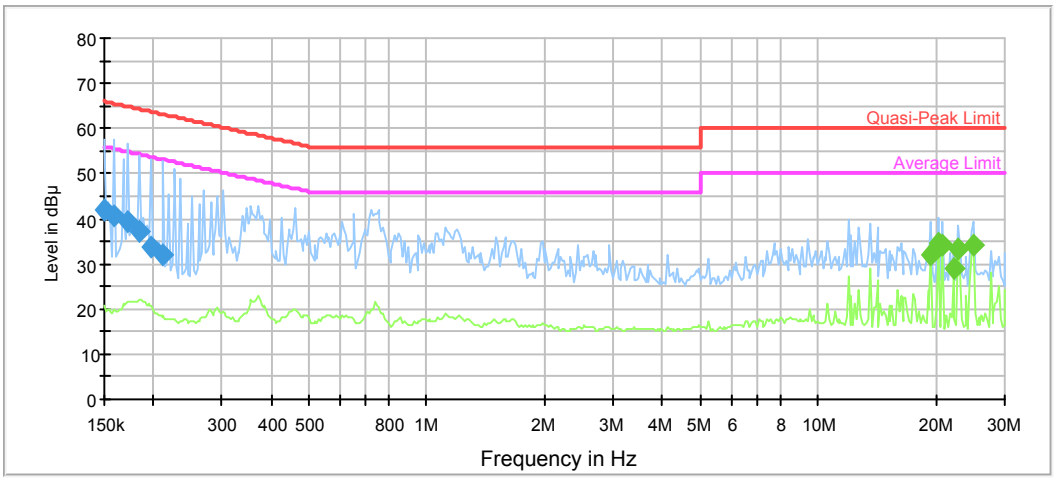
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	36.1	9.000	L1	11.2	29.9	66.0
0.153015	36.7	9.000	L1	11.1	29.1	65.8
0.159228	36.2	9.000	L1	11.1	29.3	65.5
0.177646	37.9	9.000	L1	10.8	26.7	64.6
0.190460	35.2	9.000	L1	10.7	28.8	64.0
0.204199	32.7	9.000	L1	10.6	30.7	63.4

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.737074	21.7	9.000	L1	9.8	24.3	46.0
11.953526	25.5	9.000	L1	9.9	24.5	50.0
13.604227	25.0	9.000	L1	9.9	25.0	50.0
20.254840	28.2	9.000	L1	10.1	21.8	50.0
20.868582	26.8	9.000	L1	10.1	23.2	50.0
23.051898	25.7	9.000	L1	10.1	24.3	50.0

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	41.8	9.000	N	11.2	24.2	66.0
0.159228	40.6	9.000	N	11.0	24.9	65.5
0.172421	39.2	9.000	N	10.9	25.6	64.8
0.184859	37.3	9.000	N	10.7	26.9	64.2
0.198194	33.7	9.000	N	10.6	30.0	63.7
0.212491	32.0	9.000	N	10.5	31.1	63.1

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
19.464503	32.2	9.000	N	10.0	17.8	50.0
20.254840	34.7	9.000	N	10.0	15.3	50.0
20.868582	34.0	9.000	N	10.0	16.0	50.0
22.152421	28.8	9.000	N	10.0	21.2	50.0
22.823661	33.4	9.000	N	10.0	16.6	50.0
24.961902	34.0	9.000	N	10.1	16.0	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.

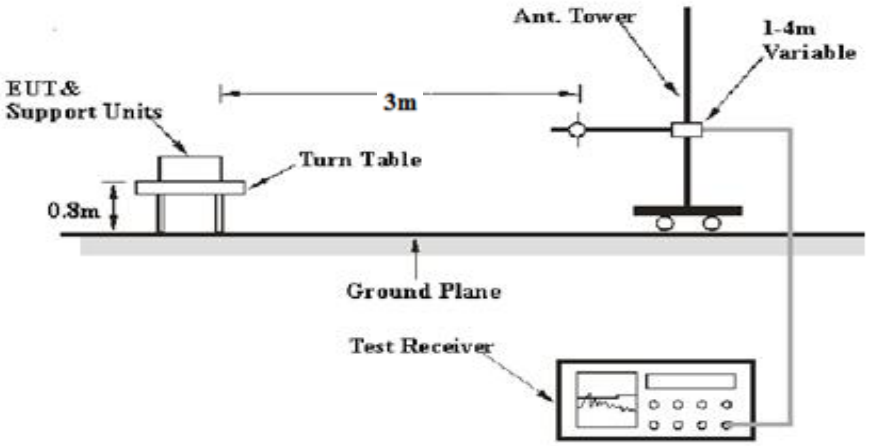
(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(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.

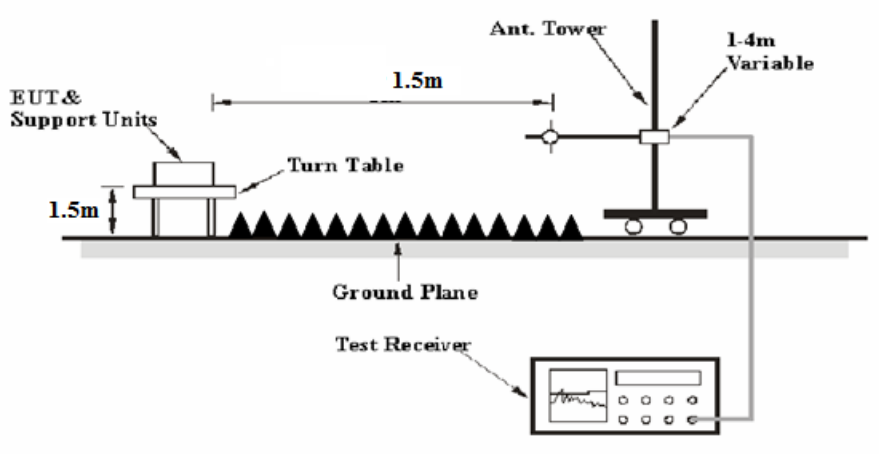
(7) The provisions of §15.205 apply to intentional radiators operating under this section.

EUT Setup

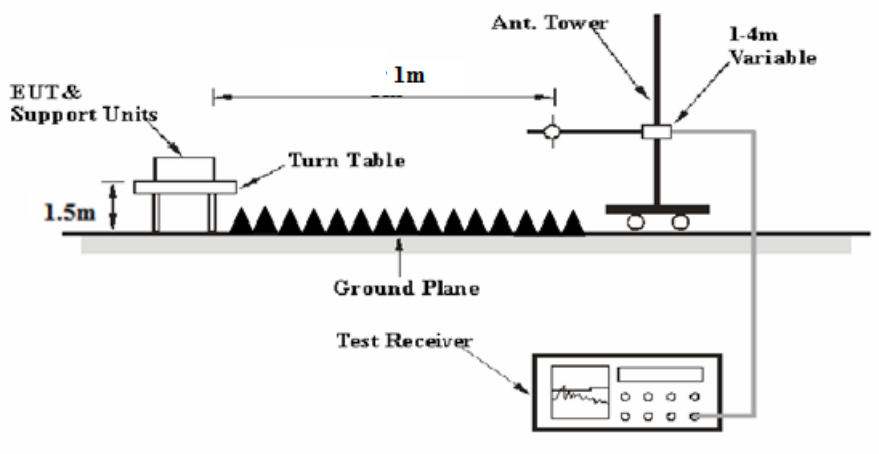
Below 1 GHz:



1-26.5 GHz:



26.5-40 GHz:



The radiated emission Below 1GHz tests were performed in the 3 meters chamber test site A, above 1GHz tests were performed in the 3 meters chamber test site B, 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	ESR3	102453	2019-06-26	2020-06-26
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2019-05-06	2020-05-06
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
Radiation Above 1GHz					
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-01-04	2020-01-04
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
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2019-06-27	2020-06-27
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2019-06-27	2020-06-27
Ducommun Technolagies	Horn Antenna	ARH-2823-02	1007726-01 1302	2016-11-18	2019-11-18
Sinoscite	Bandstop Filters	BSF5150-5850MN-0899-003	899003	2019-05-06	2020-05-06
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2019-06-27	2020-06-27
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

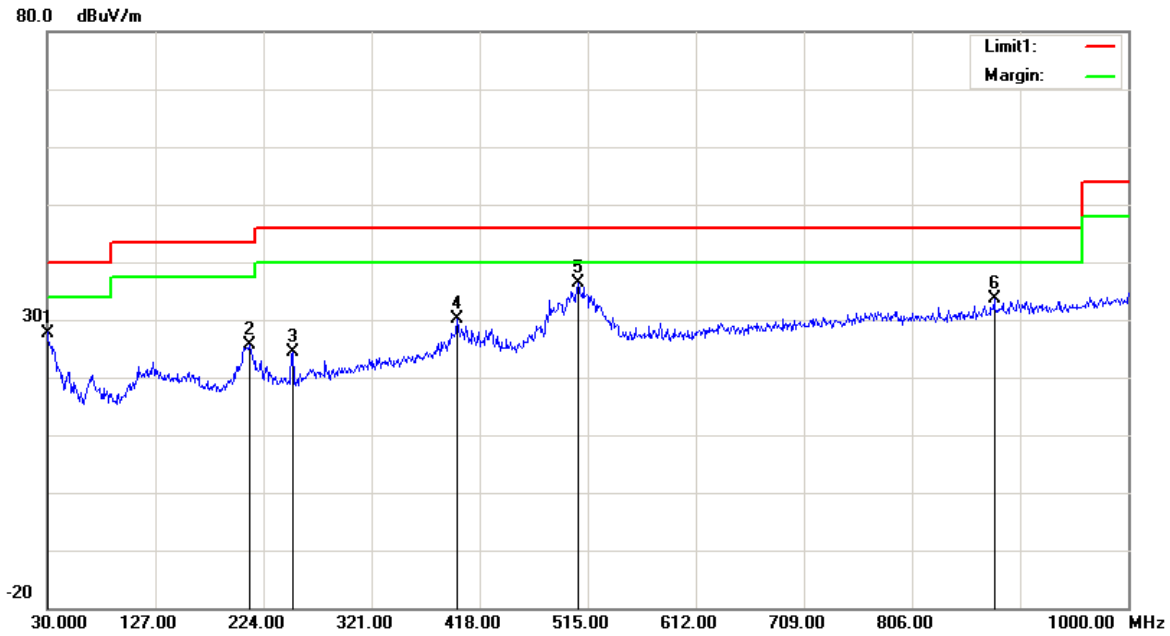
Environmental Conditions

Test Items	Radiation Below 1GHz	Radiation Above 1GHz
Temperature:	27 °C	29.1 °C
Relative Humidity:	50%	50 %
ATM Pressure:	100.1 kPa	100.1 kPa
Tester:	Vern Shen	Vern Shen
Test Date:	2019-07-23	2019-07-28

Test Mode: Transmitting

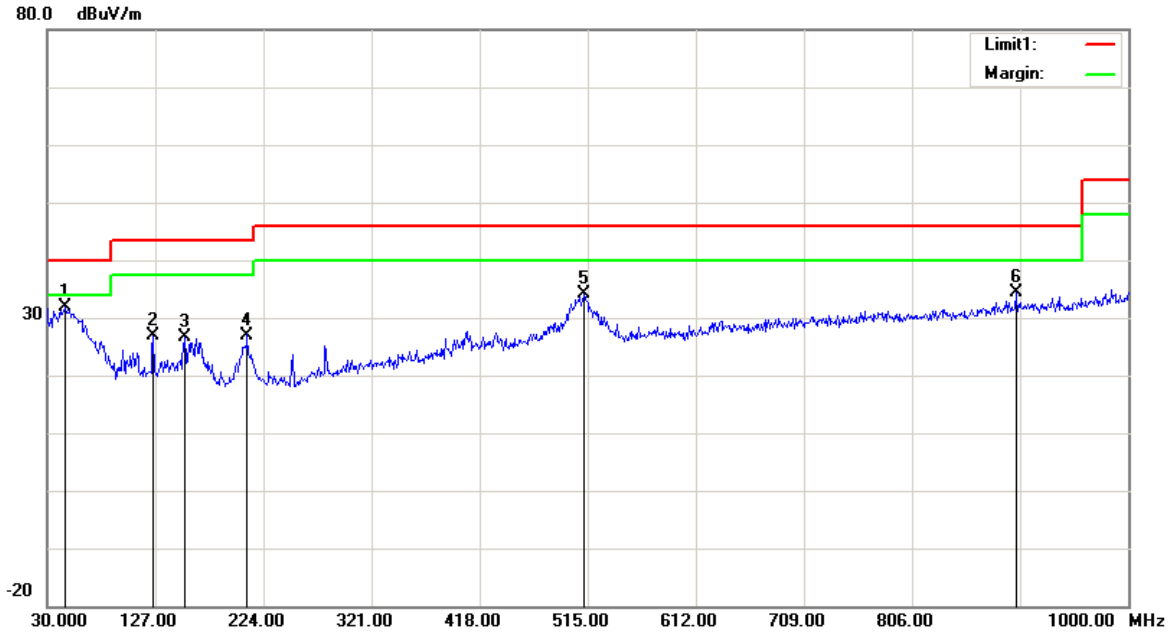
Below 1GHz (802.11n ht20, 5745 MHz 2Tx was the worst):

Horizontal



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.0000	26.03	peak	1.72	27.75	40.00	12.25
211.3900	33.01	peak	-7.38	25.63	43.50	17.87
250.1900	30.36	peak	-6.03	24.33	46.00	21.67
397.6300	32.14	peak	-2.04	30.10	46.00	15.90
506.2700	36.69	peak	-0.28	36.41	46.00	9.59
879.7200	34.16	peak	-0.47	33.69	46.00	12.31

Vertical



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
45.5200	41.24	peak	-9.44	31.80	40.00	8.20
125.0600	31.52	peak	-4.64	26.88	43.50	16.62
153.1900	32.69	peak	-5.95	26.74	43.50	16.76
209.4500	34.35	peak	-7.35	27.00	43.50	16.50
512.0900	34.32	peak	-0.24	34.08	46.00	11.92
899.1200	34.31	peak	0.10	34.41	46.00	11.59

1GHz-40GHz:
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	69.91	PK	H	30.46	4.71	0.00	105.08	99.06	N/A	N/A
5180.00	60.03	AV	H	30.46	4.71	0.00	95.20	89.18	N/A	N/A
5180.00	81.53	PK	V	30.46	4.71	0.00	116.70	110.68	N/A	N/A
5180.00	71.37	AV	V	30.46	4.71	0.00	106.54	100.52	N/A	N/A
5150.00	31.76	PK	V	30.40	4.70	0.00	66.86	60.84	74.00	13.16
5150.00	15.41	AV	V	30.40	4.70	0.00	50.51	44.49	54.00	9.51
10360.00	40.65	PK	V	37.10	6.91	26.86	57.80	51.78	68.20	16.42
15540.00	37.69	PK	V	36.79	8.39	25.66	57.21	51.19	74.00	22.81
15540.00	24.89	AV	V	36.79	8.39	25.66	44.41	38.39	54.00	15.61
Middle Channel: 5200 MHz										
5200.00	70.65	PK	H	30.50	4.71	0.00	105.86	99.84	N/A	N/A
5200.00	60.25	AV	H	30.50	4.71	0.00	95.46	89.44	N/A	N/A
5200.00	80.78	PK	V	30.50	4.71	0.00	115.99	109.97	N/A	N/A
5200.00	70.14	AV	V	30.50	4.71	0.00	105.35	99.33	N/A	N/A
10400.00	40.76	PK	V	37.16	6.92	26.84	58.00	51.98	68.20	16.22
15600.00	37.66	PK	V	36.78	8.43	25.97	56.90	50.88	74.00	23.12
15600.00	23.93	AV	V	36.78	8.43	25.97	43.17	37.15	54.00	16.85
High Channel: 5240 MHz										
5240.00	70.32	PK	H	30.58	4.75	0.00	105.65	99.63	N/A	N/A
5240.00	60.45	AV	H	30.58	4.75	0.00	95.78	89.76	N/A	N/A
5240.00	81.14	PK	V	30.58	4.75	0.00	116.47	110.45	N/A	N/A
5240.00	71.12	AV	V	30.58	4.75	0.00	106.45	100.43	N/A	N/A
5350.00	31.07	PK	V	30.80	4.84	0.00	66.71	60.69	74.00	13.31
5350.00	14.98	AV	V	30.80	4.84	0.00	50.62	44.6	54.00	9.40
10480.00	38.49	PK	V	37.27	6.94	27.02	55.68	49.66	68.20	18.54
15720.00	36.74	PK	V	36.76	8.51	25.68	56.33	50.31	74.00	23.69
15720.00	23.75	AV	V	36.76	8.51	25.68	43.34	37.32	54.00	16.68

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	70.22	PK	H	30.46	4.71	0.00	105.39	99.37	N/A	N/A
5180.00	61.09	AV	H	30.46	4.71	0.00	96.26	90.24	N/A	N/A
5180.00	78.58	PK	V	30.46	4.71	0.00	113.75	107.73	N/A	N/A
5180.00	68.49	AV	V	30.46	4.71	0.00	103.66	97.64	N/A	N/A
5150.00	32.54	PK	V	30.40	4.70	0.00	67.64	61.62	74.00	12.38
5150.00	15.97	AV	V	30.40	4.70	0.00	51.07	45.05	54.00	8.95
10360.00	39.71	PK	V	37.10	6.91	26.86	56.86	50.84	68.20	17.36
15540.00	37.49	PK	V	36.79	8.39	25.66	57.01	50.99	74.00	23.01
15540.00	23.97	AV	V	36.79	8.39	25.66	43.49	37.47	54.00	16.53
Middle Channel: 5200 MHz										
5200.00	70.16	PK	H	30.50	4.71	0.00	105.37	99.35	N/A	N/A
5200.00	60.51	AV	H	30.50	4.71	0.00	95.72	89.7	N/A	N/A
5200.00	78.36	PK	V	30.50	4.71	0.00	113.57	107.55	N/A	N/A
5200.00	68.49	AV	V	30.50	4.71	0.00	103.70	97.68	N/A	N/A
10400.00	40.03	PK	V	37.16	6.92	26.84	57.27	51.25	68.20	16.95
15600.00	38.05	PK	V	36.78	8.43	25.97	57.29	51.27	74.00	22.73
15600.00	24.63	AV	V	36.78	8.43	25.97	43.87	37.85	54.00	16.15
High Channel: 5240 MHz										
5240.00	70.73	PK	H	30.58	4.75	0.00	106.06	100.04	N/A	N/A
5240.00	60.02	AV	H	30.58	4.75	0.00	95.35	89.33	N/A	N/A
5240.00	78.10	PK	V	30.58	4.75	0.00	113.43	107.41	N/A	N/A
5240.00	68.36	AV	V	30.58	4.75	0.00	103.69	97.67	N/A	N/A
5350.00	31.52	PK	V	30.80	4.84	0.00	67.16	61.14	74.00	12.86
5350.00	15.74	AV	V	30.80	4.84	0.00	51.38	45.36	54.00	8.64
10480.00	39.95	PK	V	37.27	6.94	27.02	57.14	51.12	68.20	17.08
15720.00	37.85	PK	V	36.76	8.51	25.68	57.44	51.42	74.00	22.58
15720.00	23.63	AV	V	36.76	8.51	25.68	43.22	37.2	54.00	16.80

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	71.56	PK	H	30.46	4.71	0.00	106.73	100.71	N/A	N/A
5180.00	61.36	AV	H	30.46	4.71	0.00	96.53	90.51	N/A	N/A
5180.00	79.90	PK	V	30.46	4.71	0.00	115.07	109.05	N/A	N/A
5180.00	69.98	AV	V	30.46	4.71	0.00	105.15	99.13	N/A	N/A
5150.00	30.06	PK	V	30.40	4.70	0.00	65.16	59.14	74.00	14.86
5150.00	15.41	AV	V	30.40	4.70	0.00	50.51	44.49	54.00	9.51
10360.00	38.56	PK	V	37.10	6.91	26.86	55.71	49.69	68.20	18.51
15540.00	37.14	PK	V	36.79	8.39	25.66	56.66	50.64	74.00	23.36
15540.00	23.55	AV	V	36.79	8.39	25.66	43.07	37.05	54.00	16.95
Middle Channel: 5200 MHz										
5200.00	71.69	PK	H	30.50	4.71	0.00	106.90	100.88	N/A	N/A
5200.00	61.44	AV	H	30.50	4.71	0.00	96.65	90.63	N/A	N/A
5200.00	80.23	PK	V	30.50	4.71	0.00	115.44	109.42	N/A	N/A
5200.00	69.97	AV	V	30.50	4.71	0.00	105.18	99.16	N/A	N/A
10400.00	39.45	PK	V	37.16	6.92	26.84	56.69	50.67	68.20	17.53
15600.00	38.14	PK	V	36.78	8.43	25.97	57.38	51.36	74.00	22.64
15600.00	24.01	AV	V	36.78	8.43	25.97	43.25	37.23	54.00	16.77
High Channel: 5240 MHz										
5240.00	71.53	PK	H	30.58	4.75	0.00	106.86	100.84	N/A	N/A
5240.00	61.02	AV	H	30.58	4.75	0.00	96.35	90.33	N/A	N/A
5240.00	79.87	PK	V	30.58	4.75	0.00	115.20	109.18	N/A	N/A
5240.00	69.58	AV	V	30.58	4.75	0.00	104.91	98.89	N/A	N/A
5350.00	30.14	PK	V	30.80	4.84	0.00	65.78	59.76	74.00	14.24
5350.00	15.36	AV	V	30.80	4.84	0.00	51.00	44.98	54.00	9.02
10480.00	38.97	PK	V	37.27	6.94	27.02	56.16	50.14	68.20	18.06
15720.00	37.50	PK	V	36.76	8.51	25.68	57.09	51.07	74.00	22.93
15720.00	23.96	AV	V	36.76	8.51	25.68	43.55	37.53	54.00	16.47

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	70.30	PK	H	30.48	4.71	0.00	105.49	99.47	N/A	N/A
5190.00	59.14	AV	H	30.48	4.71	0.00	94.33	88.31	N/A	N/A
5190.00	77.82	PK	V	30.48	4.71	0.00	113.01	106.99	N/A	N/A
5190.00	66.36	AV	V	30.48	4.71	0.00	101.55	95.53	N/A	N/A
5150.00	33.40	PK	V	30.40	4.70	0.00	68.50	62.48	74.00	11.52
5150.00	15.41	AV	V	30.40	4.70	0.00	50.51	44.49	54.00	9.51
10380.00	38.65	PK	V	37.13	6.92	26.85	55.85	49.83	68.20	18.37
15570.00	36.79	PK	V	36.79	8.41	25.82	56.17	50.15	74.00	23.85
15570.00	23.65	AV	V	36.79	8.41	25.82	43.03	37.01	54.00	16.99
High Channel: 5230 MHz										
5230.00	70.54	PK	H	30.56	4.74	0.00	105.84	99.82	N/A	N/A
5230.00	60.02	AV	H	30.56	4.74	0.00	95.32	89.3	N/A	N/A
5230.00	77.87	PK	V	30.56	4.74	0.00	113.17	107.15	N/A	N/A
5230.00	67.09	AV	V	30.56	4.74	0.00	102.39	96.37	N/A	N/A
5350.00	30.12	PK	V	30.80	4.84	0.00	65.76	59.74	74.00	14.26
5350.00	15.24	AV	V	30.80	4.84	0.00	50.88	44.86	54.00	9.14
10460.00	37.98	PK	V	37.24	6.93	26.98	55.17	49.15	68.20	19.05
15690.00	37.15	PK	V	36.76	8.49	25.71	56.69	50.67	74.00	23.33
15690.00	24.03	AV	V	36.76	8.49	25.71	43.57	37.55	54.00	16.45

802.11ac vht80(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	69.24	PK	H	30.52	4.72	0.00	104.48	98.46	N/A	N/A
5210.00	57.87	AV	H	30.52	4.72	0.00	93.11	87.09	N/A	N/A
5210.00	76.80	PK	V	30.52	4.72	0.00	112.04	106.02	N/A	N/A
5210.00	64.25	AV	V	30.52	4.72	0.00	99.49	93.47	N/A	N/A
5150.00	33.59	PK	V	30.40	4.70	0.00	68.69	62.67	74.00	11.33
5150.00	17.00	AV	V	30.40	4.70	0.00	52.10	46.08	54.00	7.92
5350.00	31.23	PK	V	30.80	4.84	0.00	66.87	60.85	74.00	13.15
5350.00	15.63	AV	V	30.80	4.84	0.00	51.27	45.25	54.00	8.75
10420.00	37.58	PK	V	37.19	6.93	26.89	54.81	48.79	68.20	19.41
15630.00	36.74	PK	V	36.77	8.45	25.88	56.08	50.06	74.00	23.94
15630.00	24.12	AV	V	36.77	8.45	25.88	43.46	37.44	54.00	16.56

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	65.87	PK	H	31.44	4.96	0.00	102.27	96.25	N/A	N/A
5745.00	55.93	AV	H	31.44	4.96	0.00	92.33	86.31	N/A	N/A
5745.00	77.25	PK	V	31.44	4.96	0.00	113.65	107.63	N/A	N/A
5745.00	67.48	AV	V	31.44	4.96	0.00	103.88	97.86	N/A	N/A
5725.00	34.63	PK	V	31.42	4.96	0.00	71.01	64.99	122.20	57.21
5720.00	33.57	PK	V	31.41	4.96	0.00	69.94	63.92	110.80	46.88
5700.00	32.74	PK	V	31.38	4.97	0.00	69.09	63.07	105.20	42.13
5650.00	31.55	PK	V	31.31	4.95	0.00	67.81	61.79	68.20	6.41
11490.00	39.54	PK	V	38.29	6.98	26.57	58.24	52.22	74.00	21.78
11490.00	24.85	AV	V	38.29	6.98	26.57	43.55	37.53	54.00	16.47
17235.00	38.23	PK	V	41.02	9.01	25.11	63.15	57.13	68.20	11.07
Middle Channel: 5785 MHz										
5785.00	66.25	PK	H	31.50	4.94	0.00	102.69	96.67	N/A	N/A
5785.00	56.47	AV	H	31.50	4.94	0.00	92.91	86.89	N/A	N/A
5785.00	77.68	PK	V	31.50	4.94	0.00	114.12	108.1	N/A	N/A
5785.00	67.95	AV	V	31.50	4.94	0.00	104.39	98.37	N/A	N/A
11570.00	38.74	PK	V	38.36	6.98	26.97	57.11	51.09	74.00	22.91
11570.00	23.98	AV	V	38.36	6.98	26.97	42.35	36.33	54.00	17.67
17355.00	36.45	PK	V	41.28	9.04	25.16	61.61	55.59	68.20	12.61
High Channel: 5825 MHz										
5825.00	66.04	PK	H	31.56	4.94	0.00	102.54	96.52	N/A	N/A
5825.00	56.28	AV	H	31.56	4.94	0.00	92.78	86.76	N/A	N/A
5825.00	77.28	PK	V	31.56	4.94	0.00	113.78	107.76	N/A	N/A
5825.00	67.39	AV	V	31.56	4.94	0.00	103.89	97.87	N/A	N/A
5850.00	34.36	PK	V	31.59	4.95	0.00	70.90	64.88	122.20	57.32
5855.00	33.54	PK	V	31.60	4.95	0.00	70.09	64.07	110.80	46.73
5875.00	33.21	PK	V	31.63	4.95	0.00	69.79	63.77	105.20	41.43
5925.00	31.64	PK	V	31.70	4.95	0.00	68.29	62.27	68.20	5.93
11650.00	38.51	PK	V	38.42	6.99	26.84	57.08	51.06	74.00	22.94
11650.00	24.26	AV	V	38.42	6.99	26.84	42.83	36.81	54.00	17.19
17475.00	36.87	PK	V	41.55	9.06	24.55	62.93	56.91	68.20	11.29

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	70.12	PK	H	31.44	4.96	0.00	106.52	100.5	N/A	N/A
5745.00	60.53	AV	H	31.44	4.96	0.00	96.93	90.91	N/A	N/A
5745.00	77.85	PK	V	31.44	4.96	0.00	114.25	108.23	N/A	N/A
5745.00	68.25	AV	V	31.44	4.96	0.00	104.65	98.63	N/A	N/A
5725.00	33.56	PK	V	31.42	4.96	0.00	69.94	63.92	122.20	58.28
5720.00	32.74	PK	V	31.41	4.96	0.00	69.11	63.09	110.80	47.71
5700.00	32.03	PK	V	31.38	4.97	0.00	68.38	62.36	105.20	42.84
5650.00	31.74	PK	V	31.31	4.95	0.00	68.00	61.98	68.20	6.22
11490.00	38.41	PK	V	38.29	6.98	26.57	57.11	51.09	74.00	22.91
11490.00	24.58	AV	V	38.29	6.98	26.57	43.28	37.26	54.00	16.74
17235.00	36.41	PK	V	41.02	9.01	25.11	61.33	55.31	68.20	12.89
Middle Channel: 5785 MHz										
5785.00	69.87	PK	H	31.50	4.94	0.00	106.31	100.29	N/A	N/A
5785.00	59.90	AV	H	31.50	4.94	0.00	96.34	90.32	N/A	N/A
5785.00	77.41	PK	V	31.50	4.94	0.00	113.85	107.83	N/A	N/A
5785.00	67.85	AV	V	31.50	4.94	0.00	104.29	98.27	N/A	N/A
11570.00	38.41	PK	V	38.36	6.98	26.97	56.78	50.76	74.00	23.24
11570.00	24.33	AV	V	38.36	6.98	26.97	42.70	36.68	54.00	17.32
17355.00	37.09	PK	V	41.28	9.04	25.16	62.25	56.23	68.20	11.97
High Channel: 5825 MHz										
5825.00	69.72	PK	H	31.56	4.94	0.00	106.22	100.2	N/A	N/A
5825.00	60.50	AV	H	31.56	4.94	0.00	97.00	90.98	N/A	N/A
5825.00	76.98	PK	V	31.56	4.94	0.00	113.48	107.46	N/A	N/A
5825.00	67.35	AV	V	31.56	4.94	0.00	103.85	97.83	N/A	N/A
5850.00	33.74	PK	V	31.59	4.95	0.00	70.28	64.26	122.20	57.94
5855.00	32.59	PK	V	31.60	4.95	0.00	69.14	63.12	110.80	47.68
5875.00	32.14	PK	V	31.63	4.95	0.00	68.72	62.7	105.20	42.50
5925.00	31.70	PK	V	31.70	4.95	0.00	68.35	62.33	68.20	5.87
11650.00	38.63	PK	V	38.42	6.99	26.84	57.20	51.18	74.00	22.82
11650.00	24.97	AV	V	38.42	6.99	26.84	43.54	37.52	54.00	16.48
17475.00	36.48	PK	V	41.55	9.06	24.55	62.54	56.52	68.20	11.68

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	70.54	PK	H	31.44	4.96	0.00	106.94	100.92	N/A	N/A
5745.00	59.87	AV	H	31.44	4.96	0.00	96.27	90.25	N/A	N/A
5745.00	78.98	PK	V	31.44	4.96	0.00	115.38	109.36	N/A	N/A
5745.00	67.58	AV	V	31.44	4.96	0.00	103.98	97.96	N/A	N/A
5725.00	34.56	PK	V	31.42	4.96	0.00	70.94	64.92	122.20	57.28
5720.00	32.98	PK	V	31.41	4.96	0.00	69.35	63.33	110.80	47.47
5700.00	31.85	PK	V	31.38	4.97	0.00	68.20	62.18	105.20	43.02
5650.00	30.85	PK	V	31.31	4.95	0.00	67.11	61.09	68.20	7.11
11490.00	38.47	PK	V	38.29	6.98	26.57	57.17	51.15	74.00	22.85
11490.00	24.36	AV	V	38.29	6.98	26.57	43.06	37.04	54.00	16.96
17235.00	36.30	PK	V	41.02	9.01	25.11	61.22	55.2	68.20	13.00
Middle Channel: 5785 MHz										
5785.00	71.84	PK	H	31.50	4.94	0.00	108.28	102.26	N/A	N/A
5785.00	60.54	AV	H	31.50	4.94	0.00	96.98	90.96	N/A	N/A
5785.00	79.25	PK	V	31.50	4.94	0.00	115.69	109.67	N/A	N/A
5785.00	68.65	AV	V	31.50	4.94	0.00	105.09	99.07	N/A	N/A
11570.00	38.36	PK	V	38.36	6.98	26.97	56.73	50.71	74.00	23.29
11570.00	24.51	AV	V	38.36	6.98	26.97	42.88	36.86	54.00	17.14
17355.00	36.47	PK	V	41.28	9.04	25.16	61.63	55.61	68.20	12.59
High Channel: 5825 MHz										
5825.00	70.03	PK	H	31.56	4.94	0.00	106.53	100.51	N/A	N/A
5825.00	69.25	AV	H	31.56	4.94	0.00	105.75	99.73	N/A	N/A
5825.00	78.25	PK	V	31.56	4.94	0.00	114.75	108.73	N/A	N/A
5825.00	67.39	AV	V	31.56	4.94	0.00	103.89	97.87	N/A	N/A
5850.00	35.45	PK	V	31.59	4.95	0.00	71.99	65.97	122.20	56.23
5855.00	33.96	PK	V	31.60	4.95	0.00	70.51	64.49	110.80	46.31
5875.00	32.87	PK	V	31.63	4.95	0.00	69.45	63.43	105.20	41.77
5925.00	30.98	PK	V	31.70	4.95	0.00	67.63	61.61	68.20	6.59
11650.00	38.40	PK	V	38.42	6.99	26.84	56.97	50.95	74.00	23.05
11650.00	24.33	AV	V	38.42	6.99	26.84	42.90	36.88	54.00	17.12
17475.00	36.70	PK	V	41.55	9.06	24.55	62.76	56.74	68.20	11.46

802.11n ht40(2Tx was the worst)

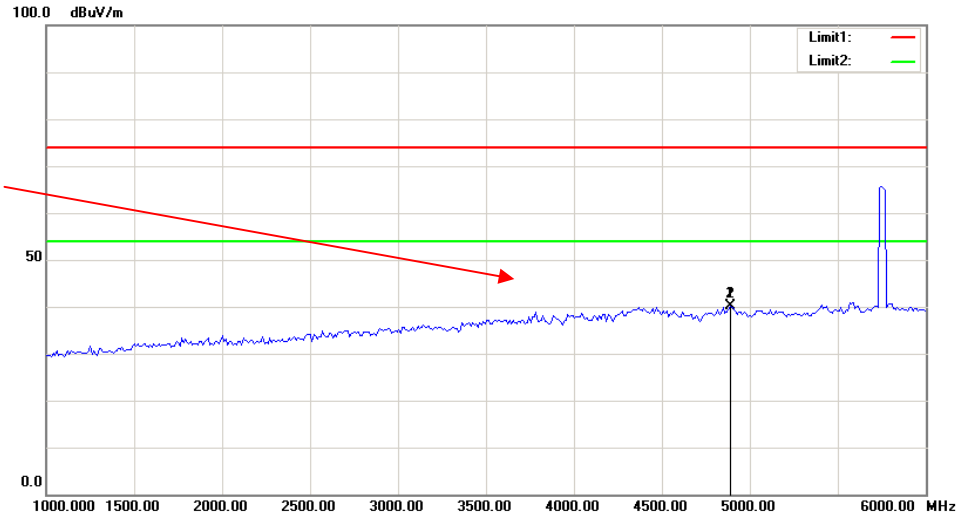
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5755 MHz										
5755.00	68.74	PK	H	31.46	4.95	0.00	105.15	99.13	N/A	N/A
5755.00	57.63	AV	H	31.46	4.95	0.00	94.04	88.02	N/A	N/A
5755.00	76.08	PK	V	31.46	4.95	0.00	112.49	106.47	N/A	N/A
5755.00	65.15	AV	V	31.46	4.95	0.00	101.56	95.54	N/A	N/A
5725.00	37.12	PK	V	31.42	4.96	0.00	73.50	67.48	122.20	54.72
5720.00	36.74	PK	V	31.41	4.96	0.00	73.11	67.09	110.80	43.71
5700.00	31.98	PK	V	31.38	4.97	0.00	68.33	62.31	105.20	42.89
5650.00	31.74	PK	V	31.31	4.95	0.00	68.00	61.98	68.20	6.22
11510.00	38.65	PK	V	38.31	6.98	26.58	57.36	51.34	74.00	22.66
11510.00	24.15	AV	V	38.31	6.98	26.58	42.86	36.84	54.00	17.16
17265.00	36.74	PK	V	41.08	9.02	24.84	62.00	55.98	68.20	12.22
High Channel: 5795 MHz										
5795.00	69.85	PK	H	31.51	4.94	0.00	106.30	100.28	N/A	N/A
5795.00	58.36	AV	H	31.51	4.94	0.00	94.81	88.79	N/A	N/A
5795.00	76.26	PK	V	31.51	4.94	0.00	112.71	106.69	N/A	N/A
5795.00	64.95	AV	V	31.51	4.94	0.00	101.40	95.38	N/A	N/A
5850.00	34.52	PK	V	31.59	4.95	0.00	71.06	65.04	122.20	57.16
5855.00	33.96	PK	V	31.60	4.95	0.00	70.51	64.49	110.80	46.31
5875.00	32.87	PK	V	31.63	4.95	0.00	69.45	63.43	105.20	41.77
5925.00	31.62	PK	V	31.70	4.95	0.00	68.27	62.25	68.20	5.95
11590.00	38.65	PK	V	38.37	6.99	27.10	56.91	50.89	74.00	23.11
11590.00	24.58	AV	V	38.37	6.99	27.10	42.84	36.82	54.00	17.18
17385.00	36.95	PK	V	41.35	9.04	25.51	61.83	55.81	68.20	12.39

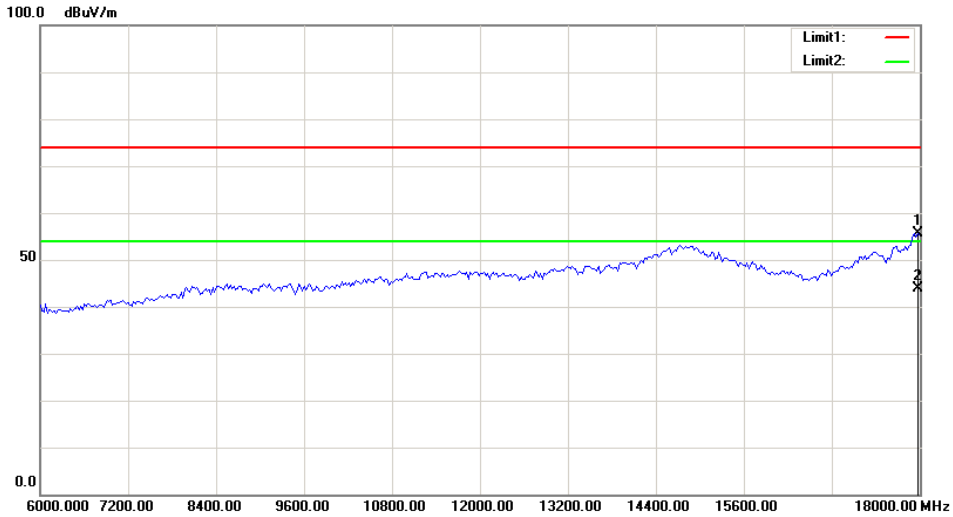
802.11ac vht80(2Tx was the worst)

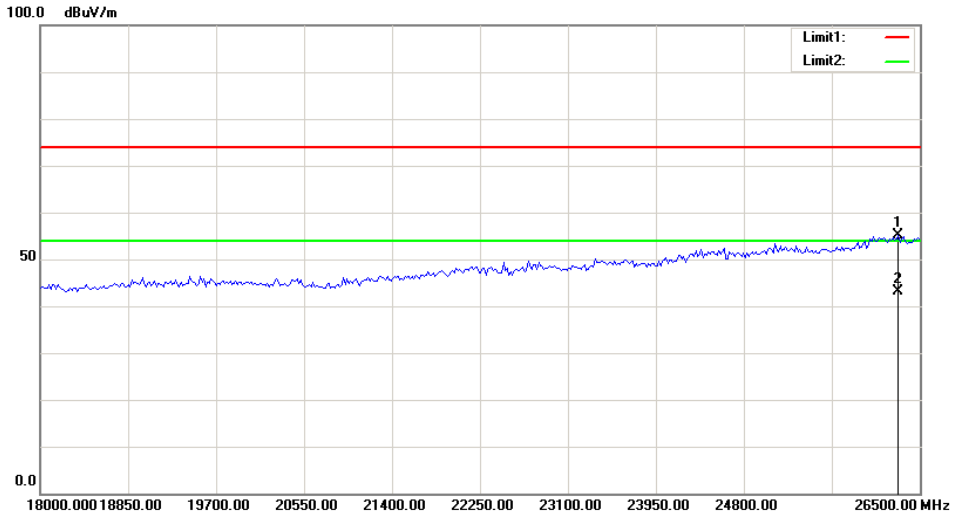
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)						
5775.00	68.21	PK	H	31.49	4.95	0.00	104.65	98.63	N/A	N/A
5775.00	56.17	AV	H	31.49	4.95	0.00	92.61	86.59	N/A	N/A
5775.00	75.10	PK	V	31.49	4.95	0.00	111.54	105.52	N/A	N/A
5775.00	63.15	AV	V	31.49	4.95	0.00	99.59	93.57	N/A	N/A
5725.00	35.28	PK	V	31.42	4.96	0.00	71.66	65.64	122.20	56.56
5720.00	34.52	PK	V	31.41	4.96	0.00	70.89	64.87	110.80	45.93
5700.00	34.29	PK	V	31.38	4.97	0.00	70.64	64.62	105.20	40.58
5650.00	30.21	PK	V	31.31	4.95	0.00	66.47	60.45	68.20	7.75
5850.00	32.36	PK	V	31.59	4.95	0.00	68.90	62.88	122.20	59.32
5855.00	31.64	PK	V	31.60	4.95	0.00	68.19	62.17	110.80	48.63
5875.00	31.23	PK	V	31.63	4.95	0.00	67.81	61.79	105.20	43.41
5925.00	30.65	PK	V	31.70	4.95	0.00	67.30	61.28	68.20	6.92
11550.00	38.74	PK	V	38.34	6.98	26.84	57.22	51.2	74.00	22.80
11550.00	24.65	AV	V	38.34	6.98	26.84	43.13	37.11	54.00	16.89
17325.00	37.22	PK	V	41.22	9.03	24.81	62.66	56.64	68.20	11.56

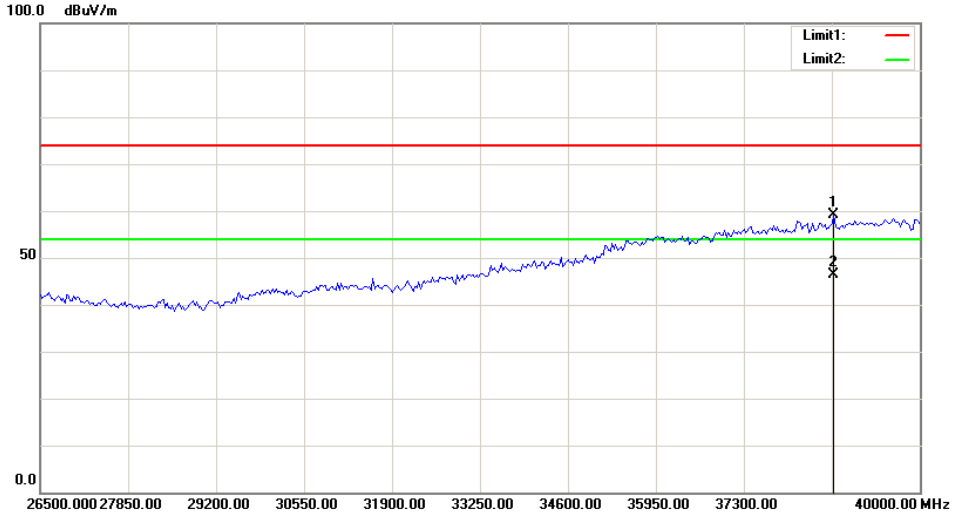
Test Plots(For worst mode 802.11n ht20 2Tx 5745MHz)
Horizontal

Fundamental Test with Band Rejection Filter



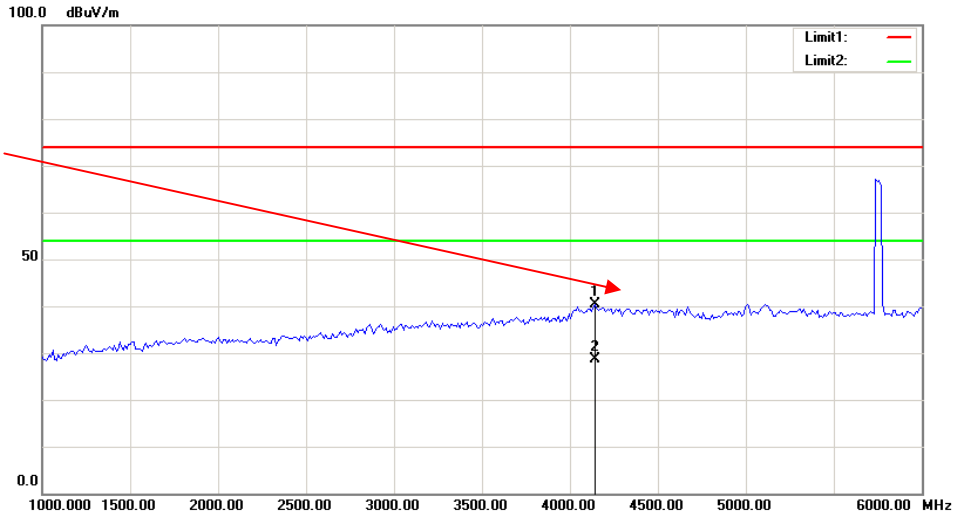


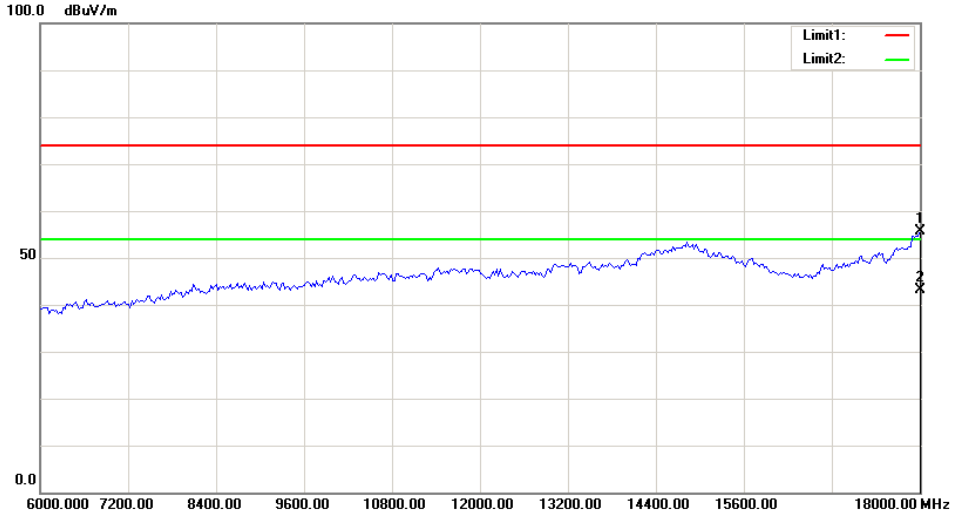


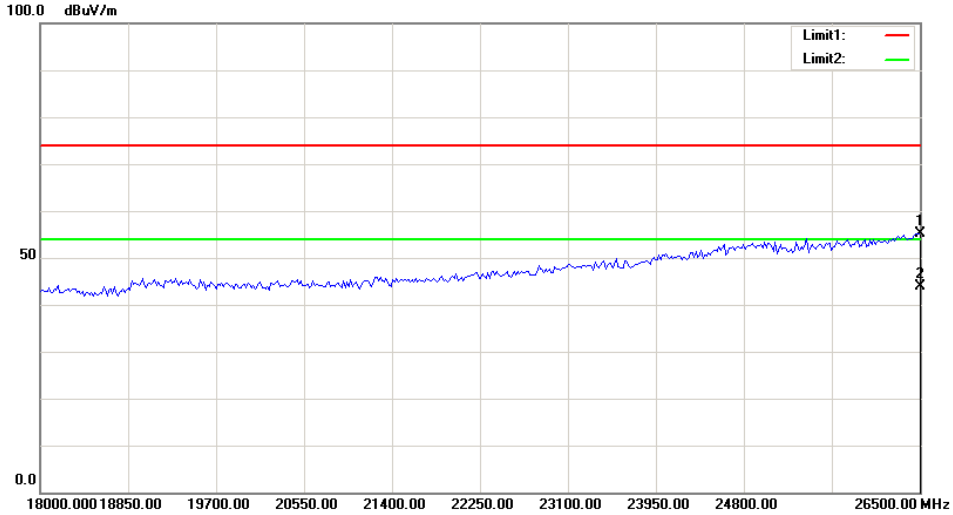

100.0 dBuV/m
Limit1:
Limit2:
50
0.0
1
2
26500.000 27850.00 29200.00 30550.00 31900.00 33250.00 34600.00 35950.00 37300.00 40000.00 MHz

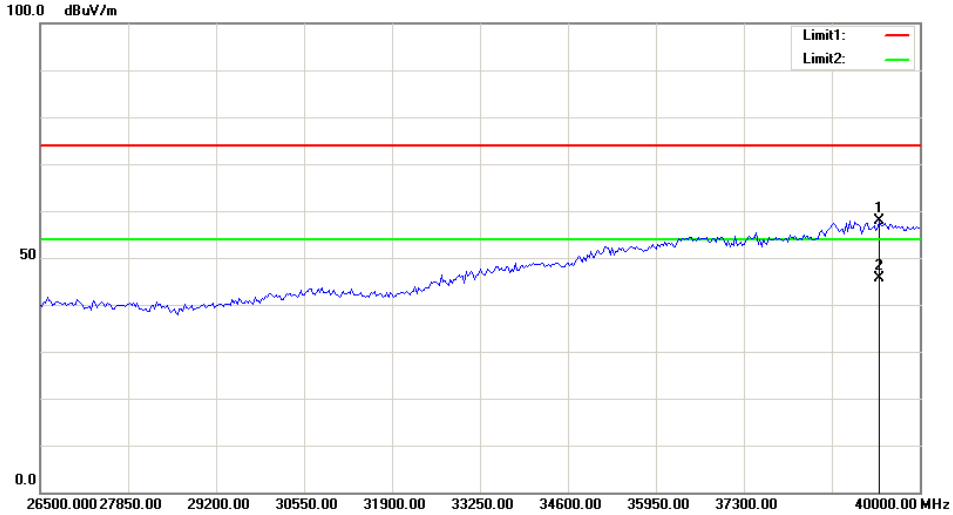
Vertical

Fundamental Test with Band Rejection Filter








100.0 dBuV/m
Limit1:
Limit2:
50
0.0
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	FSV40	101474	2019-01-09	2020-01-09
Unknown	Coaxial Cable	C-SJ00-0010	C0010/06	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:	26.5 °C
Relative Humidity:	71 %
ATM Pressure:	100.5 kPa
Tester:	Lily Xie
Test Date:	2019-08-22

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)
802.11a	5180	20.24	16.607
	5200	20.24	16.607
	5240	20.24	16.607
802.11n ht20	5180	21.20	17.645
	5200	21.12	17.645
	5240	20.88	17.645
802.11n ht40	5190	41.12	36.567
	5230	41.12	36.727
802.11ac vht80	5210	83.20	75.689

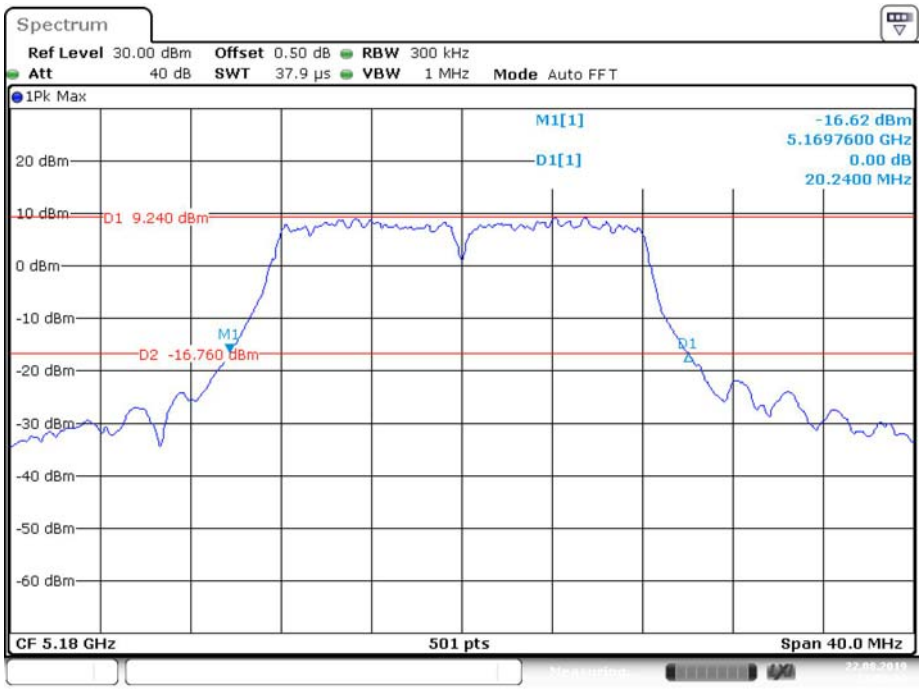
5725-5850MHz:

Mode	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5745	16.56	16.607
	5785	16.56	16.687
	5825	16.56	16.687
802.11n ht20	5745	17.68	17.645
	5785	17.68	17.645
	5825	17.68	17.645
802.11n ht40	5755	36.32	36.727
	5795	36.32	36.727
802.11ac vht80	5775	76.16	75.689

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.

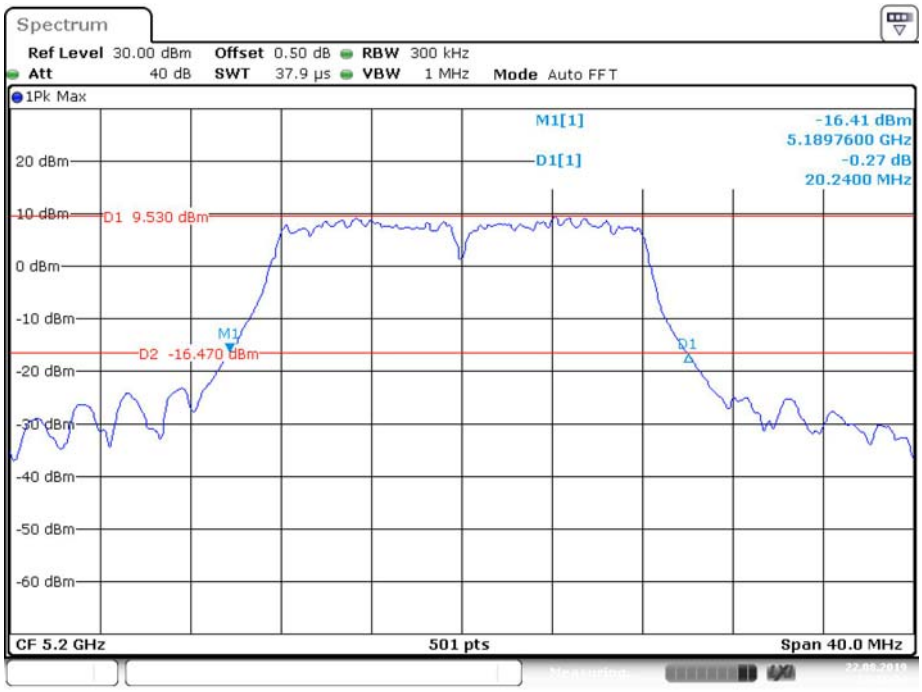
5150-5250 MHz band:
26dB Bandwidth:

802.11a Low Channel



Date: 22.AUG.2019 13:08:13

802.11a Middle Channel



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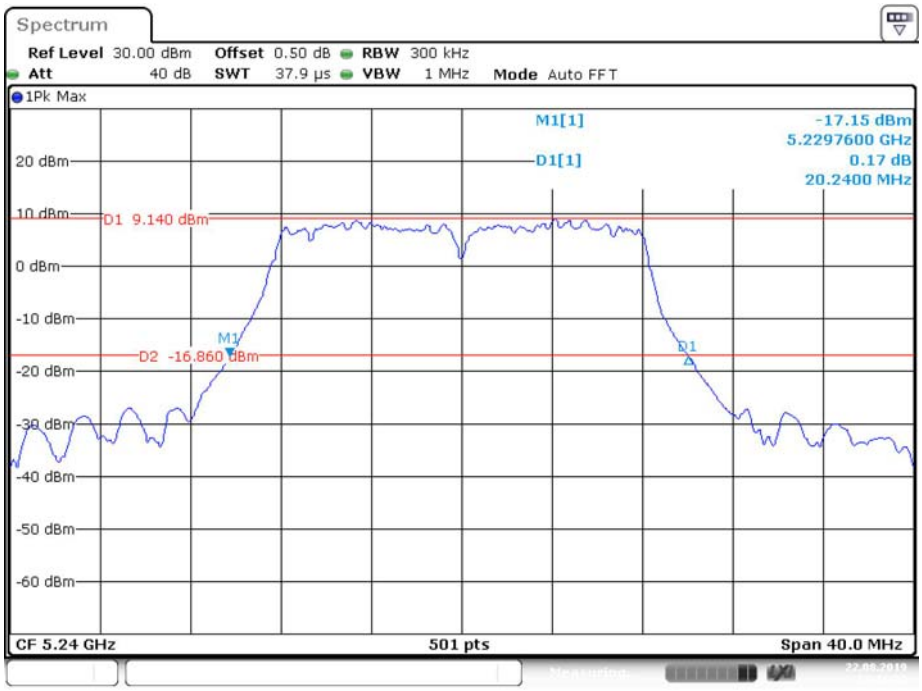
802.11a High Channel



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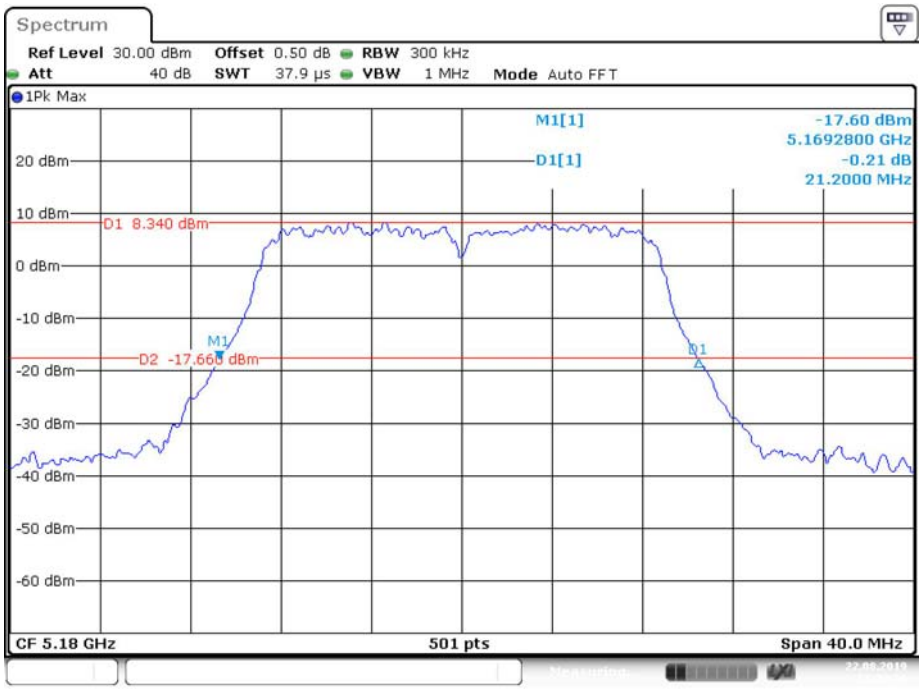
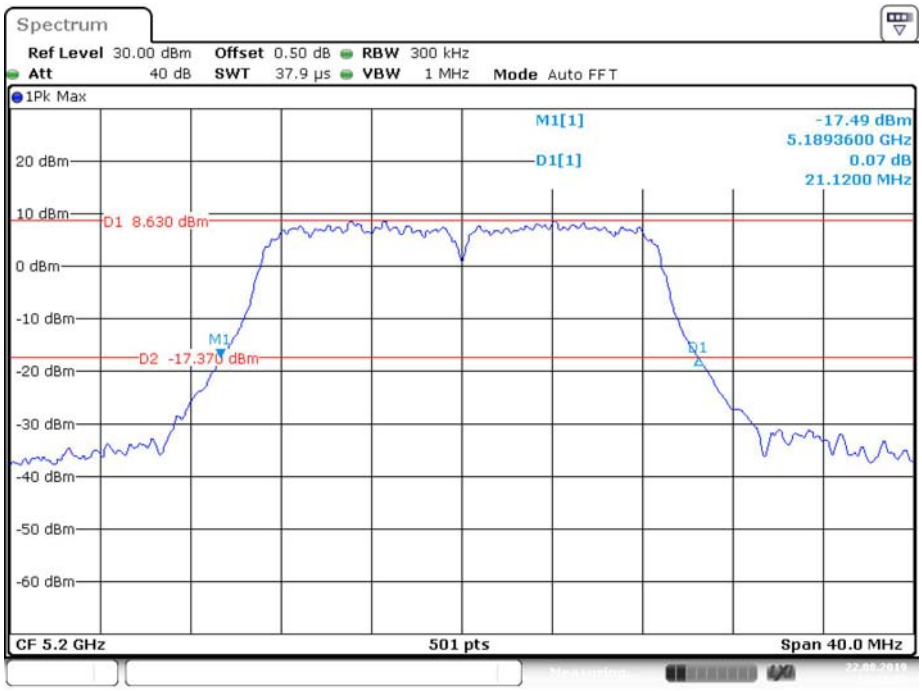
802.11n ht20 Low Channel



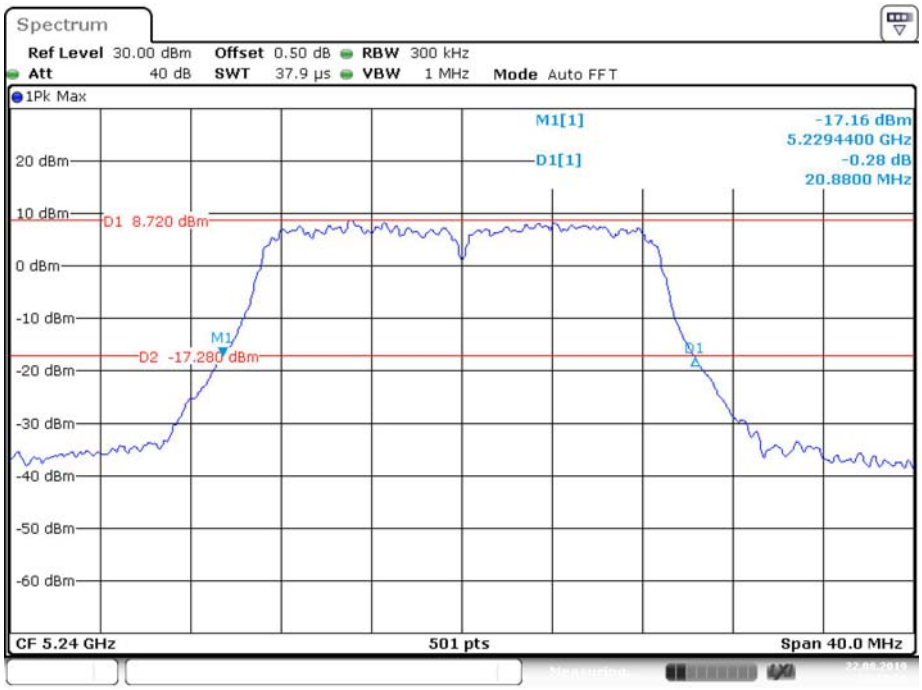
Date: 22.AUG.2019 13:20:10

802.11n ht20 Middle Channel



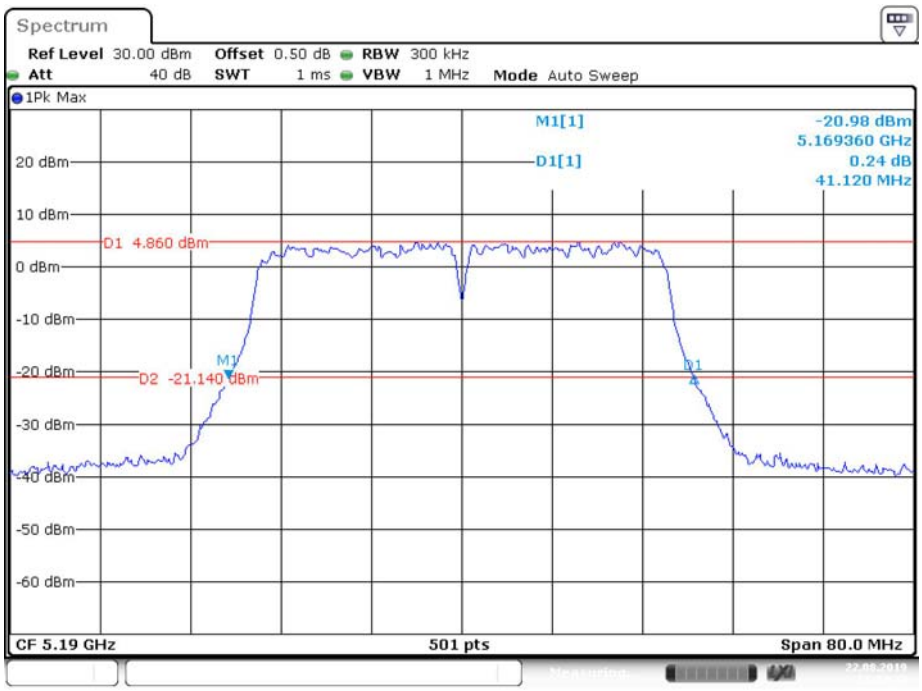
Date: 22.AUG.2019 13:18:53

802.11n ht20 High Channel



Date: 22.AUG.2019 13:18:08

802.11n ht40 Low Channel



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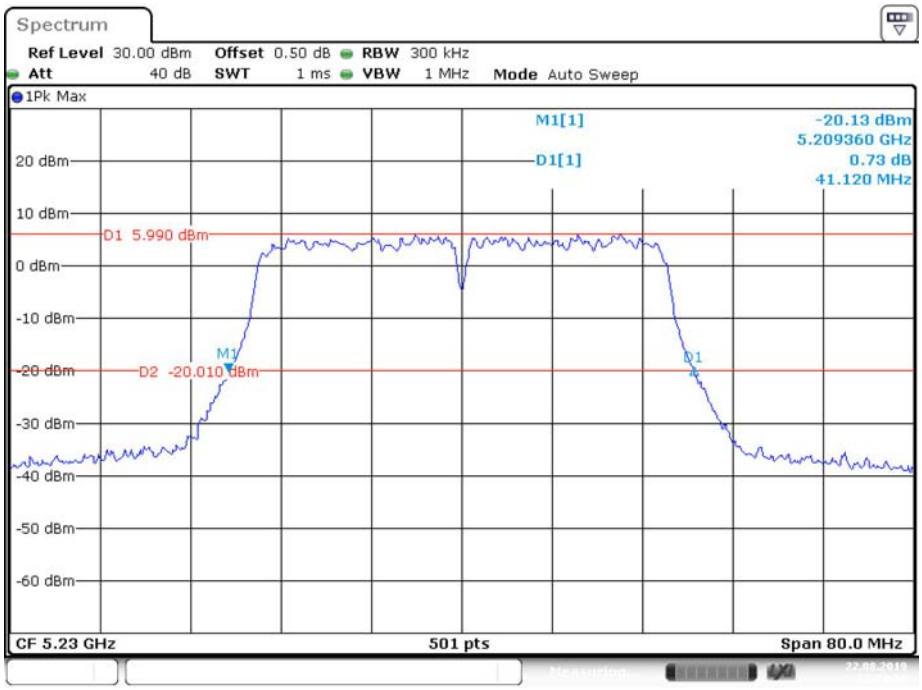
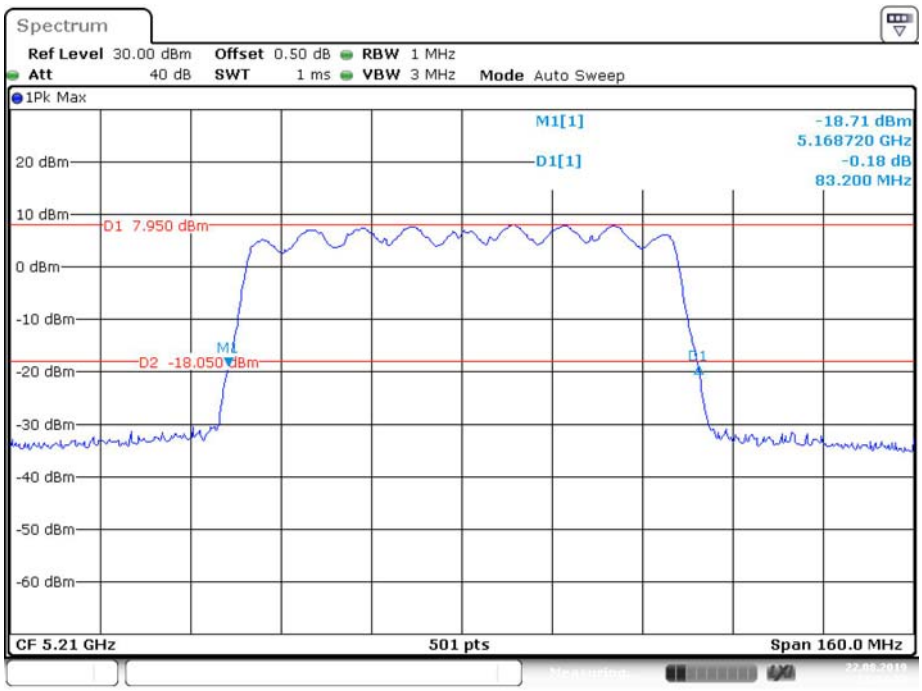
802.11n ht40 High Channel



Date: 22.AUG.2019 13:23:33

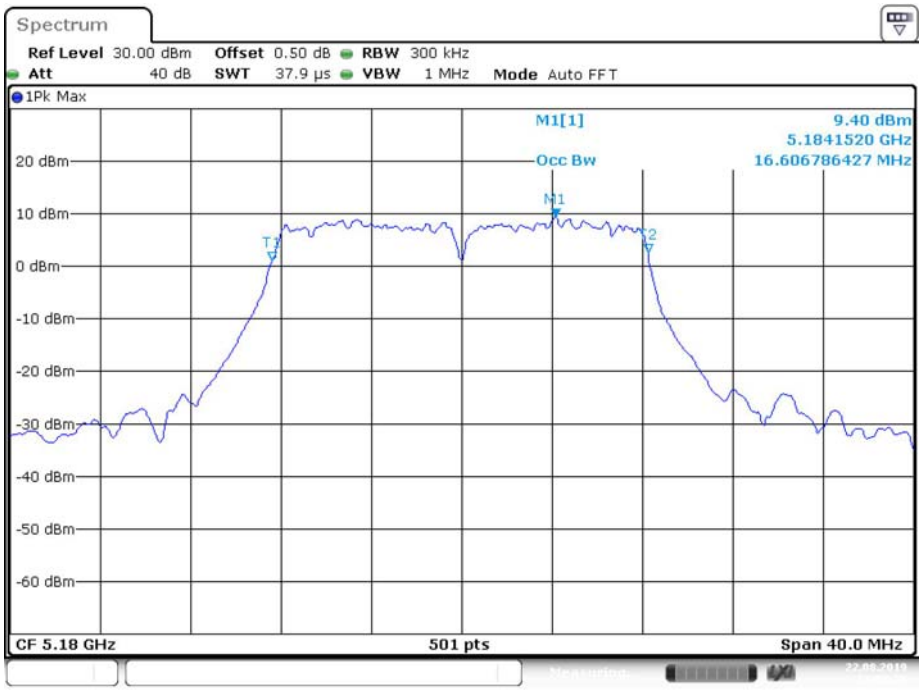
802.11ac vht80 Middle Channel



Date: 22.AUG.2019 13:24:37

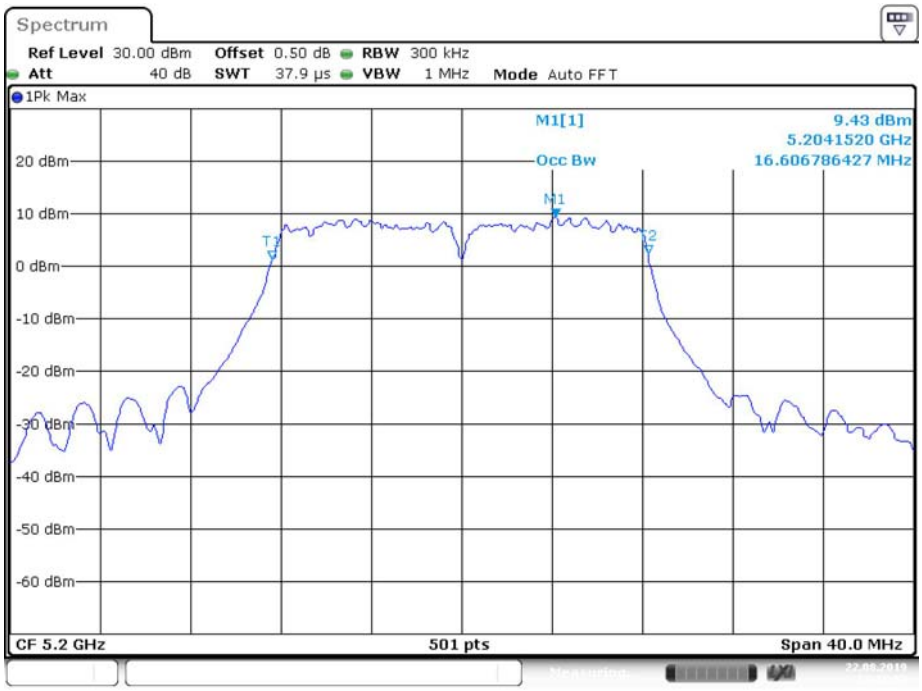
99% Occupied Bandwidth:

802.11a Low Channel



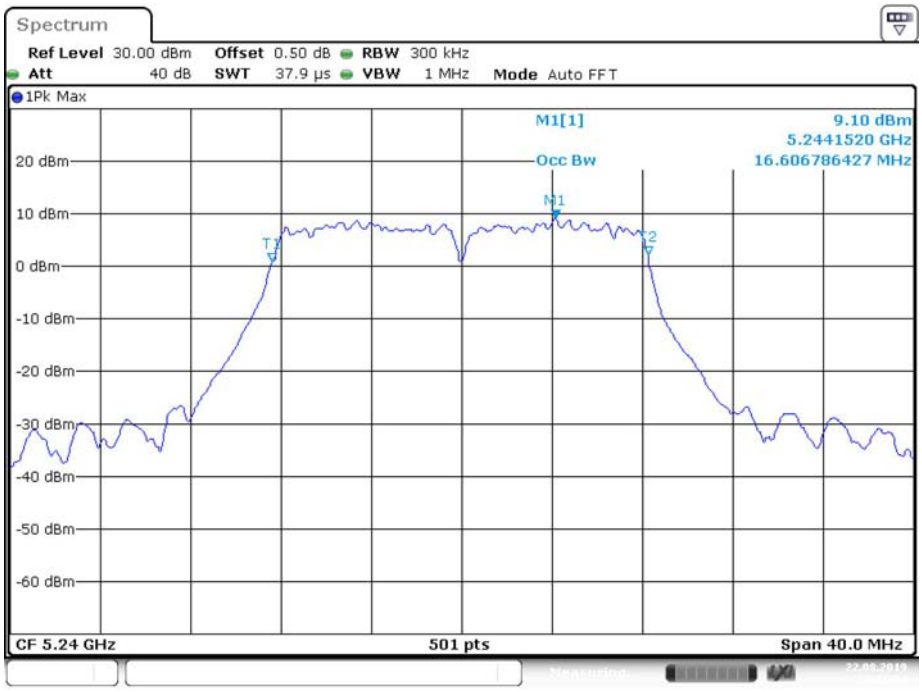
Date: 22.AUG.2019 13:08:25

802.11a Middle Channel



Date: 22.AUG.2019 13:15:53

802.11a High Channel



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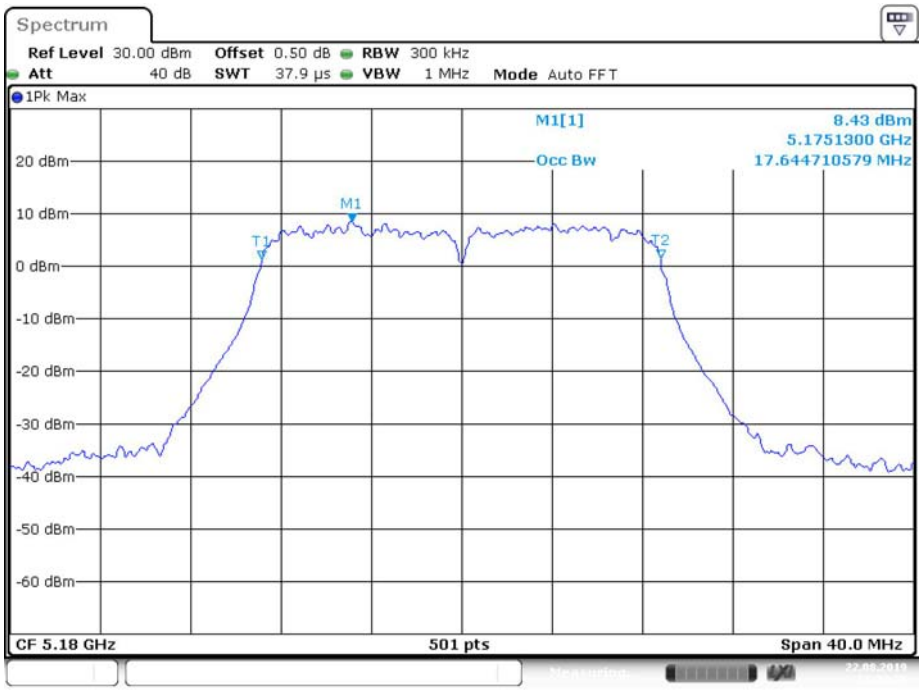
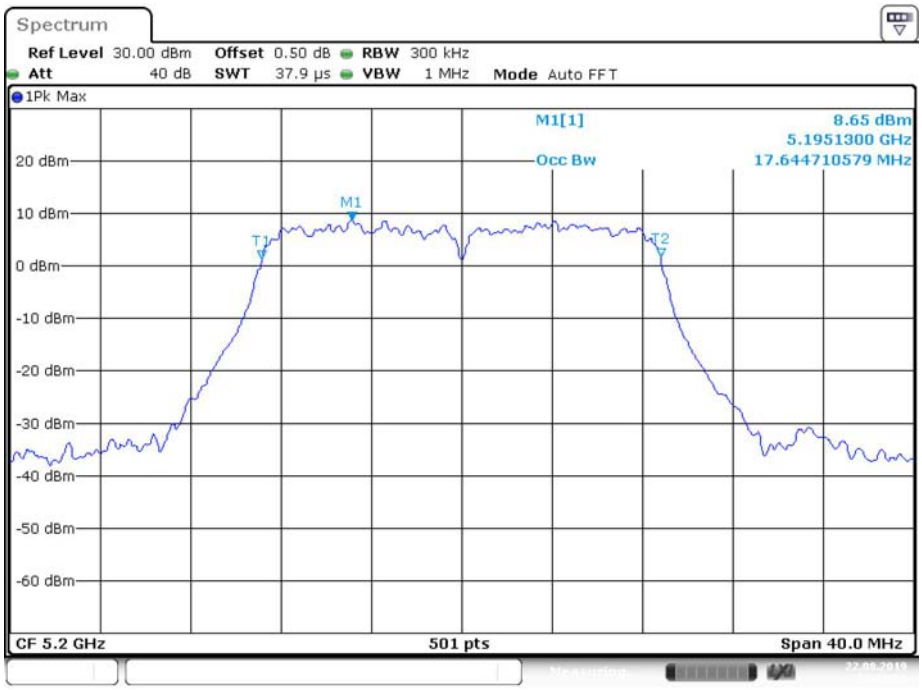
802.11n ht20 Low Channel



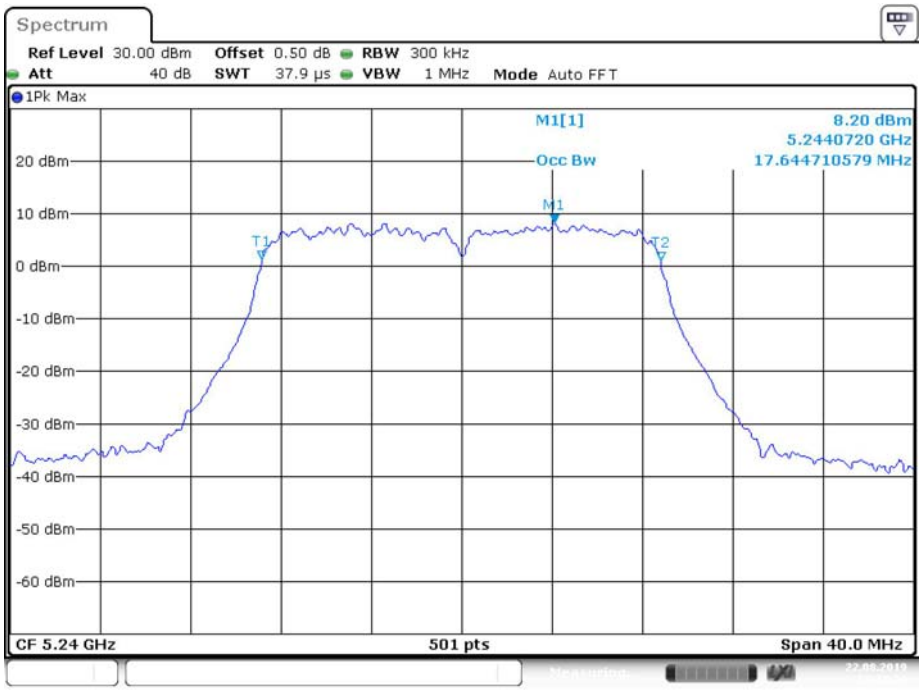
Date: 22.AUG.2019 13:20:25

802.11n ht20 Middle Channel



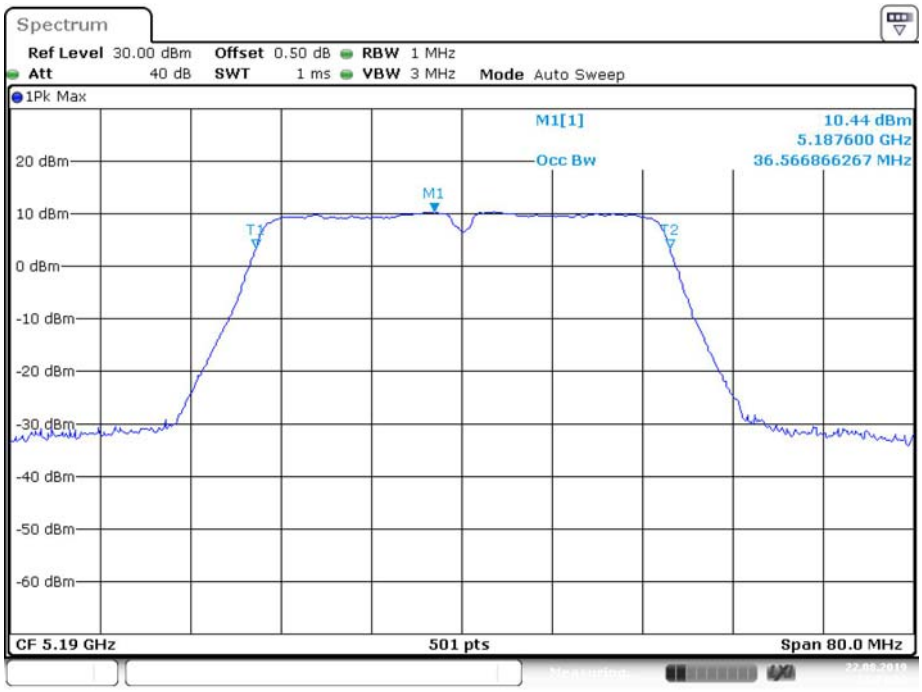
Date: 22.AUG.2019 13:19:08

802.11n ht20 High Channel



Date: 22.AUG.2019 13:18:23

802.11n ht40 Low Channel



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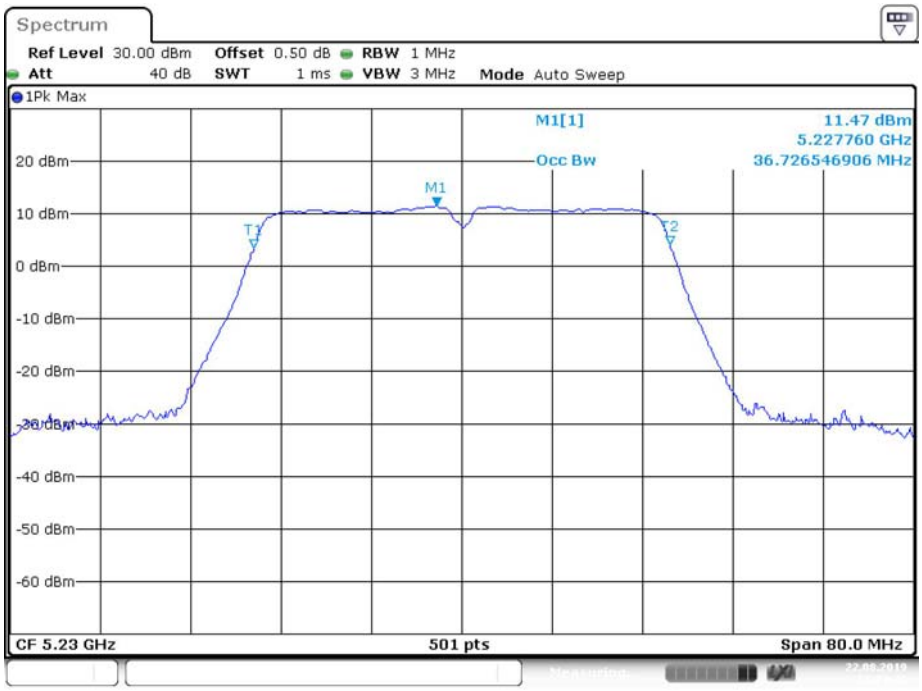
802.11n ht40 High Channel



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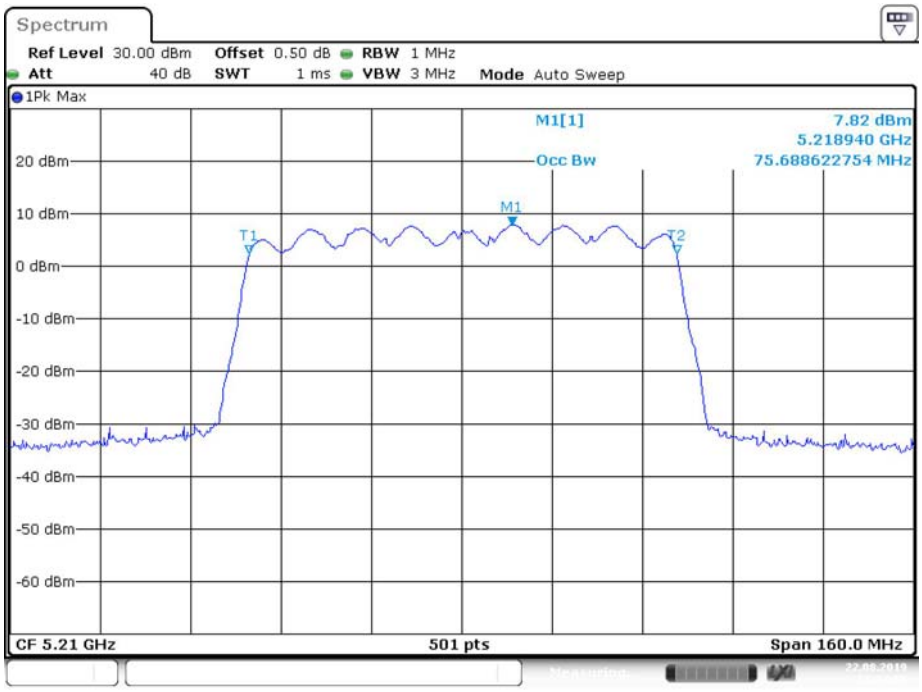
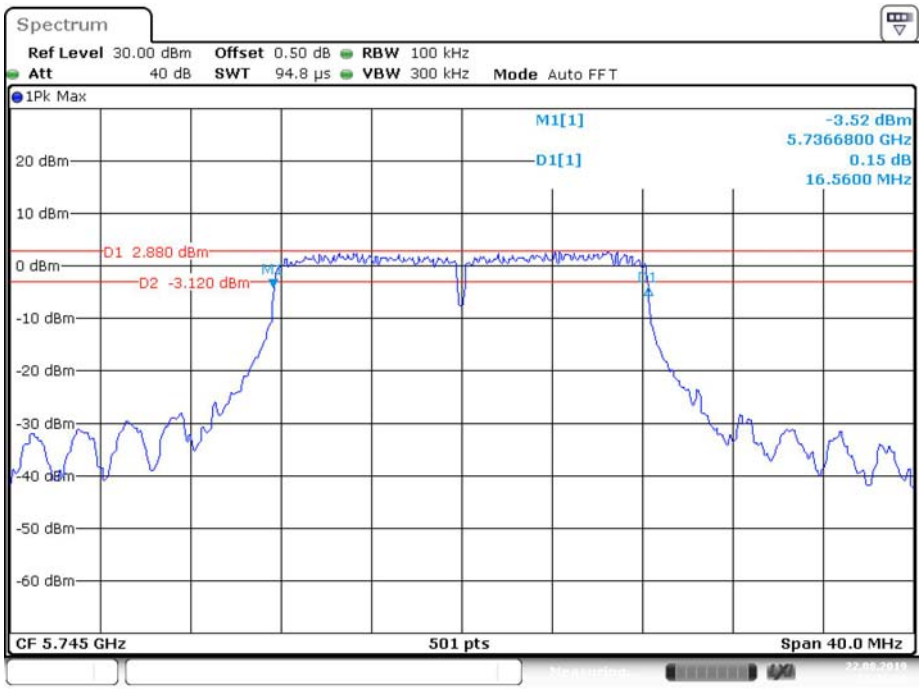
802.11ac vht80 Middle Channel



Date: 22.AUG.2019 13:24:55

5725-5850 MHz band:
6dB Emission Bandwidth:

802.11a Low Channel



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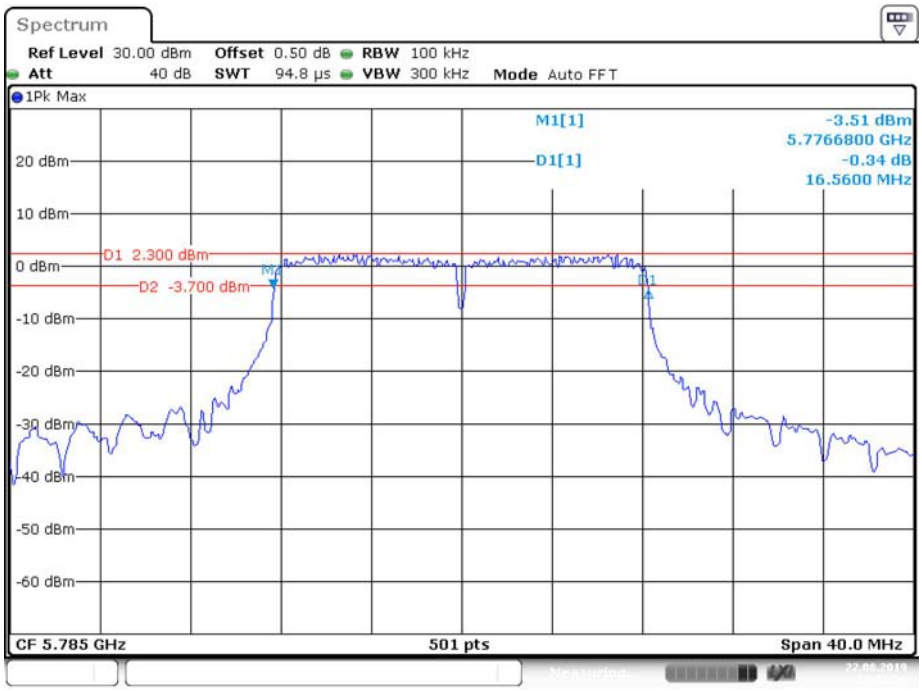

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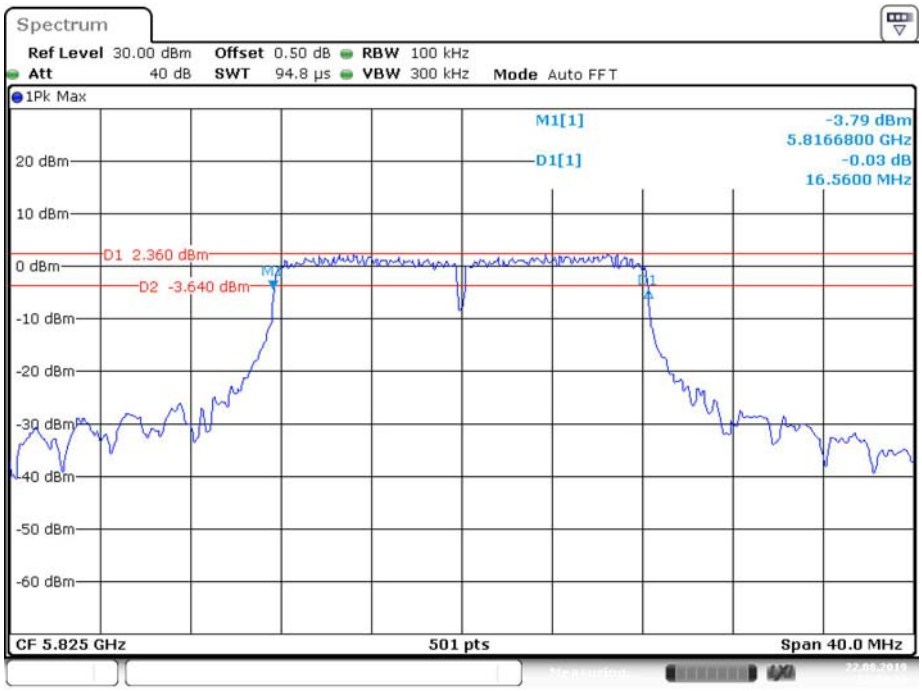
802.11a High Channel



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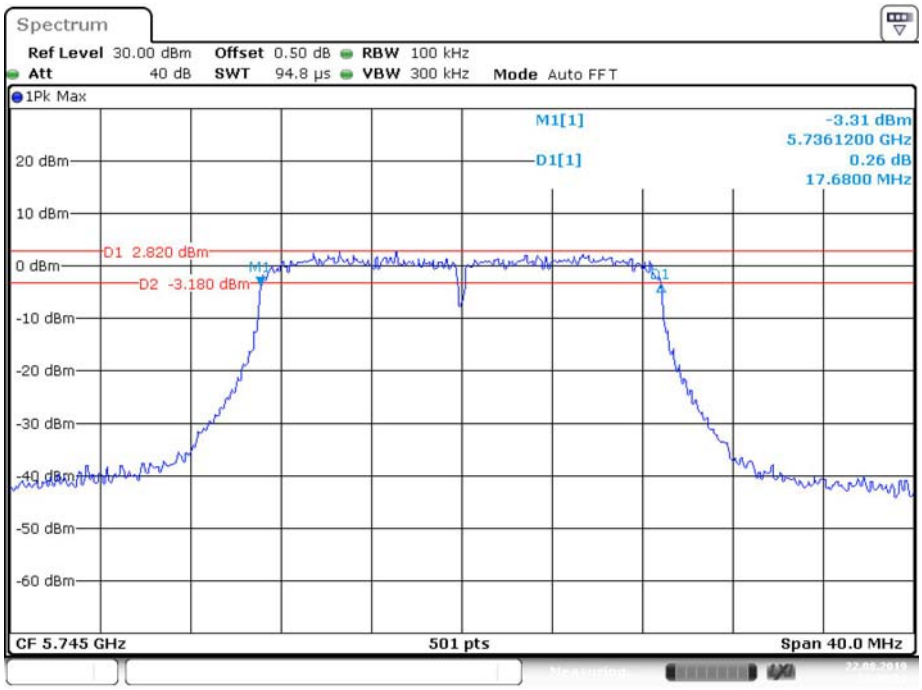

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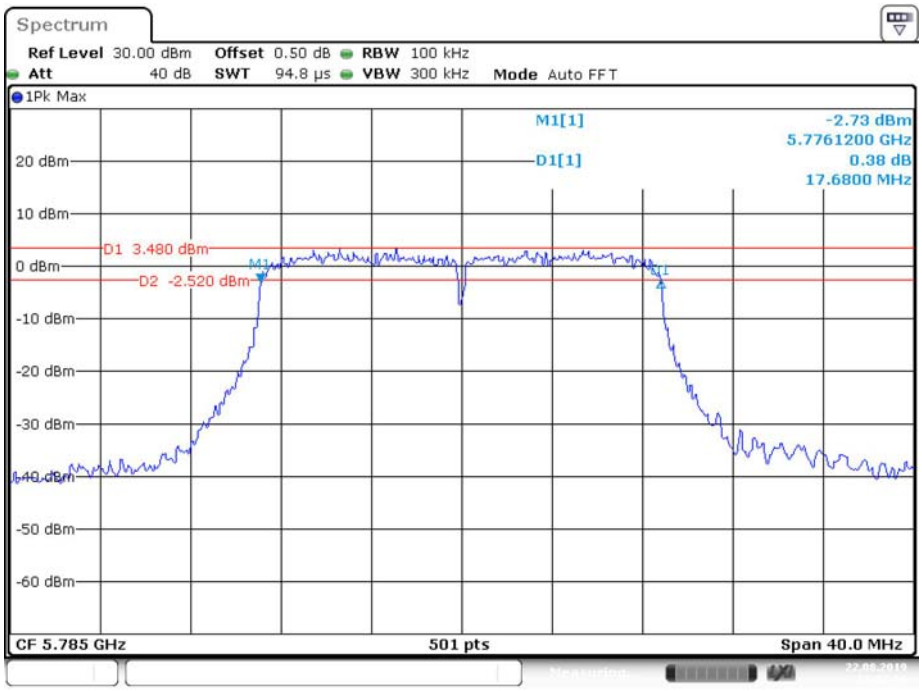

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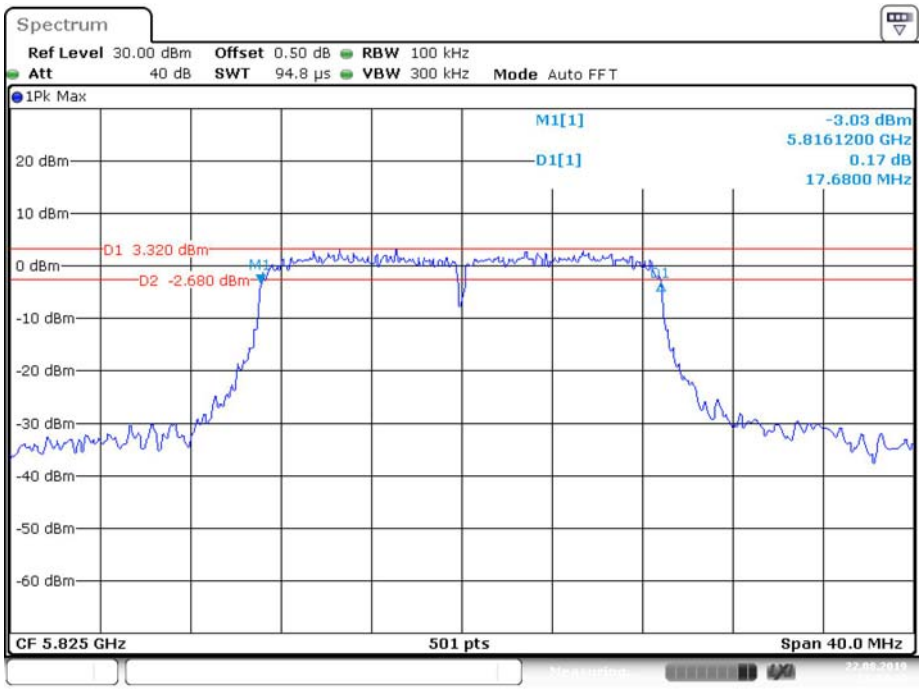

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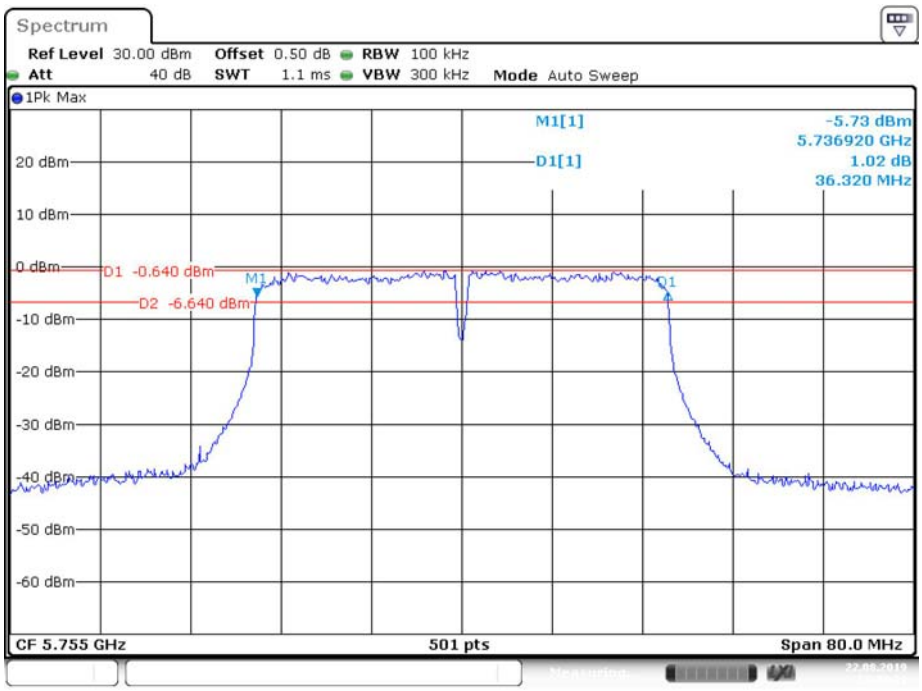
802.11n ht40 Low Channel



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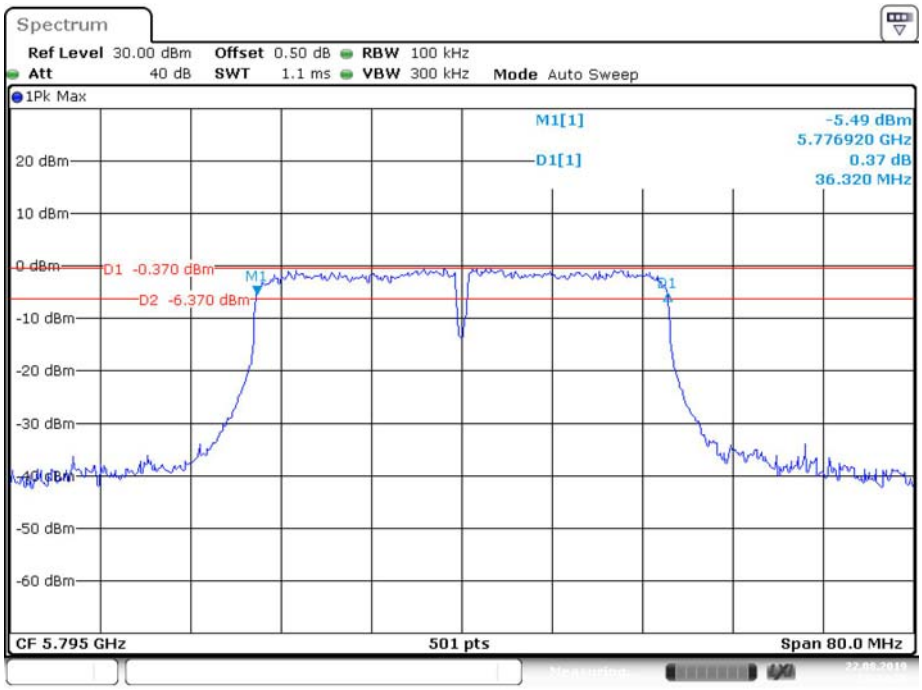
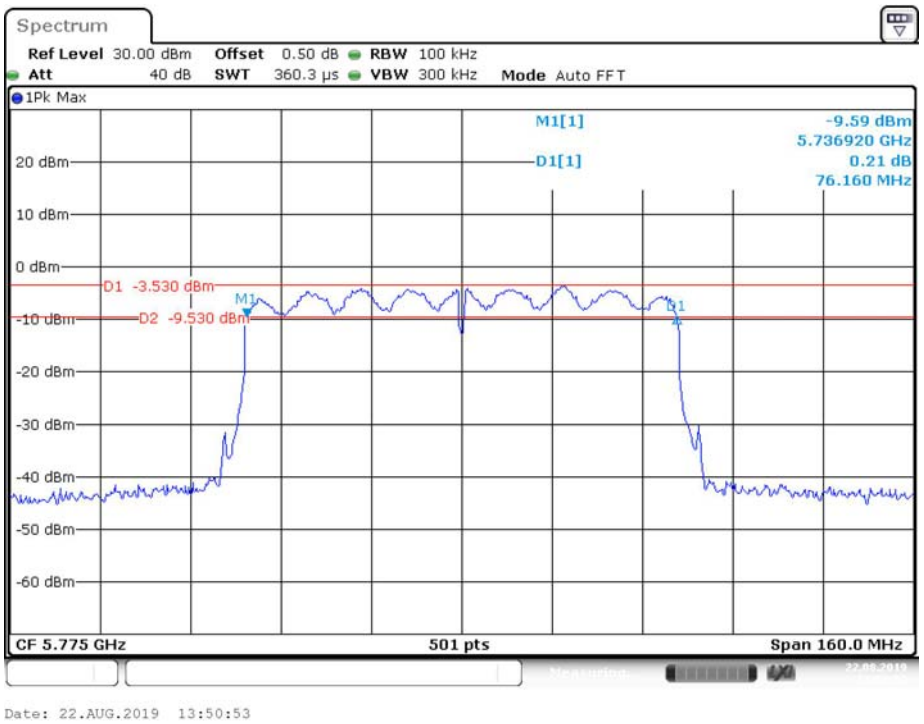
802.11n ht40 High Channel



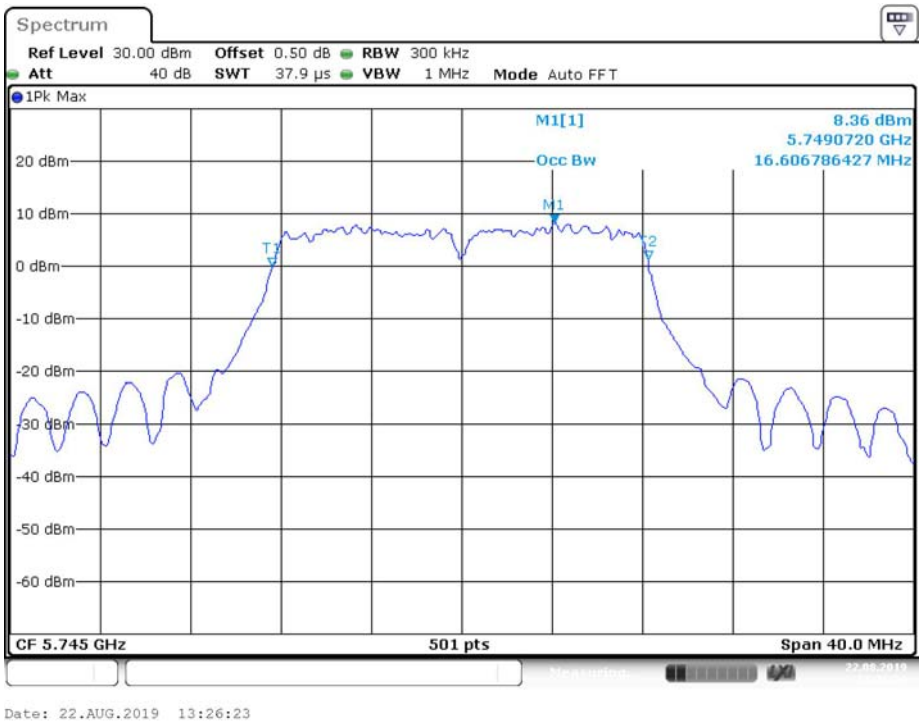
Date: 22.AUG.2019 13:43:25

802.11ac vht80 Middle Channel

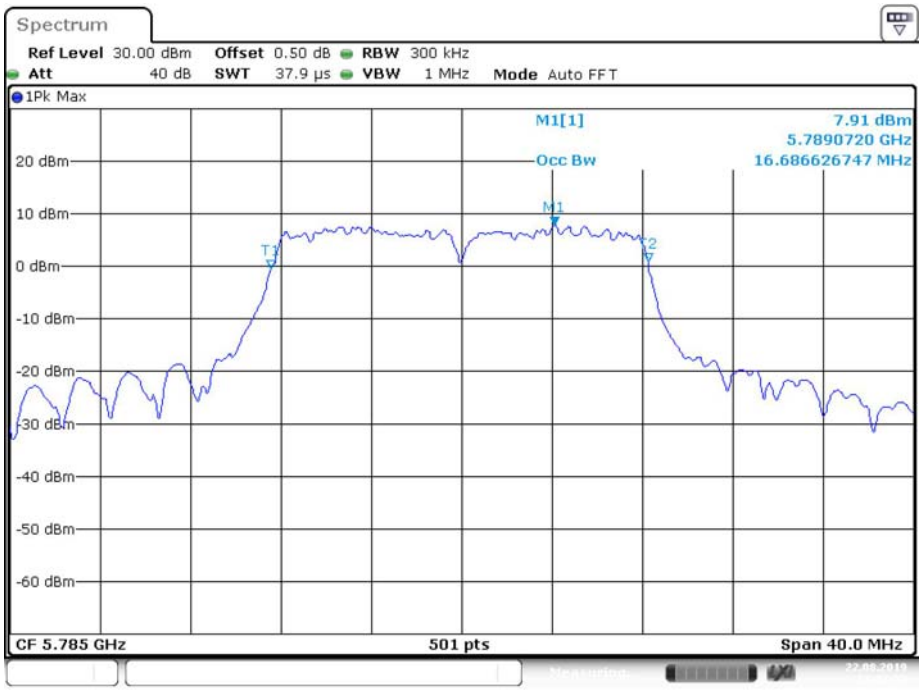


99% Occupied Bandwidth:

802.11a Low Channel



802.11a Middle Channel



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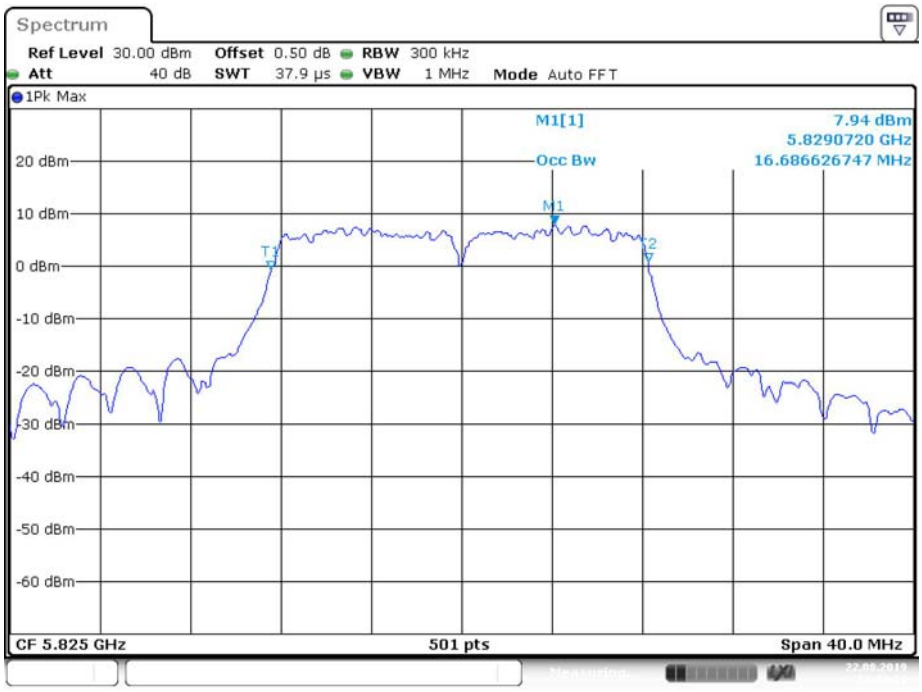

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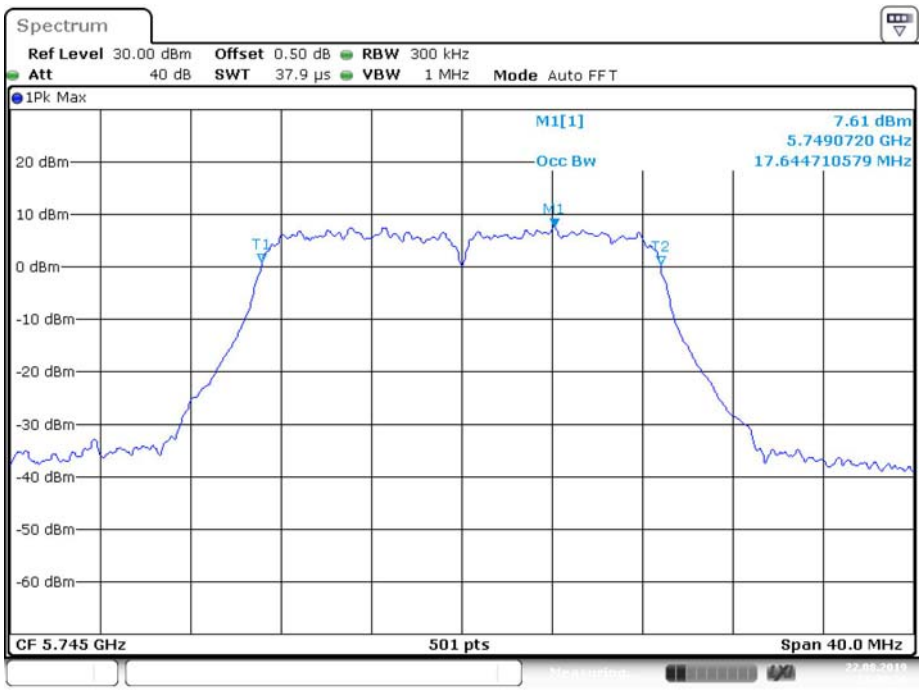

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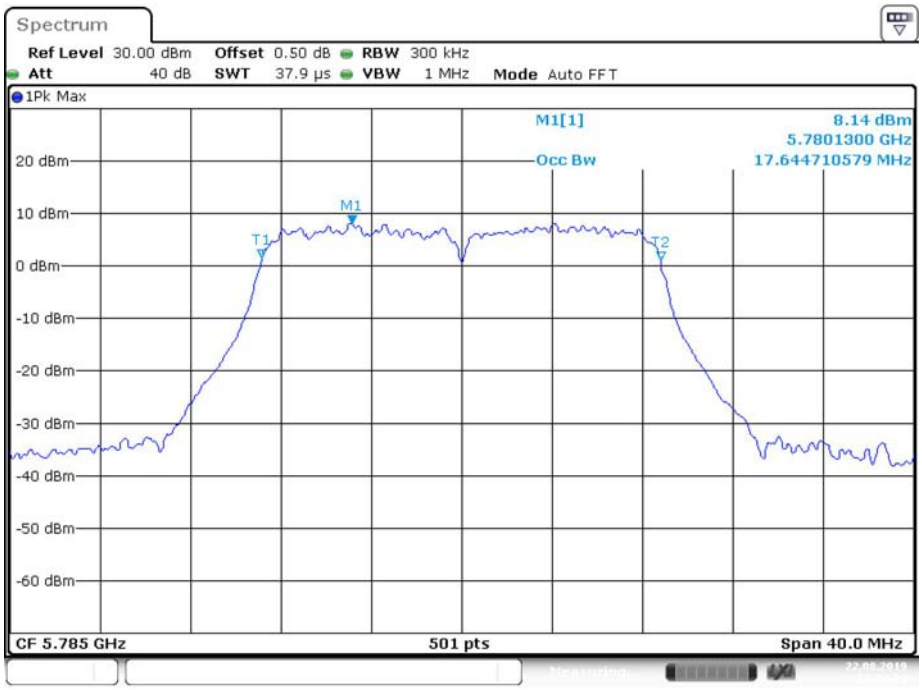

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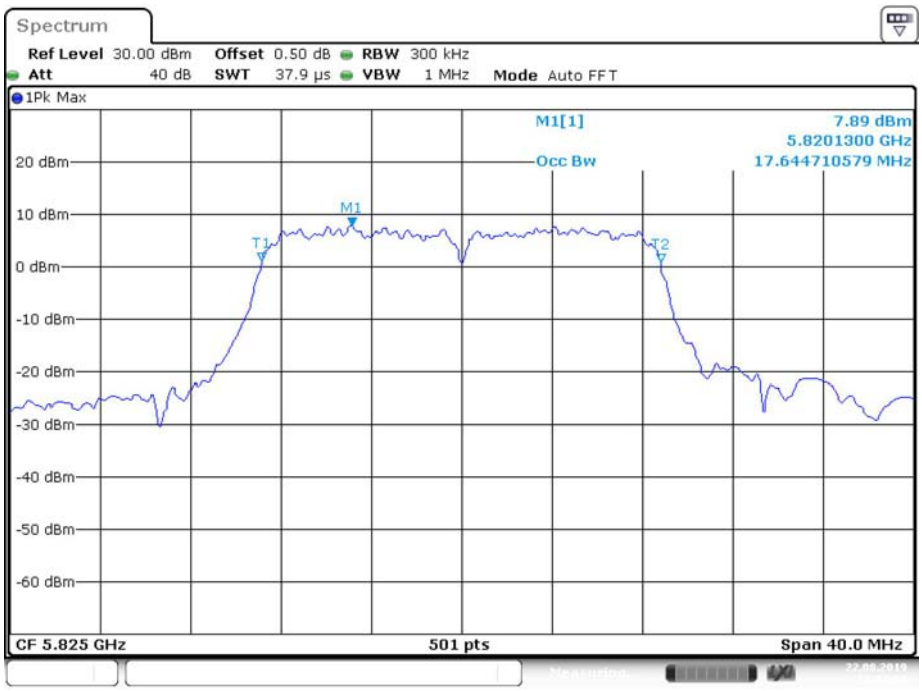

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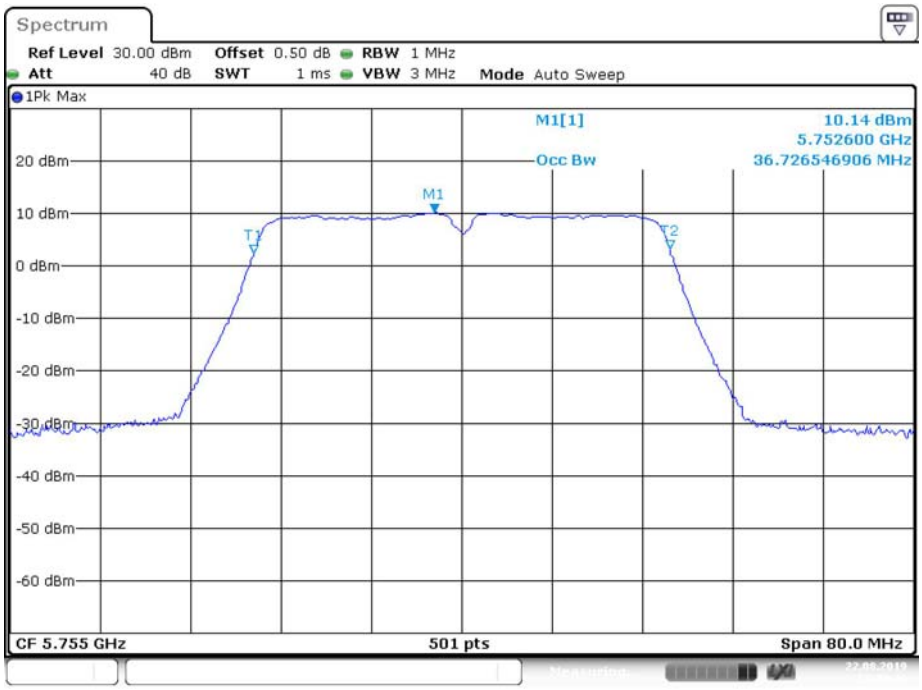

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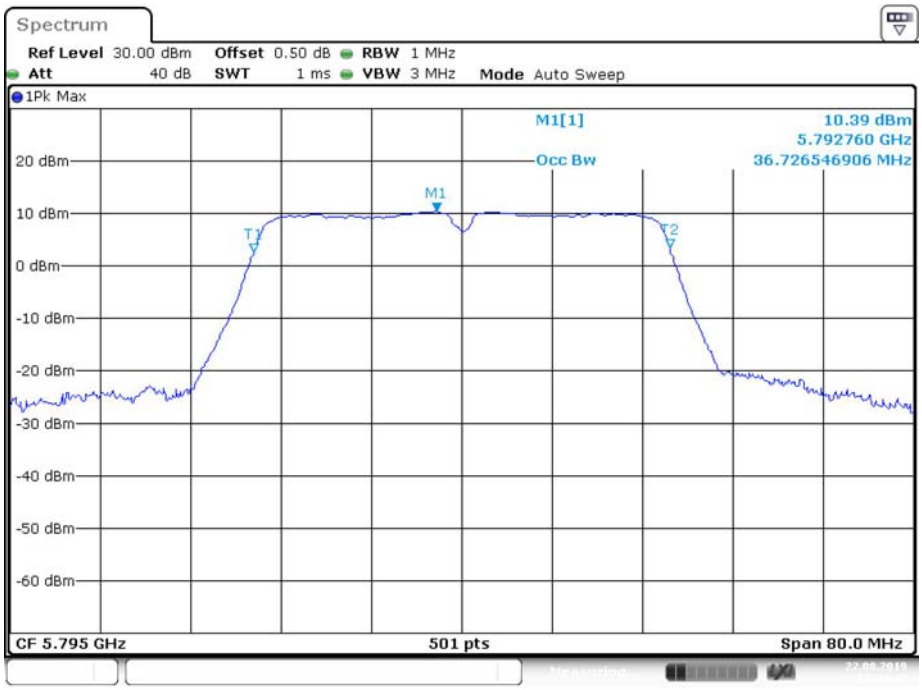
802.11n ht40 High Channel



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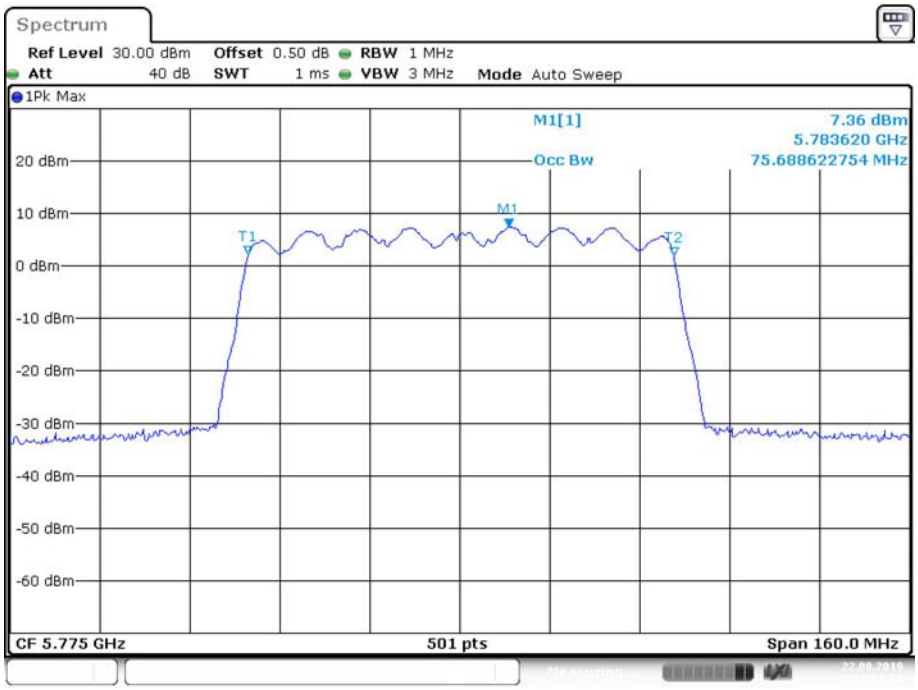
802.11ac vht80 Middle Channel



Date: 22.AUG.2019 13:51:11

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
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	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:	26.5 °C
Relative Humidity:	71 %
ATM Pressure:	100.5 kPa
Tester:	Lily Xie
Test Date:	2019-08-22

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	17.65	17.77	/	30
		5200	17.88	17.82	/	30
		5240	17.94	17.88	/	30
	802.11n ht20	5180	16.52	16.86	19.7	30
		5200	16.43	16.51	19.48	30
		5240	16.86	16.77	19.83	30
	802.11n ht 40	5190	16.23	16.96	19.62	30
		5230	16.63	16.83	19.74	30
	802.11ac vht80	5210	15.39	15.61	18.51	30
5725 - 5850 MHz	802.11 a	5745	17.66	17.88	/	30
		5785	17.81	17.95	/	30
		5825	17.86	17.32	/	30
	802.11n ht20	5745	16.96	16.85	19.92	30
		5785	16.96	16.34	19.67	30
		5825	16.86	16.67	19.78	30
	802.11n ht 40	5755	16.68	16.25	19.48	30
		5795	16.81	16.32	19.58	30
	802.11ac vht80	5775	15.53	15.61	18.58	30

Note:
The device is an indoor master device.
The maximum antenna gain is 2.0dBi 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 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 = 2.0dBi

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	FSV40	101474	2019-01-09	2020-01-09
Unknown	Coaxial Cable	C-SJ00-0010	C0010/06	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:	26.5 °C
Relative Humidity:	71 %
ATM Pressure:	100.5 kPa
Tester:	Lily Xie
Test Date:	2019-08-22

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	
802.11 a	5180	10.12	9.06	/	17
	5200	10.30	9.32	/	17
	5240	10.14	9.64	/	17
802.11n ht20	5180	8.42	8.97	11.71	17
	5200	10.45	9.26	12.91	17
	5240	9.81	8.77	12.33	17
802.11n ht 40	5190	6.23	6.56	9.41	17
	5230	7.39	4.65	9.24	17
802.11ac vht80	5210	4.07	3.07	6.61	17

5725-5850MHz

Mode	Frequency (MHz)	Reading (dBm/300kHz)		Result (dBm/500kHz)			Limit (dBm/500kHz)
		Chain 0	Chain 1	Chain 0	Chain 1	Total	
802.11 a	5745	7.74	7.35	9.96	9.57	/	30
	5785	7.66	7.63	9.88	9.85	/	30
	5825	7.24	6.92	9.46	9.14	/	30
802.11n ht20	5745	7.12	6.14	9.34	8.36	11.89	30
	5785	8.05	7.63	10.27	9.85	13.08	30
	5825	7.82	6.02	10.04	8.24	12.24	30
802.11n ht 40	5755	2.37	3.53	4.59	5.75	8.22	30
	5795	2.86	3.34	5.08	5.56	8.34	30
802.11ac vht80	5775	1.41	0.33	3.63	2.55	6.13	30

Note:
The device is an indoor master device.
The maximum antenna gain is 2.0 dBi 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:

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

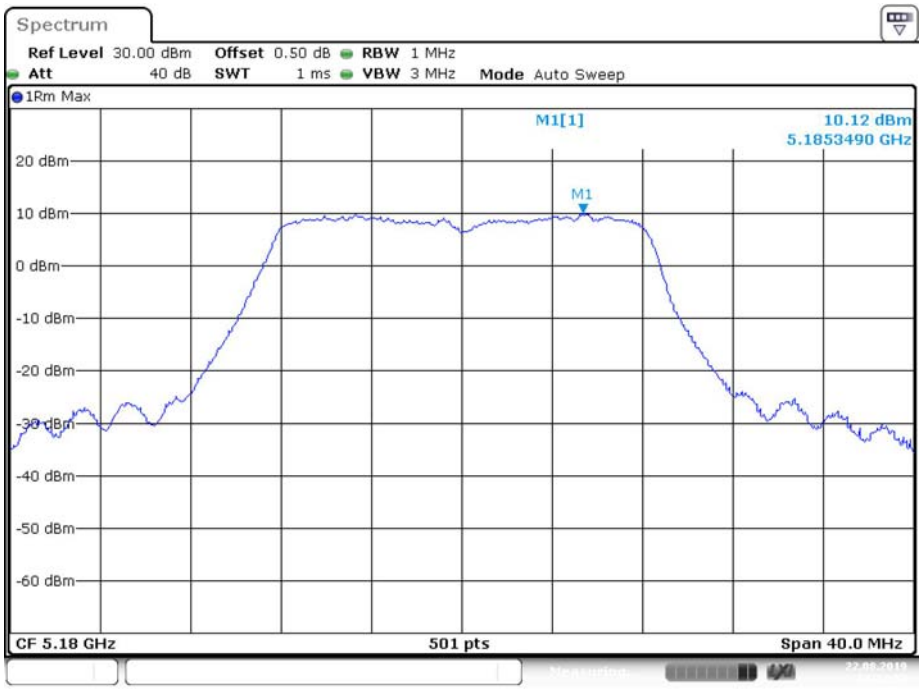
So:

$$\text{Directional gain} = G_{ANT} + \text{Array Gain} = 2.0\text{dBi}+10*\log(2/1)=5\text{dBi}$$

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.

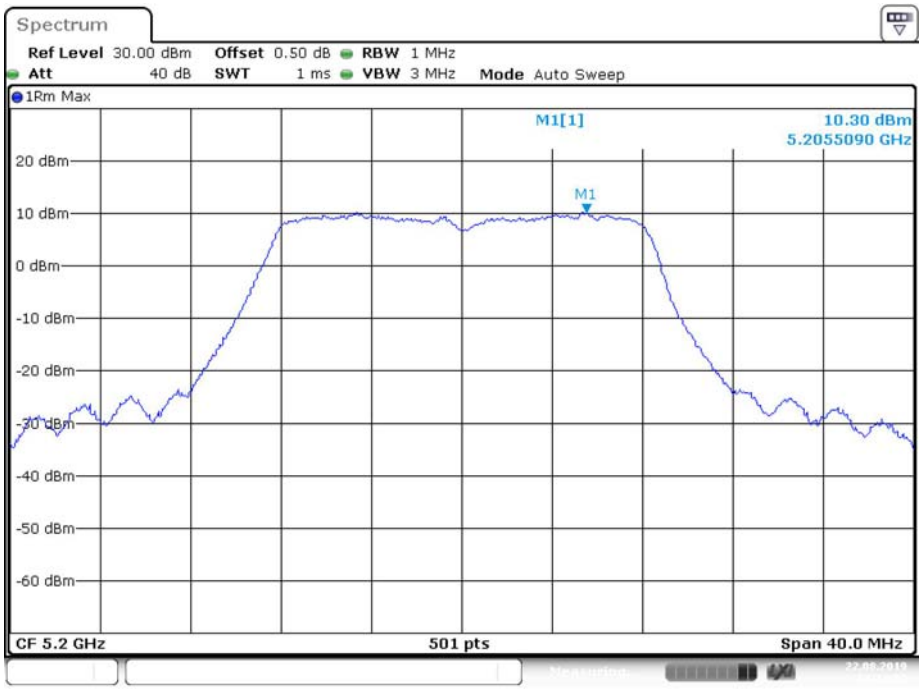
5150-5250 MHz
Chain 0:

802.11a Low Channel



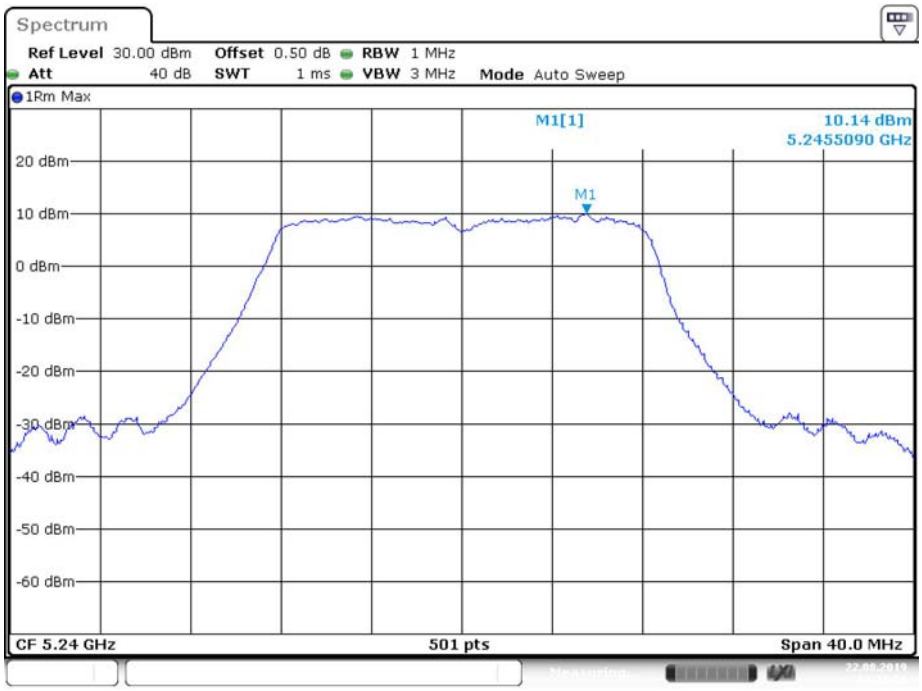
Date: 22.AUG.2019 14:12:07

802.11a Middle Channel



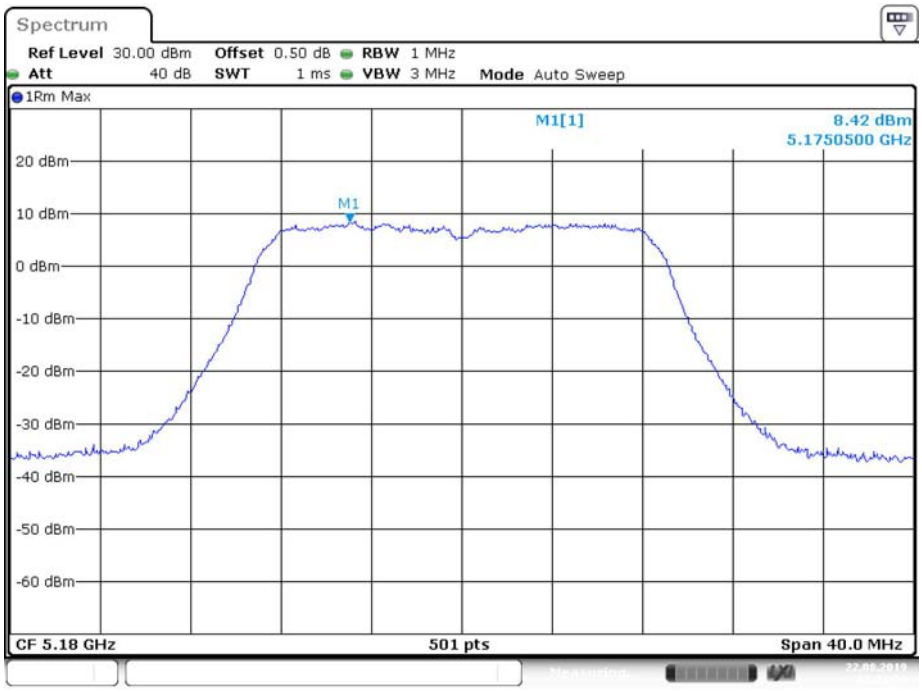
Date: 22.AUG.2019 14:13:52

802.11a High Channel



Date: 22.AUG.2019 14:17:38

802.11n ht20 Low Channel



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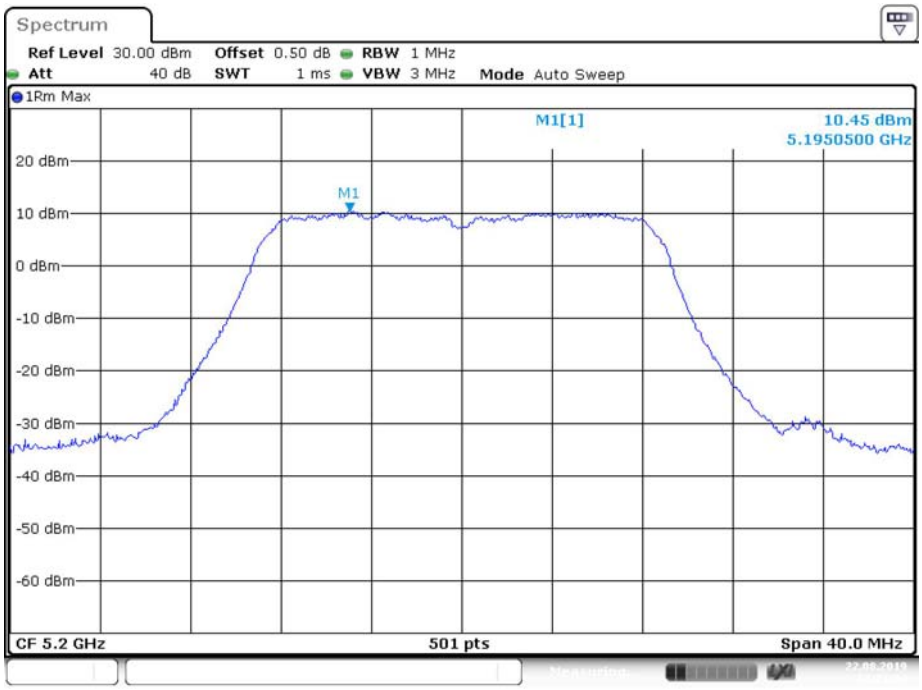
802.11n ht20 Middle Channel



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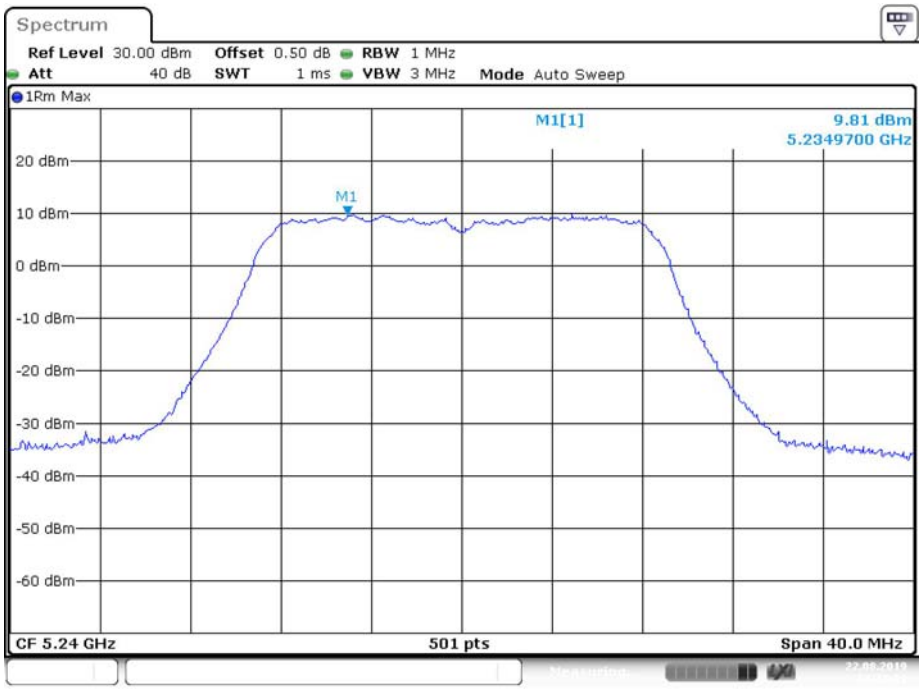
802.11n ht20 High Channel



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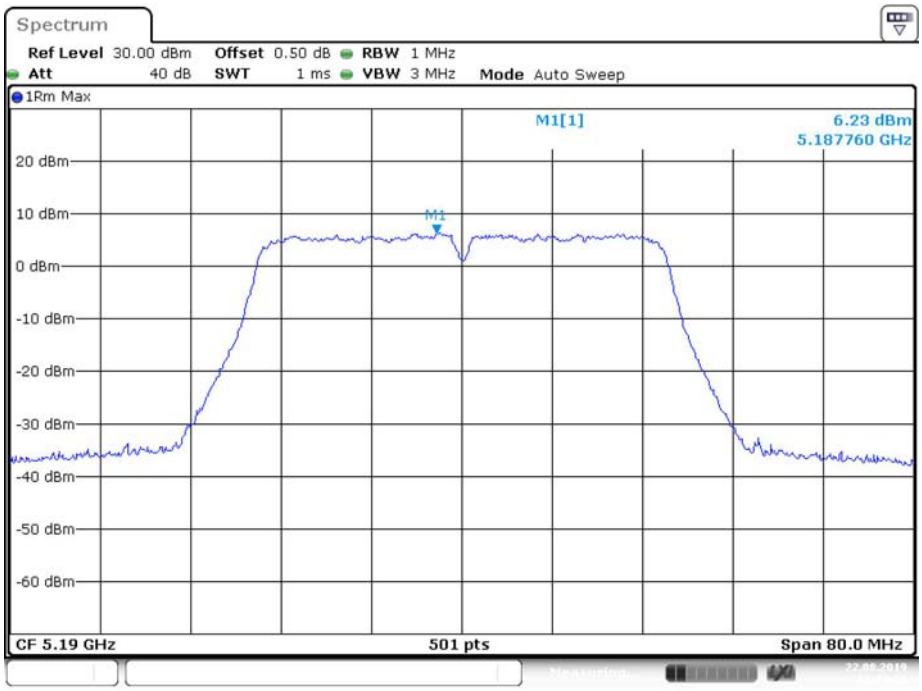
802.11n ht40 Low Channel



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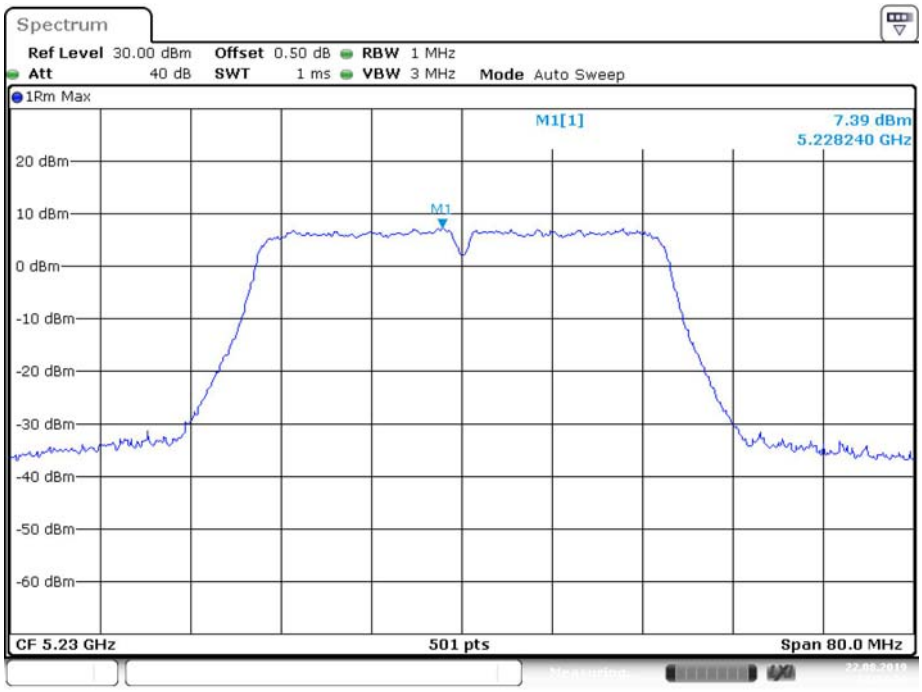
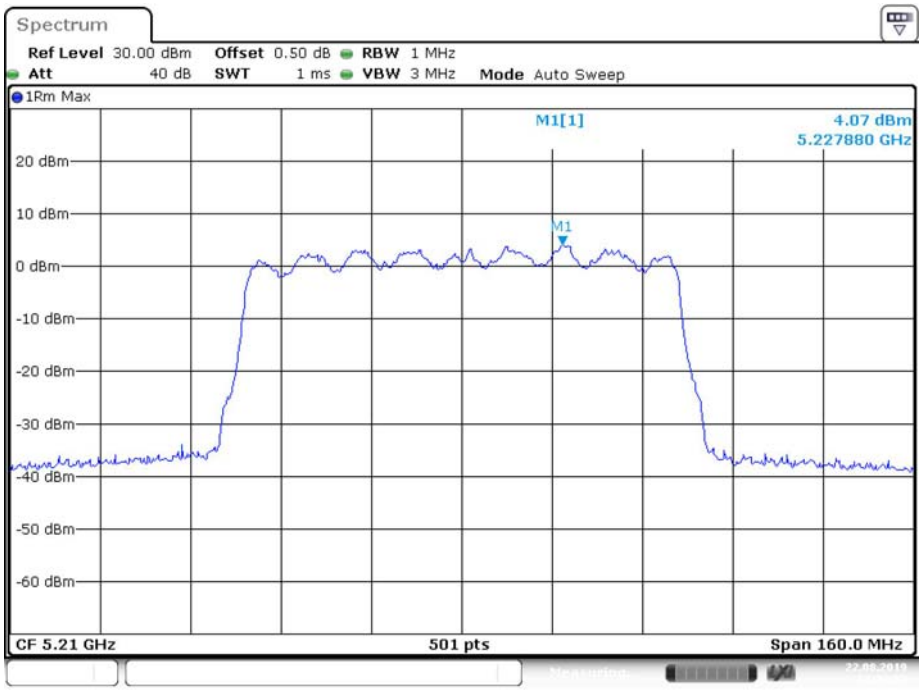
802.11n ht40 High Channel



Date: 22.AUG.2019 14:24:33

802.11ac80 Middle Channel



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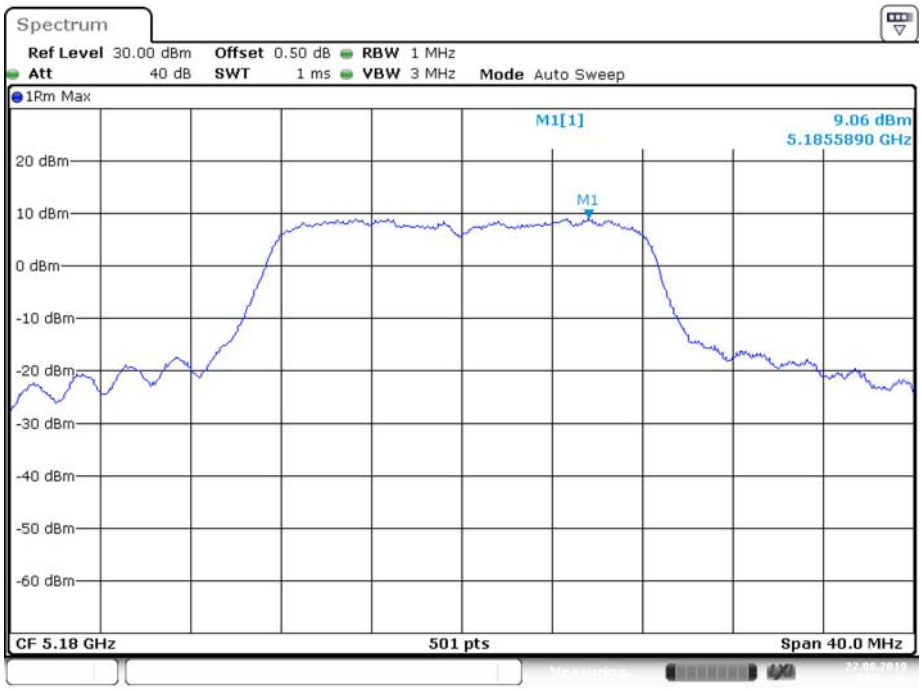
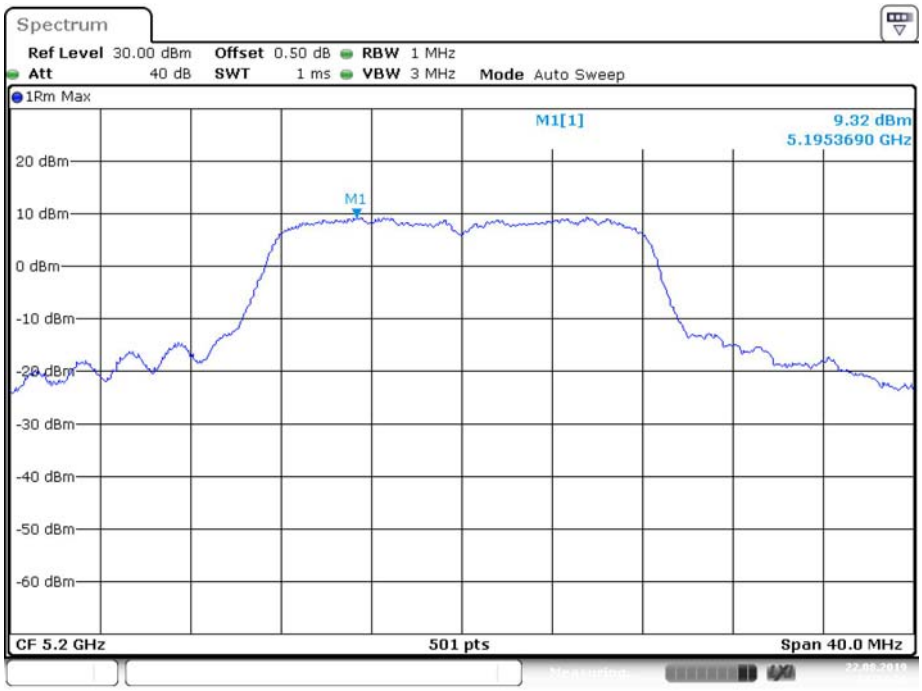
Chain 1:

802.11a Low Channel



Date: 22.AUG.2019 14:11:23

802.11a Middle Channel



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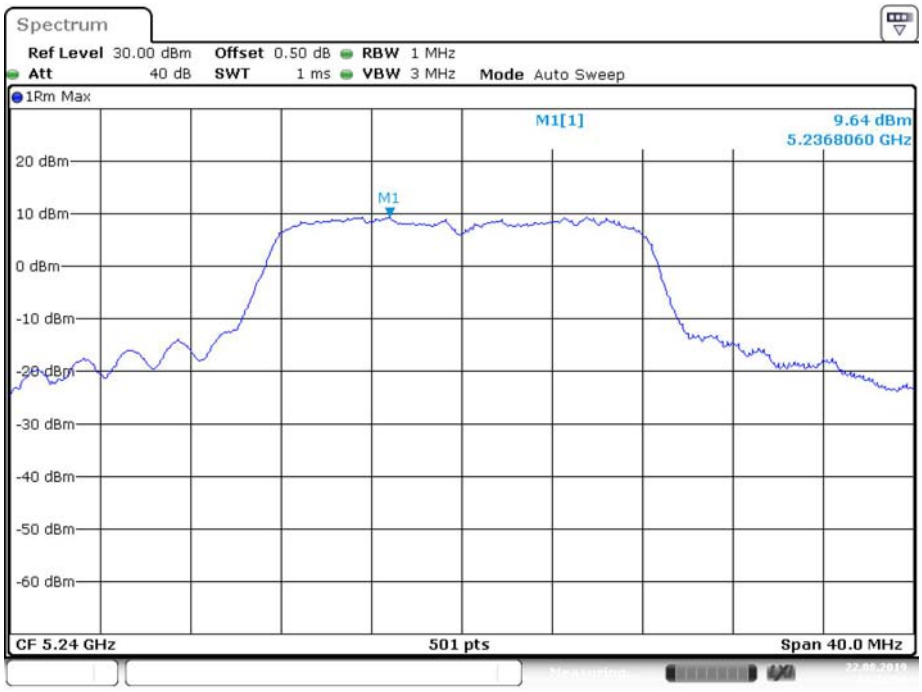
802.11a High Channel



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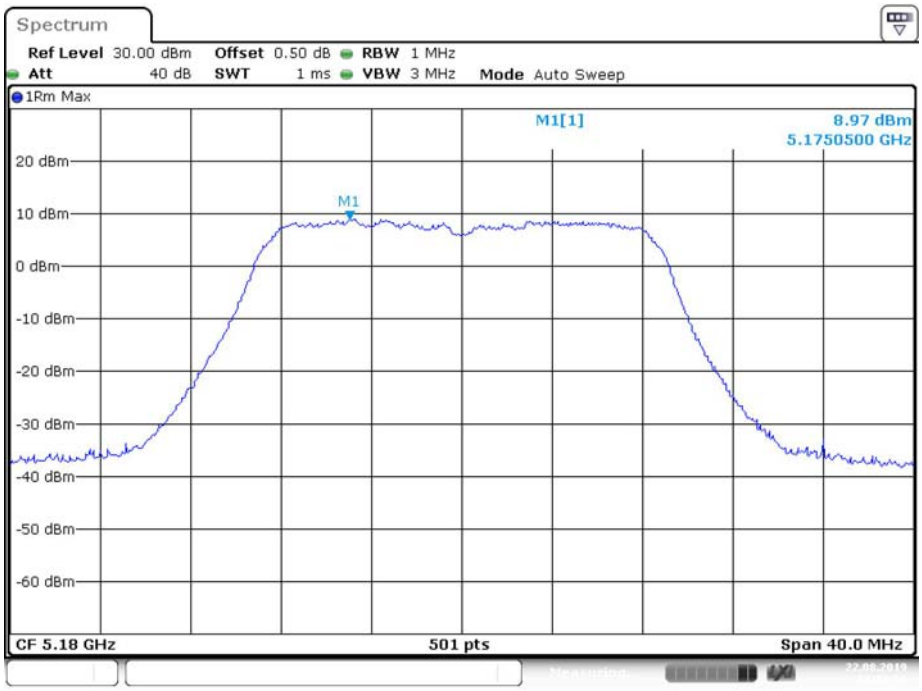
802.11n ht20 Low Channel



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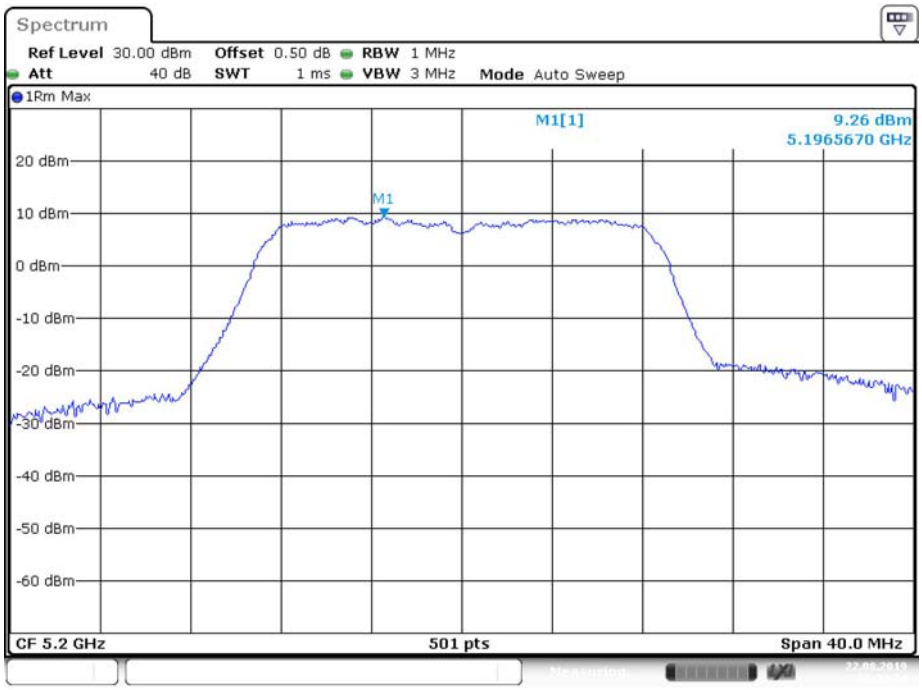
802.11n ht20 Middle Channel



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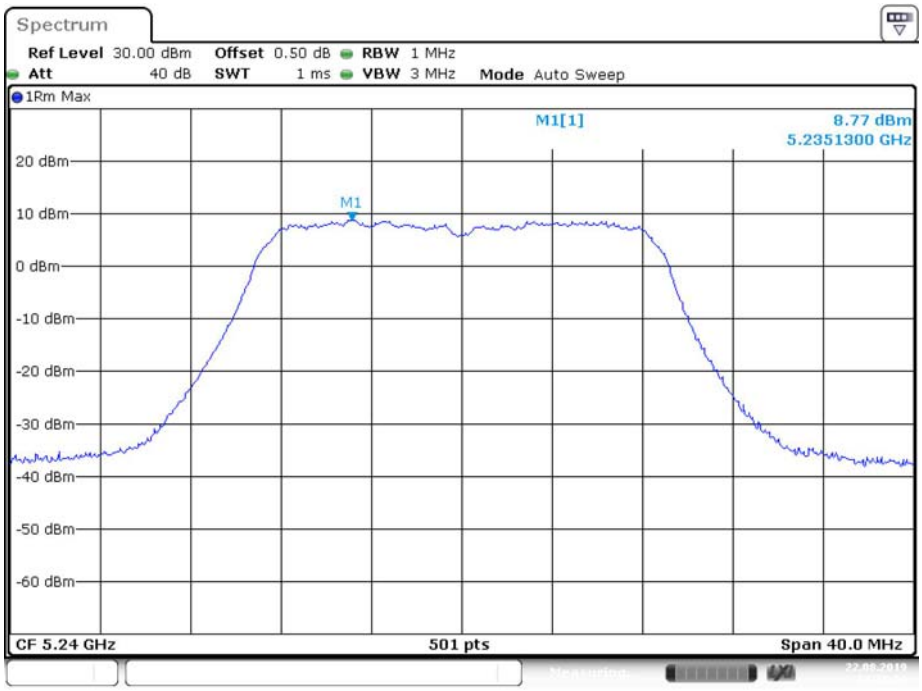
802.11n ht20 High Channel



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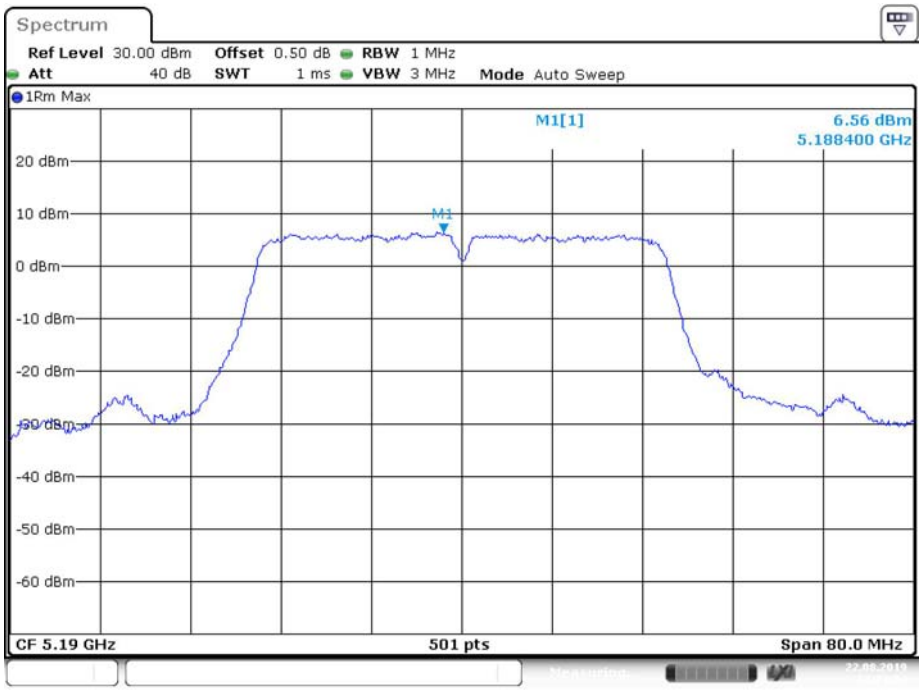
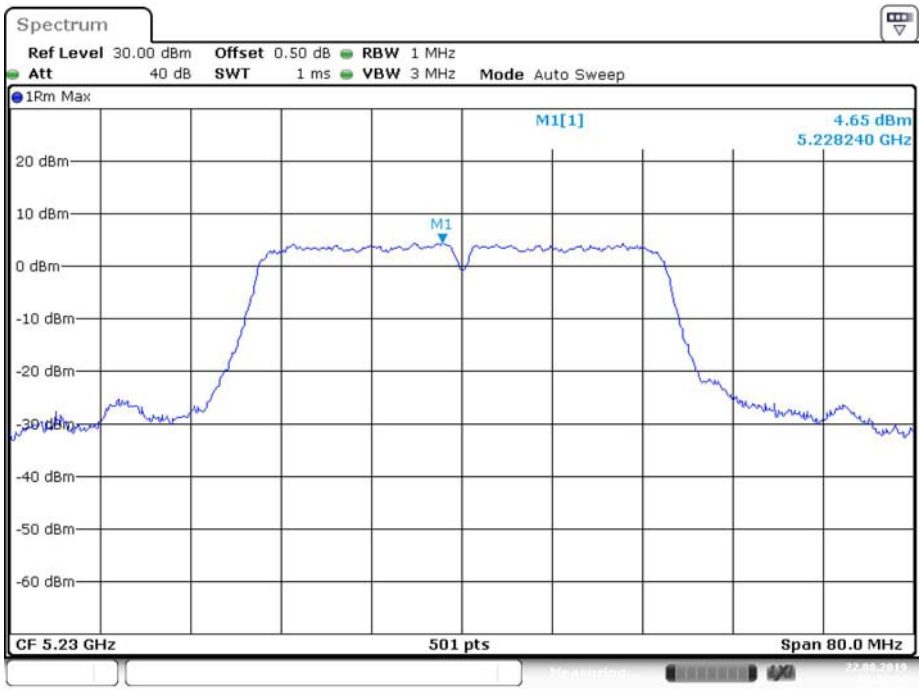
802.11n ht40 Low Channel



Date: 22.AUG.2019 14:23:04

802.11n ht40 High Channel



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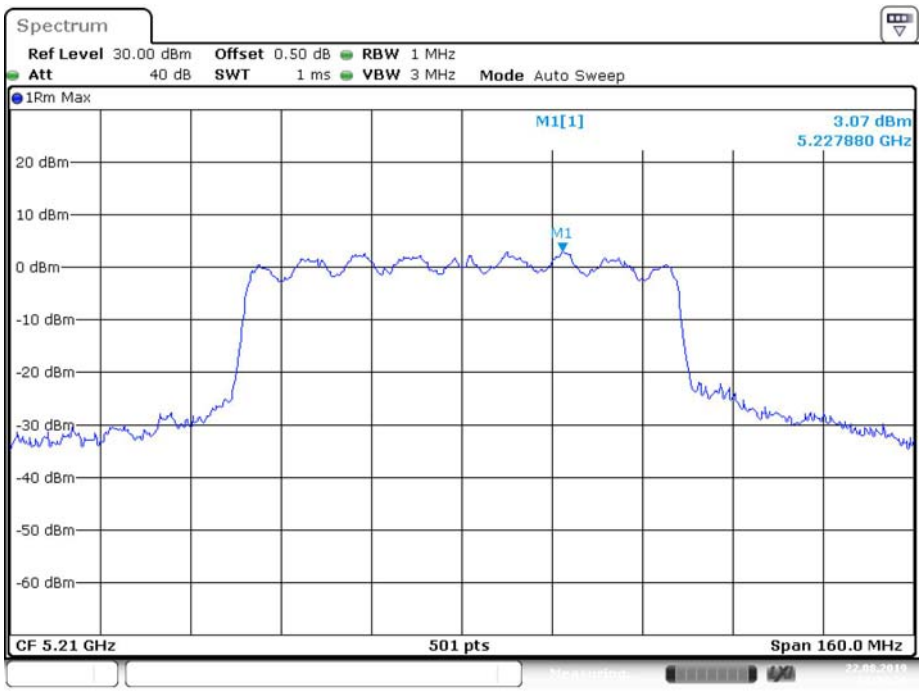
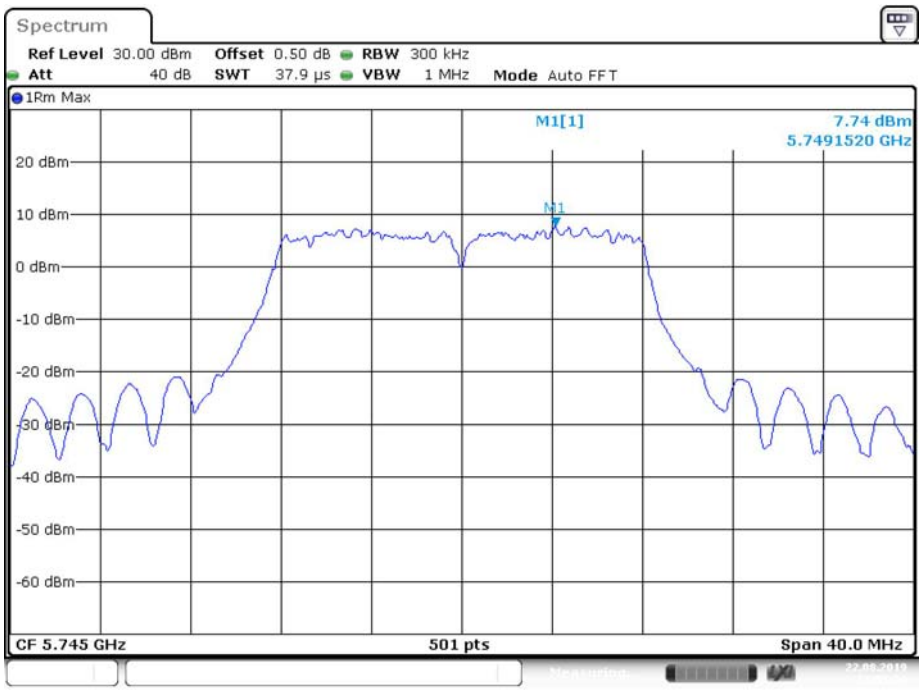
802.11ac80 Middle Channel



Date: 22.AUG.2019 14:28:26

5745-5850 MHz Band:
Chain 0:

802.11a Low Channel



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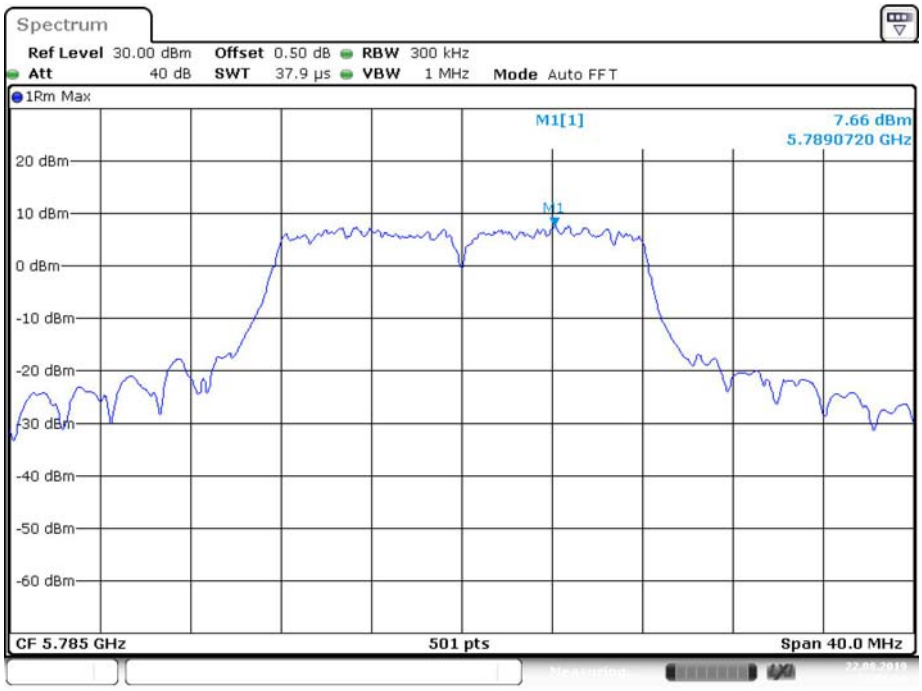
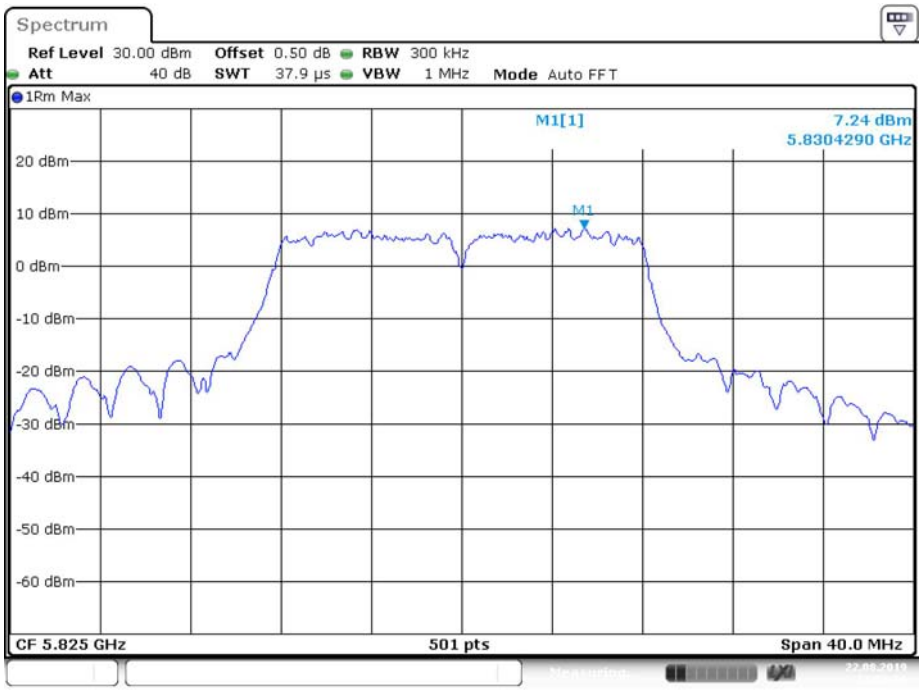
802.11a Middle Channel



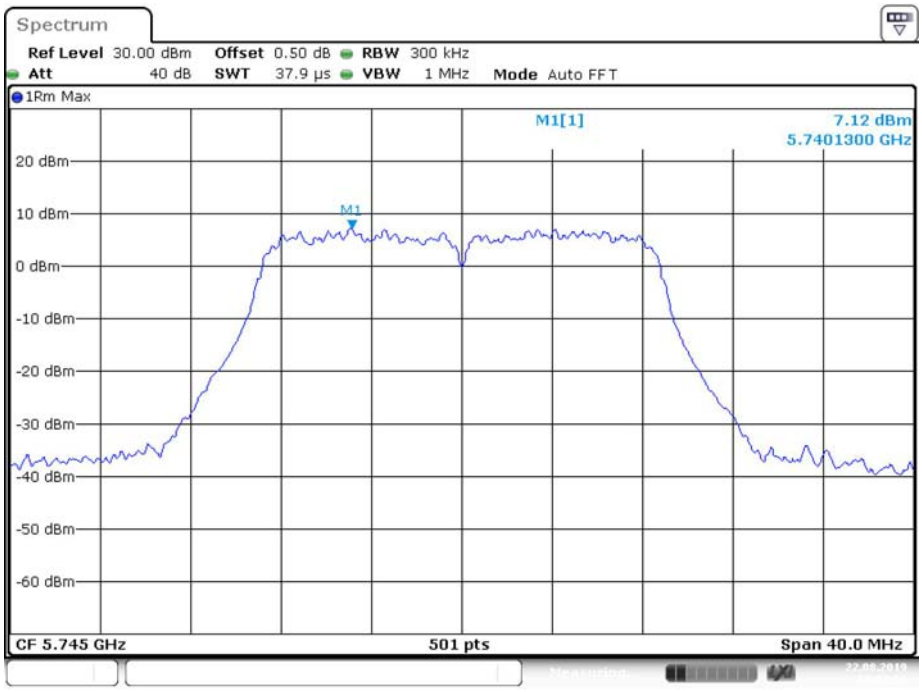
Date: 22.AUG.2019 13:56:03

802.11a High Channel



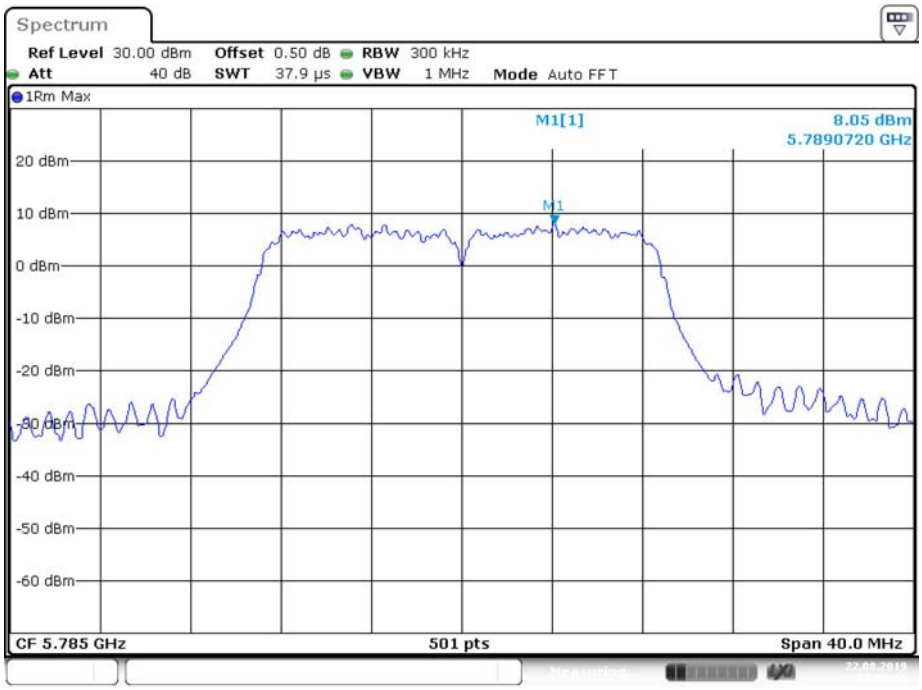
Date: 22.AUG.2019 13:58:17

802.11n ht20 Low Channel



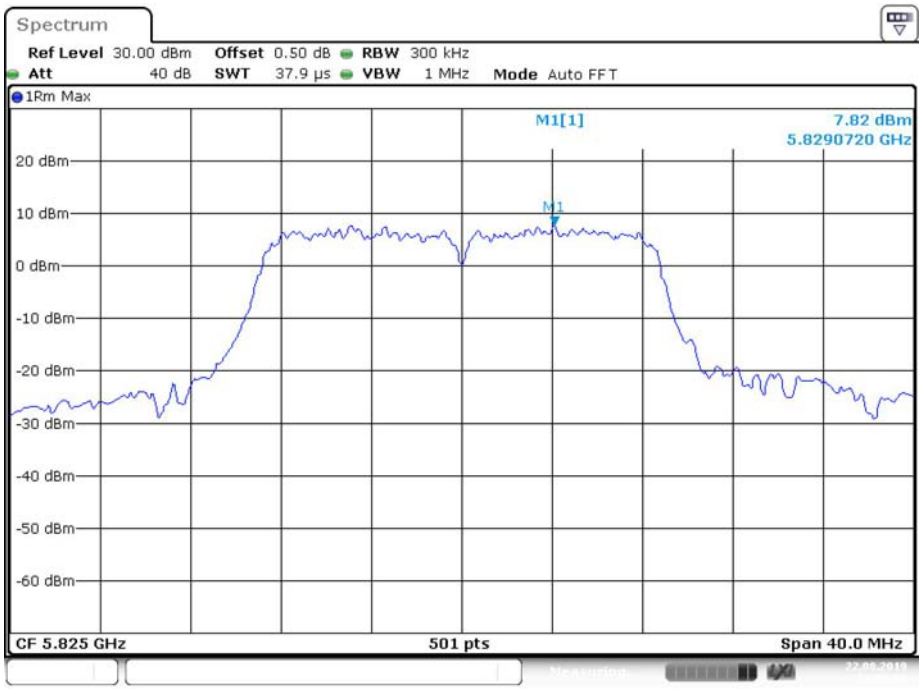
Date: 22.AUG.2019 14:02:08

802.11n ht20 Middle Channel



Date: 22.AUG.2019 14:01:09

802.11n ht20 High Channel



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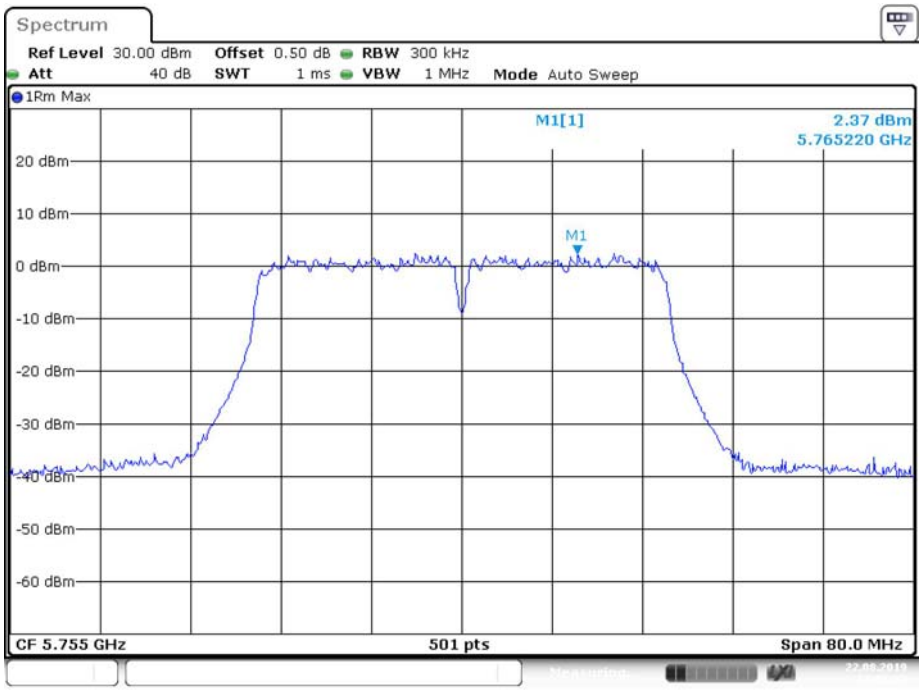
802.11n ht40 Low Channel



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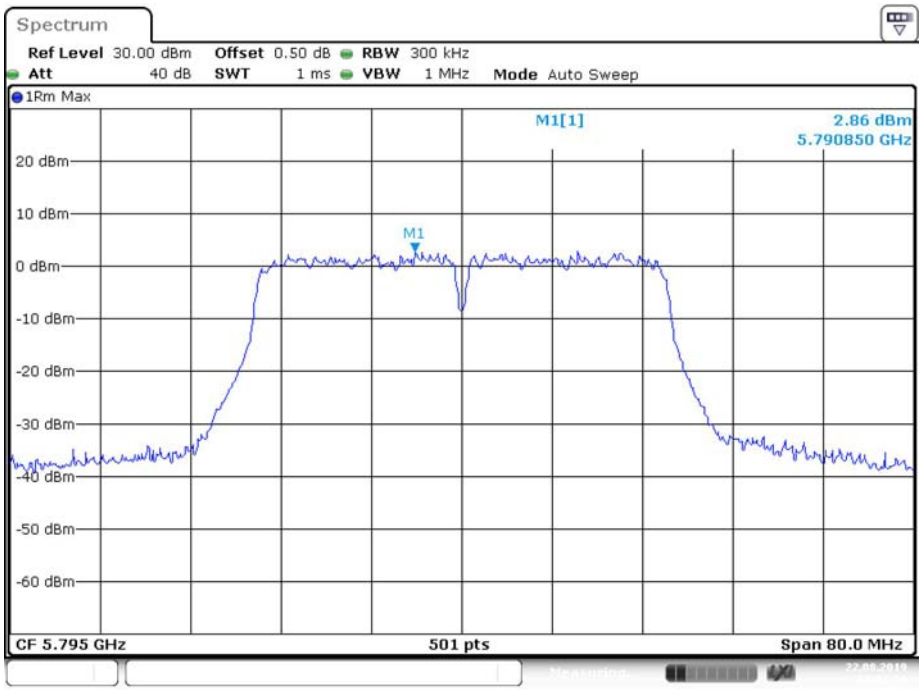
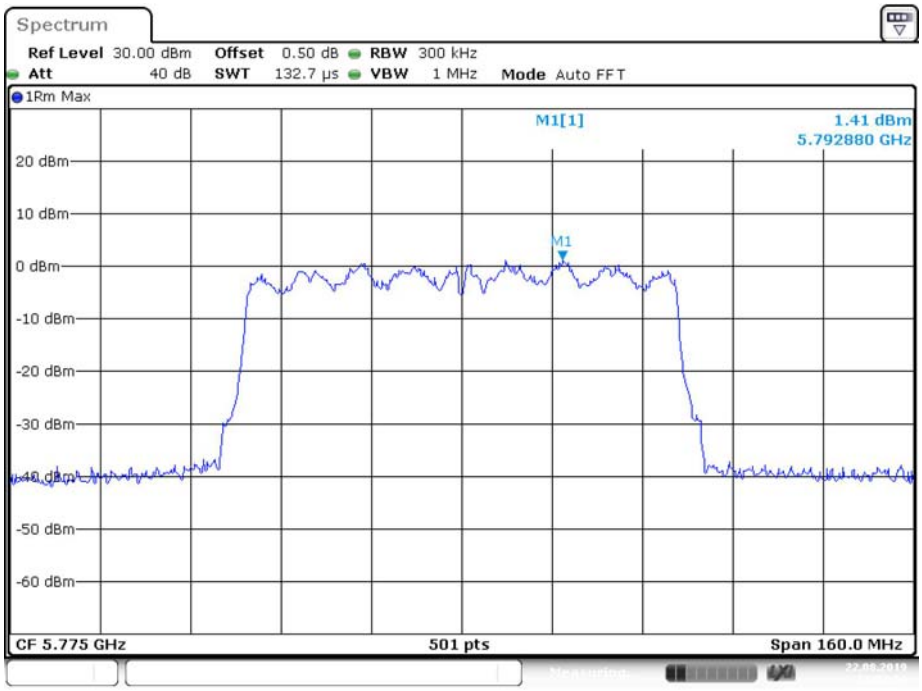
802.11n ht40 High Channel



Date: 22.AUG.2019 14:07:19

802.11 ac80 Middle Channel



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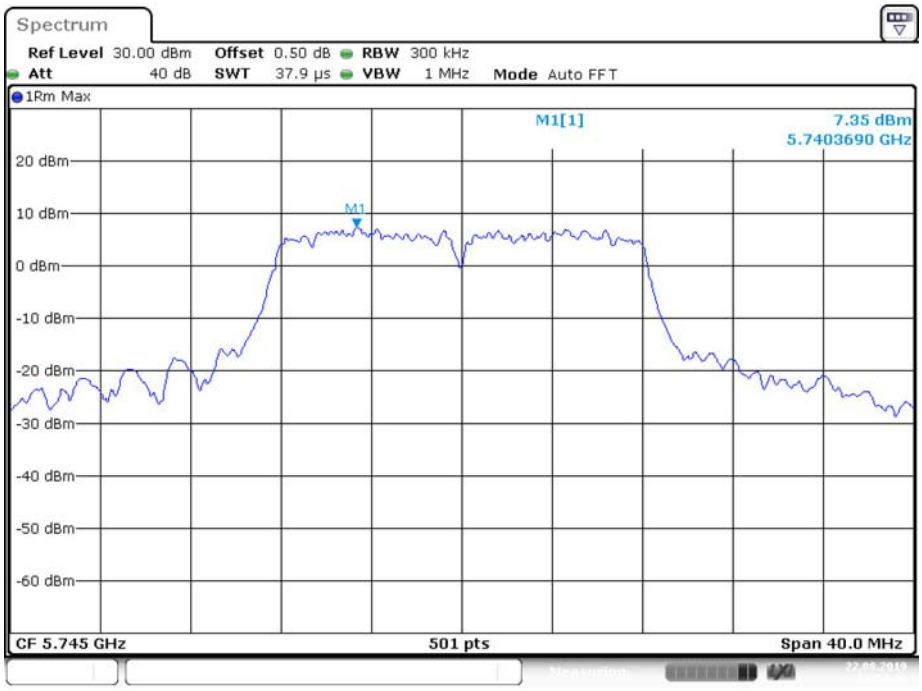
Chain 1:

802.11a Low Channel



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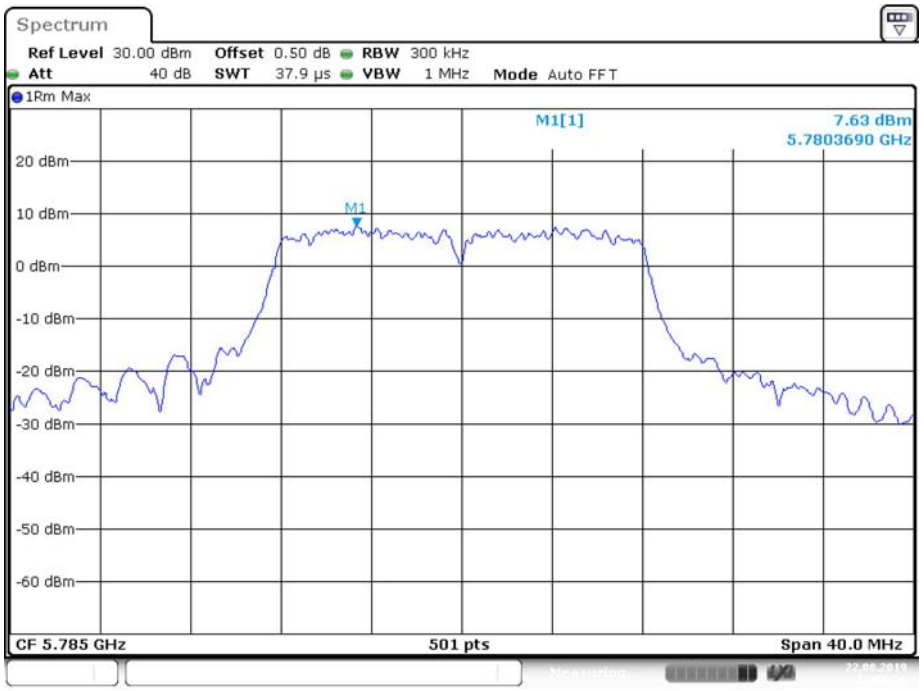
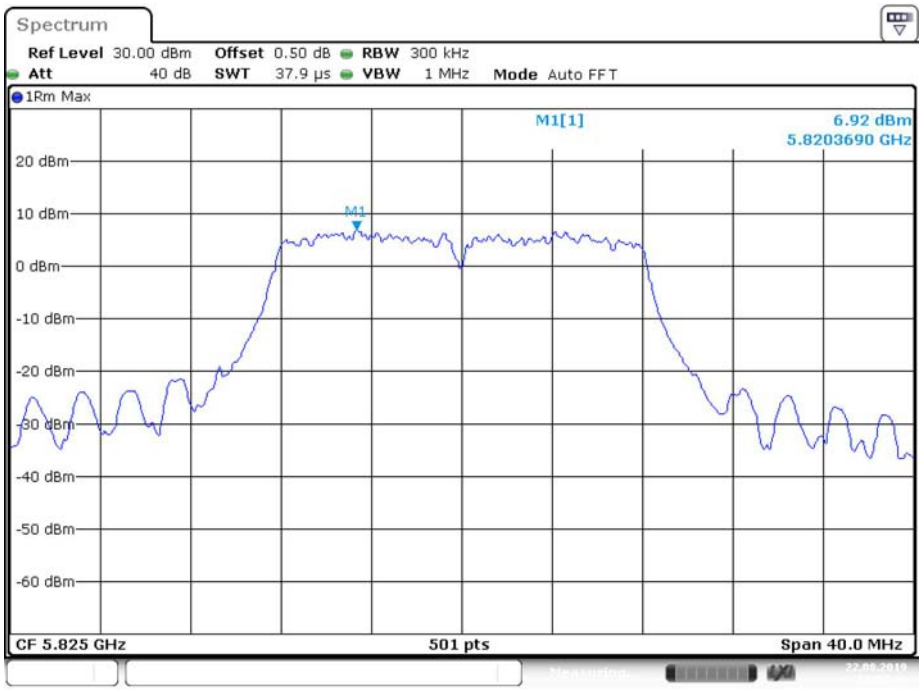
802.11a Middle Channel



Date: 22.AUG.2019 13:56:36

802.11a High Channel



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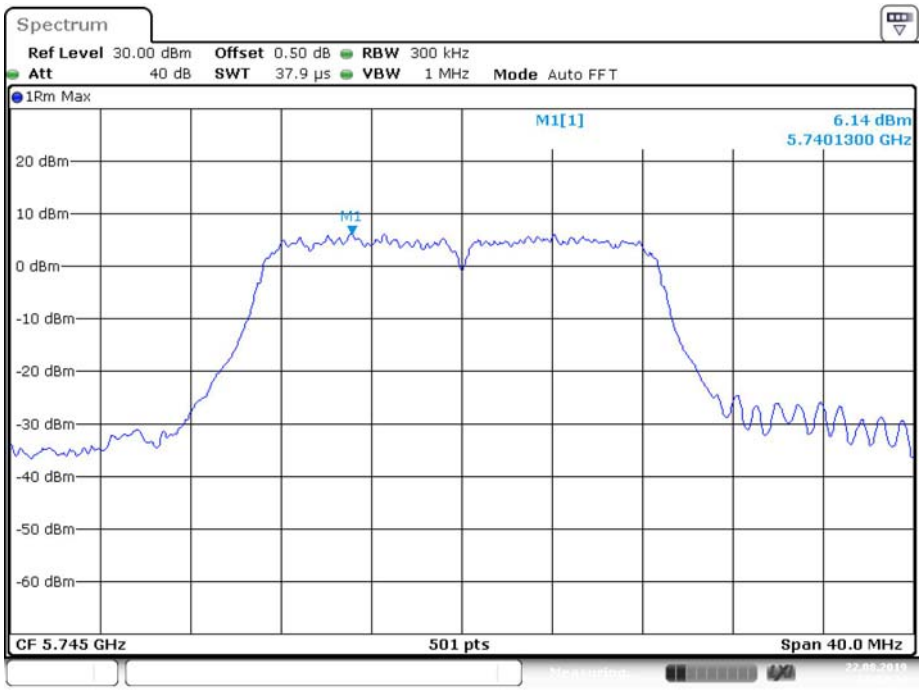
802.11n ht20 Low Channel



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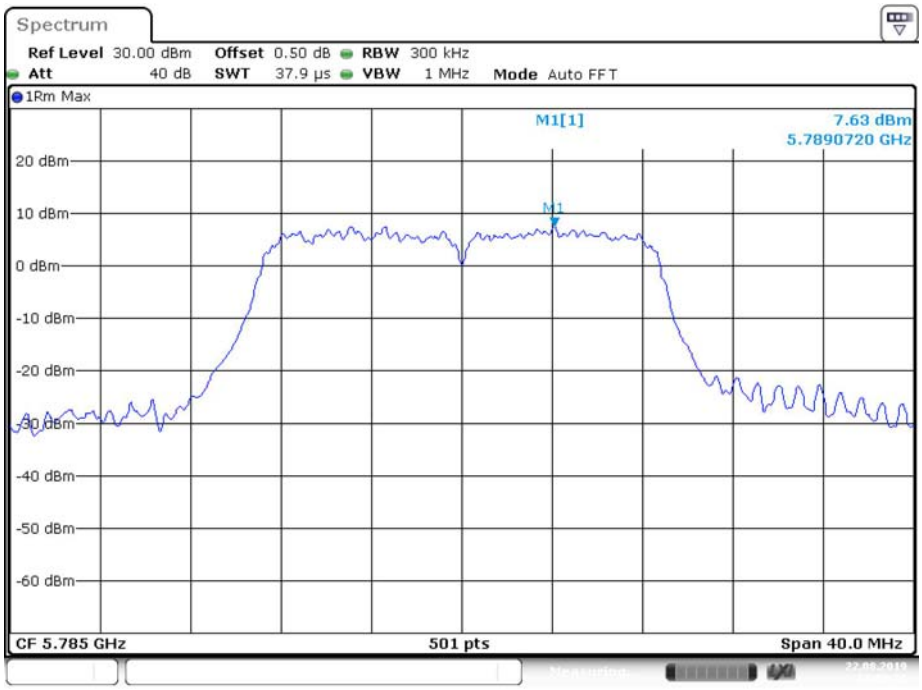
802.11n ht20 Middle Channel



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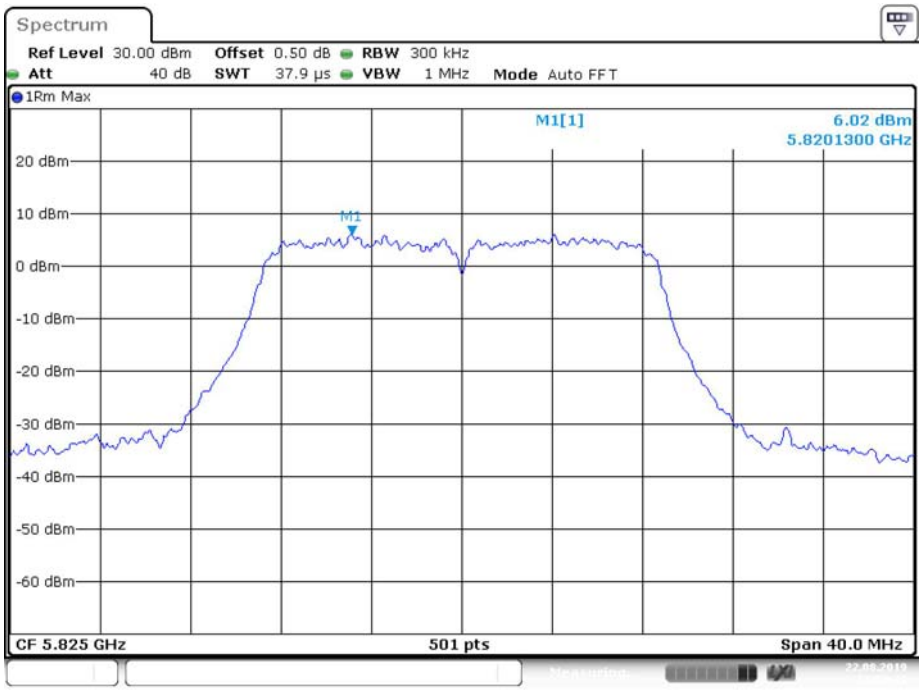
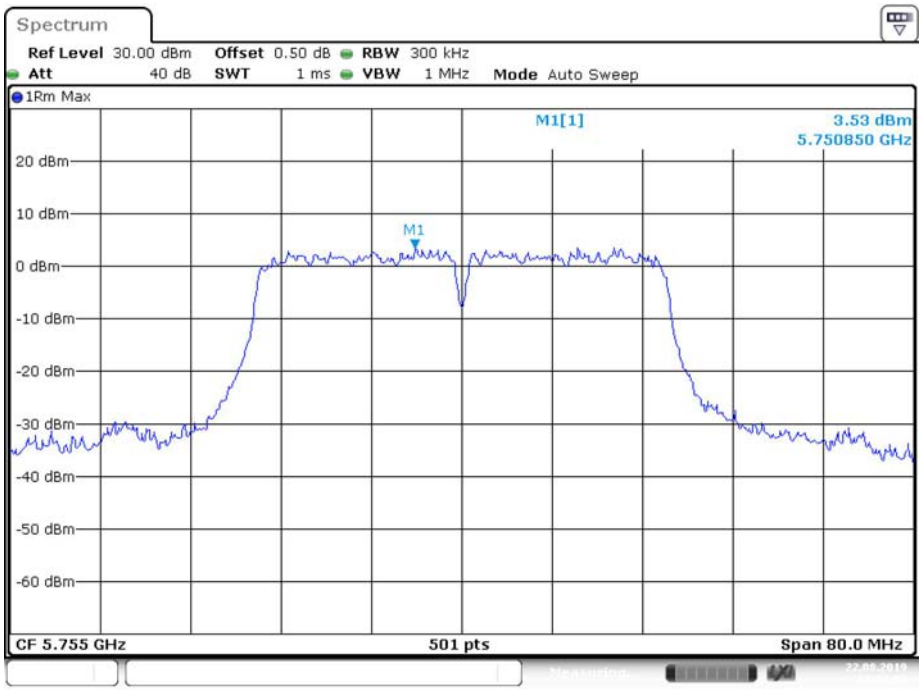
802.11n ht20 High Channel



Date: 22.AUG.2019 13:59:41

802.11n ht40 Low Channel



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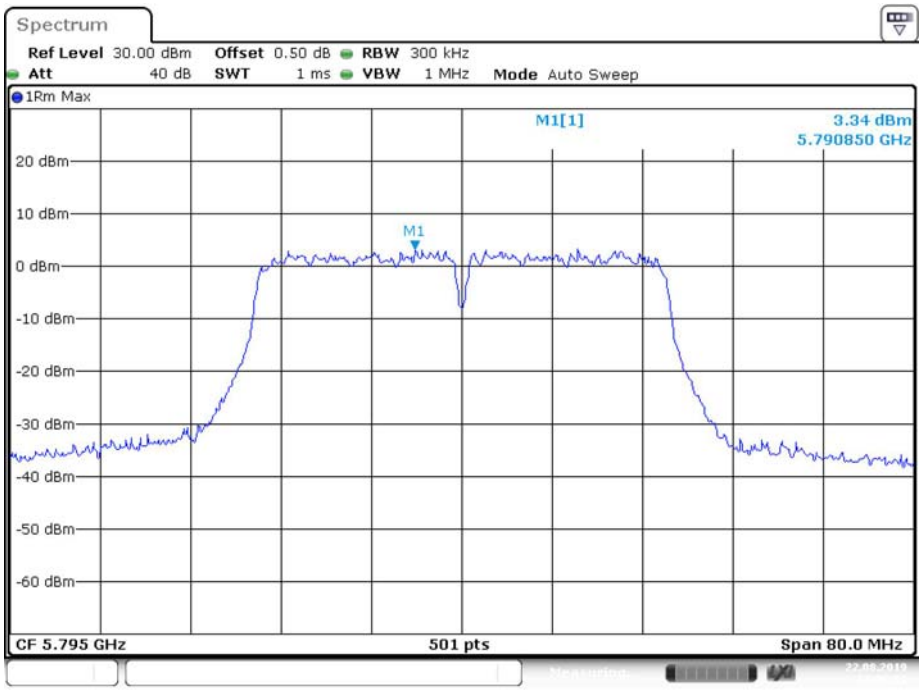
802.11n ht40 High Channel



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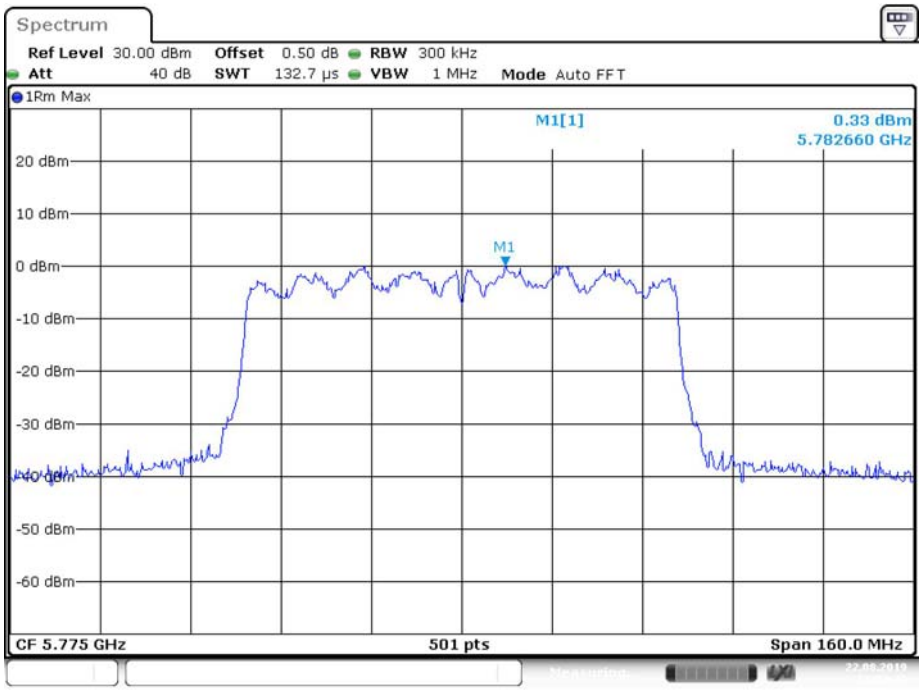
802.11 ac80 Middle Channel



Date: 22.AUG.2019 13:53:49

***** END OF REPORT *****