FCC PART 15.407

TEST REPORT

For

Shenzhen EDUP Electronics Technology Co.,Ltd.

6 Floor, #6 Building, No.48, Kangzheng Road Liantang Industrial Area, Buji Town Shenzhen, China

FCC ID:2AHRD-EP9636

Report Type:	**Product Name:**
Original Report	Dual Band PCI Express adapter

Report Number:	RDG200610006-00B
Report Date:	2020-07-08
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:	Dual Band PCI Express adapter
EUT Model:	EP-9636GS
Multiple Models:	EP-9636, EP-9636PRO, EP-9636Plus, EP-9636SE, WT-9636GS, EPLOVE-9636GS, WT-9636PRO, EPLOVE-9636PRO, WT-9636
Operation Frequency:	5745-5825(802.11a/n ht20/ac vht20/ax hew20) 5755-5795 MHz(802.11n ht40/ac vht40/ax hew40) 5775 MHz(802.11ac vht80/ax hew80)
Maximum Output Power (Conducted):	15.66 dBm
Modulation Type:	802.11a/n/ac:OFDM-BPSK, QPSK, 16QAM, 64QAM,256QAM 802.11ax: OFDMA- BPSK, QPSK, 16QAM, 64QAM,256QAM, 1024QAM
Rated Input Voltage:	Powered by PC system
Serial Number:	RDG200610006-RF-S1
EUT Received Date:	2020.06.12
EUT Received Status:	Good

Notes: *Model EP-9636GS was selected for fully testing, the detailed information about the difference among EP-9636, EP-9636PRO, EP-9636Plus, EP-9636SE, WT-9636GS, EPLOVE-9636GS, WT-9636PRO, EPLOVE-9636PRO, WT-9636 and model EP-9636GS 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 ***Shenzhen EDUP Electronics Technology Co.,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, 15.209 and 15.407 rules.

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: 2AHRD-EP9636.

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 fac vhtor 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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SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system support 802.11a/n ht20/n ht40/ac vht20/40/80/ax hew 20/40/80, the vht20/vht40 were reduced since the identical parameters with 802.11n ht20 and ht40.

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, 802.11ax hew20 channel 149, 157 and 165 was tested, for 802.11n ht40, 802.11ax hew40 channel 151, 159 were tested, for 802.11ac vht80,802.11ax hew80 channel 155 was tested.

EUT Exercise Software

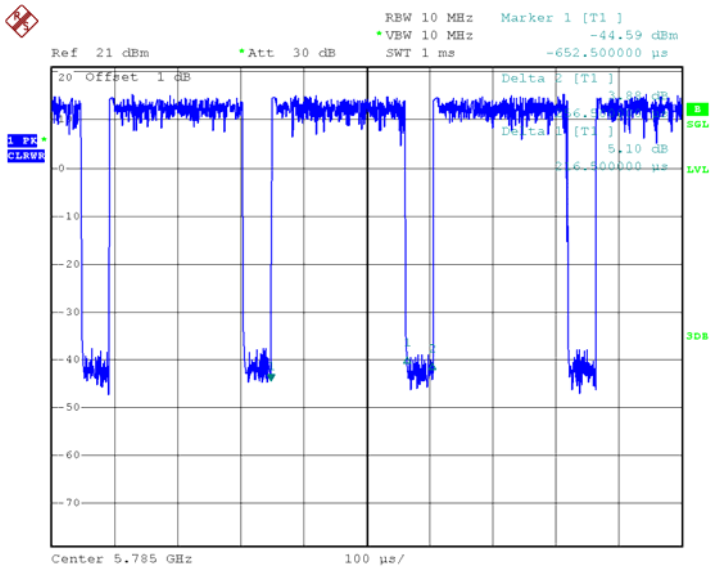
The software "DRTU" was used for testing, which was provided by Manufacturer. The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all date rates, bandwidths, and modulations. The device supports SISO and MIMO at 802.11n and ac mode, per pre-test, MIMO 2TX mode was the worst and reported. The maximum power was configured as below table, that provided by the Manufacturer:

Mode	Channel	Frequency (MHz)	Data rate	Power level Setting	
				Chain 0	Chain 1
802.11a	Low	5745	6Mbps	15.5	16
	Middle	5785	6Mbps	15.5	16
	High	5825	6Mbps	15.5	16
802.11n ht20	Low	5745	MCS0	15	15
	Middle	5785	MCS0	15	15
	High	5825	MCS0	15	15
802.11ax hew20	Low	5745	MCS0	15	15
	Middle	5785	MCS0	15	15
	High	5825	MCS0	15	15
802.11n ht40	Low	5755	MCS0	15	15
	High	5795	MCS0	15	15
802.11ax hew40	Low	5755	MCS0	15	15
	High	5795	MCS0	15	15
802.11ac vht80	Middle	5775	MCS0	15	15
802.11ax hew80	Middle	5775	MCS0	15	15

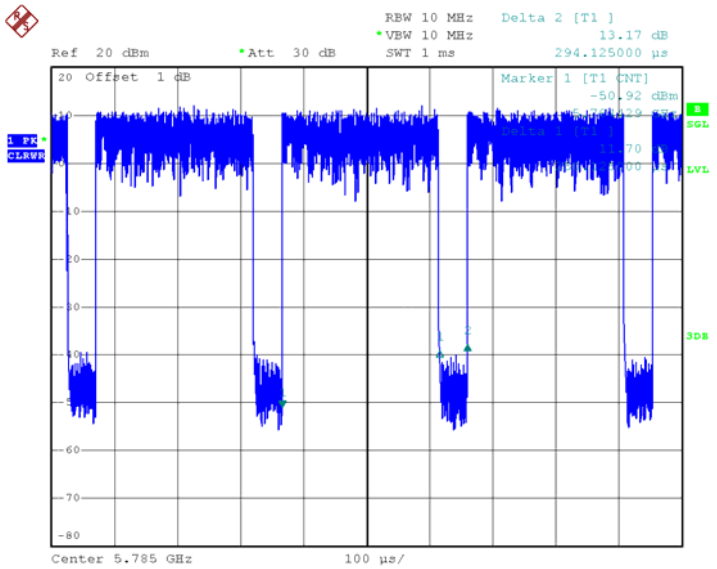
The duty cycle as below:

Mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle (%)
802.11 a	0.217	0.257	84.44
802.11n ht20	0.250	0.294	85.03
802.11ax hew20	0.231	0.273	84.62
802.11n ht40	0.247	0.289	85.47
802.11ax hew40	0.231	0.275	84.00
802.11ac vht80	0.235	0.277	84.84
802.11ax hew80	0.231	0.273	84.62

802.11a



802.11n ht20



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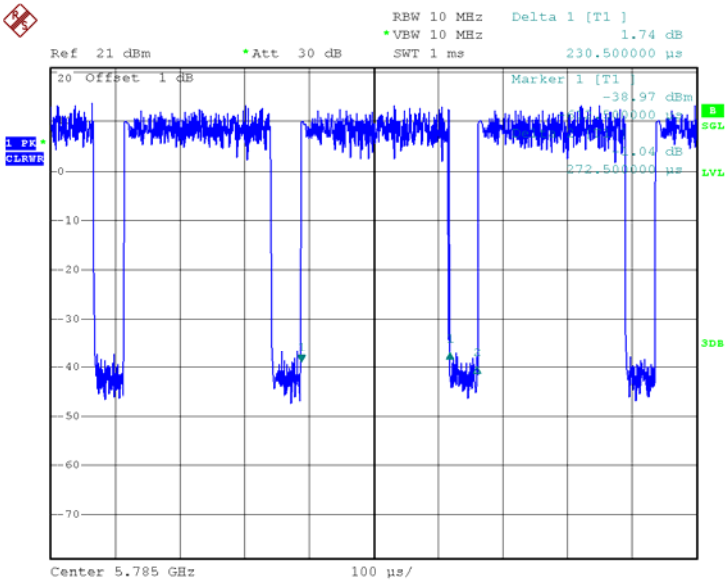
802.11ax hew20



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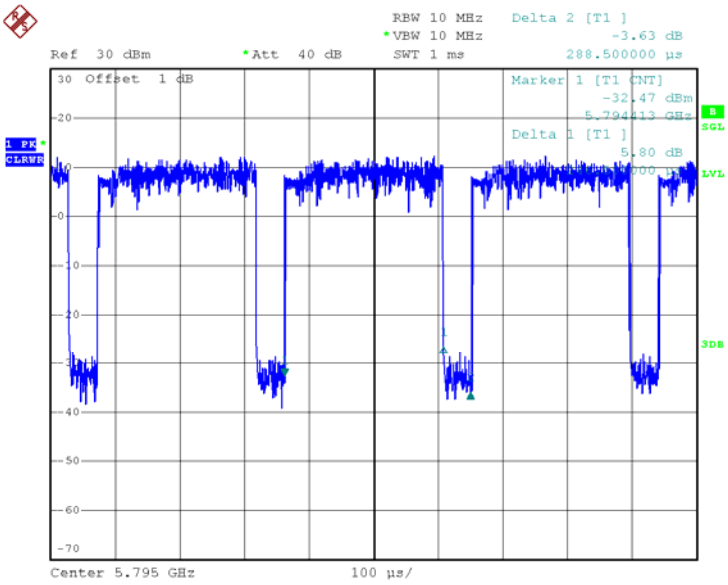
802.11n ht40



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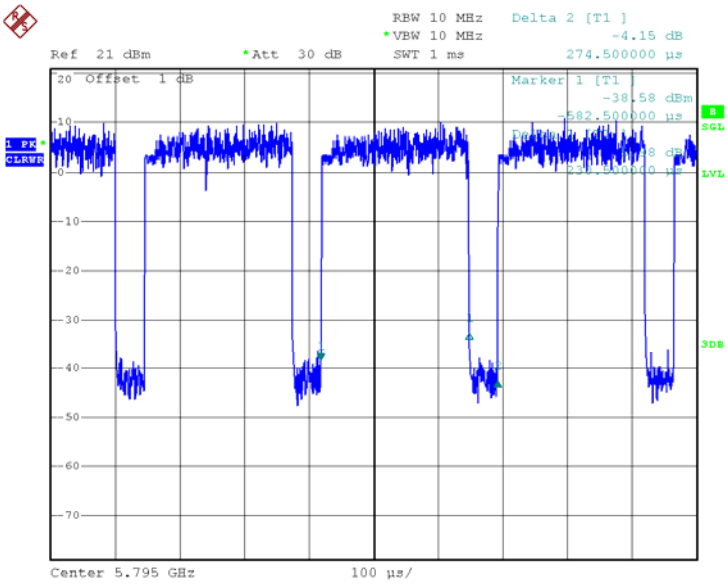
802.11ax hew40



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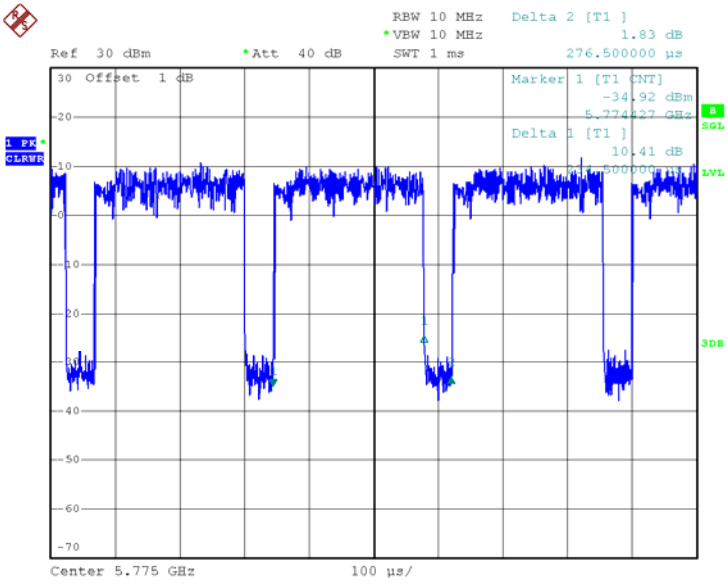
802.11ac vht80



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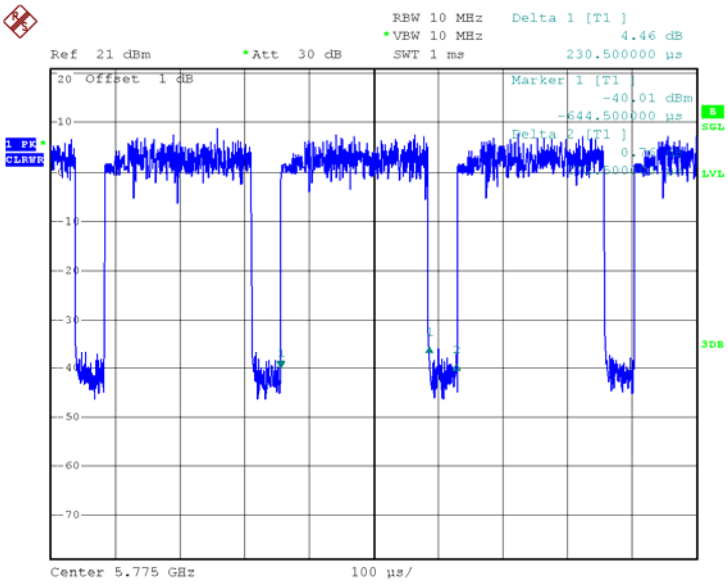
802.11ax hew80



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Equipment Modifications

No modification was made to the EUT.

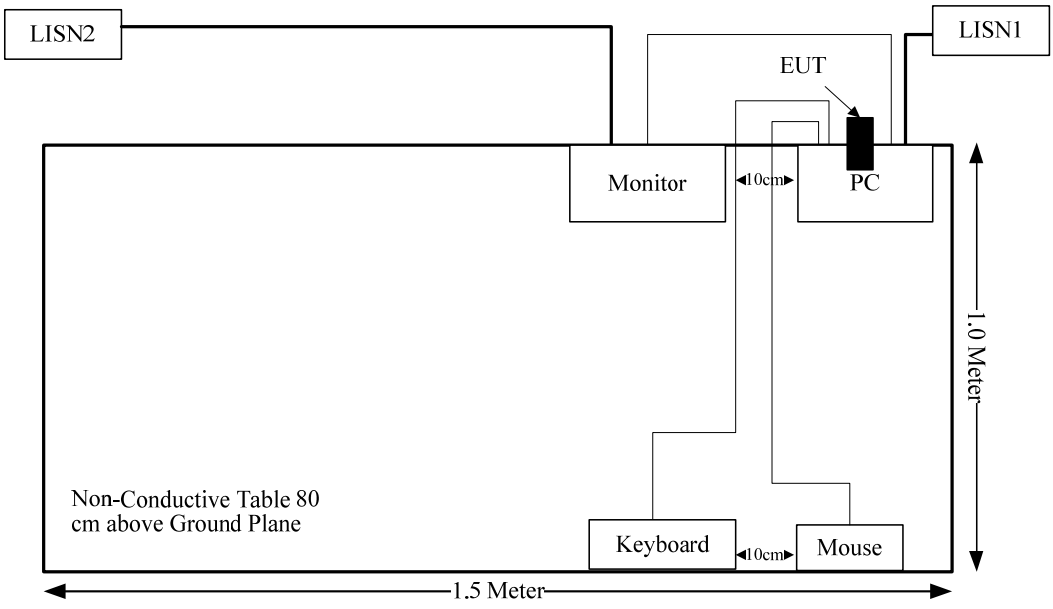
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
ViewSonic	Monitor	VA2226-A	100002857466
DELL	Keyboard	L100	CNORH656658907BL05DC
DELL	Mouse	MO56UOA	18H11
Jinhetian	PC	X25001	X252131

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB Cable	yes	No	1.8	PC	Keyboard
USB Cable	Yes	No	1.5	PC	Mouse
VGA Cable	Yes	Yes	1.5	PC	Monitor

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

Rules	Description of Test	Result
FCC §15.407 (f) & §1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliance
FCC§15.203	Antenna Requirement	Compliance
FCC§15.407(b)(6)& §15.207(a)	Conducted Emissions	Not applicable
FCC§15.205& §15.209 &§15.407(b)	Undesirable Emission& Restricted Bands	Compliance
FCC§15.407(b)	Out Of Band Emissions	Compliance
FCC§15.407(a) (e)	Emission Bandwidth	Compliance
FCC§15.407(a)	Conducted Transmitter Output Power	Compliance
FCC§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 fac vhtor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

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	6	3.98	27	501.19	20.00	0.3971	1.0
WLAN	5725-2825	6	3.98	16	39.81	20.00	0.0315	1.0

Note: The WLAN 2.4G and 5G can`t transmit simultaneously.

Result: The device meet FCC MPE at 20 cm distance

FCC §15.203- ANTENNA REQUIREMENT

Applicable Standard

According to FCC§ 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.
c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

Antenna Connector Construction

The EUT has 2 antenna for 2.4G&5G WLAN use a unique type of connector to attach to the EUT, 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
Chain 0	Dipole	50	6 dBi/2.4-2.5GHz 6 dBi/5.15-5.85GHz
Chain 1	Dipole	50	6 dBi/2.4-2.5GHz 6 dBi/5.15-5.85GHz

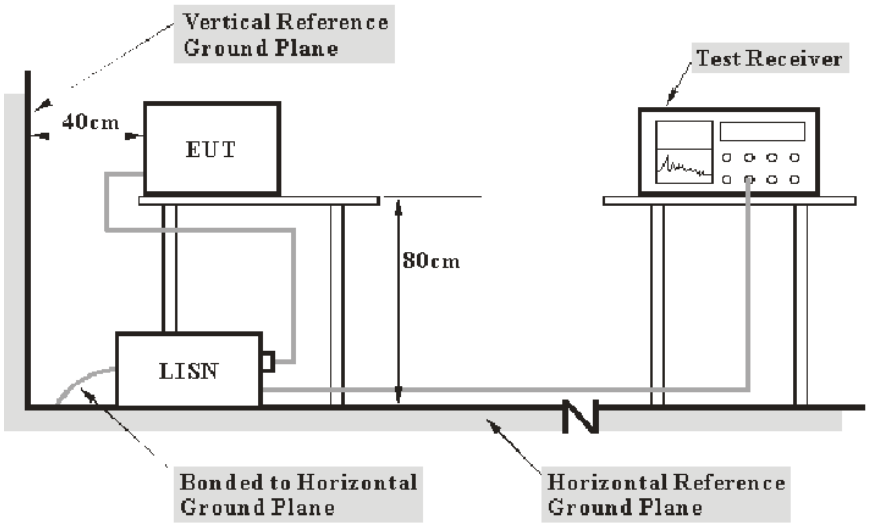
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207(a).

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 PC 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

Test Procedure

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

The frequency and amplitude of the six highest ac power-line conducted emissions relative to the limit, measured over all the current-carrying conductors of the EUT power cords, and the operating frequency or frequency to which the EUT is tuned (if appropriate), should be reported, unless such emissions are more than 20 dB below the limit. AC power-line conducted emissions measurements are to be separately carried out only on each of the phase ("hot") line(s) and (if used) on the neutral line(s), but not on the ground [protective earth] line(s). If less than six emission frequencies are within 20 dB of the limit, then the noise level of the measuring instrument at representative frequencies should be reported. The specific conductor of the power-line cord for each of the reported emissions should be identified. Measure the six highest emissions with respect to the limit on each current-carrying conductor of each power cord associated with the EUT (but not the power cords of associated or peripheral equipment that are part of the test configuration). Then, report the six highest emissions with respect to the limit from among all the measurements identifying the frequency and specific current-carrying conductor identified with the emission. The six highest emissions should be reported for each of the current-carrying conductors, or the six highest emissions may be reported over all the current-carrying conductors.

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
R&S	LISN	ENV 216	101614	2019-09-12	2020-09-12
R&S	EMI Test Receiver	ESCI	101121	2020-05-09	2021-05-09
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	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).

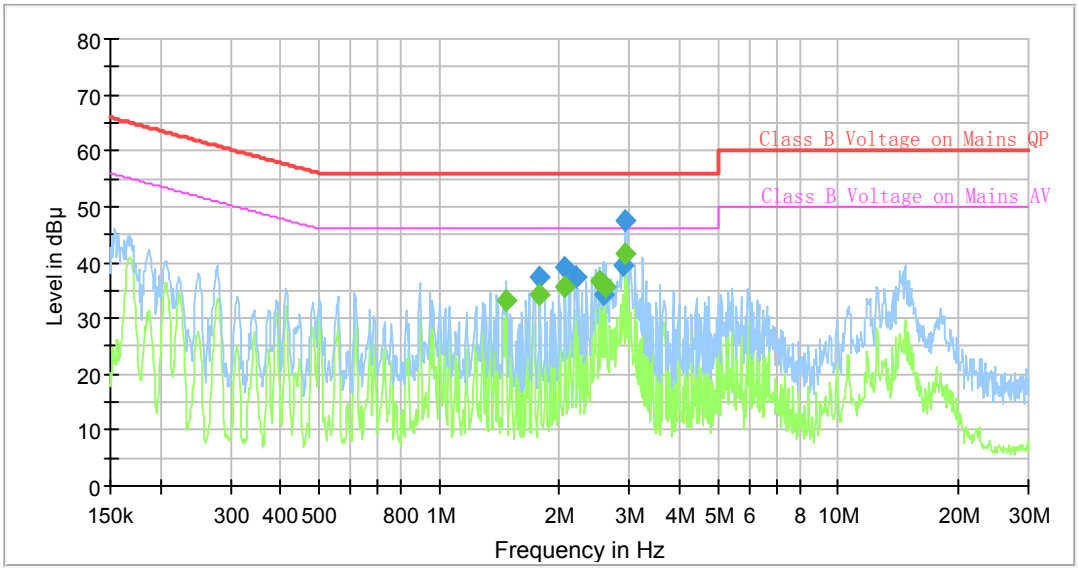
Test Data

Environmental Conditions

Temperature:	28.2℃
Relative Humidity:	63%
ATM Pressure:	100.1 kPa
Tester:	Barry Yang
Test Date:	2020-07-09

Test Mode: Transmitting(802.11 a mode chain 1 high channel was the worst)

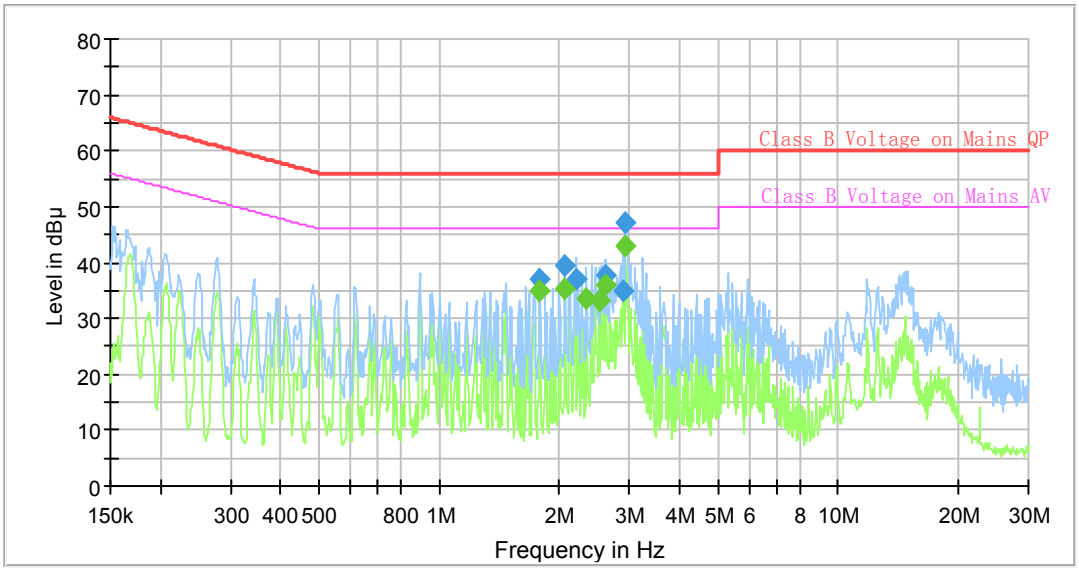
AC120 V, 60 Hz, Line:



Final_Result

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Limit (dB µ V)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
1.465485	---	33.31	46.00	12.69	9.000	L1	9.7
1.789056	---	34.18	46.00	11.82	9.000	L1	9.8
1.789056	37.40	---	56.00	18.60	9.000	L1	9.8
2.067473	39.21	---	56.00	16.79	9.000	L1	9.8
2.067473	---	35.52	46.00	10.48	9.000	L1	9.8
2.205965	37.39	---	56.00	18.61	9.000	L1	9.8
2.511402	---	36.55	46.00	9.45	9.000	L1	9.8
2.574818	34.21	---	56.00	21.79	9.000	L1	9.8
2.626701	---	35.60	46.00	10.40	9.000	L1	9.8
2.902231	39.51	---	56.00	16.49	9.000	L1	9.8
2.931326	---	41.51	46.00	4.49	9.000	L1	9.8
2.931326	47.34	---	56.00	8.66	9.000	L1	9.8

AC120 V, 60 Hz, Neutral:



Final_Result

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Limit (dB µ V)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
1.789056	---	34.80	46.00	11.20	9.000	N	9.6
1.789056	37.14	---	56.00	18.86	9.000	N	9.6
2.067473	---	35.37	46.00	10.63	9.000	N	9.6
2.067473	39.36	---	56.00	16.64	9.000	N	9.6
2.205965	37.12	---	56.00	18.88	9.000	N	9.6
2.342024	---	33.63	46.00	12.37	9.000	N	9.6
2.511402	---	33.34	46.00	12.66	9.000	N	9.6
2.613633	37.79	---	56.00	18.21	9.000	N	9.6
2.626701	---	36.06	46.00	9.94	9.000	N	9.6
2.902231	34.99	---	56.00	21.01	9.000	N	9.6
2.931326	---	42.82	46.00	3.18	9.000	N	9.6
2.931326	47.18	---	56.00	8.82	9.000	N	9.6

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 manufac vhturing, 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 manufac vhturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

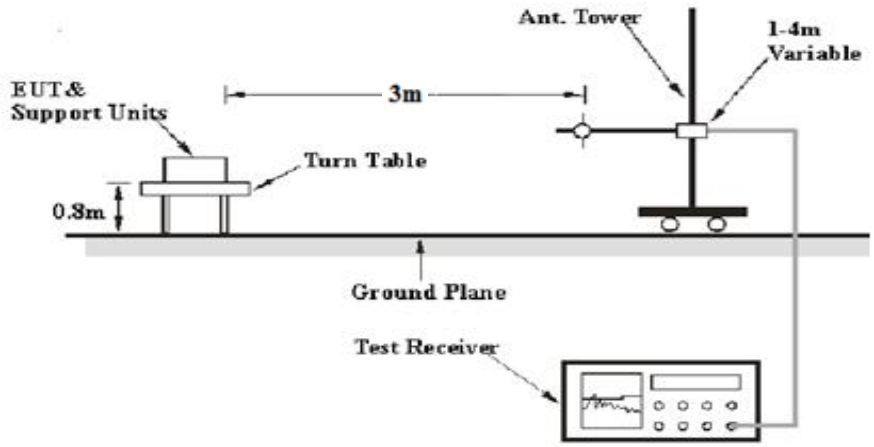
(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(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.

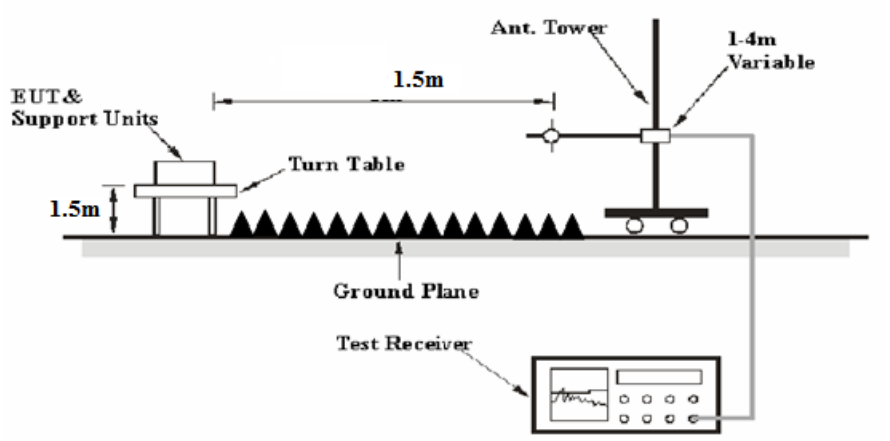
(7) The provisions of §15.205 apply to intentional radiators operating under this section.

EUT Setup

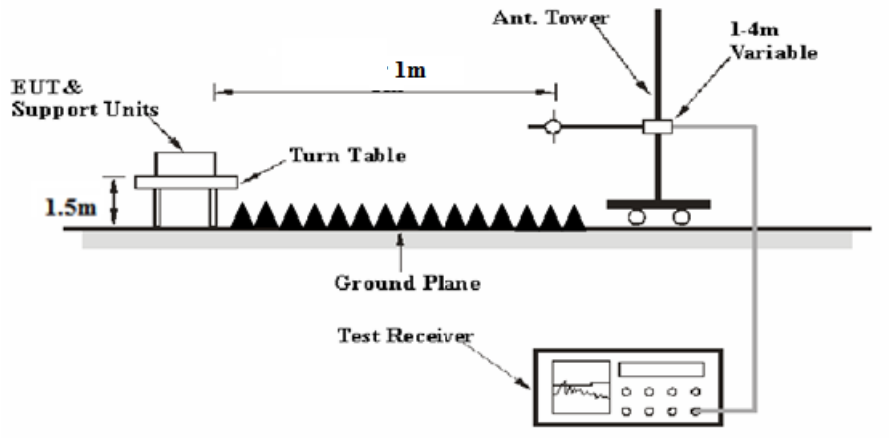
Below 1 GHz:



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

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 fac vhtor of 20dB/decade from 3m to 1.5m or 1m
Distance extrapolation fac vhtor =20 log (specific distance [3m]/test distance [1.5m]) dB= 6.02 dB
or
Distance extrapolation fac vhtor =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 Fac vhtor and Cable Loss, and subtrac vhting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Fac vhtor + 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 Fac vhtor and Cable Loss, and subtrac vhting the Amplifier Gain from the Meter Reading and the Distance extrapolation fac vhtor. The basic equation is as follows:

Corrected Amplitude
= Meter Reading + Antenna Fac vhtor + Cable Loss - Amplifier Gain-Distance extrapolation fac vhtor

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					
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
R&S	EMI Test Receiver	ESR3	102453	2019-09-12	2020-09-12
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2020-05-06	2021-05-06
HP	Amplifier	8447D	2727A05902	2019-09-05	2020-09-05
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Radiation Above 1GHz					
Agilent	Spectrum Analyzer	E4440A	SG43360054	2020-05-09	2021-05-09
R&S	Spectrum Analyzer	FSP 38	100478	2020-05-09	2021-05-09
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	2017-12-06	2020-12-05
Ducommun Technolagies	Horn Antenna	ARH-2823-02	1007726-01 1302	2017-12-06	2020-12-05
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	2020-06-27	2021-06-27
Mini-Circuit	Amplifier	ZVA-213-S+	54201245	2019-09-05	2020-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2020-06-27	2021-06-27
Sinoscite	Bandstop Filters	BSF5150-5850MN-0899-003	899003	2020-05-06	2021-05-06
Micro-tronics	High Pass Filter	HPM50111	S/N-G217	2020-06-16	2021-06-16

*** 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

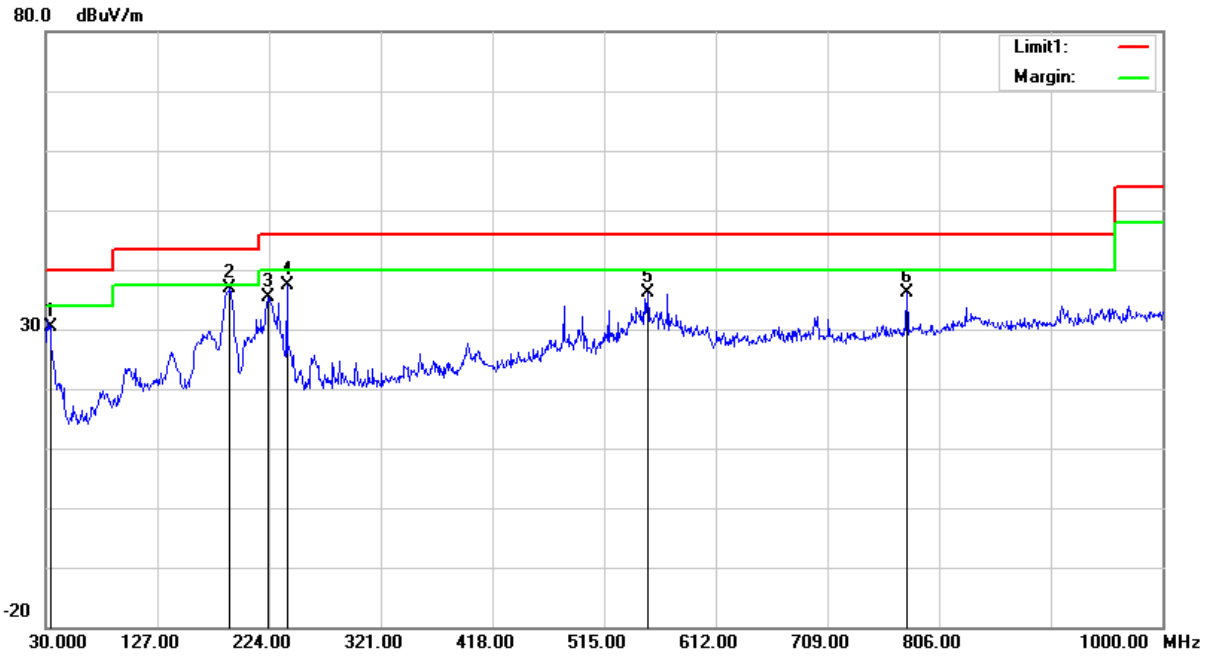
Test Items	Radiation Below 1GHz	Radiation Above 1GHz
Temperature:	25.5°C	25.6°C
Relative Humidity:	53 %	56 %
ATM Pressure:	100.5kPa	99.8kPa
Tester:	Jalon Liu	Felix Wang
Test Date:	2020-06-15	2020-07-03

Test Mode: Transmitting

Test Result: Compliance, please refer to the below data and plots:

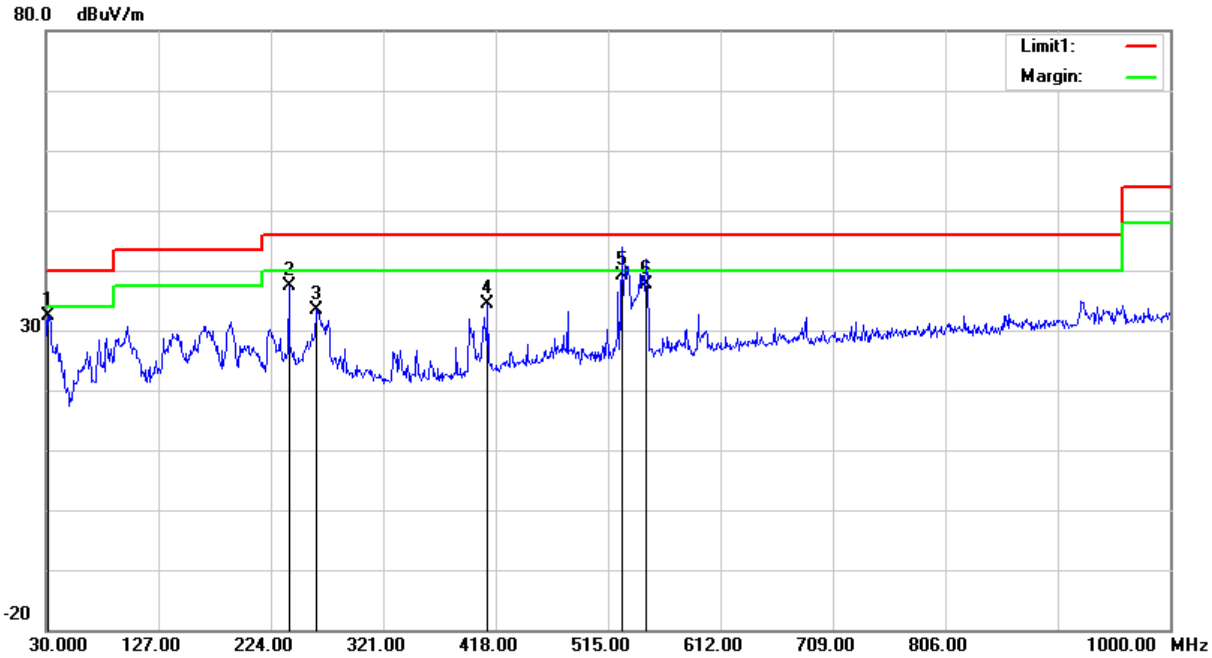
1) Below 1GHz(*802.11 a mode chain 1 High channel was the worst*)

Horizontal



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Fac vhtor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
33.8800	31.55	peak	-1.29	30.26	40.00	9.74
190.0500	43.93	peak	-7.16	36.77	43.50	6.73
223.0300	42.23	peak	-6.82	35.41	46.00	10.59
239.5200	43.43	peak	-6.02	37.41	46.00	8.59
552.8300	35.77	peak	0.36	36.13	46.00	9.87
777.8700	31.84	peak	4.37	36.21	46.00	9.79

Vertical



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Fac vhtor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
31.9400	32.20	peak	0.19	32.39	40.00	7.61
239.5200	43.32	peak	-6.02	37.30	46.00	8.70
262.8000	38.28	peak	-4.80	33.48	46.00	12.52
411.2100	36.08	peak	-1.80	34.28	46.00	11.72
526.6400	38.78	QP	0.25	39.03	46.00	6.97
547.9800	37.32	QP	0.32	37.64	46.00	8.36

2) 1GHz-40GHz:
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)	Fac vhtor (dB/m)						
Low Channel: 5745 MHz										
5745.00	70.72	PK	H	34.20	3.69	0.00	108.61	102.59	N/A	N/A
5745.00	62.33	AV	H	34.20	3.69	0.00	100.22	94.2	N/A	N/A
5745.00	76.07	PK	V	34.20	3.69	0.00	113.96	107.94	N/A	N/A
5745.00	67.38	AV	V	34.20	3.69	0.00	105.27	99.25	N/A	N/A
5725.00	30.41	PK	V	34.19	3.69	0.00	68.29	62.27	122.20	59.93
5720.00	28.16	PK	V	34.19	3.69	0.00	66.04	60.02	110.80	50.78
5700.00	27.67	PK	V	34.18	3.68	0.00	65.53	59.51	105.20	45.69
5650.00	27.21	PK	V	34.16	3.63	0.00	65.00	58.98	68.20	9.22
11490.00	39.21	PK	V	38.99	6.59	25.51	59.28	53.26	74.00	20.74
11490.00	24.05	AV	V	38.99	6.59	25.51	44.12	38.1	54.00	15.90
17235.00	34.85	PK	V	41.56	8.78	23.72	61.47	55.45	68.20	12.75
Middle Channel: 5785 MHz										
5785.00	66.87	PK	H	34.21	3.71	0.00	104.79	98.77	N/A	N/A
5785.00	58.24	AV	H	34.21	3.71	0.00	96.16	90.14	N/A	N/A
5785.00	75.26	PK	V	34.21	3.71	0.00	113.18	107.16	N/A	N/A
5785.00	67.12	AV	V	34.21	3.71	0.00	105.04	99.02	N/A	N/A
11570.00	39.24	PK	V	39.00	6.61	25.46	59.39	53.37	74.00	20.63
11570.00	27.09	AV	V	39.00	6.61	25.46	47.24	41.22	54.00	12.78
17355.00	35.23	PK	V	42.26	8.81	23.60	62.70	56.68	68.20	11.52
High Channel: 5825 MHz										
5825.00	67.23	PK	H	34.23	3.73	0.00	105.19	99.17	N/A	N/A
5825.00	58.12	AV	H	34.23	3.73	0.00	96.08	90.06	N/A	N/A
5825.00	75.54	PK	V	34.23	3.73	0.00	113.50	107.48	N/A	N/A
5825.00	66.41	AV	V	34.23	3.73	0.00	104.37	98.35	N/A	N/A
5850.00	29.23	PK	V	34.24	3.75	0.00	67.22	61.2	122.20	61.00
5855.00	29.28	PK	V	34.24	3.75	0.00	67.27	61.25	110.80	49.55
5875.00	28.13	PK	V	34.25	3.77	0.00	66.15	60.13	105.20	45.07
5925.00	28.03	PK	V	34.27	3.80	0.00	66.10	60.08	68.20	8.12
11650.00	40.24	PK	V	39.00	6.64	25.41	60.47	54.45	74.00	19.55
11650.00	28.09	AV	V	39.00	6.64	25.41	48.32	42.3	54.00	11.70
17475.00	35.23	PK	V	42.96	8.84	23.48	63.55	57.53	68.20	10.67

Chain1

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)	Fac vhtor (dB/m)						
Low Channel: 5745 MHz										
5745.00	70.86	PK	H	34.20	3.69	0.00	108.75	102.73	N/A	N/A
5745.00	62.45	AV	H	34.20	3.69	0.00	100.34	94.32	N/A	N/A
5745.00	77.50	PK	V	34.20	3.69	0.00	115.39	109.37	N/A	N/A
5745.00	68.74	AV	V	34.20	3.69	0.00	106.63	100.61	N/A	N/A
5725.00	28.06	PK	V	34.19	3.69	0.00	65.94	59.92	122.20	62.28
5720.00	27.35	PK	V	34.19	3.69	0.00	65.23	59.21	110.80	51.59
5700.00	27.21	PK	V	34.18	3.68	0.00	65.07	59.05	105.20	46.15
5650.00	27.12	PK	V	34.16	3.63	0.00	64.91	58.89	68.20	9.31
11490.00	39.22	PK	V	38.99	6.59	25.51	59.29	53.27	74.00	20.73
11490.00	26.78	AV	V	38.99	6.59	25.51	46.85	40.83	54.00	13.17
17235.00	34.56	PK	V	41.56	8.78	23.72	61.18	55.16	68.20	13.04
Middle Channel: 5785 MHz										
5785.00	70.82	PK	H	34.21	3.71	0.00	108.74	102.72	N/A	N/A
5785.00	62.42	AV	H	34.21	3.71	0.00	100.34	94.32	N/A	N/A
5785.00	76.76	PK	V	34.21	3.71	0.00	114.68	108.66	N/A	N/A
5785.00	68.25	AV	V	34.21	3.71	0.00	106.17	100.15	N/A	N/A
11570.00	39.60	PK	V	39.00	6.61	25.46	59.75	53.73	74.00	20.27
11570.00	27.54	AV	V	39.00	6.61	25.46	47.69	41.67	54.00	12.33
17355.00	34.42	PK	V	42.26	8.81	23.60	61.89	55.87	68.20	12.33
High Channel: 5825 MHz										
5825.00	68.12	PK	H	34.23	3.73	0.00	106.08	100.06	N/A	N/A
5825.00	58.89	AV	H	34.23	3.73	0.00	96.85	90.83	N/A	N/A
5825.00	75.53	PK	V	34.23	3.73	0.00	113.49	107.47	N/A	N/A
5825.00	65.73	AV	V	34.23	3.73	0.00	103.69	97.67	N/A	N/A
5850.00	28.46	PK	V	34.24	3.75	0.00	66.45	60.43	122.20	61.77
5855.00	28.44	PK	V	34.24	3.75	0.00	66.43	60.41	110.80	50.39
5875.00	27.70	PK	V	34.25	3.77	0.00	65.72	59.7	105.20	45.50
5925.00	27.61	PK	V	34.27	3.80	0.00	65.68	59.66	68.20	8.54
11650.00	43.16	PK	V	39.00	6.64	25.41	63.39	57.37	74.00	16.63
11650.00	32.04	AV	V	39.00	6.64	25.41	52.27	46.25	54.00	7.75
17475.00	34.83	PK	V	42.96	8.84	23.48	63.15	57.13	68.20	11.07

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)	Fac vhtor (dB/m)						
Low Channel: 5745 MHz										
5745.00	71.94	PK	H	34.20	3.69	0.00	109.83	103.81	N/A	N/A
5745.00	59.98	AV	H	34.20	3.69	0.00	97.87	91.85	N/A	N/A
5745.00	77.92	PK	V	34.20	3.69	0.00	115.81	109.79	N/A	N/A
5745.00	66.32	AV	V	34.20	3.69	0.00	104.21	98.194	N/A	N/A
5725.00	41.65	PK	V	34.19	3.69	0.00	79.53	73.51	122.20	48.69
5720.00	36.17	PK	V	34.19	3.69	0.00	74.05	68.03	110.80	42.77
5700.00	28.17	PK	V	34.18	3.68	0.00	66.03	60.01	105.20	45.19
5650.00	27.37	PK	V	34.16	3.63	0.00	65.16	59.14	68.20	9.06
11490.00	42.92	PK	V	38.99	6.59	25.51	62.99	56.97	74.00	17.03
11490.00	30.32	AV	V	38.99	6.59	25.51	50.39	44.37	54.00	9.63
17235.00	36.04	PK	V	41.56	8.78	23.72	62.66	56.64	68.20	11.56
Middle Channel: 5785 MHz										
5785.00	71.12	PK	H	34.21	3.71	0.00	109.04	103.02	N/A	N/A
5785.00	61.55	AV	H	34.21	3.71	0.00	99.47	93.45	N/A	N/A
5785.00	78.09	PK	V	34.21	3.71	0.00	116.01	109.99	N/A	N/A
5785.00	68.48	AV	V	34.21	3.71	0.00	106.40	100.38	N/A	N/A
11570.00	38.07	PK	V	39.00	6.61	25.46	58.22	52.2	74.00	21.80
11570.00	25.86	AV	V	39.00	6.61	25.46	46.01	39.99	54.00	14.01
17355.00	35.54	PK	V	42.26	8.81	23.60	63.01	56.99	68.20	11.21
High Channel: 5825 MHz										
5825.00	69.54	PK	H	34.23	3.73	0.00	107.50	101.48	N/A	N/A
5825.00	61.01	AV	H	34.23	3.73	0.00	98.97	92.95	N/A	N/A
5825.00	76.94	PK	V	34.23	3.73	0.00	114.90	108.88	N/A	N/A
5825.00	66.26	AV	V	34.23	3.73	0.00	104.22	98.2	N/A	N/A
5850.00	36.31	PK	V	34.24	3.75	0.00	74.30	68.28	122.20	53.92
5855.00	34.72	PK	V	34.24	3.75	0.00	72.71	66.69	110.80	44.11
5875.00	29.08	PK	V	34.25	3.77	0.00	67.10	61.08	105.20	44.12
5925.00	27.95	PK	V	34.27	3.80	0.00	66.02	60	68.20	8.20
11650.00	44.04	PK	V	39.00	6.64	25.41	64.27	58.25	74.00	15.75
11650.00	31.42	AV	V	39.00	6.64	25.41	51.65	45.63	54.00	8.37
17475.00	34.92	PK	V	42.96	8.84	23.48	63.24	57.22	68.20	10.98

802.11ax hew20(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)	Fac vhtor (dB/m)						
Low Channel: 5745 MHz										
5745.00	72.10	PK	H	34.20	3.69	0.00	109.99	103.97	N/A	N/A
5745.00	60.02	AV	H	34.20	3.69	0.00	97.91	91.89	N/A	N/A
5745.00	77.96	PK	V	34.20	3.69	0.00	115.85	109.83	N/A	N/A
5745.00	66.48	AV	V	34.20	3.69	0.00	104.37	98.354	N/A	N/A
5725.00	41.57	PK	V	34.19	3.69	0.00	79.45	73.43	122.20	48.77
5720.00	36.05	PK	V	34.19	3.69	0.00	73.93	67.91	110.80	42.89
5700.00	28.13	PK	V	34.18	3.68	0.00	65.99	59.97	105.20	45.23
5650.00	27.29	PK	V	34.16	3.63	0.00	65.08	59.06	68.20	9.14
11490.00	42.72	PK	V	38.99	6.59	25.51	62.79	56.77	74.00	17.23
11490.00	30.12	AV	V	38.99	6.59	25.51	50.19	44.17	54.00	9.83
17235.00	36.20	PK	V	41.56	8.78	23.72	62.82	56.8	68.20	11.40
Middle Channel: 5785 MHz										
5785.00	71.12	PK	H	34.21	3.71	0.00	109.04	103.02	N/A	N/A
5785.00	61.75	AV	H	34.21	3.71	0.00	99.67	93.65	N/A	N/A
5785.00	78.01	PK	V	34.21	3.71	0.00	115.93	109.91	N/A	N/A
5785.00	68.52	AV	V	34.21	3.71	0.00	106.44	100.42	N/A	N/A
11570.00	37.99	PK	V	39.00	6.61	25.46	58.14	52.12	74.00	21.88
11570.00	25.78	AV	V	39.00	6.61	25.46	45.93	39.91	54.00	14.09
17355.00	35.62	PK	V	42.26	8.81	23.60	63.09	57.07	68.20	11.13
High Channel: 5825 MHz										
5825.00	69.58	PK	H	34.23	3.73	0.00	107.54	101.52	N/A	N/A
5825.00	61.05	AV	H	34.23	3.73	0.00	99.01	92.99	N/A	N/A
5825.00	76.82	PK	V	34.23	3.73	0.00	114.78	108.76	N/A	N/A
5825.00	66.06	AV	V	34.23	3.73	0.00	104.02	98	N/A	N/A
5850.00	36.47	PK	V	34.24	3.75	0.00	74.46	68.44	122.20	53.76
5855.00	34.84	PK	V	34.24	3.75	0.00	72.83	66.81	110.80	43.99
5875.00	29.12	PK	V	34.25	3.77	0.00	67.14	61.12	105.20	44.08
5925.00	27.95	PK	V	34.27	3.80	0.00	66.02	60	68.20	8.20
11650.00	44.00	PK	V	39.00	6.64	25.41	64.23	58.21	74.00	15.79
11650.00	31.62	AV	V	39.00	6.64	25.41	51.85	45.83	54.00	8.17
17475.00	34.88	PK	V	42.96	8.84	23.48	63.20	57.18	68.20	11.02

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)	Fac vhtor (dB/m)						
Low Channel: 5755 MHz										
5755.00	70.93	PK	H	34.20	3.70	0.00	108.83	102.81	N/A	N/A
5755.00	59.58	AV	H	34.20	3.70	0.00	97.48	91.46	N/A	N/A
5755.00	74.16	PK	V	34.20	3.70	0.00	112.06	106.04	N/A	N/A
5755.00	63.81	AV	V	34.20	3.70	0.00	101.71	95.69	N/A	N/A
5725.00	42.16	PK	V	34.19	3.69	0.00	80.04	74.02	122.20	48.18
5720.00	40.97	PK	V	34.19	3.69	0.00	78.85	72.83	110.80	37.97
5700.00	39.11	PK	V	34.18	3.68	0.00	76.97	70.95	105.20	34.25
5650.00	27.62	PK	V	34.16	3.63	0.00	65.41	59.39	68.20	8.81
11510.00	41.49	PK	V	39.00	6.59	25.50	61.58	55.56	74.00	18.44
11510.00	28.20	AV	V	39.00	6.59	25.50	48.29	42.27	54.00	11.73
17265.00	35.15	PK	V	41.74	8.79	23.69	61.99	55.97	68.20	12.23
High Channel: 5795 MHz										
5795.00	70.83	PK	H	34.22	3.71	0.00	108.76	102.74	N/A	N/A
5795.00	60.45	AV	H	34.22	3.71	0.00	98.38	92.36	N/A	N/A
5795.00	74.70	PK	V	34.22	3.71	0.00	112.63	106.61	N/A	N/A
5795.00	63.80	AV	V	34.22	3.71	0.00	101.73	95.71	N/A	N/A
5850.00	34.19	PK	V	34.24	3.75	0.00	72.18	66.16	122.20	56.04
5855.00	32.71	PK	V	34.24	3.75	0.00	70.70	64.68	110.80	46.12
5875.00	32.38	PK	V	34.25	3.77	0.00	70.40	64.38	105.20	40.82
5925.00	28.60	PK	V	34.27	3.80	0.00	66.67	60.65	68.20	7.55
11590.00	40.91	PK	V	39.00	6.62	25.45	61.08	55.06	74.00	18.94
11590.00	28.71	AV	V	39.00	6.62	25.45	48.88	42.86	54.00	11.14
17385.00	35.64	PK	V	42.43	8.82	23.57	63.32	57.3	68.20	10.90

802.11ax hew40(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)	Fac vhtor (dB/m)						
Low Channel: 5755 MHz										
5755.00	70.73	PK	H	34.20	3.70	0.00	108.63	102.61	N/A	N/A
5755.00	59.42	AV	H	34.20	3.70	0.00	97.32	91.3	N/A	N/A
5755.00	74.12	PK	V	34.20	3.70	0.00	112.02	106	N/A	N/A
5755.00	63.73	AV	V	34.20	3.70	0.00	101.63	95.61	N/A	N/A
5725.00	42.36	PK	V	34.19	3.69	0.00	80.24	74.22	122.20	47.98
5720.00	41.17	PK	V	34.19	3.69	0.00	79.05	73.03	110.80	37.77
5700.00	39.15	PK	V	34.18	3.68	0.00	77.01	70.99	105.20	34.21
5650.00	27.70	PK	V	34.16	3.63	0.00	65.49	59.47	68.20	8.73
11510.00	41.41	PK	V	39.00	6.59	25.50	61.50	55.48	74.00	18.52
11510.00	28.16	AV	V	39.00	6.59	25.50	48.25	42.23	54.00	11.77
17265.00	35.23	PK	V	41.74	8.79	23.69	62.07	56.05	68.20	12.15
High Channel: 5795 MHz										
5795.00	70.83	PK	H	34.22	3.71	0.00	108.76	102.74	N/A	N/A
5795.00	60.45	AV	H	34.22	3.71	0.00	98.38	92.36	N/A	N/A
5795.00	74.43	PK	V	34.22	3.71	0.00	112.36	106.34	N/A	N/A
5795.00	63.72	AV	V	34.22	3.71	0.00	101.65	95.63	N/A	N/A
5850.00	34.11	PK	V	34.24	3.75	0.00	72.10	66.08	122.20	56.12
5855.00	32.83	PK	V	34.24	3.75	0.00	70.82	64.8	110.80	46.00
5875.00	32.30	PK	V	34.25	3.77	0.00	70.32	64.3	105.20	40.90
5925.00	28.52	PK	V	34.27	3.80	0.00	66.59	60.57	68.20	7.63
11590.00	40.83	PK	V	39.00	6.62	25.45	61.00	54.98	74.00	19.02
11590.00	28.75	AV	V	39.00	6.62	25.45	48.92	42.9	54.00	11.10
17385.00	35.56	PK	V	42.43	8.82	23.57	63.24	57.22	68.20	10.98

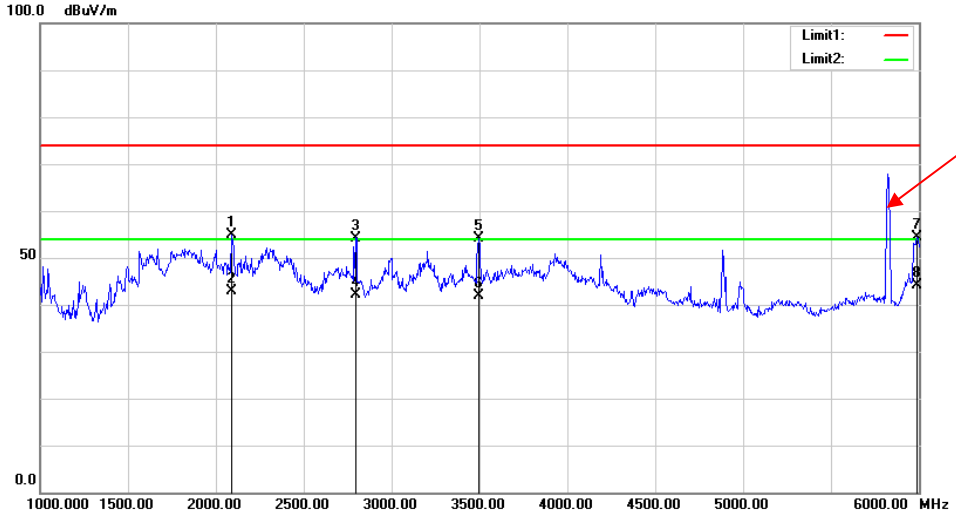
802.11ac vht80(2TX was the worst)

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)	Fac vhtor (dB/m)						
Middle Channel: 5775 MHz										
5775.00	68.33	PK	H	34.21	3.70	0.00	106.24	100.22	N/A	N/A
5775.00	58.45	AV	H	34.21	3.70	0.00	96.36	90.34	N/A	N/A
5775.00	71.34	PK	V	34.21	3.70	0.00	109.25	103.23	N/A	N/A
5775.00	61.56	AV	V	34.21	3.70	0.00	99.47	93.45	N/A	N/A
5725.00	41.01	PK	V	34.19	3.69	0.00	78.89	72.87	122.20	49.33
5720.00	39.52	PK	V	34.19	3.69	0.00	77.40	71.38	110.80	39.42
5700.00	39.16	PK	V	34.18	3.68	0.00	77.02	71	105.20	34.20
5650.00	31.54	PK	V	34.16	3.63	0.00	69.33	63.31	68.20	4.89
5850.00	38.34	PK	V	34.24	3.75	0.00	76.33	70.31	122.20	51.89
5855.00	37.65	PK	V	34.24	3.75	0.00	75.64	69.62	110.80	41.18
5875.00	36.45	PK	V	34.25	3.77	0.00	74.47	68.45	105.20	36.75
5925.00	30.44	PK	V	34.27	3.80	0.00	68.51	62.49	68.20	5.71
11550.00	37.17	PK	V	39.00	6.61	25.48	57.30	51.28	74.00	22.72
11550.00	25.14	AV	V	39.00	6.61	25.48	45.27	39.25	54.00	14.75
17325.00	35.89	PK	V	42.09	8.80	23.63	63.15	57.13	68.20	11.07

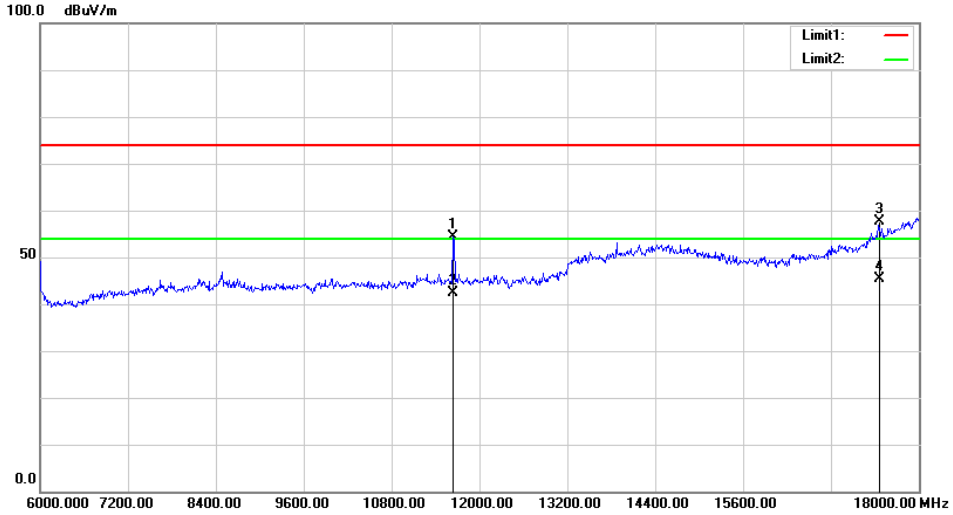
802.11ax hew80(2TX was the worst)

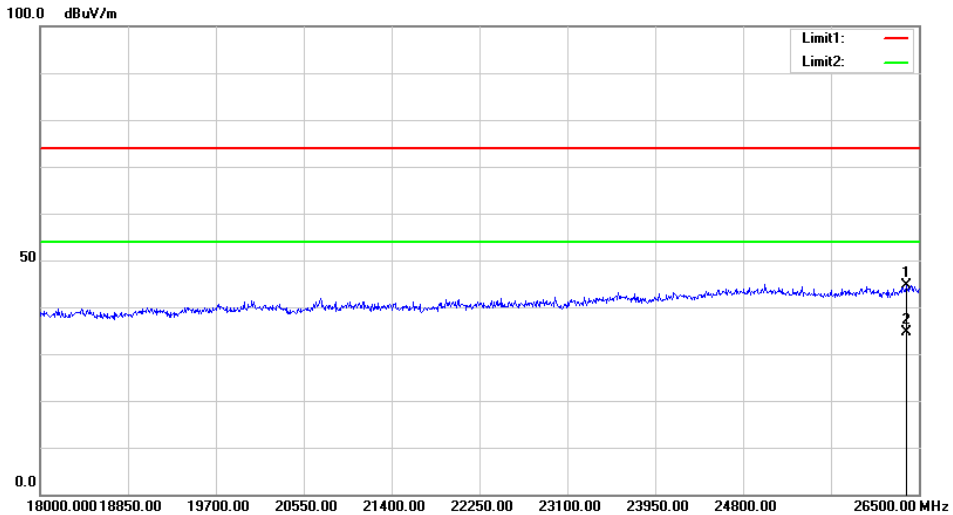
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Fac vhtor (dB/m)						
Middle Channel: 5775 MHz										
5775.00	68.54	PK	H	34.21	3.70	0.00	106.45	100.43	N/A	N/A
5775.00	58.42	AV	H	34.21	3.70	0.00	96.33	90.31	N/A	N/A
5775.00	71.92	PK	V	34.21	3.70	0.00	109.83	103.81	N/A	N/A
5775.00	61.21	AV	V	34.21	3.70	0.00	99.12	93.1	N/A	N/A
5725.00	41.08	PK	V	34.19	3.69	0.00	78.96	72.94	122.20	49.26
5720.00	39.62	PK	V	34.19	3.69	0.00	77.50	71.48	110.80	39.32
5700.00	39.18	PK	V	34.18	3.68	0.00	77.04	71.02	105.20	34.18
5650.00	31.93	PK	V	34.16	3.63	0.00	69.72	63.7	68.20	4.50
5850.00	39.89	PK	V	34.24	3.75	0.00	77.88	71.86	122.20	50.34
5855.00	38.78	PK	V	34.24	3.75	0.00	76.77	70.75	110.80	40.05
5875.00	37.46	PK	V	34.25	3.77	0.00	75.48	69.46	105.20	35.74
5925.00	30.11	PK	V	34.27	3.80	0.00	68.18	62.16	68.20	6.04
11550.00	37.22	PK	V	39.00	6.61	25.48	57.35	51.33	74.00	22.67
11550.00	25.10	AV	V	39.00	6.61	25.48	45.23	39.21	54.00	14.79
17325.00	35.82	PK	V	42.09	8.80	23.63	63.08	57.06	68.20	11.14

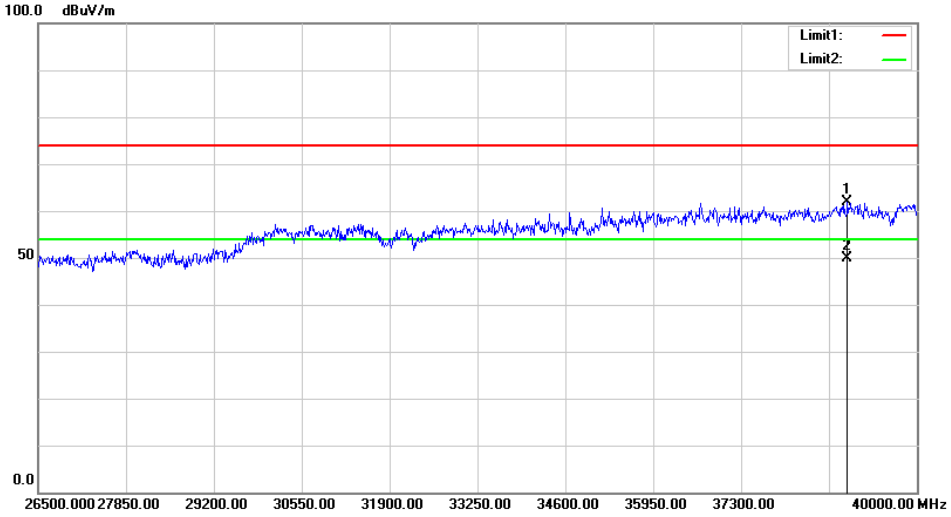
Test Plots(For worst mode 802.11a chain 1 5825MHz)
Horizontal



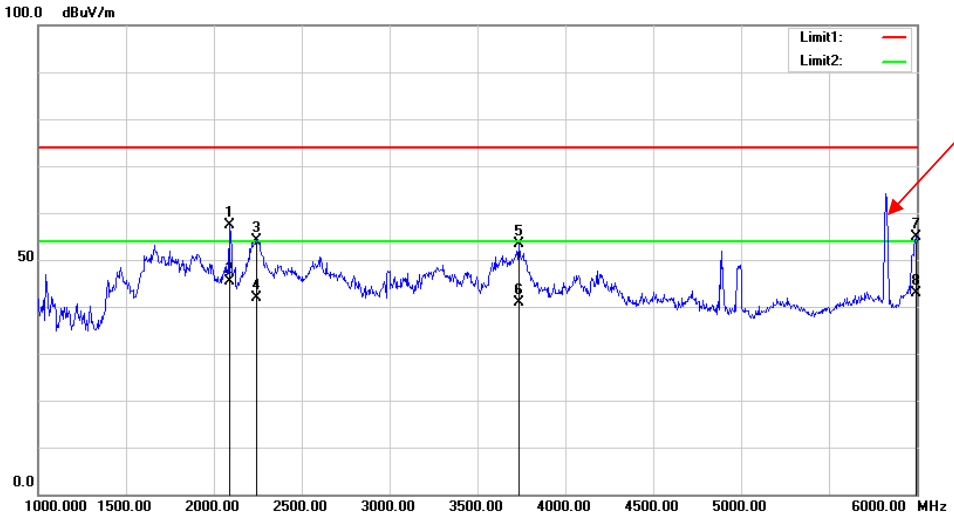
Fundamental Test with Band Rejection Filter



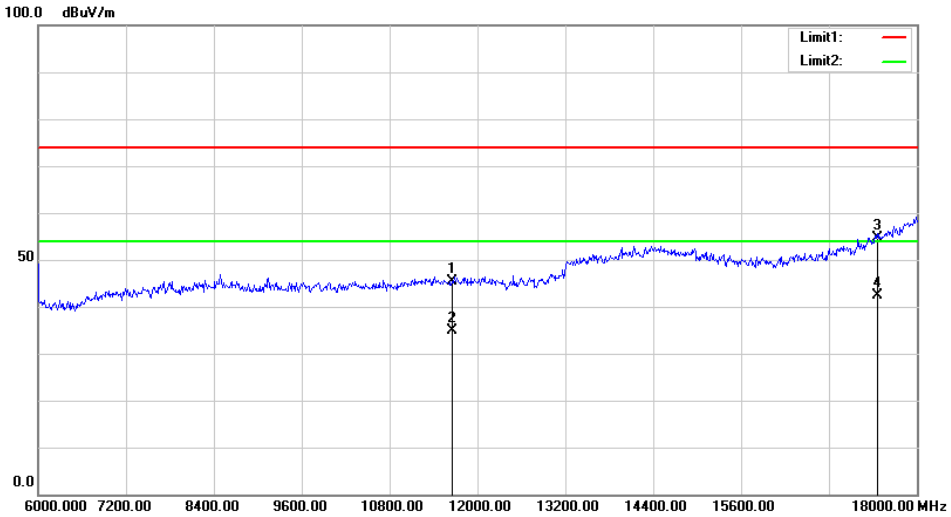


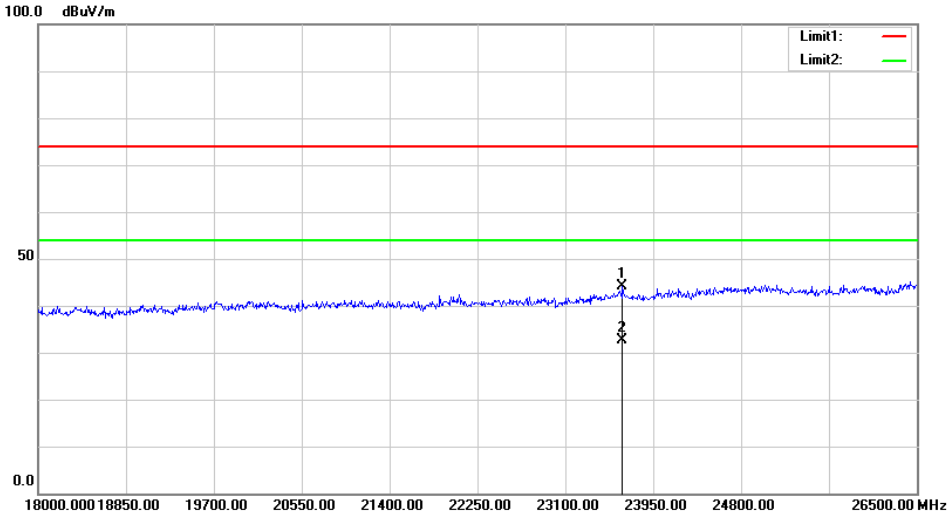


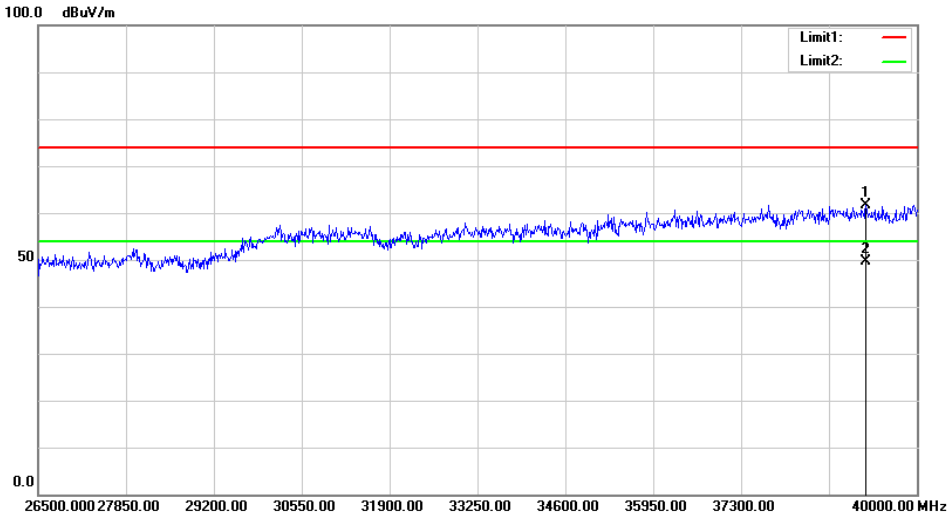
Vertical



Fundamental Test with Band Rejection Filter




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


100.0 dBuV/m
Limit1:
Limit2:
50
0.0
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	FSP 38	100478	2020-05-09	2021-05-09
Unknown	Coaxial Cable	C-SJ00-0010	C0010/03	Each time	N/A
E-Microwave	Blocking Control	EMDCB-00036	0E01201048	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:	27.9~29.8°C
Relative Humidity:	52~64 %
ATM Pressure:	100.1~100.9kPa
Tester:	Lucy Lu
Test Date:	2020-06-18~2020-06-28

Test Result: Pass.

Please refer to the following tables and plots.

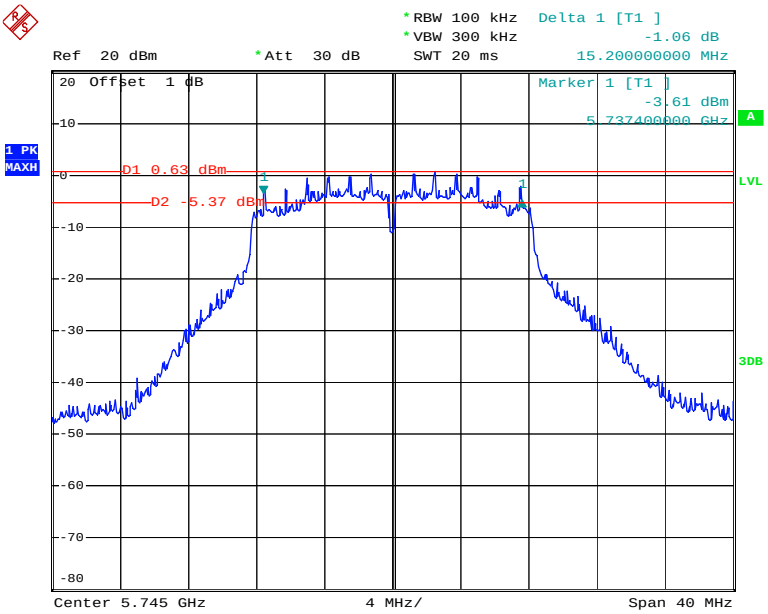
Test mode: Transmitting (test was only performed at chain 0)

Mode	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	6 dB Emission Bandwidth Limits (MHz)	99% Occupied Bandwidth (MHz)
802.11 a	5745	15.200	≥0.5	16.96
	5785	15.360	≥0.5	16.96
	5825	15.200	≥0.5	16.88
802.11n ht20	5745	15.200	≥0.5	18.00
	5785	15.200	≥0.5	18.00
	5825	15.360	≥0.5	18.00
802.11ax hew20	5745	19.120	≥0.5	19.28
	5785	19.200	≥0.5	19.20
	5825	19.120	≥0.5	19.20
802.11n ht40	5755	35.360	≥0.5	36.48
	5795	35.200	≥0.5	36.48
802.11ax hew40	5755	38.080	≥0.5	38.24
	5795	38.080	≥0.5	38.56
802.11ac vht80	5775	76.800	≥0.5	76.48
802.11ax hew80	5775	78.080	≥0.5	78.08

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

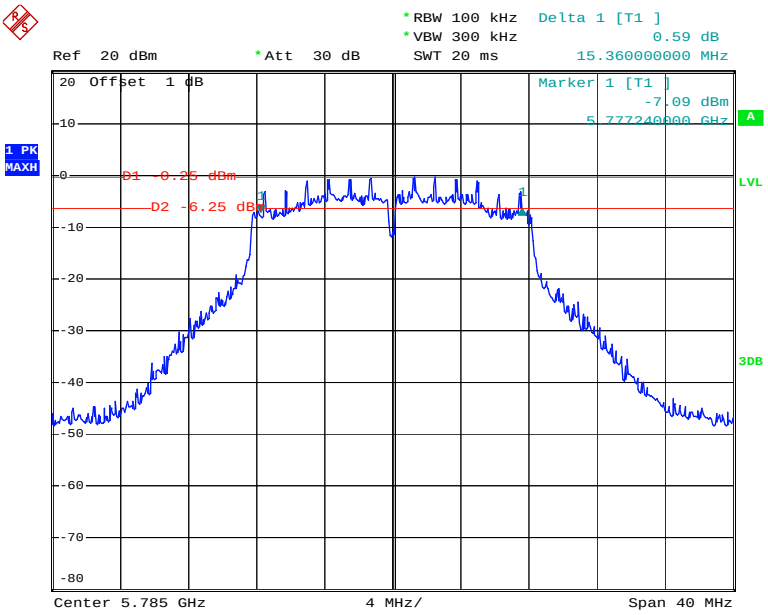
6dB Emission Bandwidth:

802.11a Low Channel



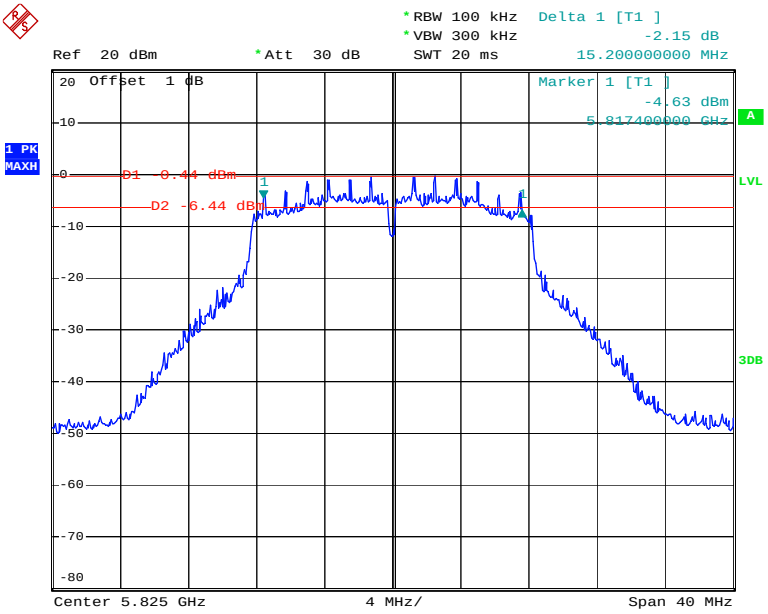
Date: 18.JUN.2020 16:49:11

802.11a Middle Channel



Date: 18.JUN.2020 16:50:58

802.11a High Channel



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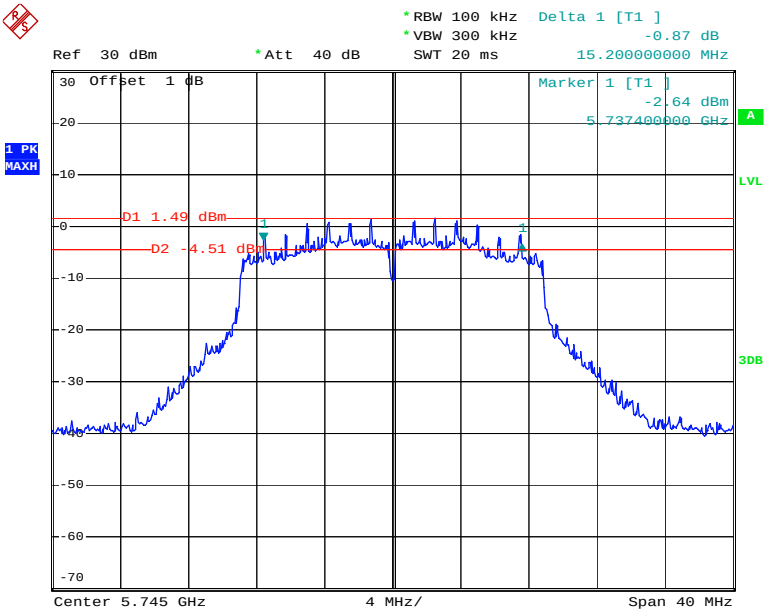
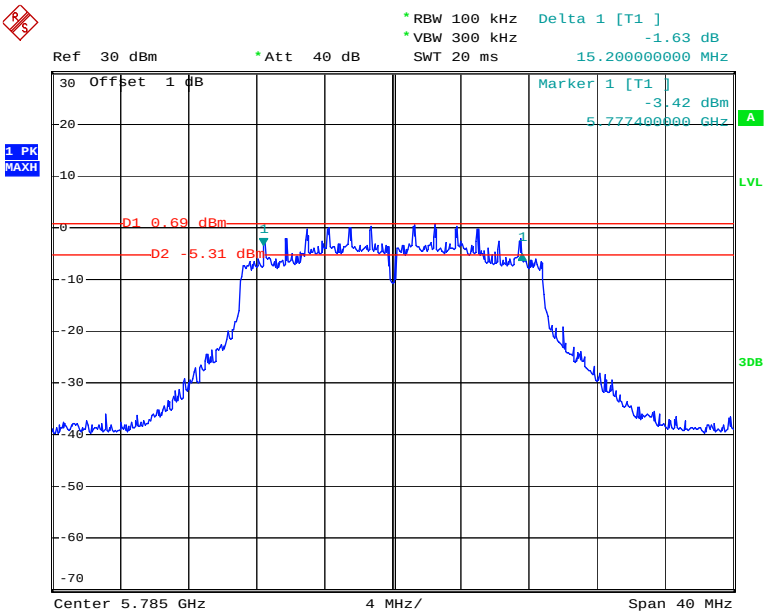
802.11n ht20 Low Channel



Date: 28.JUN.2020 12:01:17

802.11n ht20 Middle Channel



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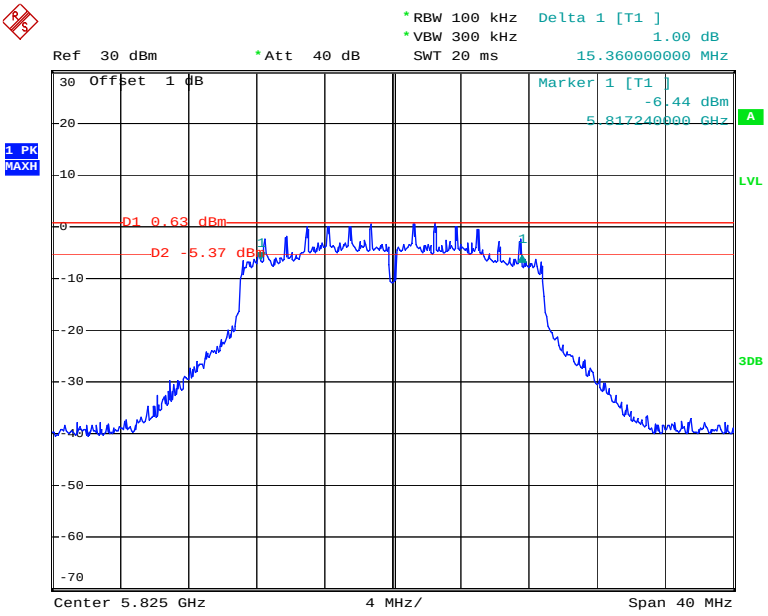
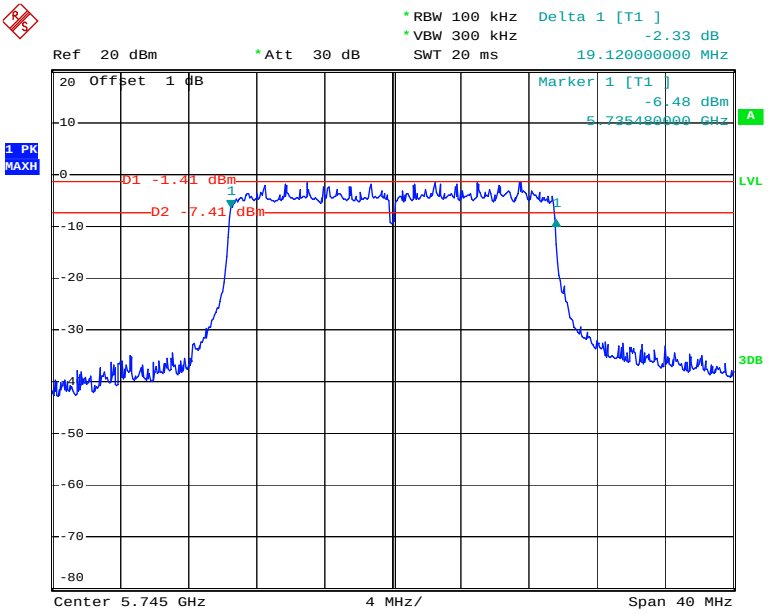
802.11n ht20 High Channel



Date: 28.JUN.2020 11:59:21

802.11ax hew20 Low Channel



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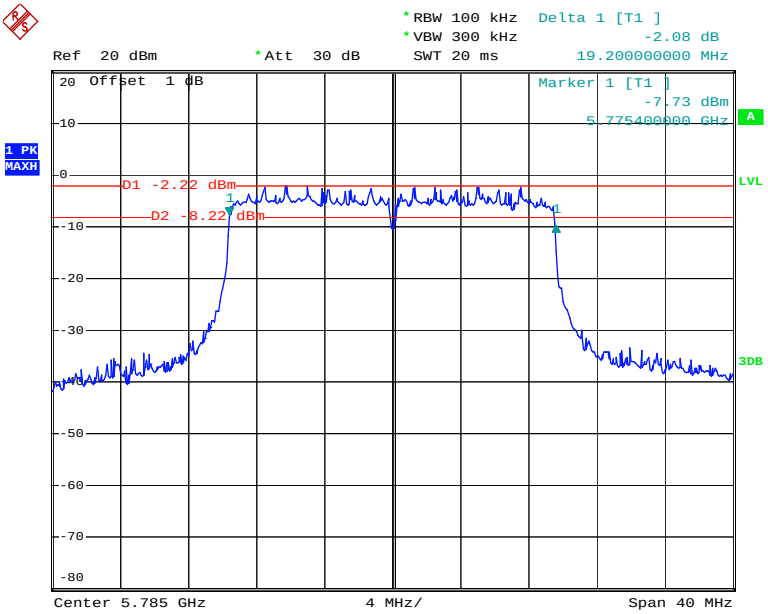
802.11ax hew20 Middle Channel



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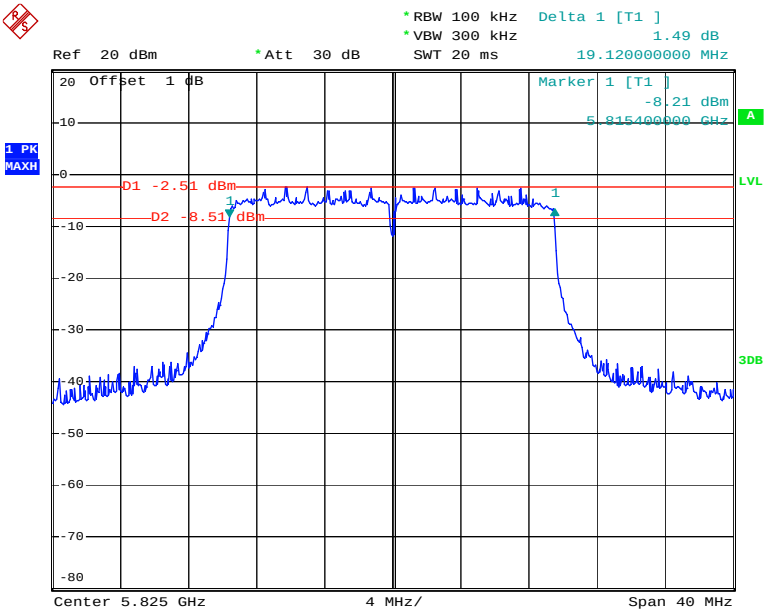
802.11ax hew20 High Channel



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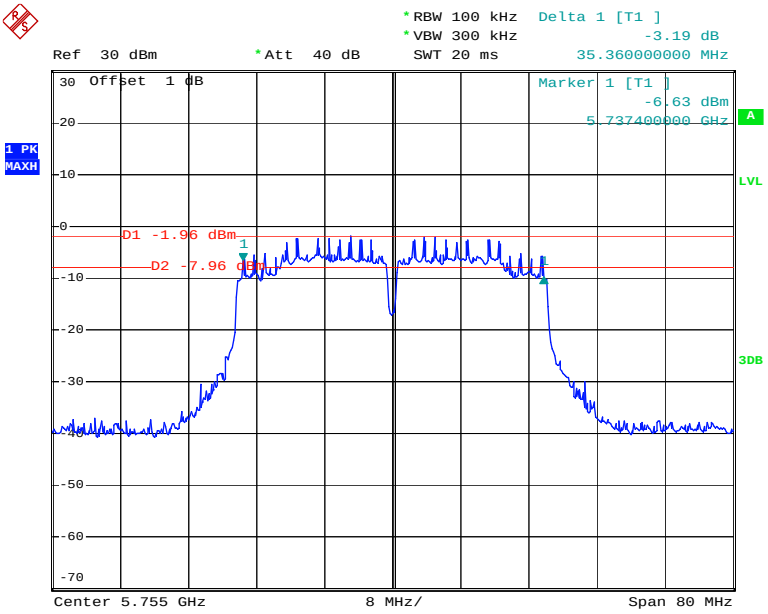
802.11n ht40 Low Channel



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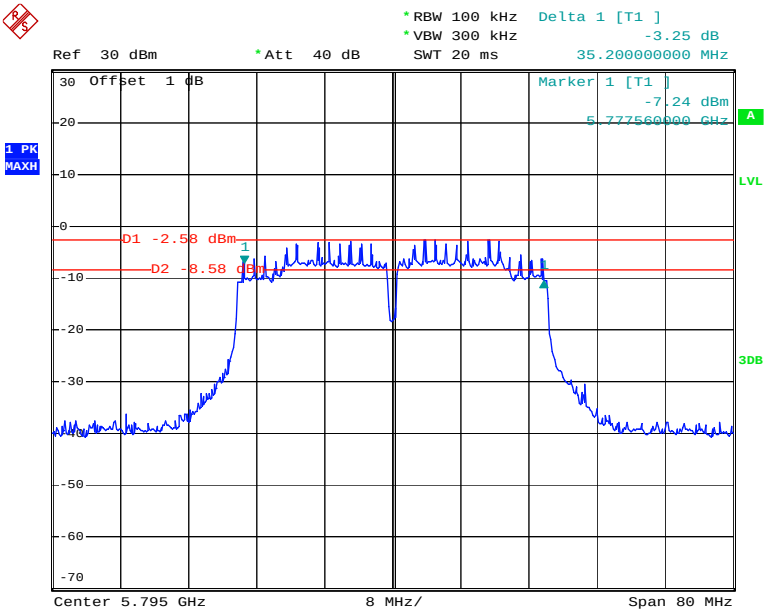
802.11n ht40 High Channel



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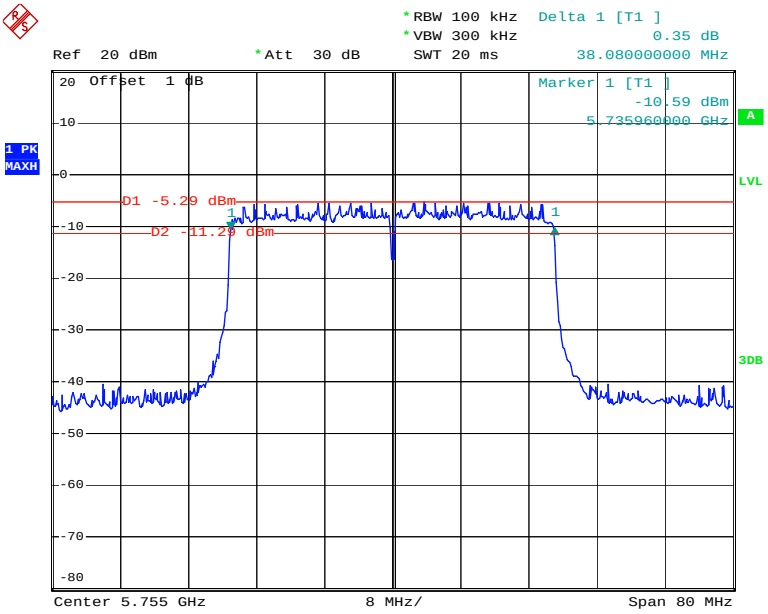
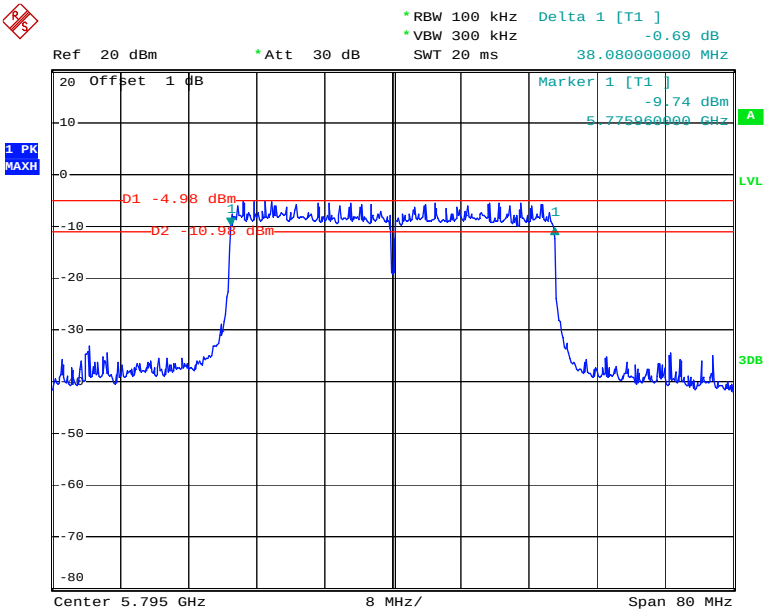
802.11ax hew40 Low Channel



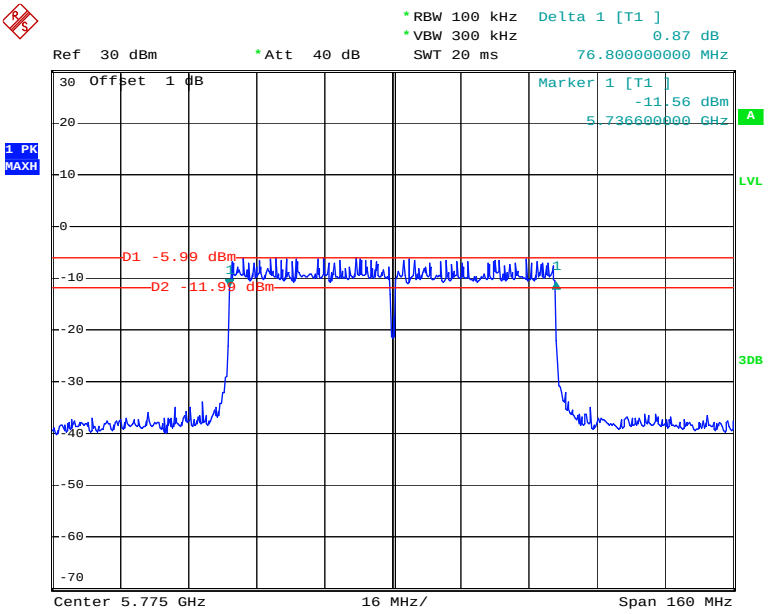
Date: 18.JUN.2020 17:08:54

802.11ax hew40 High Channel



Date: 18.JUN.2020 17:11:56

802.11ac vht80 Middle Channel



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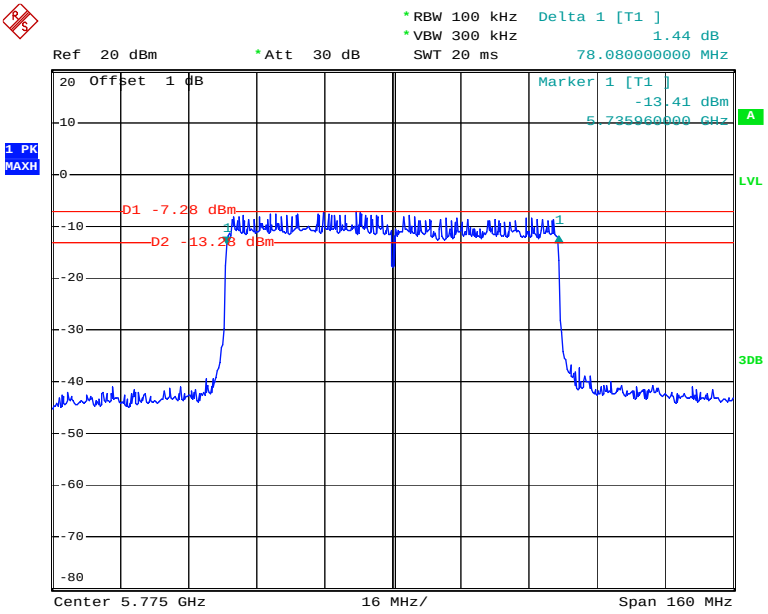
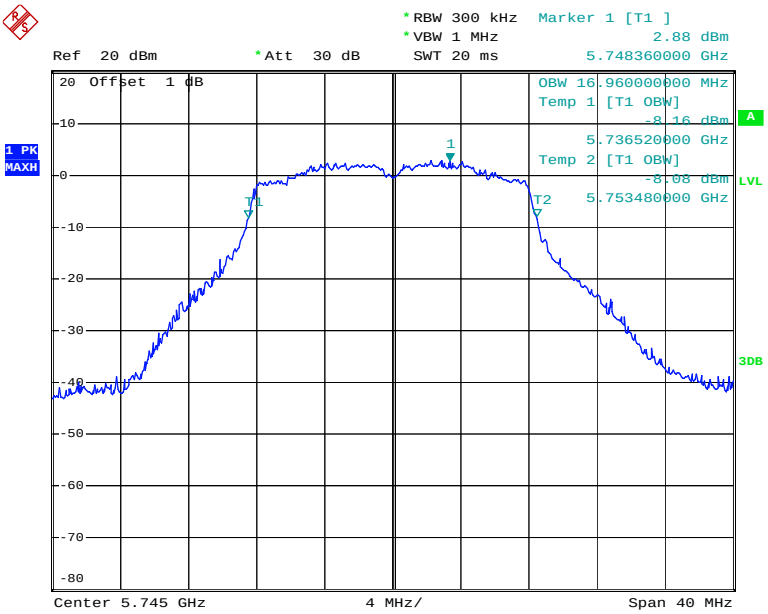
802.11ax hew80 Middle Channel



Date: 18.JUN.2020 17:07:29

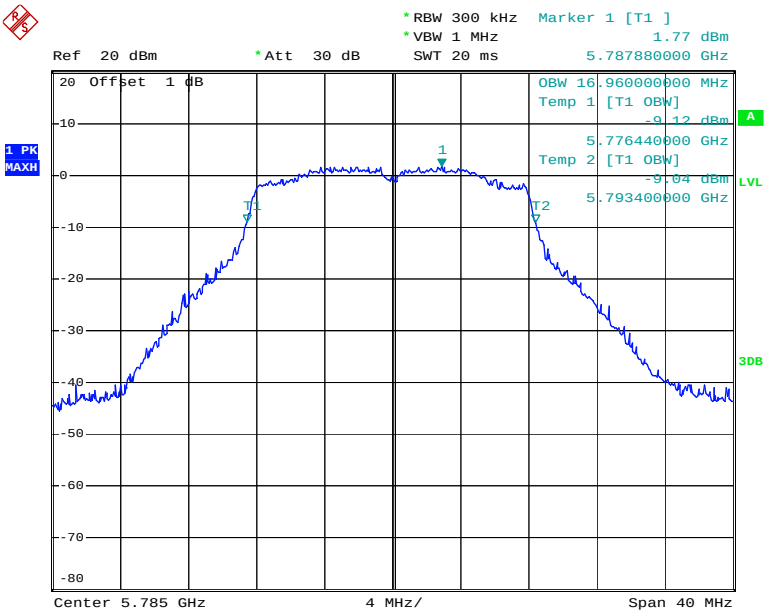
99% Occupied Bandwidth:

802.11a Low Channel



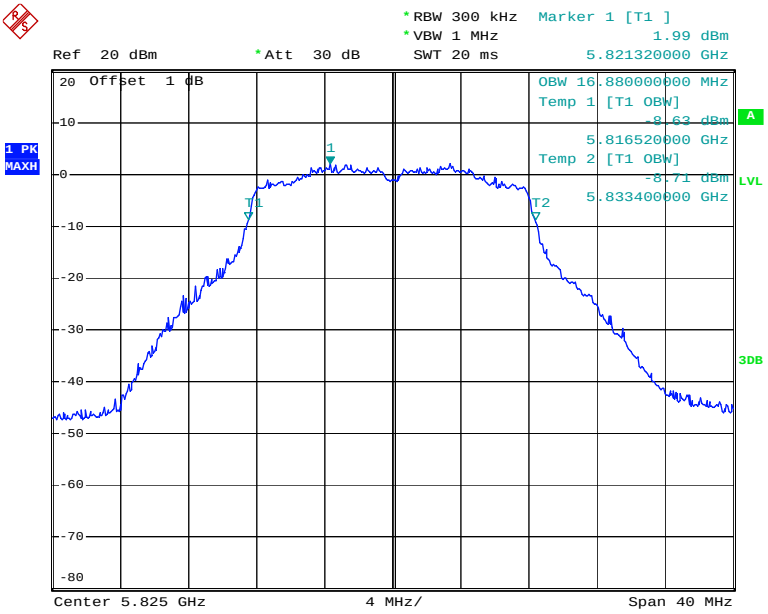
Date: 18.JUN.2020 16:49:24

802.11a Middle Channel



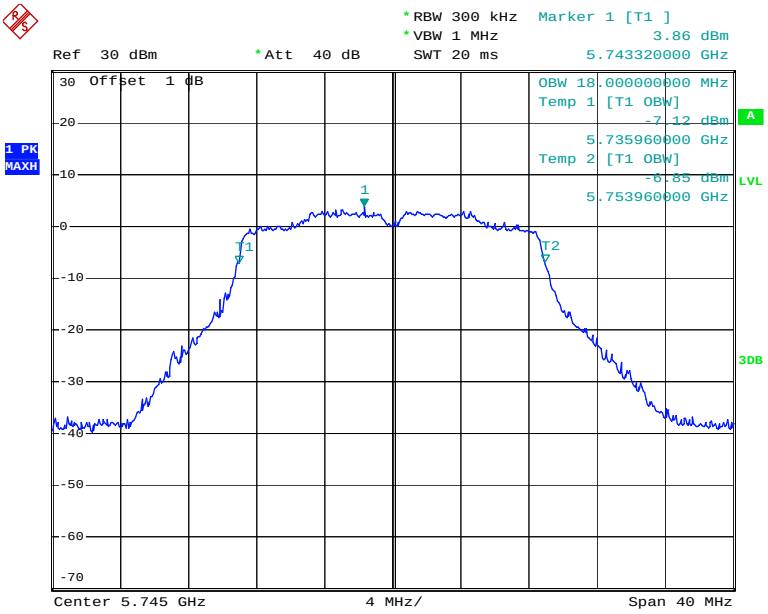
Date: 18.JUN.2020 16:51:11

802.11a High Channel



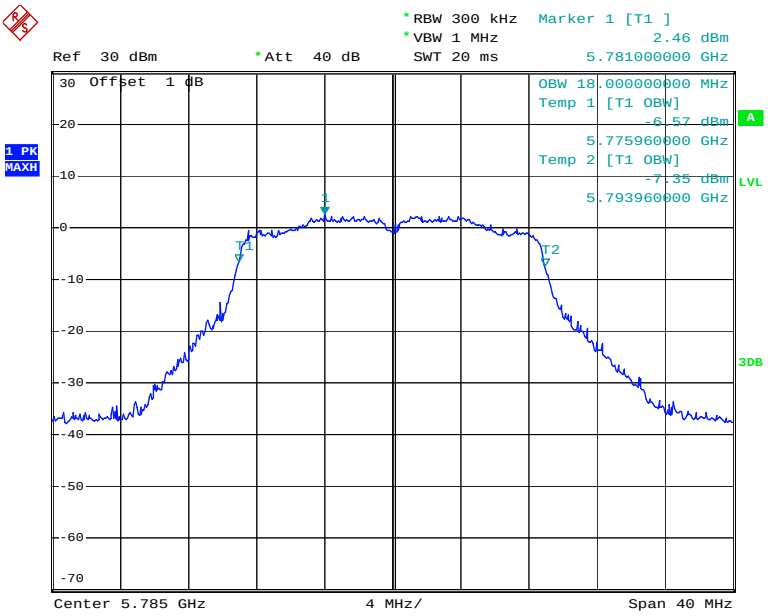
Date: 18.JUN.2020 16:52:11

802.11n ht20 Low Channel



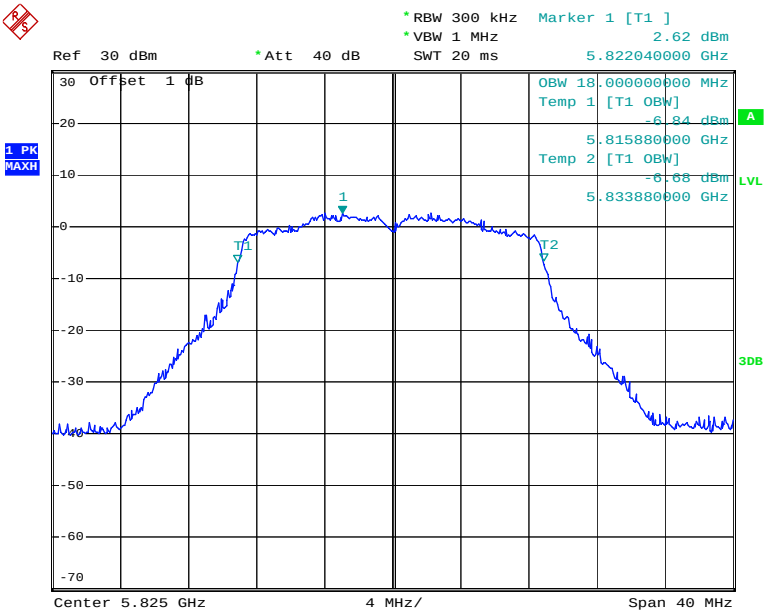
Date: 28.JUN.2020 12:01:30

802.11n ht20 Middle Channel



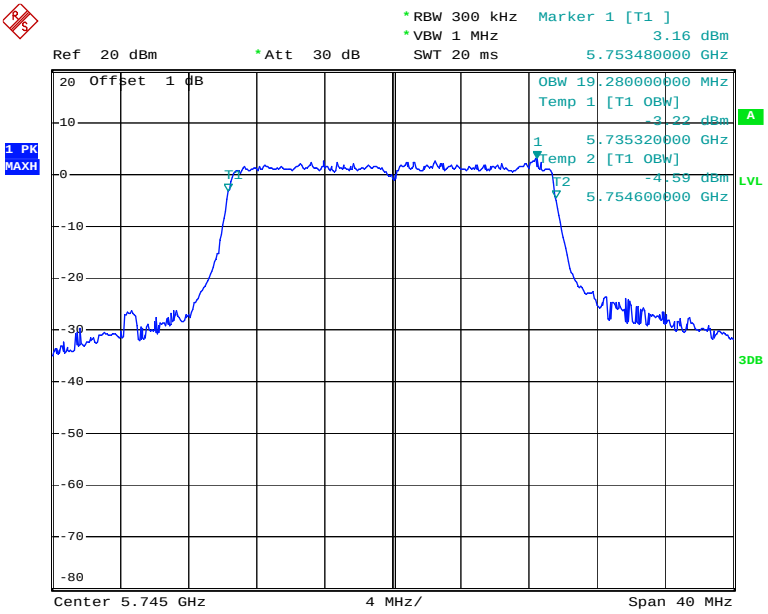
Date: 28.JUN.2020 12:00:36

802.11n ht20 High Channel



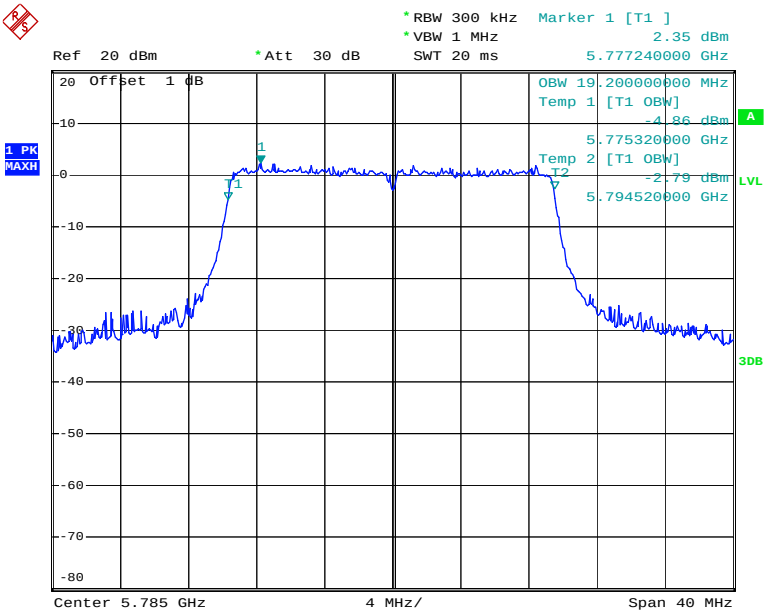
Date: 28.JUN.2020 11:59:34

802.11ax hew20 Low Channel



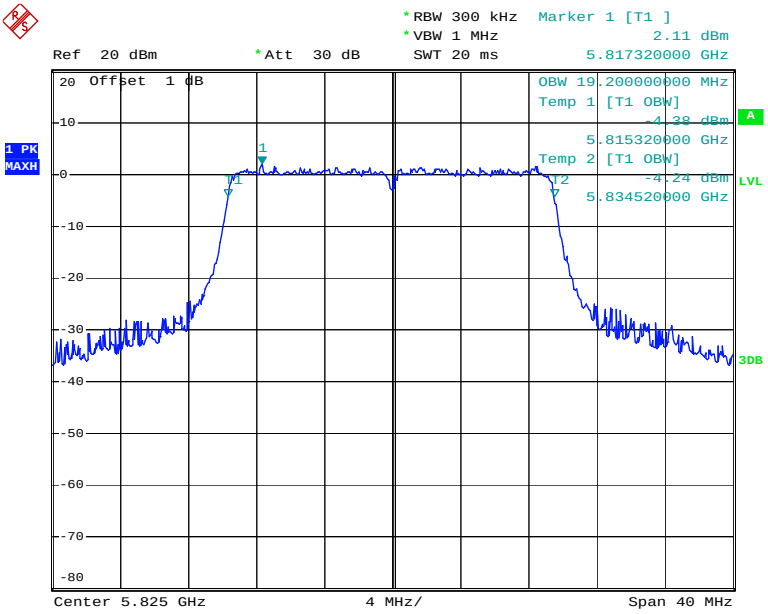
Date: 18.JUN.2020 16:57:33

802.11ax hew20 Middle Channel



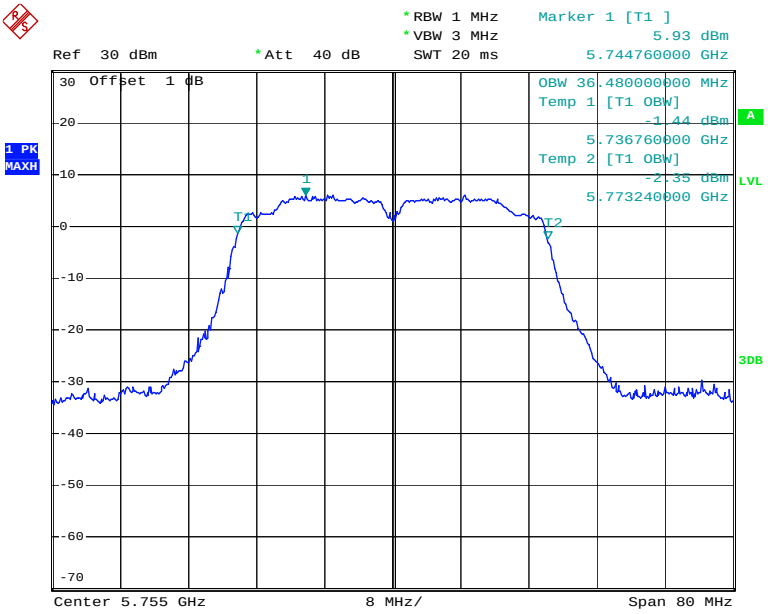
Date: 18.JUN.2020 16:56:15

802.11ax hew20 High Channel



Date: 18.JUN.2020 16:54:20

802.11n ht40 Low Channel



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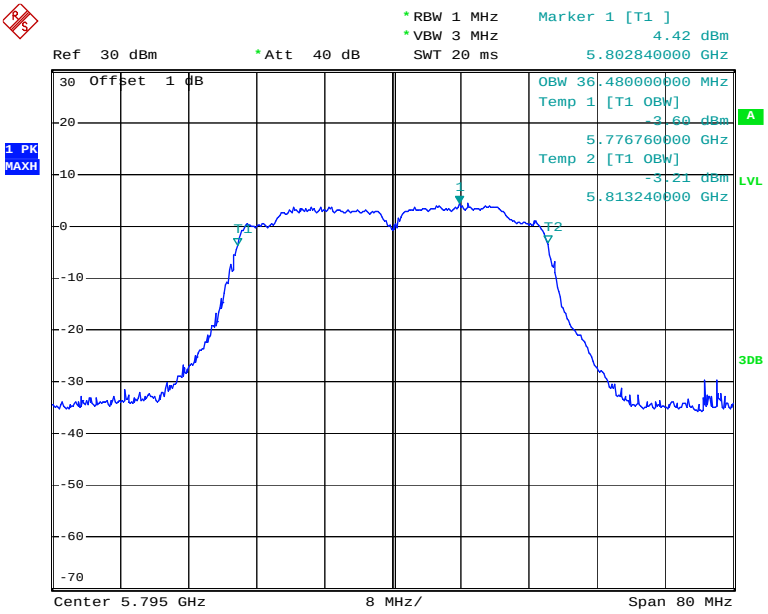
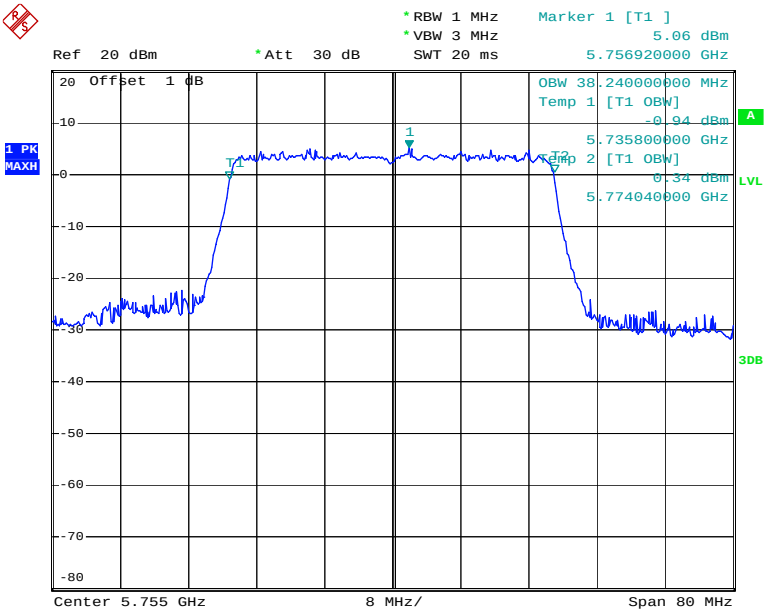
802.11n ht40 High Channel



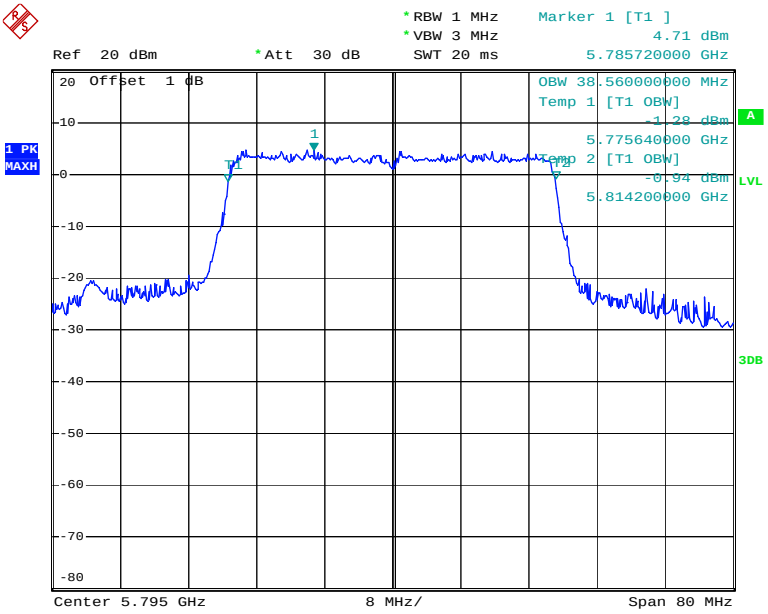
Date: 28.JUN.2020 12:17:08

802.11ax hew40 Low Channel



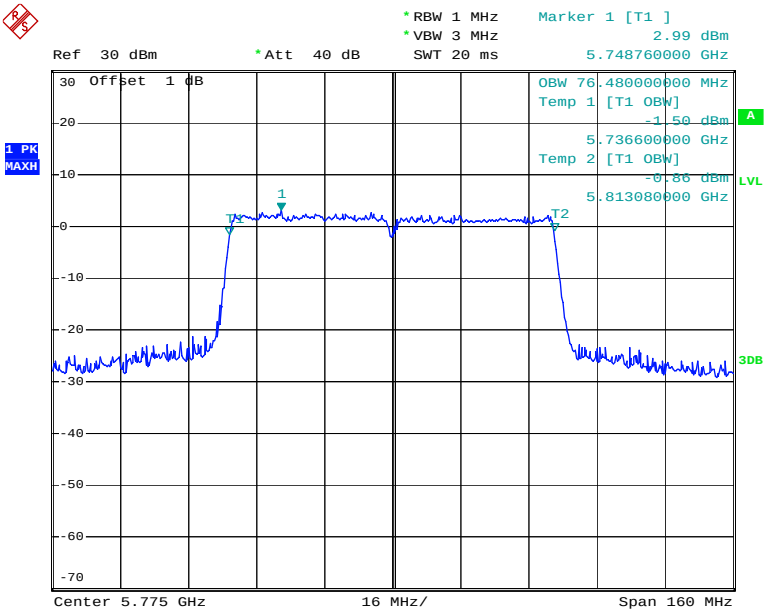
Date: 18.JUN.2020 17:09:11

802.11ax hew40 High Channel



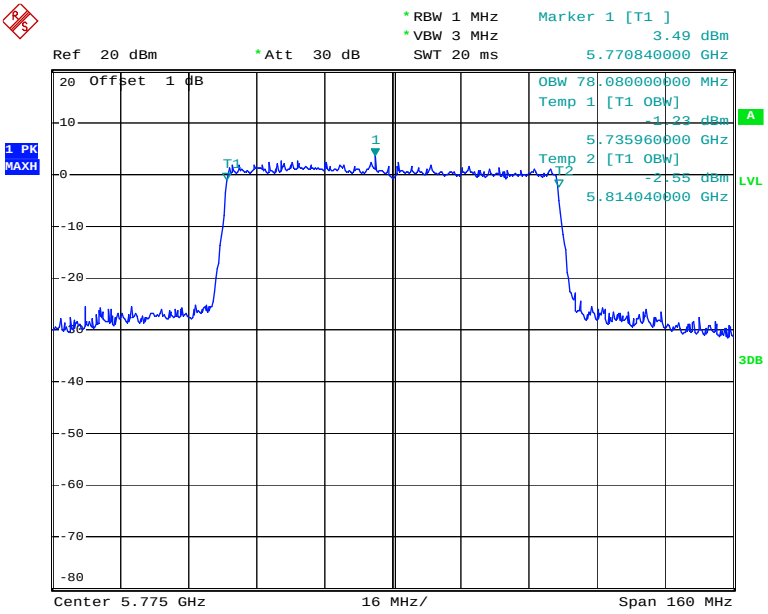
Date: 18.JUN.2020 17:12:09

802.11ac vht80 Middle Channel



Date: 28.JUN.2020 12:54:36

802.11ax hew80 Middle Channel



Date: 18.JUN.2020 17:07:50

FCC §15.407(a) –MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.407(a)

(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
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each time	N/A
E-Microwave	Blocking Control	EMDCB-00036	0E01201048	Each time	N/A
E-Microwave	Coaxial Attenuators	EMCA10-5RN-6	OE01203239	Each Time	N/A
Agilent	USB Wideband Power Sensor	U2021XA	MY5425009	2020-05-09	2021-05-09

*** 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

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

Test Data

Environmental Conditions

Temperature:	23.9°C
Relative Humidity:	52 %
ATM Pressure:	101.6 kPa
Tester:	Lucy Lu
Test Date:	2020-04-16

Test Mode: Transmitting

Mode	Frequency (MHz)	Conducted Average Output Power (dBm)			Limit (dBm)
		Chain 0	Chain 1	Total	
802.11 a	5745	11.99	13.66	/	30
	5785	11.26	13.88	/	30
	5825	10.45	13.75	/	30
802.11n ht20	5745	12.54	12.75	15.66	30
	5785	12.23	12.41	15.33	30
	5825	12.05	12.04	15.06	30
802.11ax hew20	5745	11.92	12.47	15.21	30
	5785	11.62	12.26	14.96	30
	5825	11.12	11.89	14.53	30
802.11n ht40	5755	12.02	12.87	15.48	30
	5795	11.43	12.57	15.05	30
802.11ax hew40	5755	11.12	12.03	14.61	30
	5795	10.67	12.12	14.47	30
802.11ac vht80	5775	11.54	12.49	15.05	30
802.11ax hew80	5775	11.06	12.19	14.67	30

Note:
The duty cycle factor has been calculated into the test data.
The maximum antenna gain is 6 dBi. 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 NANT ≤ 4;

So:

Directional gain = GANT + Array Gain = 6 dBi

FCC §15.407(a) - POWER SPECTRAL DENSITY

Applicable Standard

According to FCC §15.407(a)

(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	FSP 38	100478	2020-05-09	2021-05-09
Unknown	Coaxial Cable	C-SJ00-0010	C0010/03	Each time	N/A
E-Microwave	Blocking Control	EMDCB-00036	0E01201048	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:	27.9~29.8 °C
Relative Humidity:	52~64 %
ATM Pressure:	100.1~100.9 kPa
Tester:	Lucy Lu
Test Date:	2020-06-18~2020-06-28

Test Mode: Transmitting

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

Mode	Frequency (MHz)	Reading (dBm/300kHz)		Maximum Power Spectral Density (dBm/500kHz)			Limit (dBm/500kHz)
		Chain 0	Chain 1	Chain 0	Chain 1	Total	
802.11a	5745	-2.98	-1.48	-0.76	0.74	/	30
	5785	-3.71	-0.84	-1.49	1.38	/	30
	5825	-4.21	-0.99	-1.99	1.23	/	30
802.11n ht20	5745	-1.62	-3.17	0.60	-0.95	2.9	27
	5785	-2.29	-0.77	-0.07	1.45	3.77	27
	5825	-2.74	-0.68	-0.52	1.54	3.64	27
802.11ax hew20	5745	-4.50	-1.72	-2.28	0.50	2.34	27
	5785	-5.52	-3.36	-3.30	-1.14	0.92	27
	5825	-5.61	-3.67	-3.39	-1.45	0.7	27
802.11n ht40	5755	-5.37	-4.16	-3.15	-1.94	0.51	27
	5795	-7.34	-4.25	-5.12	-2.03	-0.3	27
802.11ax hew40	5755	-7.43	-6.36	-5.21	-4.14	-1.63	27
	5795	-8.47	-6.58	-6.25	-4.36	-2.19	27
802.11ac vht80	5775	-9.34	-7.07	-7.12	-4.85	-2.83	27
802.11ax hew80	5775	-11.10	-9.74	-8.88	-7.52	-5.14	27

Note:
The maximum antenna gain is 6 dBi. 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(NANT/NSS) dB.

So:

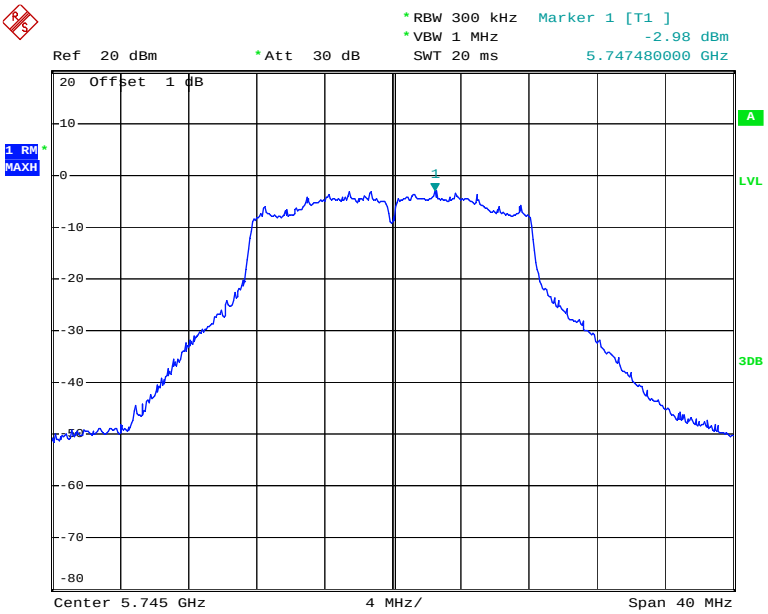
Directional gain = GANT + Array Gain = 6dBi+10*log(2/1)=9 dBi

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.

Method SA-3 in KDB 789033 D02 General UNII Test Procedures New Rules v02r01was used for PSD test.

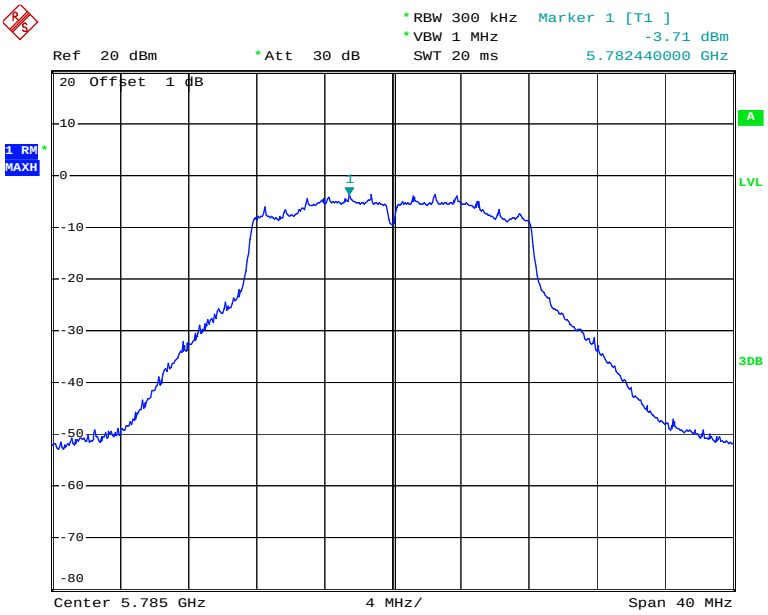
Chain 0

802.11a Low Channel



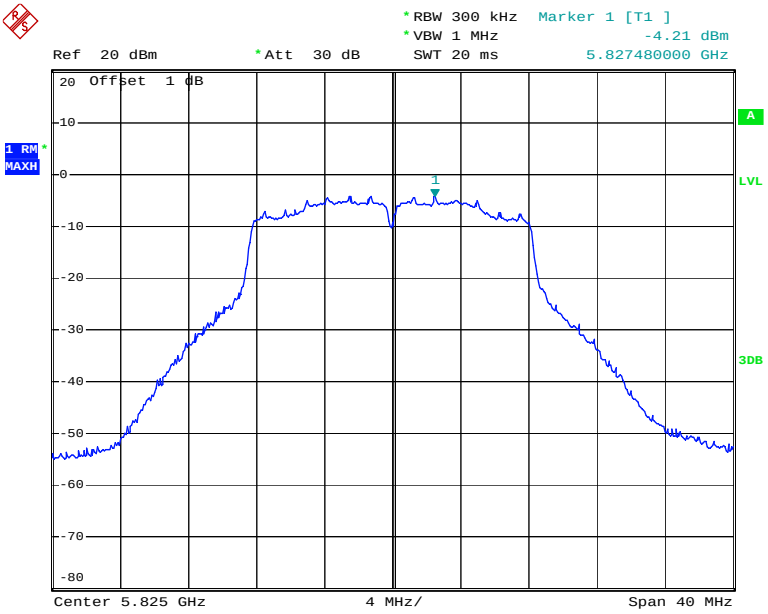
Date: 18.JUN.2020 16:49:36

802.11a Middle Channel



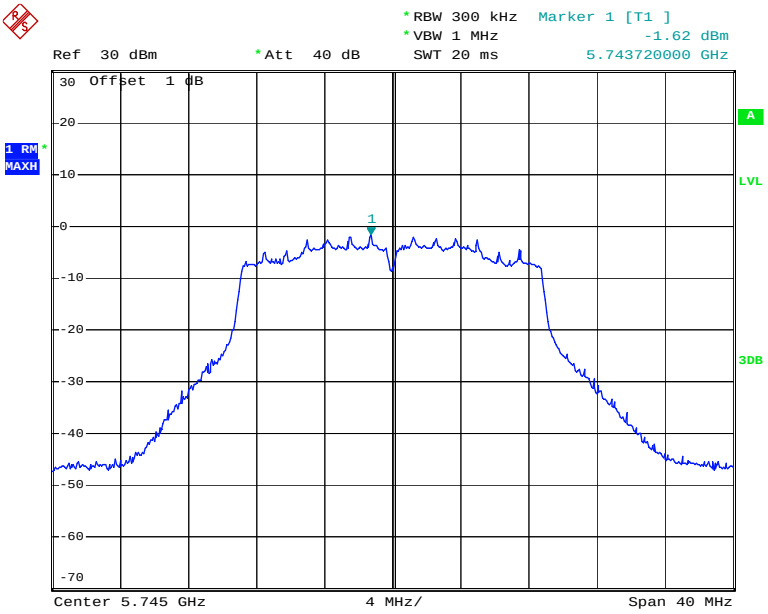
Date: 18.JUN.2020 16:51:23

802.11a High Channel



Date: 18.JUN.2020 16:52:23

802.11n ht20 Low Channel



Date: 28.JUN.2020 12:01:38

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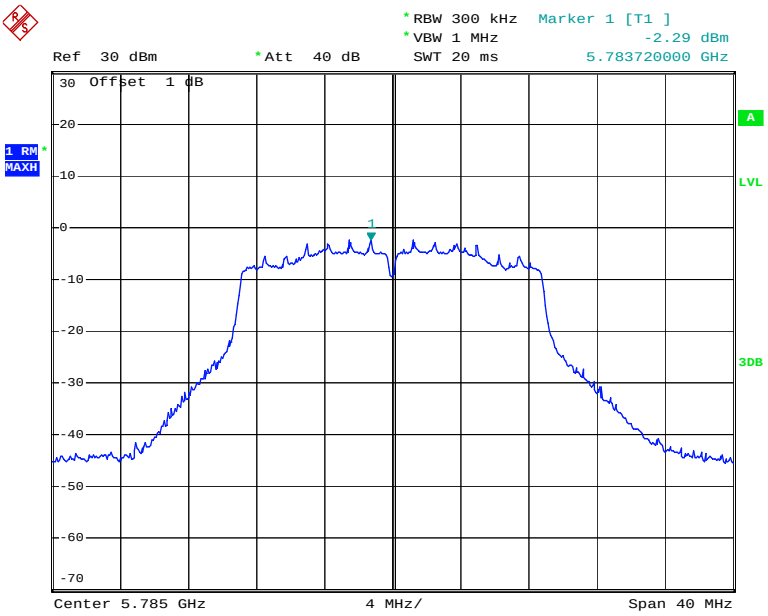

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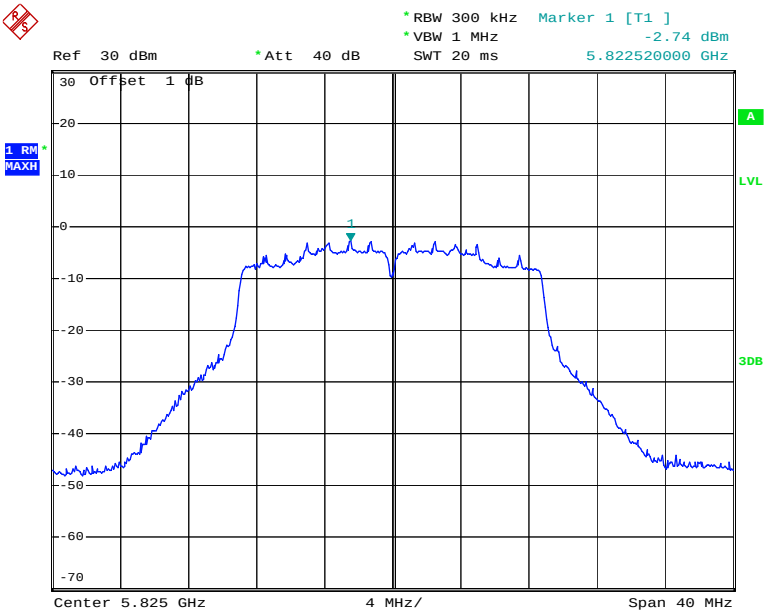
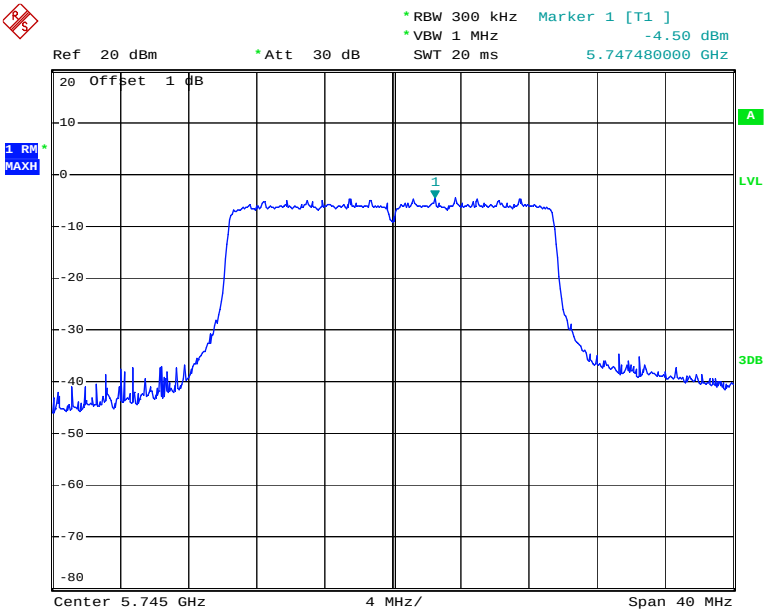


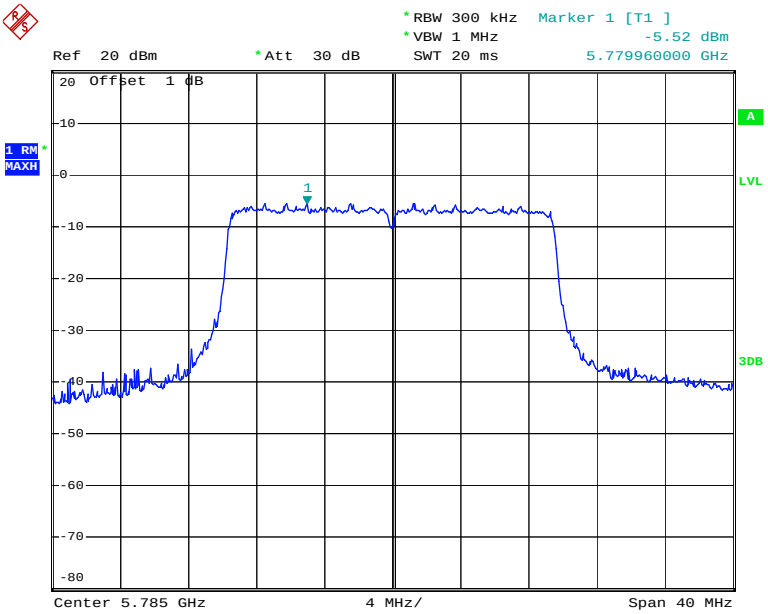
Date: 28.JUN.2020 11:59:42

802.11ax hew20 Low Channel



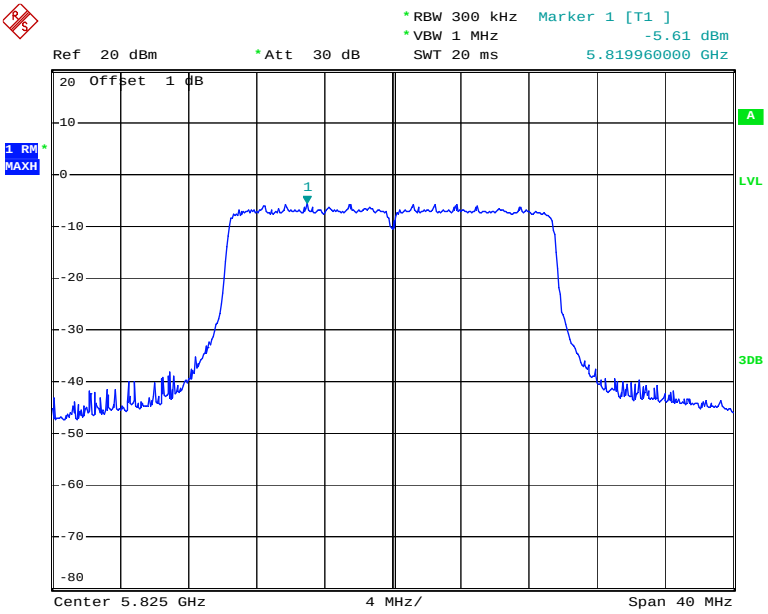
Date: 18.JUN.2020 16:57:46

802.11ax hew20 Middle Channel



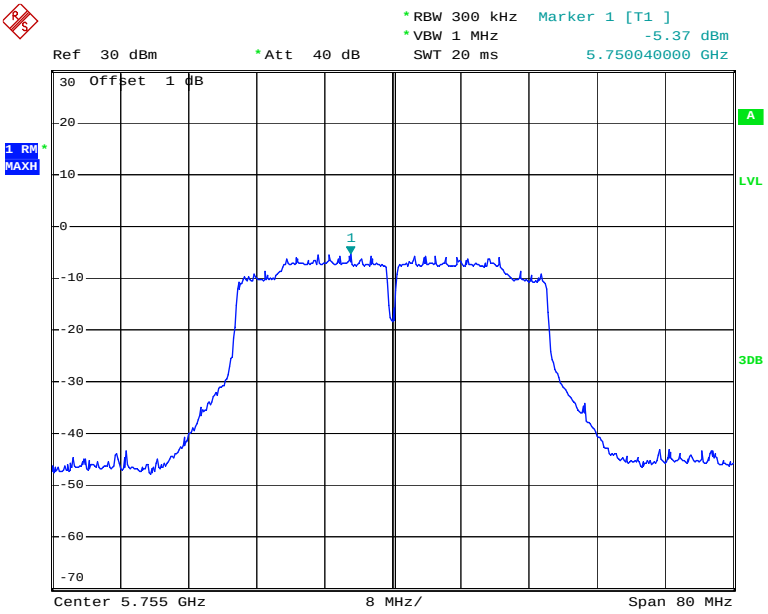
Date: 18.JUN.2020 16:56:27

802.11ax hew20 High Channel



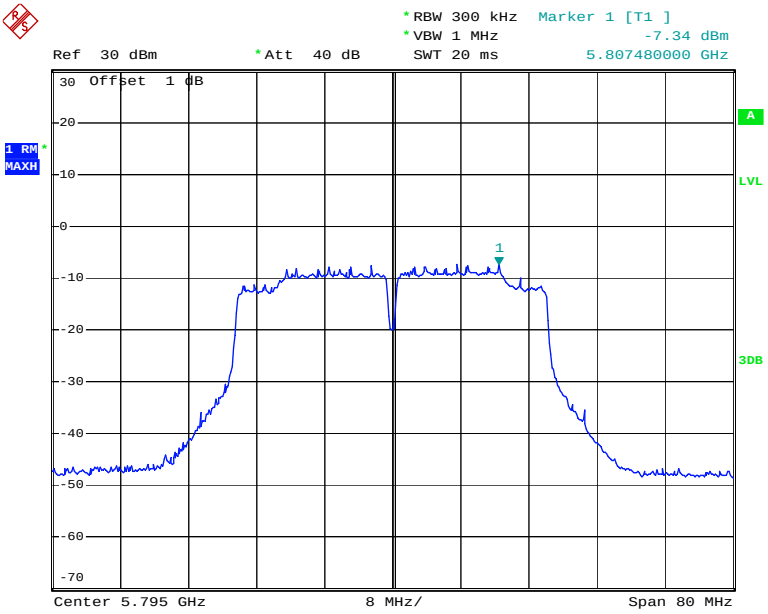
Date: 18.JUN.2020 16:54:33

802.11n ht40 Low Channel



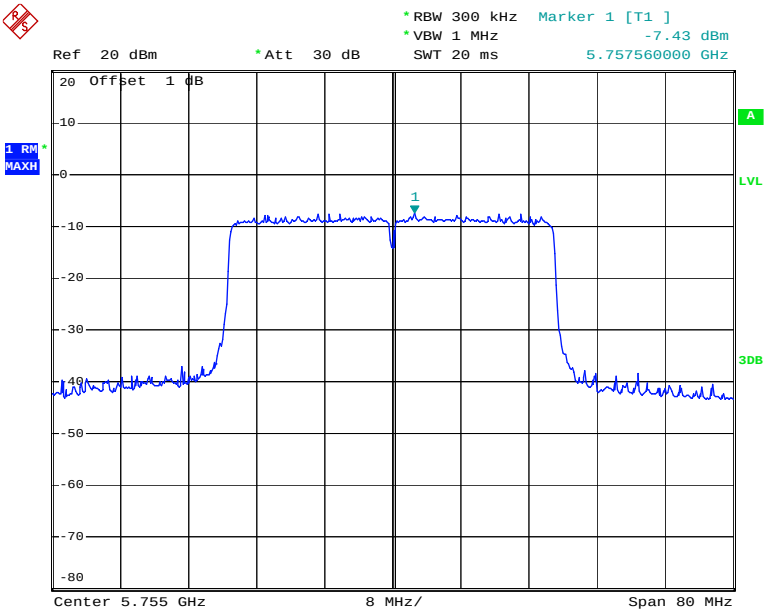
Date: 28.JUN.2020 12:02:50

802.11n ht40 High Channel



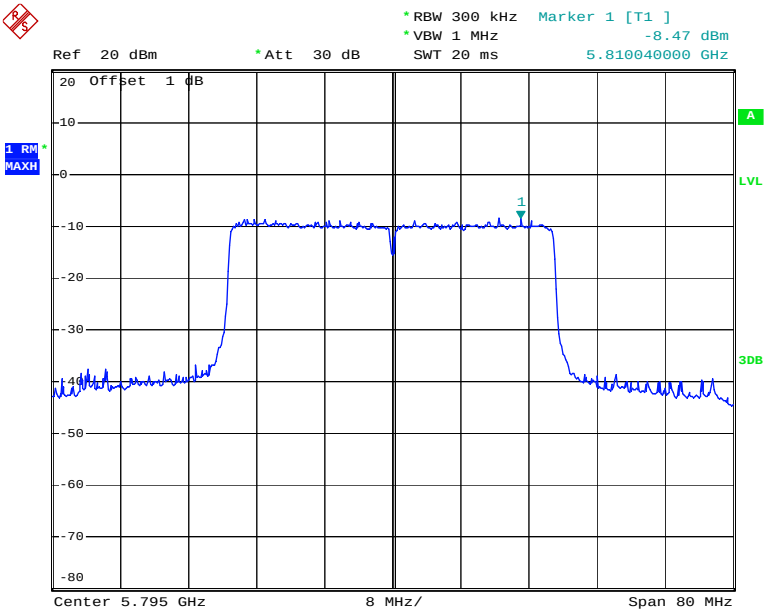
Date: 28.JUN.2020 12:17:16

802.11ax hew40 Low Channel



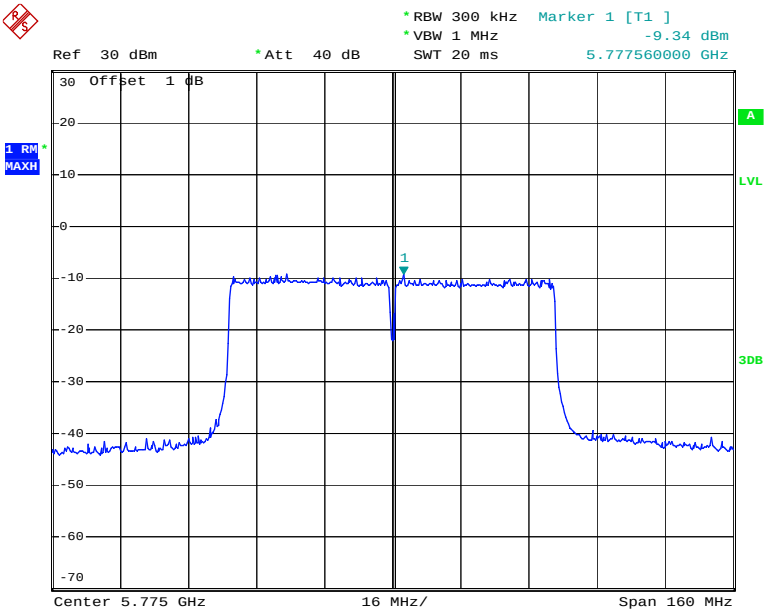
Date: 18.JUN.2020 17:09:29

802.11ax hew40 High Channel



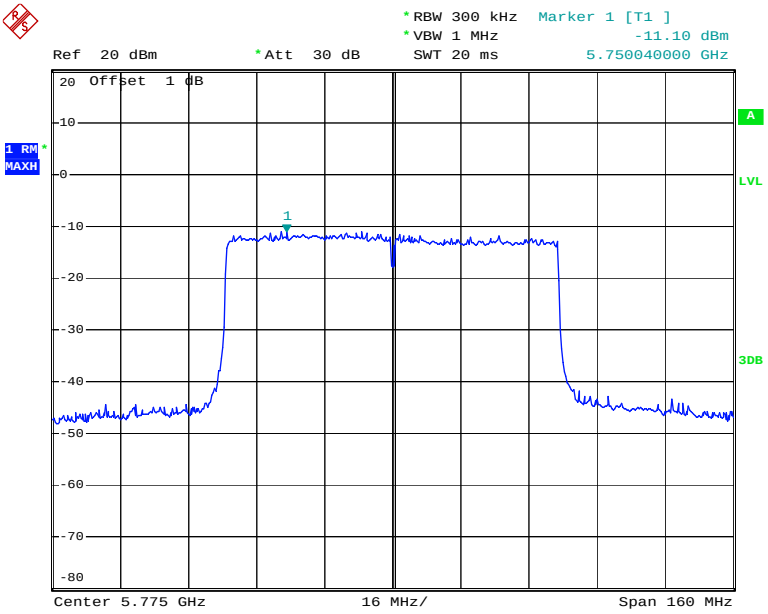
Date: 18.JUN.2020 17:12:21

802.11ac vht80 Middle Channel



Date: 28.JUN.2020 12:54:48

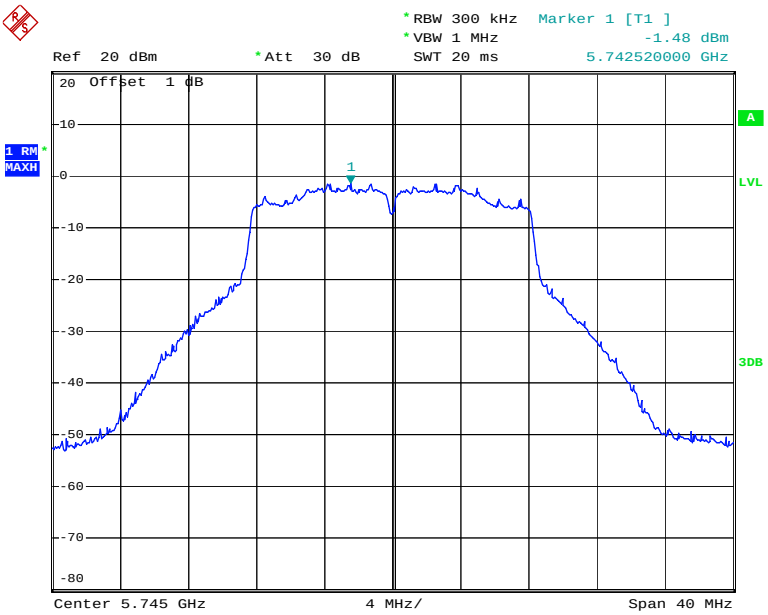
802.11ax hew80 Middle Channel



Date: 18.JUN.2020 17:08:02

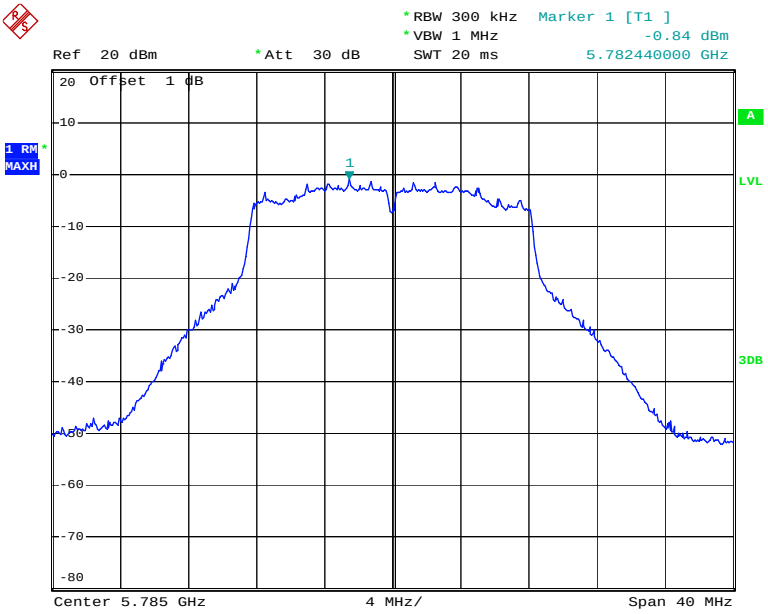
Chain 1:

802.11a Low Channel



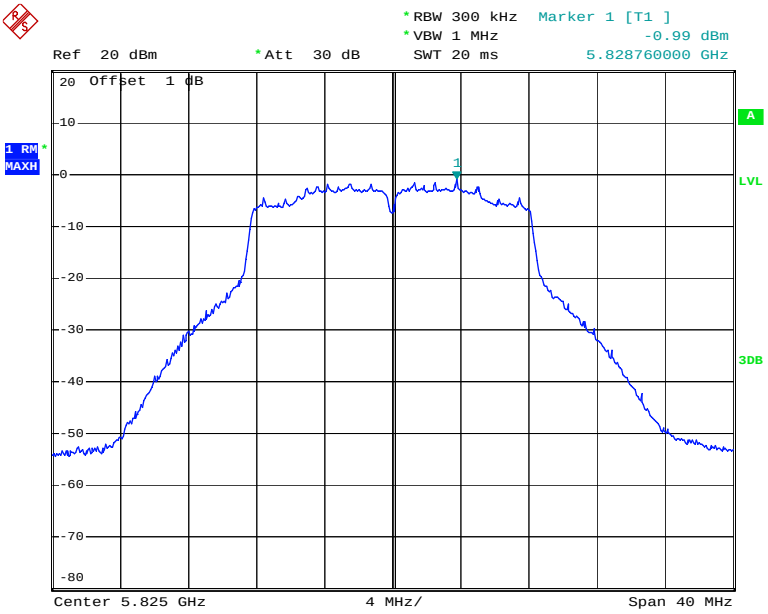
Date: 18.JUN.2020 17:19:29

802.11a Middle Channel



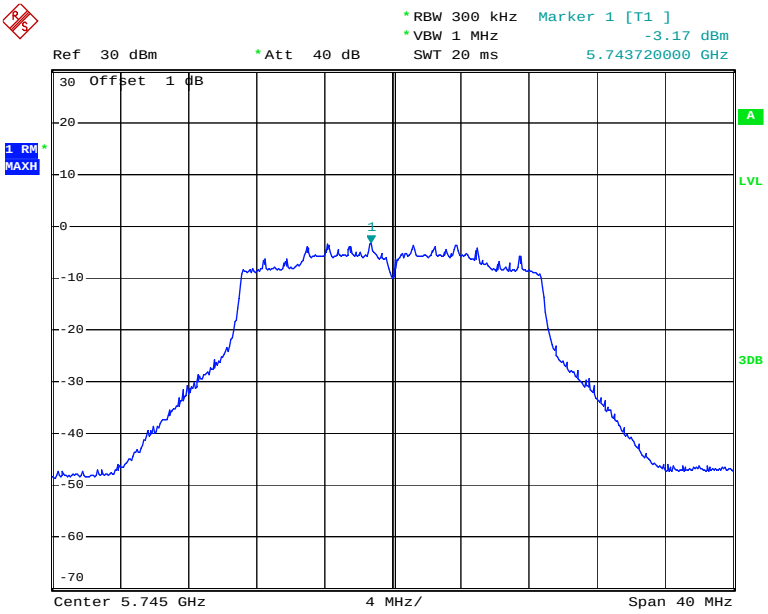
Date: 18.JUN.2020 17:19:03

802.11a High Channel



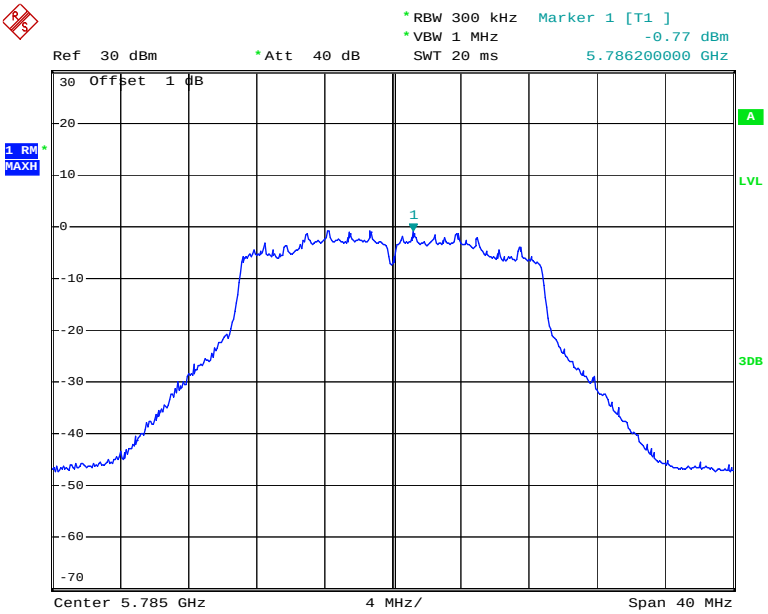
Date: 18.JUN.2020 17:18:31

802.11n ht20 Low Channel



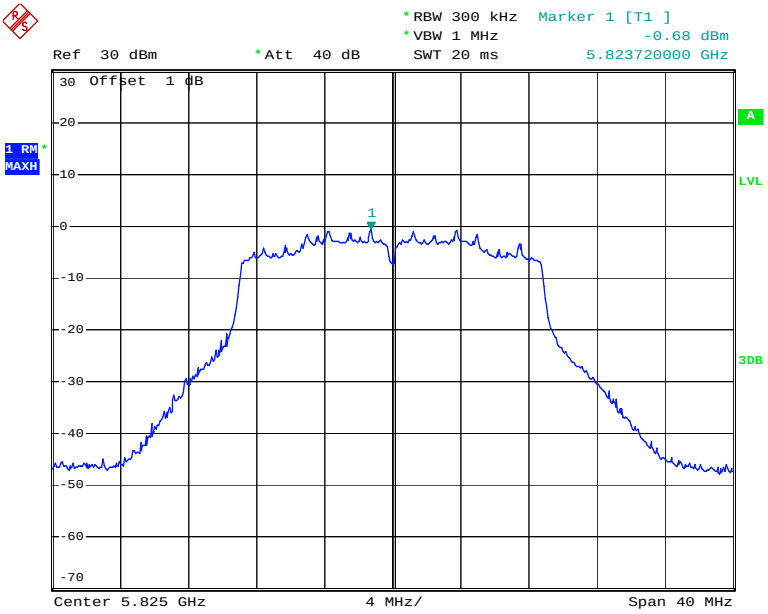
Date: 28.JUN.2020 11:44:35

802.11n ht20 Middle Channel



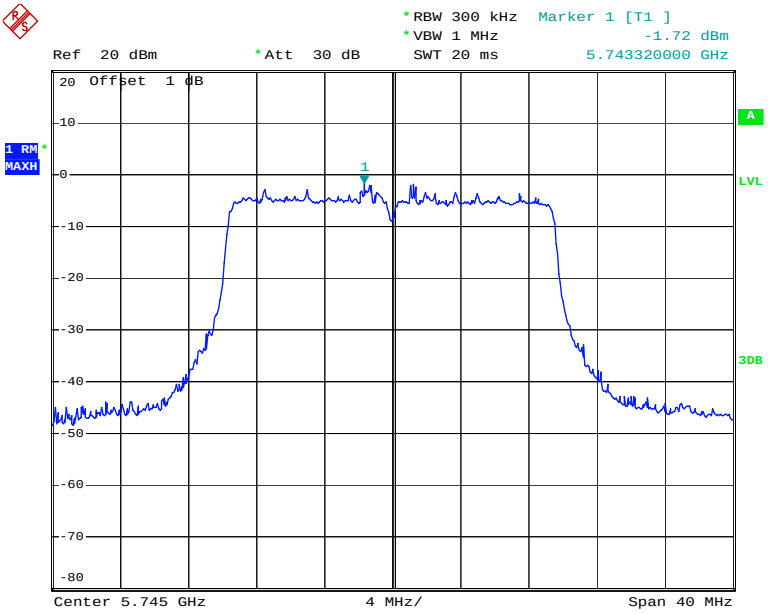
Date: 28.JUN.2020 11:46:54

802.11n ht20 High Channel



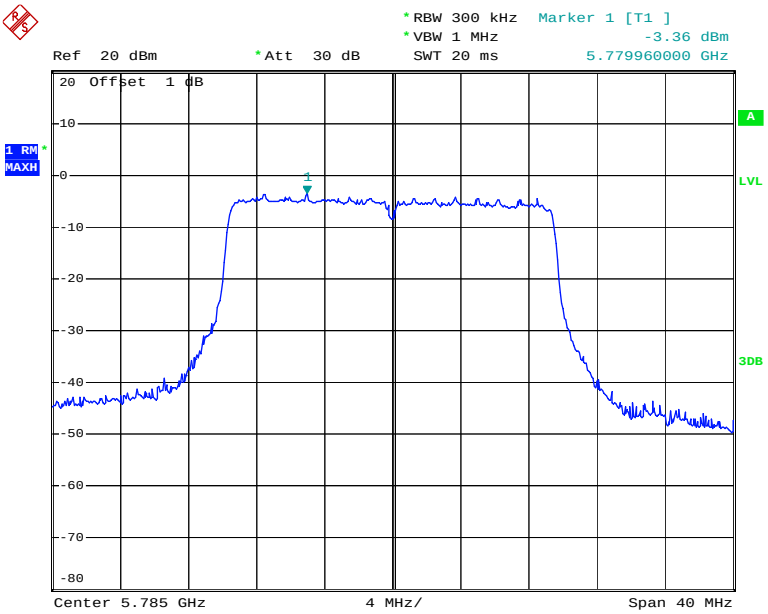
Date: 28.JUN.2020 11:48:29

802.11ax hew20 Low Channel



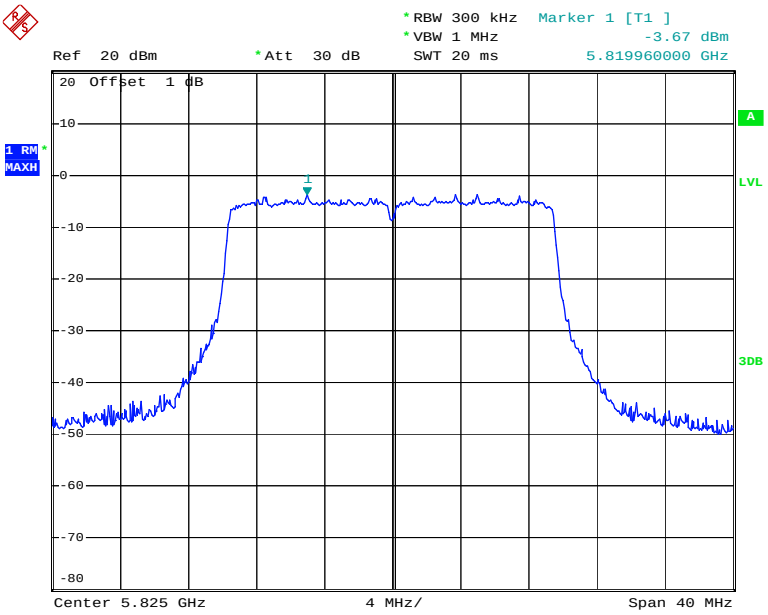
Date: 18.JUN.2020 17:15:33

802.11ax hew20 Middle Channel



Date: 18.JUN.2020 17:16:25

802.11ax hew20 High Channel



Date: 18.JUN.2020 17:17:27

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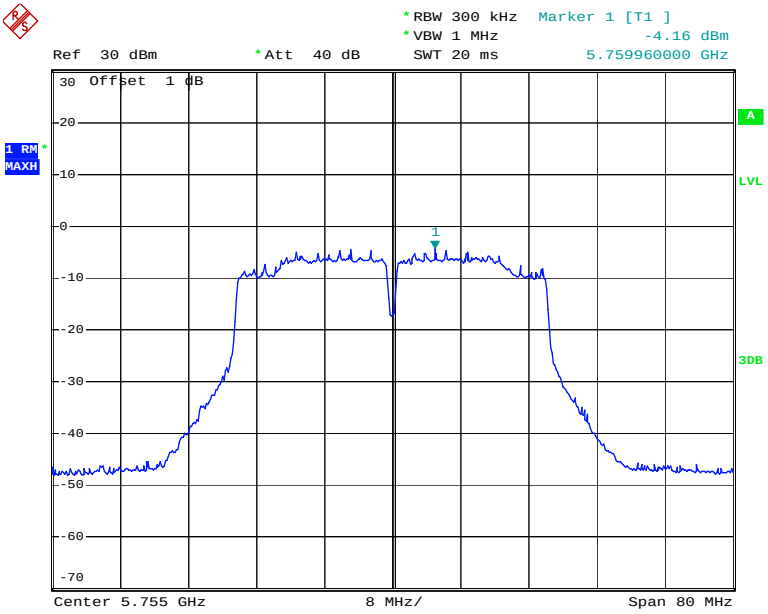
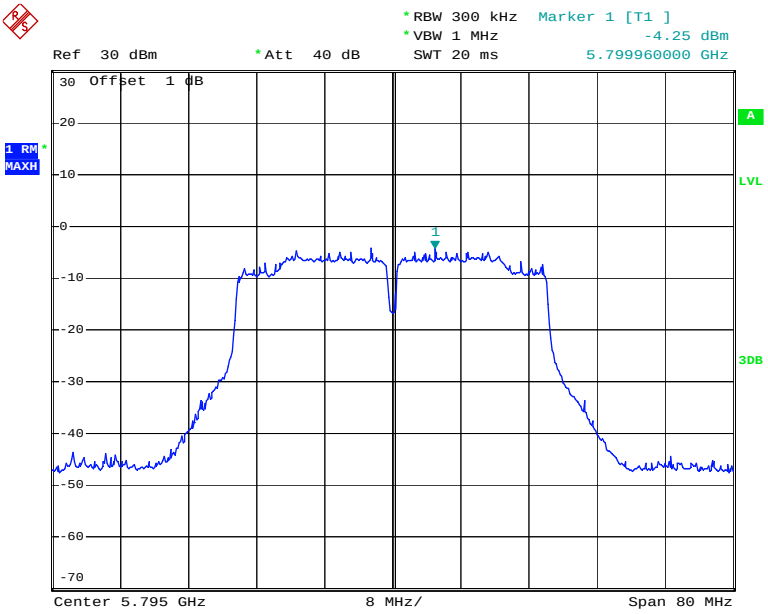


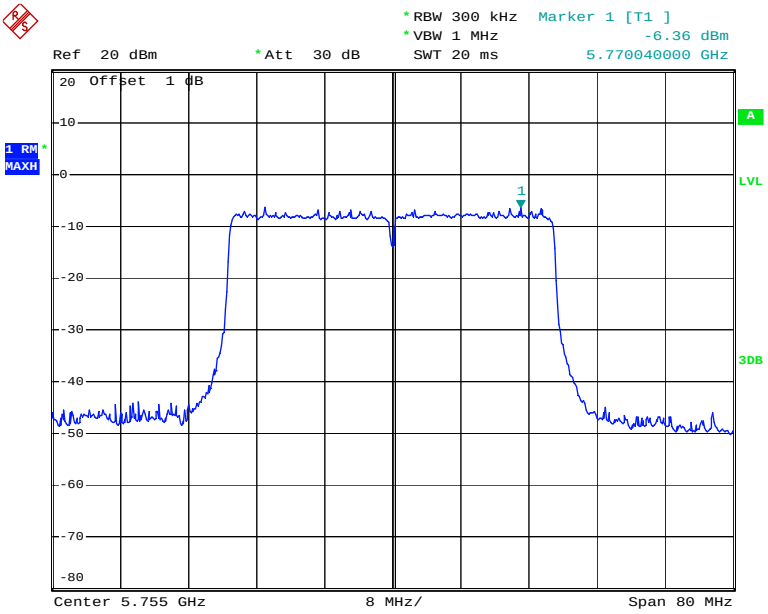
Date: 28.JUN.2020 12:26:00

802.11n ht40 High Channel



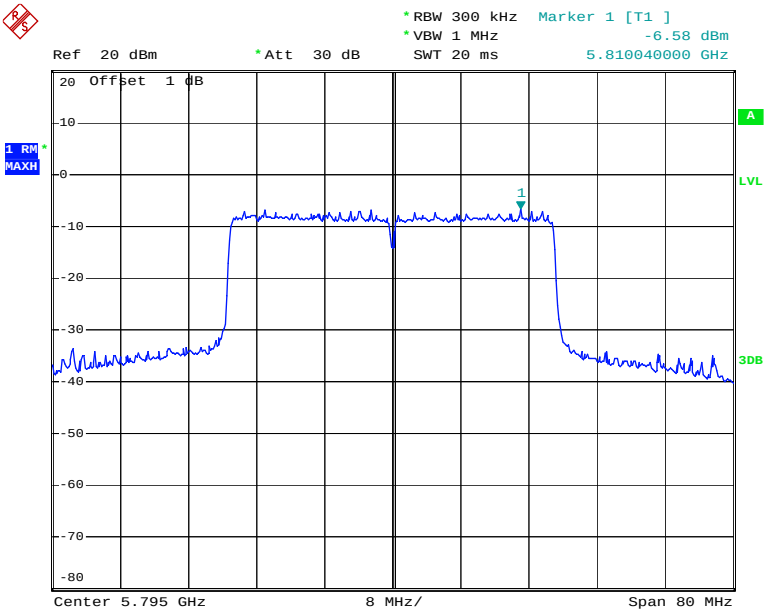
Date: 28.JUN.2020 12:24:38

802.11ax hew40 Low Channel



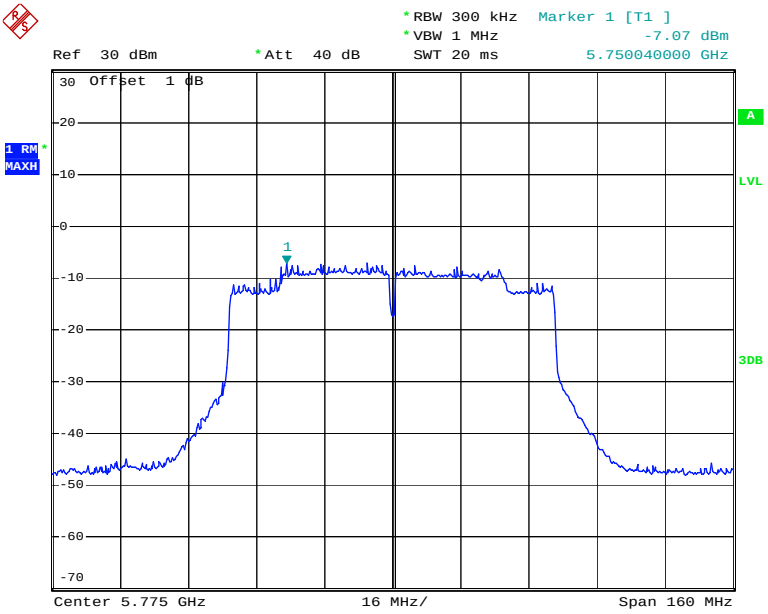
Date: 18.JUN.2020 17:13:55

802.11ax hew40 High Channel



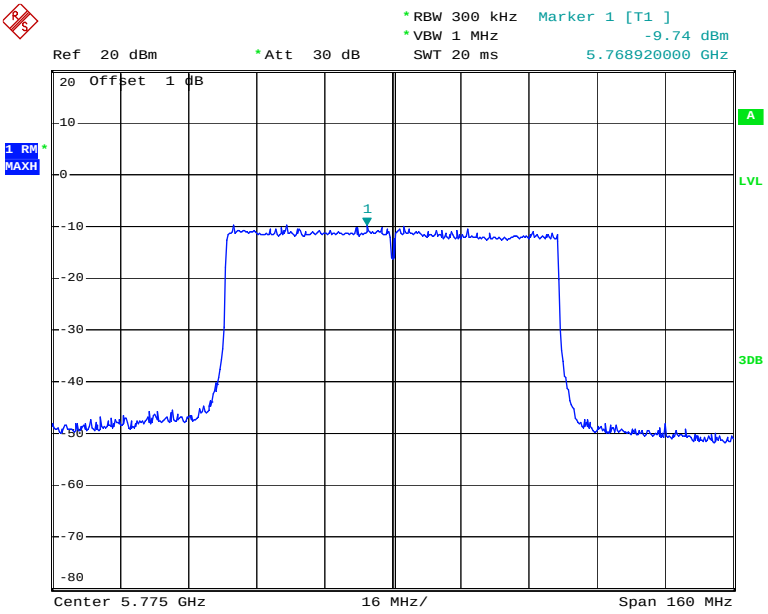
Date: 18.JUN.2020 17:13:13

802.11ac vht80 Middle Channel



Date: 28.JUN.2020 12:27:33

802.11ax hew80 Middle Channel



Date: 18.JUN.2020 17:14:29

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