

FCC PART 15.407 TEST REPORT

For

MFOURTEL MEXICO S.A. DE C.V.

Av. Ejercito Nacional 436 Piso 3 Chapultepec, Morales Miguel Hidalgo D.F 11570, Mexico

FCC ID: CLNM4WILINK5

Report Type: Original Report	Product Name: M4 WiLink 5
Report Number: <u>RDG190227007-00C</u>	
Report Date: <u>2019-03-13</u>	
Reviewed By:	Jerry Zhang EMC 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:		M4 WiLink 5
EUT Model:		M4 WiLink 5
Operation Frequency:		5180-5240 MHz(802.11a/n ht20/ac vht20) 5190-5230 MHz(802.11n ht40/ac vht40) 5210MHz(802.11ac vht80) 5745-5825 MHz(802.11a/n ht20/ac vht20) 5755-5795 MHz(802.11n ht40/ac vht40) 5775MHz(802.11ac vht80)
Maximum Output Power (Conducted):		13.82 dBm(5150-5250 MHz band) 17.66 dBm(5725-5850 MHz band)
Modulation Type:		OFDM(802.11a/n/ac)
Rated Input Voltage:		DC12V from adapter
Adapter Information	Model:	ZL-A012W1201000
	Input:	100-240V, 50/60Hz, 0.5A
	Output:	DC12V _{CC} , 1A
External Dimension:		190mm(L)*158mm(W)*40mm(H)
Serial Number:		190227007
EUT Received Date:		2019/2/28

Objective

This type approval report is prepared on behalf of *MFOURTEL MEXICO S.A. DE C.V.* 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: CLNM4WILINK5.
FCC Part 22H, 24E, Part 27 PCB submissions with FCC ID: CLNM4WILINK5.

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 °C
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 to testing:

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.
802.11ac80 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.
802.11ac80 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

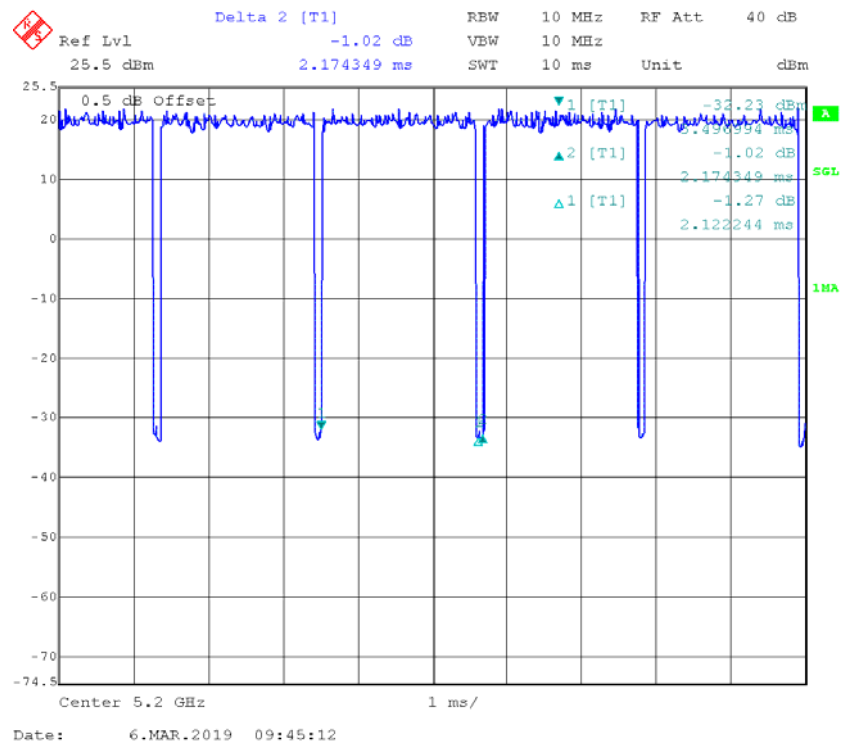
The software “QRCT” was used for testing, which was provided by manufacturer. The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates, bandwidths, and modulations. The maximum power was configured as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

Band	Mode	Channel	Frequency (MHz)	Data rate	Power level setting
5.15 - 5.25 GHz	802.11a	Low	5180	6 Mbps	17
		Middle	5200	6 Mbps	17
		High	5240	6 Mbps	17
	802.11n ht20	Low	5180	MCS8	13
		Middle	5200	MCS8	13
		High	5240	MCS8	13
	802.11n ht40	Low	5190	MCS8	10
		High	5230	MCS8	12.5
	802ac vht80	Middle	5210	MCS8	10
5.725 - 5.85 GHz	802.11a	Low	5745	6 Mbps	18
		Middle	5785	6 Mbps	18
		High	5825	6 Mbps	18
	802.11n ht20	Low	5745	MCS8	18
		Middle	5785	MCS8	18
		High	5825	MCS8	18
	802.11n ht40	Low	5755	MCS8	18
		High	5795	MCS8	18
	802ac vht80	Middle	5775	MCS8	18

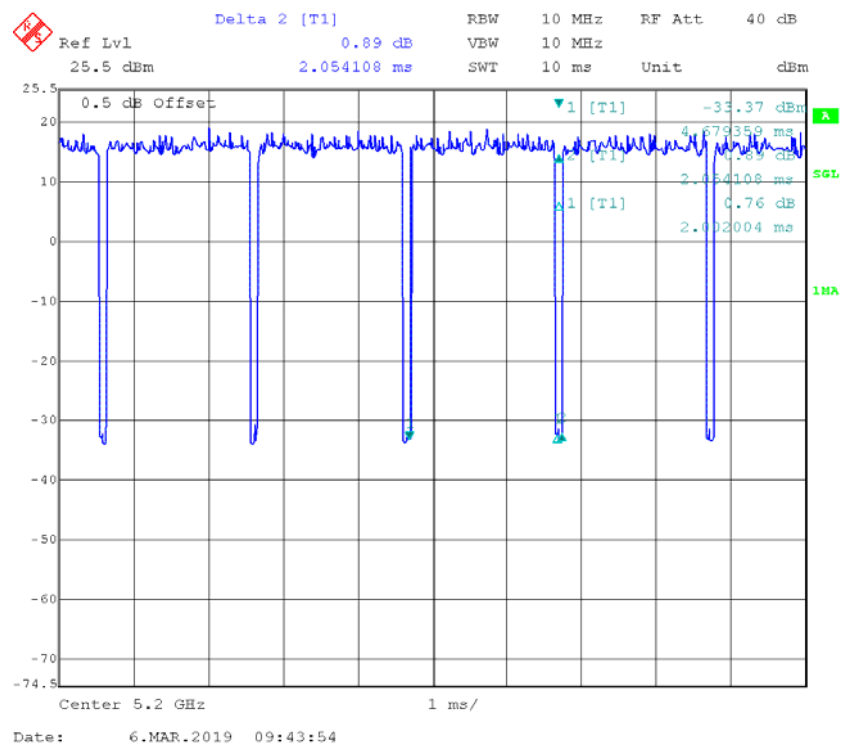
The duty cycle as below:

Mode	T _{on} (ms)	T _{on+off} (ms)	Duty Cycle(x) (%)	Duty Cycle Factor(10*log(1/x)) (dB)
802.11 a	2.122	2.174	97.61	0.11
802.11n ht20	2.002	2.054	97.47	0.11
802.11n ht40	0.98	1.052	93.16	0.31
802.11ac80	0.475	0.599	79.30	1.01

802.11a



802.11n ht20



Ref Lvl 25.5 dBm
Delta 2 [T1] -1.06 dB
1.052104 ms
RBW 10 MHz
VBW 10 MHz
SWT 6 ms
RF Att 40 dB
Unit dBm

0.5 dB Offset

▼1 [T1] -33.87 dBm
2.494990 ms
-1.06 dB
1.052104 ms
Δ1 [T1] -0.49 dB
979.959950 μs

Center 5.19 GHz
600 μs/

Date: 6.MAR.2019 09:41:35

Delta 2 [T1] -3.69 dB RBW 10 MHz RF Att 40 dB

Ref Lvl 25.5 dBm 559.118236 μs SWT 3 ms Unit dBm

0.5 dB Offset

▼ 1 [T1] -32.49 dBm
1.484970 ms
-1.69 dB
559.118236 μs
474.949900 μs

Center 5.21 GHz 300 μs/

Equipment Modifications

No modification was made to the EUT.

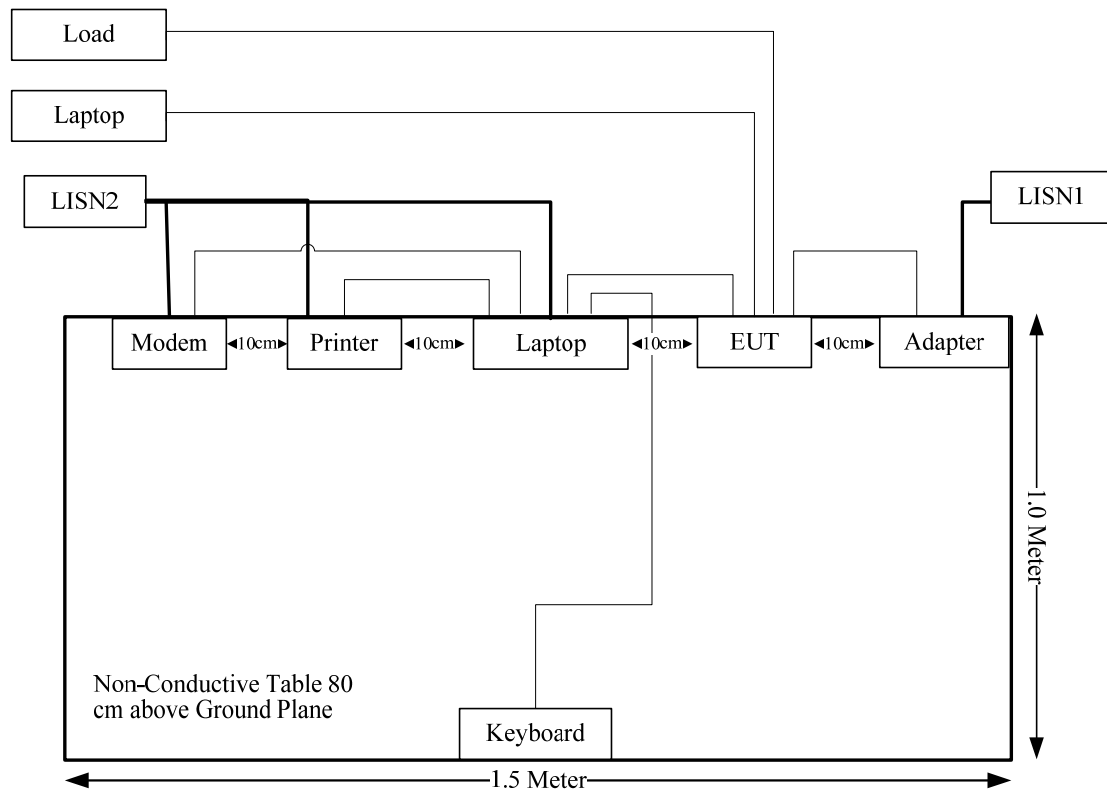
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1232
DELL	Laptop	PP11L	QDS-BRCM1012
Unknown	Load	/	/
HP	Printer	C3941A	JPTVOB2337
DELL	Keyboard	L100	CNORH656658907BL05DC
SAST	Modem	AEM-2100	293

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Serial Cable	Yes	No	1.2	Serial Port of Laptop	Modem
Parallel Cable	Yes	No	1.2	Parallel Port of Laptop	Printer
Keyboard Cable	Yes	No	1.8	USB Port of Laptop	Keyboard
Adapter Cable	No	No	1.2	Adapter	EUT
RJ45 Cable	Yes	No	1.0	EUT	Laptop
RJ45 Cable	Yes	No	10	EUT	Laptop
RJ45 Cable*3	Yes	No	10	EUT	Load

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.407 (f) & §1.1310 & §2.1091	Maximum Permissible 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/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

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

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

Calculated Data:

Mode	Frequency (MHz)	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
WLAN	2412-2462	4.5	2.82	25	316.23	20.00	0.18	1.0
WLAN	5150-5250	4.5	2.82	14	25.12	20.00	0.01	1.0
WLAN	5725-5850	4.5	2.82	18	63.10	20.00	0.04	1.0
WCDMA band 2	1850-1910	4.8	3.02	23	199.53	20.00	0.12	1.0
WCDMA Band 5	824-849	2.7	1.86	23	199.53	20.00	0.07	0.55
LTE Band 2	1850-1910	4.8	3.02	23	199.53	20.00	0.12	1.0
LTE band 4	1710-1755	4.8	3.02	24	251.19	20.00	0.15	1.0
LTE Band 5	824-849	2.7	1.86	23	199.53	20.00	0.07	0.55
LTE Band 7	2500-2570	4.8	3.02	22	158.49	20.00	0.10	1.0
LTE Band 66	1710-1780	4.8	3.02	23	199.53	20.00	0.12	1.0

The WLAN and WWAN can transmit simultaneously:

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

$$=S_{WLAN}/S_{limit-WLAN} + S_{WWAN}/S_{limit-WWAN}$$

$$=0.18/1+0.07/0.55$$

$$=0.31$$

$$< 1.0$$

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.

And according to FCC 47 CFR section 15.407 (a)(1), if transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has 2 internal PCB antenna permanently attached to the unit for WiFi, 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
WIFI Chain 0	PCB	50	4.5 dBi/2.4-2.5GHz 4.5 dBi/5.15-5.85GHz
WIFI Chain 1	PCB	50	4.5 dBi/2.4-2.5GHz 4.5 dBi/5.15-5.85GHz

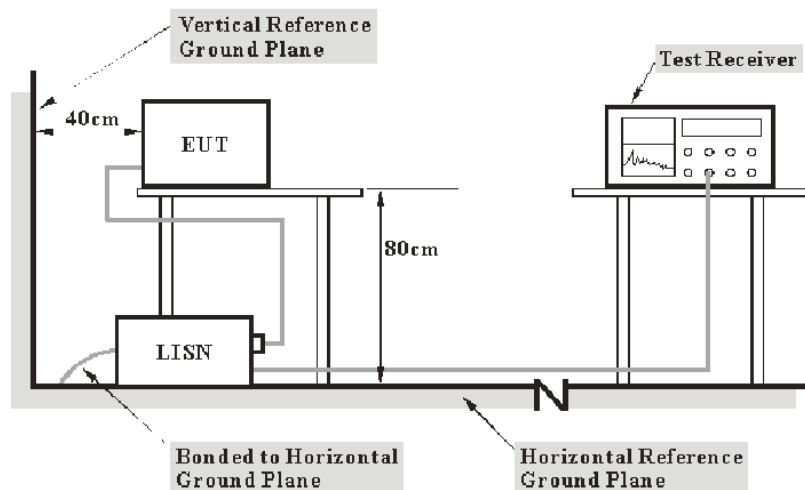
Result: Compliance.

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 liss 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:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2018-12-10	2019-12-10
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	L.I.S.N	ESH2-Z5	892107/021	2018-09-19	2019-09-19

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

Test Procedure

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

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

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

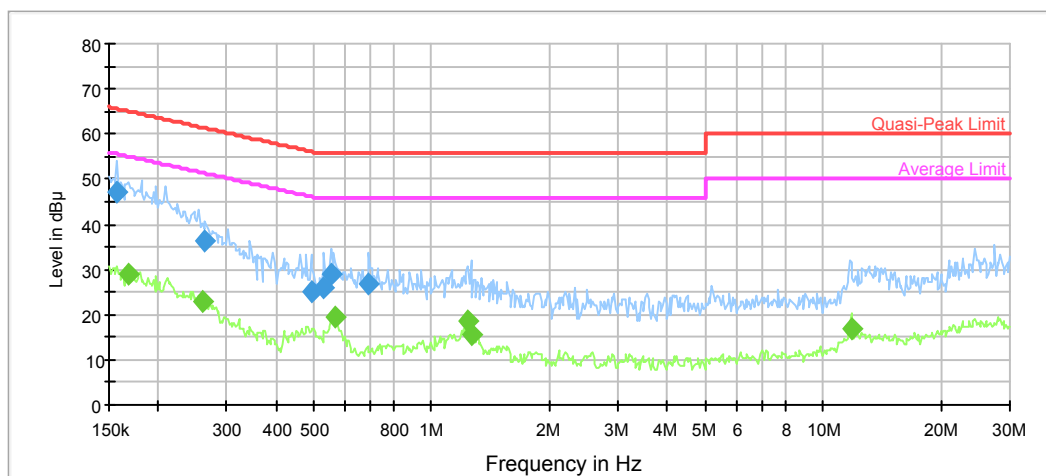
Test Data**Environmental Conditions**

Temperature:	27.6°C
Relative Humidity:	49%
ATM Pressure:	100.7kPa

The testing was performed by Vern Shen on 2019-03-04.

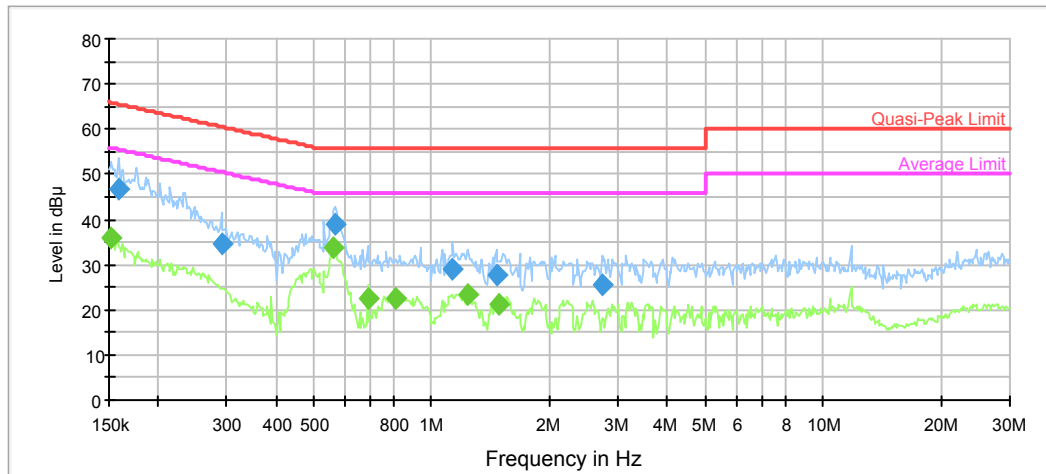
Test Mode: Transmitting (802.11a 5745 MHz Chain 0 was the worst)

AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.157346	47.3	9.000	L1	11.1	18.3	65.6	Compliance
0.264113	36.4	9.000	L1	10.3	24.9	61.3	Compliance
0.491712	25.0	9.000	L1	9.9	31.1	56.1	Compliance
0.532496	25.8	9.000	L1	9.9	30.2	56.0	Compliance
0.554139	28.8	9.000	L1	9.8	27.2	56.0	Compliance
0.692650	26.6	9.000	L1	9.8	29.4	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.169044	29.0	9.000	L1	10.9	26.0	55.0	Compliance
0.259937	22.7	9.000	L1	10.3	28.7	51.4	Compliance
0.567545	19.6	9.000	L1	9.8	26.4	46.0	Compliance
1.239175	18.5	9.000	L1	9.8	27.5	46.0	Compliance
1.259081	15.7	9.000	L1	9.8	30.3	46.0	Compliance
11.815800	16.8	9.000	L1	9.9	33.2	50.0	Compliance

AC120 V, 60 Hz, Neutral:

frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.158604	46.8	9.000	N	11.0	18.7	65.5	Compliance
0.290613	34.8	9.000	N	10.2	25.7	60.5	Compliance
0.567545	38.9	9.000	N	9.8	17.1	56.0	Compliance
1.135185	29.0	9.000	N	9.8	27.0	56.0	Compliance
1.464886	27.7	9.000	N	9.8	28.3	56.0	Compliance
2.727252	25.4	9.000	N	9.8	30.6	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.151200	35.9	9.000	N	11.1	20.1	55.9	Compliance
0.563041	33.9	9.000	N	9.8	12.1	46.0	Compliance
0.687153	22.3	9.000	N	9.8	23.7	46.0	Compliance
0.812315	22.7	9.000	N	9.8	23.3	46.0	Compliance
1.239175	23.1	9.000	N	9.8	22.9	46.0	Compliance
1.488418	21.0	9.000	N	9.8	25.0	46.0	Compliance

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.

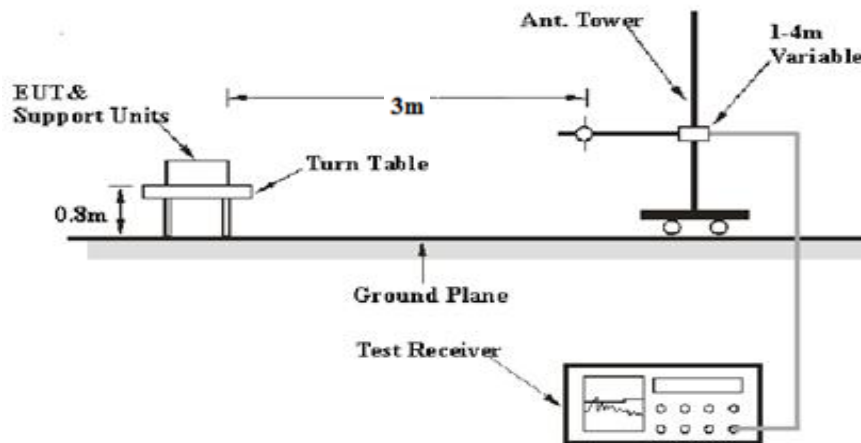
(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(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.

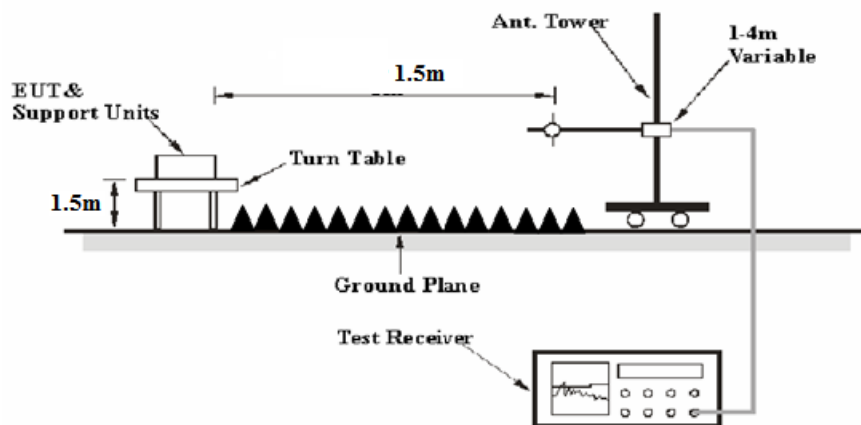
(7) The provisions of §15.205 apply to intentional radiators operating under this section.

EUT Setup

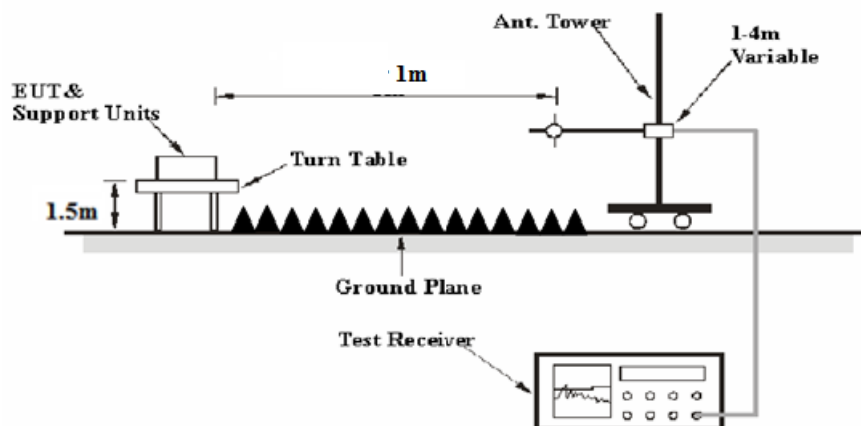
Below 1 GHz:



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 A, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.407 limits.

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

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

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

30-1000MHz:

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

1GHz- 40GHz:

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

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: $E [dB\mu V/m] = EIRP[dBm] + 95.2$, 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 = $20 \log (\text{specific distance } [3m]/\text{test distance } [1.5m])$ dB= 6.02 dB

or

Distance extrapolation factor = $20 \log (\text{specific distance } [3m]/\text{test distance } [1m])$ 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:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

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:

$$\begin{aligned} &\text{Corrected Amplitude} \\ &= \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain} - \text{Distance extrapolation factor} \end{aligned}$$

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:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2018-12-10	2019-12-10
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-1000-01	2018-09-05	2019-09-05
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
R&S	Spectrum Analyzer	FSP 38	100478	2019-01-04	2020-01-04
TDK RF	Horn Antenna	HRN-0118	130 084	2018-10-12	2021-10-12
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-01 1302	2016-11-18	2019-11-18
MICRO-COAX	Coaxial Cable	UFA147-1-2362- 100100	64639 231029- 001	2019-02-24	2020-02-28
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2018-06-27	2019-06-27
MITEQ	Amplifier	AFS42-00101800- 25-S-42	2001271	2018-09-05	2019-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2018-06-27	2019-06-27
Sinoscite	Bandstop Filters	BSF5150-5850MN- 0899-003	0899003	2018-05-06	2019-05-06
Mini Circuits	High Pass Filter	VHF-6010+	31118	2018-06-16	2019-06-16

* **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**

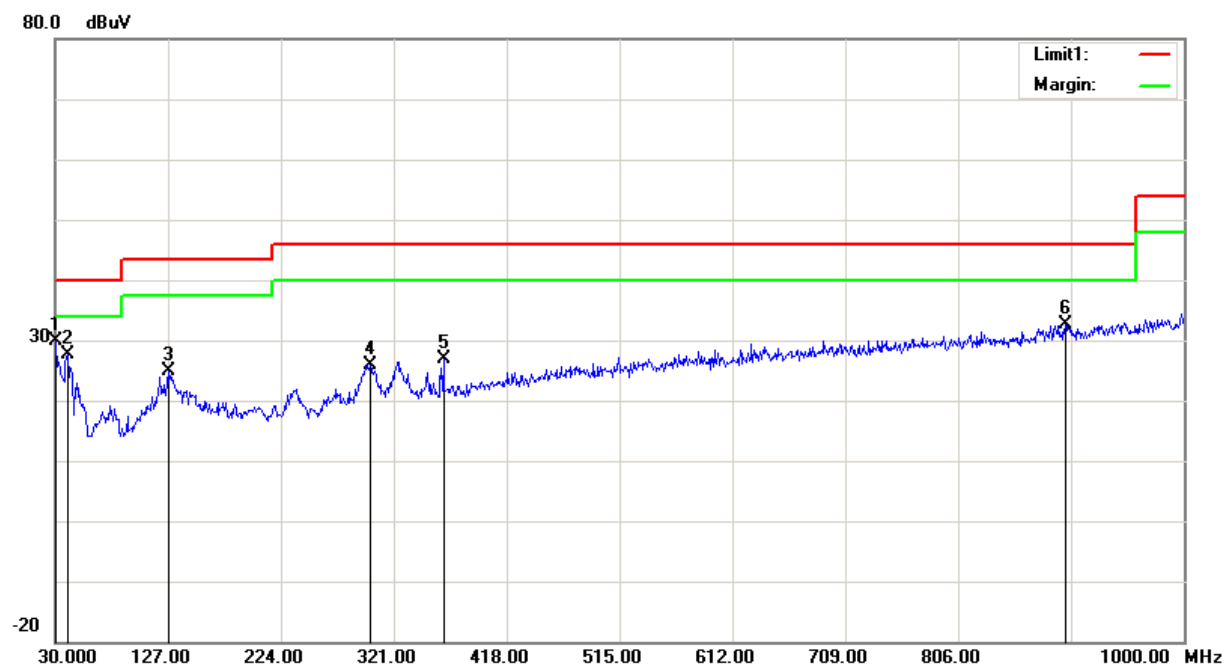
Temperature:	26.6~26.9 °C
Relative Humidity:	41~50 %
ATM Pressure:	99.6~99.9 kPa

* The testing was performed by Neil Liao on 2019-03-05.

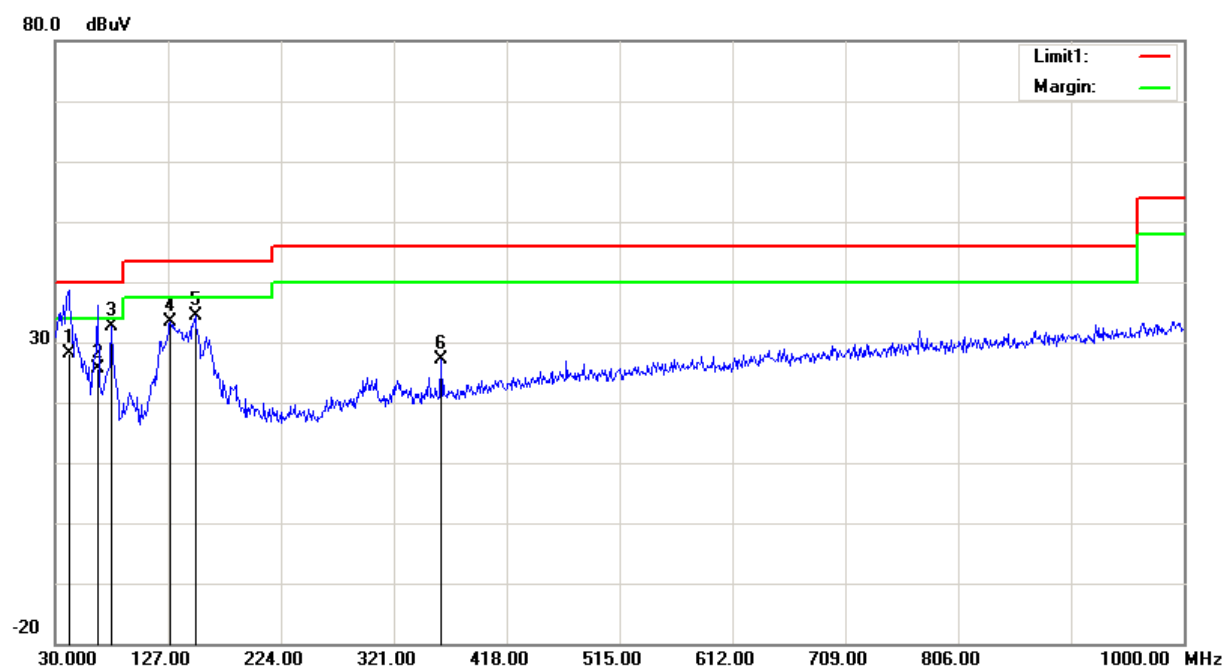
Test Mode: Transmitting

1) Below 1GHz(802.11a 5745 MHz Chain 0 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	34.09	peak	-4.20	29.89	40.00	10.11
40.6700	39.91	peak	-12.23	27.68	40.00	12.32
127.0000	35.49	peak	-10.69	24.80	43.50	18.70
300.6300	35.76	peak	-9.83	25.93	46.00	20.07
363.6800	35.78	peak	-8.86	26.92	46.00	19.08
898.1500	36.53	peak	-3.88	32.65	46.00	13.35

Vertical

Frequency (MHz)	Receiver Reading (dB μ V)	Detector	Correction Factor (dB/m)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
41.6400	41.01	QP	-12.87	28.14	40.00	11.86
66.8600	43.08	QP	-17.39	25.69	40.00	14.31
78.5000	49.75	peak	-17.10	32.65	40.00	7.35
128.9400	44.07	peak	-10.77	33.30	43.50	10.20
150.2800	46.30	peak	-11.95	34.35	43.50	9.15
361.7400	35.90	peak	-8.85	27.05	46.00	18.95

2) 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	74.49	PK	H	30.46	4.71	0.00	109.66	103.64	N/A	N/A
5180.00	65.01	AV	H	30.46	4.71	0.00	100.18	94.16	N/A	N/A
5180.00	79.21	PK	V	30.46	4.71	0.00	114.38	108.36	N/A	N/A
5180.00	69.06	AV	V	30.46	4.71	0.00	104.23	98.21	N/A	N/A
5150.00	33.63	PK	V	30.40	4.70	0.00	68.73	62.71	74.00	11.29
5150.00	19.95	AV	V	30.40	4.70	0.00	55.05	49.03	54.00	4.97
10360.00	45.94	PK	V	37.10	6.91	26.86	63.09	57.07	68.20	11.13
15540.00	35.87	PK	V	36.79	8.39	25.66	55.39	49.37	74.00	24.63
15540.00	23.25	AV	V	36.79	8.39	25.66	42.77	36.75	54.00	17.25
Middle Channel: 5200 MHz										
5200.00	72.57	PK	H	30.50	4.71	0.00	107.78	101.76	N/A	N/A
5200.00	62.81	AV	H	30.50	4.71	0.00	98.02	92	N/A	N/A
5200.00	76.88	PK	V	30.50	4.71	0.00	112.09	106.07	N/A	N/A
5200.00	66.94	AV	V	30.50	4.71	0.00	102.15	96.13	N/A	N/A
10400.00	41.93	PK	V	37.16	6.92	26.84	59.17	53.15	68.20	15.05
15600.00	35.93	PK	V	36.78	8.43	25.97	55.17	49.15	74.00	24.85
15600.00	23.01	AV	V	36.78	8.43	25.97	42.25	36.23	54.00	17.77
High Channel: 5240 MHz										
5240.00	72.71	PK	H	30.58	4.75	0.00	108.04	102.02	N/A	N/A
5240.00	62.85	AV	H	30.58	4.75	0.00	98.18	92.16	N/A	N/A
5240.00	76.23	PK	V	30.58	4.75	0.00	111.56	105.54	N/A	N/A
5240.00	66.95	AV	V	30.58	4.75	0.00	102.28	96.26	N/A	N/A
5350.00	27.72	PK	V	30.80	4.84	0.00	63.36	57.34	74.00	16.66
5350.00	16.15	AV	V	30.80	4.84	0.00	51.79	45.77	54.00	8.23
10480.00	41.92	PK	V	37.27	6.94	27.02	59.11	53.09	68.20	15.11
15720.00	35.59	PK	V	36.76	8.51	25.68	55.18	49.16	74.00	24.84
15720.00	22.84	AV	V	36.76	8.51	25.68	42.43	36.41	54.00	17.59

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	69.08	PK	H	30.46	4.71	0.00	104.25	98.23	N/A	N/A
5180.00	59.44	AV	H	30.46	4.71	0.00	94.61	88.59	N/A	N/A
5180.00	72.18	PK	V	30.46	4.71	0.00	107.35	101.33	N/A	N/A
5180.00	62.33	AV	V	30.46	4.71	0.00	97.50	91.48	N/A	N/A
5150.00	27.88	PK	V	30.40	4.70	0.00	62.98	56.96	74.00	17.04
5150.00	16.66	AV	V	30.40	4.70	0.00	51.76	45.74	54.00	8.26
10360.00	44.96	PK	V	37.10	6.91	26.86	62.11	56.09	68.20	12.11
15540.00	36.01	PK	V	36.79	8.39	25.66	55.53	49.51	74.00	24.49
15540.00	23.18	AV	V	36.79	8.39	25.66	42.70	36.68	54.00	17.32
Middle Channel: 5200 MHz										
5200.00	69.17	PK	H	30.50	4.71	0.00	104.38	98.36	N/A	N/A
5200.00	59.63	AV	H	30.50	4.71	0.00	94.84	88.82	N/A	N/A
5200.00	72.17	PK	V	30.50	4.71	0.00	107.38	101.36	N/A	N/A
5200.00	62.44	AV	V	30.50	4.71	0.00	97.65	91.63	N/A	N/A
10400.00	44.41	PK	V	37.16	6.92	26.84	61.65	55.63	68.20	12.57
15600.00	35.49	PK	V	36.78	8.43	25.97	54.73	48.71	74.00	25.29
15600.00	22.93	AV	V	36.78	8.43	25.97	42.17	36.15	54.00	17.85
High Channel: 5240 MHz										
5240.00	68.17	PK	H	30.58	4.75	0.00	103.50	97.48	N/A	N/A
5240.00	58.36	AV	H	30.58	4.75	0.00	93.69	87.67	N/A	N/A
5240.00	71.54	PK	V	30.58	4.75	0.00	106.87	100.85	N/A	N/A
5240.00	61.30	AV	V	30.58	4.75	0.00	96.63	90.61	N/A	N/A
5350.00	27.41	PK	V	30.80	4.84	0.00	63.05	57.03	74.00	16.97
5350.00	16.44	AV	V	30.80	4.84	0.00	52.08	46.06	54.00	7.94
10480.00	43.77	PK	V	37.27	6.94	27.02	60.96	54.94	68.20	13.26
15720.00	35.76	PK	V	36.76	8.51	25.68	55.35	49.33	74.00	24.67
15720.00	23.24	AV	V	36.76	8.51	25.68	42.83	36.81	54.00	17.19

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	72.34	PK	H	30.46	4.71	0.00	107.51	101.49	N/A	N/A
5180.00	61.54	AV	H	30.46	4.71	0.00	96.71	90.69	N/A	N/A
5180.00	79.02	PK	V	30.46	4.71	0.00	114.19	108.17	N/A	N/A
5180.00	68.95	AV	V	30.46	4.71	0.00	104.12	98.1	N/A	N/A
5150.00	26.75	PK	V	30.40	4.70	0.00	61.85	55.83	74.00	18.17
5150.00	16.65	AV	V	30.40	4.70	0.00	51.75	45.73	54.00	8.27
10360.00	46.26	PK	V	37.10	6.91	26.86	63.41	57.39	68.20	10.81
15540.00	35.49	PK	V	36.79	8.39	25.66	55.01	48.99	74.00	25.01
15540.00	23.65	AV	V	36.79	8.39	25.66	43.17	37.15	54.00	16.85
Middle Channel: 5200 MHz										
5200.00	70.53	PK	H	30.50	4.71	0.00	105.74	99.72	N/A	N/A
5200.00	60.17	AV	H	30.50	4.71	0.00	95.38	89.36	N/A	N/A
5200.00	76.21	PK	V	30.50	4.71	0.00	111.42	105.4	N/A	N/A
5200.00	66.18	AV	V	30.50	4.71	0.00	101.39	95.37	N/A	N/A
10400.00	43.49	PK	V	37.16	6.92	26.84	60.73	54.71	68.20	13.49
15600.00	35.25	PK	V	36.78	8.43	25.97	54.49	48.47	74.00	25.53
15600.00	23.11	AV	V	36.78	8.43	25.97	42.35	36.33	54.00	17.67
High Channel: 5240 MHz										
5240.00	69.95	PK	H	30.58	4.75	0.00	105.28	99.26	N/A	N/A
5240.00	59.58	AV	H	30.58	4.75	0.00	94.91	88.89	N/A	N/A
5240.00	75.58	PK	V	30.58	4.75	0.00	110.91	104.89	N/A	N/A
5240.00	65.27	AV	V	30.58	4.75	0.00	100.60	94.58	N/A	N/A
5350.00	27.39	PK	V	30.80	4.84	0.00	63.03	57.01	74.00	16.99
5350.00	16.29	AV	V	30.80	4.84	0.00	51.93	45.91	54.00	8.09
10480.00	43.00	PK	V	37.27	6.94	27.02	60.19	54.17	68.20	14.03
15720.00	34.96	PK	V	36.76	8.51	25.68	54.55	48.53	74.00	25.47
15720.00	22.47	AV	V	36.76	8.51	25.68	42.06	36.04	54.00	17.96

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	66.57	PK	H	30.48	4.71	0.00	101.76	95.74	N/A	N/A
5190.00	55.41	AV	H	30.48	4.71	0.00	90.60	84.58	N/A	N/A
5190.00	69.88	PK	V	30.48	4.71	0.00	105.07	99.05	N/A	N/A
5190.00	58.19	AV	V	30.48	4.71	0.00	93.38	87.36	N/A	N/A
5150.00	30.20	PK	V	30.40	4.70	0.00	65.30	59.28	74.00	14.72
5150.00	16.90	AV	V	30.40	4.70	0.00	52.00	45.98	54.00	8.02
10380.00	38.98	PK	V	37.13	6.92	26.85	56.18	50.16	68.20	18.04
15570.00	35.12	PK	V	36.79	8.41	25.82	54.50	48.48	74.00	25.52
15570.00	23.28	AV	V	36.79	8.41	25.82	42.66	36.64	54.00	17.36
High Channel: 5230 MHz										
5230.00	68.96	PK	H	30.56	4.74	0.00	104.26	98.24	N/A	N/A
5230.00	57.49	AV	H	30.56	4.74	0.00	92.79	86.77	N/A	N/A
5230.00	72.63	PK	V	30.56	4.74	0.00	107.93	101.91	N/A	N/A
5230.00	61.66	AV	V	30.56	4.74	0.00	96.96	90.94	N/A	N/A
5350.00	27.63	PK	V	30.80	4.84	0.00	63.27	57.25	74.00	16.75
5350.00	16.72	AV	V	30.80	4.84	0.00	52.36	46.34	54.00	7.66
10460.00	39.65	PK	V	37.24	6.93	26.98	56.84	50.82	68.20	17.38
15690.00	35.28	PK	V	36.76	8.49	25.71	54.82	48.8	74.00	25.20
15690.00	23.40	AV	V	36.76	8.49	25.71	42.94	36.92	54.00	17.08

802.11 ac80(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)						
Middle Channel: 5210 MHz										
5210.00	64.03	PK	H	30.52	4.72	0.00	99.27	93.25	N/A	N/A
5210.00	53.76	AV	H	30.52	4.72	0.00	89.00	82.98	N/A	N/A
5210.00	67.31	PK	V	30.52	4.72	0.00	102.55	96.53	N/A	N/A
5210.00	57.01	AV	V	30.52	4.72	0.00	92.25	86.23	N/A	N/A
5150.00	29.08	PK	V	30.40	4.70	0.00	64.18	58.16	74.00	15.84
5150.00	17.97	AV	V	30.40	4.70	0.00	53.07	47.05	54.00	6.95
5350.00	26.88	PK	V	30.80	4.84	0.00	62.52	56.5	74.00	17.50
5350.00	16.70	AV	V	30.80	4.84	0.00	52.34	46.32	54.00	7.68
10420.00	37.11	PK	V	37.19	6.93	26.89	54.34	48.32	68.20	19.88
15630.00	34.98	PK	V	36.77	8.45	25.88	54.32	48.3	74.00	25.70
15630.00	23.08	AV	V	36.77	8.45	25.88	42.42	36.4	54.00	17.60

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	76.55	PK	H	31.44	4.96	0.00	112.95	106.93	N/A	N/A
5745.00	66.83	AV	H	31.44	4.96	0.00	103.23	97.21	N/A	N/A
5745.00	80.22	PK	V	31.44	4.96	0.00	116.62	110.6	N/A	N/A
5745.00	70.33	AV	V	31.44	4.96	0.00	106.73	100.71	N/A	N/A
5725.00	45.45	PK	V	31.42	4.96	0.00	81.83	75.81	122.20	46.39
5720.00	34.11	PK	V	31.41	4.96	0.00	70.48	64.46	110.80	46.34
5700.00	29.13	PK	V	31.38	4.97	0.00	65.48	59.46	105.20	45.74
5650.00	27.46	PK	V	31.31	4.95	0.00	63.72	57.7	68.20	10.50
11490.00	43.60	PK	V	38.29	6.98	26.57	62.30	56.28	74.00	17.72
11490.00	29.55	AV	V	38.29	6.98	26.57	48.25	42.23	54.00	11.77
17235.00	34.96	PK	V	41.02	9.01	25.11	59.88	53.86	68.20	14.34
Middle Channel: 5785 MHz										
5785.00	76.95	PK	H	31.50	4.94	0.00	113.39	107.37	N/A	N/A
5785.00	67.08	AV	H	31.50	4.94	0.00	103.52	97.5	N/A	N/A
5785.00	80.36	PK	V	31.50	4.94	0.00	116.80	110.78	N/A	N/A
5785.00	70.29	AV	V	31.50	4.94	0.00	106.73	100.71	N/A	N/A
11570.00	41.20	PK	V	38.36	6.98	26.97	59.57	53.55	74.00	20.45
11570.00	29.46	AV	V	38.36	6.98	26.97	47.83	41.81	54.00	12.19
17355.00	35.68	PK	V	41.28	9.04	25.16	60.84	54.82	68.20	13.38
High Channel: 5825 MHz										
5825.00	78.59	PK	H	31.56	4.94	0.00	115.09	109.07	N/A	N/A
5825.00	68.75	AV	H	31.56	4.94	0.00	105.25	99.23	N/A	N/A
5825.00	81.47	PK	V	31.56	4.94	0.00	117.97	111.95	N/A	N/A
5825.00	71.69	AV	V	31.56	4.94	0.00	108.19	102.17	N/A	N/A
5850.00	40.67	PK	V	31.59	4.95	0.00	77.21	71.19	122.20	51.01
5855.00	33.80	PK	V	31.60	4.95	0.00	70.35	64.33	110.80	46.47
5875.00	28.55	PK	V	31.63	4.95	0.00	65.13	59.11	105.20	46.09
5925.00	28.40	PK	V	31.70	4.95	0.00	65.05	59.03	68.20	9.17
11650.00	42.69	PK	V	38.42	6.99	26.84	61.26	55.24	74.00	18.76
11650.00	30.12	AV	V	38.42	6.99	26.84	48.69	42.67	54.00	11.33
17475.00	35.69	PK	V	41.55	9.06	24.55	61.75	55.73	68.20	12.47

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	71.55	PK	H	31.44	4.96	0.00	107.95	101.93	N/A	N/A
5745.00	62.03	AV	H	31.44	4.96	0.00	98.43	92.41	N/A	N/A
5745.00	76.64	PK	V	31.44	4.96	0.00	113.04	107.02	N/A	N/A
5745.00	66.93	AV	V	31.44	4.96	0.00	103.33	97.31	N/A	N/A
5725.00	45.54	PK	V	31.42	4.96	0.00	81.92	75.9	122.20	46.30
5720.00	33.64	PK	V	31.41	4.96	0.00	70.01	63.99	110.80	46.81
5700.00	28.90	PK	V	31.38	4.97	0.00	65.25	59.23	105.20	45.97
5650.00	28.25	PK	V	31.31	4.95	0.00	64.51	58.49	68.20	9.71
11490.00	41.25	PK	V	38.29	6.98	26.57	59.95	53.93	74.00	20.07
11490.00	29.48	AV	V	38.29	6.98	26.57	48.18	42.16	54.00	11.84
17235.00	34.19	PK	V	41.02	9.01	25.11	59.11	53.09	68.20	15.11
Middle Channel: 5785 MHz										
5785.00	71.36	PK	H	31.50	4.94	0.00	107.80	101.78	N/A	N/A
5785.00	61.52	AV	H	31.50	4.94	0.00	97.96	91.94	N/A	N/A
5785.00	76.85	PK	V	31.50	4.94	0.00	113.29	107.27	N/A	N/A
5785.00	67.08	AV	V	31.50	4.94	0.00	103.52	97.5	N/A	N/A
11570.00	41.32	PK	V	38.36	6.98	26.97	59.69	53.67	74.00	20.33
11570.00	28.50	AV	V	38.36	6.98	26.97	46.87	40.85	54.00	13.15
17355.00	34.87	PK	V	41.28	9.04	25.16	60.03	54.01	68.20	14.19
High Channel: 5825 MHz										
5825.00	71.14	PK	H	31.56	4.94	0.00	107.64	101.62	N/A	N/A
5825.00	60.96	AV	H	31.56	4.94	0.00	97.46	91.44	N/A	N/A
5825.00	76.77	PK	V	31.56	4.94	0.00	113.27	107.25	N/A	N/A
5825.00	66.24	AV	V	31.56	4.94	0.00	102.74	96.72	N/A	N/A
5850.00	35.15	PK	V	31.59	4.95	0.00	71.69	65.67	122.20	56.53
5855.00	33.09	PK	V	31.60	4.95	0.00	69.64	63.62	110.80	47.18
5875.00	28.85	PK	V	31.63	4.95	0.00	65.43	59.41	105.20	45.79
5925.00	28.21	PK	V	31.70	4.95	0.00	64.86	58.84	68.20	9.36
11650.00	41.75	PK	V	38.42	6.99	26.84	60.32	54.3	74.00	19.70
11650.00	28.67	AV	V	38.42	6.99	26.84	47.24	41.22	54.00	12.78
17475.00	34.83	PK	V	41.55	9.06	24.55	60.89	54.87	68.20	13.33

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	75.77	PK	H	31.44	4.96	0.00	112.17	106.15	N/A	N/A
5745.00	63.52	AV	H	31.44	4.96	0.00	99.92	93.9	N/A	N/A
5745.00	78.29	PK	V	31.44	4.96	0.00	114.69	108.67	N/A	N/A
5745.00	66.03	AV	V	31.44	4.96	0.00	102.43	96.41	N/A	N/A
5725.00	38.32	PK	V	31.42	4.96	0.00	74.70	68.68	122.20	53.52
5720.00	33.74	PK	V	31.41	4.96	0.00	70.11	64.09	110.80	46.71
5700.00	29.03	PK	V	31.38	4.97	0.00	65.38	59.36	105.20	45.84
5650.00	28.68	PK	V	31.31	4.95	0.00	64.94	58.92	68.20	9.28
11490.00	39.83	PK	V	38.29	6.98	26.57	58.53	52.51	74.00	21.49
11490.00	27.18	AV	V	38.29	6.98	26.57	45.88	39.86	54.00	14.14
17235.00	34.26	PK	V	41.02	9.01	25.11	59.18	53.16	68.20	15.04
Middle Channel: 5785 MHz										
5785.00	75.96	PK	H	31.50	4.94	0.00	112.40	106.38	N/A	N/A
5785.00	63.81	AV	H	31.50	4.94	0.00	100.25	94.23	N/A	N/A
5785.00	78.50	PK	V	31.50	4.94	0.00	114.94	108.92	N/A	N/A
5785.00	66.39	AV	V	31.50	4.94	0.00	102.83	96.81	N/A	N/A
11570.00	40.36	PK	V	38.36	6.98	26.97	58.73	52.71	74.00	21.29
11570.00	27.63	AV	V	38.36	6.98	26.97	46.00	39.98	54.00	14.02
17355.00	34.51	PK	V	41.28	9.04	25.16	59.67	53.65	68.20	14.55
High Channel: 5825 MHz										
5825.00	76.85	PK	H	31.56	4.94	0.00	113.35	107.33	N/A	N/A
5825.00	64.72	AV	H	31.56	4.94	0.00	101.22	95.2	N/A	N/A
5825.00	78.64	PK	V	31.56	4.94	0.00	115.14	109.12	N/A	N/A
5825.00	66.93	AV	V	31.56	4.94	0.00	103.43	97.41	N/A	N/A
5850.00	34.97	PK	V	31.59	4.95	0.00	71.51	65.49	122.20	56.71
5855.00	28.86	PK	V	31.60	4.95	0.00	65.41	59.39	110.80	51.41
5875.00	28.16	PK	V	31.63	4.95	0.00	64.74	58.72	105.20	46.48
5925.00	28.04	PK	V	31.70	4.95	0.00	64.69	58.67	68.20	9.53
11650.00	40.06	PK	V	38.42	6.99	26.84	58.63	52.61	74.00	21.39
11650.00	27.15	AV	V	38.42	6.99	26.84	45.72	39.7	54.00	14.30
17475.00	34.19	PK	V	41.55	9.06	24.55	60.25	54.23	68.20	13.97

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: 5755MHz										
5755.00	74.56	PK	H	31.46	4.95	0.00	110.97	104.95	N/A	N/A
5755.00	62.25	AV	H	31.46	4.95	0.00	98.66	92.64	N/A	N/A
5755.00	76.06	PK	V	31.46	4.95	0.00	112.47	106.45	N/A	N/A
5755.00	64.76	AV	V	31.46	4.95	0.00	101.17	95.15	N/A	N/A
5725.00	42.72	PK	V	31.42	4.96	0.00	79.10	73.08	122.20	49.12
5720.00	40.86	PK	V	31.41	4.96	0.00	77.23	71.21	110.80	39.59
5700.00	35.27	PK	V	31.38	4.97	0.00	71.62	65.6	105.20	39.60
5650.00	30.83	PK	V	31.31	4.95	0.00	67.09	61.07	68.20	7.13
11510.00	41.85	PK	V	38.31	6.98	26.58	60.56	54.54	74.00	19.46
11510.00	28.42	AV	V	38.31	6.98	26.58	47.13	41.11	54.00	12.89
17265.00	34.60	PK	V	41.08	9.02	24.84	59.86	53.84	68.20	14.36
High Channel: 5795 MHz										
5795.00	74.59	PK	H	31.51	4.94	0.00	111.04	105.02	N/A	N/A
5795.00	62.88	AV	H	31.51	4.94	0.00	99.33	93.31	N/A	N/A
5795.00	76.37	PK	V	31.51	4.94	0.00	112.82	106.8	N/A	N/A
5795.00	64.93	AV	V	31.51	4.94	0.00	101.38	95.36	N/A	N/A
5850.00	35.72	PK	V	31.59	4.95	0.00	72.26	66.24	122.20	55.96
5855.00	34.48	PK	V	31.60	4.95	0.00	71.03	65.01	110.80	45.79
5875.00	31.33	PK	V	31.63	4.95	0.00	67.91	61.89	105.20	43.31
5925.00	28.02	PK	V	31.70	4.95	0.00	64.67	58.65	68.20	9.55
11590.00	41.69	PK	V	38.37	6.99	27.10	59.95	53.93	74.00	20.07
11590.00	28.59	AV	V	38.37	6.99	27.10	46.85	40.83	54.00	13.17
17385.00	34.47	PK	V	41.35	9.04	25.51	59.35	53.33	68.20	14.87

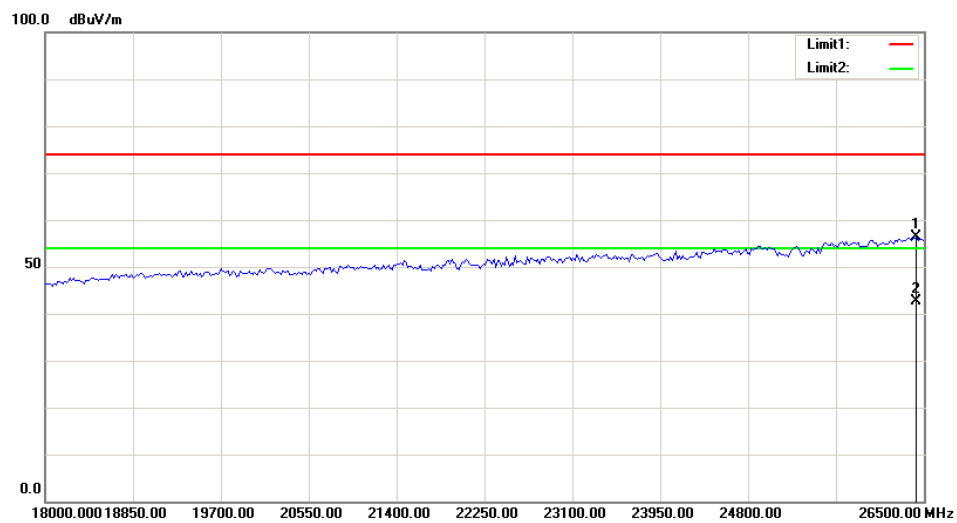
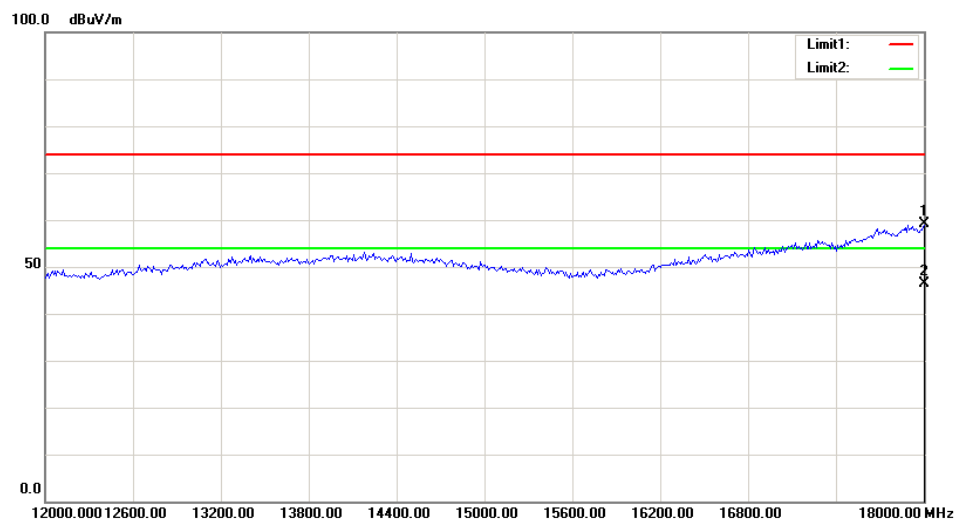
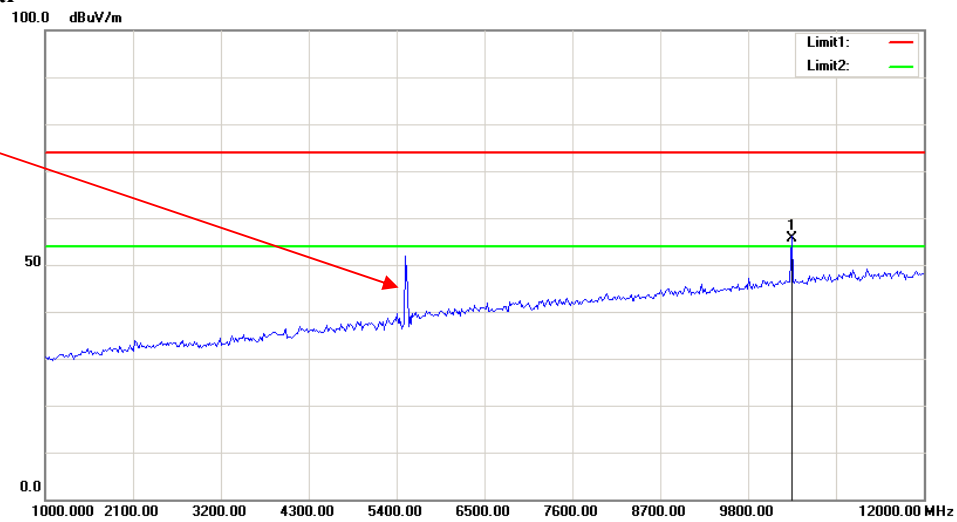
802.11 ac80(2Tx was the worst)

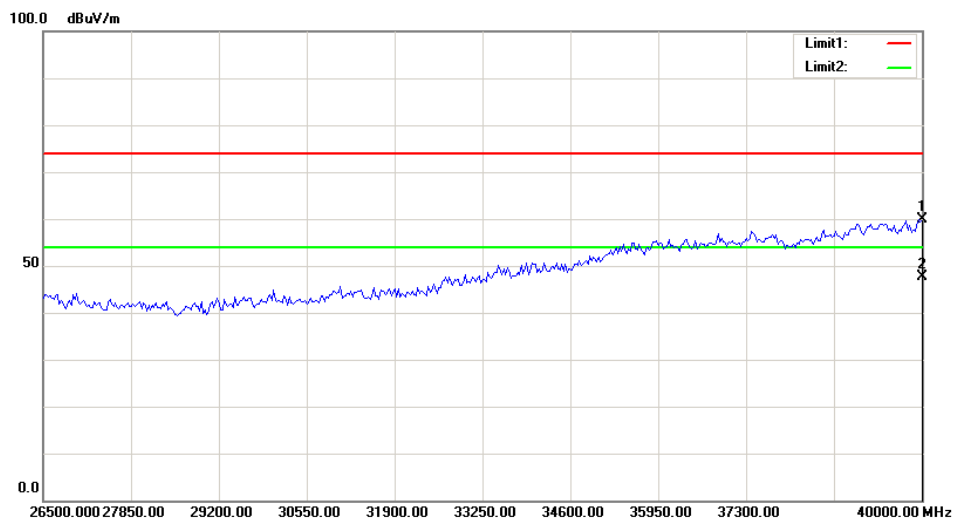
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)						
Middle Channel: 5775 MHz										
5775.00	70.55	PK	H	31.49	4.95	0.00	106.99	100.97	N/A	N/A
5775.00	59.83	AV	H	31.49	4.95	0.00	96.27	90.25	N/A	N/A
5775.00	73.23	PK	V	31.49	4.95	0.00	109.67	103.65	N/A	N/A
5775.00	62.95	AV	V	31.49	4.95	0.00	99.39	93.37	N/A	N/A
5725.00	43.69	PK	V	31.42	4.96	0.00	80.07	74.05	122.20	48.15
5720.00	41.91	PK	V	31.41	4.96	0.00	78.28	72.26	110.80	38.54
5700.00	40.01	PK	V	31.38	4.97	0.00	76.36	70.34	105.20	34.86
5650.00	28.23	PK	V	31.31	4.95	0.00	64.49	58.47	68.20	9.73
5850.00	37.84	PK	V	31.59	4.95	0.00	74.38	68.36	122.20	53.84
5855.00	34.19	PK	V	31.60	4.95	0.00	70.74	64.72	110.80	46.08
5875.00	29.54	PK	V	31.63	4.95	0.00	66.12	60.1	105.20	45.10
5925.00	28.38	PK	V	31.70	4.95	0.00	65.03	59.01	68.20	9.19
11550.00	40.19	PK	V	38.34	6.98	26.84	58.67	52.65	74.00	21.35
11550.00	27.31	AV	V	38.34	6.98	26.84	45.79	39.77	54.00	14.23
17325.00	34.22	PK	V	41.22	9.03	24.81	59.66	53.64	68.20	14.56

Test Plots(For worst mode 802.11a chain 0 5745 MHz)

Horizontal

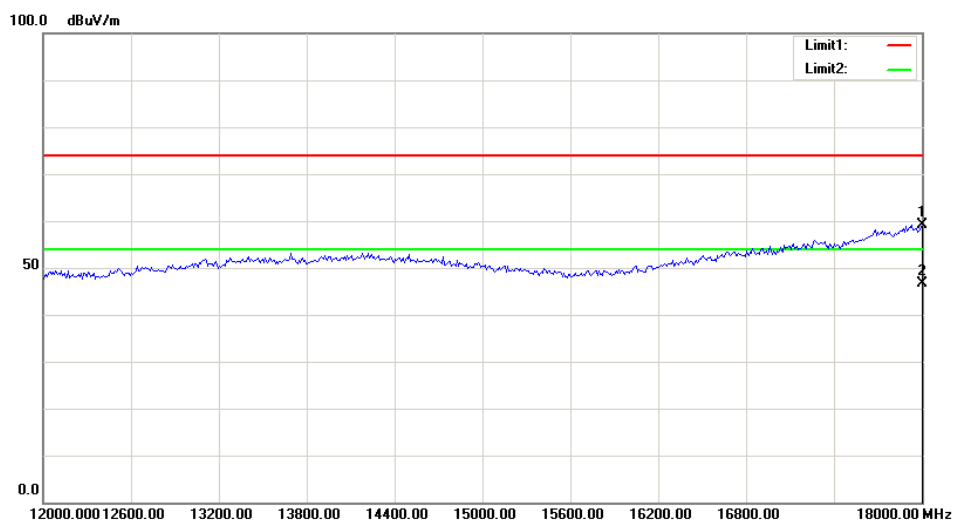
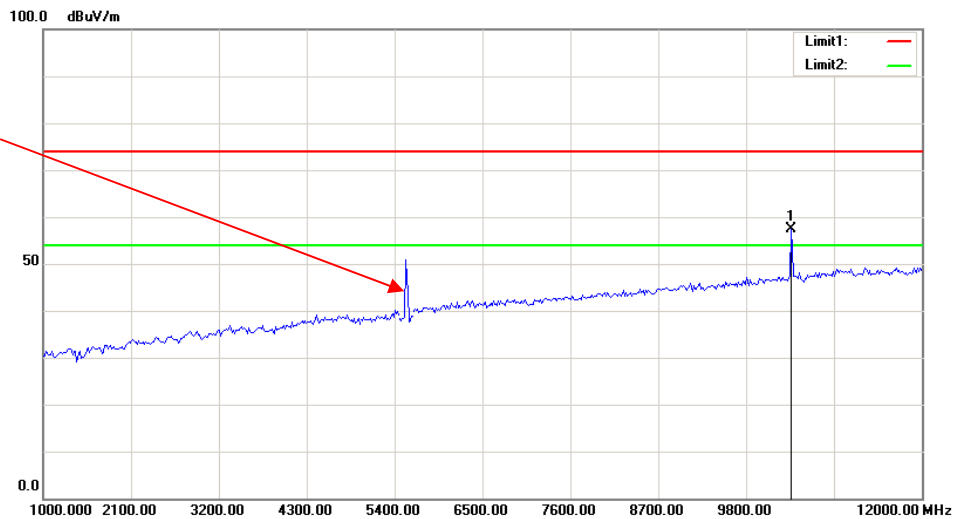
Fundamental
Test with Band
Rejection Filter

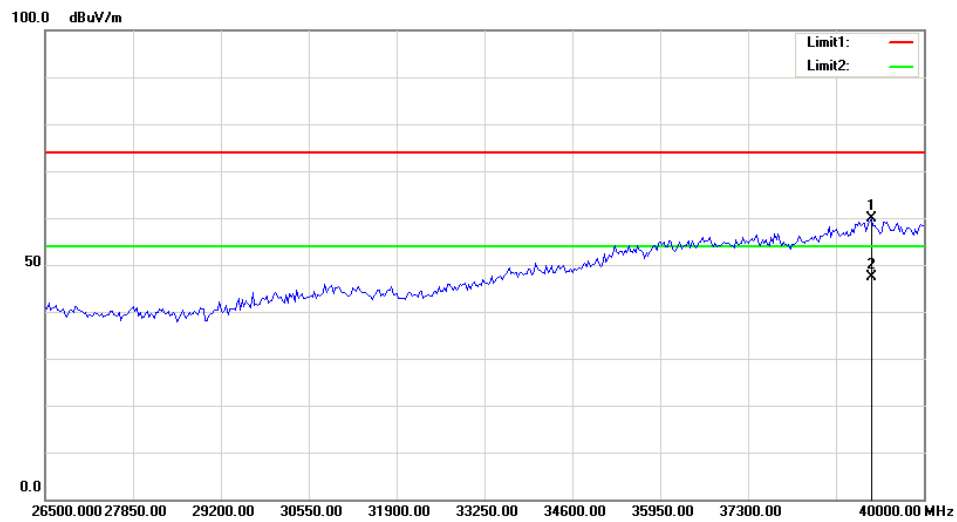
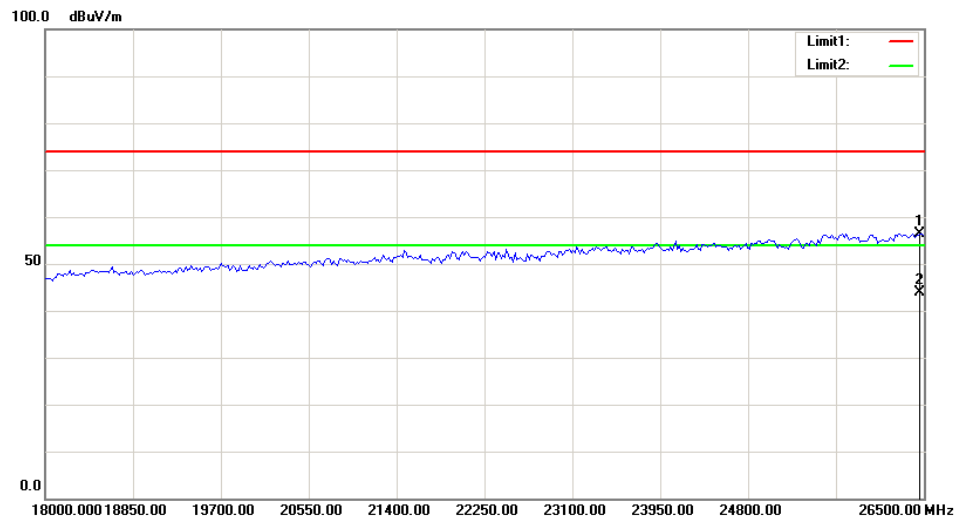




Vertical

Fundamental
Test with Band
Rejection Filter





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
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
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:	27.5°C
Relative Humidity:	61 %
ATM Pressure:	99.9 kPa

The testing was performed by Elena Lei on 2019-03-05.

Test Result: Pass.

Please refer to the following tables and plots.

Test mode: Transmitting(Test performed at chain 0)

5150-5250MHz:

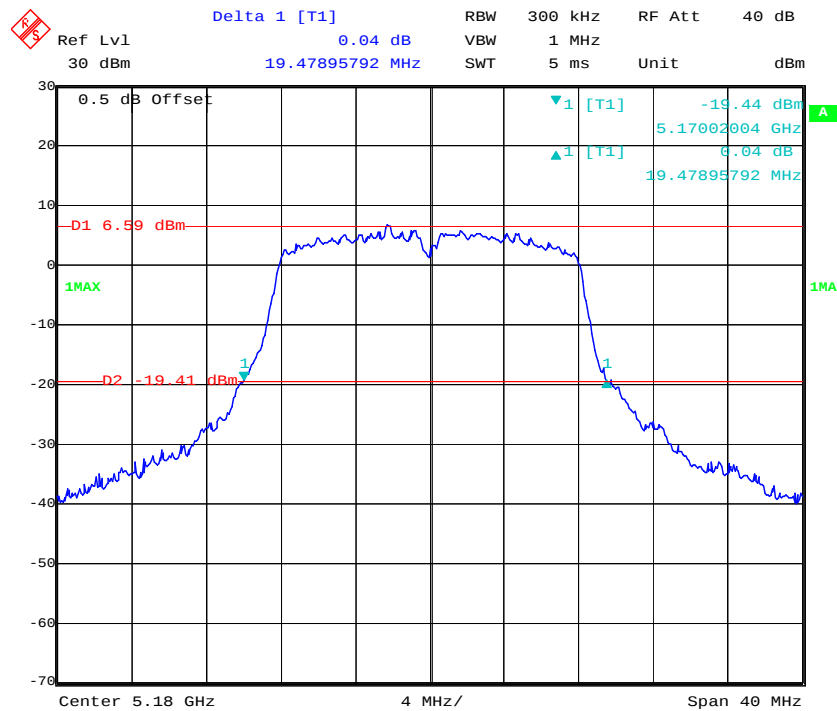
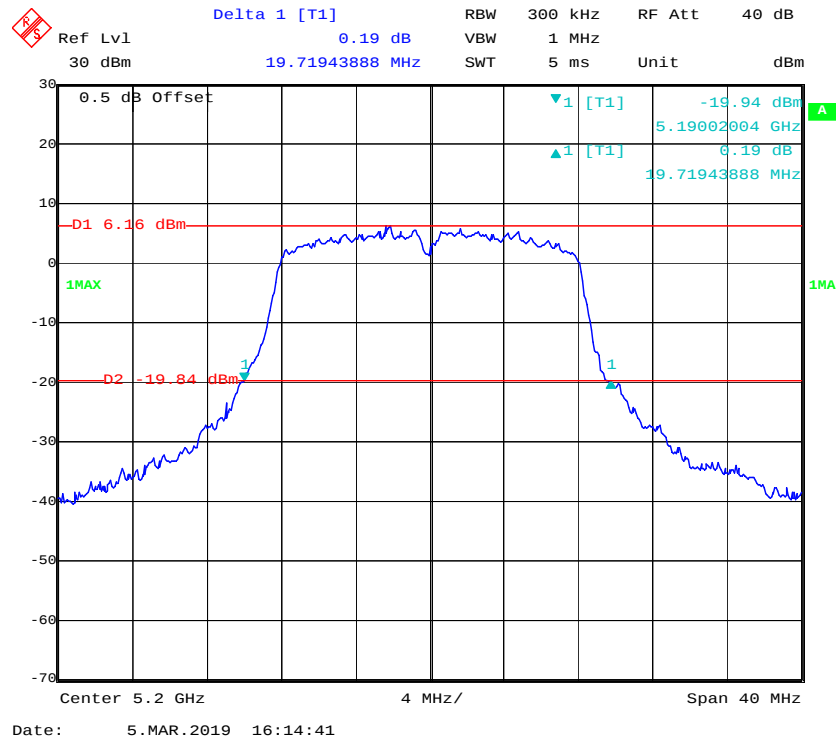
Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11 a	5180	19.479	16.433
	5200	19.719	16.353
	5240	19.319	16.353
802.11n ht20	5180	20.681	17.475
	5200	20.762	17.475
	5240	20.681	17.475
802.11n ht40	5190	40.401	36.393
	5230	40.24	36.232
802.11ac80	5210	90.1	75.351

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

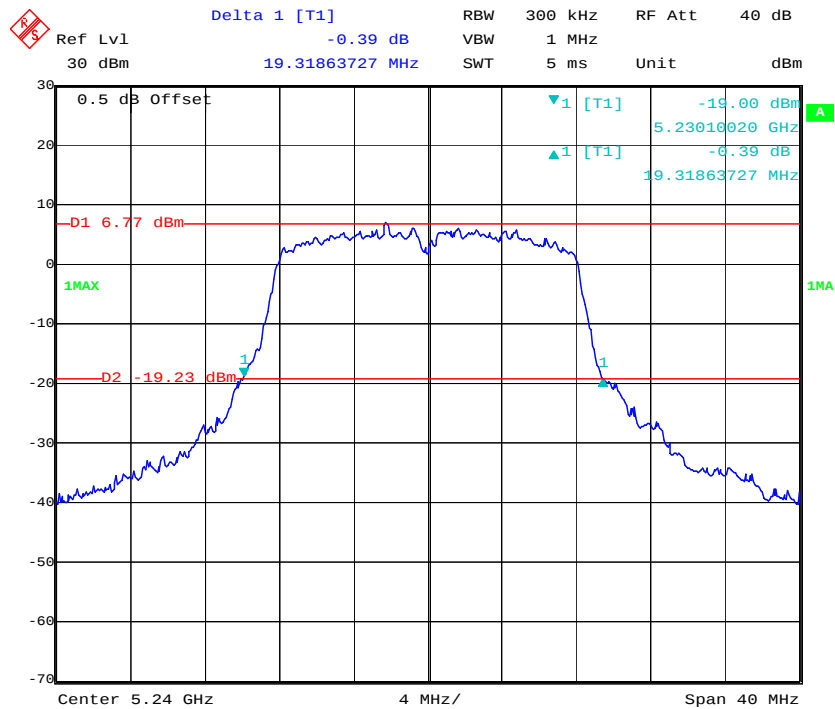
5725-5850MHz:

Mode	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11 a	Low	15.391	16.673
	Middle	15.471	16.754
	High	15.311	17.796
802.11n ht20	Low	15.551	17.555
	Middle	15.551	17.555
	High	15.551	17.635
802.11n ht40	Low	35.271	36.232
	High	35.431	36.393
802.11ac80	Middle	75.671	75.351

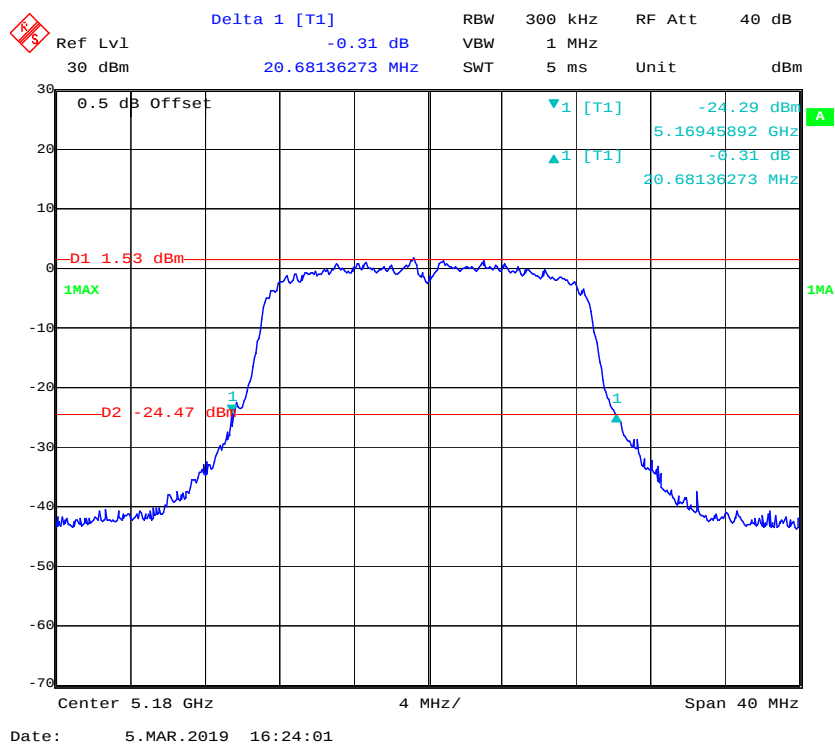
Note: For 5725-5850MHz band, the 99% Occupied Bandwidth have not fall into the band 5470-5725MHz.

5150-5250MHz: 26dB Emission Bandwidth:**802.11a Low Channel****802.11a Middle Channel**

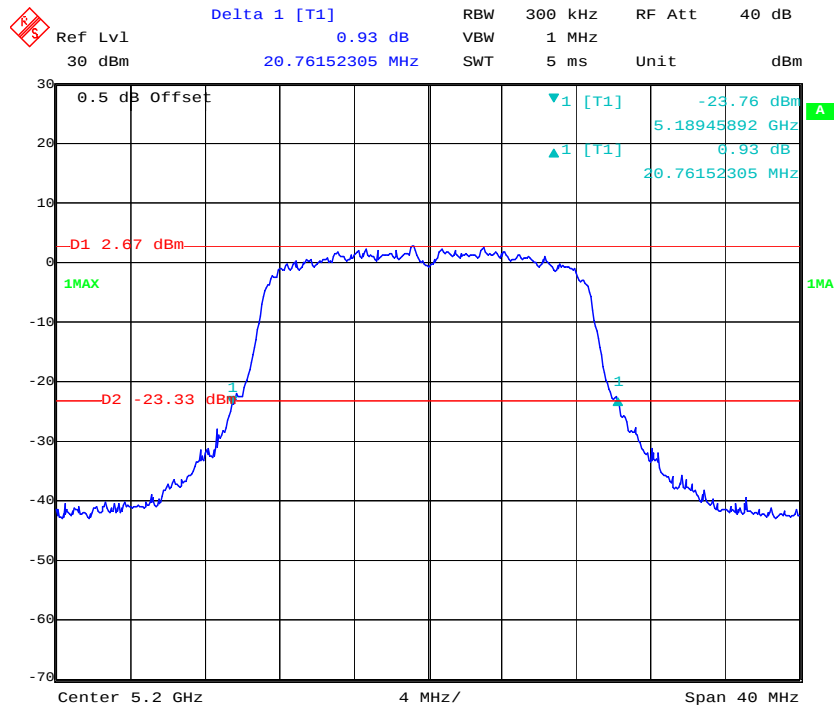
802.11a High Channel



802.11n ht20 Low Channel

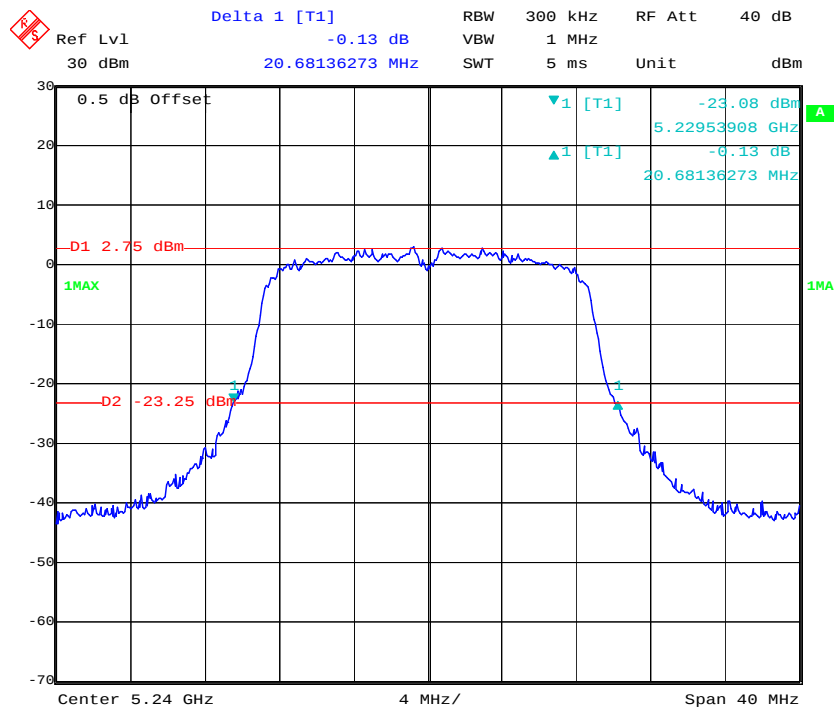


802.11n ht20 Middle Channel



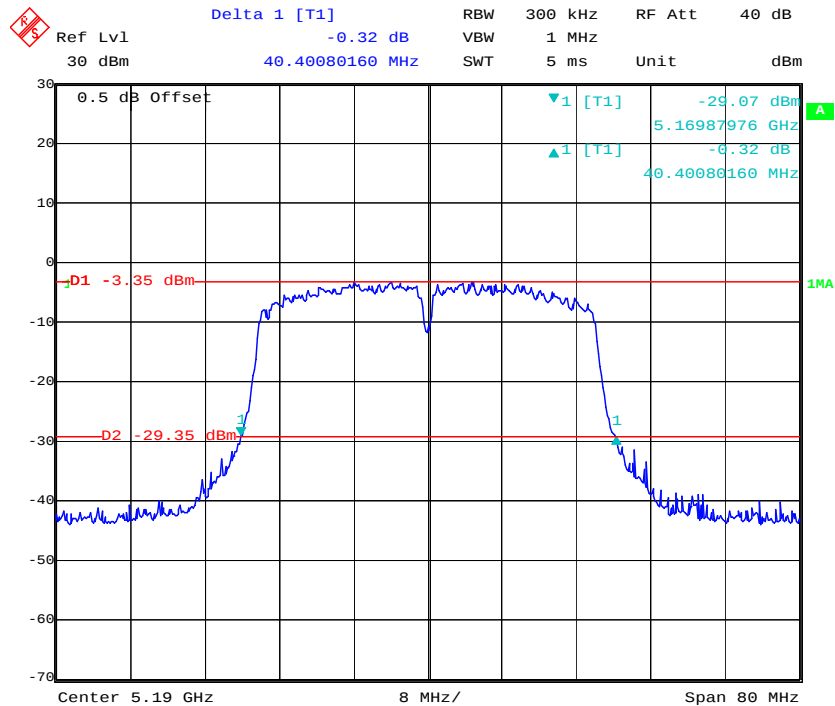
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802.11n ht20 High Channel



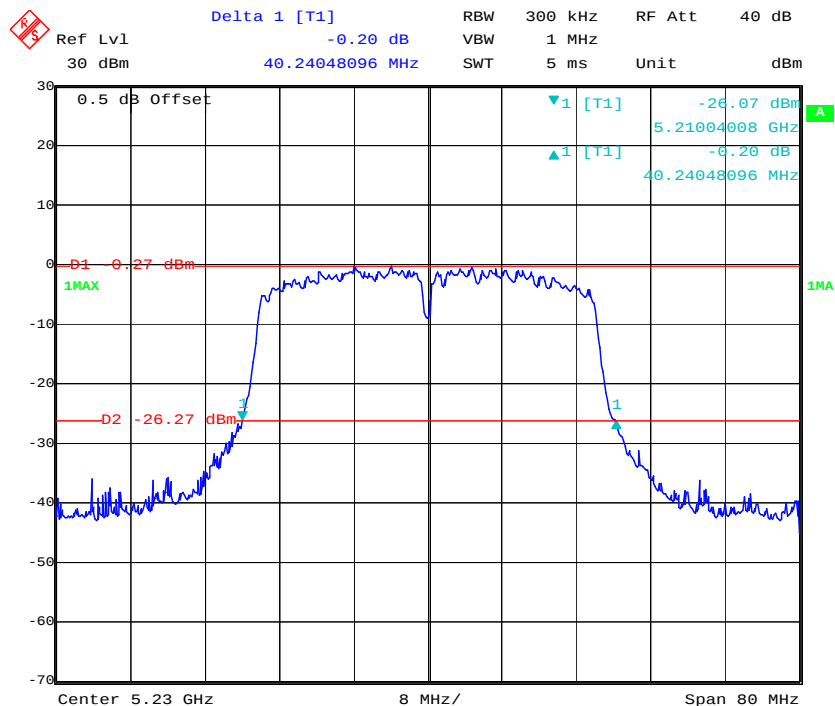
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802.11n ht40 Low Channel



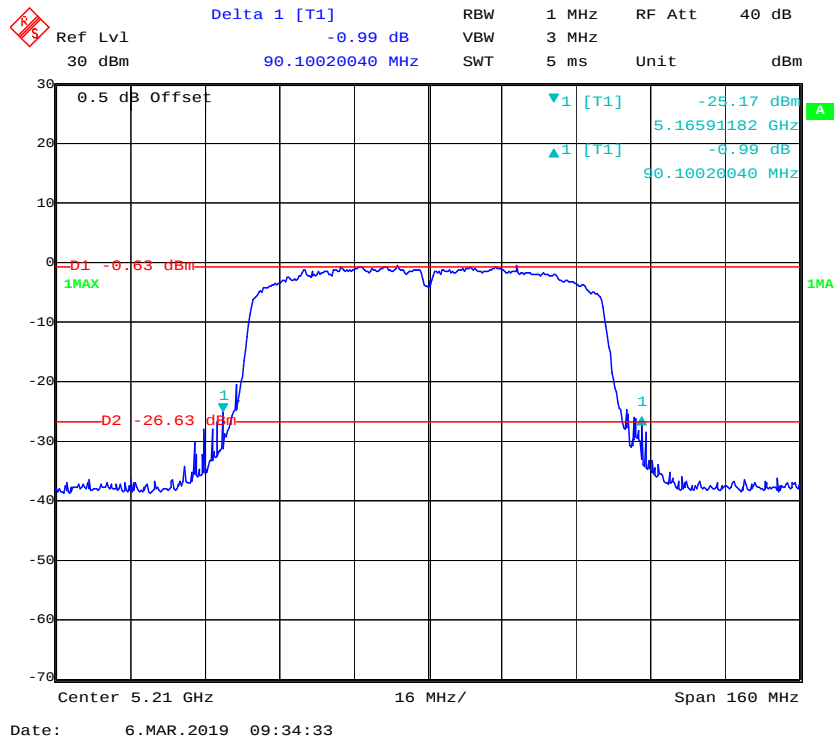
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802.11n ht40 High Channel



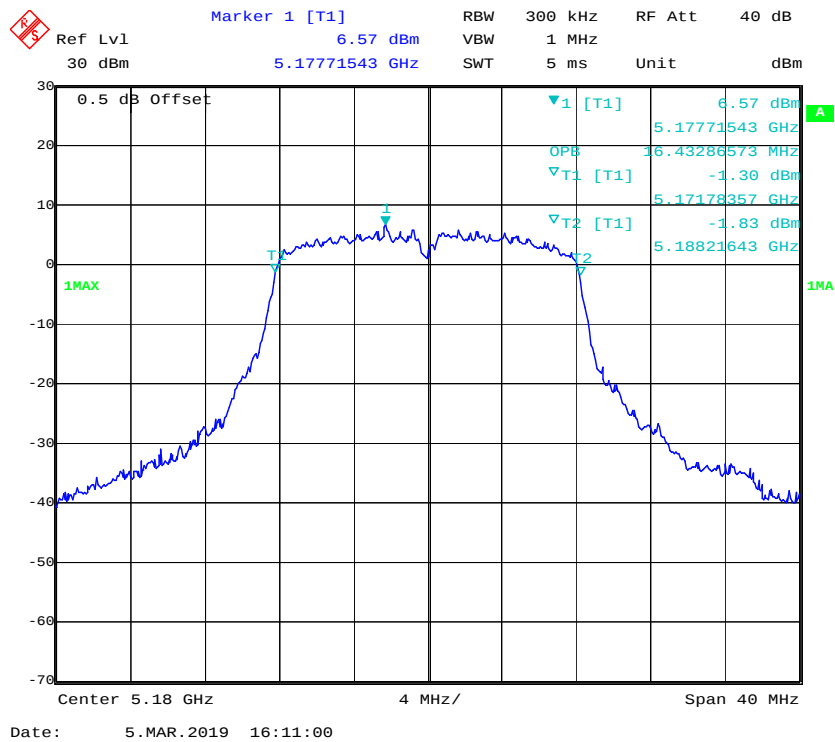
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802.11ac80 Middle Channel

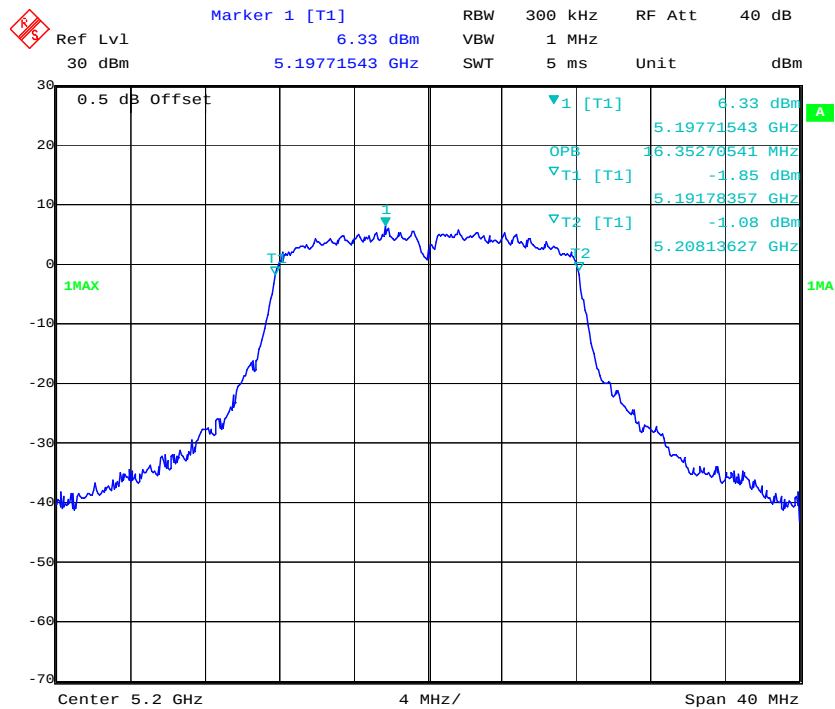


99% Occupied Bandwidth:

802.11a Low Channel

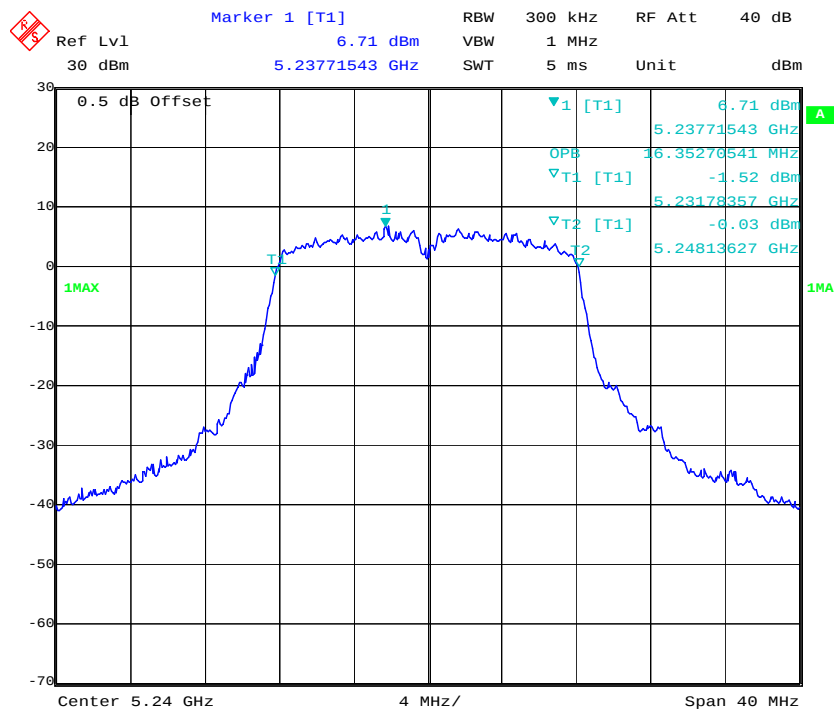


802.11a Middle Channel



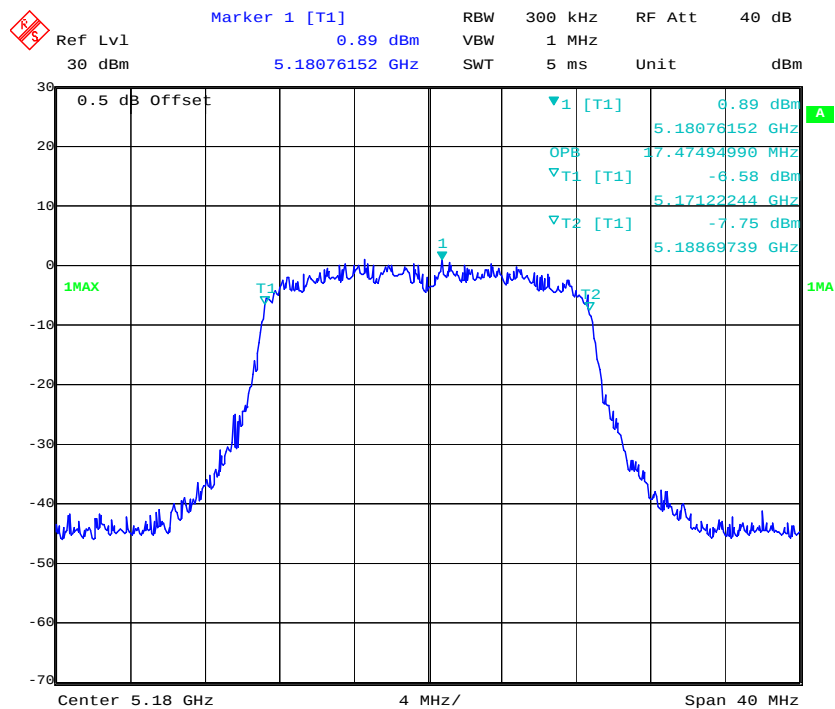
Date: 5.MAR.2019 16:15:05

802.11a High Channel



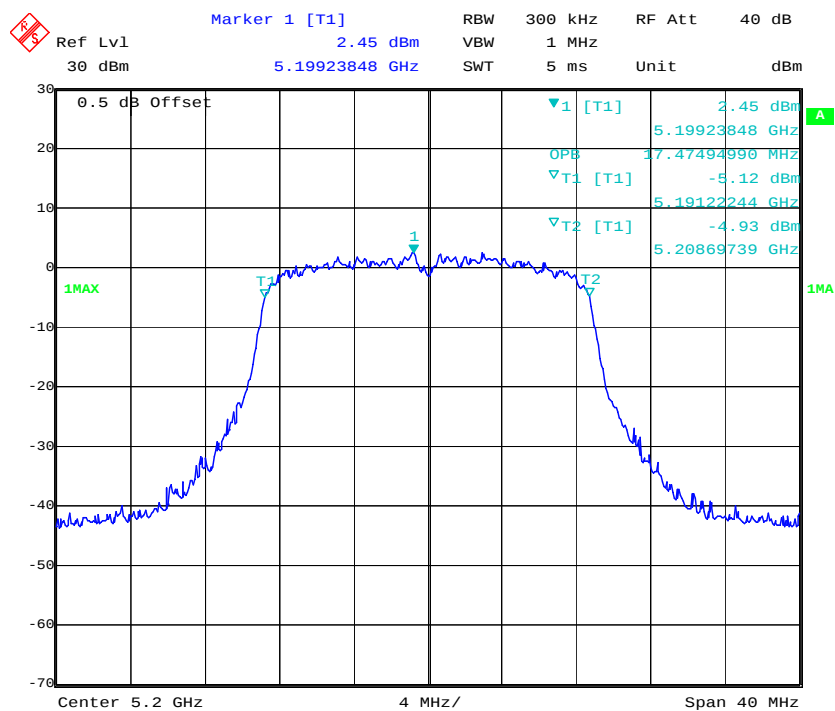
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802.11n ht20 Low Channel



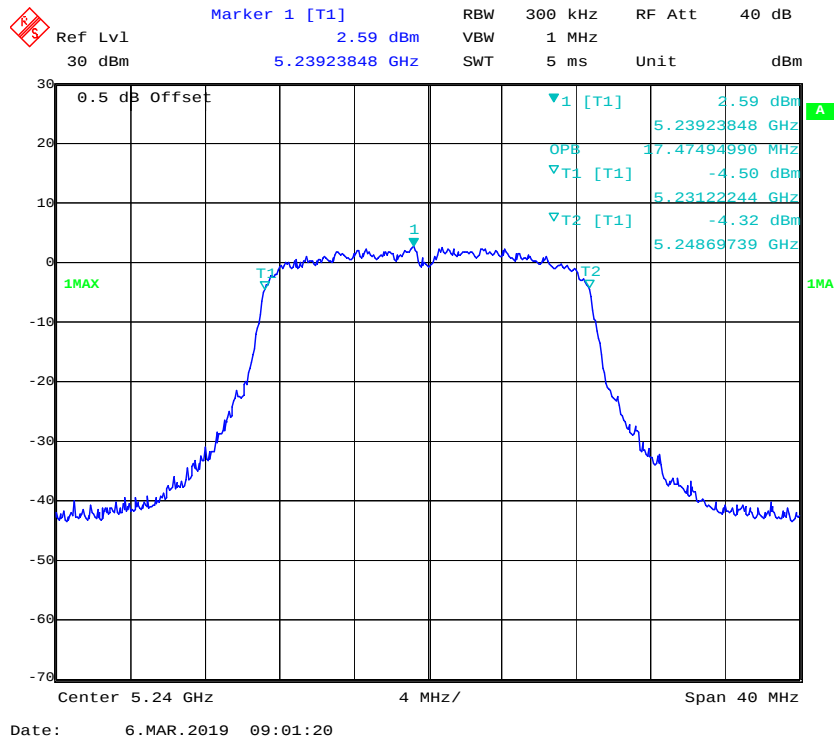
Date: 5.MAR.2019 16:24:08

802.11n ht20 Middle Channel

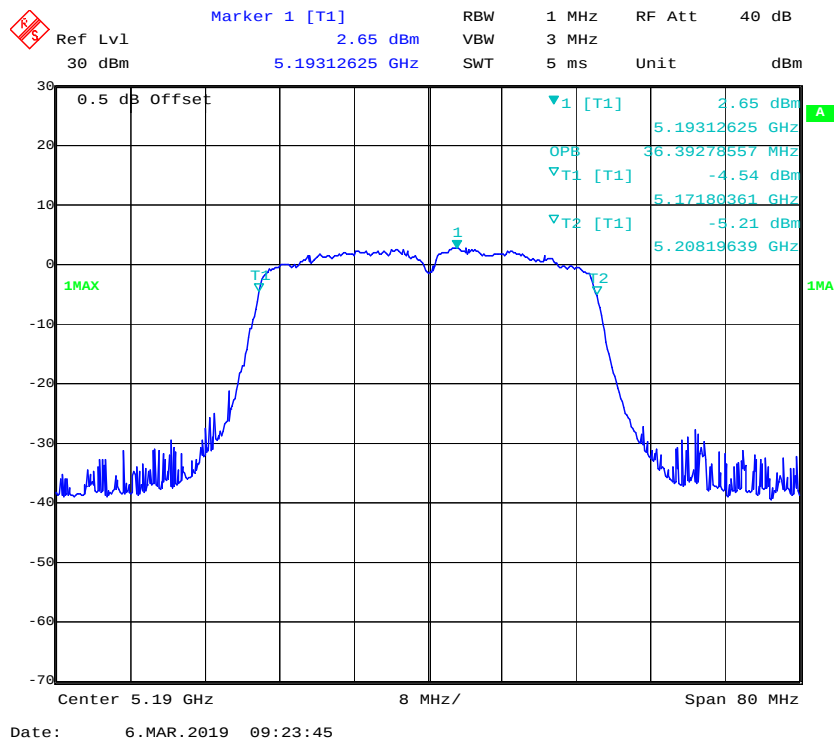


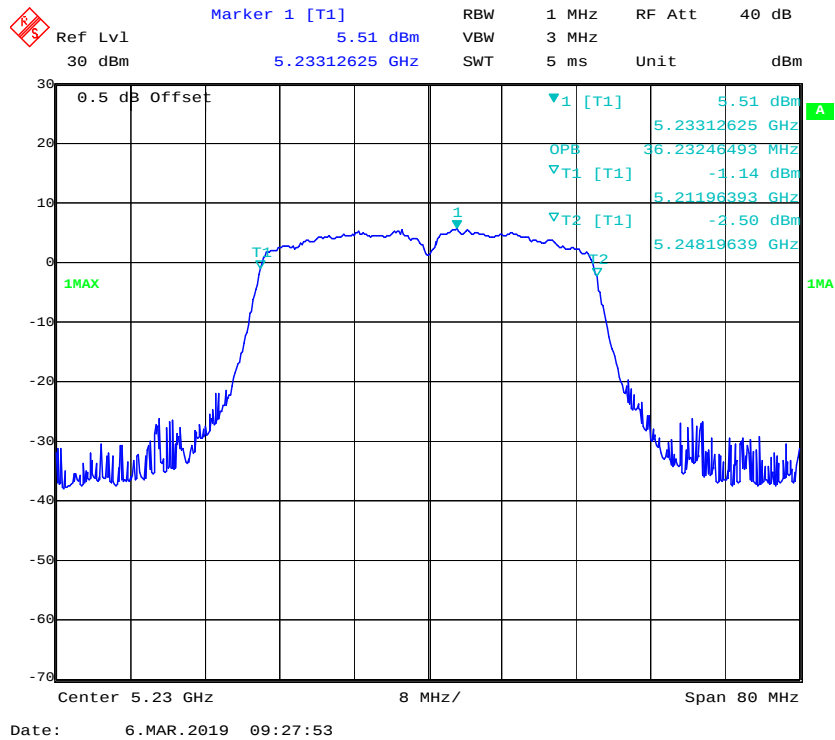
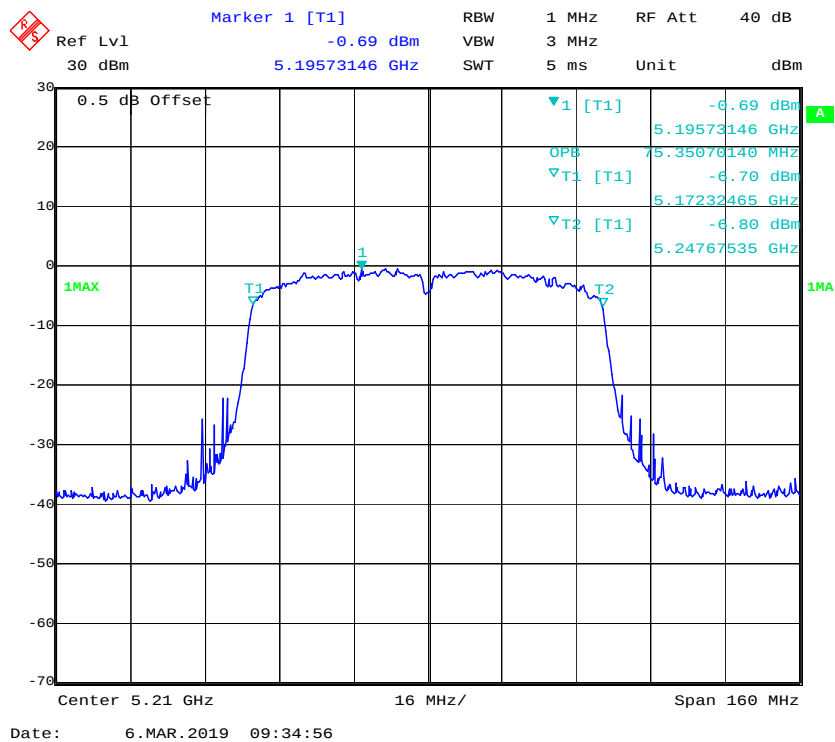
Date: 6.MAR.2019 08:42:58

802.11n ht20 High Channel



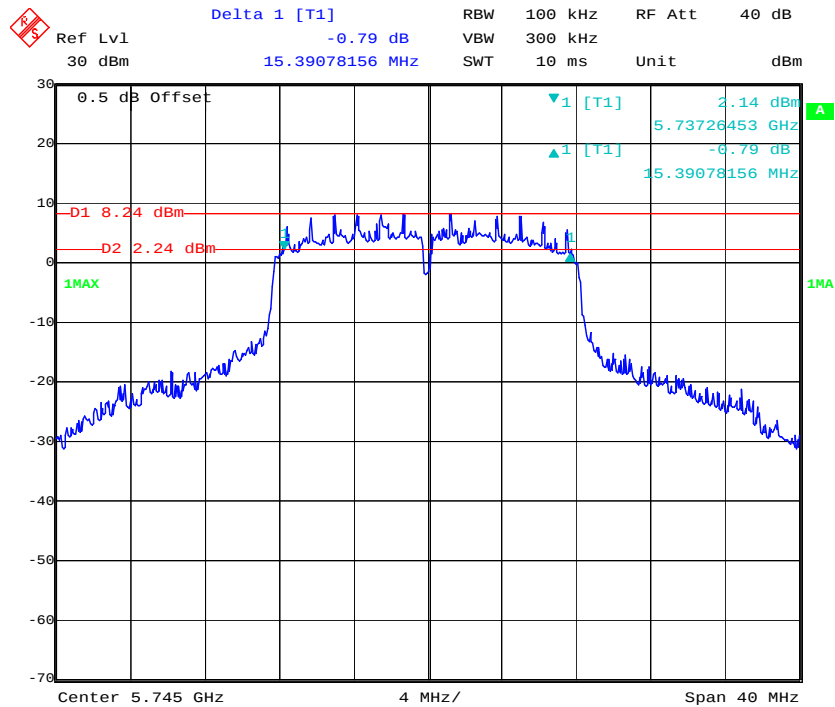
802.11n ht40 Low Channel



802.11n ht40 High Channel**802.11ac80 Middle Channel**

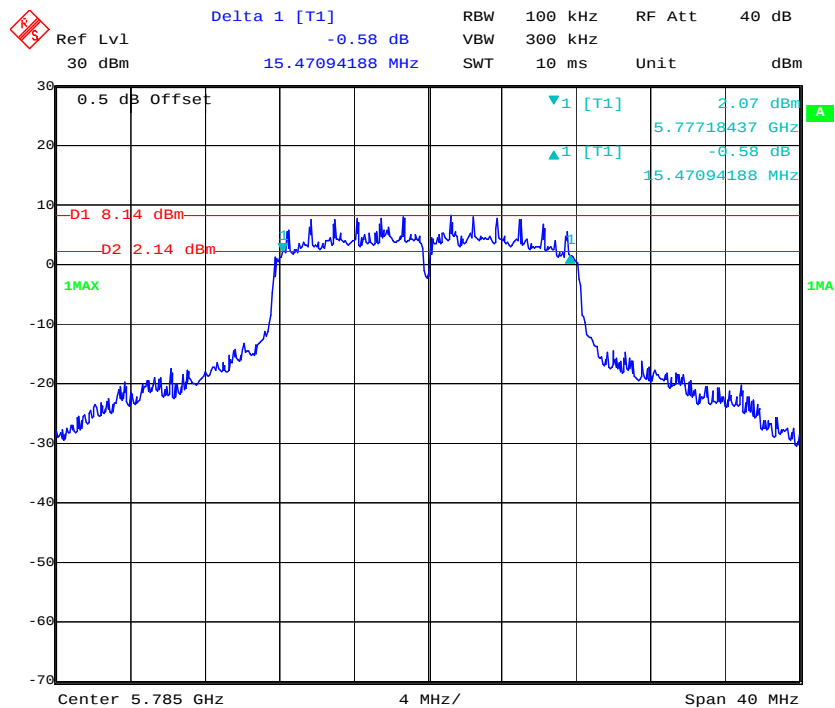
5725-5850MHz:
6dB Bandwidth:

802.11a Low Channel

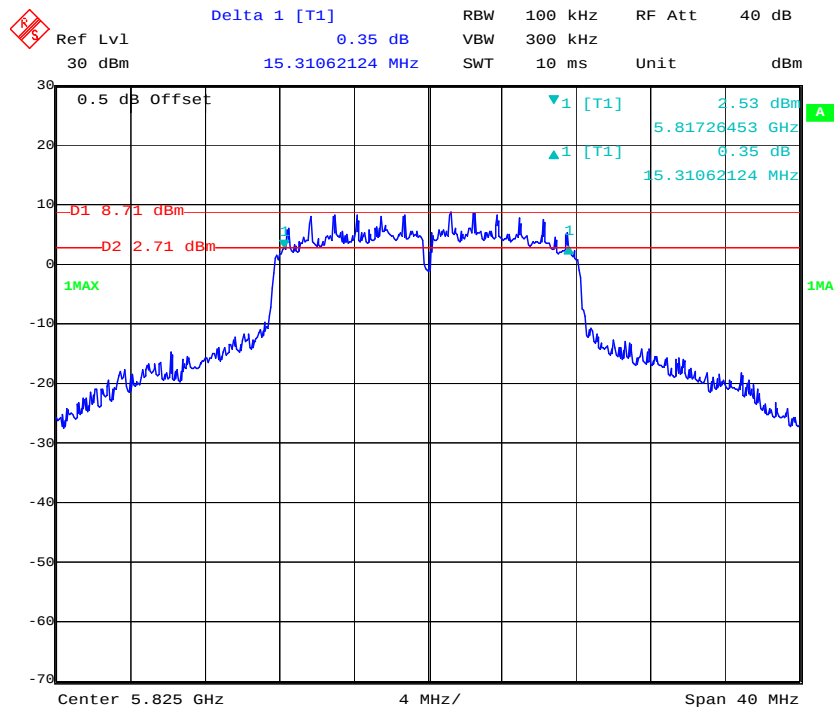
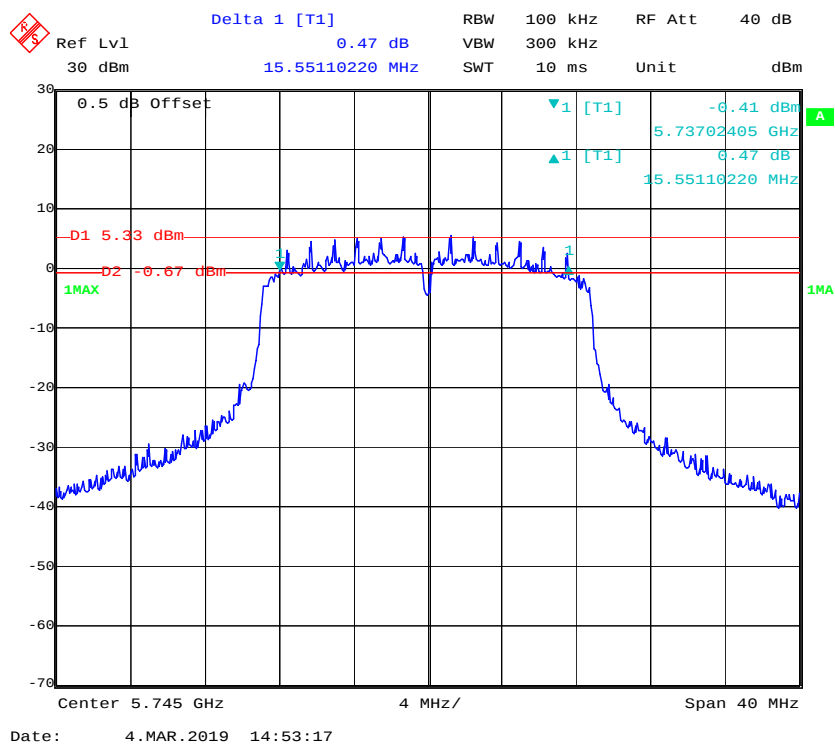


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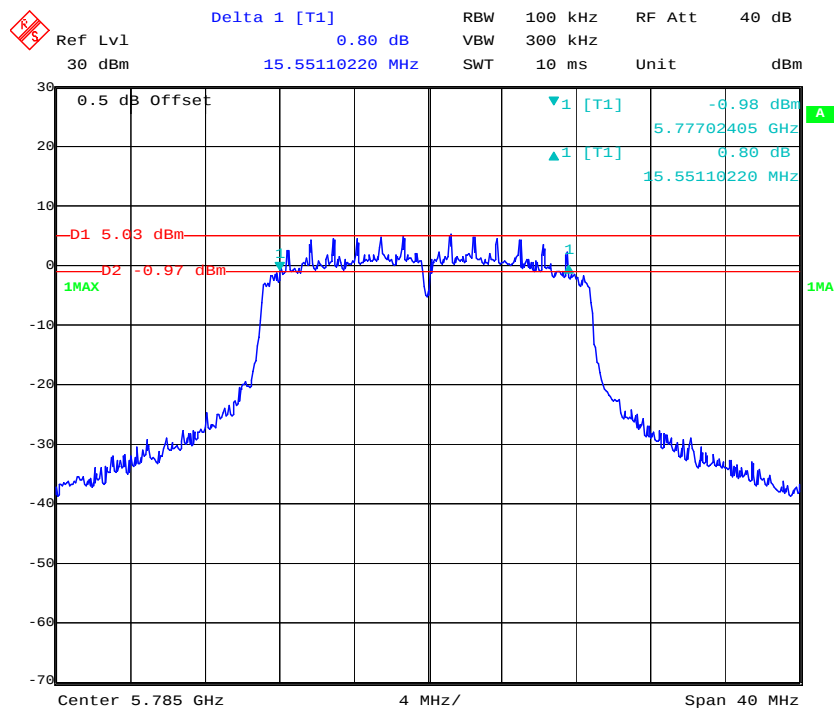
802.11a Middle Channel



Date: 4.MAR.2019 14:39:23

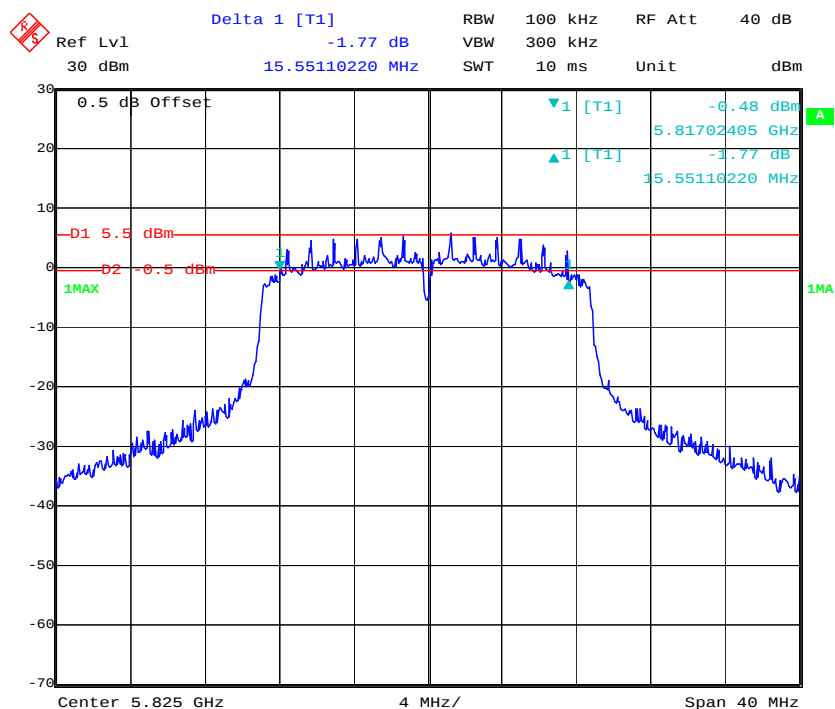
802.11a High Channel**802.11ht20 Low Channel**

802.11ht20 Middle Channel

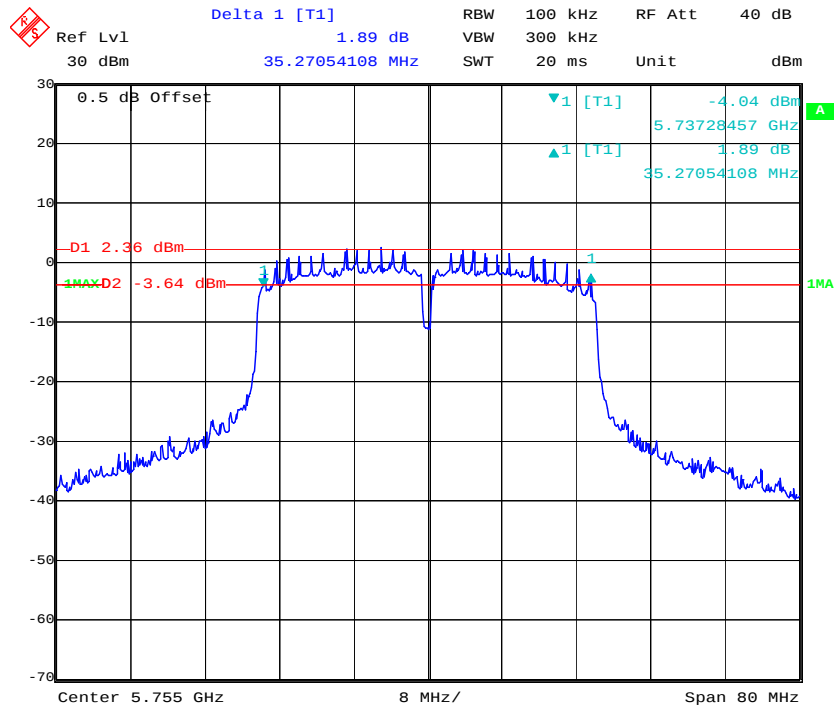


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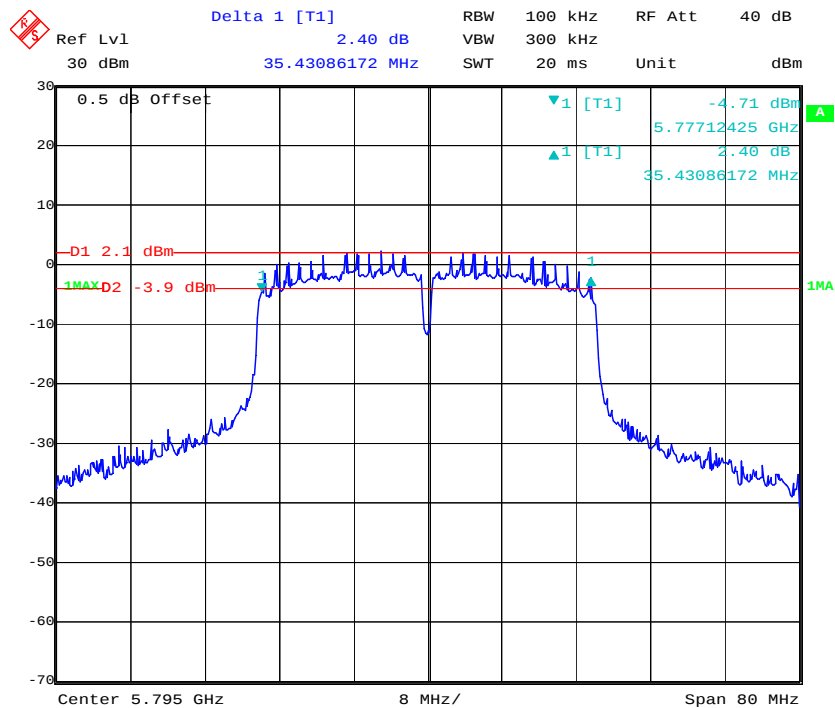
802.11ht20 High Channel



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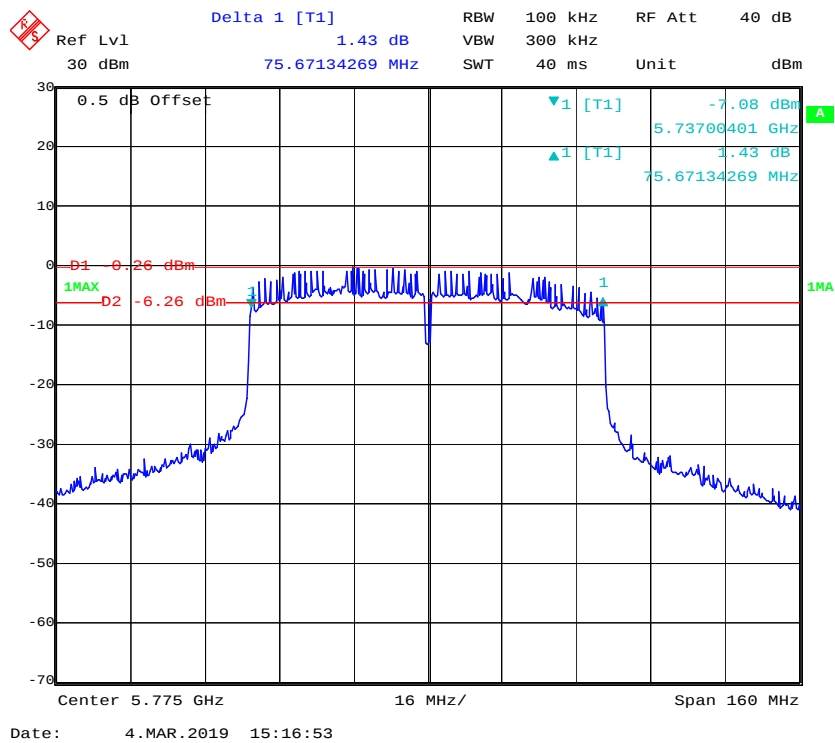
802.11ht40 Low Channel

Date: 4.MAR.2019 15:07:00

802.11ht40 High Channel

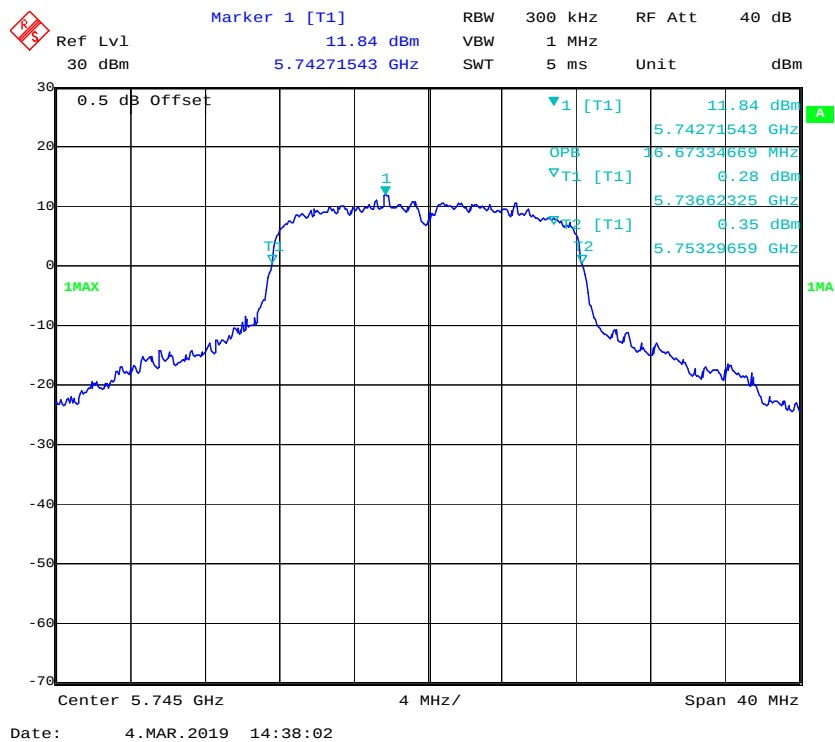
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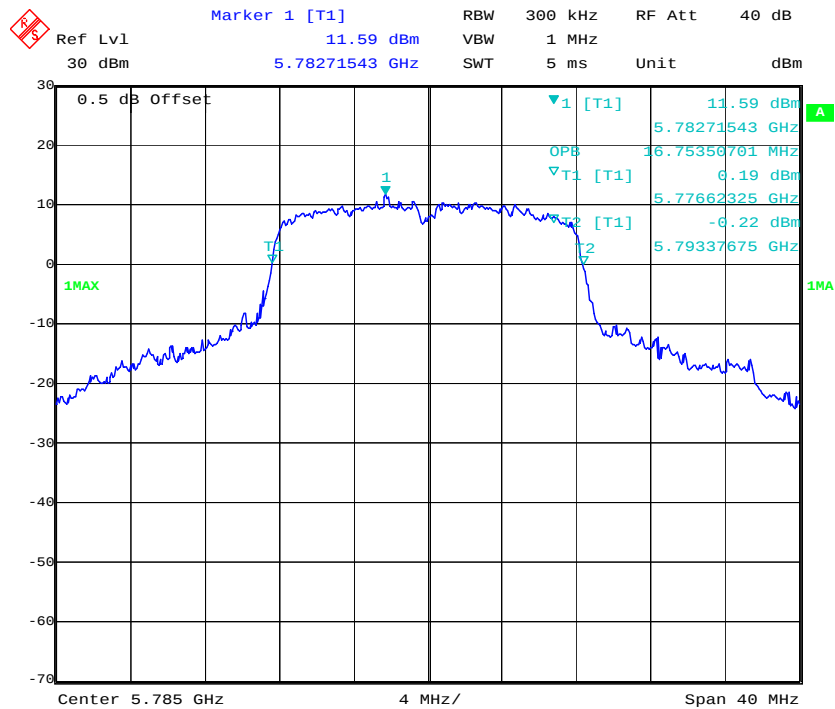
802.11ac80 Middle Channel



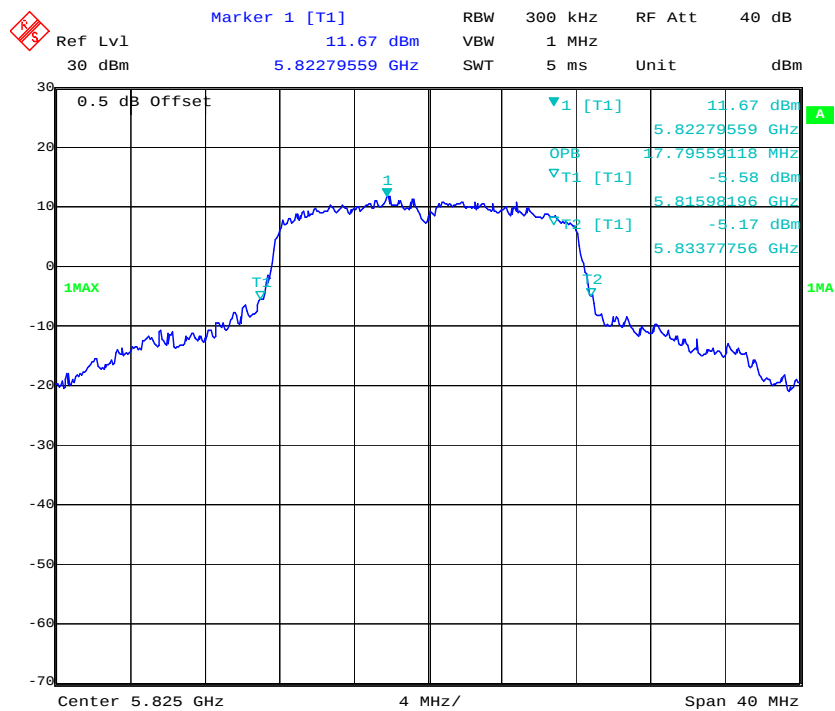
99% Occupied Bandwidth:

802.11a Low Channel

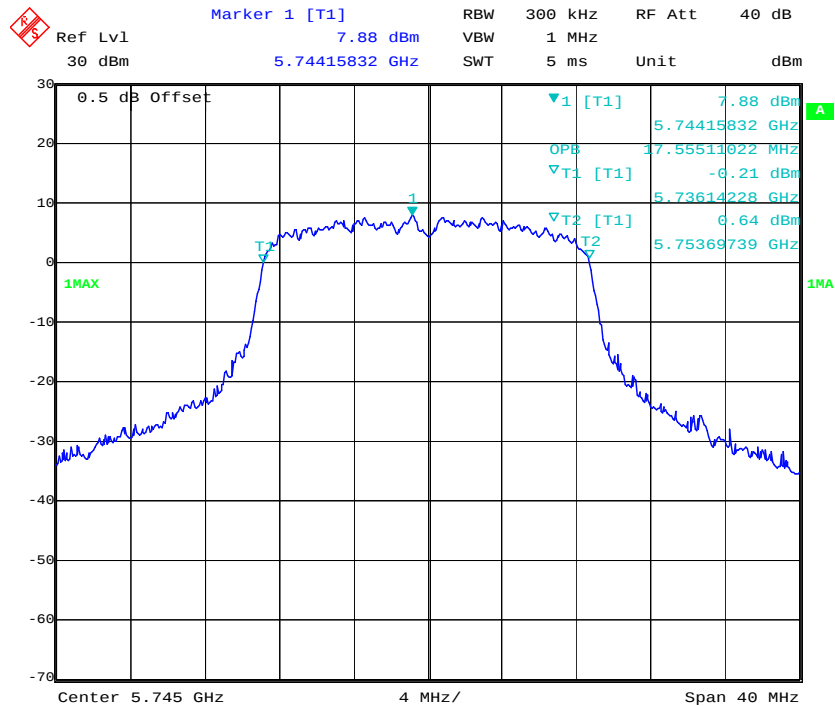


802.11a Middle Channel

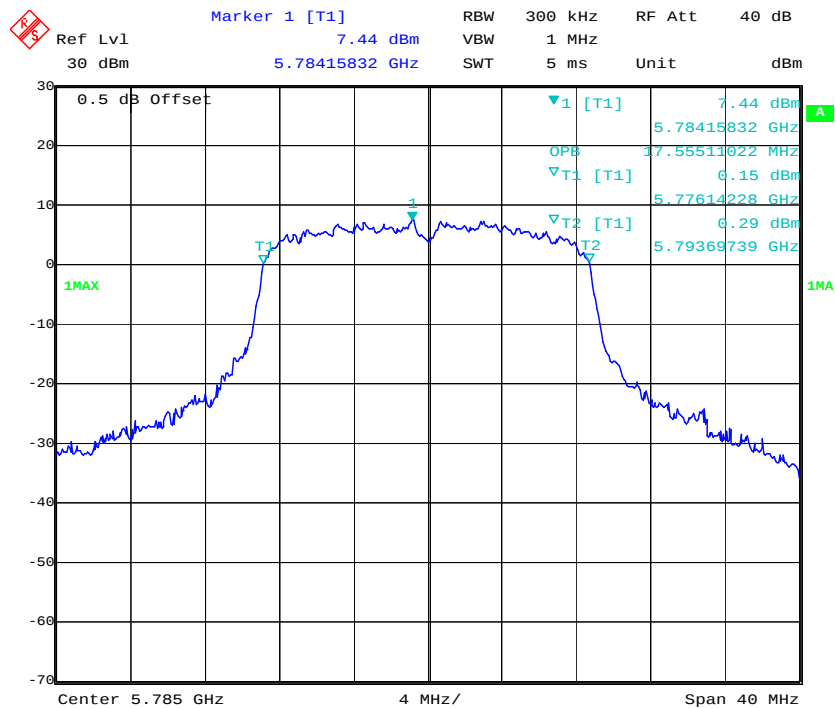
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802.11a High Channel

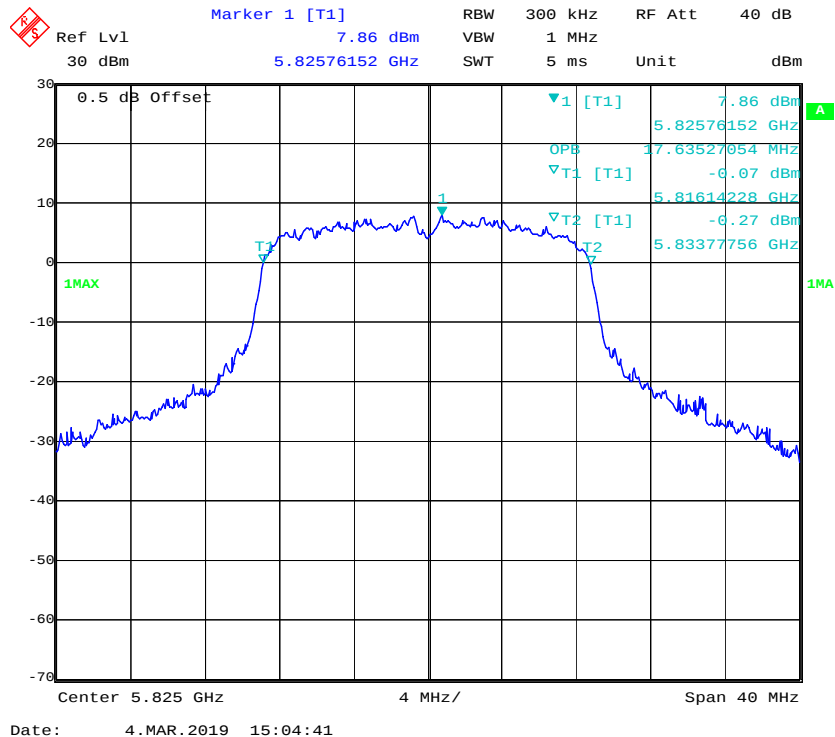
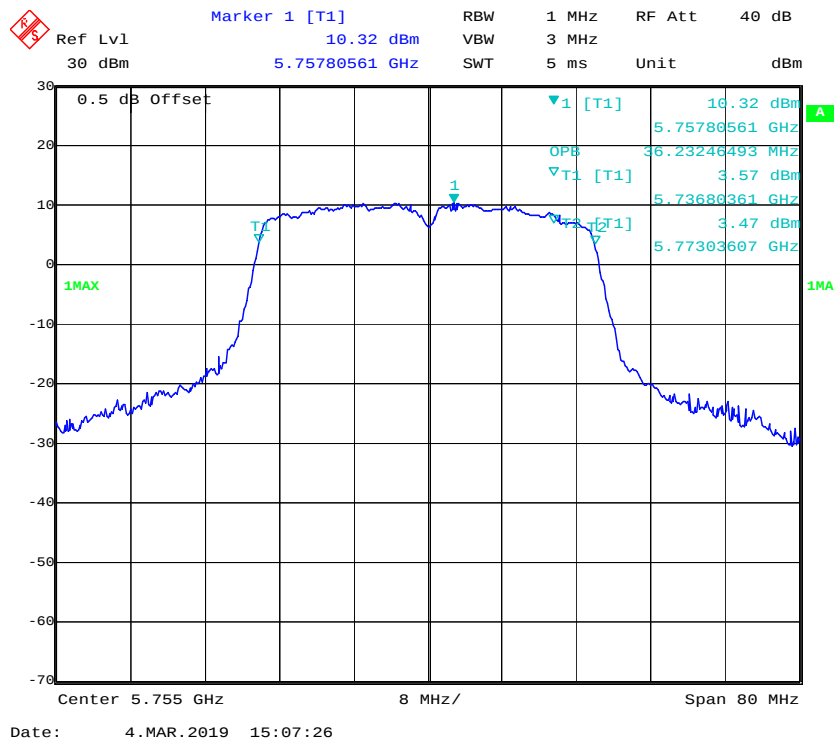
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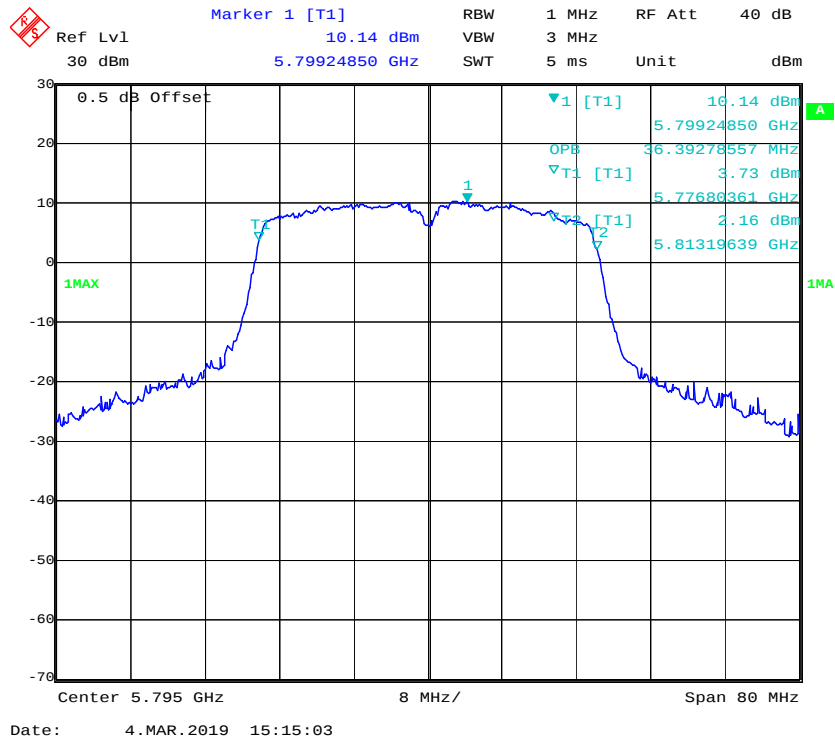
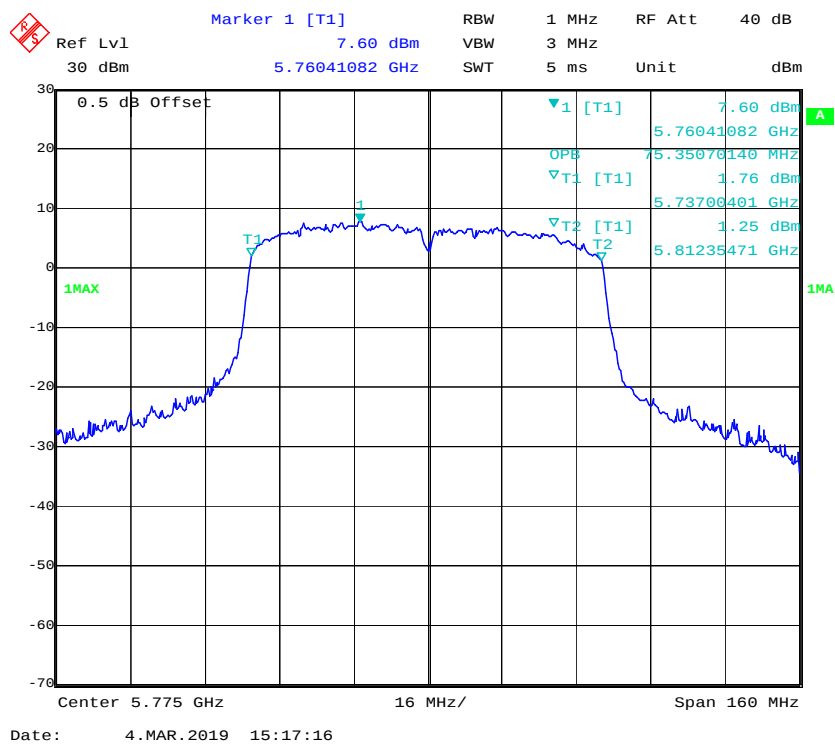
802.11ht20 Low Channel

Date: 4.MAR.2019 14:53:47

802.11ht20 Middle Channel

Date: 4.MAR.2019 14:55:49

802.11ht20 High Channel**802.11ht40 Low Channel**

802.11ht40 High Channel**802.11ac80 Middle Channel**

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
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
Agilent	USB Wideband Power Sensor	U2022XA	MY5417006	2017-12-11	2018-12-11

* **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:	27.5°C
Relative Humidity:	61 %
ATM Pressure:	99.9 kPa

The testing was performed by Elena Lei on 2019-03-06.

Test Mode: Transmitting

UNII Band	Mode	Frequency (MHz)	Conducted Average Output Power (dBm)			Limit (dBm)	Result
			Chain 0	Chain 1	Total		
5150 - 5250 MHz	802.11 a	5180	13.48	13.78	/	30	PASS
		5200	13.56	13.82	/	30	PASS
		5240	13.68	13.81	/	30	PASS
	802.11ht20	5180	9.58	9.98	12.79	30	PASS
		5200	9.61	9.84	12.74	30	PASS
		5240	9.51	9.91	12.72	30	PASS
	802.11ht40	5190	7.02	7.42	10.23	30	PASS
		5230	9.43	9.99	9.90	30	PASS
	802.11 ac80	5210	6.68	7.02	9.86	30	PASS
5725 - 5850 MHz	802.11 a	5745	17.33	17.59	/	30	PASS
		5785	17.24	17.61	/	30	PASS
		5825	17.66	17.48	/	30	PASS
	802.11ht20	5745	14.08	14.83	17.48	30	PASS
		5785	13.87	14.77	17.35	30	PASS
		5825	14.18	14.63	17.42	30	PASS
	802.11ht40	5755	14.36	14.59	17.49	30	PASS
		5795	14.21	14.67	17.46	30	PASS
	802.11 ac80	5775	14.18	14.58	17.39	30	PASS

Note:

The duty cycle was calculated into the reading already.

The maximum antenna gain is 4.5dBi 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 = $G_{ANT} + \text{Array Gain} = 4.5\text{dBi} < 6\text{dBi}$

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
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
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 Data

Environmental Conditions

Temperature:	27.5°C
Relative Humidity:	61 %
ATM Pressure:	99.9 kPa

The testing was performed by Elena Lei on 2019-03-06.

Test Mode: Transmitting

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

5150-5250MHz

Mode	Frequency (MHz)	Result (dBm/MHz)			Limit (dBm/MHz)
		Chain 0	Chain 1	Total	
802.11a	5180	4.2	4.24	/	17
	5200	4.03	4.01	/	17
	5240	4.39	4.36	/	17
802.11n ht20	5180	-0.08	0.35	3.15	15.5
	5200	0.82	1.30	4.08	15.5
	5240	1.10	1.46	4.29	15.5
802.11n ht40	5190	-4.60	-4.40	-1.49	15.5
	5230	-1.93	-1.91	1.09	15.5
802.11ac 80	5210	-7.19	-7.50	-4.33	15.5

5725-5850MHz

Mode	Frequency (MHz)	Reading (dBm/300kHz)		Result (dBm/500kHz)			Limit (dBm/500kHz)
		Chain 0	Chain 1	Chain 0	Chain 1	Total	
802.11a	5745	7.79	7.74	10.01	9.96	/	30
	5785	7.68	8.32	9.90	10.54	/	30
	5825	7.83	8.16	10.05	10.38	/	30
802.11n ht20	5745	5.06	5.30	7.28	7.52	10.41	28.5
	5785	4.57	5.47	6.79	7.69	10.27	28.5
	5825	5.51	5.69	7.73	7.91	10.83	28.5
802.11n ht40	5755	2.05	2.65	4.27	4.87	7.59	28.5
	5795	1.49	2.73	3.71	4.95	7.38	28.5
802.11ac 80	5775	-1.32	-0.55	0.90	1.67	4.31	28.5

Note 1: The maximum antenna gain is 4.5dBi 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:

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

So:

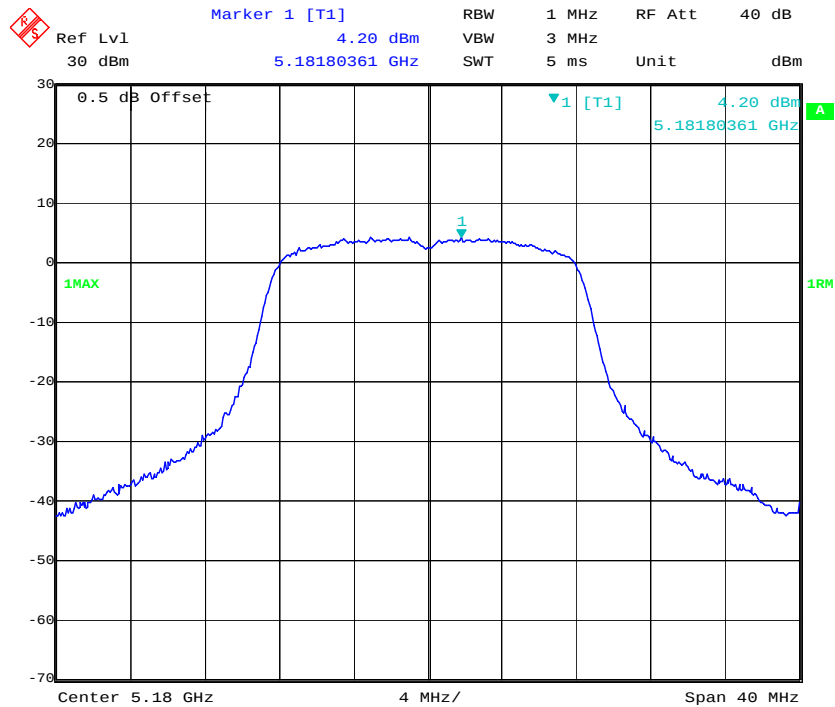
$$\text{Directional gain} = G_{\text{ANT}} + \text{Array Gain} = 4.5\text{dBi} + 10 \cdot \log(2/1) = 7.5\text{dBi}$$

Note 2: For 5.8GHz band, If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10\log(500\text{kHz}/\text{RBW})$ to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

Note 3: SA-3 in KDB 789033 D02 General UNII Test Procedures New Rules v02r01 was used for PSD test.

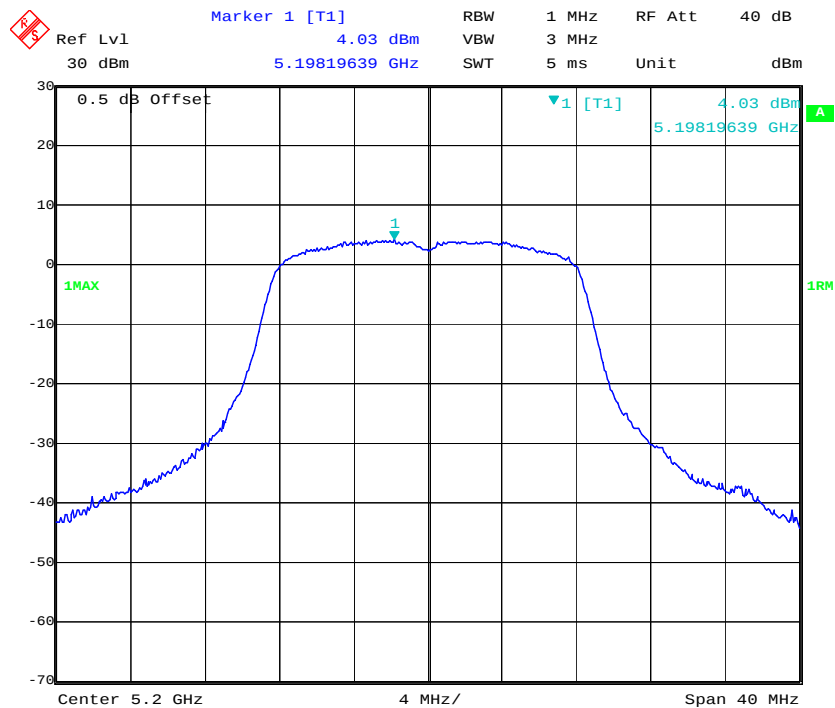
5150-5250MHz
Chain 0:

802.11a Low Channel



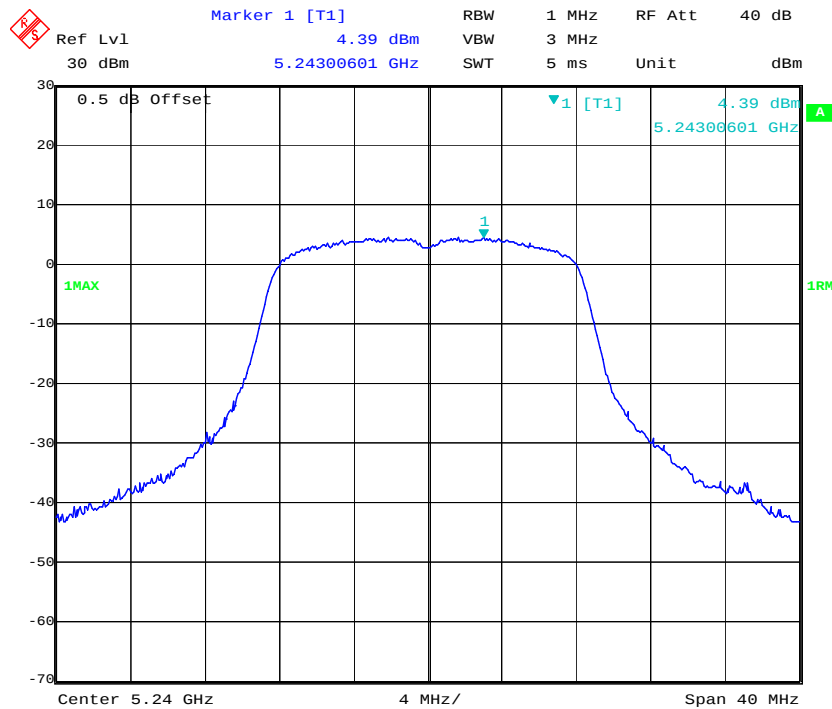
Date: 5.MAR.2019 16:11:16

802.11a Middle Channel



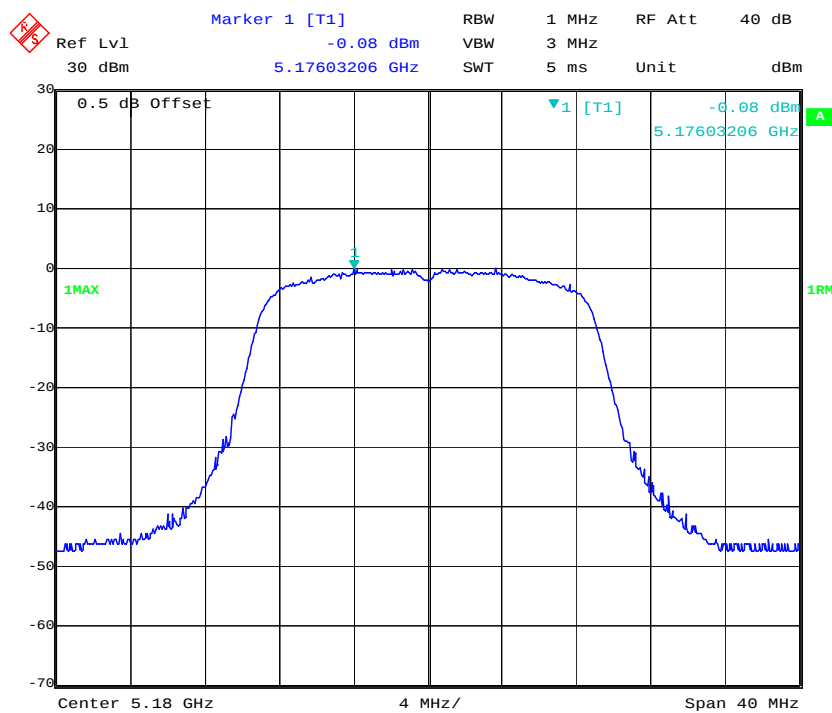
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802.11a High Channel



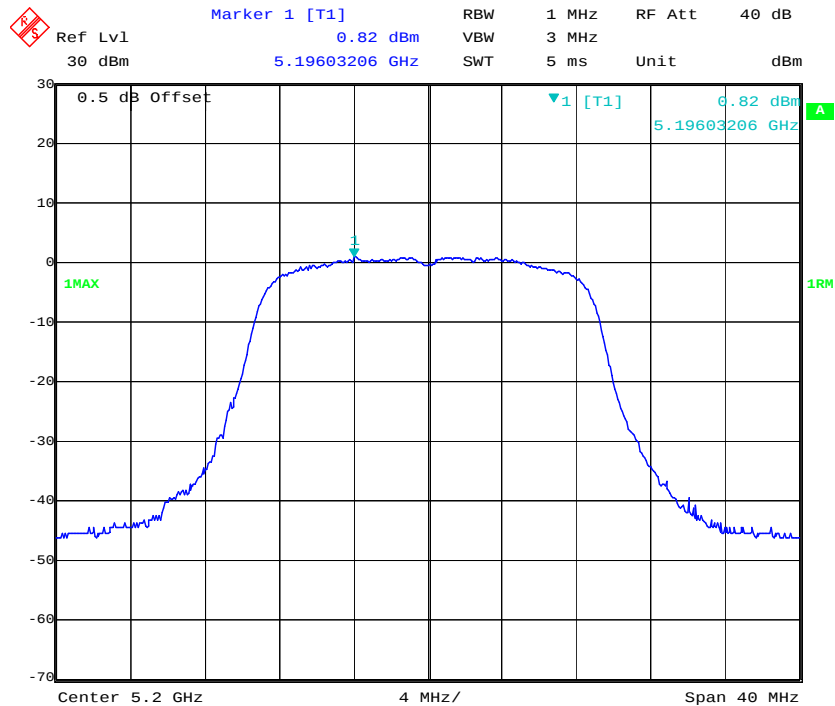
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802.11n ht20 Low Channel



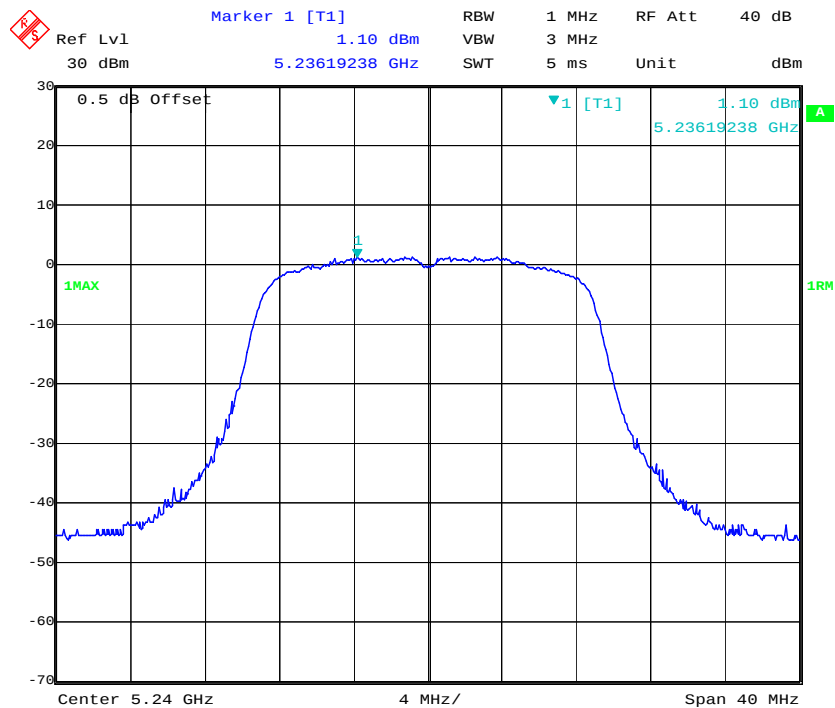
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802.11n ht20 Middle Channel



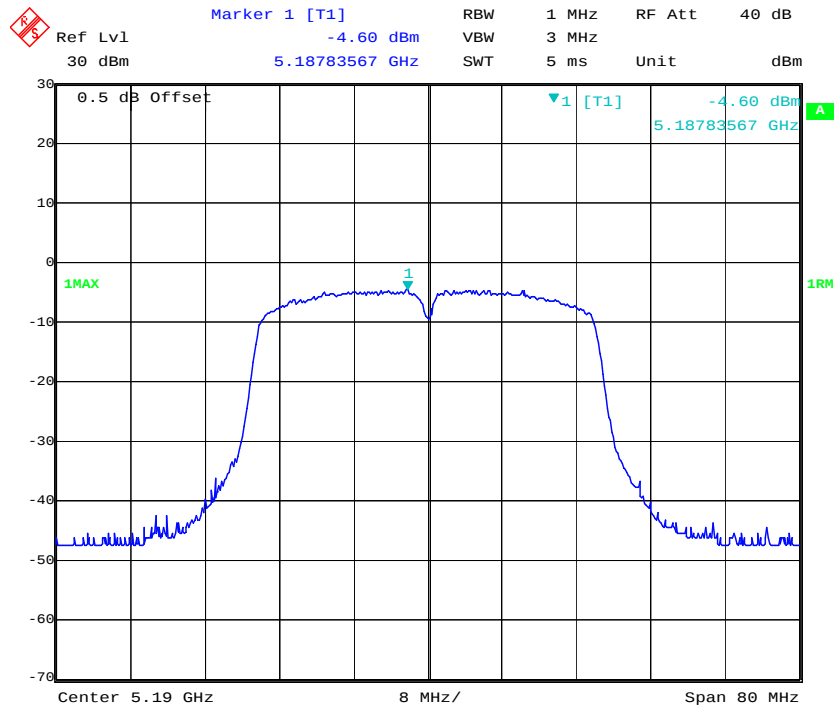
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802.11n ht20 High Channel



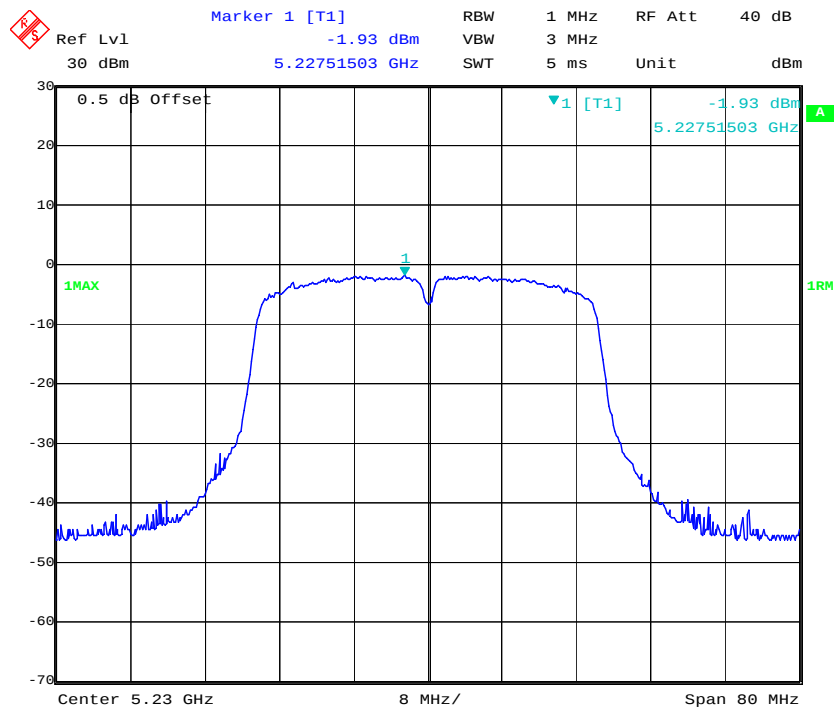
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802.11n ht40 Low Channel

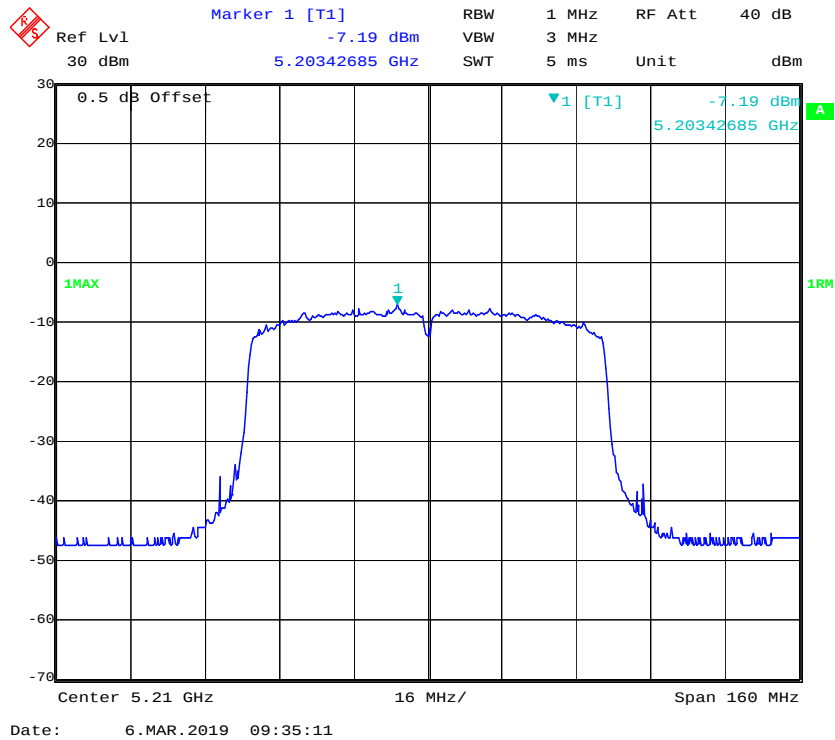
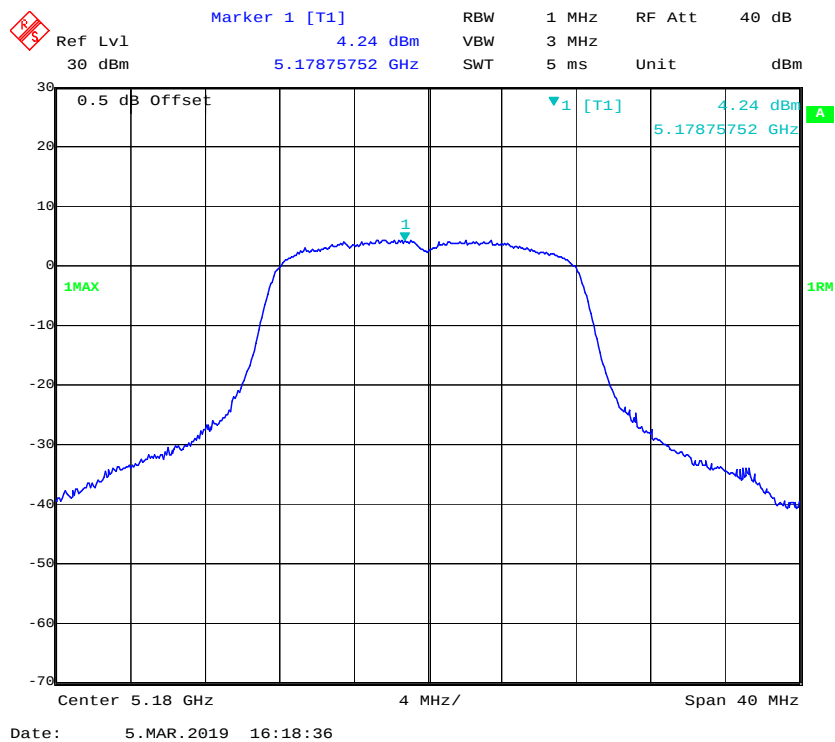


Date: 6.MAR.2019 09:24:04

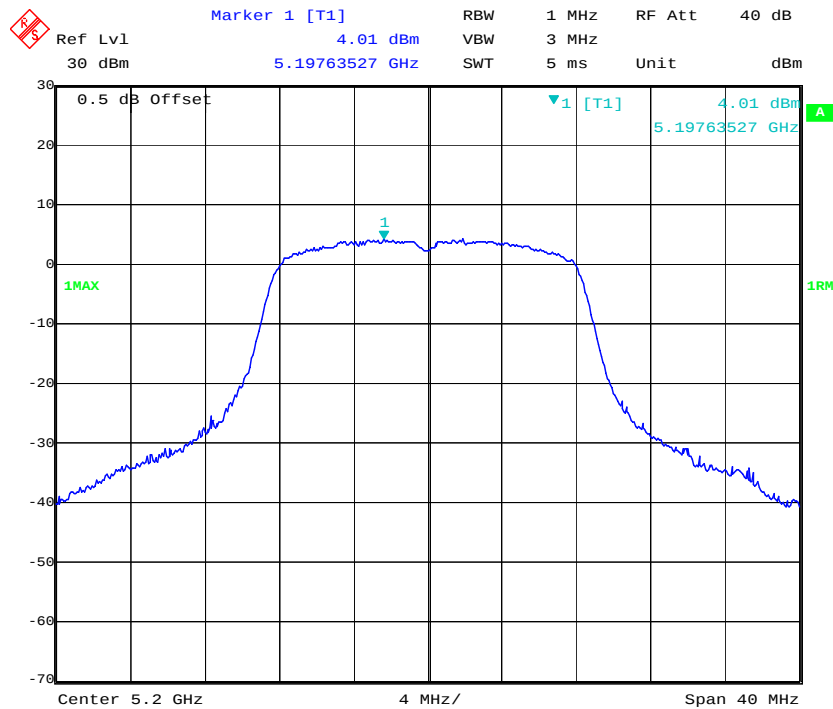
802.11n ht40 High Channel



Date: 6.MAR.2019 09:28:18

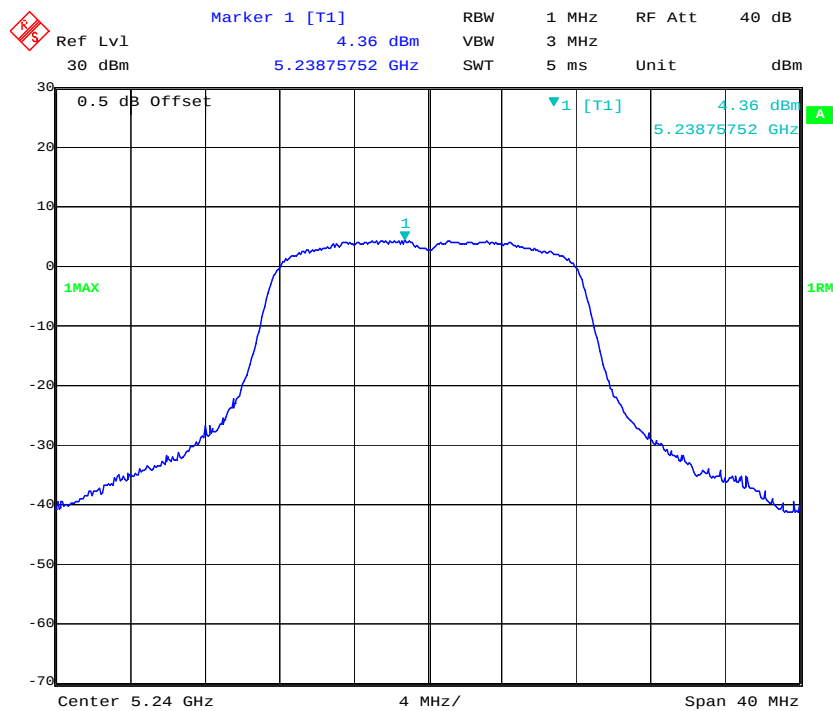
802.11ac80 Middle Channel**Chain 1:****802.11a Low Channel**

802.11a Middle Channel



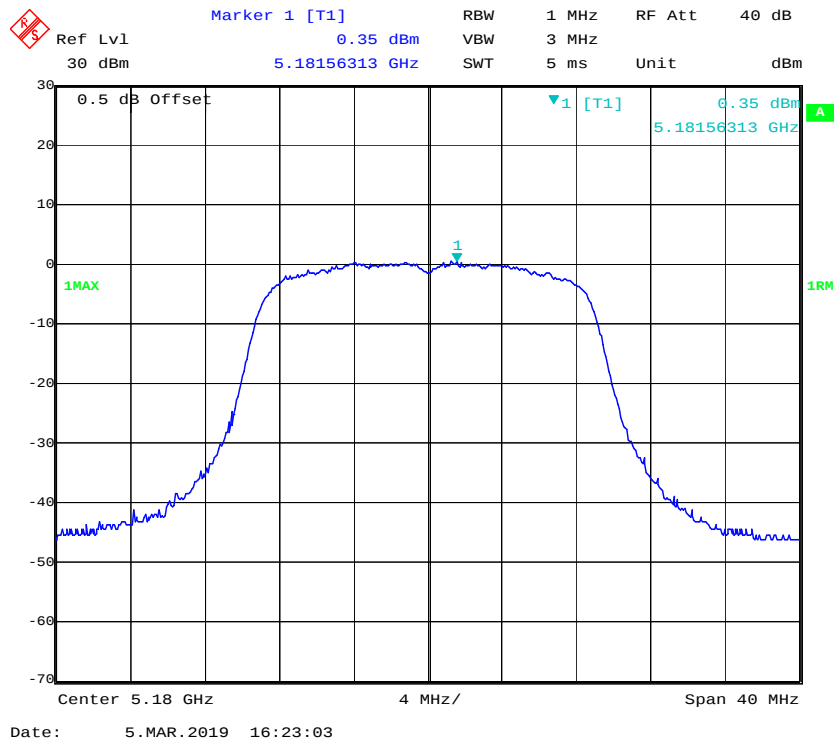
Date: 5.MAR.2019 16:17:10

802.11a High Channel

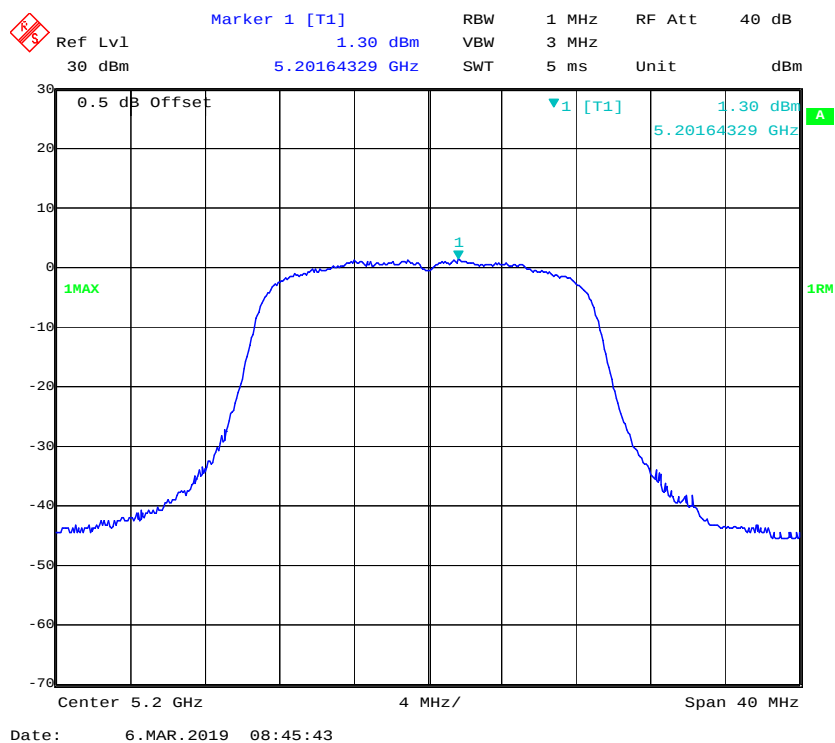


Date: 5.MAR.2019 16:20:19

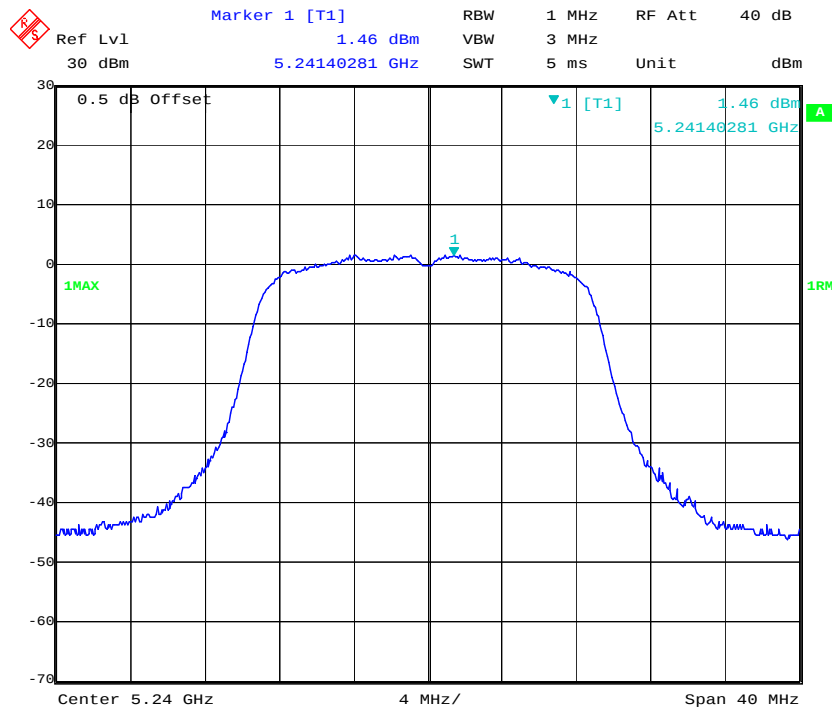
802.11n ht20 Low Channel



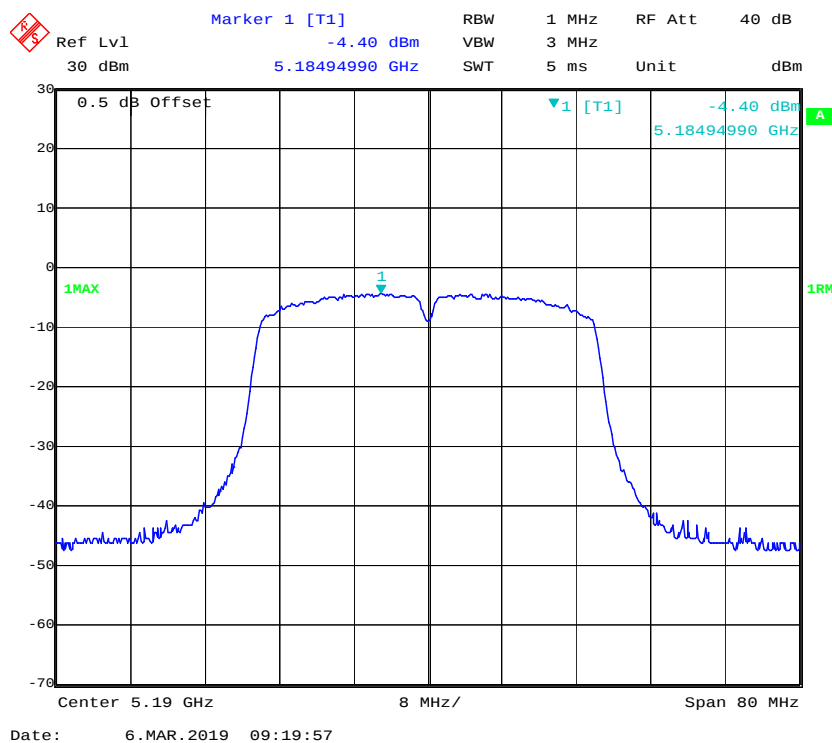
802.11n ht20 Middle Channel

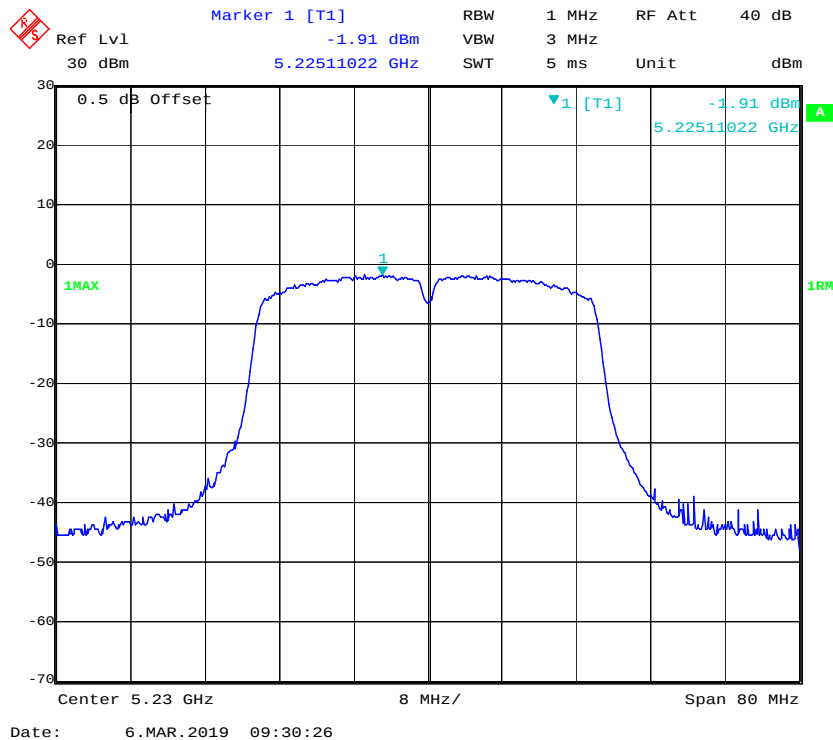
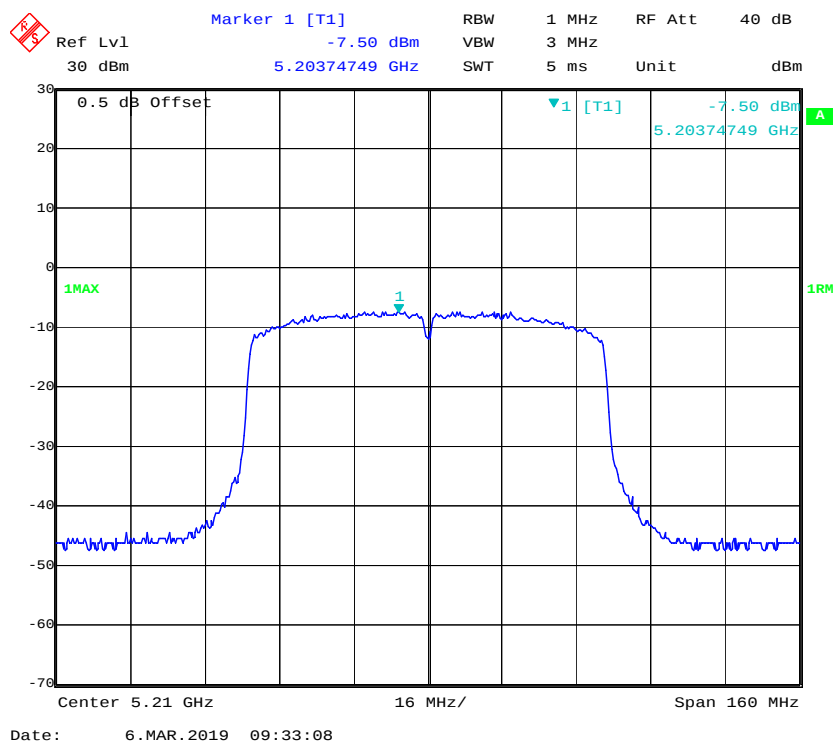


802.11n ht20 High Channel



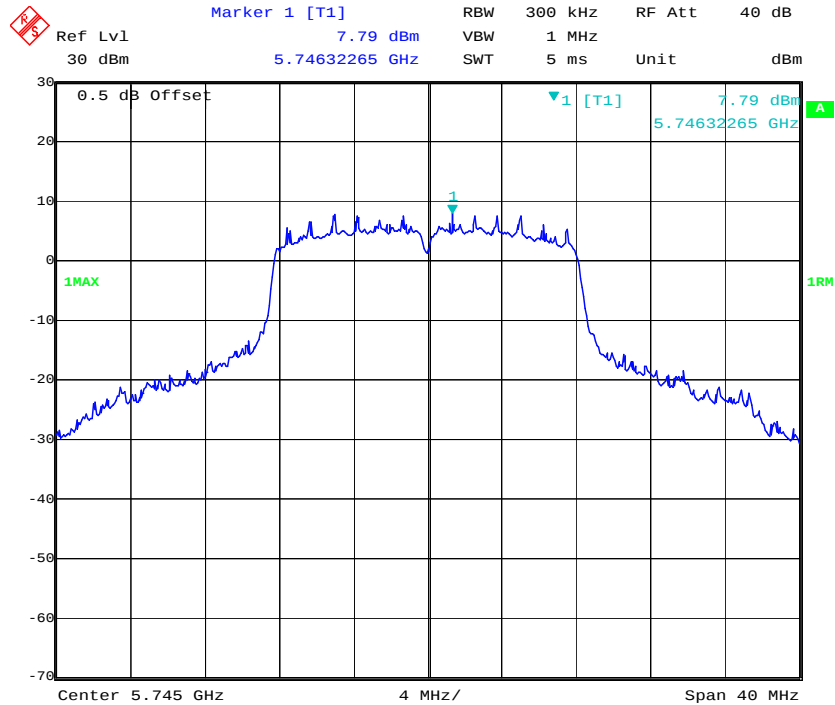
802.11n ht40 Low Channel



802.11n ht40 High Channel**802.11ac80 Middle Channel**

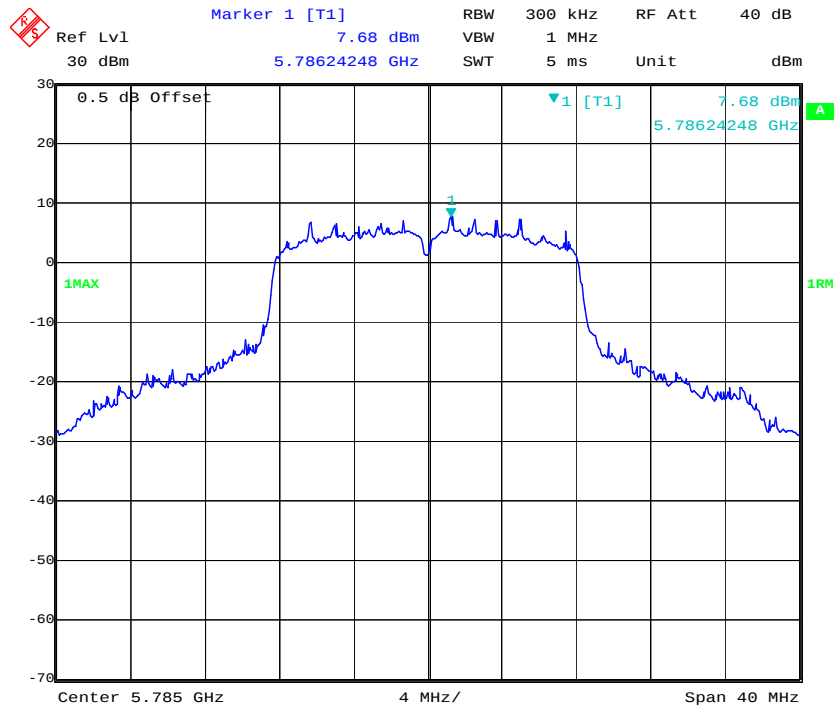
5725-5850MHz
Chain 0:

802.11a Low Channel



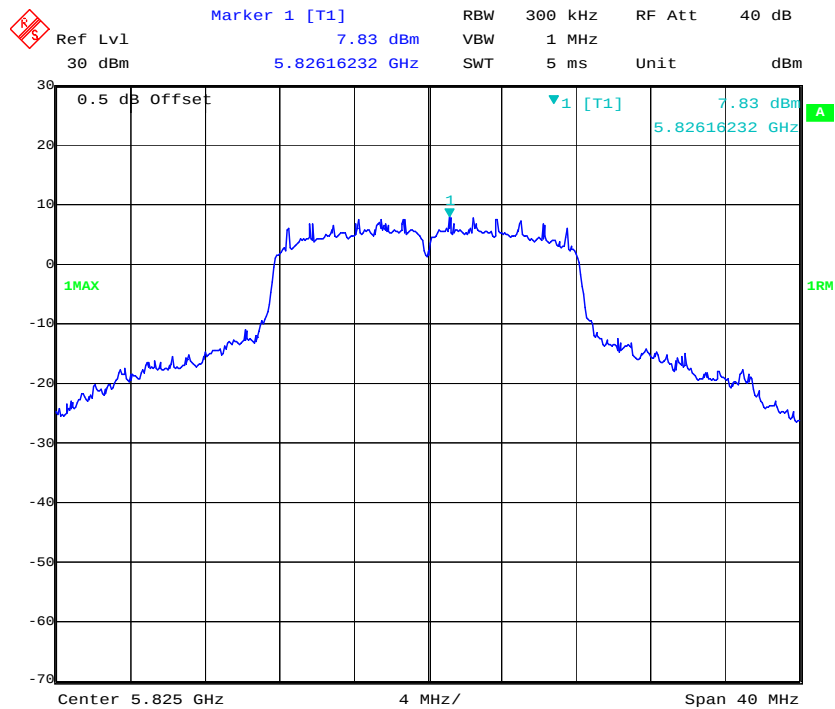
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802.11a Middle Channel



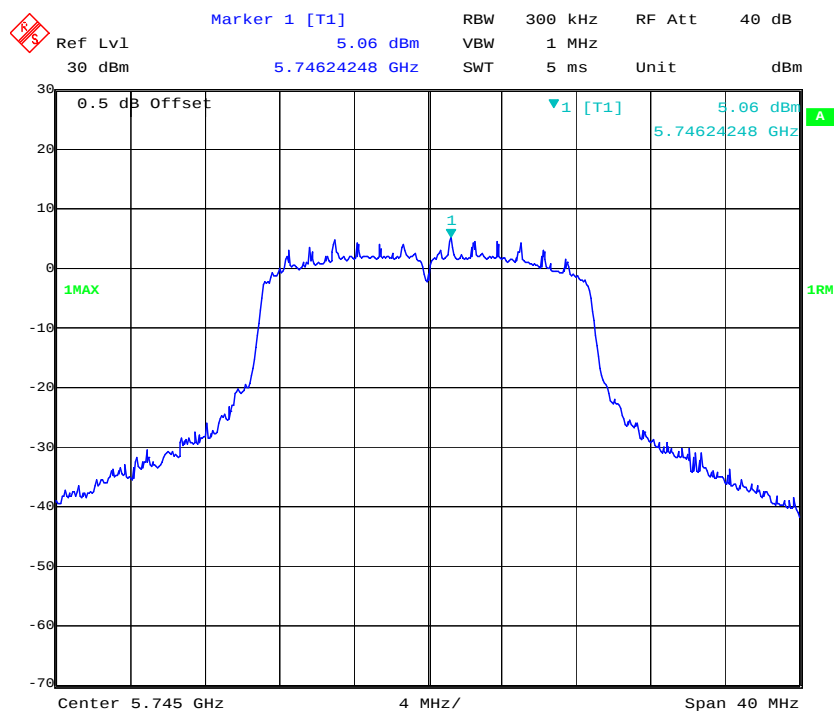
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802.11a High Channel



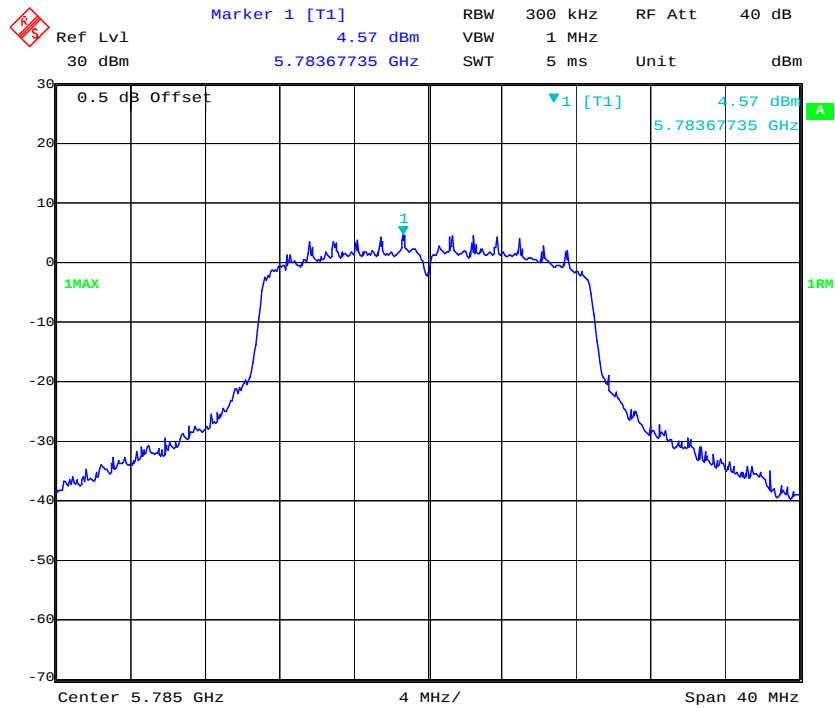
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802.11n ht20 Low Channel



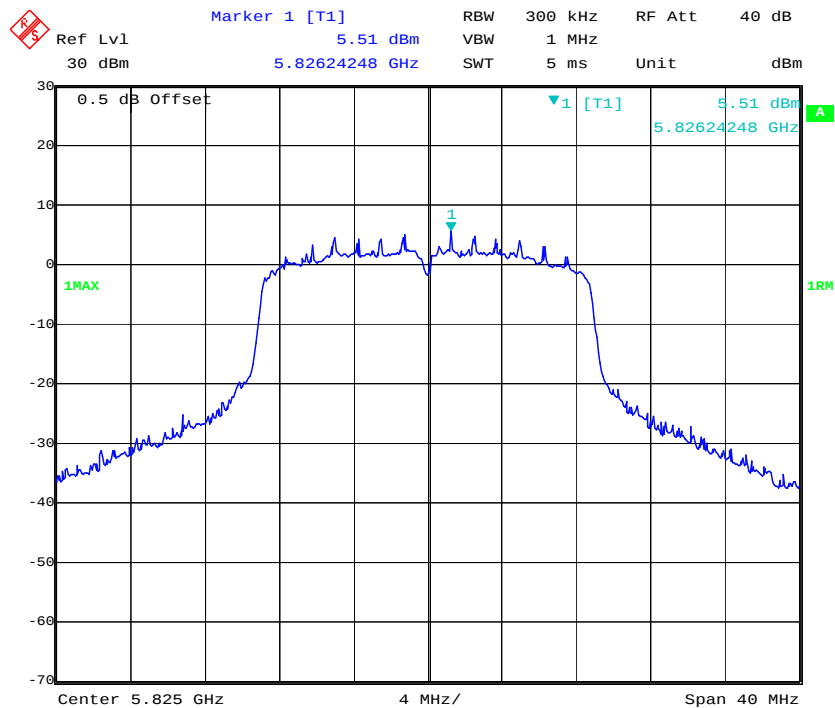
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802.11n ht20 Middle Channel



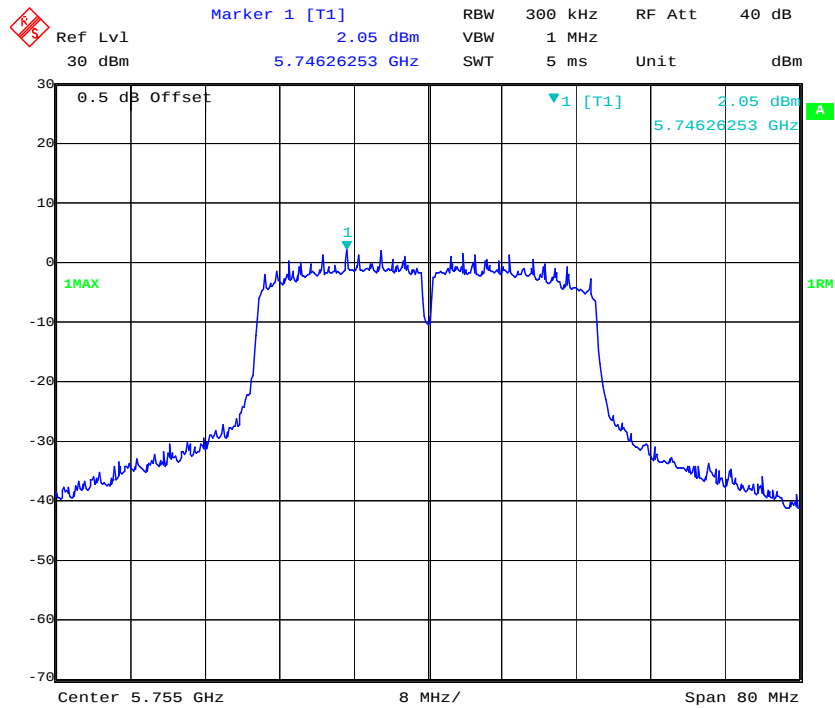
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802.11n ht20 High Channel



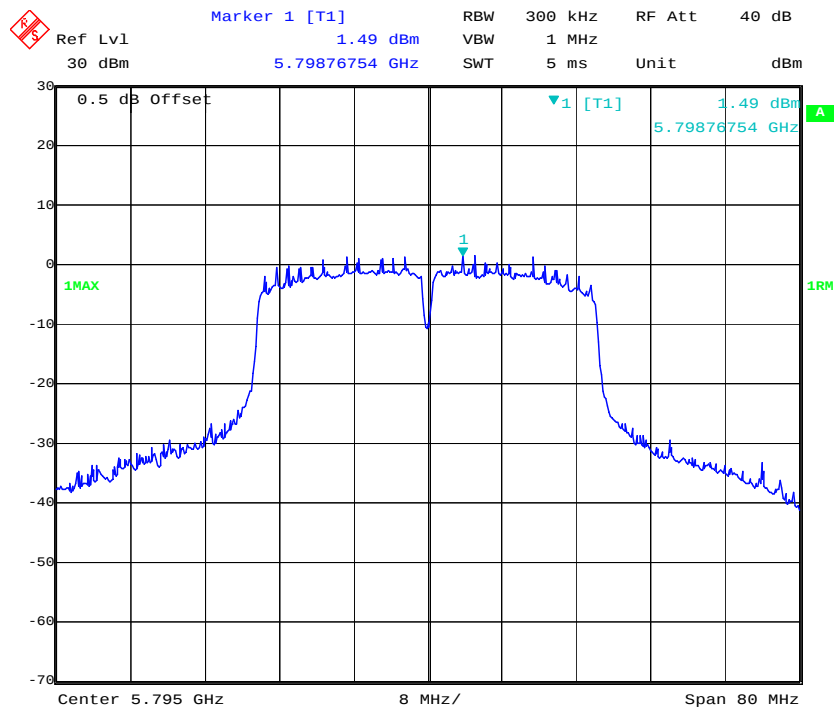
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802.11n ht40 Low Channel

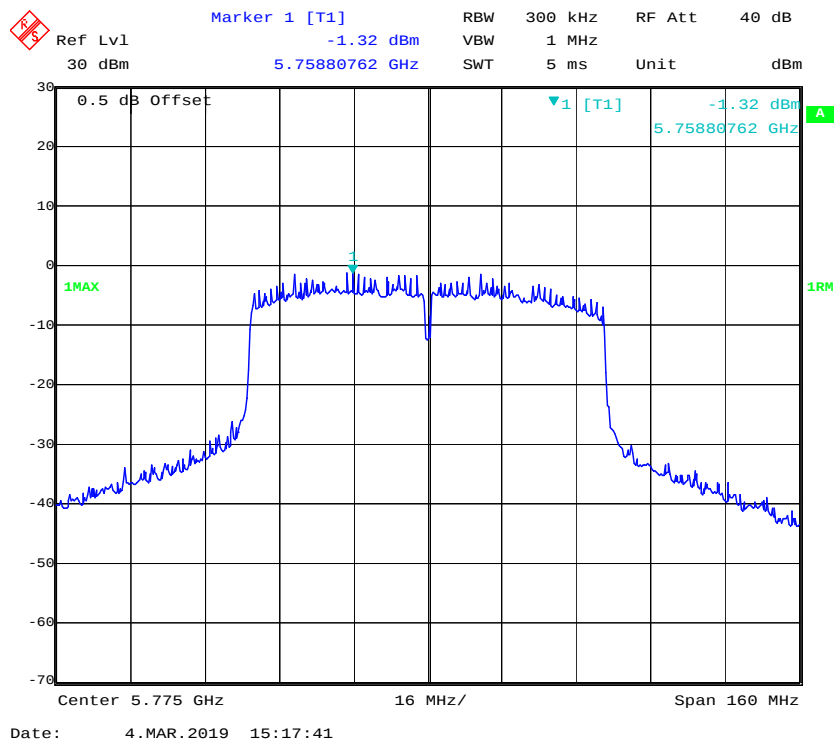
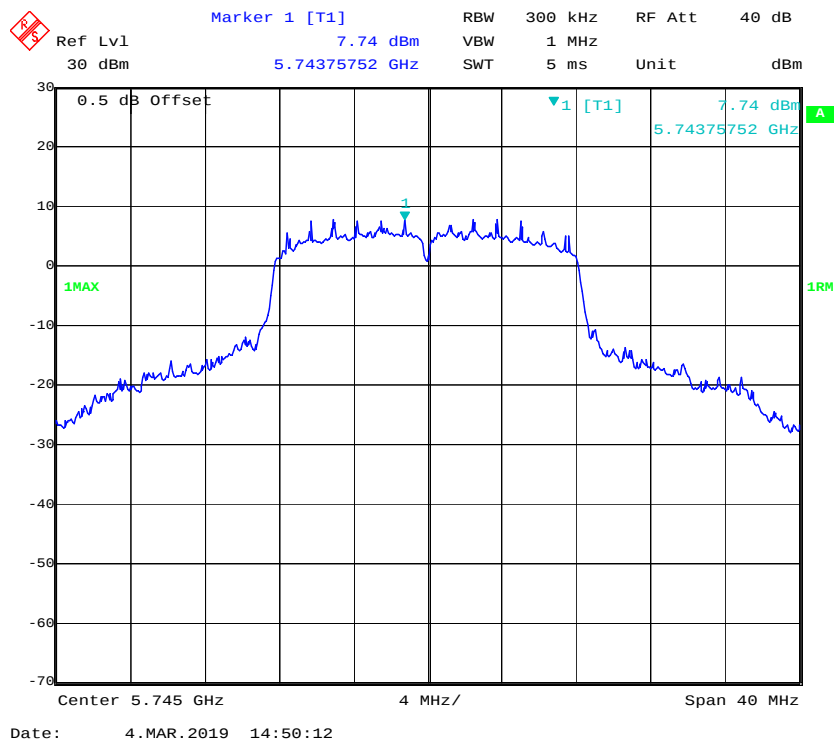


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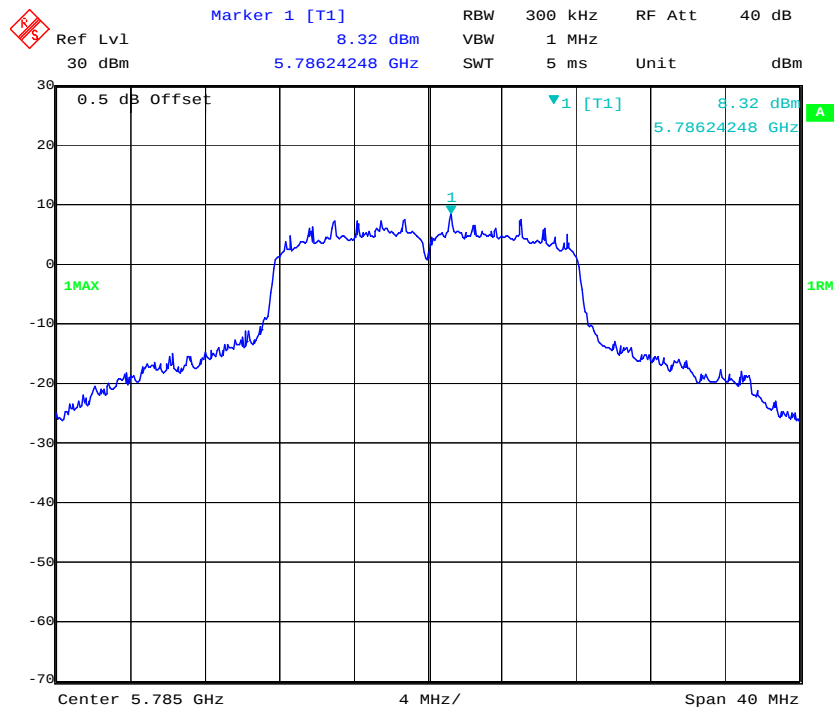
802.11n ht40 High Channel



Date: 4.MAR.2019 15:15:28

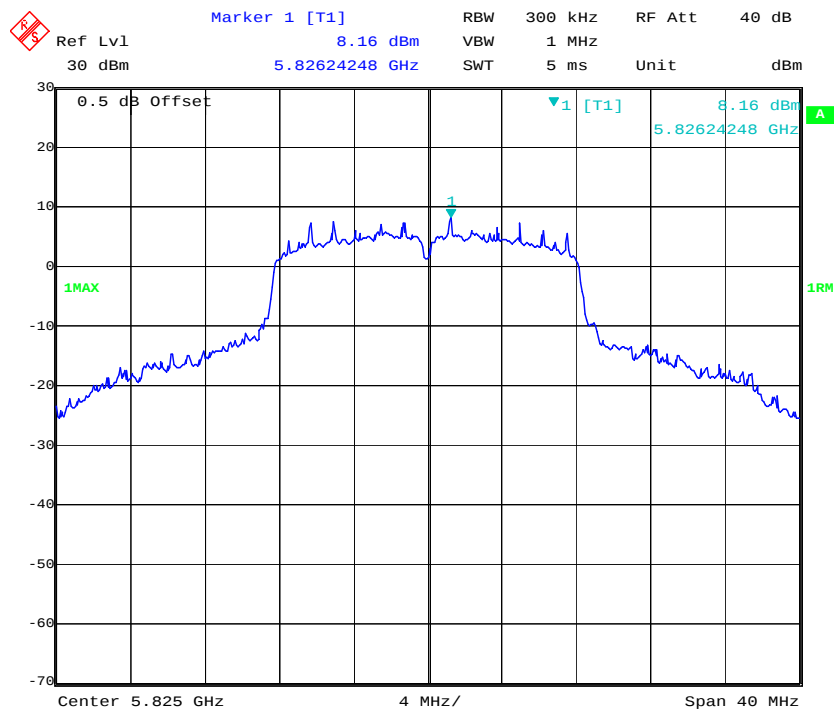
802.11ac80 Middle Channel**Chain 1:****802.11a Low Channel**

802.11a Middle Channel



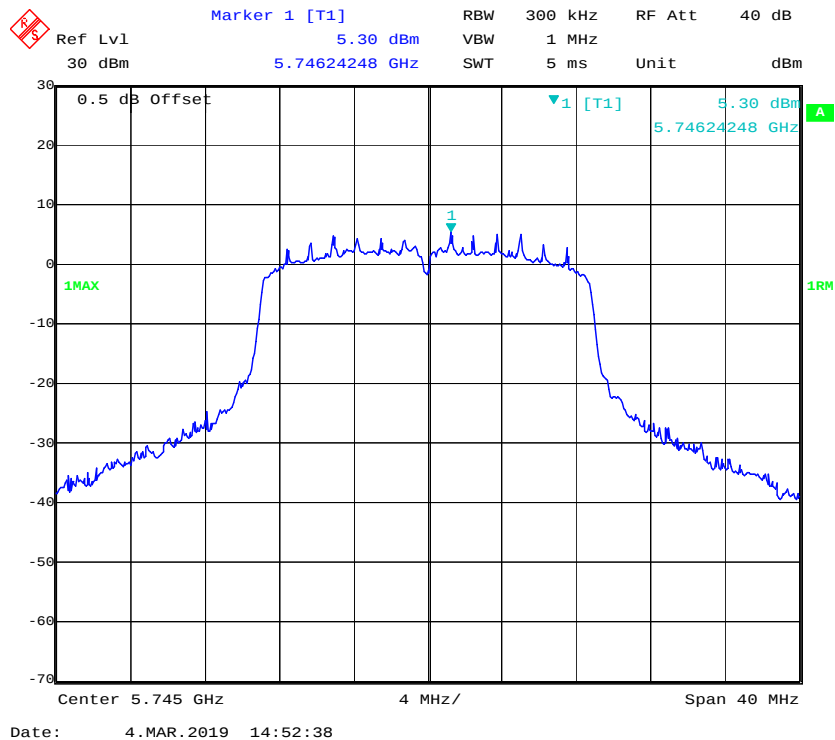
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802.11a High Channel

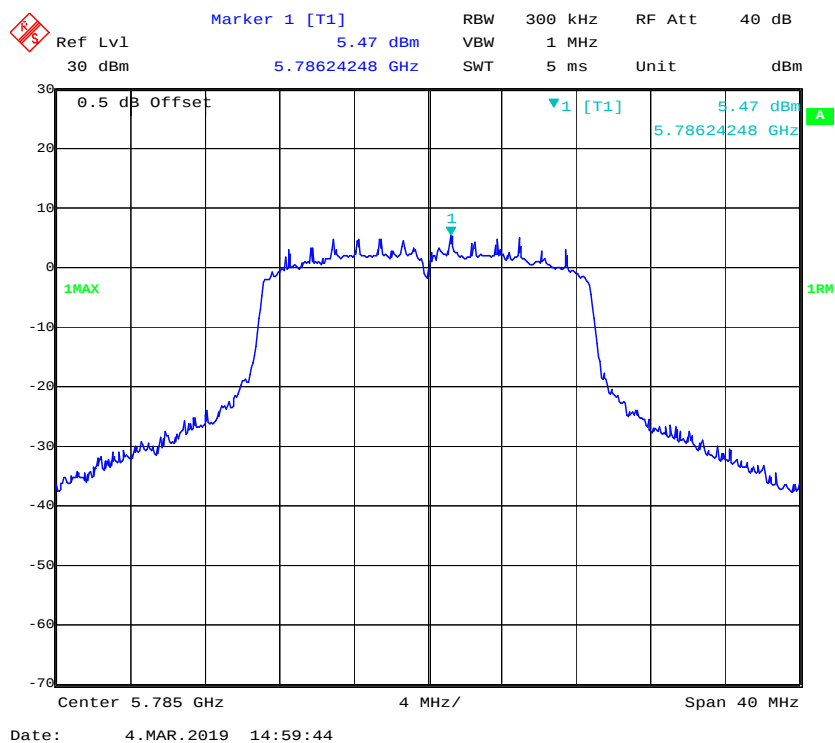


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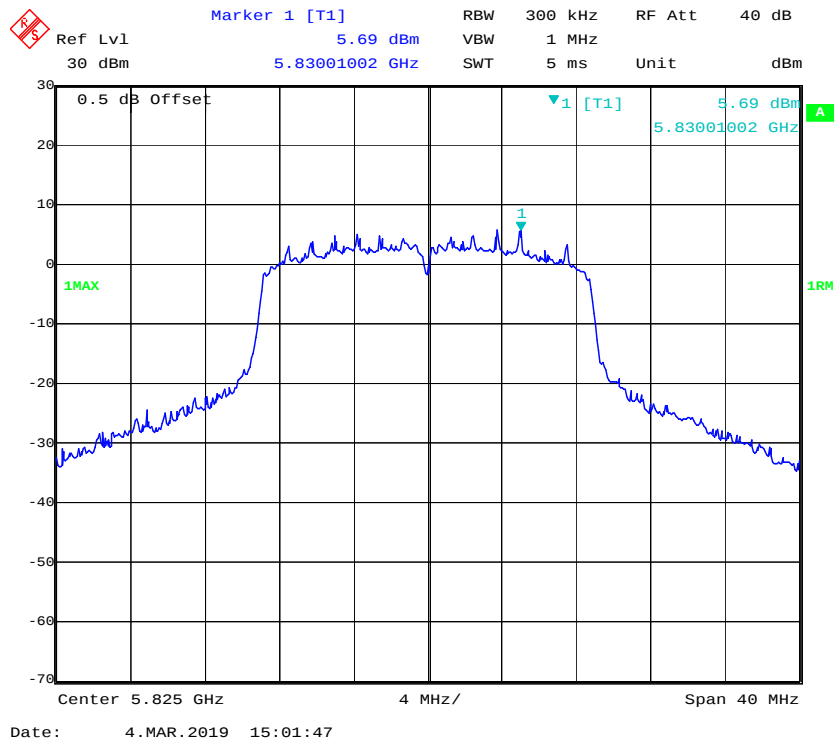
802.11n ht20 Low Channel



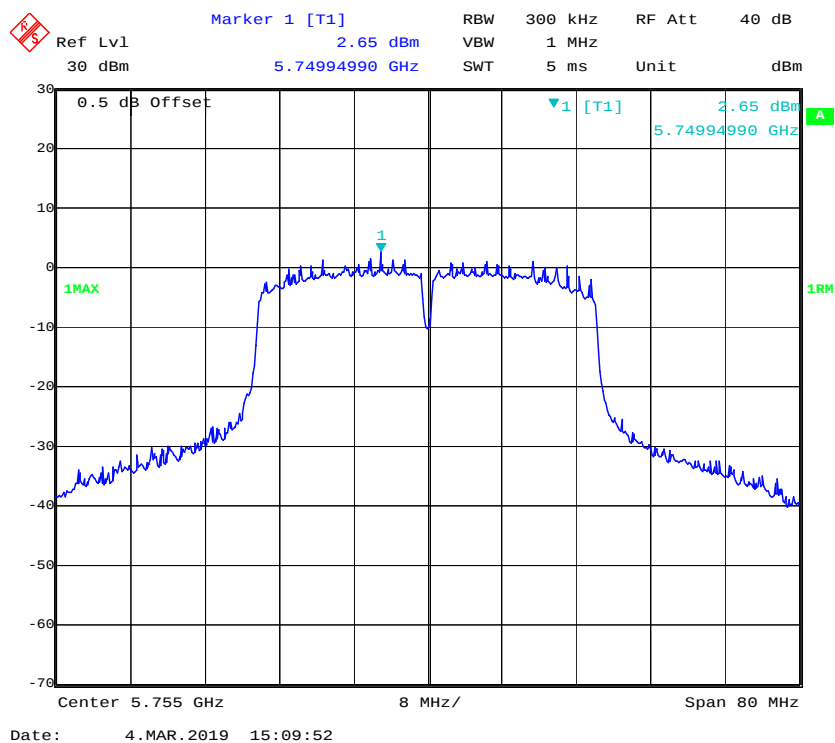
802.11n ht20 Middle Channel



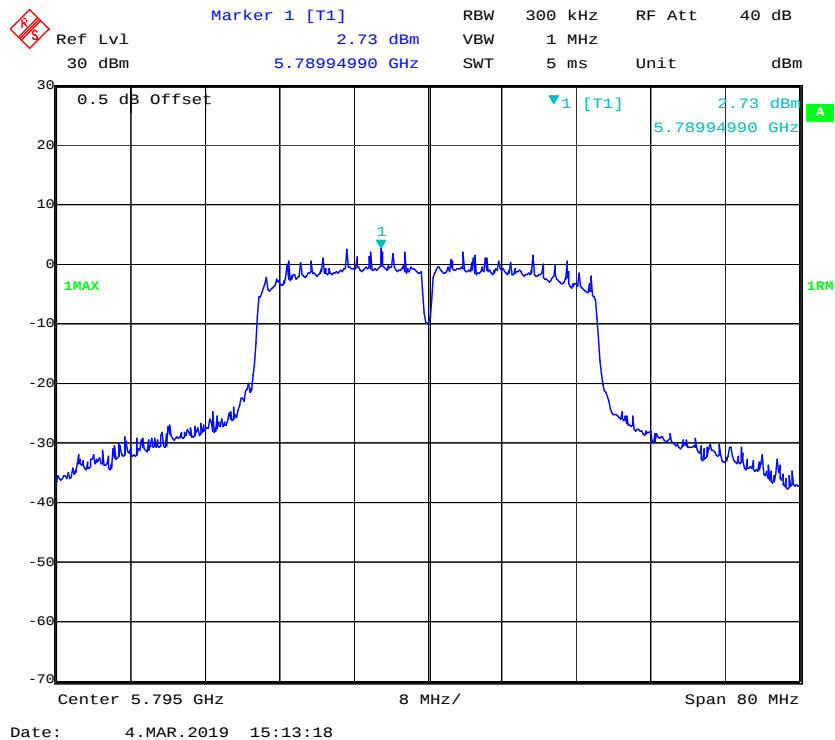
802.11 n ht20 High Channel



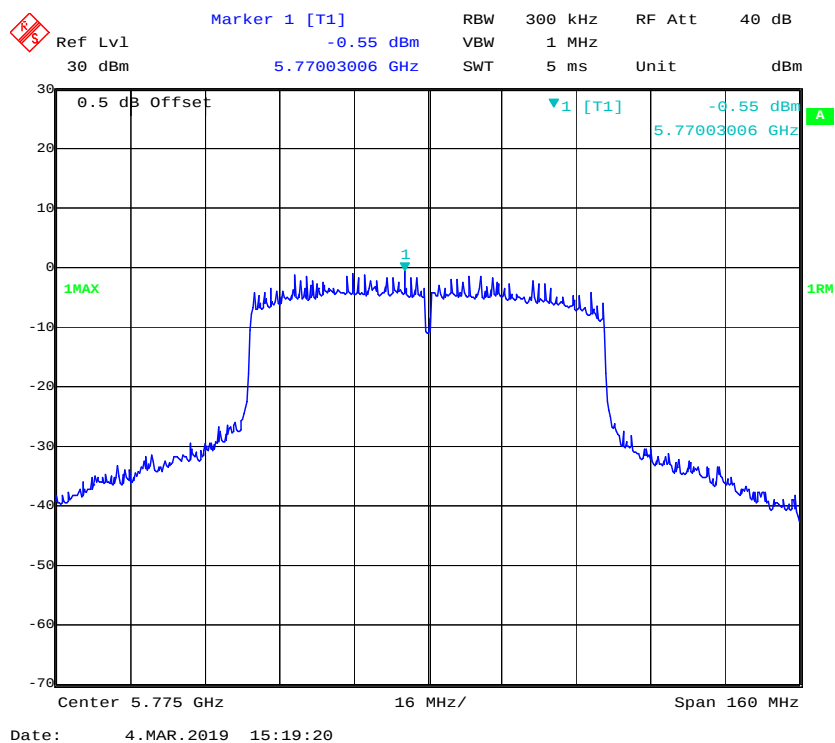
802.11n ht40 Low Channel



802.11n ht40 High Channel



802.11ac80 Middle Channel



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