TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 15.407

TEST REPORT

For

ZIONCOM ELECTRONICS (SHENZHEN) LTD.

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

FCC ID: X7DIP04347

Report Type:	**Product Name:**
Original Report	AC1200 Wireless Dual Band Router

Report Number: RDG180129005-00B

Report Date: 2018-02-13

Reviewed By: Jerry Zhang
EMC Manager

Jerry Zhang

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

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

TABLE OF CONTENTS

GENERAL INFORMATION **4**
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) 4
OBJECTIVE 4
RELATED SUBMITTAL(S)/GRANT(S) 4
TEST METHODOLOGY 4
MEASUREMENT UNCERTAINTY 5
TEST FACILITY 5
SYSTEM TEST CONFIGURATION **6**
DESCRIPTION OF TEST CONFIGURATION 6
EUT EXERCISE SOFTWARE 6
EQUIPMENT MODIFICATIONS 10
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS 10
SUPPORT CABLE LIST AND DETAILS 10
BLOCK DIAGRAM OF TEST SETUP 10
SUMMARY OF TEST RESULTS **11**
FCC §15.407 (f) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE) **12**
APPLICABLE STANDARD 12
FCC §15.203 – ANTENNA REQUIREMENT **14**
APPLICABLE STANDARD 14
ANTENNA CONNECTOR CONSTRUCTION 14
FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS **15**
APPLICABLE STANDARD 15
EUT SETUP 15
EMI TEST RECEIVER SETUP 15
CORRECTED AMPLITUDE & MARGIN CALCULATION 16
TEST EQUIPMENT LIST AND DETAILS 16
TEST PROCEDURE 16
TEST DATA 17
FCC §15.209, §15.205 & §15.407(b) –UNWANTED EMISSION **21**
APPLICABLE STANDARD 21
EUT SETUP 22
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP 23
TEST PROCEDURE 23
CORRECTED AMPLITUDE & MARGIN CALCULATION 23
TEST EQUIPMENT LIST AND DETAILS 24
TEST DATA 24
FCC §15.407(b)–OUT- OF-BAND EMISSIONS **37**
APPLICABLE STANDARD 37
TEST PROCEDURE 37
TEST EQUIPMENT LIST AND DETAILS 38
TEST DATA 38
FCC §15.407(a)(e) –EMISSION BANDWIDTH AND OCCUPIED BANDWIDTH **54**
APPLICABLE STANDARD 54
TEST EQUIPMENT LIST AND DETAILS 54
TEST PROCEDURE 54

TEST DATA 54

FCC §15.407(a) –MAXIMUM CONDUCTED OUTPUT POWER.....74

APPLICABLE STANDARD 74
TEST EQUIPMENT LIST AND DETAILS.....75
TEST PROCEDURE 75
TEST DATA 75

FCC §15.407(a) - POWER SPECTRAL DENSITY 77

APPLICABLE STANDARD 77
TEST PROCEDURE 78
TEST EQUIPMENT LIST AND DETAILS.....78
TEST DATA 78

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

	EUT Name:	AC1200 Wireless Dual Band Router
	EUT Model:	A810R
	Multiple Models:	IP04347
	FCC ID:	X7DIP04347
	Rated Input Voltage:	DC 9V from Adapter
Adapter 1 Information	**Model Name:**	DCP005C09080U
	Input:	AC 100-240V~50/60Hz 0.2A
	Output:	DC 9V 0.8A
Adapter 2 Information	**Model Name:**	DCP017C090800U
	Input:	AC 100-240V~50/60Hz 0.2A
	Output:	DC 9V 0.8A
	External Dimension:	Length (159.36mm)*Width (109.07mm)*High (36.16mm)
	Serial Number:	180129005
	EUT Received Date:	2018.01.31

Note: The series product, models A810R, IP04347 are electrically identical, we selected A810R for fully test , the difference between them please refer to the declaration letter.

Objective

This type approval report is prepared on behalf of ***ZIONCOM ELECTRONICS (SHENZHEN) LTD.***in accordance with Part 2-Subpart J, Part 15-Subparts A, and E of the Federal Communications Commission's rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: X7DIP04347.

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: 4.58 dB for Horizontal, 4.59 dB for Vertical 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical 1G~6GHz: 4.45 dB, 6G~40GHz: 5.23 dB
Unwanted Emissions,conducted	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

Test Facility

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

The test site has been approved by the FCC 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 test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

The device has 3 external antennas for 2.4GHz and 2 external antennas for 5GHz. For 5G Band, the system supports 802.11a/n ht20/n ht40/ac vht20/ac vht40/ac vht80, the vh20/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 mode was the worst and reported.

EUT Exercise Software

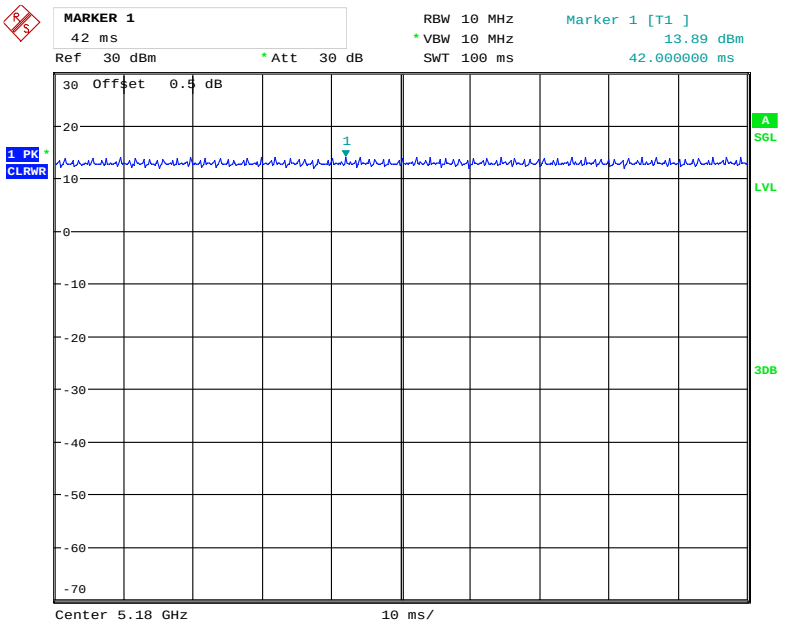
The software "MP-Tool-v3.3" was used for testing, which was provided by manufacturer. The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations. The maximum power was configured as below table, that provided by the manufacturer:

Band	Mode	Channel	Frequency (MHz)	Data rate	Power level	
					ANT 1	ANT 2
5150-5250MHz	802.11a	Low	5180	6 Mbps	43	43
		Middle	5200	6 Mbps	43	43
		High	5240	6 Mbps	42	42
	802.11n ht20	Low	5180	MCS8	37	37
		Middle	5200	MCS8	37	37
		High	5240	MCS8	36	36
	802.11n ht40	Low	5190	MCS8	36	36
		High	5230	MCS8	34	34
	802.11ac80	Middle	5210	MCS8	32	32
5725-5850MHz	802.11a	Low	5745	6 Mbps	42	41
		Middle	5785	6 Mbps	38	37
		High	5825	6 Mbps	36	34
	802.11n ht20	Low	5745	MCS8	35	35
		Middle	5785	MCS8	33	33
		High	5825	MCS8	30	30
	802.11n ht40	Low	5755	MCS8	34	34
		High	5795	MCS8	32	32
	802.11ac80	Middle	5775	MCS8	30	30

The duty cycle as below:

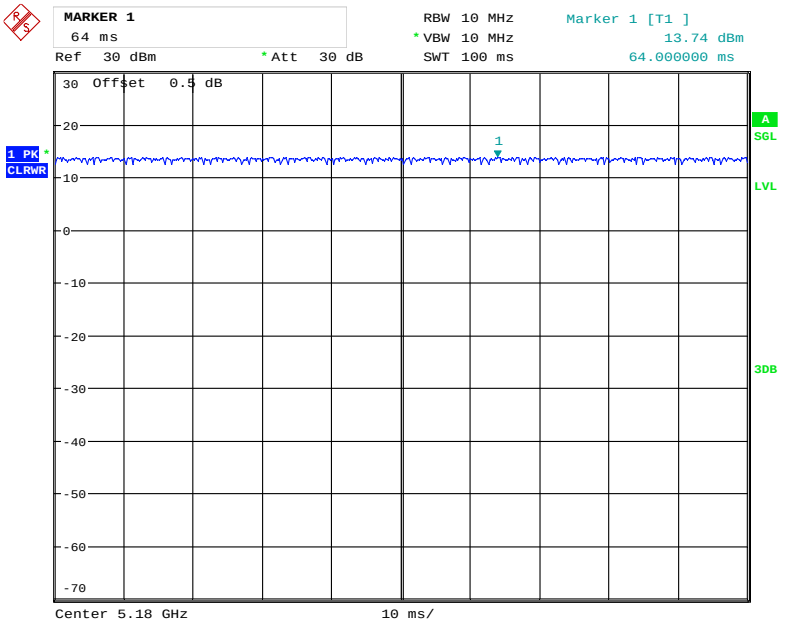
Mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle (%)
802.11a	100	100	100
802.11n ht20	100	100	100
802.11n ht40	100	100	100
802.11ac80	100	100	100

802.11a mode



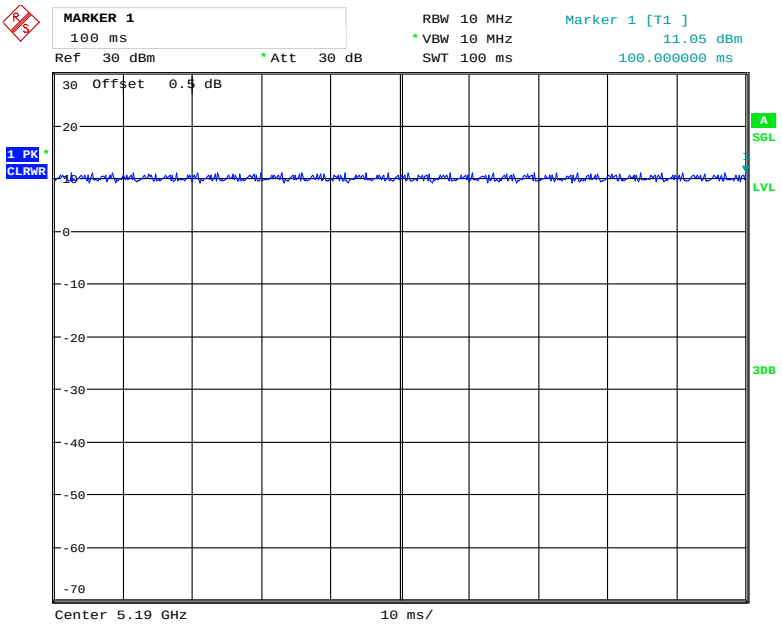
Date: 6.FEB.2018 09:56:31

802.11n ht20 mode



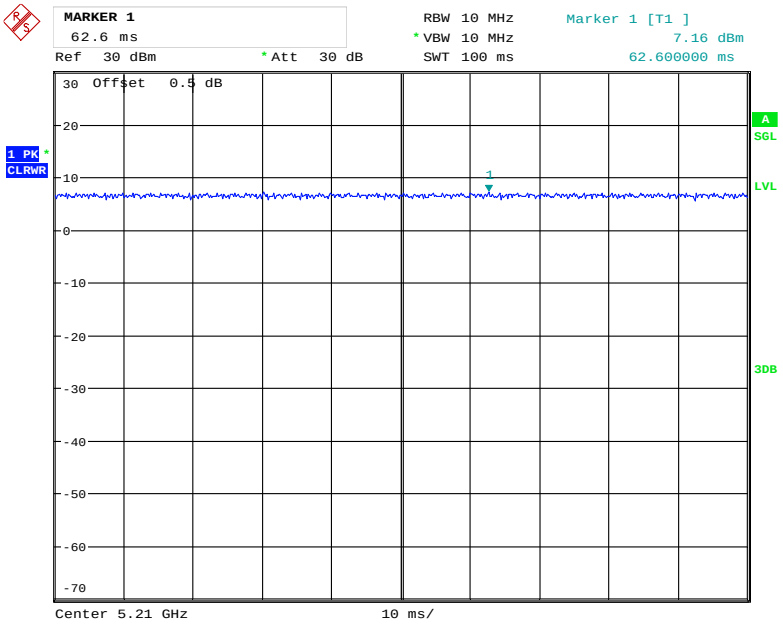
Date: 6.FEB.2018 09:56:00

802.11n ht40 mode



Date: 6.FEB.2018 09:57:06

802.11ac80 mode



Date: 6.FEB.2018 09:57:55

Equipment Modifications

No modification was made to the EUT.

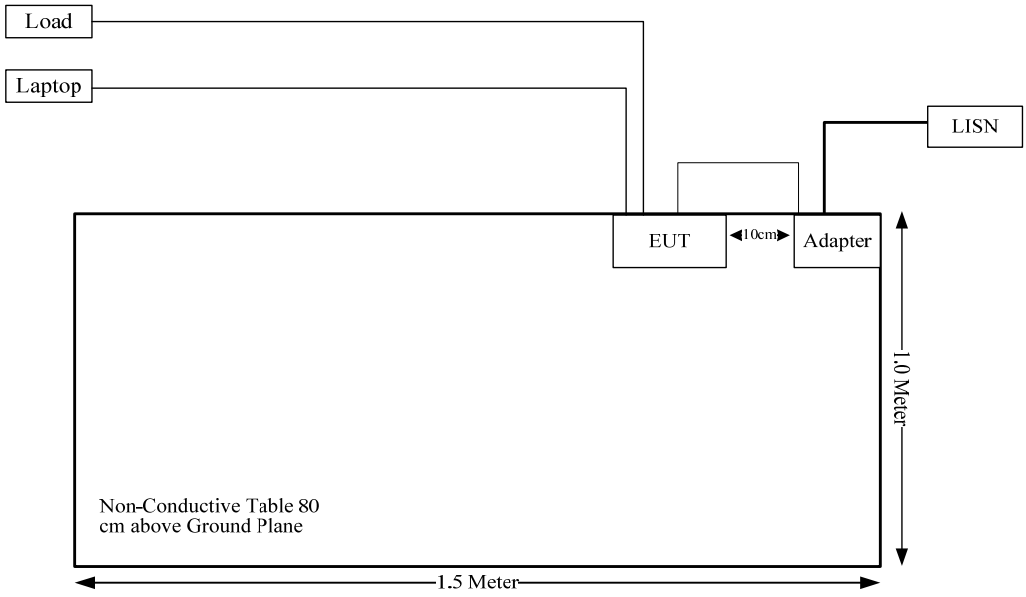
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1017

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45 Cable	yes	No	10	RJ45 Port of Laptop	EUT
RJ45 Cable*2	yes	No	0.8	EUT	Load
Adapter Cable	No	No	1.1	Adapter	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

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

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

Applicable Standard

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

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

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

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

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

Calculation formula:

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

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

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

Calculated Data:

Frequency Band	Antenna Gain		Output Power including Turn-Up tolerance		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)			
2.4GHz	5	3.16	24	251.19	20.00	0.16	1.0
5GHz	5	3.16	14	25.12	20.00	0.02	1.0

The 2.4GHz and 5GHz band can transmit simultaneously:

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

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

=0.16/1+0.02/1

=0.18

< 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 have 2 external antennas for 5G Band, which permanently attached to the unit, ANT 1 and ANT 2 for TX and RX, all the antenna gains are 5dBi. Please refer to the EUT photo.

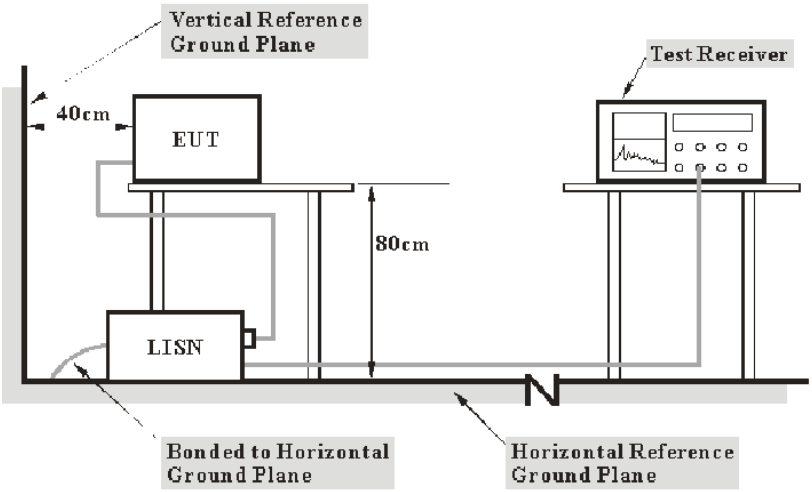
Result: Compliance.

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

Applicable Standard

FCC §15.207(a), §15.407(b) (6).

EUT Setup



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

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

The spacing between the peripherals was 10 cm.

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

EMI Test Receiver Setup

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

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

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

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

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

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

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

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2017-12-11	2018-12-11
N/A	Coaxial Cable	C-NJNJ-50	C-0200-01	2017-09-05	2018-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2017-12-08	2018-12-08
R&S	L.I.S.N	ESH2-Z5	892107/021	2017-09-25	2018-09-25

*** 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

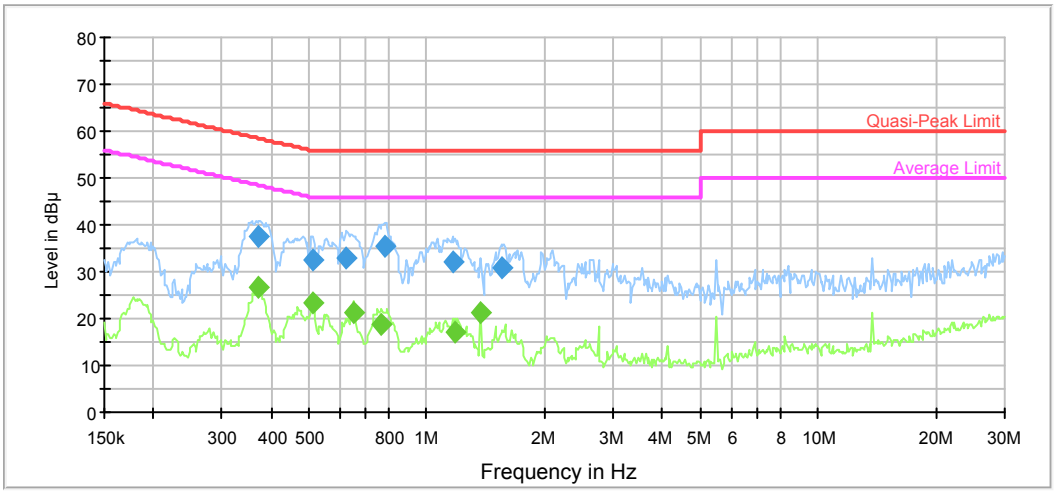
Temperature:	22.3°C
Relative Humidity:	28 %
ATM Pressure:	102kPa

The testing was performed by Jim Zhang on 2018-02-13.

Test Mode: Transmitting

For Adapter 1:

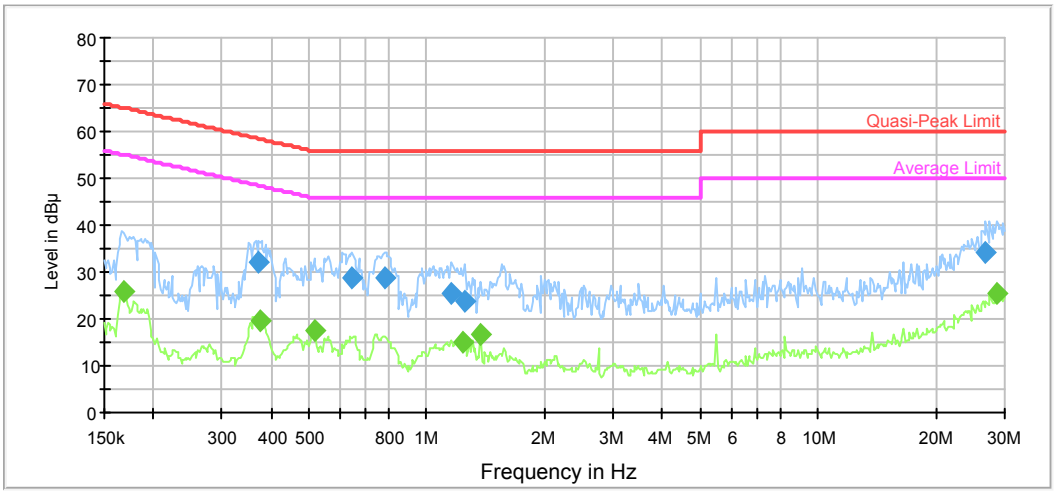
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.372042	37.4	9.000	L1	10.0	21.1	58.5	Compliance
0.511698	32.6	9.000	L1	9.9	23.4	56.0	Compliance
0.624492	33.1	9.000	L1	9.8	22.9	56.0	Compliance
0.780588	35.3	9.000	L1	9.8	20.7	56.0	Compliance
1.162648	32.0	9.000	L1	9.8	24.0	56.0	Compliance
1.548915	30.9	9.000	L1	9.7	25.1	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.372042	26.6	9.000	L1	10.0	21.9	48.5	Compliance
0.511698	23.3	9.000	L1	9.9	22.7	46.0	Compliance
0.649874	21.1	9.000	L1	9.8	24.9	46.0	Compliance
0.768247	18.6	9.000	L1	9.8	27.4	46.0	Compliance
1.181325	17.1	9.000	L1	9.8	28.9	46.0	Compliance
1.374420	21.4	9.000	L1	9.7	24.6	46.0	Compliance

AC120 V, 60 Hz, Neutral:

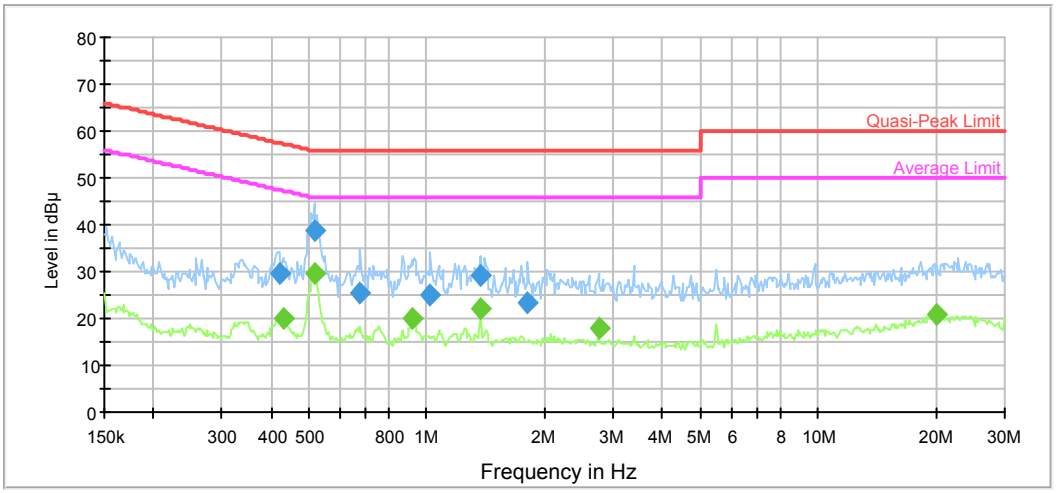


requency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.372042	32.0	9.000	N	10.0	26.5	58.5	Compliance
0.644717	28.8	9.000	N	9.8	27.2	56.0	Compliance
0.780588	28.7	9.000	N	9.8	27.3	56.0	Compliance
1.153421	25.5	9.000	N	9.8	30.5	56.0	Compliance
1.249088	23.7	9.000	N	9.8	32.3	56.0	Compliance
26.847135	34.3	9.000	N	10.1	25.7	60.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.167702	25.9	9.000	N	10.9	29.2	55.1	Compliance
0.375019	19.5	9.000	N	10.0	28.9	48.4	Compliance
0.515791	17.5	9.000	N	9.9	28.5	46.0	Compliance
1.239175	14.8	9.000	N	9.8	31.2	46.0	Compliance
1.374420	16.6	9.000	N	9.7	29.4	46.0	Compliance
28.614240	25.5	9.000	N	10.2	24.5	50.0	Compliance

For Adapter 2:

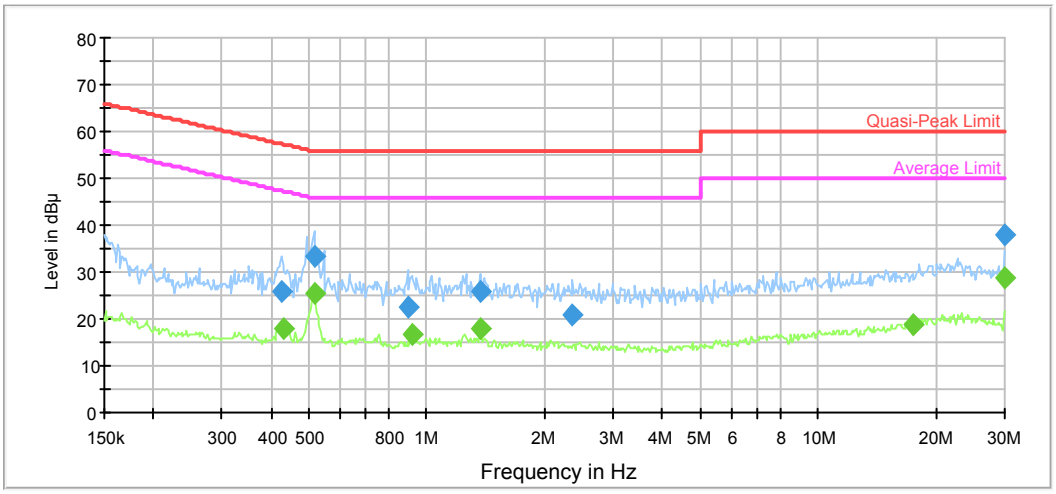
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.419276	29.5	9.000	L1	10.0	28.0	57.5	Compliance
0.515791	38.8	9.000	L1	9.9	17.2	56.0	Compliance
0.676289	25.5	9.000	L1	9.8	30.5	56.0	Compliance
1.023481	24.8	9.000	L1	9.8	31.2	56.0	Compliance
1.374420	29.1	9.000	L1	9.7	26.9	56.0	Compliance
1.816511	23.4	9.000	L1	9.7	32.6	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.429420	19.8	9.000	L1	9.9	27.5	47.3	Compliance
0.515791	29.6	9.000	L1	9.9	16.4	46.0	Compliance
0.915445	19.8	9.000	L1	9.8	26.2	46.0	Compliance
1.374420	22.3	9.000	L1	9.7	23.7	46.0	Compliance
2.749070	17.7	9.000	L1	9.8	28.3	46.0	Compliance
20.152030	20.9	9.000	L1	10.1	29.1	50.0	Compliance

AC120 V, 60 Hz, Neutral:



requency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.426011	26.0	9.000	N	9.9	31.3	57.3	Compliance
0.515791	33.4	9.000	N	9.9	22.6	56.0	Compliance
0.893821	22.5	9.000	N	9.8	33.5	56.0	Compliance
1.374420	25.8	9.000	N	9.7	30.2	56.0	Compliance
2.362847	21.0	9.000	N	9.8	35.0	56.0	Compliance
30.000000	38.0	9.000	N	10.2	22.0	60.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.429420	18.0	9.000	N	9.9	29.3	47.3	Compliance
0.515791	25.4	9.000	N	9.9	20.6	46.0	Compliance
0.922769	16.8	9.000	N	9.8	29.2	46.0	Compliance
1.374420	17.7	9.000	N	9.7	28.3	46.0	Compliance
17.459396	18.9	9.000	N	10.0	31.1	50.0	Compliance
30.000000	28.9	120.000	N	10.2	21.1	50.0	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.

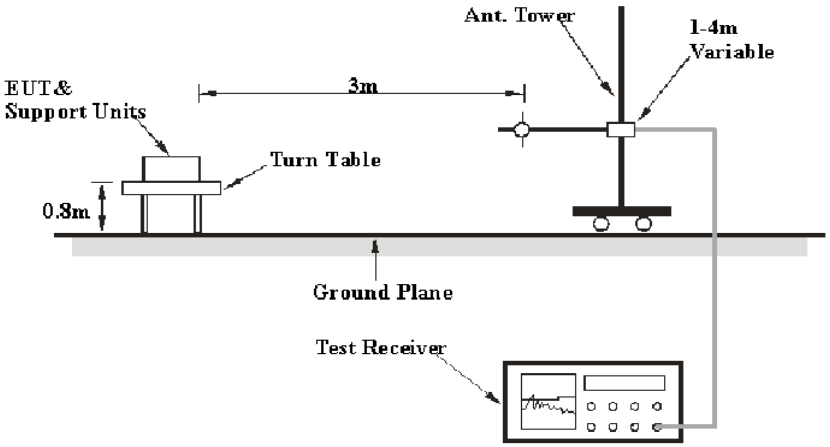
(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(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.

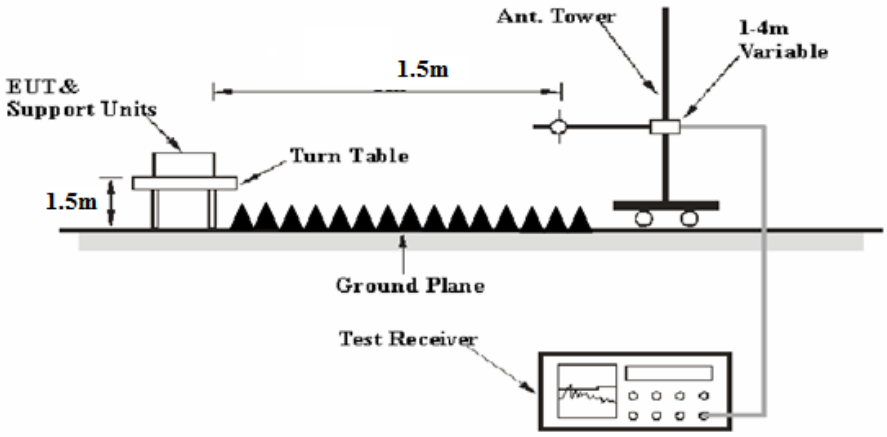
(7) The provisions of §15.205 apply to intentional radiators operating under this section.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters chamber test site, 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

Test Procedure

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

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

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 U-NII Test Procedures New Rules v02r01, emission shall be computed as: E [dBμV/m] = EIRP[dBm] + 95.2, for d = 3 meters.

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

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

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

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

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

Margin = Extrapolation result -Limit

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
R&S	EMI Test Receiver	ESCI	100224	2017-12-11	2018-12-11
HP	Amplifier	8447D	2727A05902	2017-09-05	2018-09-05
N/A	Coaxial Cable	C-NJNJ-50	C-0400-01	2017-09-05	2018-09-05
N/A	Coaxial Cable	C-NJNJ-50	C-0075-01	2017-09-05	2018-09-05
N/A	Coaxial Cable	C-NJNJ-50	C-1000-01	2017-09-05	2018-09-05
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
Agilent	Spectrum Analyzer	E4440A	SG43360054	2018-01-04	2019-01-04
N/A	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2017-09-05	2018-09-05
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2017-06-27	2018-06-27
N/A	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2017-06-27	2018-06-27
Ducommun Technolagies	Horn Antenna	ARH-2823-02	1007726-01 1302	2016-11-18	2019-11-18
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-08	2018-12-08
Chengdu OuLi	Bandrejector Filter	5725-5850	005	2017-09-05	2018-09-05
Chengdu OuLi	Bandrejector Filter	5150-5350	006	2017-09-05	2018-09-05

*** 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

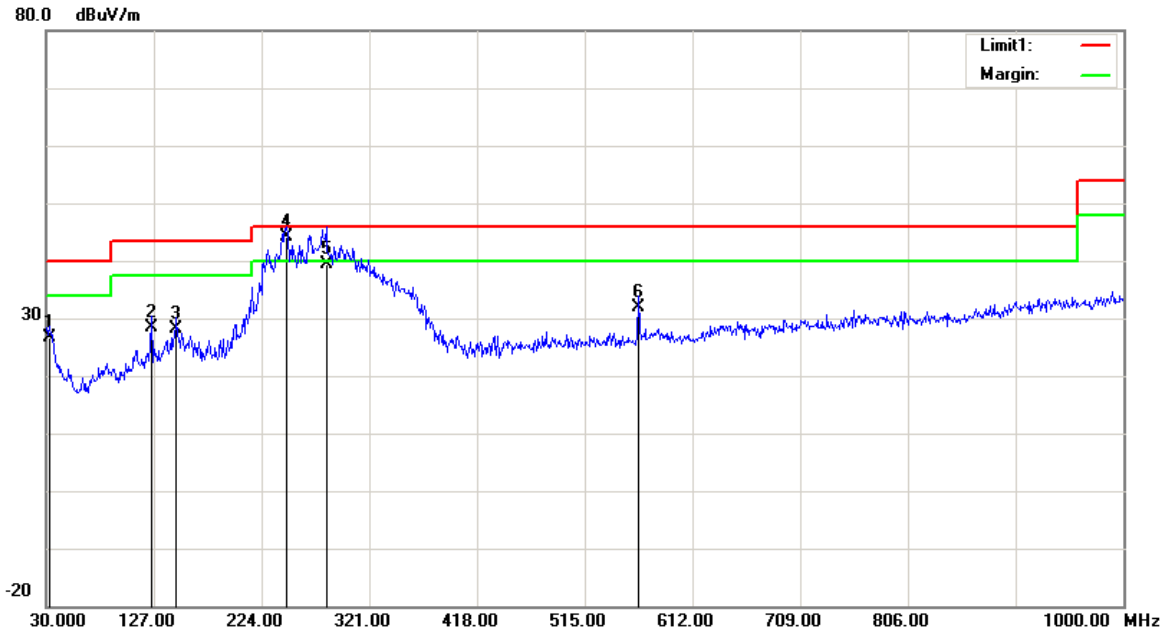
Temperature:	16.4 °C
Relative Humidity:	37 %
ATM Pressure:	102.1 kPa

** The testing was performed by Steven Zuo on 2018-02-06.*

Test Mode: Transmitting(Adapter 1 was the worst)

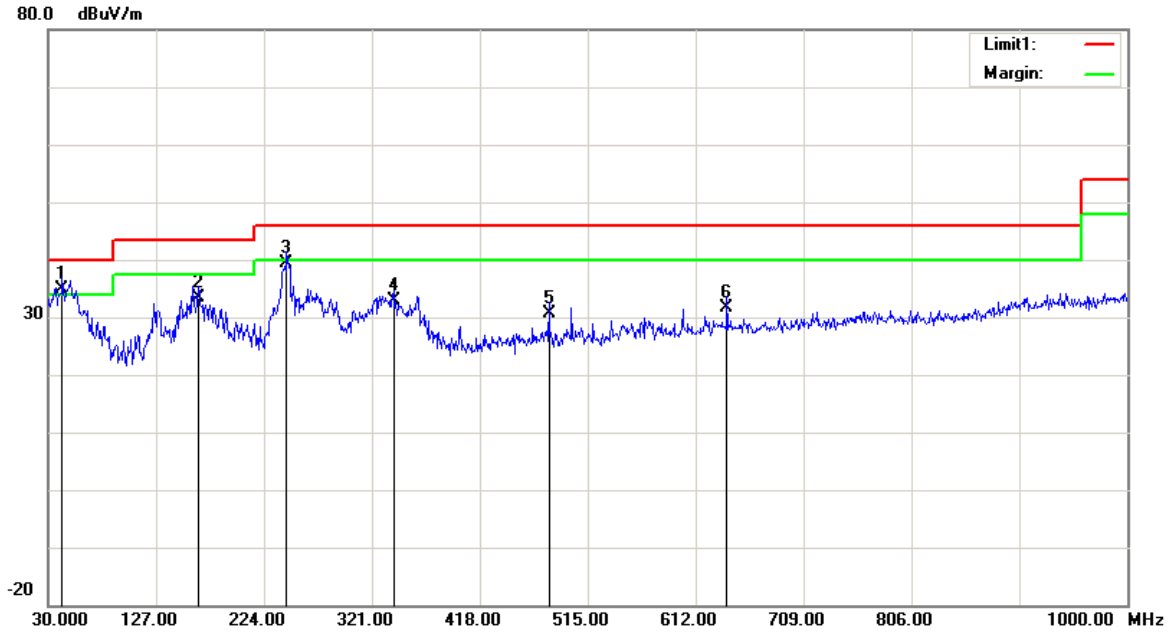
1) Below 1GHz(802.11n ht20 5785 MHz was the worst):

Horizontal



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
32.9100	27.80	QP	-1.10	26.70	40.00	13.30
125.0600	33.13	QP	-4.83	28.30	43.50	15.20
147.3700	34.59	QP	-6.49	28.10	43.50	15.40
246.3100	50.52	QP	-6.32	44.20	46.00	1.80
282.2000	43.16	QP	-3.66	39.50	46.00	6.50
563.5000	31.72	QP	0.18	31.90	46.00	14.10

Vertical



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
42.6100	42.95	QP	-8.05	34.90	40.00	5.10
164.8300	40.43	QP	-6.93	33.50	43.50	10.00
244.3700	45.70	QP	-6.30	39.40	46.00	6.60
340.4000	36.32	QP	-3.52	32.80	46.00	13.20
480.0800	31.71	QP	-1.01	30.70	46.00	15.30
640.1300	29.74	QP	1.86	31.60	46.00	14.40

2) 1GHz-40GHz:
5150-5250MHz
802.11a(ANT 1 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	64.29	PK	H	33.59	3.58	0.00	101.46	95.44	N/A	N/A
5180.00	54.57	AV	H	33.59	3.58	0.00	91.74	85.72	N/A	N/A
5180.00	74.28	PK	V	33.59	3.58	0.00	111.45	105.43	N/A	N/A
5180.00	64.95	AV	V	33.59	3.58	0.00	102.12	96.1	N/A	N/A
5150.00	27.89	PK	V	33.54	3.56	0.00	64.99	58.97	74.00	15.03
5150.00	14.79	AV	V	33.54	3.56	0.00	51.89	45.87	54.00	8.13
10360.00	49.26	PK	V	38.17	6.29	36.85	56.87	50.85	74.00	23.15
10360.00	37.58	AV	V	38.17	6.29	36.85	45.19	39.17	54.00	14.83
15540.00	45.48	PK	V	38.06	8.85	39.04	53.35	47.33	74.00	26.67
15540.00	33.26	AV	V	38.06	8.85	39.04	41.13	35.11	54.00	18.89
9829.00	57.36	PK	V	38.03	5.96	36.72	64.63	58.61	74.00	15.39
9829.00	45.29	AV	V	38.03	5.96	36.72	52.56	46.54	54.00	7.46
Middle Channel: 5200 MHz										
5200.00	64.75	PK	H	33.62	3.60	0.00	101.97	95.95	N/A	N/A
5200.00	54.66	AV	H	33.62	3.60	0.00	91.88	85.86	N/A	N/A
5200.00	74.58	PK	V	33.62	3.60	0.00	111.80	105.78	N/A	N/A
5200.00	64.73	AV	V	33.62	3.60	0.00	101.95	95.93	N/A	N/A
10400.00	48.46	PK	V	38.18	6.32	36.86	56.10	50.08	74.00	23.92
10400.00	35.94	AV	V	38.18	6.32	36.86	43.58	37.56	54.00	16.44
15600.00	45.65	PK	V	38.00	8.83	39.09	53.39	47.37	74.00	26.63
15600.00	33.38	AV	V	38.00	8.83	39.09	41.12	35.1	54.00	18.90
High Channel: 5240 MHz										
5240.00	64.62	PK	H	33.68	3.52	0.00	101.82	95.8	N/A	N/A
5240.00	54.78	AV	H	33.68	3.52	0.00	91.98	85.96	N/A	N/A
5240.00	74.34	PK	V	33.68	3.52	0.00	111.54	105.52	N/A	N/A
5240.00	64.57	AV	V	33.68	3.52	0.00	101.77	95.75	N/A	N/A
5350.00	25.45	PK	V	33.86	3.52	0.00	62.83	56.81	74.00	17.19
5350.00	13.48	AV	V	33.86	3.52	0.00	50.86	44.84	54.00	9.16
10480.00	47.95	PK	V	38.20	6.37	36.88	55.64	49.62	74.00	24.38
10480.00	36.03	AV	V	38.20	6.37	36.88	43.72	37.7	54.00	16.30
15720.00	45.79	PK	V	37.88	8.79	39.18	53.28	47.26	74.00	26.74
15720.00	33.54	AV	V	37.88	8.79	39.18	41.03	35.01	54.00	18.99

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	63.46	PK	H	33.59	3.58	0.00	100.63	94.61	N/A	N/A
5180.00	53.59	AV	H	33.59	3.58	0.00	90.76	84.74	N/A	N/A
5180.00	75.84	PK	V	33.59	3.58	0.00	113.01	106.99	N/A	N/A
5180.00	65.63	AV	V	33.59	3.58	0.00	102.80	96.78	N/A	N/A
5150.00	27.52	PK	V	33.54	3.56	0.00	64.62	58.6	74.00	15.40
5150.00	14.45	AV	V	33.54	3.56	0.00	51.55	45.53	54.00	8.47
10360.00	47.85	PK	V	38.17	6.29	36.85	55.46	49.44	74.00	24.56
10360.00	36.06	AV	V	38.17	6.29	36.85	43.67	37.65	54.00	16.35
15540.00	45.76	PK	V	38.06	8.85	39.04	53.63	47.61	74.00	26.39
15540.00	33.27	AV	V	38.06	8.85	39.04	41.14	35.12	54.00	18.88
Middle Channel: 5200 MHz										
5200.00	63.18	PK	H	33.62	3.60	0.00	100.40	94.38	N/A	N/A
5200.00	53.44	AV	H	33.62	3.60	0.00	90.66	84.64	N/A	N/A
5200.00	75.21	PK	V	33.62	3.60	0.00	112.43	106.41	N/A	N/A
5200.00	65.49	AV	V	33.62	3.60	0.00	102.71	96.69	N/A	N/A
10400.00	48.05	PK	V	38.18	6.32	36.86	55.69	49.67	74.00	24.33
10400.00	36.09	AV	V	38.18	6.32	36.86	43.73	37.71	54.00	16.29
15600.00	45.82	PK	V	38.00	8.83	39.09	53.56	47.54	74.00	26.46
15600.00	33.25	AV	V	38.00	8.83	39.09	40.99	34.97	54.00	19.03
High Channel: 5240 MHz										
5240.00	63.59	PK	H	33.68	3.52	0.00	100.79	94.77	N/A	N/A
5240.00	54.16	AV	H	33.68	3.52	0.00	91.36	85.34	N/A	N/A
5240.00	75.43	PK	V	33.68	3.52	0.00	112.63	106.61	N/A	N/A
5240.00	65.37	AV	V	33.68	3.52	0.00	102.57	96.55	N/A	N/A
5350.00	25.68	PK	V	33.86	3.52	0.00	63.06	57.04	74.00	16.96
5350.00	13.72	AV	V	33.86	3.52	0.00	51.10	45.08	54.00	8.92
10480.00	47.81	PK	V	38.20	6.37	36.88	55.50	49.48	74.00	24.52
10480.00	36.17	AV	V	38.20	6.37	36.88	43.86	37.84	54.00	16.16
15720.00	45.86	PK	V	37.88	8.79	39.18	53.35	47.33	74.00	26.67
15720.00	33.31	AV	V	37.88	8.79	39.18	40.80	34.78	54.00	19.22

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	59.78	PK	H	33.60	3.59	0.00	96.97	90.95	N/A	N/A
5190.00	50.23	AV	H	33.60	3.59	0.00	87.42	81.4	N/A	N/A
5190.00	73.35	PK	V	33.60	3.59	0.00	110.54	104.52	N/A	N/A
5190.00	63.64	AV	V	33.60	3.59	0.00	100.83	94.81	N/A	N/A
5150.00	33.76	PK	V	33.54	3.56	0.00	70.86	64.84	74.00	9.16
5150.00	18.15	AV	V	33.54	3.56	0.00	55.25	49.23	54.00	4.77
10380.00	47.97	PK	V	38.18	6.31	36.85	55.61	49.59	74.00	24.41
10380.00	36.11	AV	V	38.18	6.31	36.85	43.75	37.73	54.00	16.27
15570.00	45.74	PK	V	38.03	8.84	39.06	53.55	47.53	74.00	26.47
15570.00	33.13	AV	V	38.03	8.84	39.06	40.94	34.92	54.00	19.08
High Channel: 5230 MHz										
5230.00	59.68	PK	H	33.67	3.54	0.00	96.89	90.87	N/A	N/A
5230.00	50.13	AV	H	33.67	3.54	0.00	87.34	81.32	N/A	N/A
5230.00	71.65	PK	V	33.67	3.54	0.00	108.86	102.84	N/A	N/A
5230.00	61.84	AV	V	33.67	3.54	0.00	99.05	93.03	N/A	N/A
5350.00	25.78	PK	V	33.86	3.52	0.00	63.16	57.14	74.00	16.86
5350.00	13.64	AV	V	33.86	3.52	0.00	51.02	45	54.00	9.00
10460.00	47.94	PK	V	38.19	6.36	36.87	55.62	49.6	74.00	24.40
10460.00	36.01	AV	V	38.19	6.36	36.87	43.69	37.67	54.00	16.33
15690.00	45.89	PK	V	37.91	8.80	39.15	53.45	47.43	74.00	26.57
15690.00	33.13	AV	V	37.91	8.80	39.15	40.69	34.67	54.00	19.33

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	56.82	PK	H	33.64	3.58	0.00	94.04	88.02	N/A	N/A
5210.00	46.93	AV	H	33.64	3.58	0.00	84.15	78.13	N/A	N/A
5210.00	68.75	PK	V	33.64	3.58	0.00	105.97	99.95	N/A	N/A
5210.00	58.37	AV	V	33.64	3.58	0.00	95.59	89.57	N/A	N/A
5150.00	31.58	PK	V	33.54	3.56	0.00	68.68	62.66	74.00	11.34
5150.00	17.65	AV	V	33.54	3.56	0.00	54.75	48.73	54.00	5.27
5350.00	28.17	PK	V	33.86	3.52	0.00	65.55	59.53	74.00	14.47
5350.00	14.63	AV	V	33.86	3.52	0.00	52.01	45.99	54.00	8.01
10420.00	48.19	PK	V	38.18	6.33	36.86	55.84	49.82	74.00	24.18
10420.00	35.96	AV	V	38.18	6.33	36.86	43.61	37.59	54.00	16.41
15630.00	45.95	PK	V	37.97	8.82	39.11	53.63	47.61	74.00	26.39
15630.00	33.11	AV	V	37.97	8.82	39.11	40.79	34.77	54.00	19.23

5725-5850MHz:
802.11a(ANT 1 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	65.37	PK	H	34.20	3.69	0.00	103.26	97.24	N/A	N/A
5745.00	55.49	AV	H	34.20	3.69	0.00	93.38	87.36	N/A	N/A
5745.00	78.16	PK	V	34.20	3.69	0.00	116.05	110.03	N/A	N/A
5745.00	68.52	AV	V	34.20	3.69	0.00	106.41	100.39	N/A	N/A
5725.00	39.84	PK	V	34.19	3.69	0.00	77.72	71.7	122.20	50.50
5720.00	32.56	PK	V	34.19	3.69	0.00	70.44	64.42	110.80	46.38
5700.00	27.48	PK	V	34.18	3.68	0.00	65.34	59.32	105.20	45.88
5650.00	26.15	PK	V	34.16	3.63	0.00	63.94	57.92	68.20	10.28
11490.00	48.63	PK	V	38.99	6.59	37.35	56.86	50.84	74.00	23.16
11490.00	36.55	AV	V	38.99	6.59	37.35	44.78	38.76	54.00	15.24
17235.00	46.38	PK	V	41.56	8.78	38.61	58.11	52.09	74.00	21.91
17235.00	34.54	AV	V	41.56	8.78	38.61	46.27	40.25	54.00	13.75
9840.00	57.49	PK	V	38.04	5.96	36.72	64.77	58.75	74.00	15.25
9840.00	44.27	AV	V	38.04	5.96	36.72	51.55	45.53	54.00	8.47
Middle Channel: 5785 MHz										
5785.00	63.48	PK	H	34.21	3.71	0.00	101.40	95.38	N/A	N/A
5785.00	53.52	AV	H	34.21	3.71	0.00	91.44	85.42	N/A	N/A
5785.00	76.68	PK	V	34.21	3.71	0.00	114.60	108.58	N/A	N/A
5785.00	66.43	AV	V	34.21	3.71	0.00	104.35	98.33	N/A	N/A
11570.00	47.86	PK	V	39.00	6.61	37.44	56.03	50.01	74.00	23.99
11570.00	34.92	AV	V	39.00	6.61	37.44	43.09	37.07	54.00	16.93
17355.00	46.44	PK	V	42.26	8.81	38.52	58.99	52.97	74.00	21.03
17355.00	34.58	AV	V	42.26	8.81	38.52	47.13	41.11	54.00	12.89
High Channel: 5825 MHz										
5825.00	62.36	PK	H	34.23	3.73	0.00	100.32	94.3	N/A	N/A
5825.00	52.49	AV	H	34.23	3.73	0.00	90.45	84.43	N/A	N/A
5825.00	75.18	PK	V	34.23	3.73	0.00	113.14	107.12	N/A	N/A
5825.00	65.23	AV	V	34.23	3.73	0.00	103.19	97.17	N/A	N/A
5850.00	28.67	PK	V	34.24	3.75	0.00	66.66	60.64	122.20	61.56
5855.00	28.12	PK	V	34.24	3.75	0.00	66.11	60.09	110.80	50.71
5875.00	27.56	PK	V	34.25	3.77	0.00	65.58	59.56	105.20	45.64
5925.00	25.84	PK	V	34.27	3.80	0.00	63.91	57.89	68.20	10.31
11650.00	47.56	PK	V	39.00	6.64	37.53	55.67	49.65	74.00	24.35
11650.00	35.48	AV	V	39.00	6.64	37.53	43.59	37.57	54.00	16.43
17475.00	46.23	PK	V	42.96	8.84	38.44	59.59	53.57	74.00	20.43
17475.00	34.76	AV	V	42.96	8.84	38.44	48.12	42.1	54.00	11.90

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	65.98	PK	H	34.20	3.69	0.00	103.87	97.85	N/A	N/A
5745.00	55.77	AV	H	34.20	3.69	0.00	93.66	87.64	N/A	N/A
5745.00	79.64	PK	V	34.20	3.69	0.00	117.53	111.51	N/A	N/A
5745.00	69.48	AV	V	34.20	3.69	0.00	107.37	101.35	N/A	N/A
5725.00	38.46	PK	V	34.19	3.69	0.00	76.34	70.32	122.20	51.88
5720.00	31.33	PK	V	34.19	3.69	0.00	69.21	63.19	110.80	47.61
5700.00	28.46	PK	V	34.18	3.68	0.00	66.32	60.3	105.20	44.90
5650.00	25.78	PK	V	34.16	3.63	0.00	63.57	57.55	68.20	10.65
11490.00	47.61	PK	V	38.99	6.59	37.35	55.84	49.82	74.00	24.18
11490.00	35.49	AV	V	38.99	6.59	37.35	43.72	37.7	54.00	16.30
17235.00	46.33	PK	V	41.56	8.78	38.61	58.06	52.04	74.00	21.96
17235.00	34.68	AV	V	41.56	8.78	38.61	46.41	40.39	54.00	13.61
Middle Channel: 5785 MHz										
5785.00	64.36	PK	H	34.21	3.71	0.00	102.28	96.26	N/A	N/A
5785.00	54.52	AV	H	34.21	3.71	0.00	92.44	86.42	N/A	N/A
5785.00	78.79	PK	V	34.21	3.71	0.00	116.71	110.69	N/A	N/A
5785.00	68.93	AV	V	34.21	3.71	0.00	106.85	100.83	N/A	N/A
11570.00	47.41	PK	V	39.00	6.61	37.44	55.58	49.56	74.00	24.44
11570.00	35.54	AV	V	39.00	6.61	37.44	43.71	37.69	54.00	16.31
17355.00	46.32	PK	V	42.26	8.81	38.52	58.87	52.85	74.00	21.15
17355.00	34.73	AV	V	42.26	8.81	38.52	47.28	41.26	54.00	12.74
High Channel: 5825 MHz										
5825.00	63.27	PK	H	34.23	3.73	0.00	101.23	95.21	N/A	N/A
5825.00	53.36	AV	H	34.23	3.73	0.00	91.32	85.3	N/A	N/A
5825.00	77.69	PK	V	34.23	3.73	0.00	115.65	109.63	N/A	N/A
5825.00	67.57	AV	V	34.23	3.73	0.00	105.53	99.51	N/A	N/A
5850.00	28.26	PK	V	34.24	3.75	0.00	66.25	60.23	122.20	61.97
5855.00	27.49	PK	V	34.24	3.75	0.00	65.48	59.46	110.80	51.34
5875.00	27.15	PK	V	34.25	3.77	0.00	65.17	59.15	105.20	46.05
5925.00	25.34	PK	V	34.27	3.80	0.00	63.41	57.39	68.20	10.81
11650.00	47.82	PK	V	39.00	6.64	37.53	55.93	49.91	74.00	24.09
11650.00	35.65	AV	V	39.00	6.64	37.53	43.76	37.74	54.00	16.26
17475.00	46.24	PK	V	42.96	8.84	38.44	59.60	53.58	74.00	20.42
17475.00	34.43	AV	V	42.96	8.84	38.44	47.79	41.77	54.00	12.23

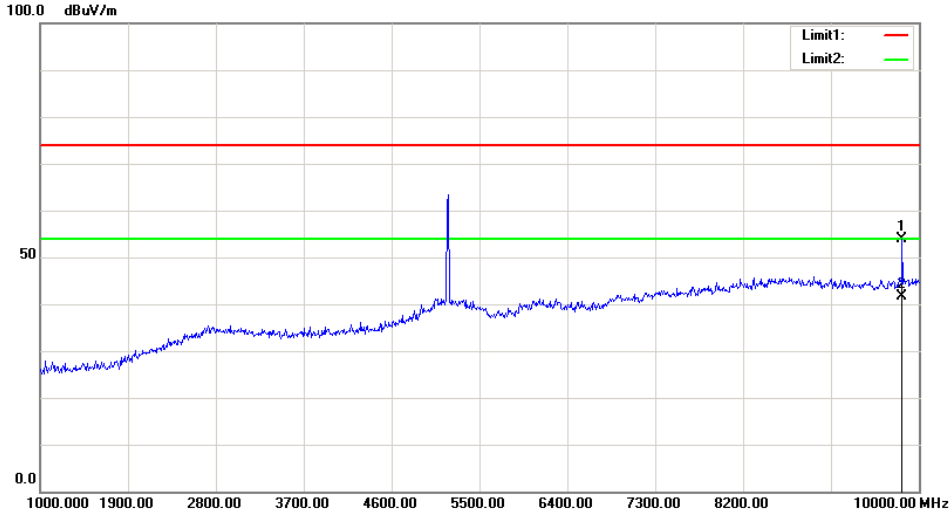
802.11n ht40(2Tx was the worst)

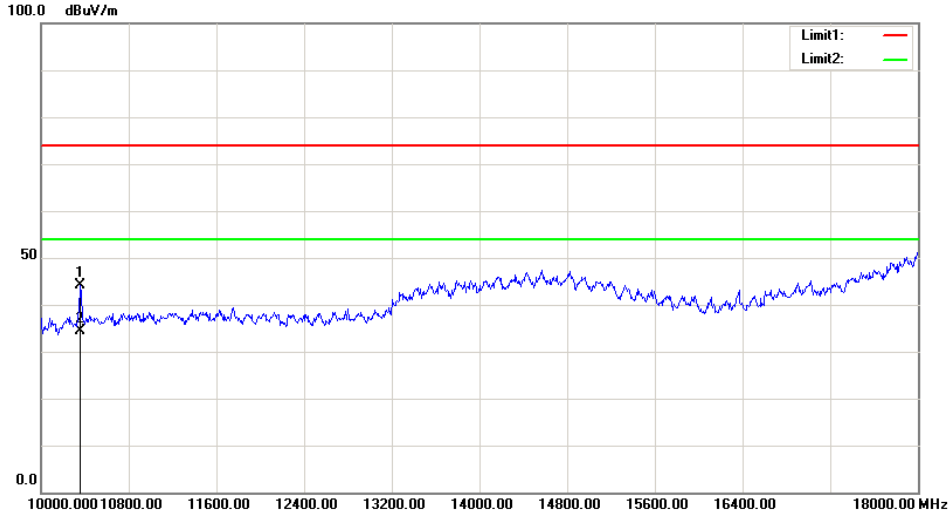
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5755 MHz										
5755.00	63.15	PK	H	34.20	3.70	0.00	101.05	95.03	N/A	N/A
5755.00	53.29	AV	H	34.20	3.70	0.00	91.19	85.17	N/A	N/A
5755.00	76.84	PK	V	34.20	3.70	0.00	114.74	108.72	N/A	N/A
5755.00	66.72	AV	V	34.20	3.70	0.00	104.62	98.6	N/A	N/A
5725.00	42.38	PK	V	34.19	3.69	0.00	80.26	74.24	122.20	47.96
5720.00	39.67	PK	V	34.19	3.69	0.00	77.55	71.53	110.80	39.27
5700.00	27.85	PK	V	34.18	3.68	0.00	65.71	59.69	105.20	45.51
5650.00	25.69	PK	V	34.16	3.63	0.00	63.48	57.46	68.20	10.74
11510.00	47.56	PK	V	39.00	6.59	37.37	55.78	49.76	74.00	24.24
11510.00	35.84	AV	V	39.00	6.59	37.37	44.06	38.04	54.00	15.96
17265.00	46.45	PK	V	41.74	8.79	38.58	58.40	52.38	74.00	21.62
17265.00	34.42	AV	V	41.74	8.79	38.58	46.37	40.35	54.00	13.65
High Channel: 5795 MHz										
5795.00	62.12	PK	H	34.22	3.71	0.00	100.05	94.03	N/A	N/A
5795.00	52.37	AV	H	34.22	3.71	0.00	90.30	84.28	N/A	N/A
5795.00	75.63	PK	V	34.22	3.71	0.00	113.56	107.54	N/A	N/A
5795.00	65.48	AV	V	34.22	3.71	0.00	103.41	97.39	N/A	N/A
5850.00	27.69	PK	V	34.24	3.75	0.00	65.68	59.66	122.20	62.54
5855.00	27.43	PK	V	34.24	3.75	0.00	65.42	59.4	110.80	51.40
5875.00	26.54	PK	V	34.25	3.77	0.00	64.56	58.54	105.20	46.66
5925.00	25.82	PK	V	34.27	3.80	0.00	63.89	57.87	68.20	10.33
11590.00	47.63	PK	V	39.00	6.62	37.46	55.79	49.77	74.00	24.23
11590.00	35.26	AV	V	39.00	6.62	37.46	43.42	37.4	54.00	16.60
17385.00	46.54	PK	V	42.43	8.82	38.50	59.29	53.27	74.00	20.73
17385.00	34.42	AV	V	42.43	8.82	38.50	47.17	41.15	54.00	12.85

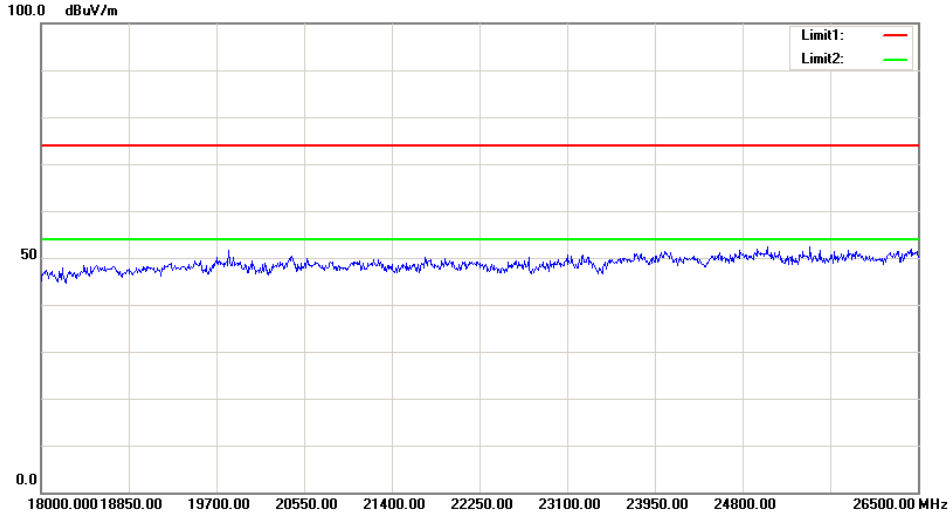
802.11 ac80(2Tx was the worst)

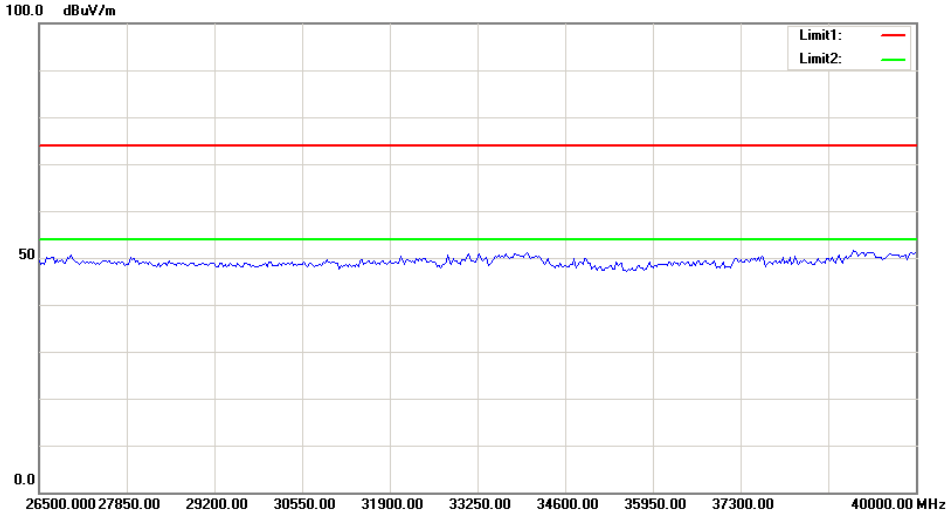
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)						
Middle Channel: 5775 MHz										
5775.00	59.23	PK	H	34.21	3.70	0.00	97.14	91.12	N/A	N/A
5775.00	49.46	AV	H	34.21	3.70	0.00	87.37	81.35	N/A	N/A
5775.00	71.85	PK	V	34.21	3.70	0.00	109.76	103.74	N/A	N/A
5775.00	61.69	AV	V	34.21	3.70	0.00	99.60	93.58	N/A	N/A
5725.00	26.28	PK	V	34.19	3.69	0.00	64.16	58.14	122.20	64.06
5720.00	29.67	PK	V	34.19	3.69	0.00	67.55	61.53	110.80	49.27
5700.00	33.82	PK	V	34.18	3.68	0.00	71.68	65.66	105.20	39.54
5650.00	35.39	PK	V	34.16	3.63	0.00	73.18	67.16	68.20	1.04
5850.00	34.26	PK	V	34.24	3.75	0.00	72.25	66.23	122.20	55.97
5855.00	31.48	PK	V	34.24	3.75	0.00	69.47	63.45	110.80	47.35
5875.00	30.55	PK	V	34.25	3.77	0.00	68.57	62.55	105.20	42.65
5925.00	26.17	PK	V	34.27	3.80	0.00	64.24	58.22	68.20	9.98
11550.00	47.36	PK	V	39.00	6.61	37.42	55.55	49.53	74.00	24.47
11550.00	35.44	AV	V	39.00	6.61	37.42	43.63	37.61	54.00	16.39
17325.00	46.25	PK	V	42.09	8.80	38.54	58.60	52.58	74.00	21.42
17325.00	34.43	AV	V	42.09	8.80	38.54	46.78	40.76	54.00	13.24

Test Plots(For worst mode 802.11a mode, ANT 1 5825MHz)
Horizontal:

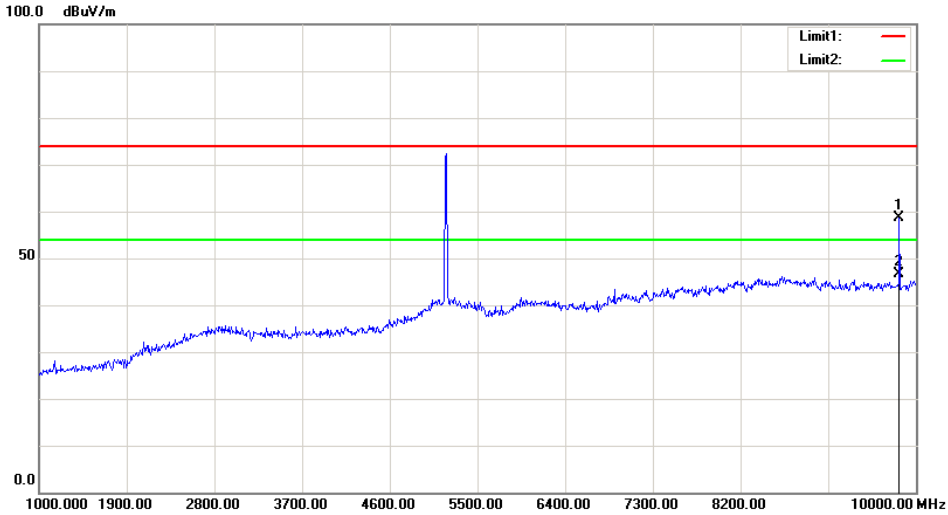


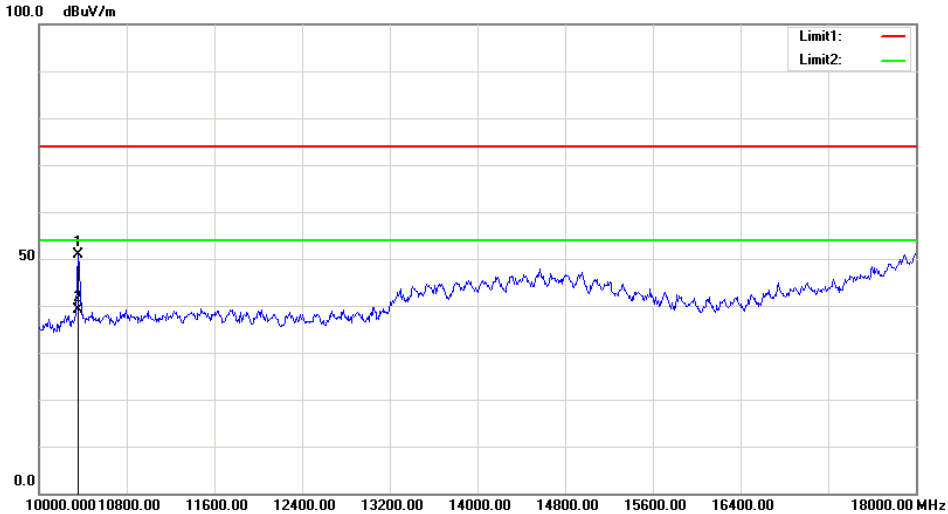


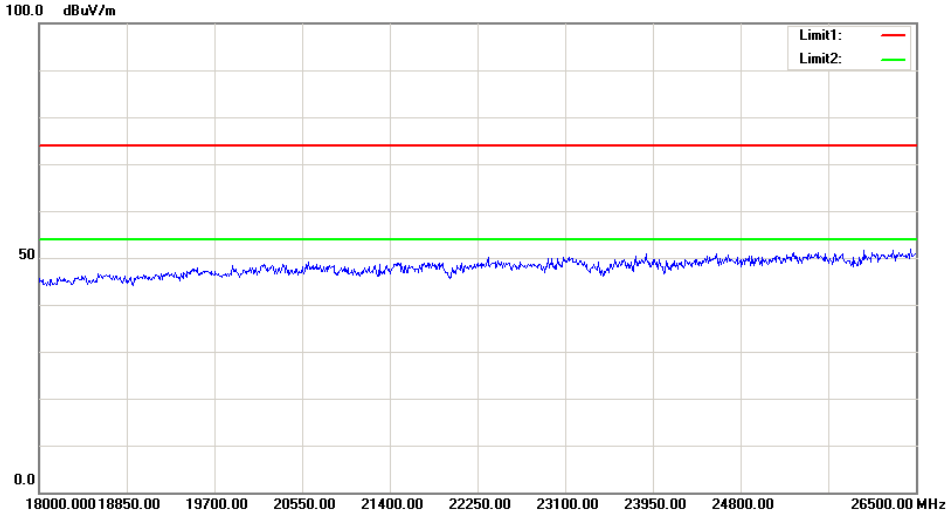


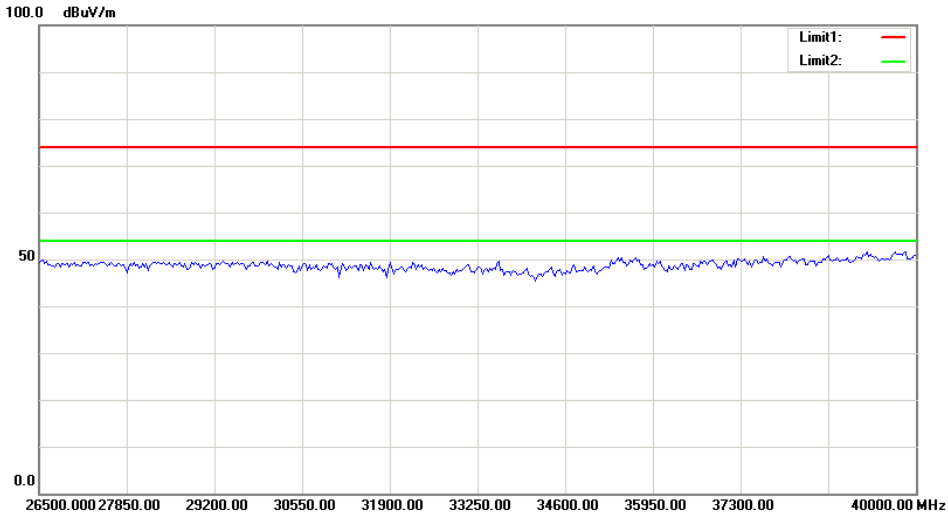

100.0 dBuV/m
Limit1:
Limit2:
50
0.0
26500.000 27850.00 29200.00 30550.00 31900.00 33250.00 34600.00 35950.00 37300.00 40000.00 MHz

Vertical:


100.0 dBuV/m
Limit1:
Limit2:
50
0.0
1000.000 1900.00 2800.00 3700.00 4600.00 5500.00 6400.00 7300.00 8200.00 10000.00 MHz


100.0 dBuV/m
Limit1:
Limit2:
50
0.0
10000.000 10800.00 11600.00 12400.00 13200.00 14000.00 14800.00 15600.00 16400.00 18000.00 MHz


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(b)–OUT- OF-BAND EMISSIONS

Applicable Standard

FCC §15.407

(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.

Test Procedure

According to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04
N/A	Coaxial Cable	C-SJ00-0010	C0010/04	Each Time	/

*** 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:	21.3°C
Relative Humidity:	36 %
ATM Pressure:	102kPa

The testing was performed by Nami Quan on 2018-02-02.

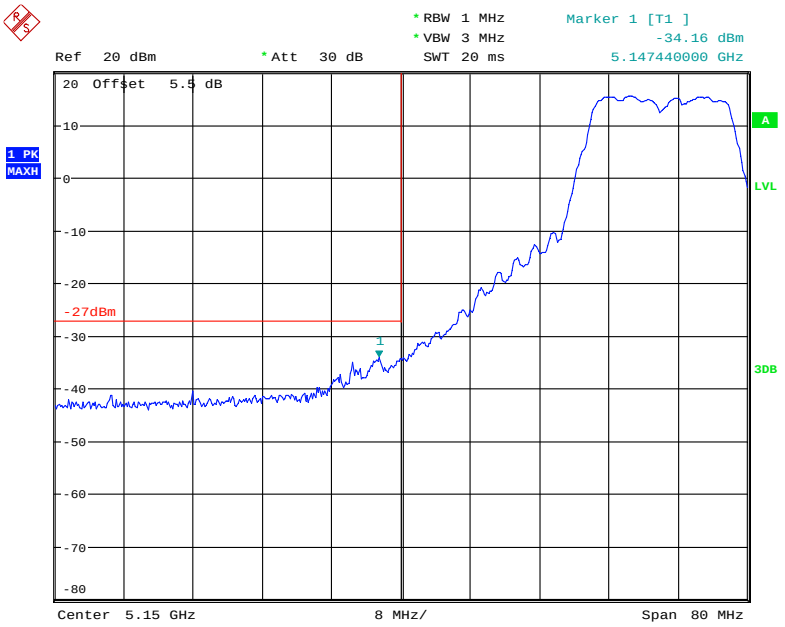
Test Result: Pass.

Please refer to the following plots.

5150-5250MHz(the atenna gain was offset in the display, all emission under limit more than 3dBc for 802.11n and ac modes, so 2TX mode also compliance the requirement)

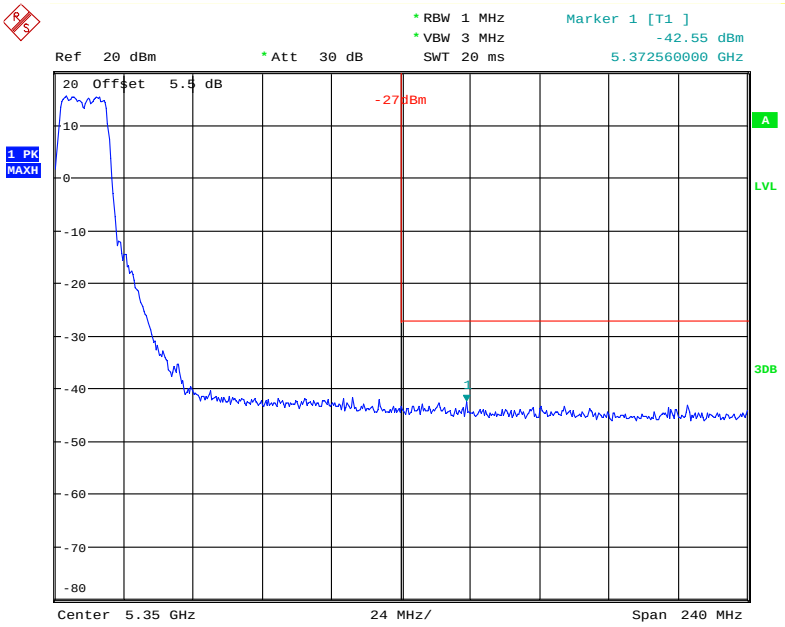
ANT 1:

802.11a Low Channel



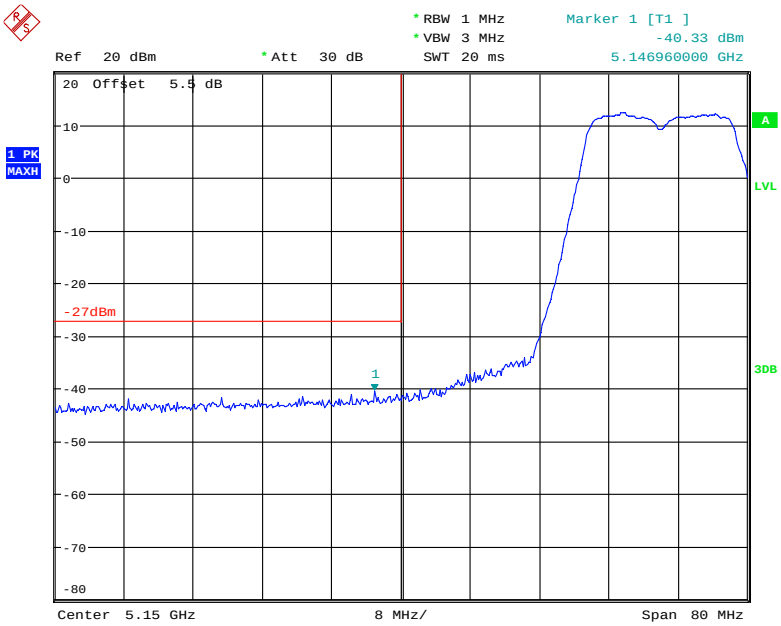
Date: 2.FEB.2018 11:43:45

802.11a High Channel



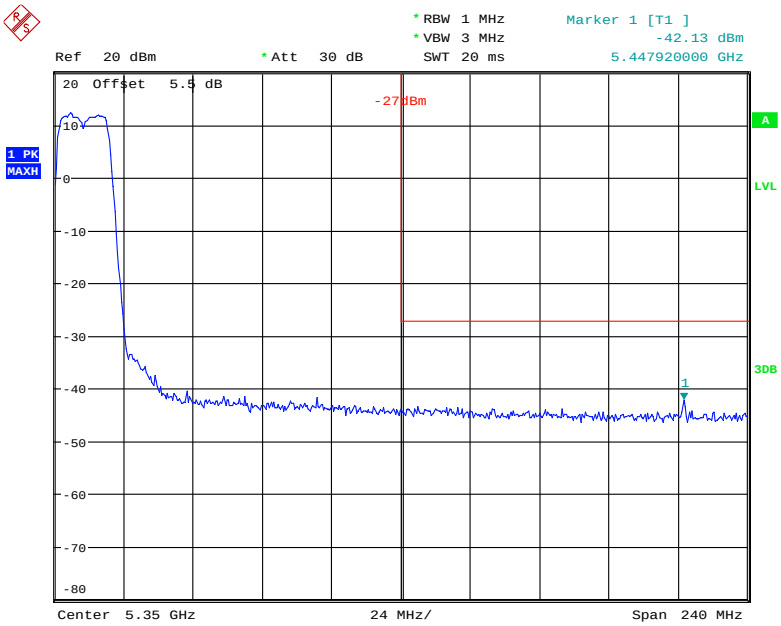
Date: 2.FEB.2018 11:44:45

802.11n ht20 Low Channel



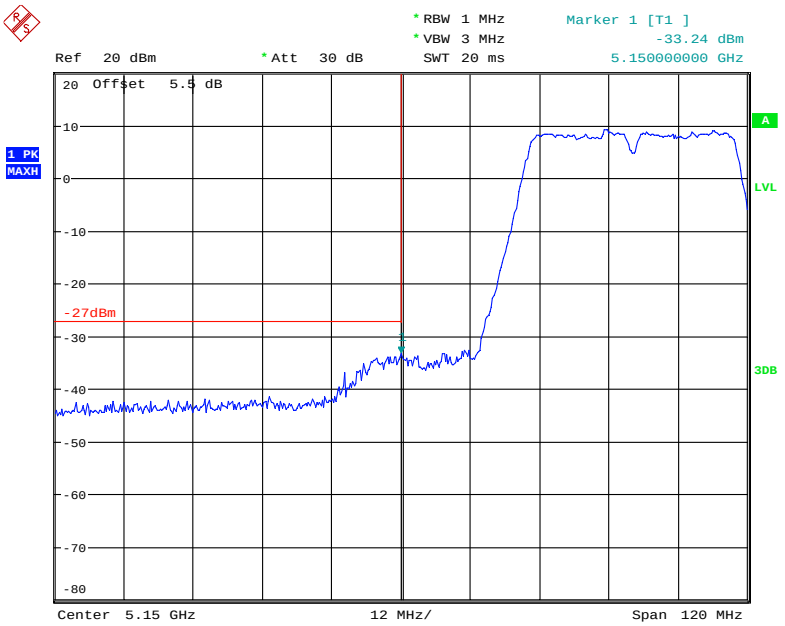
Date: 2.FEB.2018 11:47:01

802.11n ht20 High Channel



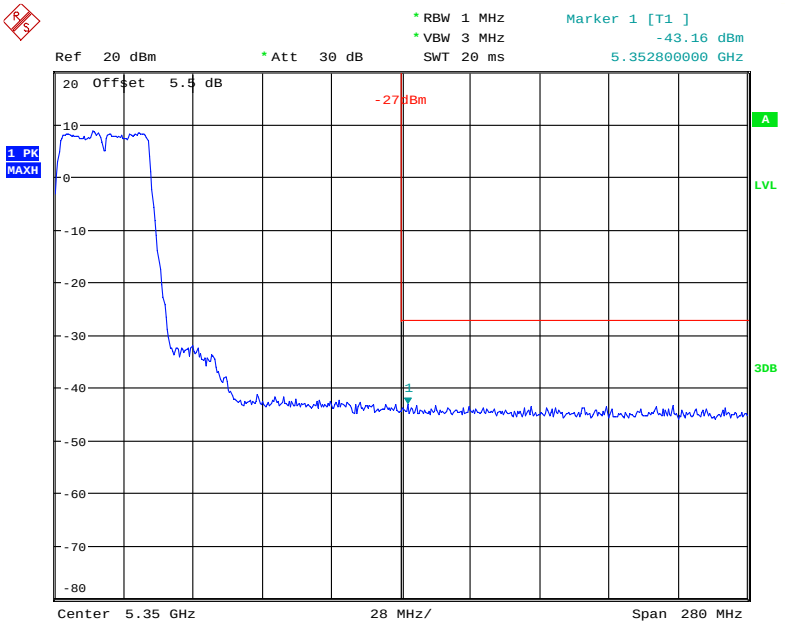
Date: 2.FEB.2018 11:47:41

802.11n ht40 Low Channel



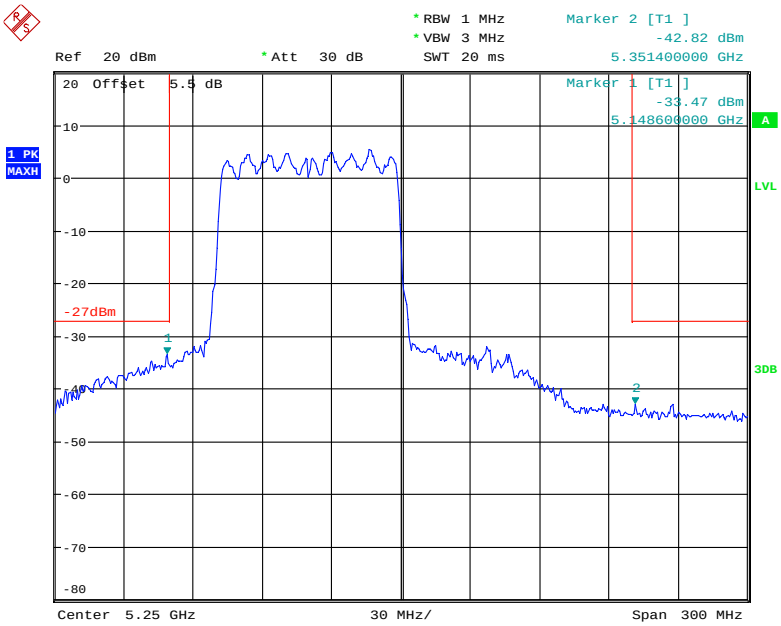
Date: 2.FEB.2018 11:51:36

802.11n ht40 High Channel



Date: 2.FEB.2018 11:52:40

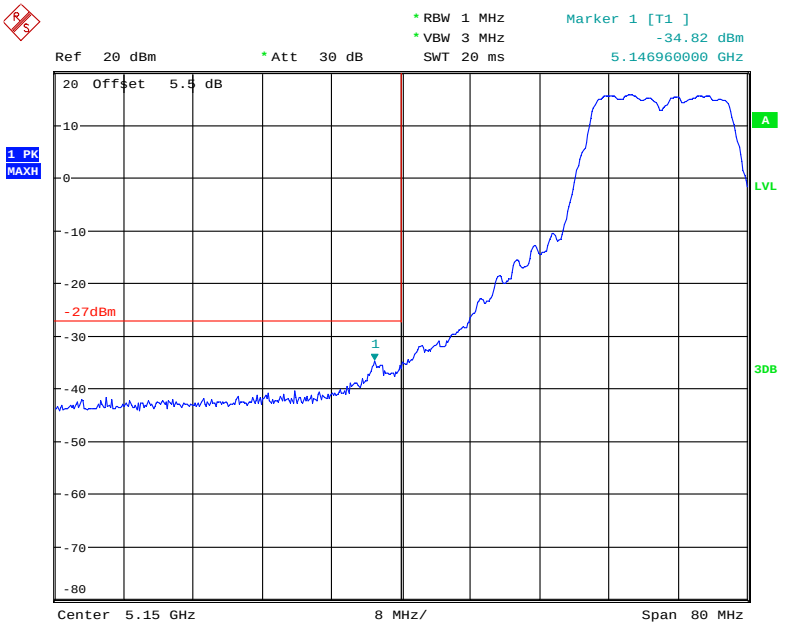
802.11n ac80 Middle Channel



Date: 2.FEB.2018 11:54:59

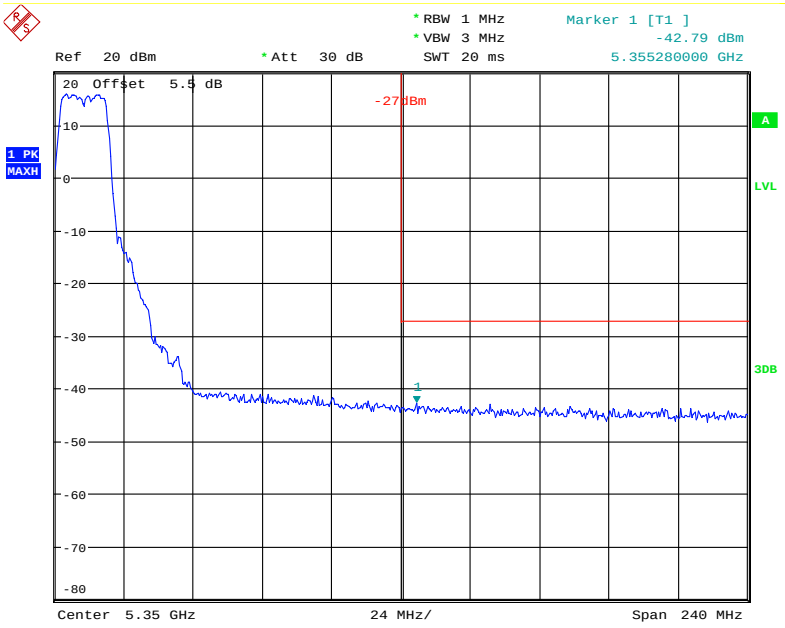
ANT 2:

802.11a Low Channel



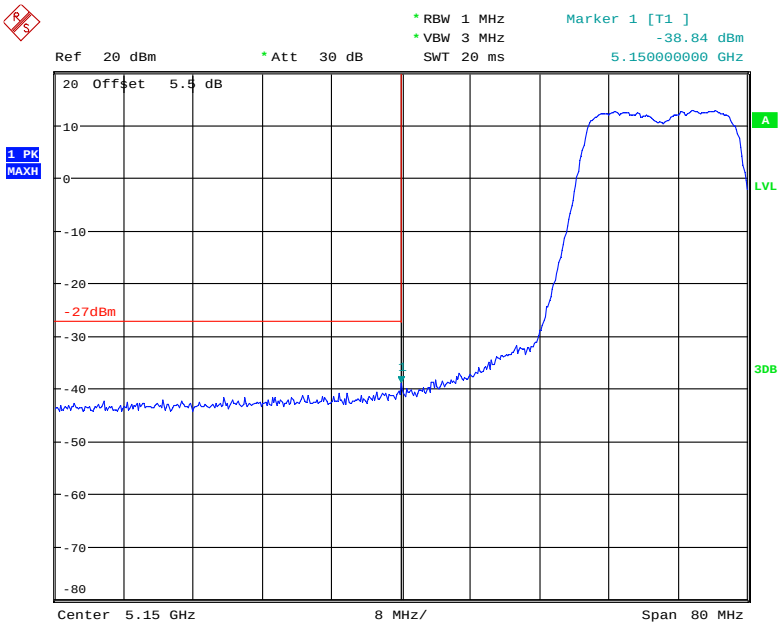
Date: 2.FEB.2018 13:04:22

802.11a High Channel



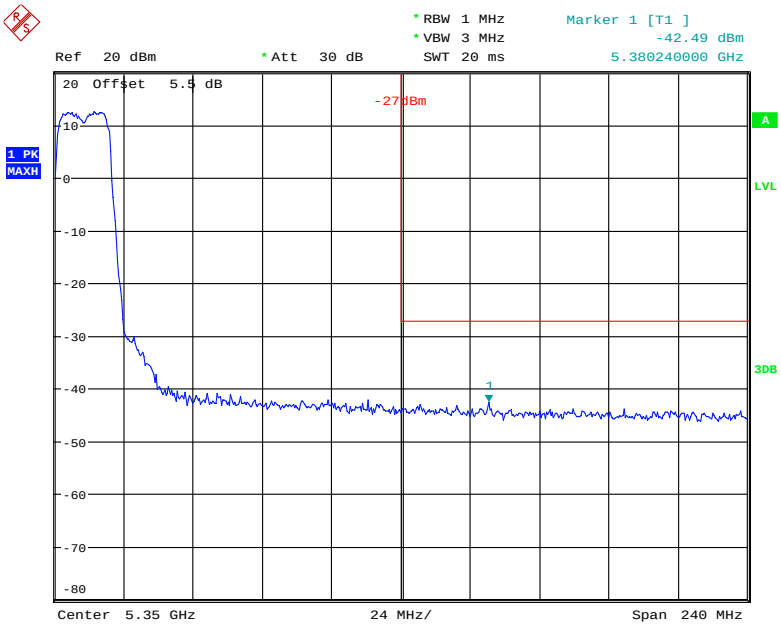
Date: 2.FEB.2018 13:04:59

802.11n ht20 Low Channel



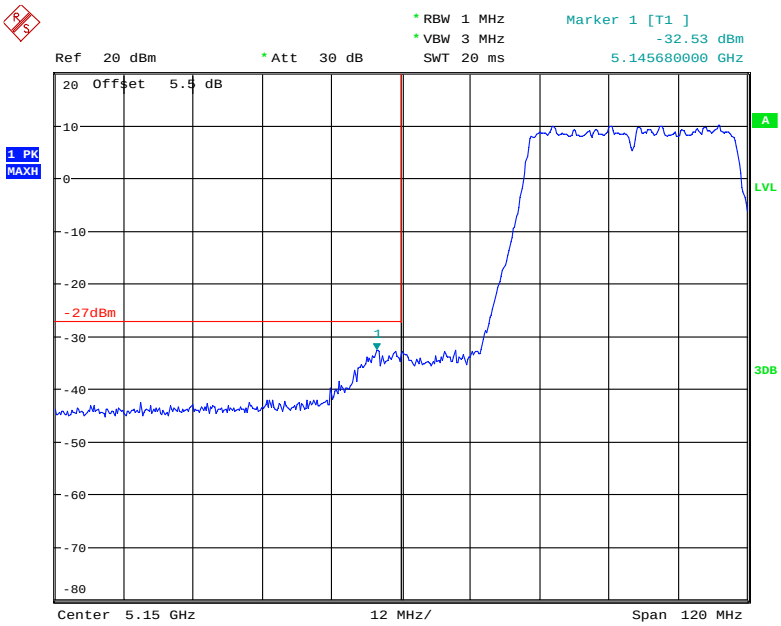
Date: 2.FEB.2018 13:06:36

802.11n ht20 High Channel



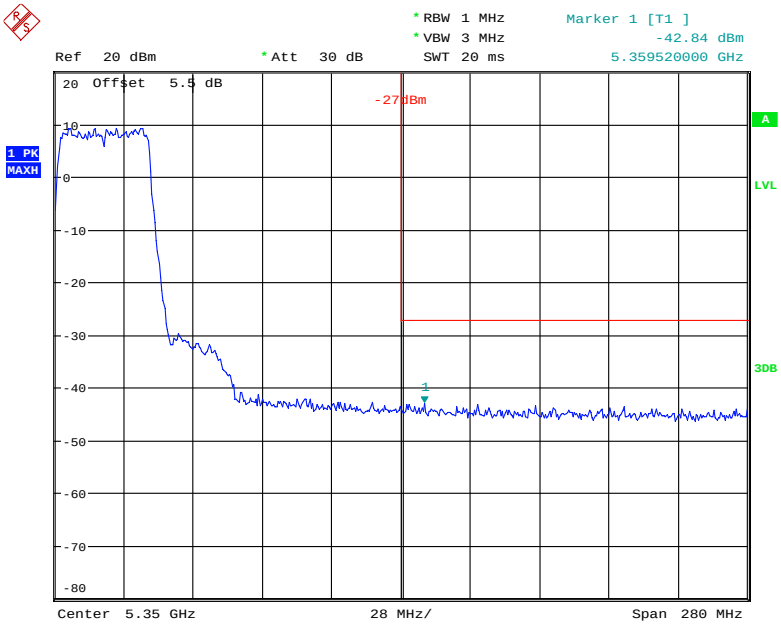
Date: 2.FEB.2018 13:07:13

802.11n ht40 Low Channel



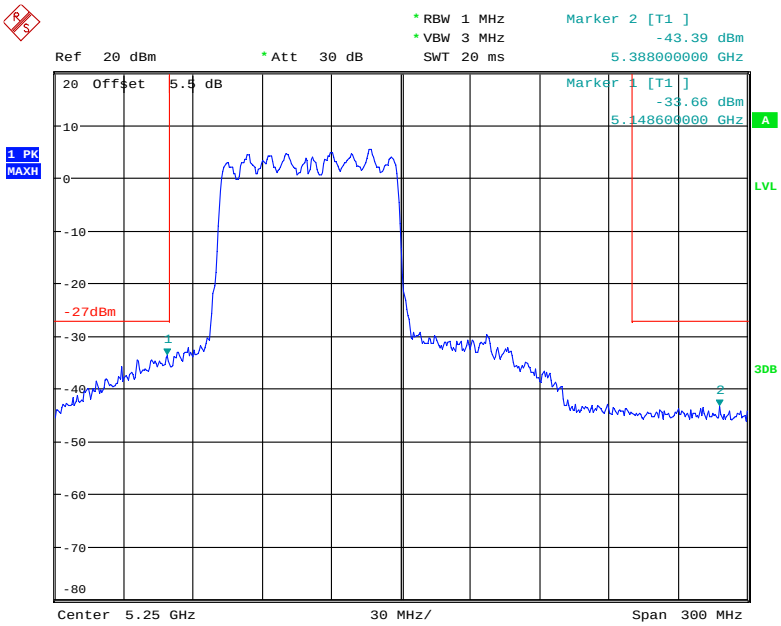
Date: 2.FEB.2018 13:11:47

802.11n ht40 High Channel



Date: 2.FEB.2018 13:12:25

802.11n ac80 Middle Channel

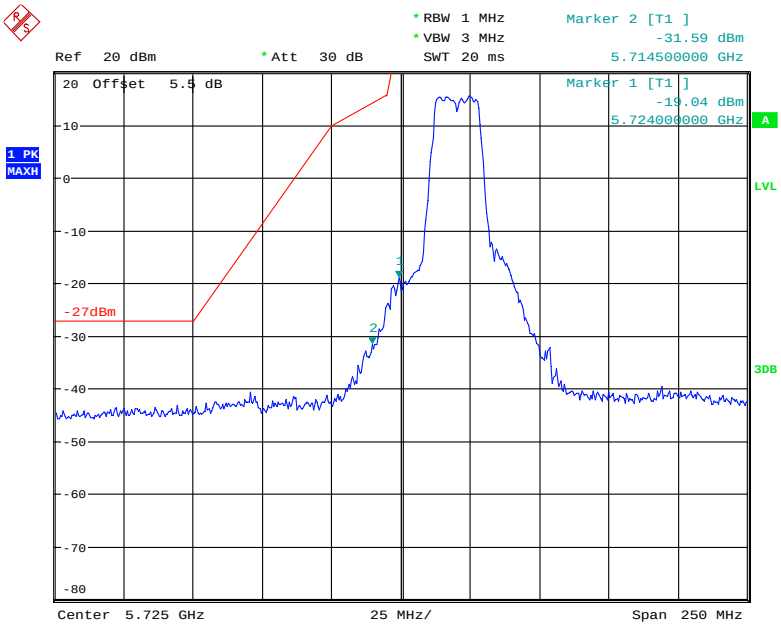


Date: 2.FEB.2018 13:17:17

5725-5850MHz(the atenna gain was offset in the display, all emission under limit more than 3dBc, so 2TX mode also compliance the requirement)

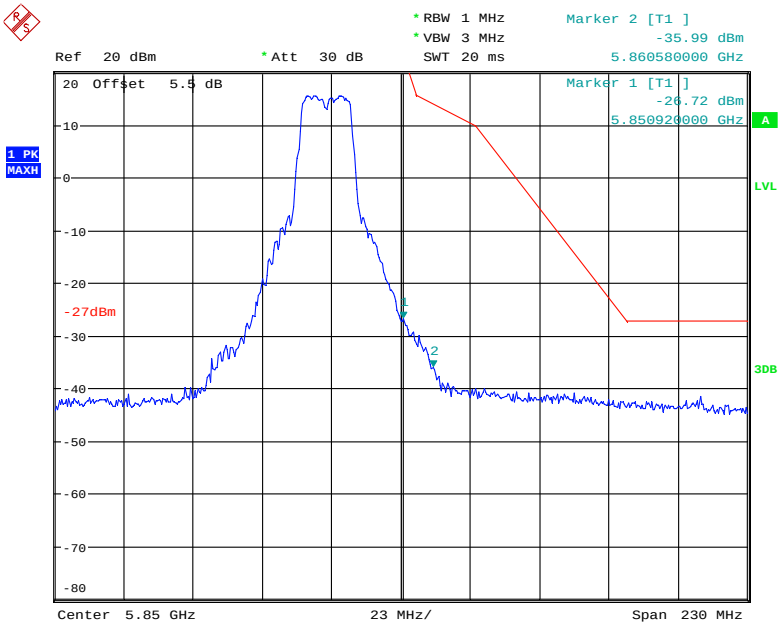
ANT 1:

802.11a Low Channel



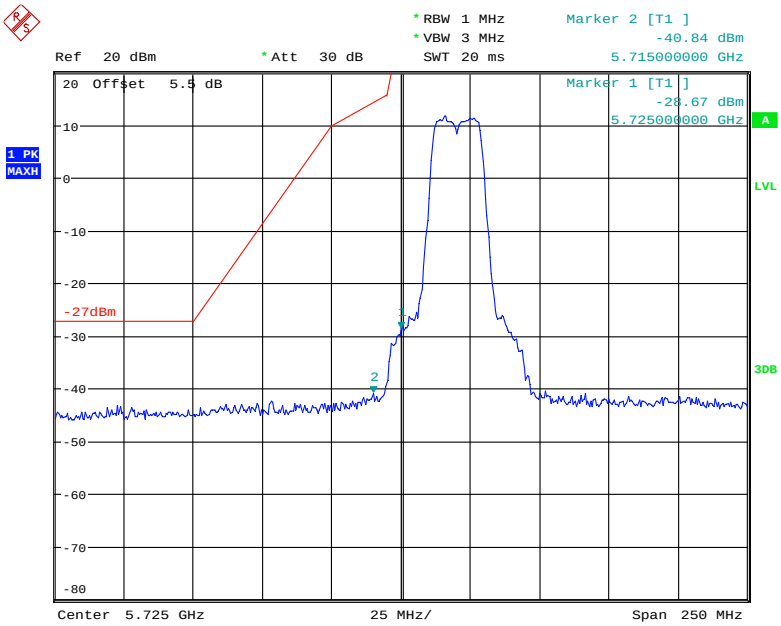
Date: 2.FEB.2018 11:45:23

802.11a High Channel



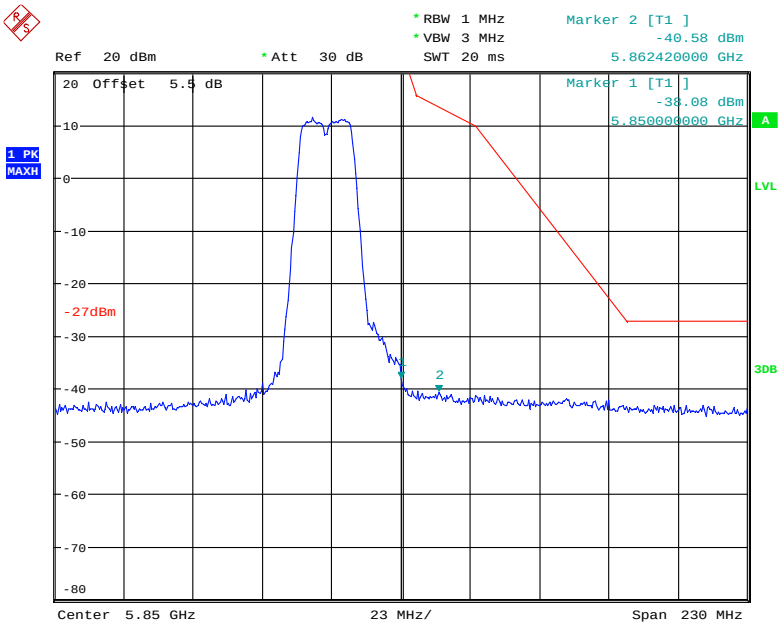
Date: 2.FEB.2018 11:46:10

802.11n ht20 Low Channel



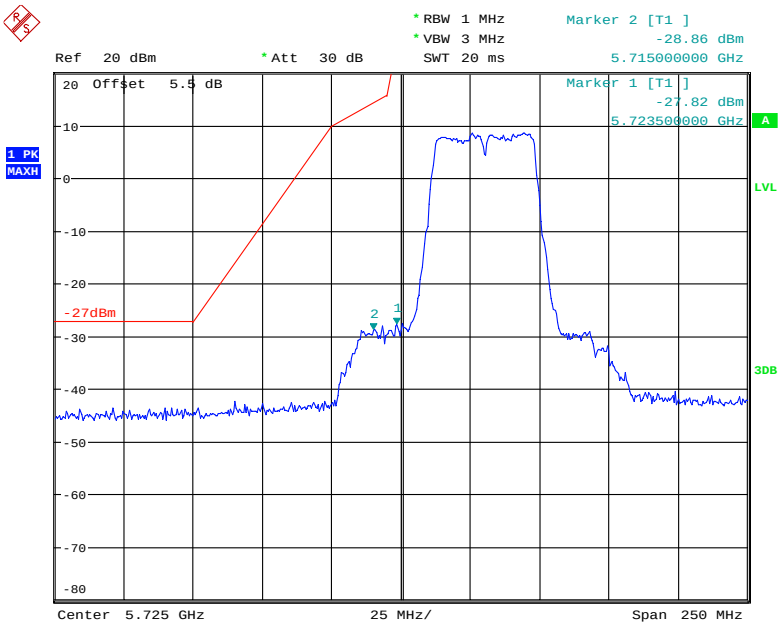
Date: 2.FEB.2018 11:48:43

802.11n ht20 High Channel



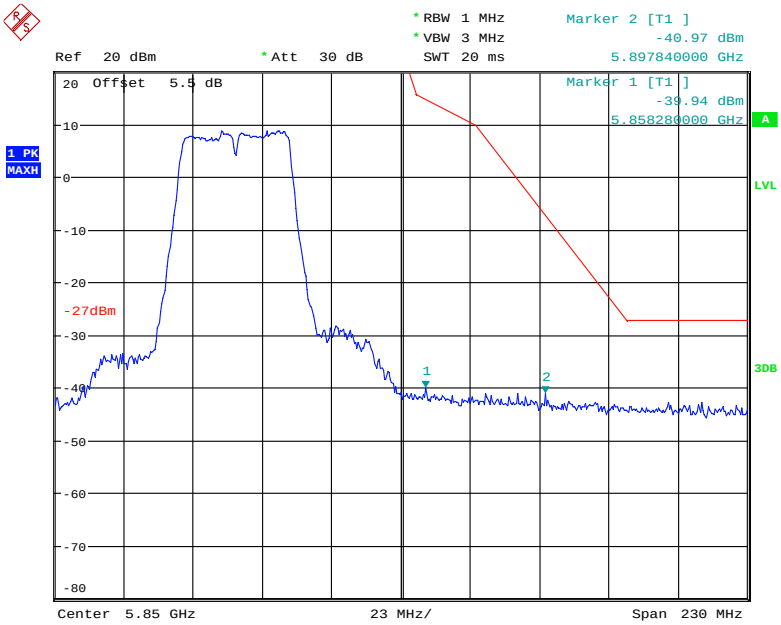
Date: 2.FEB.2018 11:50:27

802.11n ht40 Low Channel



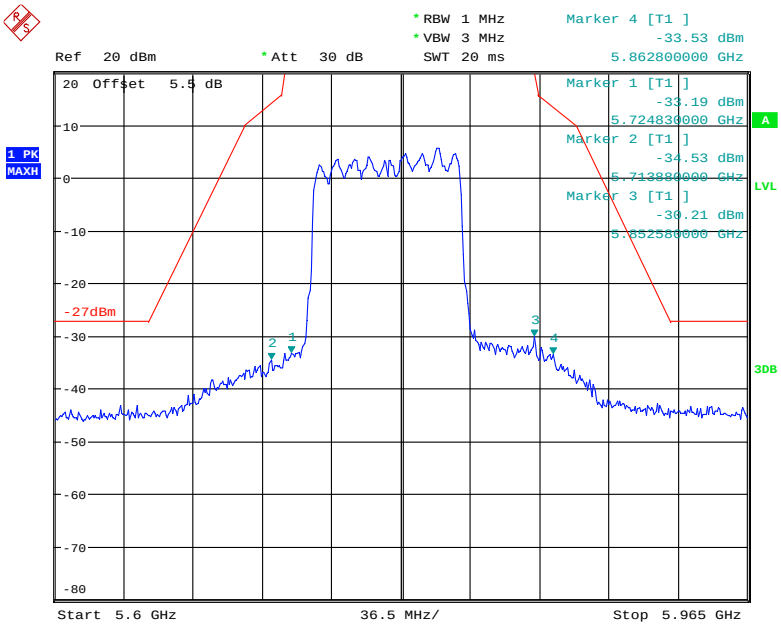
Date: 2.FEB.2018 11:53:27

802.11n ht40 High Channel



Date: 2.FEB.2018 11:54:17

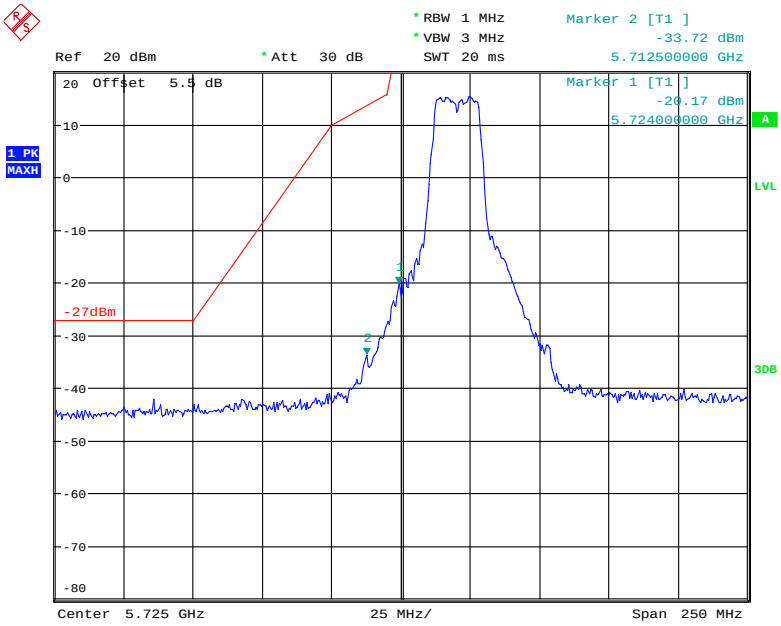
802.11n ac80 Middle Channel



Date: 2.FEB.2018 11:55:35

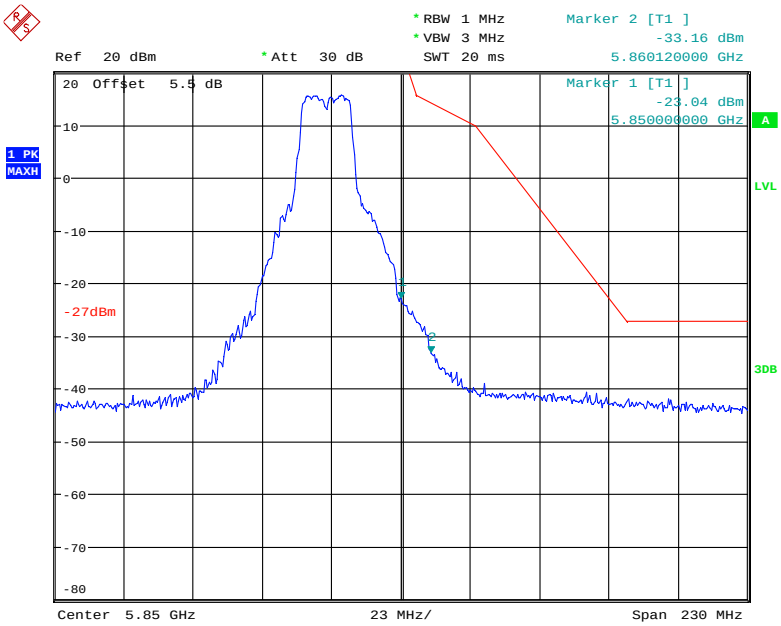
ANT 2:

802.11a Low Channel



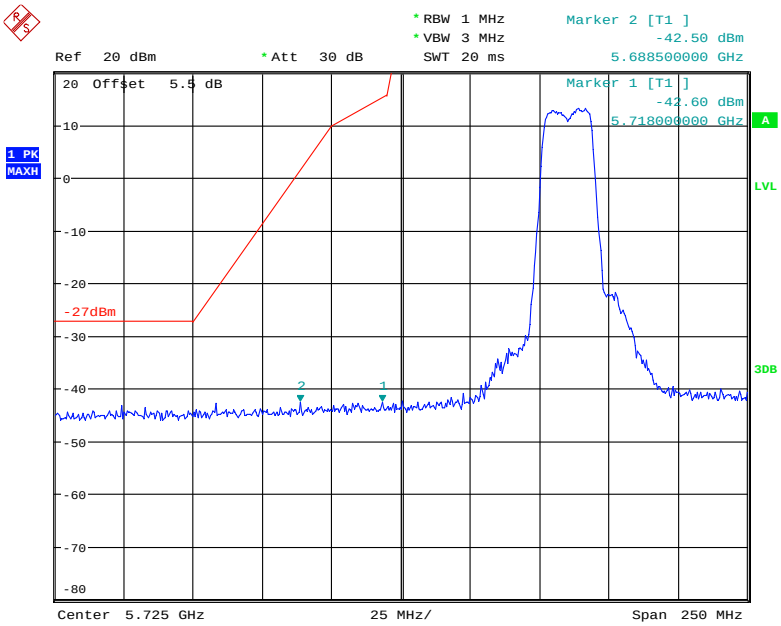
Date: 2.FEB.2018 13:08:13

802.11a High Channel



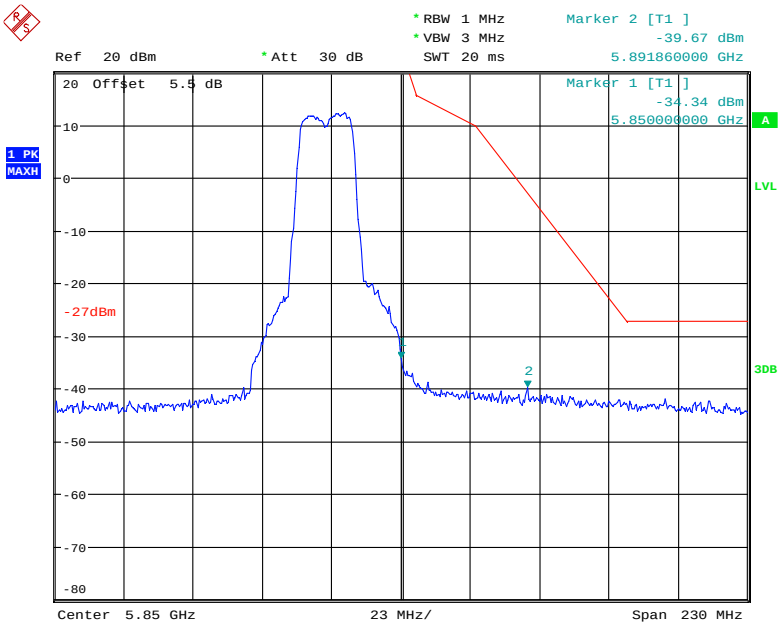
Date: 2.FEB.2018 13:08:52

802.11n ht20 Low Channel



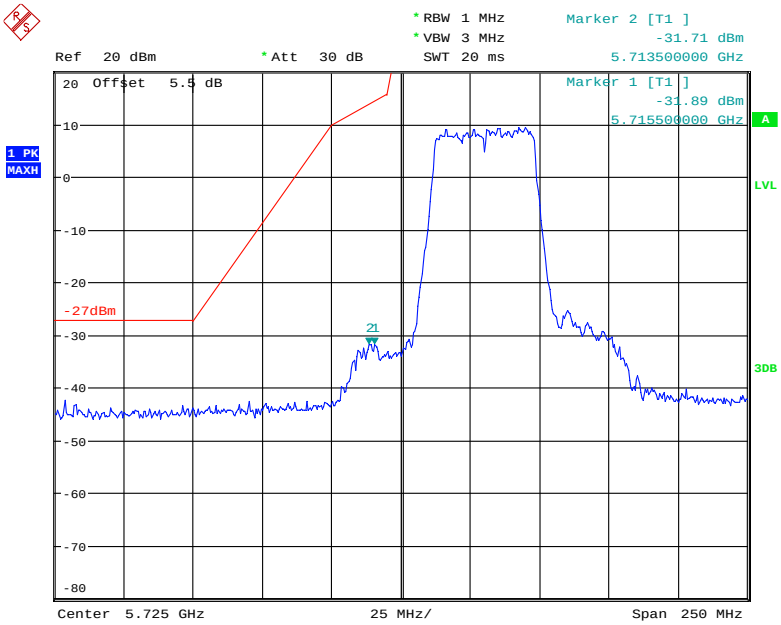
Date: 2.FEB.2018 13:10:39

802.11n ht20 High Channel



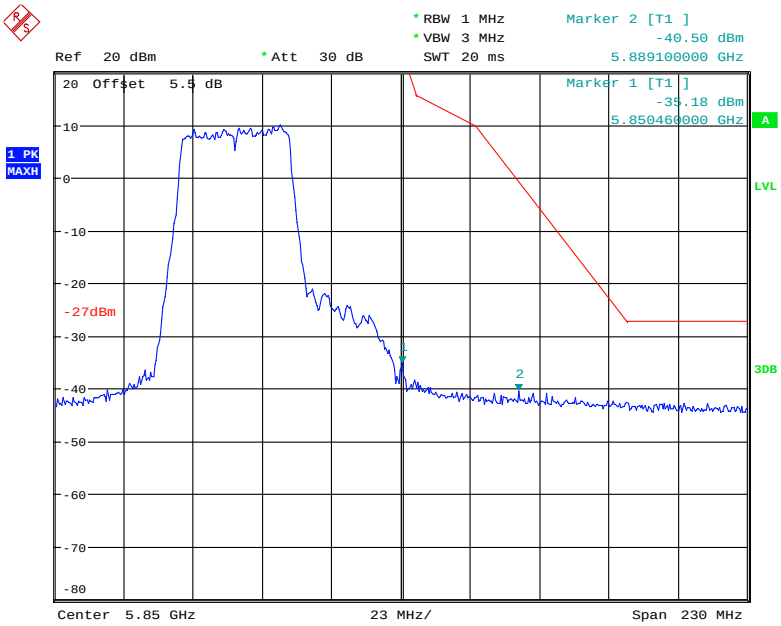
Date: 2.FEB.2018 13:09:50

802.11n ht40 Low Channel



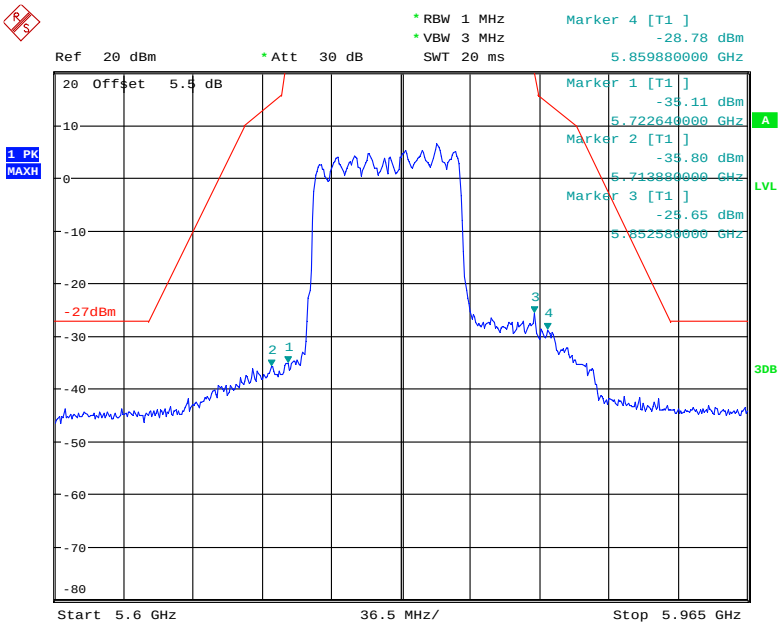
Date: 2.FEB.2018 13:13:06

802.11n ht40 High Channel



Date: 2.FEB.2018 13:13:57

802.11n ac80 Middle Channel



Date: 2.FEB.2018 13:15:27

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

Applicable Standard

15.407(a) (e)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04
N/A	Coaxial Cable	C-SJ00-0010	C0010/04	Each Time	/

*** 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 U-NII Test Procedures New Rules v02r01.

Test Data

Environmental Conditions

Temperature:	21.3°C
Relative Humidity:	36%
ATM Pressure:	102kPa

The testing was performed by Nami Quan on 2018-02-02.

Test Result: Pass.

Please refer to the following tables and plots.

Test mode: Transmitting(Test performed at ANT 1)

5150-5250MHz:

Mode	Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11 a	Low	5180	20.52	17.2
	Middle	5200	20.6	17.2
	High	5240	20.6	17.2
802.11n ht20	Low	5180	21.24	18.16
	Middle	5200	21.32	18.16
	High	5240	21.24	18.16
802.11n ht40	Low	5190	42.48	37.6
	High	5230	42.65	37.6
802.11ac80	Middle	5210	81.12	76.48

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

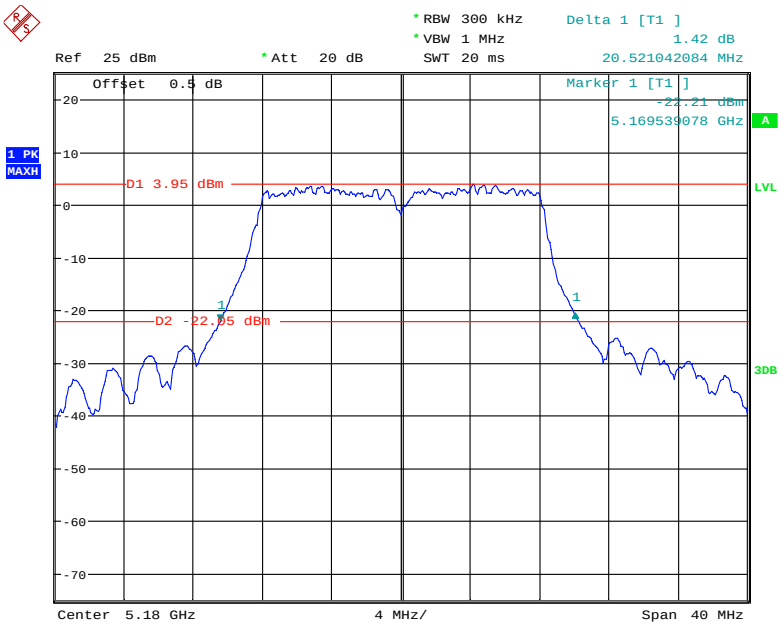
5725-5850MHz:

Mode	Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11 a	Low	5745	16.35	17.28
	Middle	5785	16.35	17.36
	High	5825	16.35	17.36
802.11n ht20	Low	5745	17.64	18.08
	Middle	5785	17.64	18.08
	High	5825	17.47	18.08
802.11n ht40	Low	5755	36.39	37.6
	High	5795	36.39	37.6
802.11ac80	Middle	5775	75.03	76.8

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

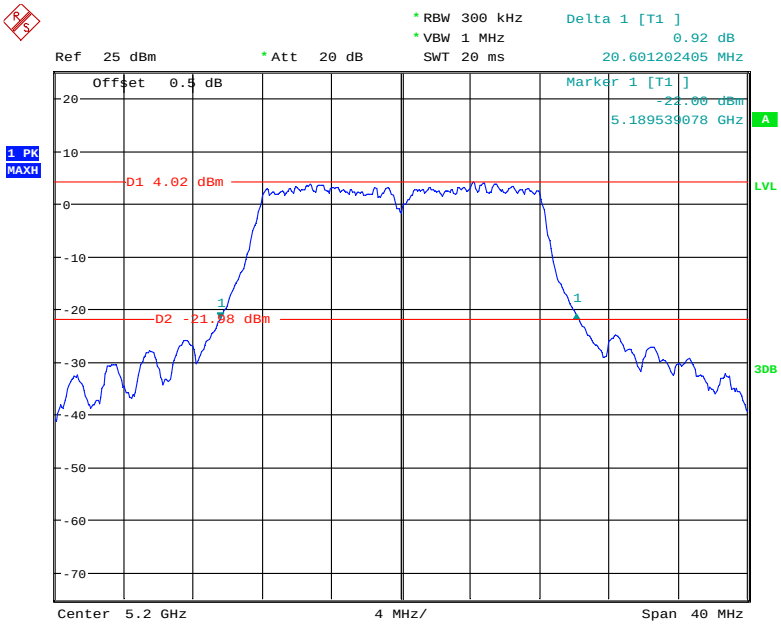
5150-5250MHz: 26dB Emission Bandwidth:

802.11a Low Channel



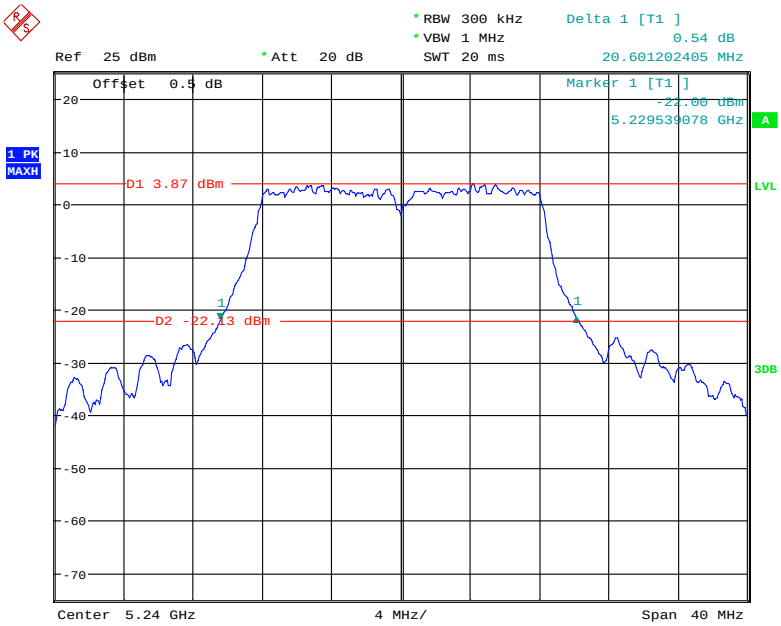
Date: 2.FEB.2018 10:25:01

802.11a Middle Channel



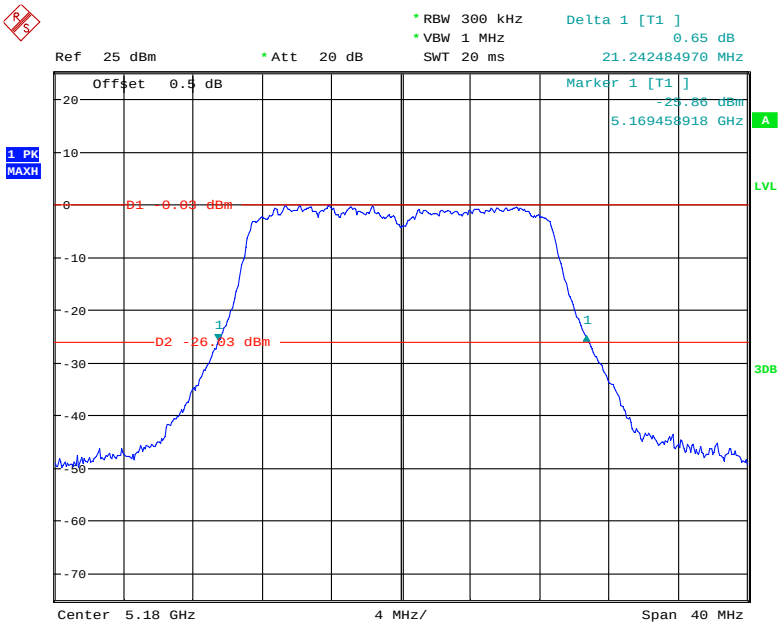
Date: 2.FEB.2018 10:26:15

802.11a High Channel



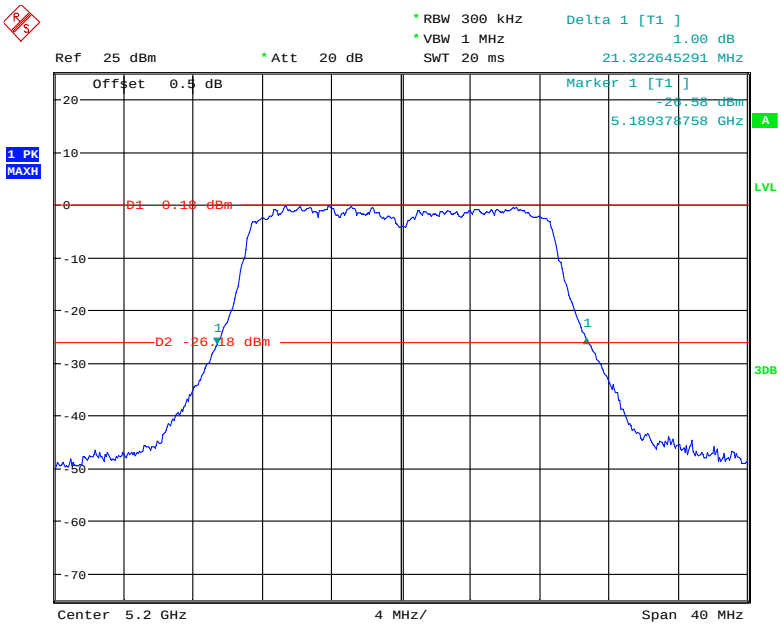
Date: 2.FEB.2018 10:27:10

802.11n ht20 Low Channel



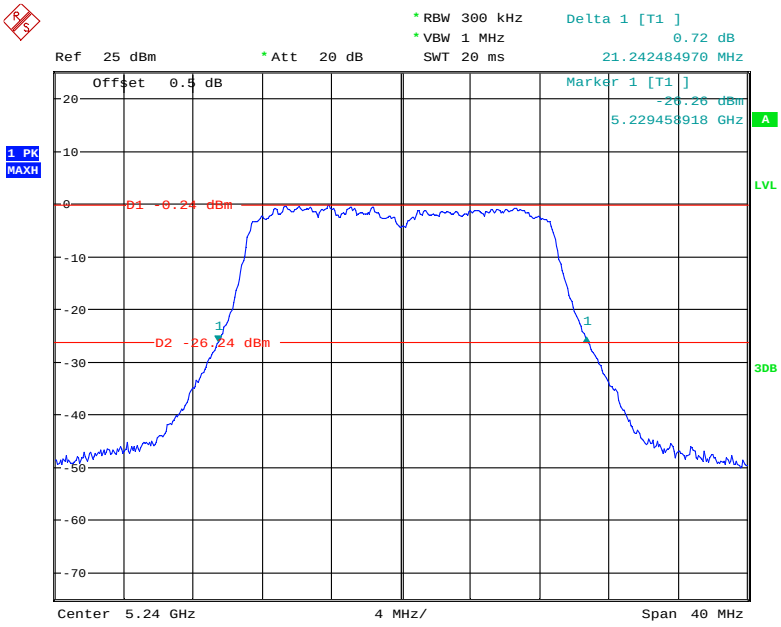
Date: 2.FEB.2018 10:28:30

802.11n ht20 Middle Channel



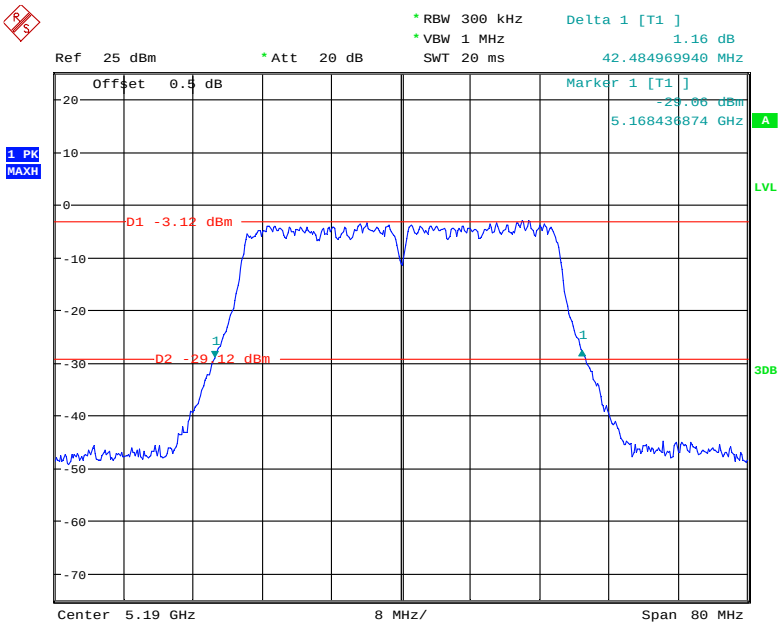
Date: 2.FEB.2018 10:29:35

802.11n ht20 High Channel



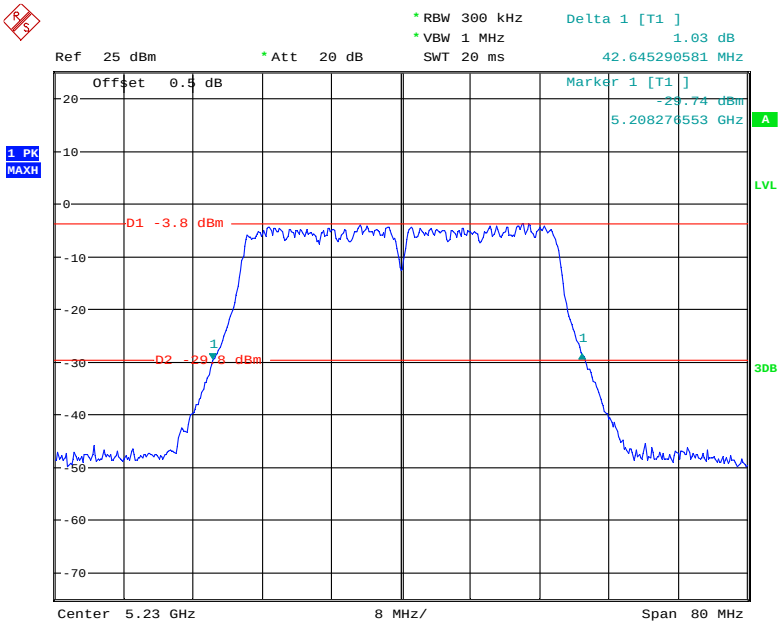
Date: 2.FEB.2018 10:30:51

802.11n ht40 Low Channel



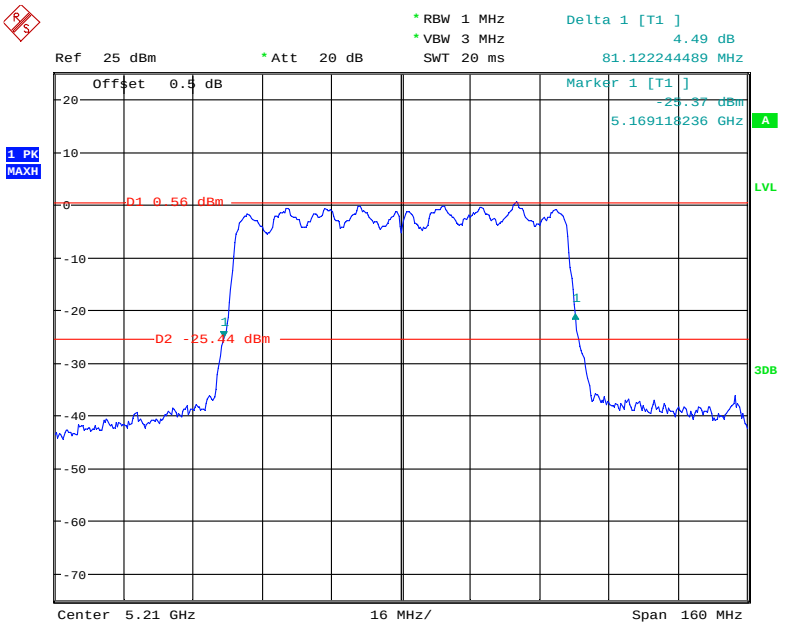
Date: 2.FEB.2018 10:32:02

802.11n ht40 High Channel



Date: 2.FEB.2018 10:34:19

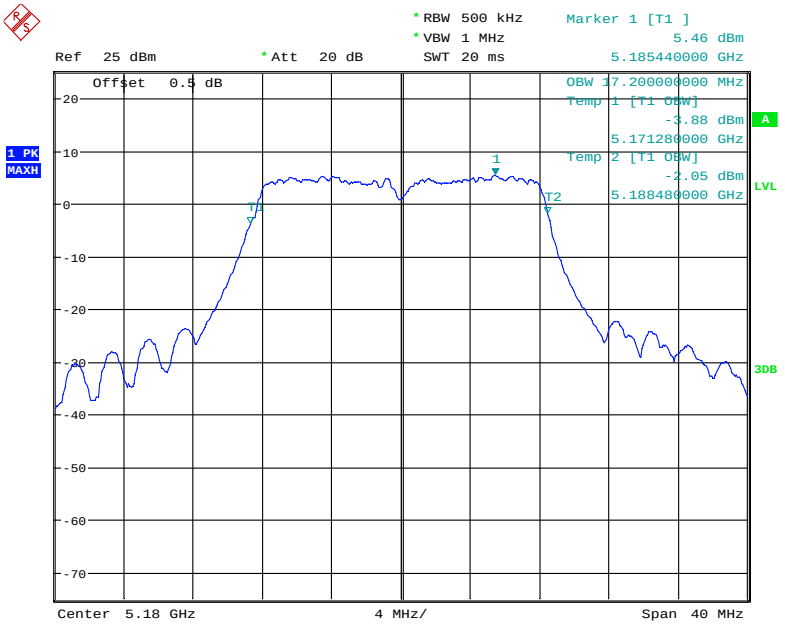
802.11ac80 Middle Channel



Date: 2.FEB.2018 10:37:05

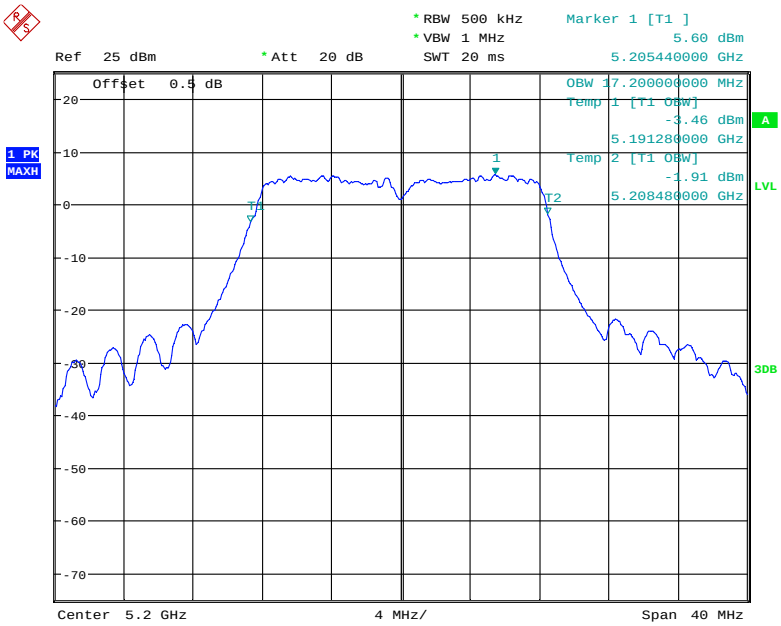
99% Occupied Bandwidth

802.11a Low Channel



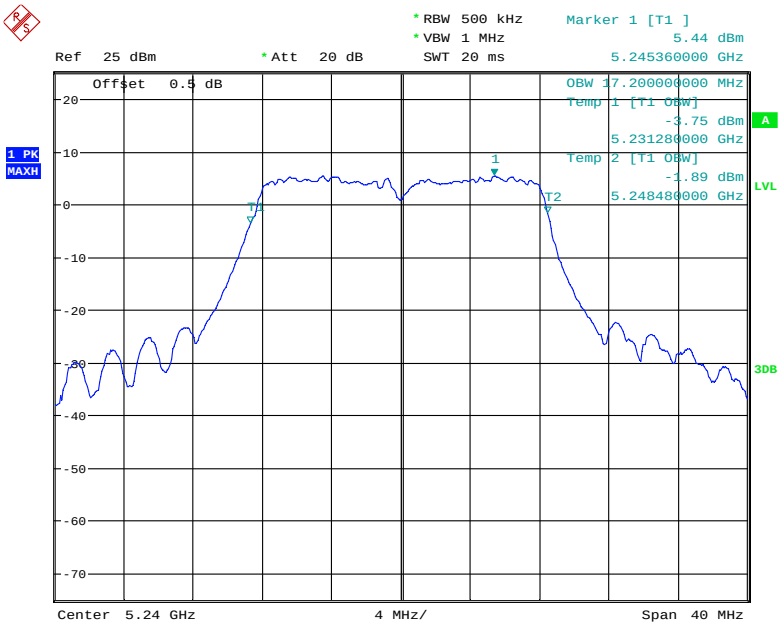
Date: 2.FEB.2018 10:25:12

802.11a Middle Channel



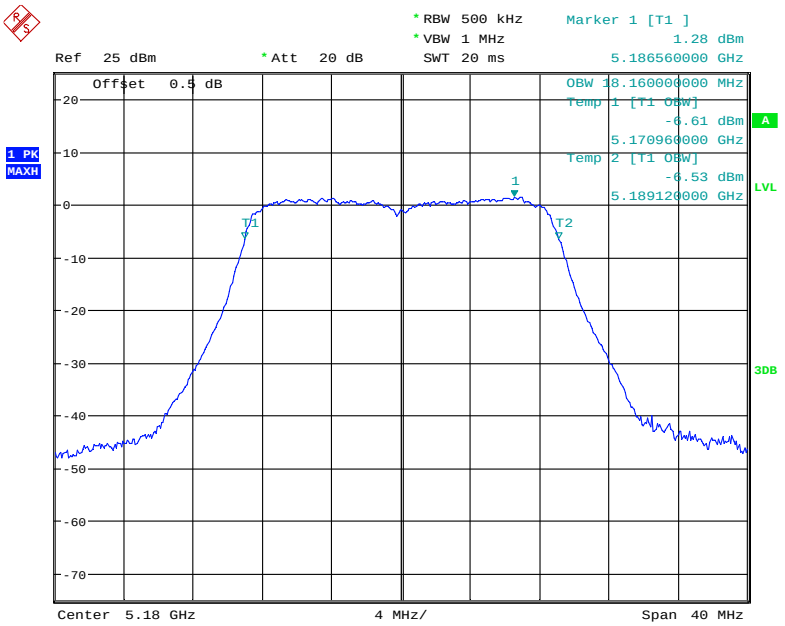
Date: 2.FEB.2018 10:26:26

802.11a High Channel



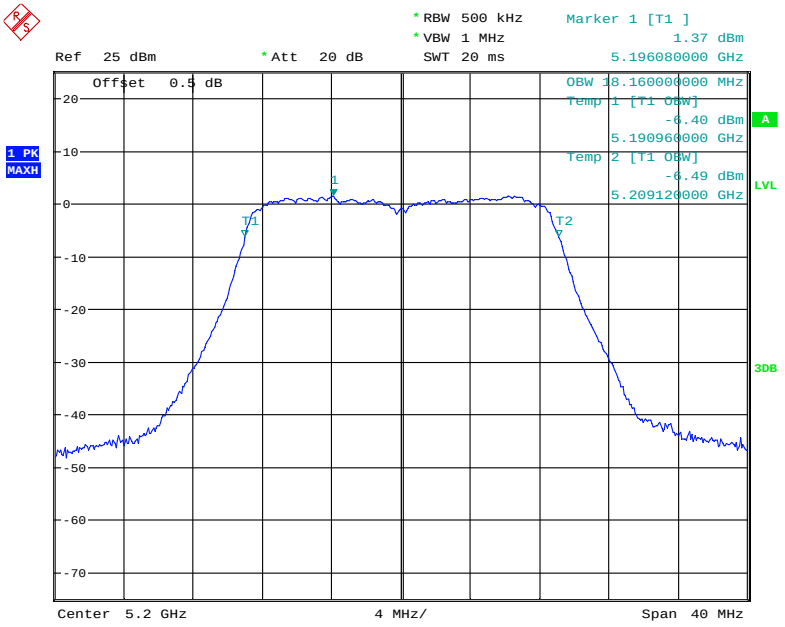
Date: 2.FEB.2018 10:27:23

802.11n ht20 Low Channel



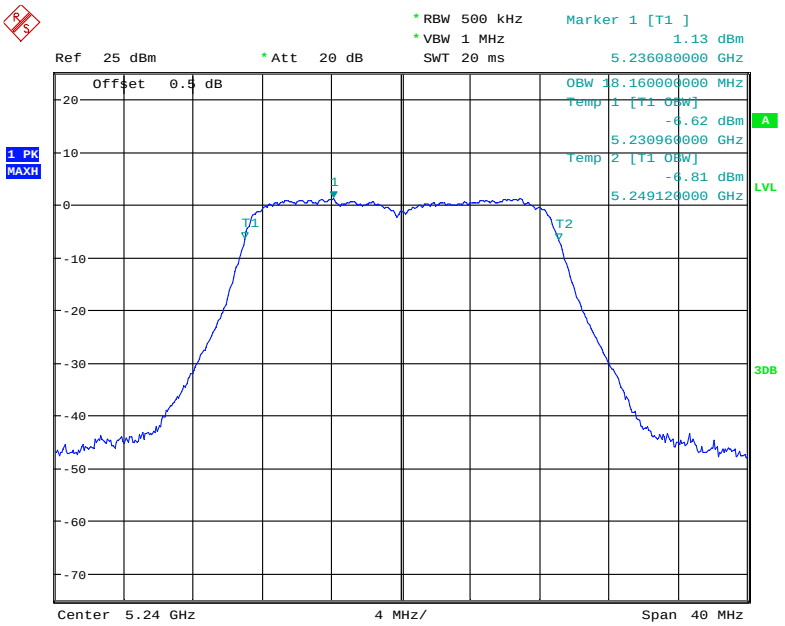
Date: 2.FEB.2018 10:28:47

802.11n ht20 Middle Channel



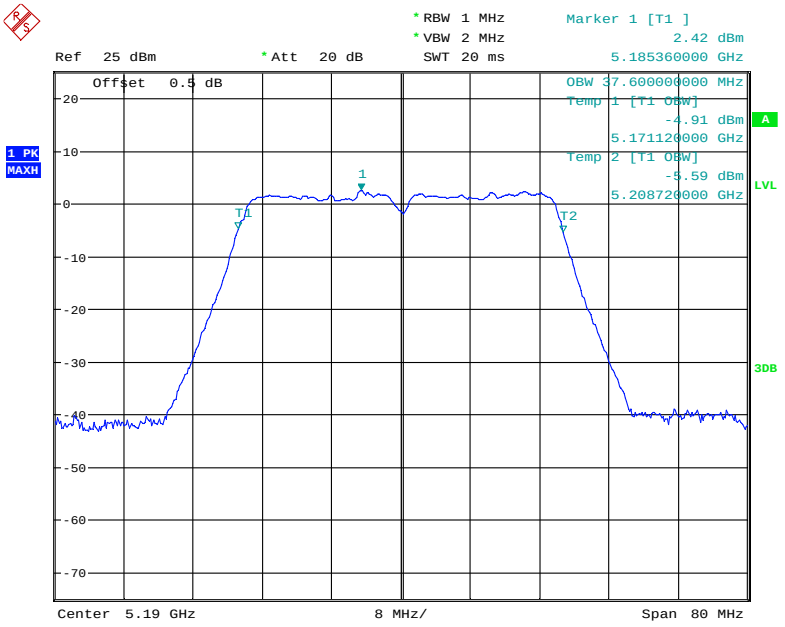
Date: 2.FEB.2018 10:29:51

802.11n ht20 High Channel



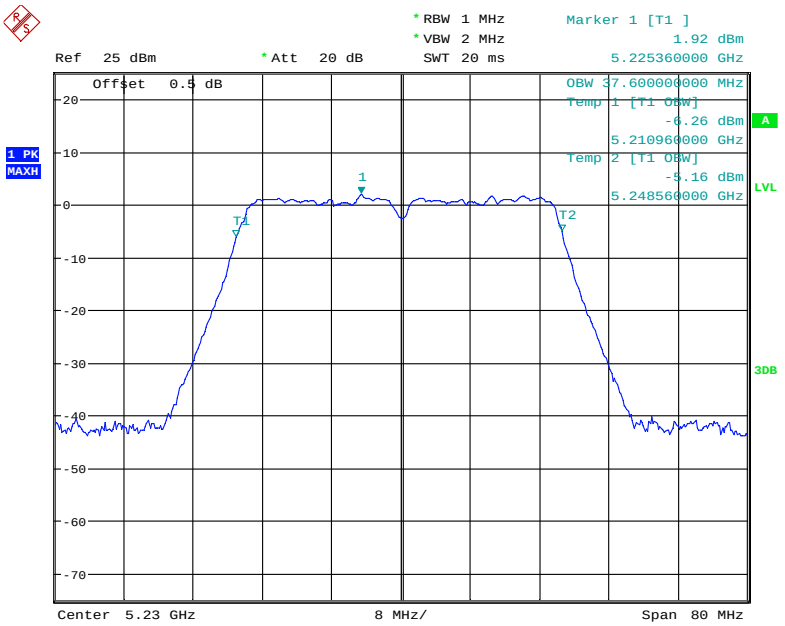
Date: 2.FEB.2018 10:31:07

802.11n ht40 Low Channel



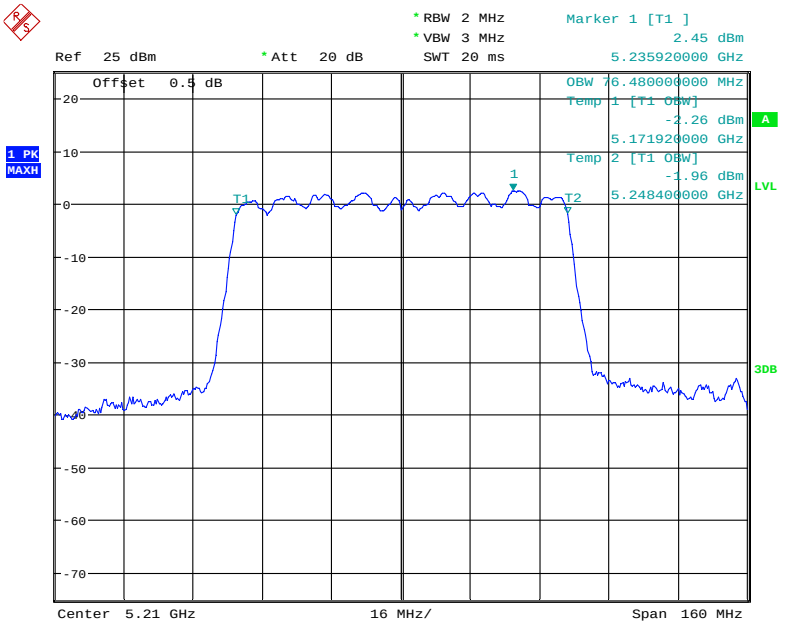
Date: 2.FEB.2018 10:32:18

802.11n ht40 High Channel



Date: 2.FEB.2018 10:34:35

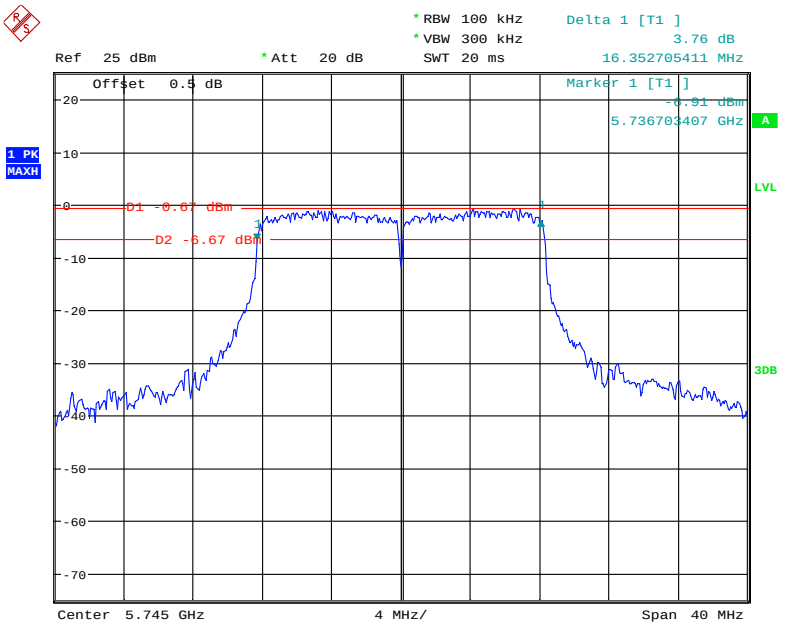
802.11ac80 Middle Channel



Date: 2.FEB.2018 10:37:21

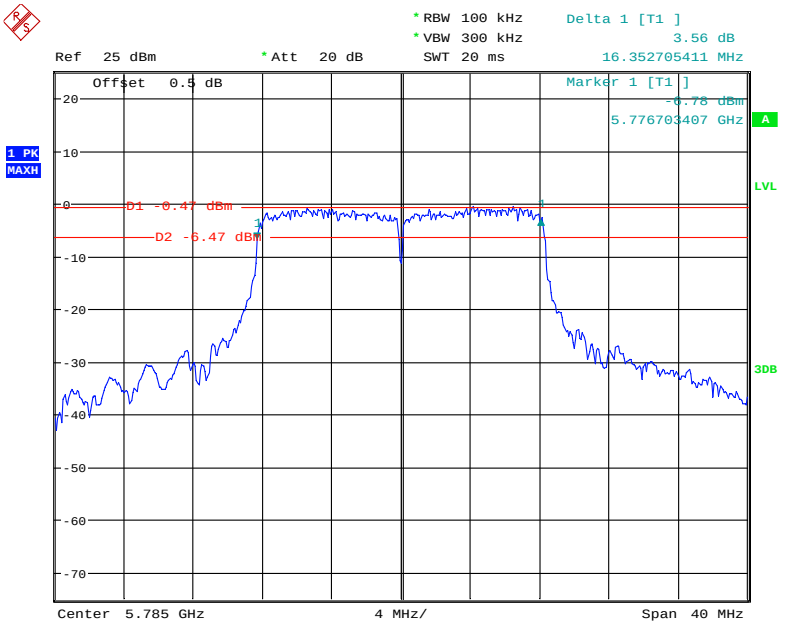
5725-5850MHz:
6dB Bandwidth:

802.11a Low Channel



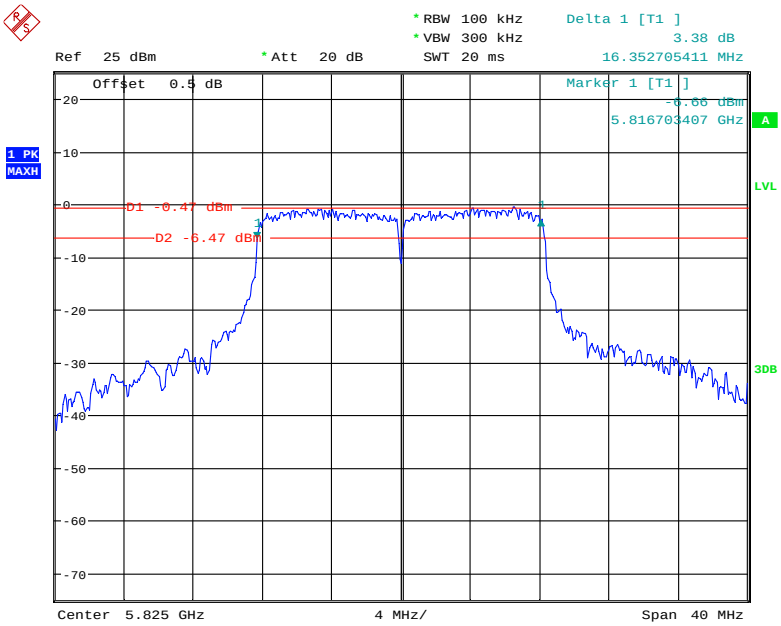
Date: 2.FEB.2018 10:49:51

802.11a Middle Channel



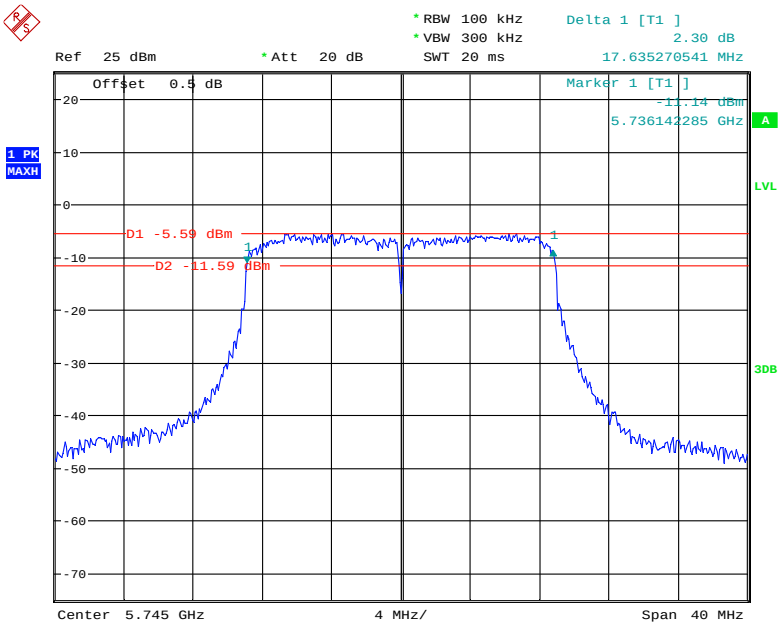
Date: 2.FEB.2018 10:51:07

802.11a High Channel



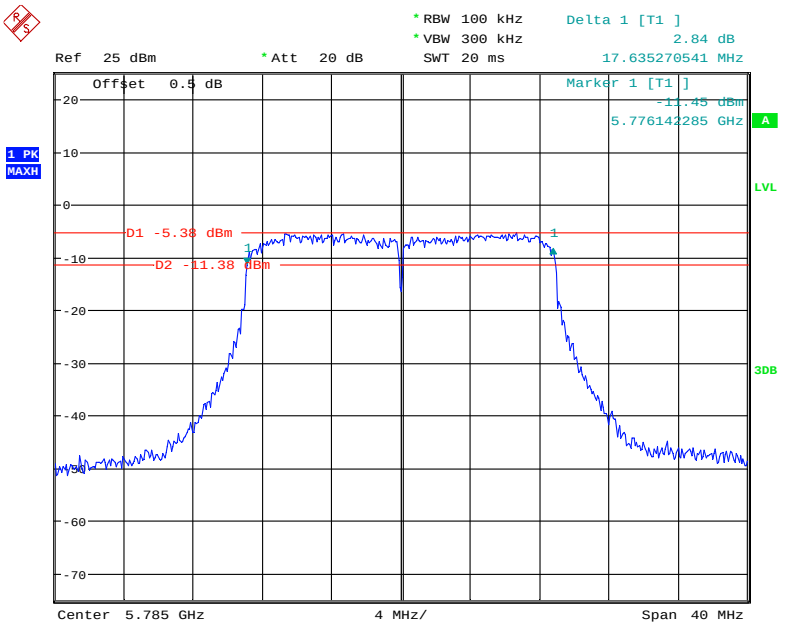
Date: 2.FEB.2018 10:52:17

802.11ht20 Low Channel



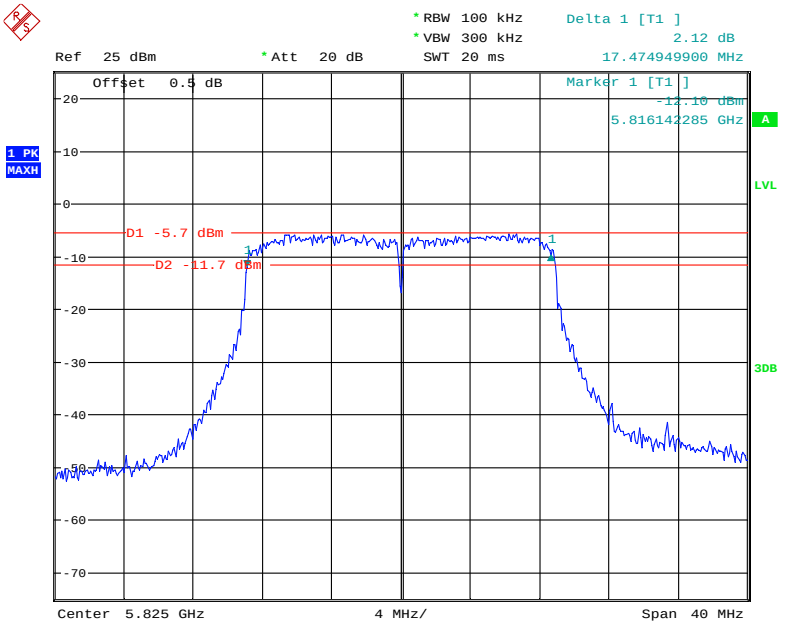
Date: 2.FEB.2018 10:41:30

802.11ht20 Middle Channel



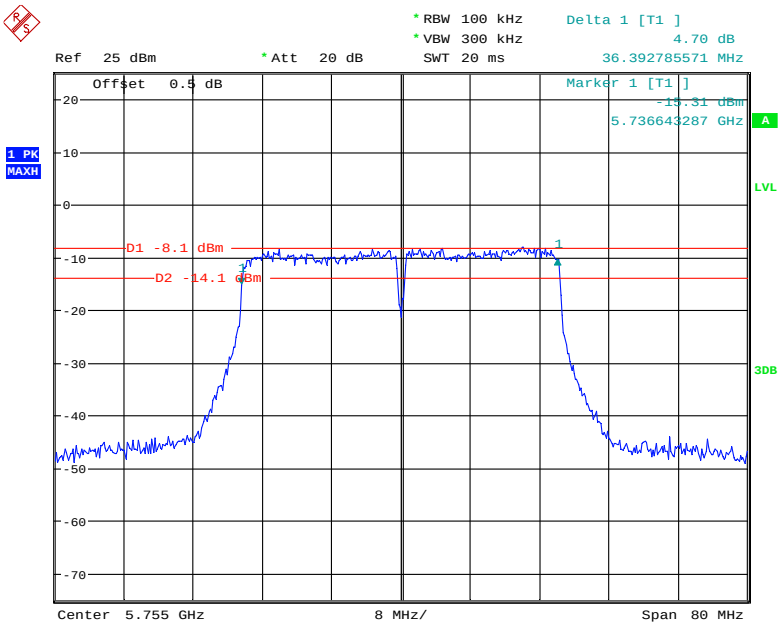
Date: 2.FEB.2018 10:43:13

802.11ht20 High Channel



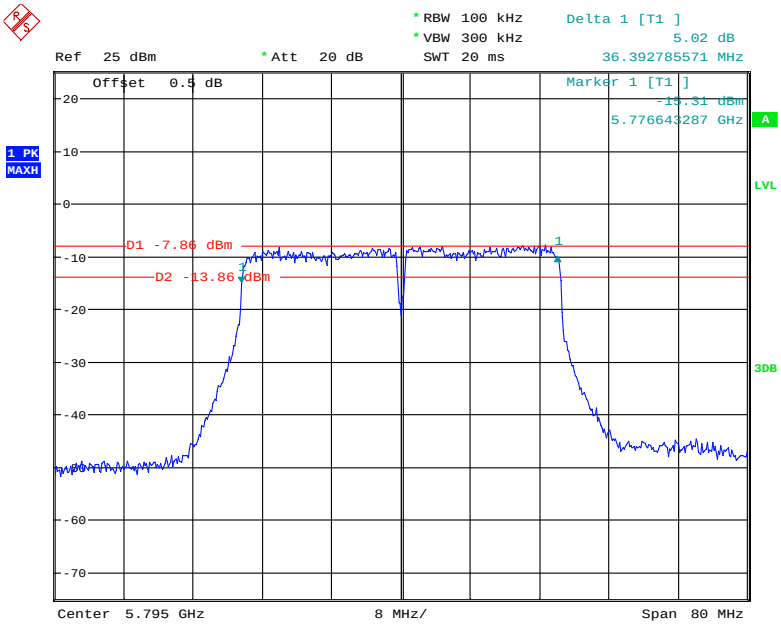
Date: 2.FEB.2018 10:44:35

802.11ht40 Low Channel



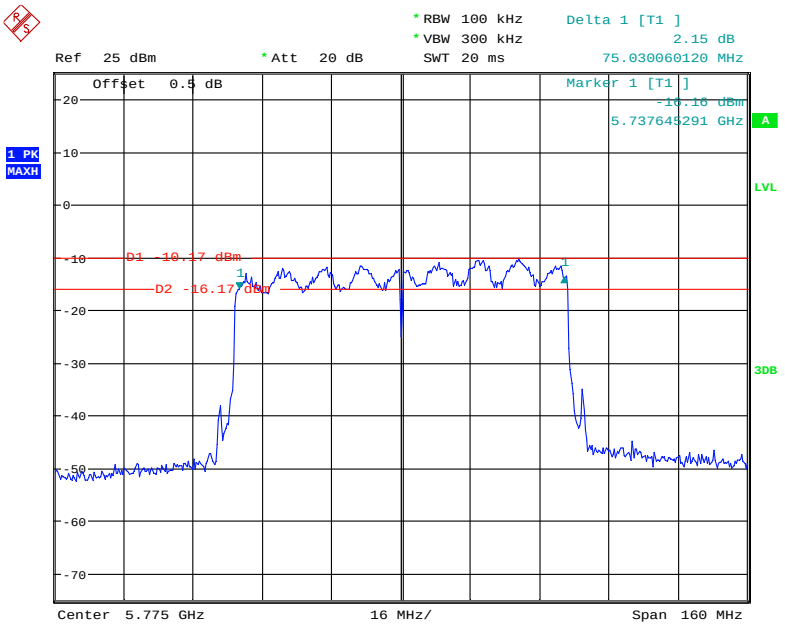
Date: 2.FEB.2018 10:46:36

802.11ht40 High Channel



Date: 2.FEB.2018 10:48:11

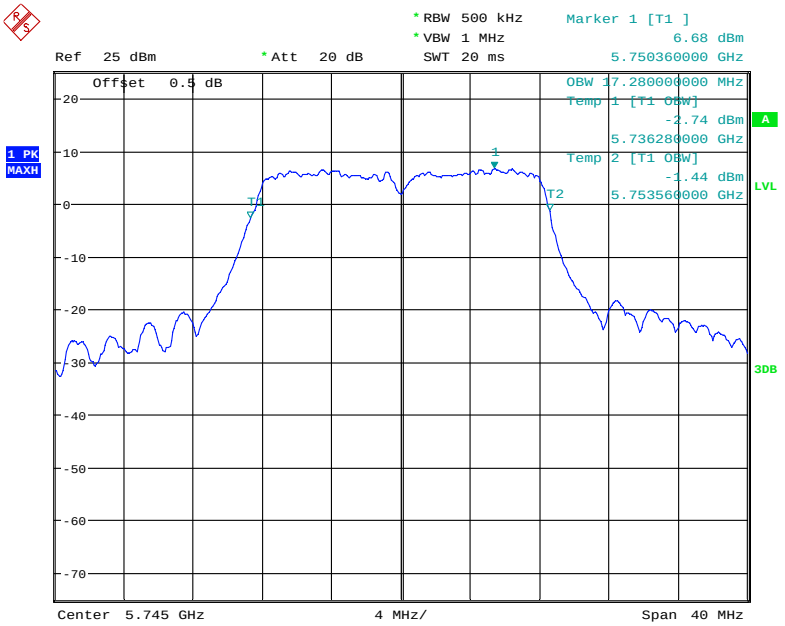
802.11ac80 Middle Channel



Date: 2.FEB.2018 10:39:24

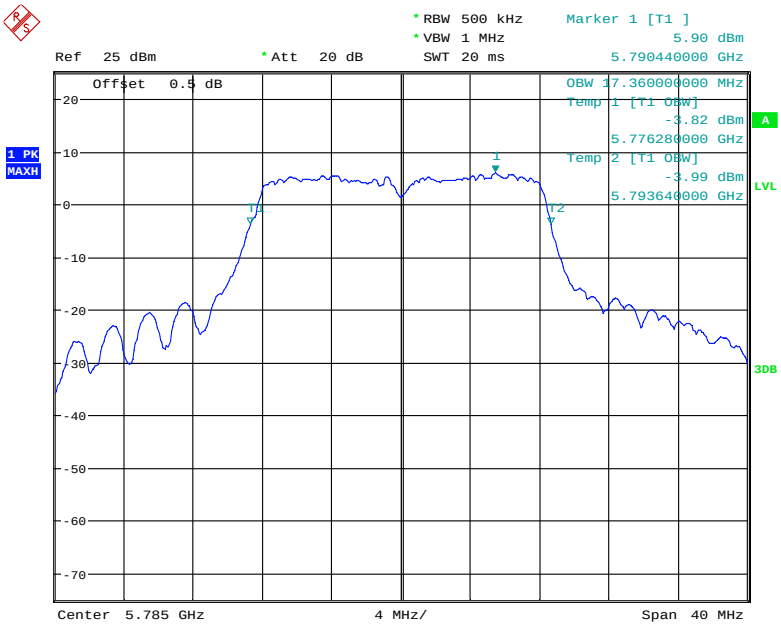
99% Occupied Bandwidth:

802.11a Low Channel



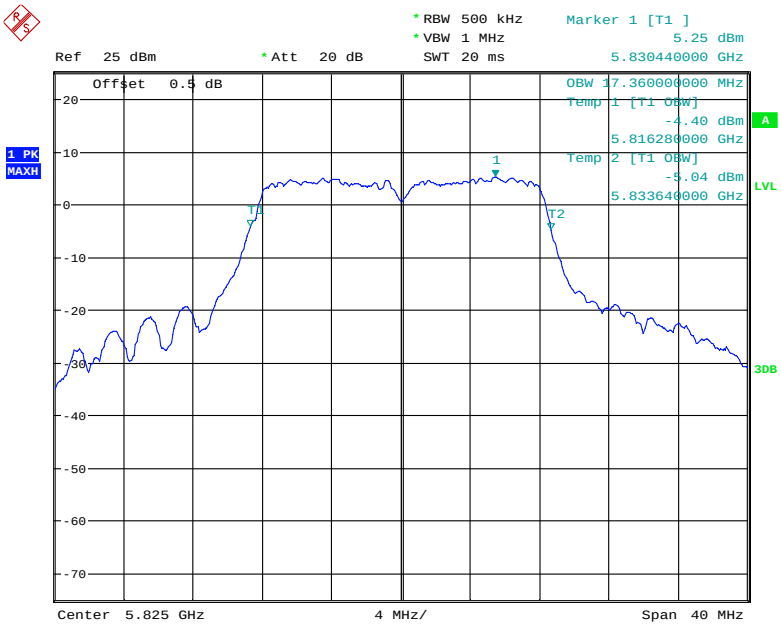
Date: 2.FEB.2018 10:50:01

802.11a Middle Channel



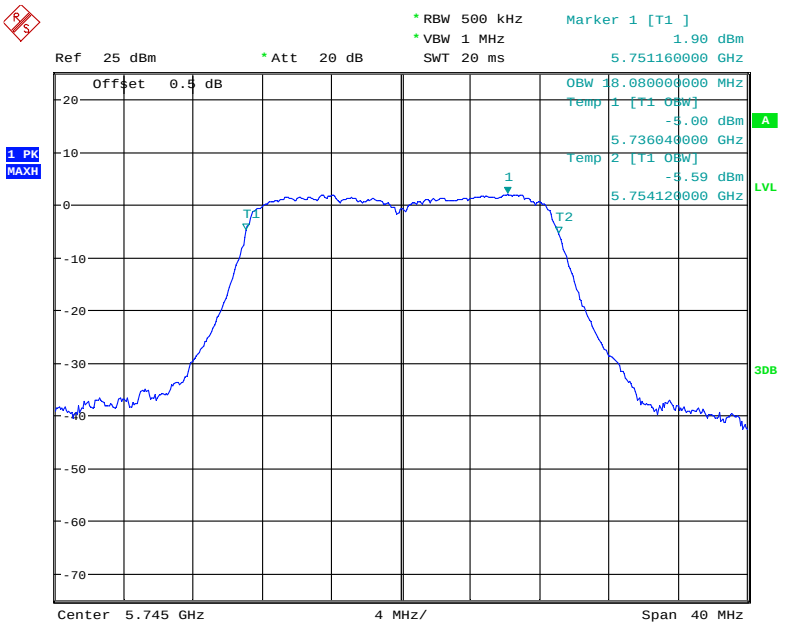
Date: 2.FEB.2018 14:14:32

802.11a High Channel



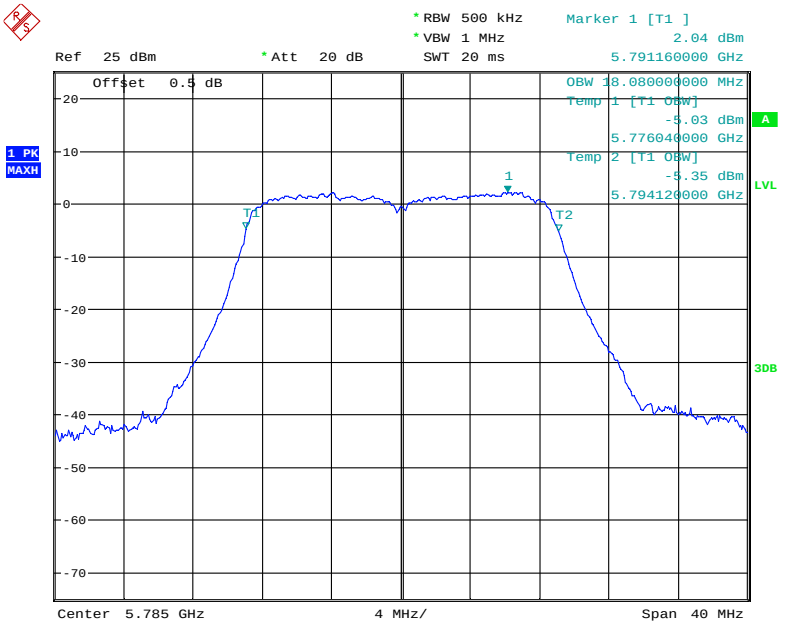
Date: 2.FEB.2018 14:16:11

802.11ht20 Low Channel



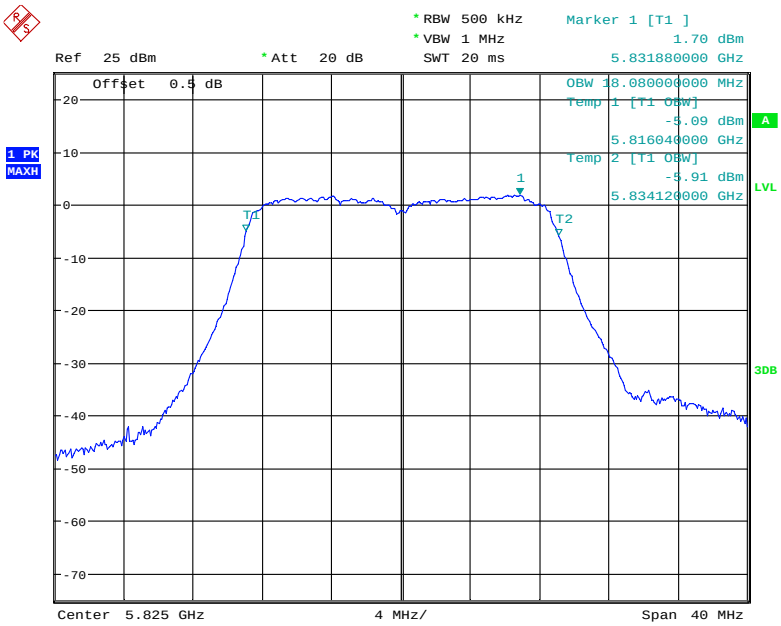
Date: 2.FEB.2018 10:41:43

802.11ht20 Middle Channel



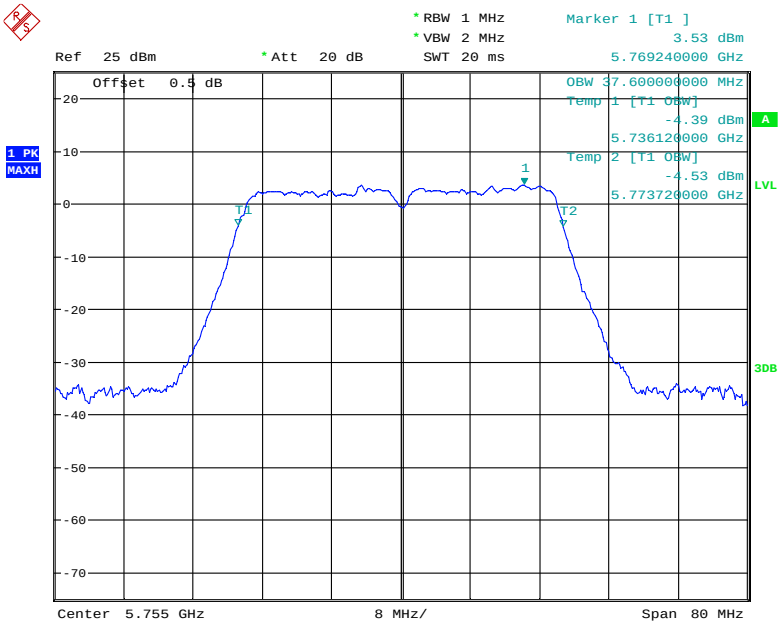
Date: 2.FEB.2018 10:43:29

802.11ht20 High Channel



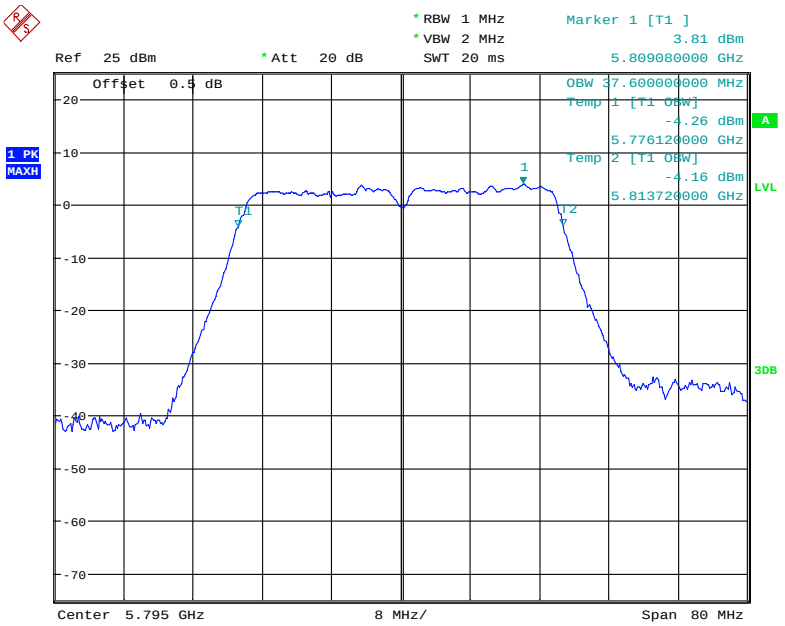
Date: 2.FEB.2018 10:44:52

802.11ht40 Low Channel



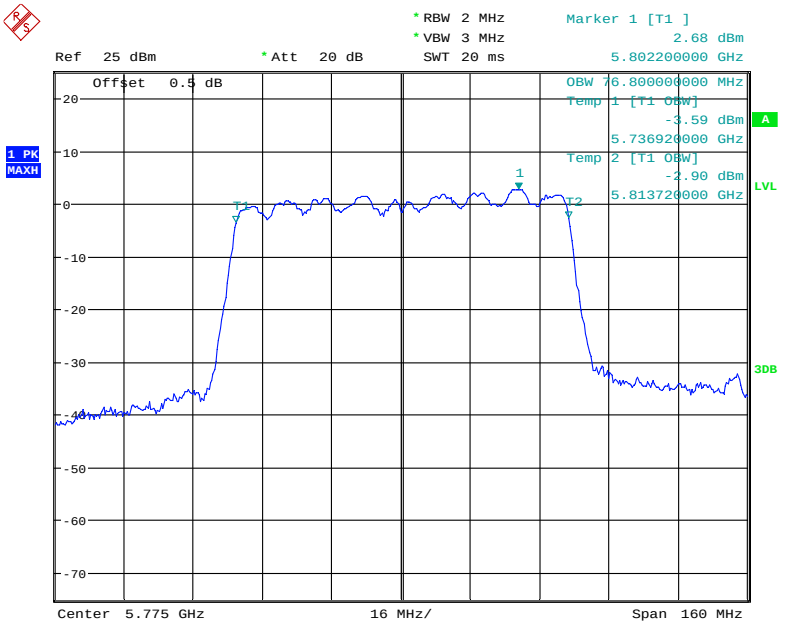
Date: 2.FEB.2018 10:46:53

802.11ht40 High Channel



Date: 2.FEB.2018 10:48:24

802.11ac80 Middle Channel



Date: 2.FEB.2018 10:39:38

FCC §15.407(a) –MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

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

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

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

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

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	USB Wideband Power Sensor	U2022XA	MY5417006	2017-12-11	2018-12-11
Agilent	USB Wideband Power Sensor	U2022XA	MY5417014	2017-12-11	2018-12-11
Agilent	USB Wideband Power Sensor	U2022XA	MY5417009	2017-12-11	2018-12-11
N/A	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 U-NII Test Procedures New Rules v02r01.

Test Data

Environmental Conditions

Temperature:	21.3°C
Relative Humidity:	36%
ATM Pressure:	102kPa

The testing was performed by Nami Quan on 2018-02-02.

Test Mode: Transmitting

UNII Band	Mode	Frequency (MHz)	Conducted Average Output Power (dBm)			Limit (dBm)	Result
			ANT 1	ANT 2	Total		
5150-5250 MHz	802.11 a	5180	12.97	12.96	/	30	PASS
		5200	13.18	13.24	/	30	PASS
		5240	13.28	13.27	/	30	PASS
	802.11ht20	5180	9.42	9.14	12.29	30	PASS
		5200	9.59	9.15	12.39	30	PASS
		5240	9.11	9.48	12.31	30	PASS
	802.11ht40	5190	9.27	9.09	12.19	30	PASS
		5230	8.83	8.95	11.9	30	PASS
	802.11 ac80	5210	7.31	7.18	10.26	30	PASS
5725-5850 MHz	802.11 a	5745	12.97	13.11	/	30	PASS
		5785	12.65	12.69	/	30	PASS
		5825	12.65	12.71	/	30	PASS
	802.11ht20	5745	8.52	9	11.78	30	PASS
		5785	8.7	9.33	12.04	30	PASS
		5825	8.26	9.14	11.73	30	PASS
	802.11ht40	5755	8.64	9.04	11.85	30	PASS
		5795	8.67	8.9	11.8	30	PASS
	802.11 ac80	5775	7.17	7.38	10.29	30	PASS

Note: The maximum antenna gain is 5.0dBi in 5GHz band. The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices:

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

So:

Directional gain = G_{ANT} + Array Gain = 5.0dBi < 6dBi

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 U-NII Test Procedures New Rules v02r01.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04
N/A	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:	21.3~22.3°C
Relative Humidity:	36 %
ATM Pressure:	101.3~102kPa

The testing was performed by Nami Quan from 2018-02-02 to 2018-02-12.

Test Mode: Transmitting

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

5150-5250MHz

Mode	Frequency (MHz)	Power Spectral Density (dBm/MHz)			
		ANT 1	ANT 2	Total	Limits
802.11 a	5180	2.72	3.12	/	17
	5200	3.05	3.47	/	17
	5240	2.78	3.31	/	17
802.11 ht20	5180	-0.29	-0.24	2.75	17
	5200	-0.38	-0.24	2.7	17
	5240	-0.57	-0.33	2.56	17
802.11 ht40	5190	-3.91	-3.4	-0.64	17
	5230	-4.45	-3.82	-1.11	17
802.11 ac80	5210	-7.51	-7.28	-4.38	17

5725-5850MHz

Mode	Frequency (MHz)	Reading (dBm/300kHz)		Power Spectral Density (dBm/500kHz)			
		ANT 1	ANT 2	ANT 1	ANT 2	Total	Limit
802.11 a	5745	-0.93	-1.12	1.29	1.1	/	30
	5785	-0.81	-1.07	1.41	1.15	/	30
	5825	-1.27	-1.50	0.95	0.72	/	30
802.11 ht20	5745	-4.75	-5.03	-2.53	-2.81	0.34	30
	5785	-5.14	-4.65	-2.92	-2.43	0.34	30
	5825	-5.56	-4.89	-3.34	-2.67	0.02	30
802.11 ht40	5755	-7.80	-6.99	-5.58	-4.77	-2.15	30
	5795	-7.72	-6.51	-5.5	-4.29	-1.84	30
802.11 ac80	5775	-10.87	-9.53	-8.65	-7.31	-4.92	30

Note 1:The maximum antenna gain is 5.0dBi in 5GHz band. The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices:

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

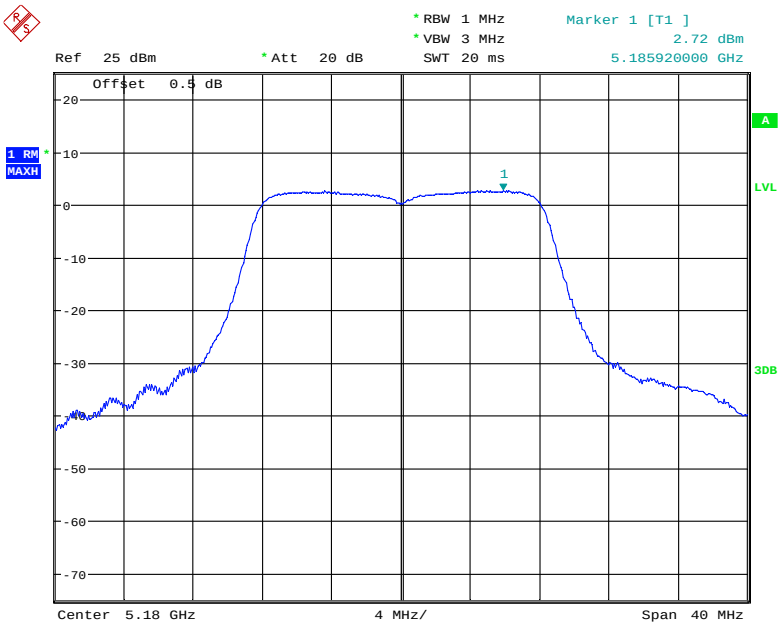
So:

$$\text{Directional gain} = G_{ANT} + \text{Array Gain} = 5.0\text{dBi}+10*\log(2/2)=5.0\text{dBi}$$

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

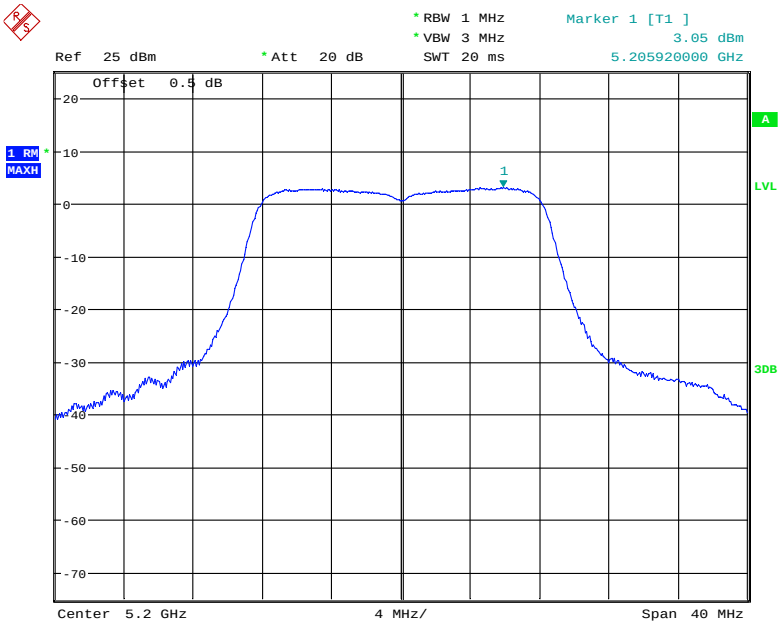
5150-5250MHz
ANT 1:

802.11a Low Channel



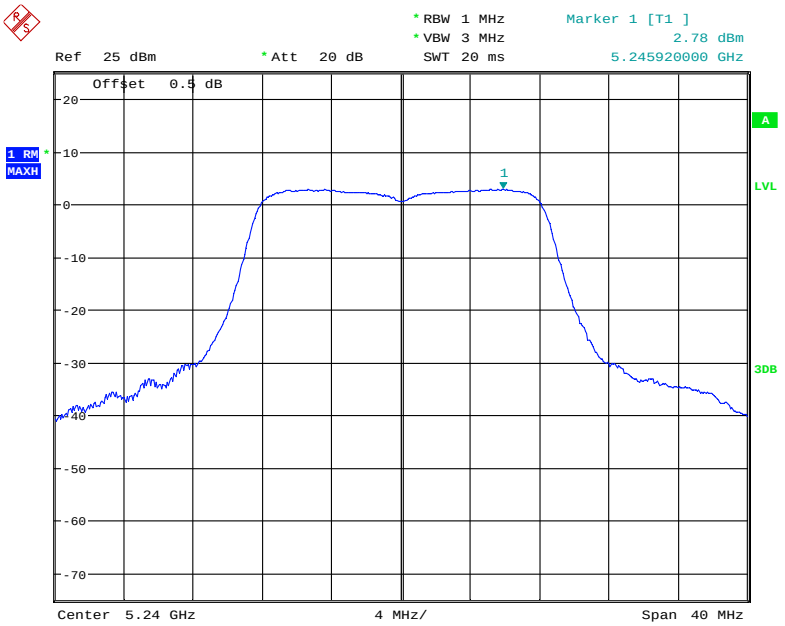
Date: 2.FEB.2018 11:38:15

802.11a Middle Channel



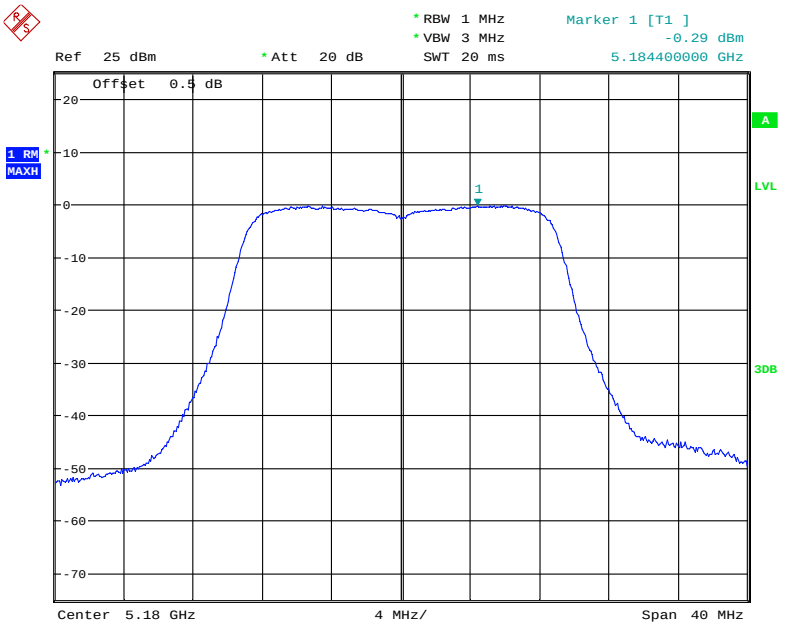
Date: 2.FEB.2018 11:20:45

802.11a High Channel



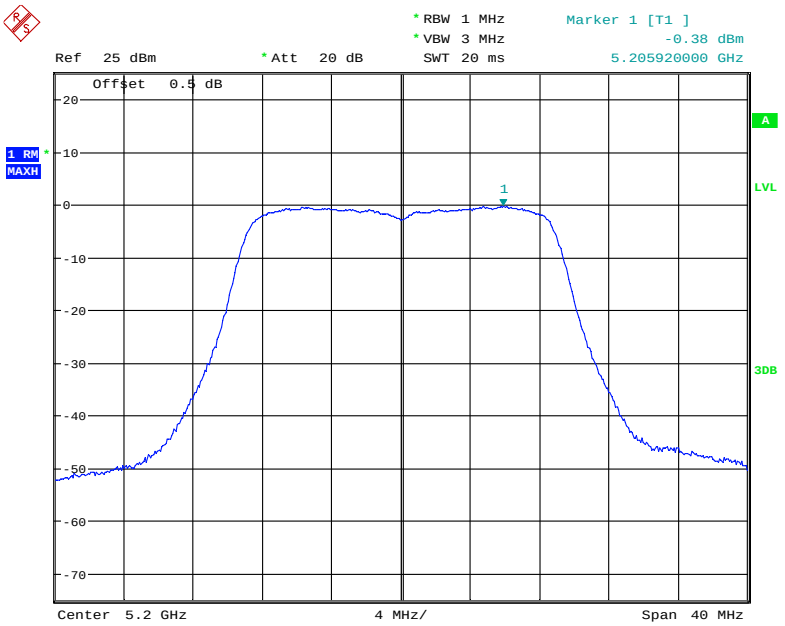
Date: 2.FEB.2018 11:21:15

802.11n ht20 Low Channel



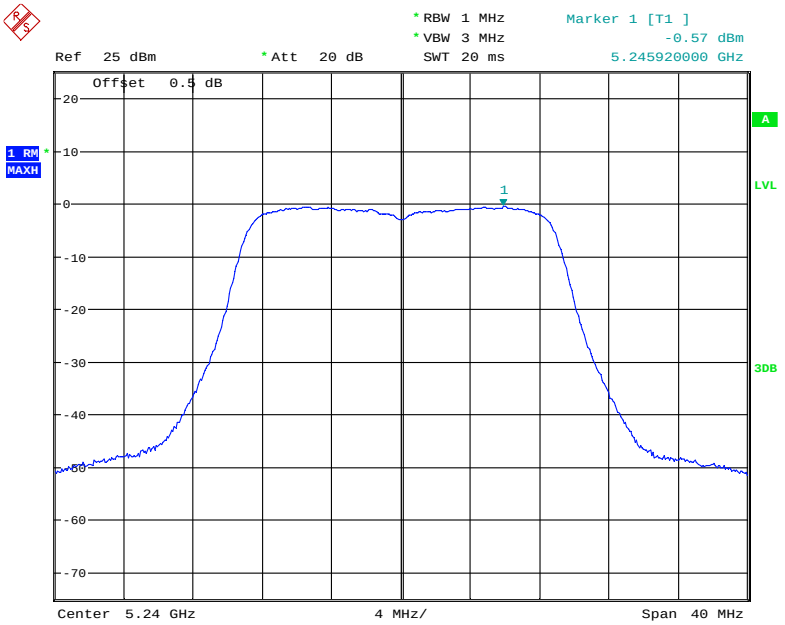
Date: 2.FEB.2018 11:23:59

802.11n ht20 Middle Channel



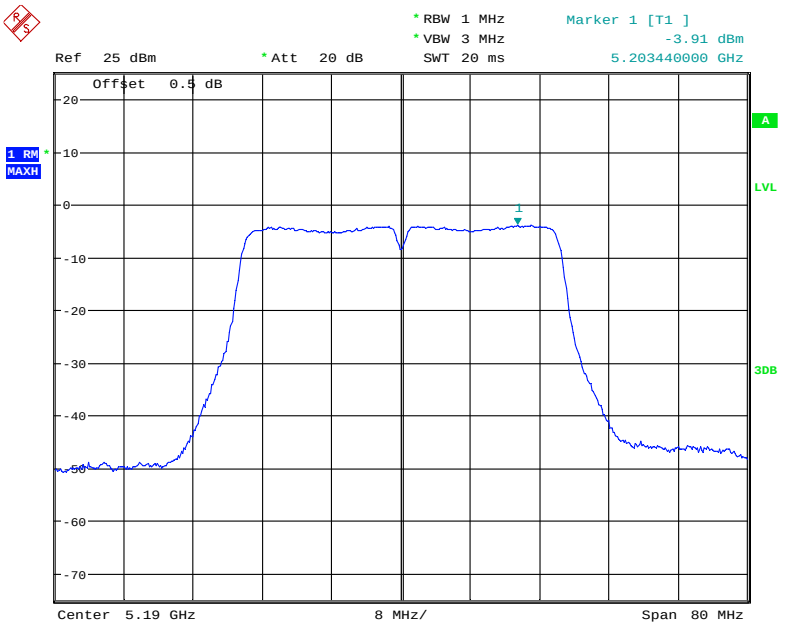
Date: 2.FEB.2018 11:24:51

802.11n ht20 High Channel



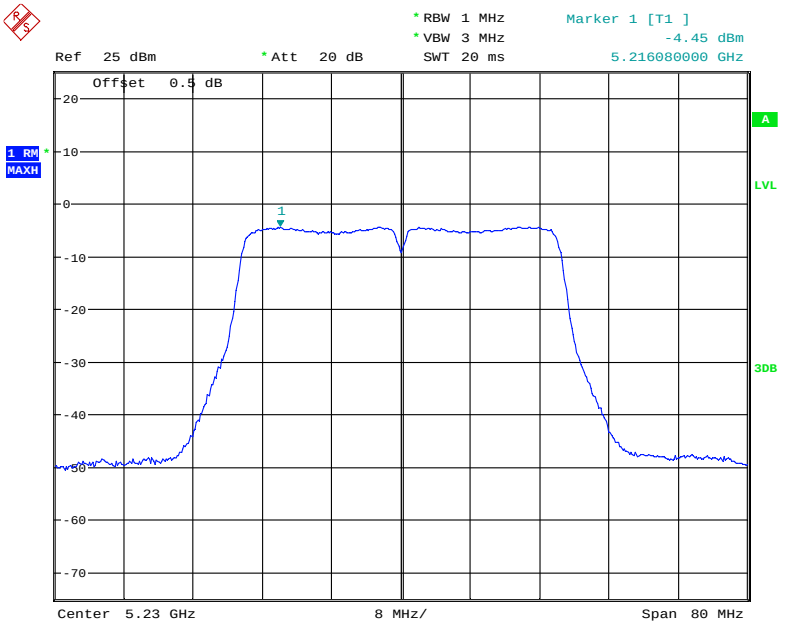
Date: 2.FEB.2018 11:25:18

802.11n ht40 Low Channel



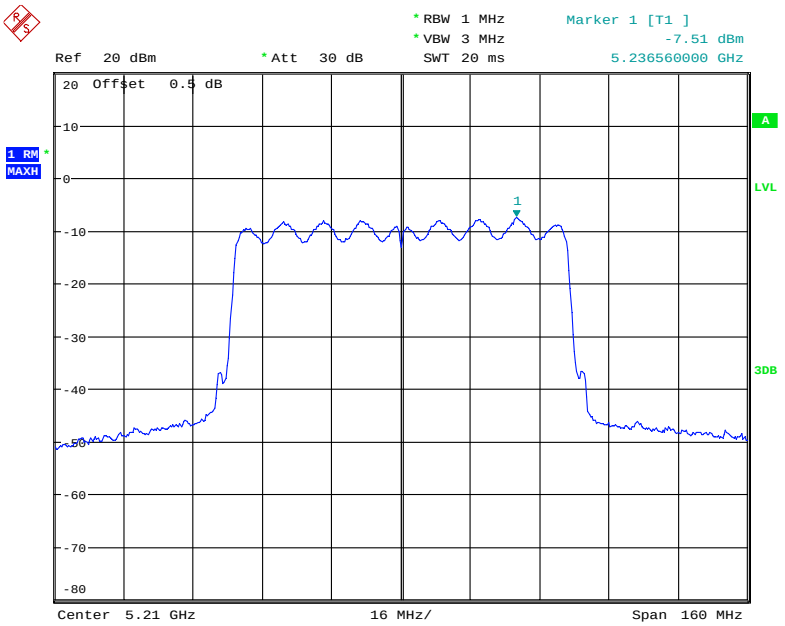
Date: 2.FEB.2018 11:31:23

802.11n ht40 High Channel



Date: 2.FEB.2018 11:35:22

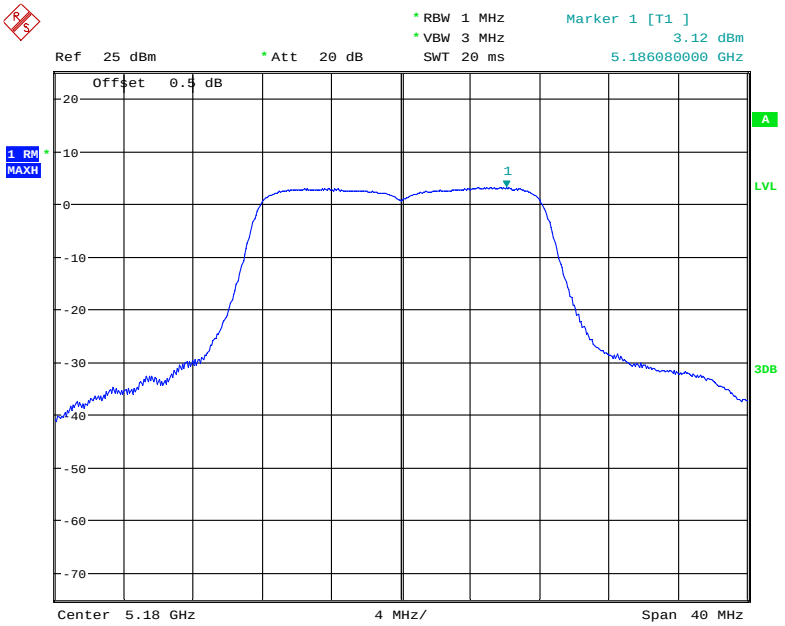
802.11ac80 Middle Channel



Date: 12.FEB.2018 11:14:10

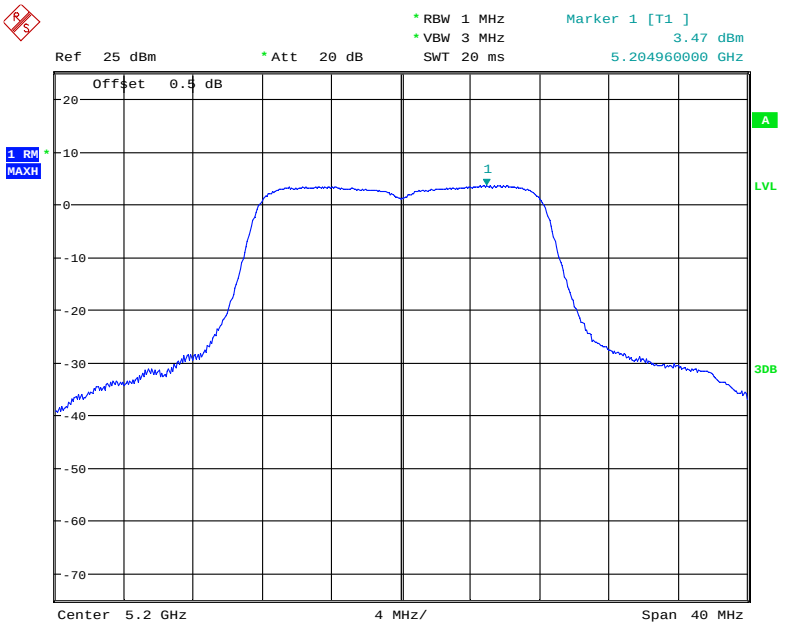
ANT 2:

802.11a Low Channel



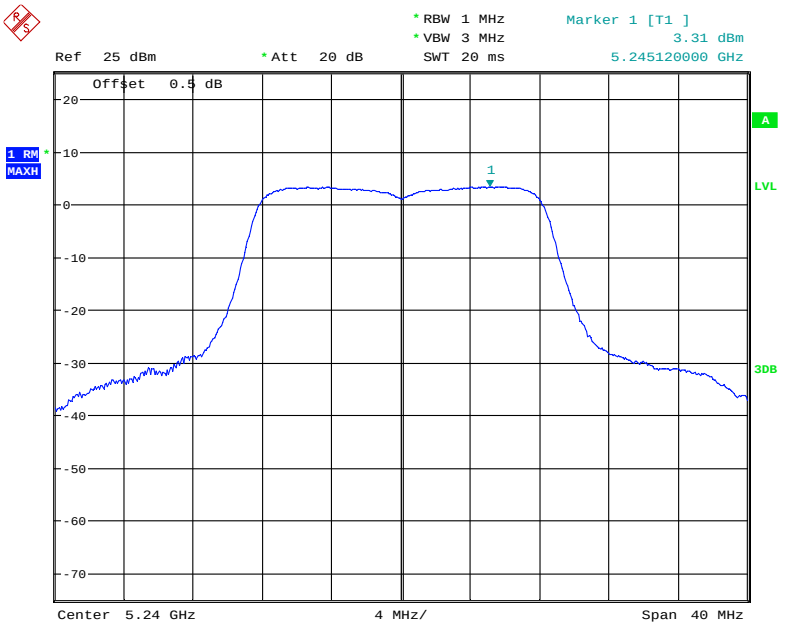
Date: 2.FEB.2018 10:57:25

802.11a Middle Channel



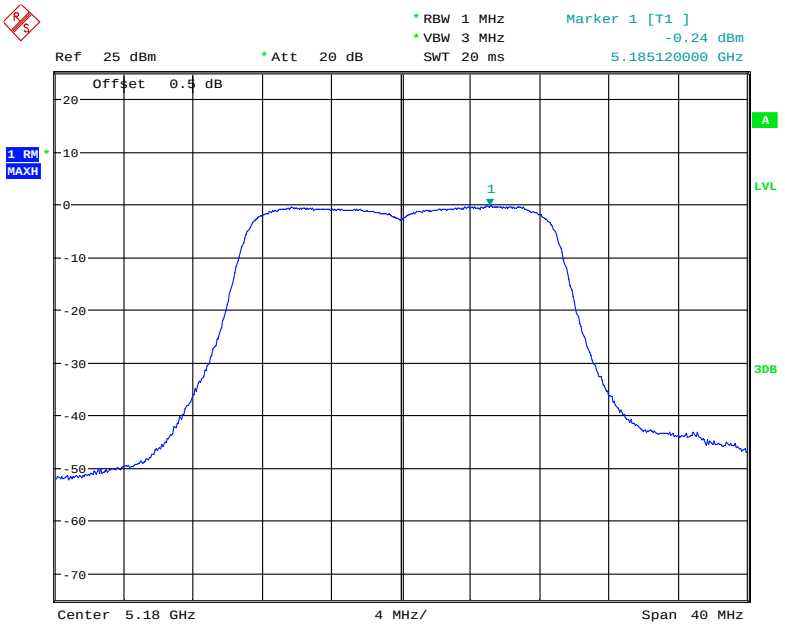
Date: 2.FEB.2018 10:58:14

802.11a High Channel



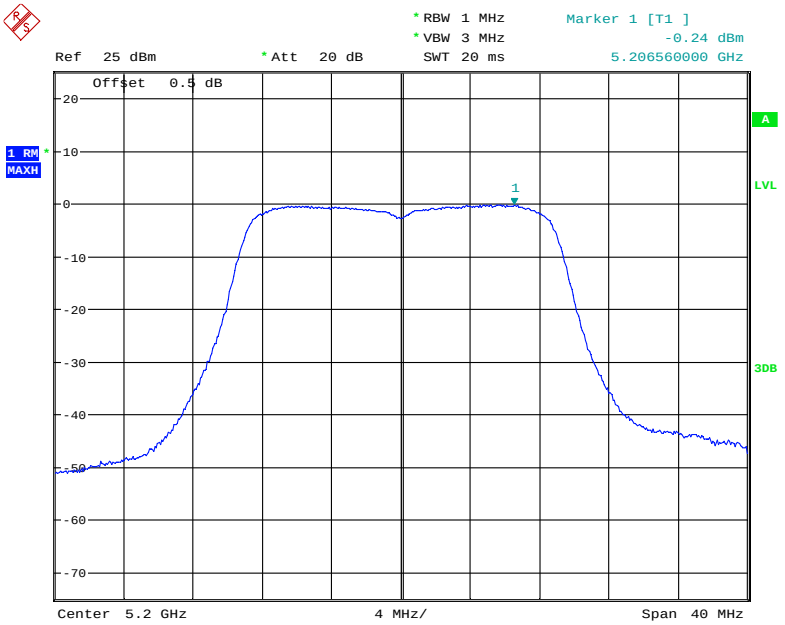
Date: 2.FEB.2018 10:59:35

802.11n ht20 Low Channel



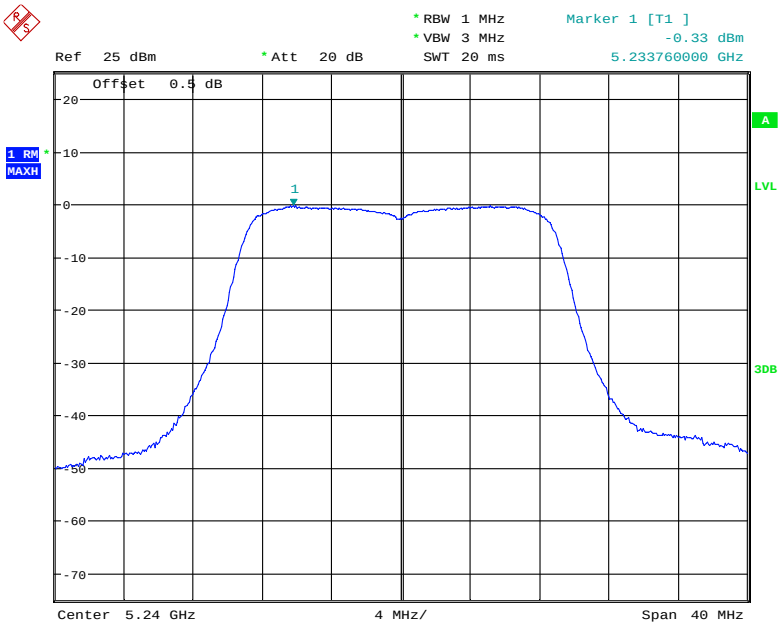
Date: 2.FEB.2018 11:02:51

802.11n ht20 Middle Channel



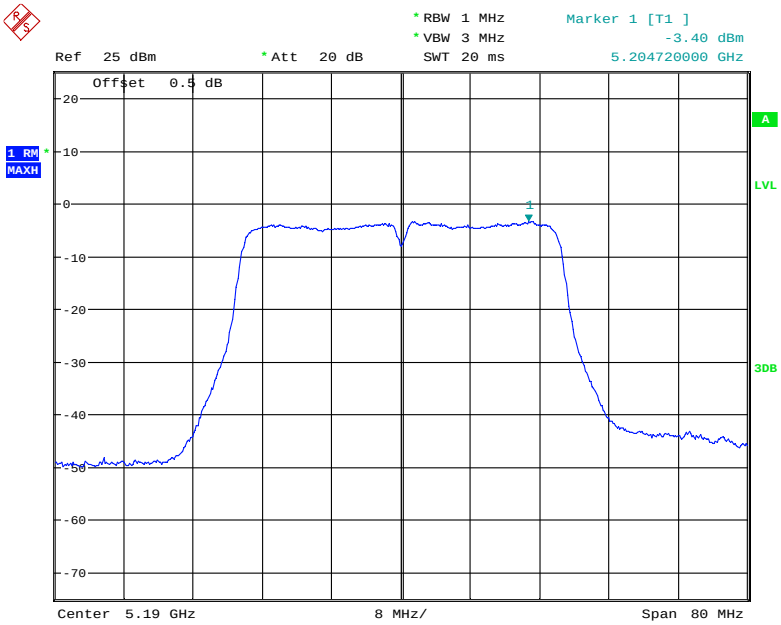
Date: 2.FEB.2018 11:05:09

802.11n ht20 High Channel



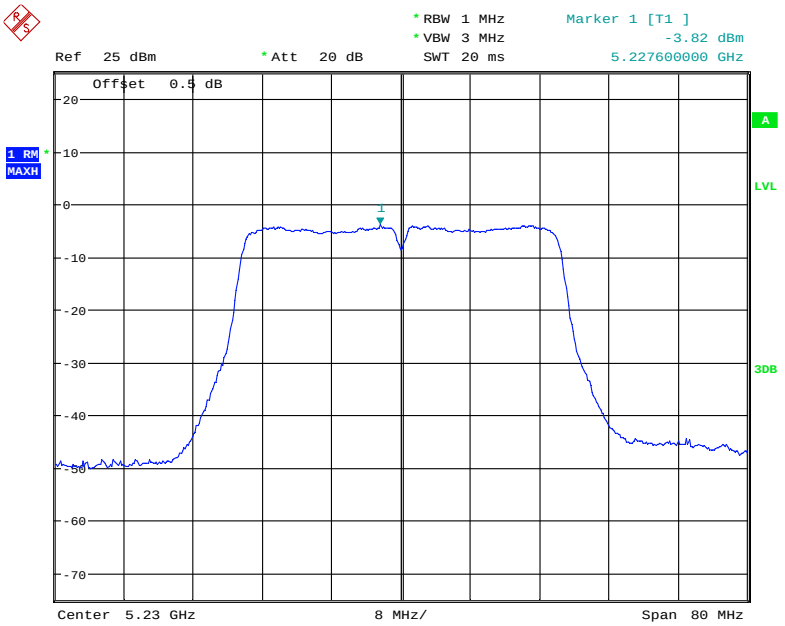
Date: 2.FEB.2018 11:05:57

802.11n ht40 Low Channel



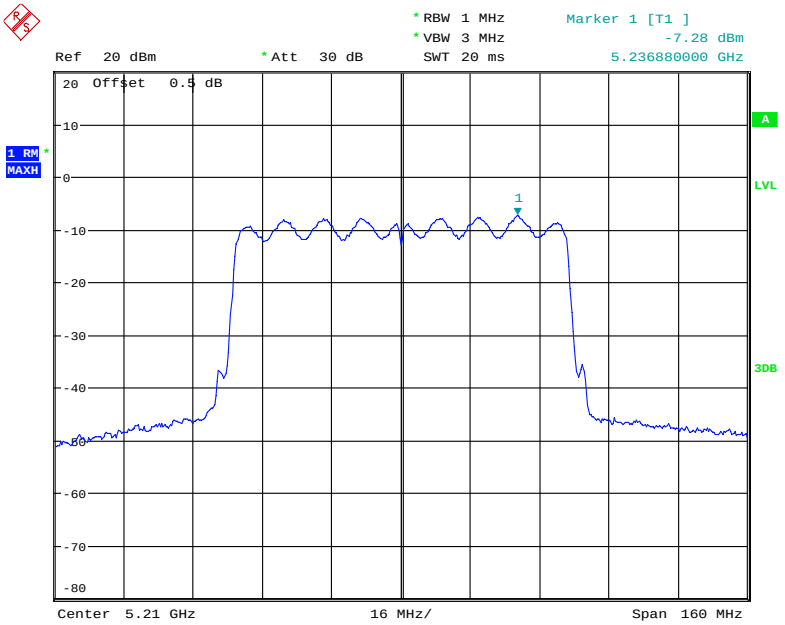
Date: 2.FEB.2018 11:06:47

802.11n ht40 High Channel



Date: 2.FEB.2018 11:07:36

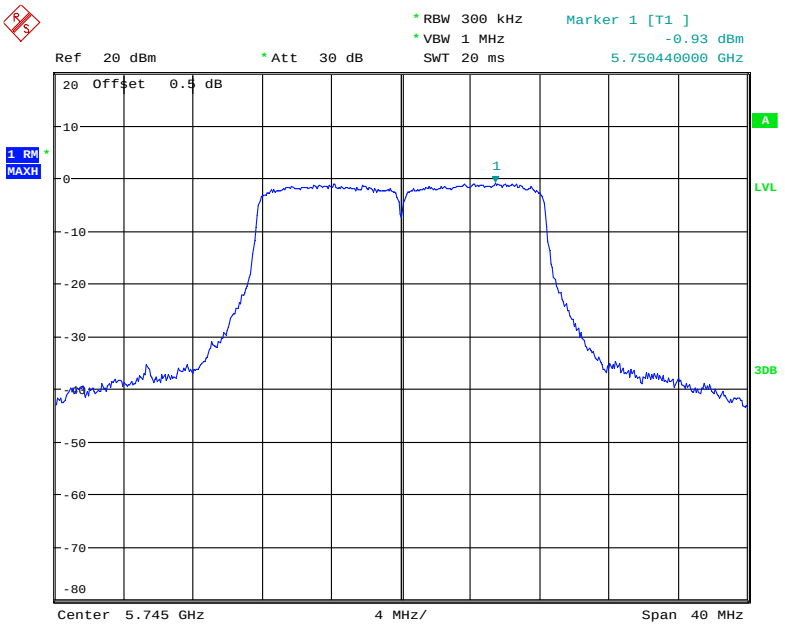
802.11ac80 Middle Channel



Date: 12.FEB.2018 11:13:48

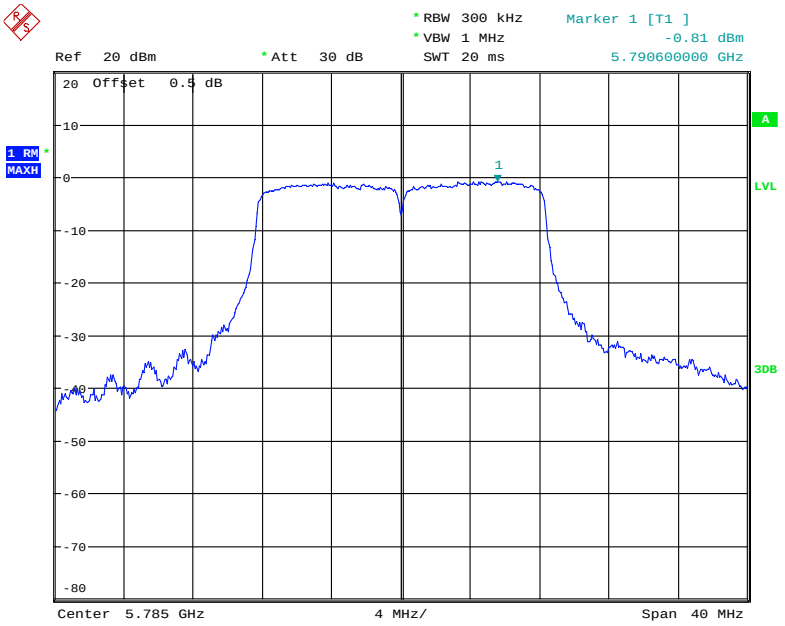
5725-5850MHz
ANT 1:

802.11a Low Channel



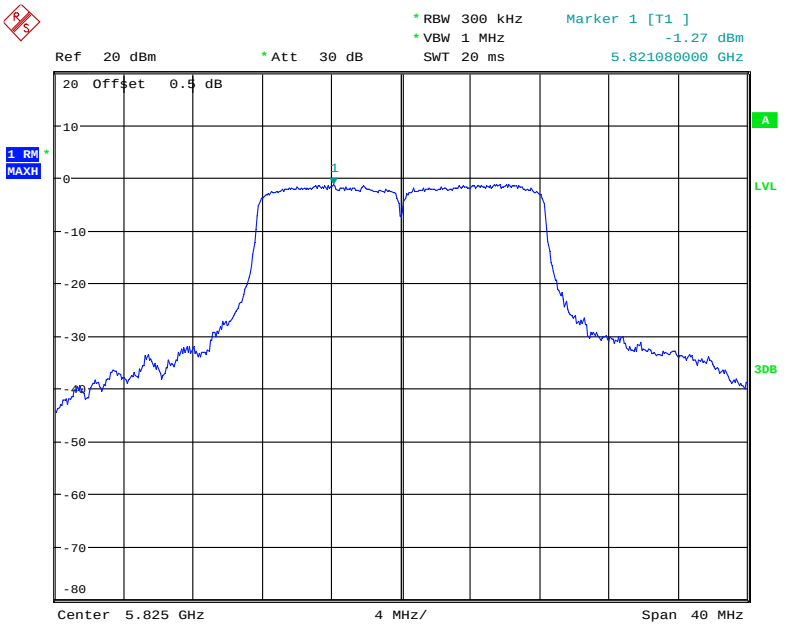
Date: 12.FEB.2018 11:03:24

802.11a Middle Channel



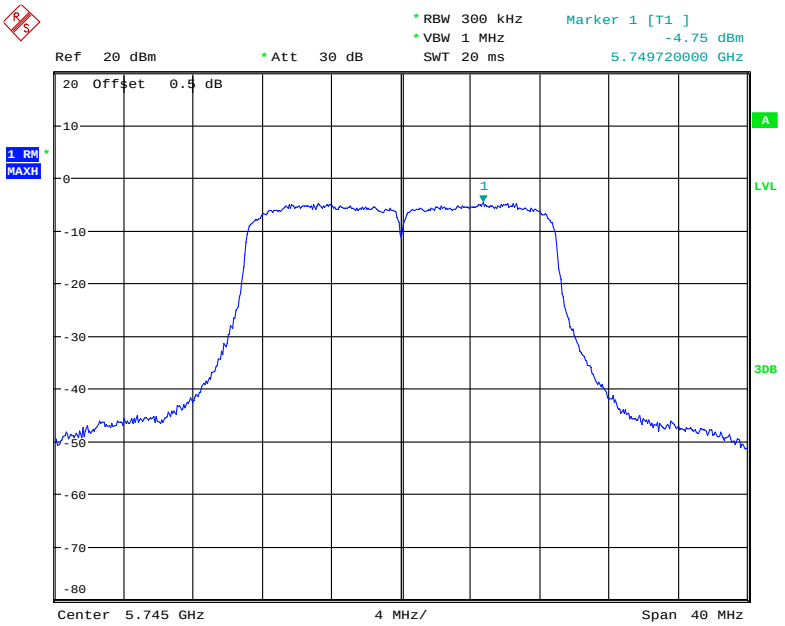
Date: 12.FEB.2018 11:03:58

802.11a High Channel



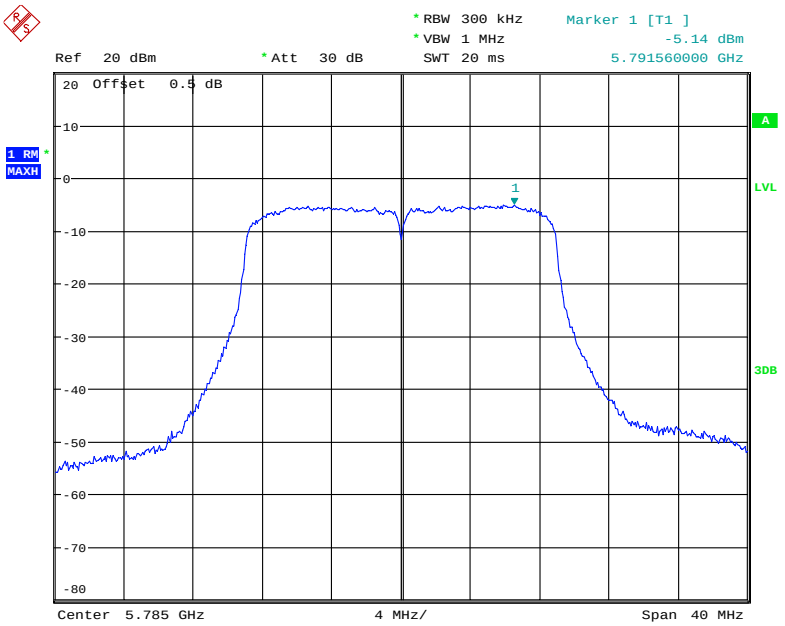
Date: 12.FEB.2018 11:04:55

802.11n ht20 Low Channel



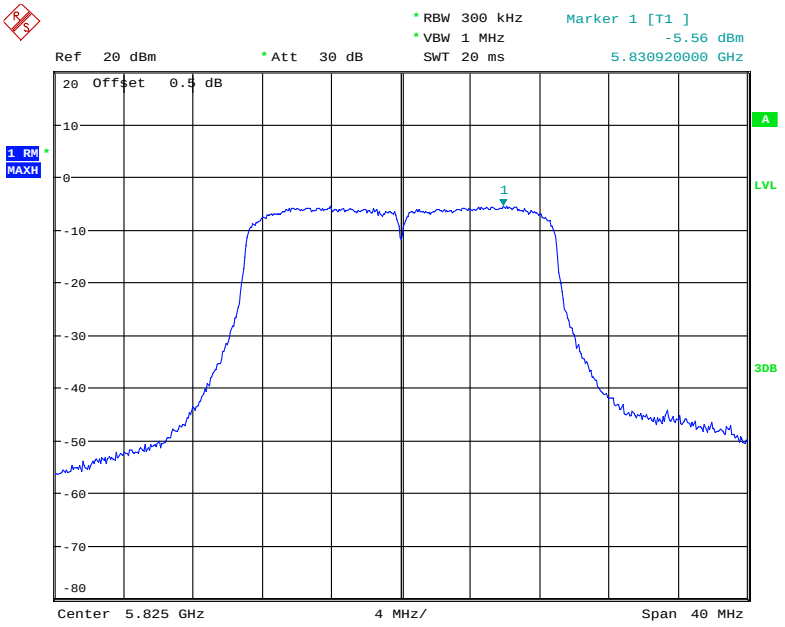
Date: 12.FEB.2018 10:58:25

802.11n ht20 Middle Channel



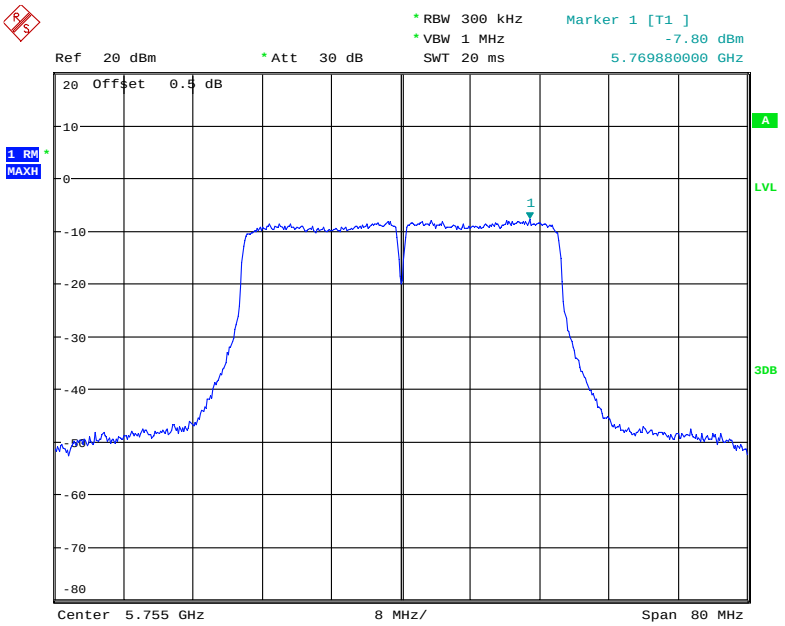
Date: 12.FEB.2018 10:58:56

802.11n ht20 High Channel



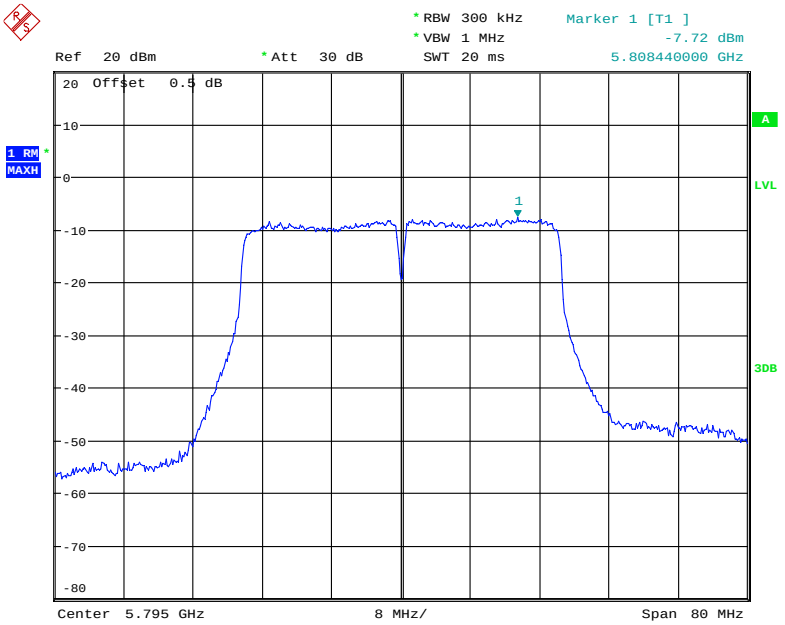
Date: 12.FEB.2018 11:00:27

802.11n ht40 Low Channel



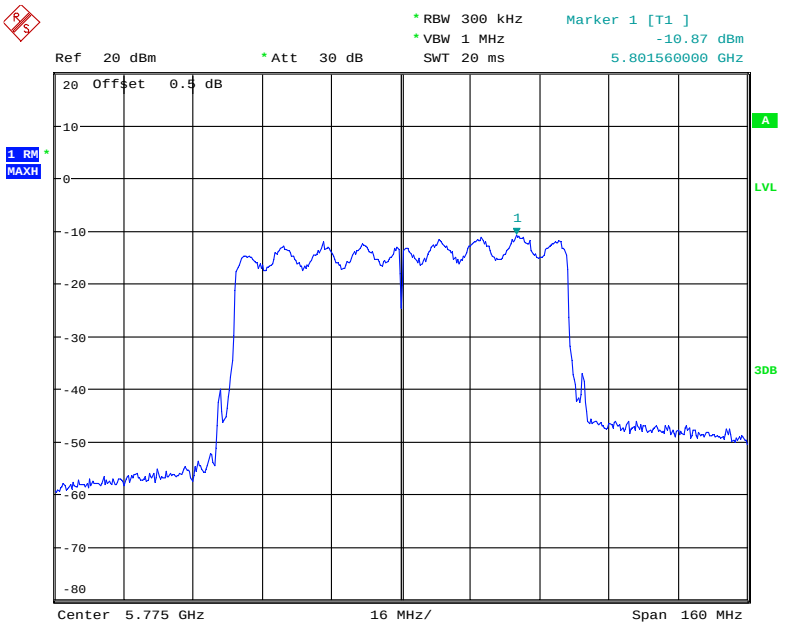
Date: 12.FEB.2018 11:01:13

802.11n ht40 High Channel



Date: 12.FEB.2018 11:01:41

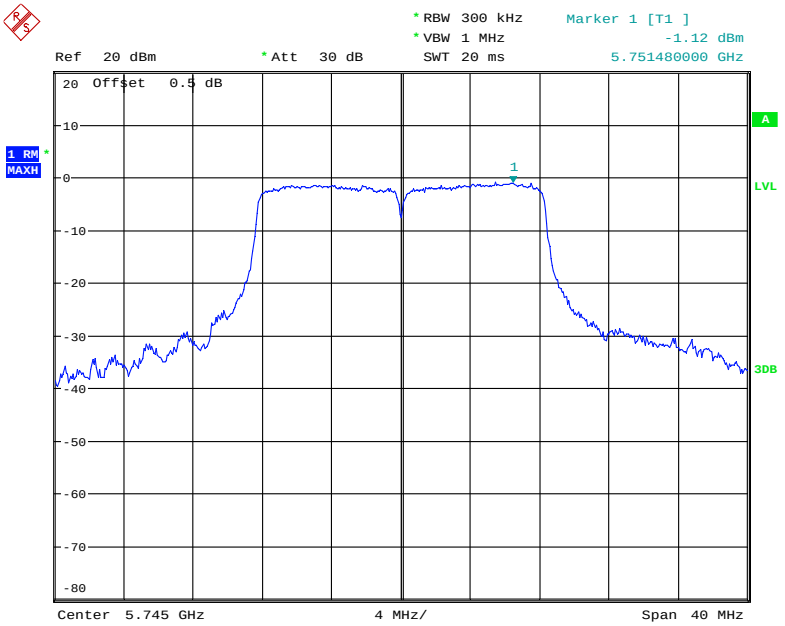
802.11ac80 Middle Channel



Date: 12.FEB.2018 11:12:52

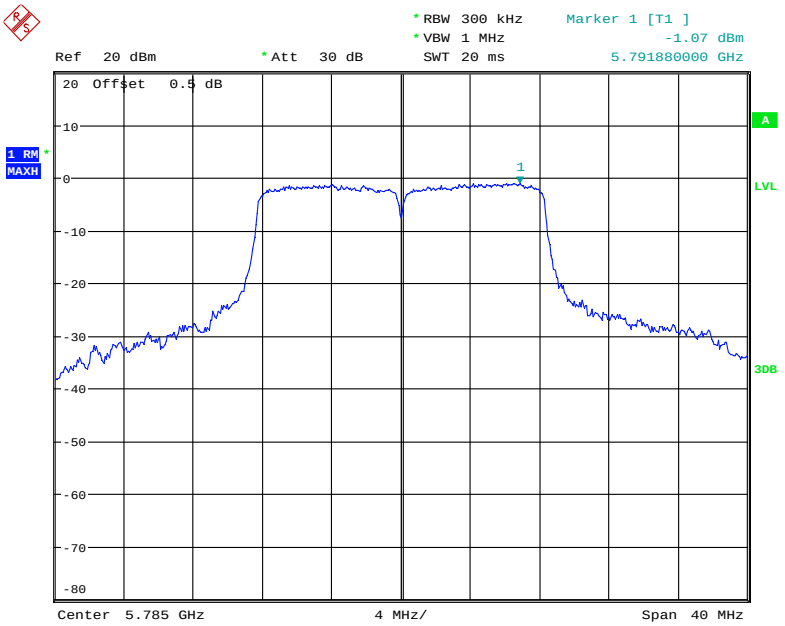
ANT 2:

802.11a Low Channel



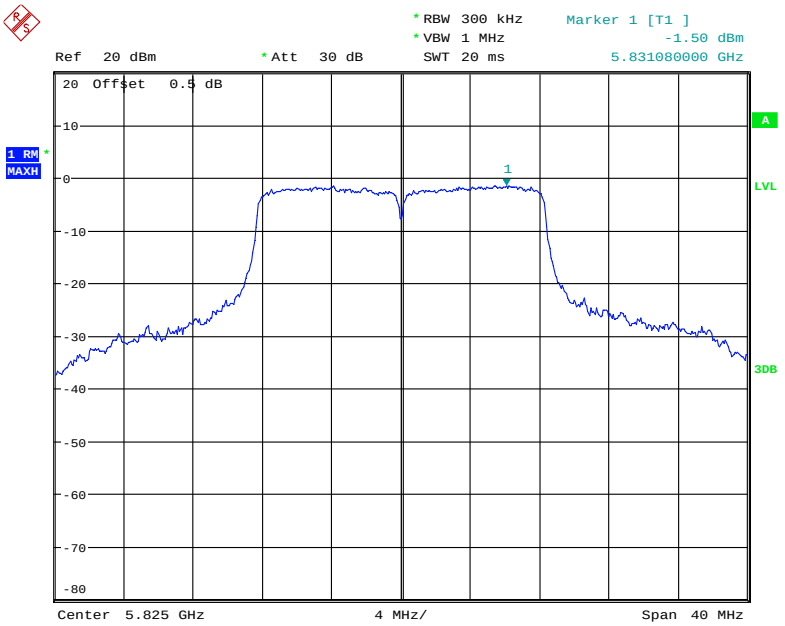
Date: 12.FEB.2018 11:06:26

802.11a Middle Channel



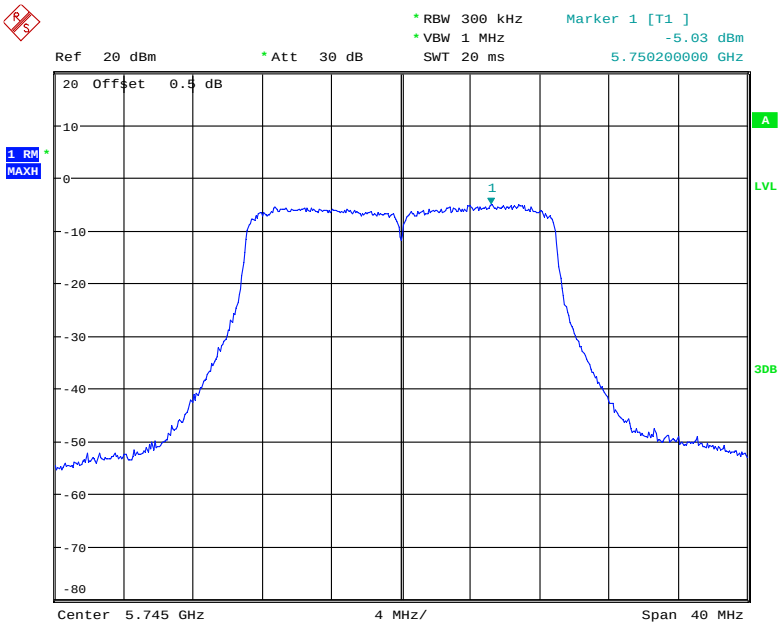
Date: 12.FEB.2018 11:09:22

802.11a High Channel



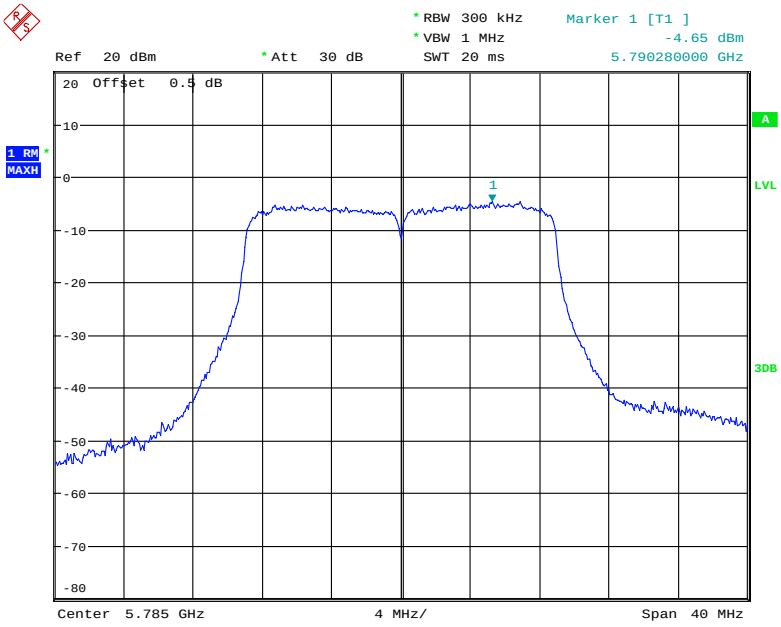
Date: 12.FEB.2018 11:08:34

802.11n ht20 Low Channel



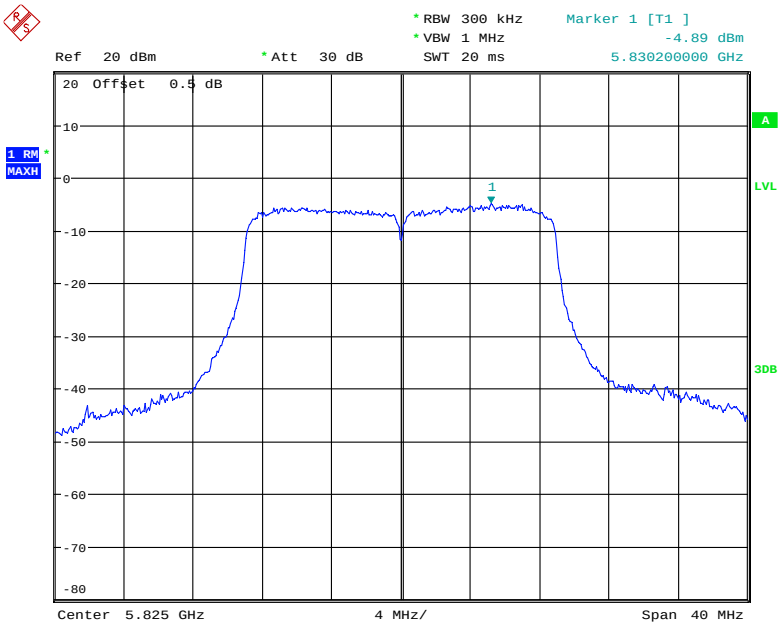
Date: 12.FEB.2018 10:46:15

802.11n ht20 Middle Channel



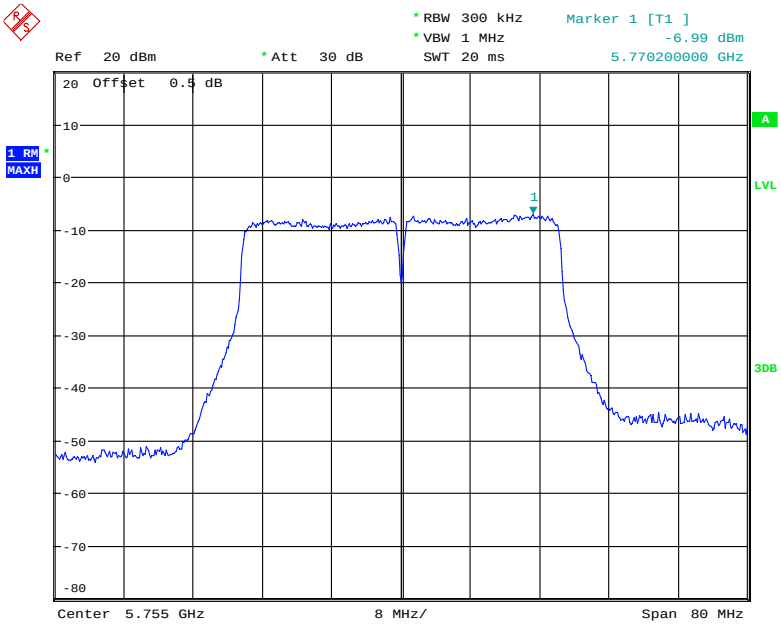
Date: 12.FEB.2018 10:46:48

802.11 n ht20 High Channel



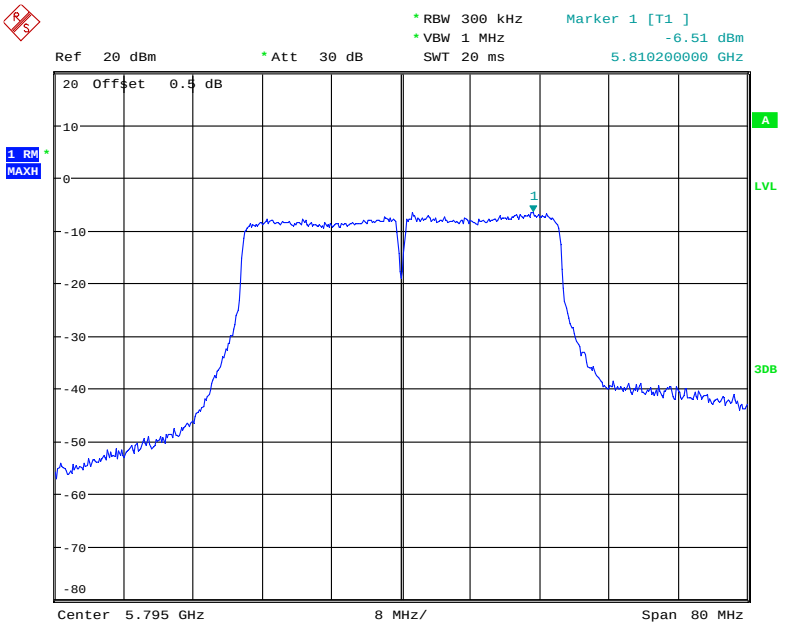
Date: 12.FEB.2018 10:47:20

802.11n ht40 Low Channel



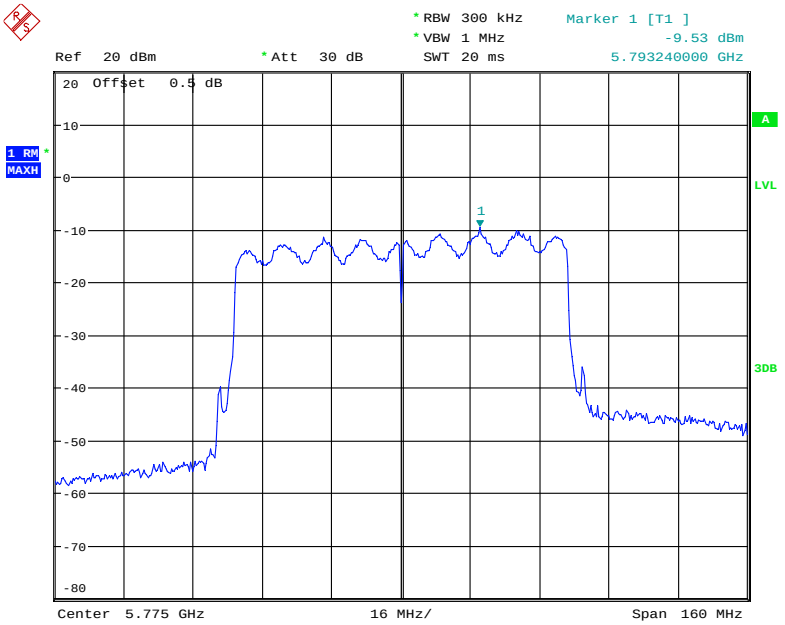
Date: 12.FEB.2018 11:10:35

802.11n ht40 High Channel



Date: 12.FEB.2018 11:11:09

802.11ac80 Middle Channel



Date: 12.FEB.2018 11:11:46

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