TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 15.407

TEST REPORT

For

Chasing-Innovation Technology Co.,Ltd.

ROOM 506 XITA BUILDING,DIGITAL CULTURE INDUSTRY, BASE,SHENLAN AVENUE 10128,NANSHAN DISTRICT, Shenzhen, China

FCC ID: 2AMOD-GLADIUSMINI

Report Type:	**Product Name:**
Original Report	GLADIUS Submersible Drone

Report Number:	RDG180921013-00B
Report Date:	2018-11-19
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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 8
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS 8
SUPPORT CABLE LIST AND DETAILS 8
BLOCK DIAGRAM OF TEST SETUP 8
SUMMARY OF TEST RESULTS **9**
FCC §15.407 (f) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE) **10**
APPLICABLE STANDARD 10
FCC §15.203 – ANTENNA REQUIREMENT **11**
APPLICABLE STANDARD 11
ANTENNA CONNECTOR CONSTRUCTION 11
FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS **12**
APPLICABLE STANDARD 12
EUT SETUP 12
EMI TEST RECEIVER SETUP 12
CORRECTED AMPLITUDE & MARGIN CALCULATION 13
TEST EQUIPMENT LIST AND DETAILS 13
TEST PROCEDURE 13
TEST DATA 14
FCC §15.209, §15.205 & §15.407(b) –UNWANTED EMISSION **16**
APPLICABLE STANDARD 16
EUT SETUP 17
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP 18
TEST PROCEDURE 18
CORRECTED AMPLITUDE & MARGIN CALCULATION 19
TEST EQUIPMENT LIST AND DETAILS 20
TEST DATA 20
FCC §15.407(b)–OUT- OF-BAND EMISSIONS **32**
APPLICABLE STANDARD 32
TEST PROCEDURE 32
TEST EQUIPMENT LIST AND DETAILS 33
TEST DATA 33
FCC §15.407(a)(e) –EMISSION BANDWIDTH AND OCCUPIED BANDWIDTH **42**
APPLICABLE STANDARD 42
TEST EQUIPMENT LIST AND DETAILS 42

TEST PROCEDURE 42
TEST DATA 42

FCC §15.407(a) –MAXIMUM CONDUCTED OUTPUT POWER 56

APPLICABLE STANDARD 56
TEST EQUIPMENT LIST AND DETAILS 57
TEST PROCEDURE 57
TEST DATA 57

FCC §15.407(a) - POWER SPECTRAL DENSITY 59

APPLICABLE STANDARD 59
TEST PROCEDURE 60
TEST EQUIPMENT LIST AND DETAILS 60
TEST DATA 60

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		GLADIUS Submersible Drone(Base Unit)
EUT Model:		Gladius Mini
FCC ID:		2AMOD-GLADIUSMINI
Rated Input Voltage:		DC11.1V from Battery or DC12.6V from adapter
Adapter Information	**Model:**	XSG1263000
	Input:	100V-240VAC 50/60Hz 1.3A
	Output:	DC12.6V 3.0A
External Dimension:		151mm(L)*107mm(W)*45mm(H)
Serial Number:		180921013
EUT Received Date:		2018.09.27

Objective

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

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

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: 2AMOD-GLADIUSMINI.
Part of system with FCC ID: 2AMOD-CICT02

Test Methodology

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

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

Measurement Uncertainty

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

Test Facility

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

The 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 system support 802.11a/n ht20 in 5GHz band and the EUT has 2 internal antennas for 2.4GHz and 5GHz.

For 5150~5250 MHz band, 4 channels are provided:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
40	5200	48	5240

Channel 36, 40 and 48 were tested.

For 5725~5850MHz band, 5 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	161	5805
153	5765	165	5825
157	5785	/	/

Channel 149, 157 and 165 were tested.

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

EUT Exercise Software

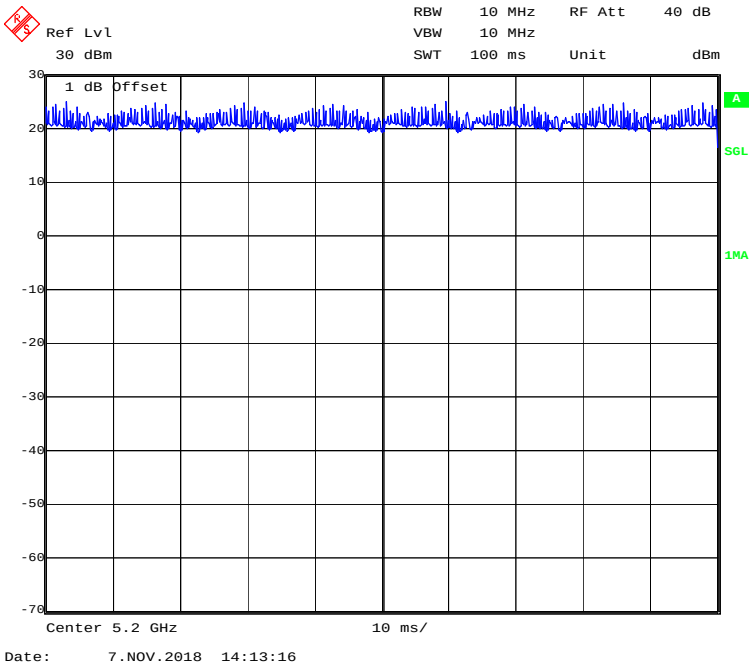
The software "Realtek 11ac_8822" was used for testing, which was provided by manufacturer. The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all date rates bandwidths, and modulations. The maximum power was configured as below table, that provided by the manufacturer:

Band	Mode	Channel	Frequency (MHz)	Data rate	Power level	
					Chain 0	Chain 1
5150 - 5250 MHz	802.11a	Low	5180	6 Mbps	48	48
		Middle	5200	6 Mbps	48	48
		High	5240	6 Mbps	48	48
	802.11n ht20	Low	5180	MCS0	49	49
		Middle	5200	MCS0	49	49
		High	5240	MCS0	49	49
5725 - 5850 MHz	802.11a	Low	5745	6 Mbps	54	54
		Middle	5785	6 Mbps	53	53
		High	5825	6 Mbps	53	53
	802.11n ht20	Low	5745	MCS0	52	52
		Middle	5785	MCS0	52	52
		High	5825	MCS0	52	52

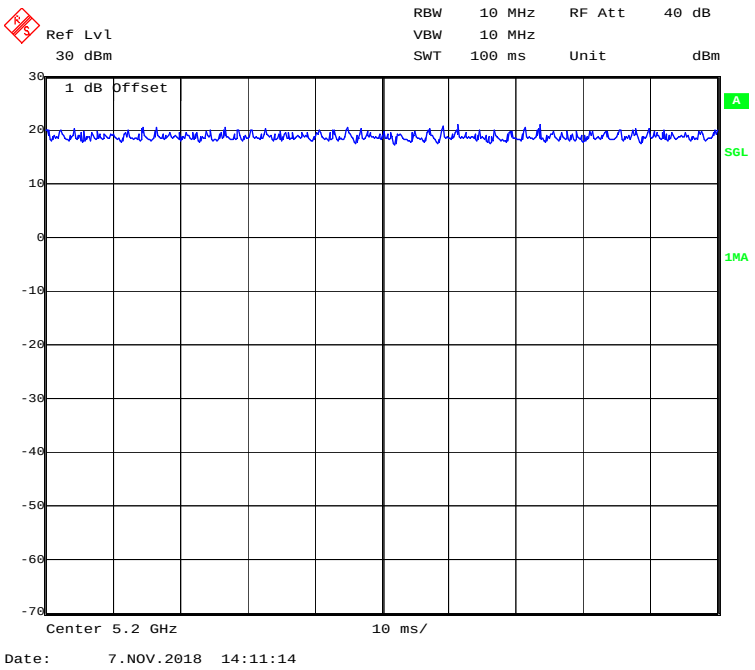
The duty cycle as below:

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

802.11a



802.11n ht20



Equipment Modifications

No modification was made to the EUT.

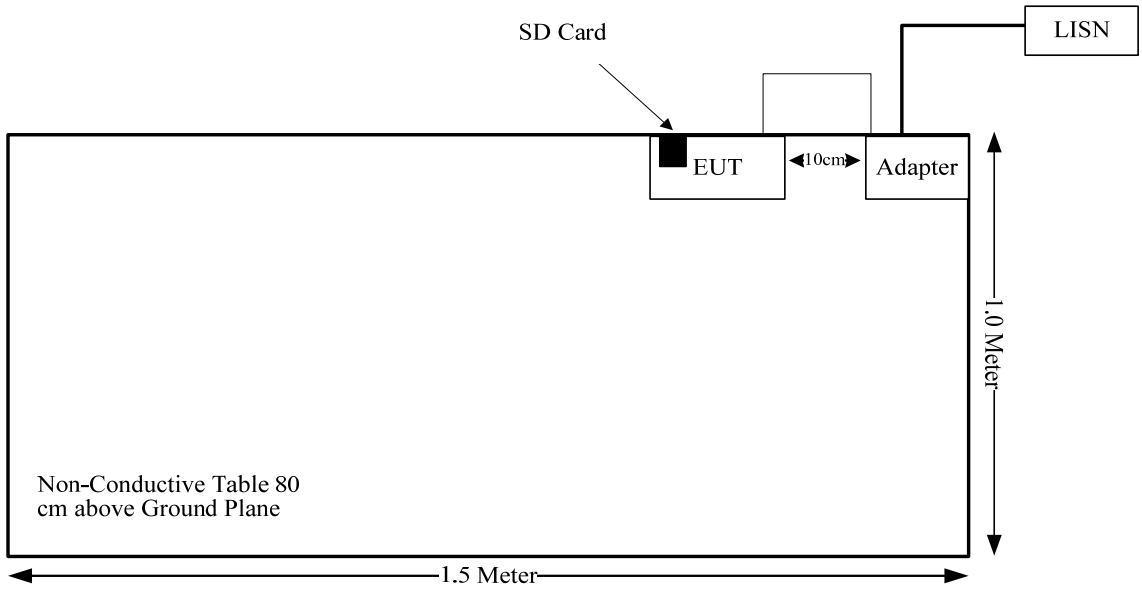
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Kinston	SD Card	4G	/

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Adapter DC cable	yes	no	2.65	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 Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b)(6)& §15.207(a)	Conducted Emissions	Compliance
§15.205& §15.209 &§15.407(b)	Undesirable Emission& Restricted Bands	Compliance
§15.407(b)	Out Of Band Emissions	Compliance
§15.407(a) (e)	Emission Bandwidth	Compliance
§15.407(g)	Frequency Stability	Compliance
§15.407(a)	Conducted Transmitter Output Power	Compliance
§15.407 (a)	Power Spectral Density	Compliance

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

Applicable Standard

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

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

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

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

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

Calculation formula:

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

Calculated Data:

Frequency (MHz)	**Antenna Gain**		**Conducted output power including Tune-up Tolerance**		**Evaluation Distance (cm)**	**Power Density (mW/cm^2)**	**MPE Limit (mW/cm^2)**
	(dBi)	**(numeric)**	**(dBm)**	**(mW)**			
2412-2462	1.1	1.29	22	158.49	20.00	0.04	1.0
5150-5250	4.4	2.75	16	39.81	20.00	0.02	1.0
5725-5850	4.4	2.75	16	39.81	20.00	0.02	1.0

The 2.4GHz band and 5GHz band can`t transmit simultaneously

Result: The device meet FCC MPE at 20 cm distance

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
And according to FCC 47 CFR section 15.407 (a)(1),if transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has 2 internal antenna arrangement, use unique connector coupling to the radio board, fulfill the requirement of this section. Please refer to the EUT photos and below information:

Antenna	Antenna Type	Connector Type	input impedance (Ohm)	Antenna Gain /Frequency
WIFI Chain 0	FPC	IPEX	50	1.1 dBi/2.4GHz 4.4 dBi/5 GHz
WIFI Chain 1	FPC	IPEX	50	1.1 dBi/2.4GHz 4.4 dBi/5 GHz

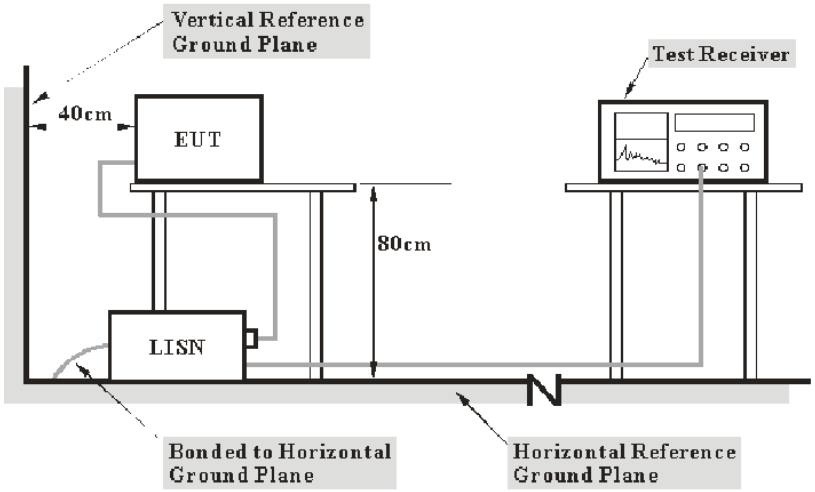
Result: Compliance.

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
R&S	Two-line V-network	ENV 216	101614	2017-12-08	2018-12-08
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2018-09-05	2019-09-05

*** 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 Procedure

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

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

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

Test Data

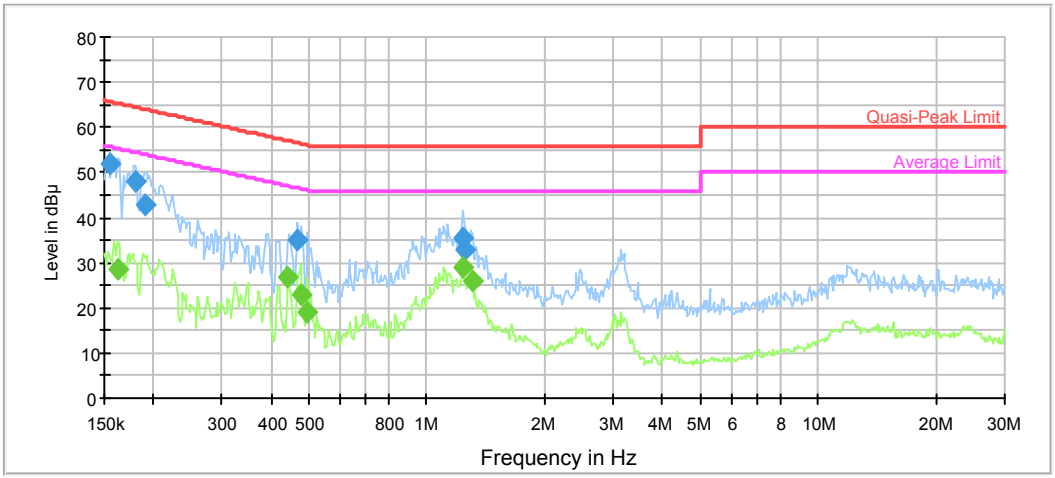
Environmental Conditions

Temperature:	27.2℃
Relative Humidity:	59%
ATM Pressure:	100.6kPa

The testing was performed by Lily Xie on 2018-10-15.

Test Mode: Transmitting

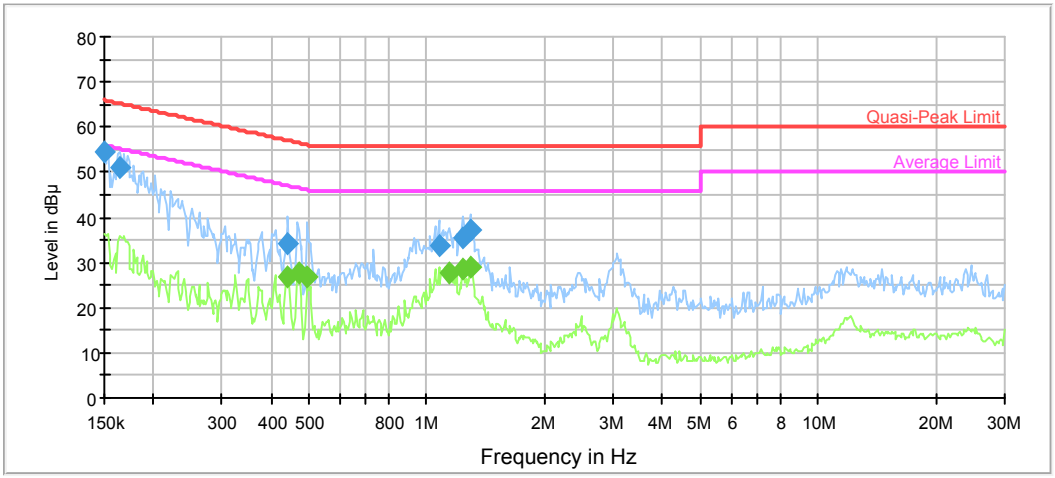
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.154858	51.8	9.000	L1	11.1	13.9	65.7	Compliance
0.180171	48.0	9.000	L1	10.8	16.5	64.5	Compliance
0.190505	42.6	9.000	L1	10.7	21.4	64.0	Compliance
0.468757	35.2	9.000	L1	9.9	21.3	56.5	Compliance
1.239175	35.3	9.000	L1	9.8	20.7	56.0	Compliance
1.249088	32.8	9.000	L1	9.8	23.2	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.162441	28.7	9.000	L1	11.0	26.6	55.3	Compliance
0.443327	26.6	9.000	L1	9.9	20.4	47.0	Compliance
0.476287	22.8	9.000	L1	9.9	23.6	46.4	Compliance
0.495646	19.2	9.000	L1	9.9	26.9	46.1	Compliance
1.239175	28.8	9.000	L1	9.8	17.2	46.0	Compliance
1.310256	26.1	9.000	L1	9.8	19.9	46.0	Compliance

AC120 V, 60 Hz, Neutral:



requency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	54.5	9.000	N	11.2	11.5	66.0	Compliance
0.165051	51.1	9.000	N	11.0	14.1	65.2	Compliance
0.443327	34.2	9.000	N	9.9	22.8	57.0	Compliance
1.073601	33.6	9.000	N	9.8	22.4	56.0	Compliance
1.239175	35.5	9.000	N	9.8	20.5	56.0	Compliance
1.289541	37.1	9.000	N	9.8	18.9	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.443327	27.0	9.000	N	9.9	20.0	47.0	Compliance
0.472507	27.8	9.000	N	9.9	18.7	46.5	Compliance
0.495646	26.7	9.000	N	9.9	19.4	46.1	Compliance
1.144267	27.7	9.000	N	9.8	18.3	46.0	Compliance
1.239175	28.7	9.000	N	9.8	17.3	46.0	Compliance
1.289541	29.1	9.000	N	9.8	16.9	46.0	Compliance

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

Applicable Standard

FCC §15.407; §15.209; §15.205;

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

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

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

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

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

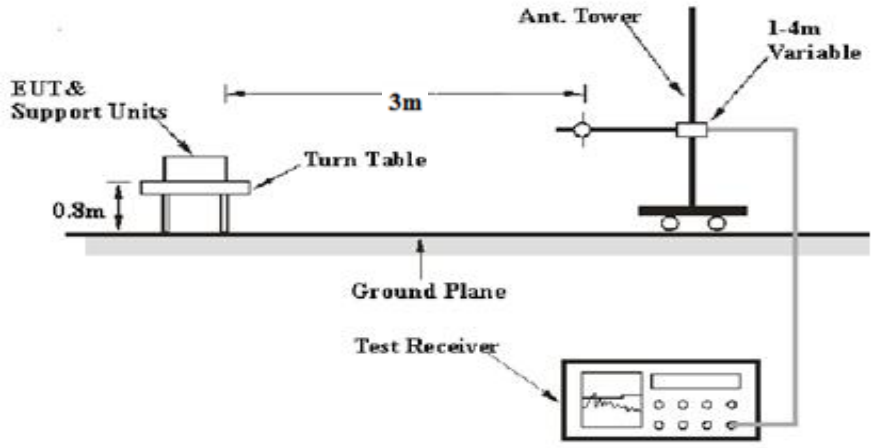
(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

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

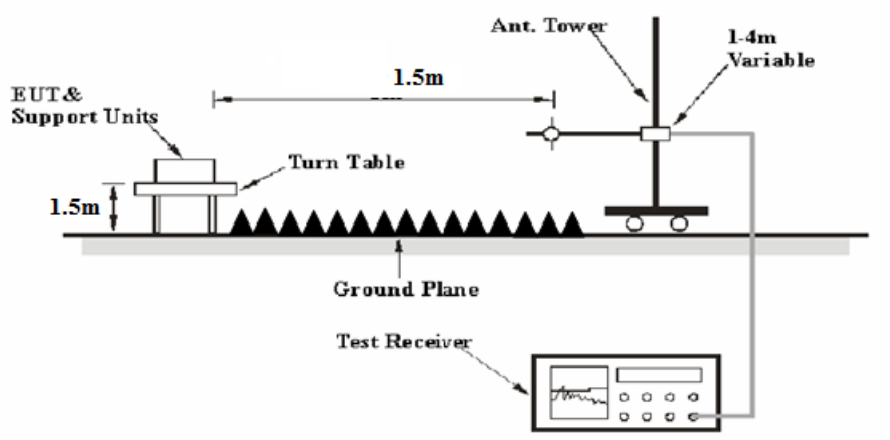
(7) The provisions of §15.205 apply to intentional radiators operating under this section.

EUT Setup

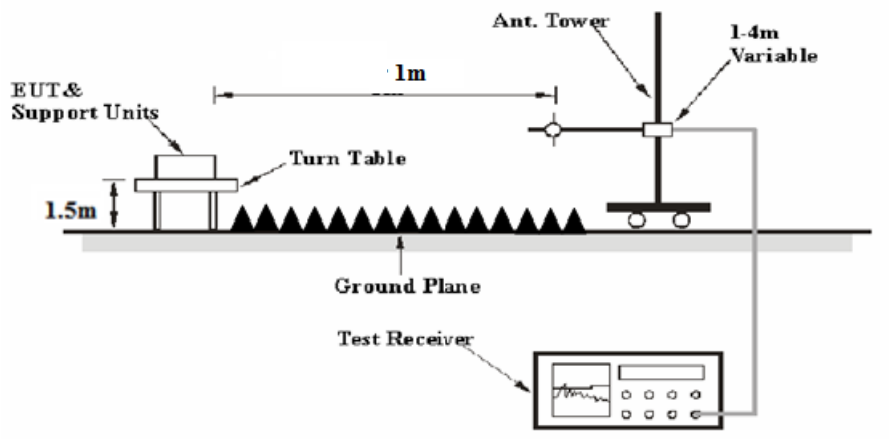
Below 1 GHz:



1-26.5 GHz:



26.5-40 GHz:



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

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

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

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

30-1000MHz:

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

1GHz- 40GHz:

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

Test Procedure

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

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

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

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

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

Corrected Amplitude & Margin Calculation

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

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

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

Margin = Limit - Corrected Amplitude

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

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

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

Margin = Limit- Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
R&S	EMI Test Receiver	ESCI	100035	2018-08-03	2019-08-03
Sunol Sciences	Antenna	JB3	A060611-3	2017-07-21	2019-07-21
HP	Amplifier	8447F	2443A01912	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-02	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-2200-01	2018-09-05	2019-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2018-01-04	2019-01-04
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-08	2018-12-08
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Ducommun Technolagies	Horn Antenna	ARH-2823-02	1007726-01 1302	2016-11-18	2019-11-18
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2018-06-27	2019-06-27
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2018-09-05	2019-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2018-06-27	2019-06-27
Sinoscite	Bandstop Filters	BSF5150-5850MN-0899-003	0899003	2018-05-06	2019-05-06
Mini Circuits	High Pass Filter	VHF-6010+	31118	2018-06-16	2019-06-16

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

Test Data

Environmental Conditions

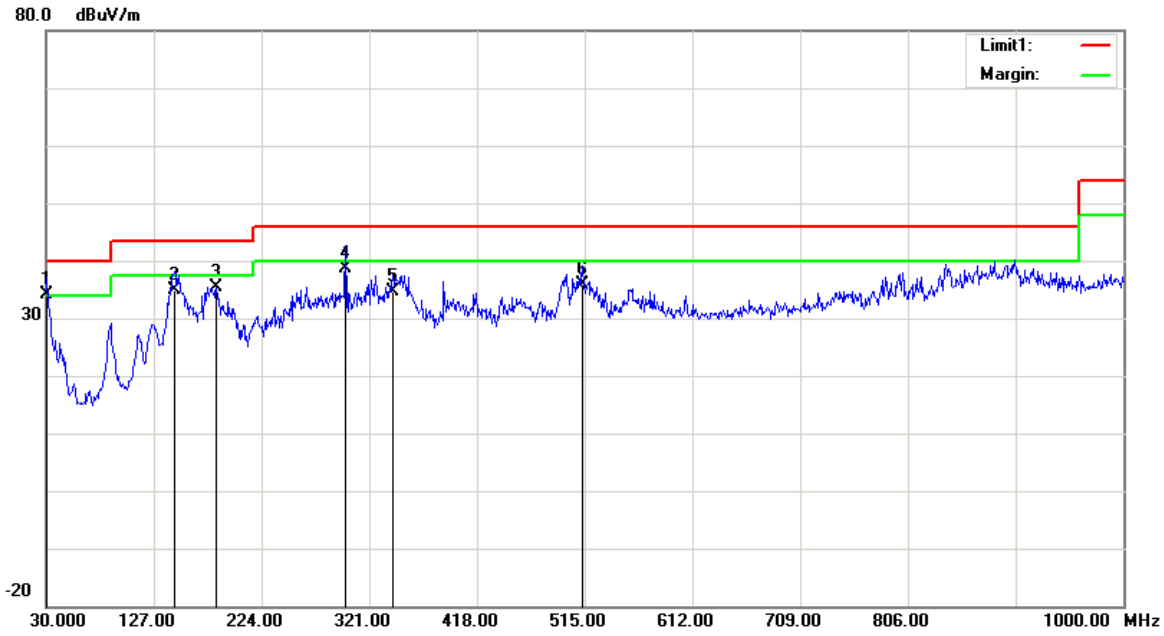
Temperature:	24.2~27.5 °C
Relative Humidity:	51 %
ATM Pressure:	100.1~100.8kPa

** The testing was performed by Tyler Pan and Alex You on 2018-10-11, 2018-11-07.*

Test Mode: Transmitting

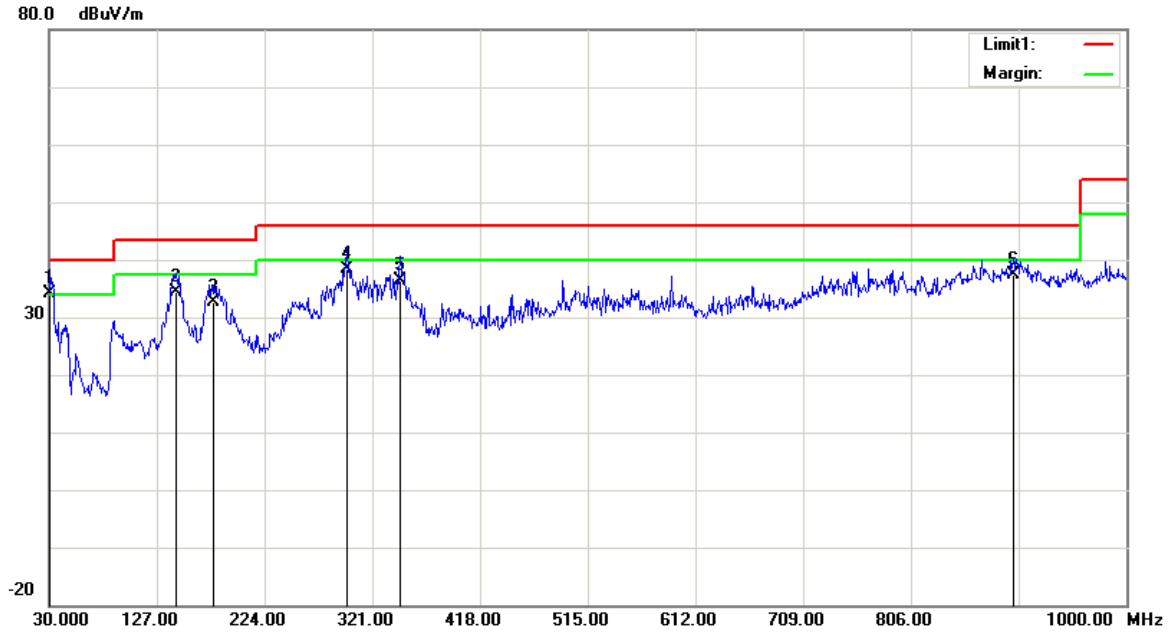
1) Below 1GHz(802.11a 5745 MHz chain 0 was the worst):

Horizontal



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.0000	35.58	QP	-1.48	34.10	40.00	5.90
145.4300	40.86	QP	-5.86	35.00	43.50	8.50
183.2600	41.99	QP	-6.69	35.30	43.50	8.20
299.6600	42.24	QP	-3.64	38.60	46.00	7.40
342.3400	36.84	QP	-2.24	34.60	46.00	11.40
513.0600	33.71	QP	2.29	36.00	46.00	10.00

Vertical



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.0000	35.68	QP	-1.48	34.20	40.00	5.80
144.4600	40.34	QP	-5.84	34.50	43.50	9.00
177.4400	38.96	QP	-6.36	32.60	43.50	10.90
297.7200	42.16	QP	-3.76	38.40	46.00	7.60
346.2200	38.65	QP	-2.15	36.50	46.00	9.50
898.1500	27.25	QP	10.15	37.40	46.00	8.60

2) 1GHz-40GHz:
5150-5250MHz
802.11a Chain 0

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5180 MHz										
5180.00	71.63	PK	H	33.59	3.58	0.00	108.80	102.78	N/A	N/A
5180.00	62.10	AV	H	33.59	3.58	0.00	99.27	93.25	N/A	N/A
5180.00	73.67	PK	V	33.59	3.58	0.00	110.84	104.82	N/A	N/A
5180.00	64.03	AV	V	33.59	3.58	0.00	101.20	95.18	N/A	N/A
5150.00	31.25	PK	V	33.54	3.56	0.00	68.35	62.33	74.00	11.67
5150.00	16.10	AV	V	33.54	3.56	0.00	53.20	47.18	54.00	6.82
10360.00	57.74	PK	V	38.17	6.29	36.85	65.35	59.33	74.00	14.67
10360.00	42.51	AV	V	38.17	6.29	36.85	50.12	44.1	54.00	9.90
15540.00	52.40	PK	V	38.06	8.85	39.04	60.27	54.25	74.00	19.75
15540.00	40.06	AV	V	38.06	8.85	39.04	47.93	41.91	54.00	12.09
3990.00	59.46	PK	V	32.38	2.63	36.99	57.48	51.46	74.00	22.54
3990.00	46.10	AV	V	32.38	2.63	36.99	44.12	38.1	54.00	15.90
Middle Channel: 5200 MHz										
5200.00	71.36	PK	H	33.62	3.60	0.00	108.58	102.56	N/A	N/A
5200.00	61.89	AV	H	33.62	3.60	0.00	99.11	93.09	N/A	N/A
5200.00	73.97	PK	V	33.62	3.60	0.00	111.19	105.17	N/A	N/A
5200.00	64.36	AV	V	33.62	3.60	0.00	101.58	95.56	N/A	N/A
10400.00	57.86	PK	V	38.18	6.32	36.86	65.50	59.48	74.00	14.52
10400.00	42.79	AV	V	38.18	6.32	36.86	50.43	44.41	54.00	9.59
15600.00	52.58	PK	V	38.00	8.83	39.09	60.32	54.3	74.00	19.70
15600.00	40.39	AV	V	38.00	8.83	39.09	48.13	42.11	54.00	11.89
3990.00	59.46	PK	V	32.38	2.63	36.99	57.48	51.46	74.00	22.54
3990.00	46.23	AV	V	32.38	2.63	36.99	44.25	38.23	54.00	15.77
High Channel: 5240 MHz										
5240.00	70.73	PK	H	33.68	3.52	0.00	107.93	101.91	N/A	N/A
5240.00	61.28	AV	H	33.68	3.52	0.00	98.48	92.46	N/A	N/A
5240.00	72.89	PK	V	33.68	3.52	0.00	110.09	104.07	N/A	N/A
5240.00	63.42	AV	V	33.68	3.52	0.00	100.62	94.6	N/A	N/A
5350.00	27.40	PK	V	33.86	3.52	0.00	64.78	58.76	74.00	15.24
5350.00	14.21	AV	V	33.86	3.52	0.00	51.59	45.57	54.00	8.43
10480.00	57.60	PK	V	38.20	6.37	36.88	65.29	59.27	74.00	14.73
10480.00	42.54	AV	V	38.20	6.37	36.88	50.23	44.21	54.00	9.79
15720.00	52.19	PK	V	37.88	8.79	39.18	59.68	53.66	74.00	20.34
15720.00	40.05	AV	V	37.88	8.79	39.18	47.54	41.52	54.00	12.48
3990.00	59.56	PK	V	32.38	2.63	36.99	57.58	51.56	74.00	22.44
3990.00	46.31	AV	V	32.38	2.63	36.99	44.33	38.31	54.00	15.69

802.11a Chain 1

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5180 MHz										
5180.00	71.11	PK	H	33.59	3.58	0.00	108.28	102.26	N/A	N/A
5180.00	61.63	AV	H	33.59	3.58	0.00	98.80	92.78	N/A	N/A
5180.00	73.64	PK	V	33.59	3.58	0.00	110.81	104.79	N/A	N/A
5180.00	64.07	AV	V	33.59	3.58	0.00	101.24	95.22	N/A	N/A
5150.00	31.36	PK	V	33.54	3.56	0.00	68.46	62.44	74.00	11.56
5150.00	15.89	AV	V	33.54	3.56	0.00	52.99	46.97	54.00	7.03
10360.00	49.34	PK	V	38.17	6.29	36.85	56.95	50.93	74.00	23.07
10360.00	36.70	AV	V	38.17	6.29	36.85	44.31	38.29	54.00	15.71
15540.00	49.54	PK	V	38.06	8.85	39.04	57.41	51.39	74.00	22.61
15540.00	37.05	AV	V	38.06	8.85	39.04	44.92	38.9	54.00	15.10
3990.00	49.45	PK	V	32.38	2.63	36.99	47.47	41.45	74.00	32.55
3990.00	46.11	AV	V	32.38	2.63	36.99	44.13	38.11	54.00	15.89
Middle Channel: 5200 MHz										
5200.00	71.26	PK	H	33.62	3.60	0.00	108.48	102.46	N/A	N/A
5200.00	61.73	AV	H	33.62	3.60	0.00	98.95	92.93	N/A	N/A
5200.00	73.97	PK	V	33.62	3.60	0.00	111.19	105.17	N/A	N/A
5200.00	64.42	AV	V	33.62	3.60	0.00	101.64	95.62	N/A	N/A
10400.00	49.41	PK	V	38.18	6.32	36.86	57.05	51.03	74.00	22.97
10400.00	36.90	AV	V	38.18	6.32	36.86	44.54	38.52	54.00	15.48
15600.00	48.76	PK	V	38.00	8.83	39.09	56.50	50.48	74.00	23.52
15600.00	36.23	AV	V	38.00	8.83	39.09	43.97	37.95	54.00	16.05
3990.00	59.67	PK	V	32.38	2.63	36.99	57.69	51.67	74.00	22.33
3990.00	46.43	AV	V	32.38	2.63	36.99	44.45	38.43	54.00	15.57
High Channel: 5240 MHz										
5240.00	70.89	PK	H	33.68	3.52	0.00	108.09	102.07	N/A	N/A
5240.00	61.30	AV	H	33.68	3.52	0.00	98.50	92.48	N/A	N/A
5240.00	73.76	PK	V	33.68	3.52	0.00	110.96	104.94	N/A	N/A
5240.00	64.23	AV	V	33.68	3.52	0.00	101.43	95.41	N/A	N/A
5350.00	27.40	PK	V	33.86	3.52	0.00	64.78	58.76	74.00	15.24
5350.00	14.21	AV	V	33.86	3.52	0.00	51.59	45.57	54.00	8.43
10480.00	49.55	PK	V	38.20	6.37	36.88	57.24	51.22	74.00	22.78
10480.00	37.12	AV	V	38.20	6.37	36.88	44.81	38.79	54.00	15.21
15720.00	49.37	PK	V	37.88	8.79	39.18	56.86	50.84	74.00	23.16
15720.00	36.85	AV	V	37.88	8.79	39.18	44.34	38.32	54.00	15.68
3990.00	59.52	PK	V	32.38	2.63	36.99	57.54	51.52	74.00	22.48
3990.00	46.22	AV	V	32.38	2.63	36.99	44.24	38.22	54.00	15.78

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	73.35	PK	H	33.59	3.58	0.00	110.52	104.5	N/A	N/A
5180.00	63.87	AV	H	33.59	3.58	0.00	101.04	95.02	N/A	N/A
5180.00	75.67	PK	V	33.59	3.58	0.00	112.84	106.82	N/A	N/A
5180.00	66.05	AV	V	33.59	3.58	0.00	103.22	97.2	N/A	N/A
5150.00	28.87	PK	V	33.54	3.56	0.00	65.97	59.95	74.00	14.05
5150.00	13.78	AV	V	33.54	3.56	0.00	50.88	44.86	54.00	9.14
10360.00	54.86	PK	V	38.17	6.29	36.85	62.47	56.45	74.00	17.55
10360.00	40.52	AV	V	38.17	6.29	36.85	48.13	42.11	54.00	11.89
15540.00	48.92	PK	V	38.06	8.85	39.04	56.79	50.77	74.00	23.23
15540.00	36.54	AV	V	38.06	8.85	39.04	44.41	38.39	54.00	15.61
3990.00	59.34	PK	V	32.38	2.63	36.99	57.36	51.34	74.00	22.66
3990.00	46.05	AV	V	32.38	2.63	36.99	44.07	38.05	54.00	15.95
Middle Channel: 5200 MHz										
5200.00	73.18	PK	H	33.62	3.60	0.00	110.40	104.38	N/A	N/A
5200.00	63.49	AV	H	33.62	3.60	0.00	100.71	94.69	N/A	N/A
5200.00	74.85	PK	V	33.62	3.60	0.00	112.07	106.05	N/A	N/A
5200.00	65.31	AV	V	33.62	3.60	0.00	102.53	96.51	N/A	N/A
10400.00	54.77	PK	V	38.18	6.32	36.86	62.41	56.39	74.00	17.61
10400.00	40.57	AV	V	38.18	6.32	36.86	48.21	42.19	54.00	11.81
15600.00	48.70	PK	V	38.00	8.83	39.09	56.44	50.42	74.00	23.58
15600.00	36.14	AV	V	38.00	8.83	39.09	43.88	37.86	54.00	16.14
3990.00	59.70	PK	V	32.38	2.63	36.99	57.72	51.7	74.00	22.30
3990.00	46.41	AV	V	32.38	2.63	36.99	44.43	38.41	54.00	15.59
High Channel: 5240 MHz										
5240.00	72.34	PK	H	33.68	3.52	0.00	109.54	103.52	N/A	N/A
5240.00	62.71	AV	H	33.68	3.52	0.00	99.91	93.89	N/A	N/A
5240.00	74.62	PK	V	33.68	3.52	0.00	111.82	105.8	N/A	N/A
5240.00	64.03	AV	V	33.68	3.52	0.00	101.23	95.21	N/A	N/A
5350.00	27.56	PK	V	33.86	3.52	0.00	64.94	58.92	74.00	15.08
5350.00	14.25	AV	V	33.86	3.52	0.00	51.63	45.61	54.00	8.39
10480.00	53.42	PK	V	38.20	6.37	36.88	61.11	55.09	74.00	18.91
10480.00	39.10	AV	V	38.20	6.37	36.88	46.79	40.77	54.00	13.23
15720.00	49.35	PK	V	37.88	8.79	39.18	56.84	50.82	74.00	23.18
15720.00	36.87	AV	V	37.88	8.79	39.18	44.36	38.34	54.00	15.66
3990.00	59.28	PK	V	32.38	2.63	36.99	57.30	51.28	74.00	22.72
3990.00	46.05	AV	V	32.38	2.63	36.99	44.07	38.05	54.00	15.95

5725-5850MHz
802.11a Chain 0

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5745 MHz										
5745.00	73.18	PK	H	34.20	3.69	0.00	111.07	105.05	N/A	N/A
5745.00	64.43	AV	H	34.20	3.69	0.00	102.32	96.3	N/A	N/A
5745.00	75.56	PK	V	34.20	3.69	0.00	113.45	107.43	N/A	N/A
5745.00	66.40	AV	V	34.20	3.69	0.00	104.29	98.27	N/A	N/A
5725.00	43.10	PK	V	34.19	3.69	0.00	80.98	74.96	122.20	47.24
5720.00	38.92	PK	V	34.19	3.69	0.00	76.80	70.78	110.80	40.02
5700.00	27.19	PK	V	34.18	3.68	0.00	65.05	59.03	105.20	46.17
5650.00	25.23	PK	V	34.16	3.63	0.00	63.02	57	68.20	11.20
11490.00	63.35	PK	V	38.99	6.59	37.35	71.58	65.56	74.00	8.44
11490.00	49.76	AV	V	38.99	6.59	37.35	57.99	51.97	54.00	2.03
17235.00	56.33	PK	V	41.56	8.78	38.61	68.06	62.04	74.00	11.96
17235.00	42.10	AV	V	41.56	8.78	38.61	53.83	47.81	54.00	6.19
Middle Channel: 5785 MHz										
5785.00	72.33	PK	H	34.21	3.71	0.00	110.25	104.23	N/A	N/A
5785.00	63.20	AV	H	34.21	3.71	0.00	101.12	95.1	N/A	N/A
5785.00	73.64	PK	V	34.21	3.71	0.00	111.56	105.54	N/A	N/A
5785.00	64.58	AV	V	34.21	3.71	0.00	102.50	96.48	N/A	N/A
11570.00	61.87	PK	V	39.00	6.61	37.44	70.04	64.02	74.00	9.98
11570.00	48.40	AV	V	39.00	6.61	37.44	56.57	50.55	54.00	3.45
17355.00	54.27	PK	V	42.26	8.81	38.52	66.82	60.8	74.00	13.20
17355.00	40.03	AV	V	42.26	8.81	38.52	52.58	46.56	54.00	7.44
High Channel: 5825 MHz										
5825.00	72.14	PK	H	34.23	3.73	0.00	110.10	104.08	N/A	N/A
5825.00	63.10	AV	H	34.23	3.73	0.00	101.06	95.04	N/A	N/A
5825.00	73.62	PK	V	34.23	3.73	0.00	111.58	105.56	N/A	N/A
5825.00	64.55	AV	V	34.23	3.73	0.00	102.51	96.49	N/A	N/A
5850.00	31.76	PK	V	34.24	3.75	0.00	69.75	63.73	122.20	58.47
5855.00	30.52	PK	V	34.24	3.75	0.00	68.51	62.49	110.80	48.31
5875.00	28.46	PK	V	34.25	3.77	0.00	66.48	60.46	105.20	44.74
5925.00	27.17	PK	V	34.27	3.80	0.00	65.24	59.22	68.20	8.98
11650.00	61.67	PK	V	39.00	6.64	37.53	69.78	63.76	74.00	10.24
11650.00	48.53	AV	V	39.00	6.64	37.53	56.64	50.62	54.00	3.38
17475.00	55.06	PK	V	42.96	8.84	38.44	68.42	62.4	74.00	11.60
17475.00	40.89	AV	V	42.96	8.84	38.44	54.25	48.23	54.00	5.77

802.11a Chain 1

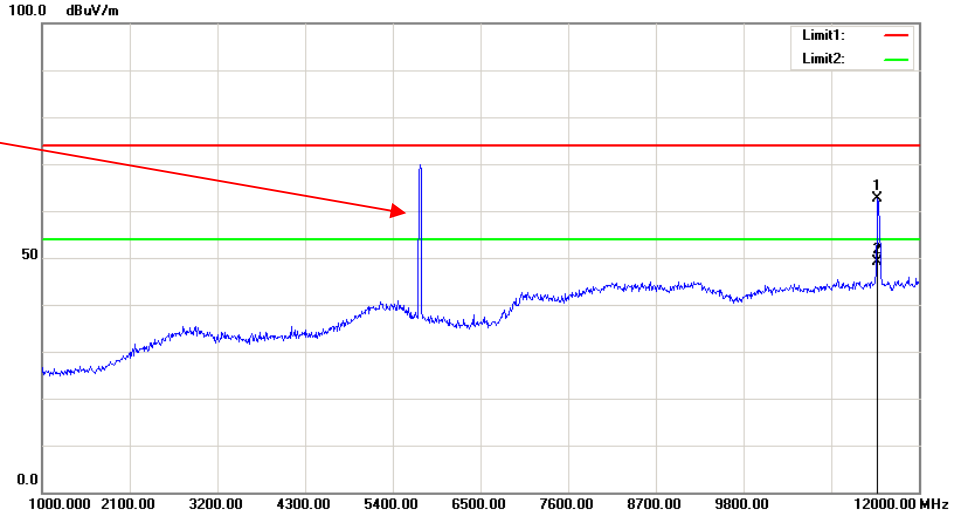
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Extrapolation result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5745 MHz										
5745.00	71.99	PK	H	34.20	3.69	0.00	109.88	103.86	N/A	N/A
5745.00	63.10	AV	H	34.20	3.69	0.00	100.99	94.97	N/A	N/A
5745.00	73.55	PK	V	34.20	3.69	0.00	111.44	105.42	N/A	N/A
5745.00	64.69	AV	V	34.20	3.69	0.00	102.58	96.56	N/A	N/A
5725.00	40.36	PK	V	34.19	3.69	0.00	78.24	72.22	122.20	49.98
5720.00	34.63	PK	V	34.19	3.69	0.00	72.51	66.49	110.80	44.31
5700.00	27.46	PK	V	34.18	3.68	0.00	65.32	59.3	105.20	45.90
5650.00	26.30	PK	V	34.16	3.63	0.00	64.09	58.07	68.20	10.13
11490.00	51.79	PK	V	38.99	6.59	37.35	60.02	54	74.00	20.00
11490.00	38.65	AV	V	38.99	6.59	37.35	46.88	40.86	54.00	13.14
17235.00	48.25	PK	V	41.56	8.78	38.61	59.98	53.96	74.00	20.04
17235.00	35.70	AV	V	41.56	8.78	38.61	47.43	41.41	54.00	12.59
Middle Channel: 5785 MHz										
5785.00	71.65	PK	H	34.21	3.71	0.00	109.57	103.55	N/A	N/A
5785.00	62.49	AV	H	34.21	3.71	0.00	100.41	94.39	N/A	N/A
5785.00	73.43	PK	V	34.21	3.71	0.00	111.35	105.33	N/A	N/A
5785.00	64.37	AV	V	34.21	3.71	0.00	102.29	96.27	N/A	N/A
11570.00	52.00	PK	V	39.00	6.61	37.44	60.17	54.15	74.00	19.85
11570.00	39.24	AV	V	39.00	6.61	37.44	47.41	41.39	54.00	12.61
17355.00	48.05	PK	V	42.26	8.81	38.52	60.60	54.58	74.00	19.42
17355.00	35.76	AV	V	42.26	8.81	38.52	48.31	42.29	54.00	11.71
High Channel: 5825 MHz										
5825.00	71.93	PK	H	34.23	3.73	0.00	109.89	103.87	N/A	N/A
5825.00	63.05	AV	H	34.23	3.73	0.00	101.01	94.99	N/A	N/A
5825.00	73.70	PK	V	34.23	3.73	0.00	111.66	105.64	N/A	N/A
5825.00	64.59	AV	V	34.23	3.73	0.00	102.55	96.53	N/A	N/A
5850.00	32.04	PK	V	34.24	3.75	0.00	70.03	64.01	122.20	58.19
5855.00	31.45	PK	V	34.24	3.75	0.00	69.44	63.42	110.80	47.38
5875.00	28.40	PK	V	34.25	3.77	0.00	66.42	60.4	105.20	44.80
5925.00	26.87	PK	V	34.27	3.80	0.00	64.94	58.92	68.20	9.28
11650.00	52.34	PK	V	39.00	6.64	37.53	60.45	54.43	74.00	19.57
11650.00	39.20	AV	V	39.00	6.64	37.53	47.31	41.29	54.00	12.71
17475.00	48.37	PK	V	42.96	8.84	38.44	61.73	55.71	74.00	18.29
17475.00	35.84	AV	V	42.96	8.84	38.44	49.20	43.18	54.00	10.82

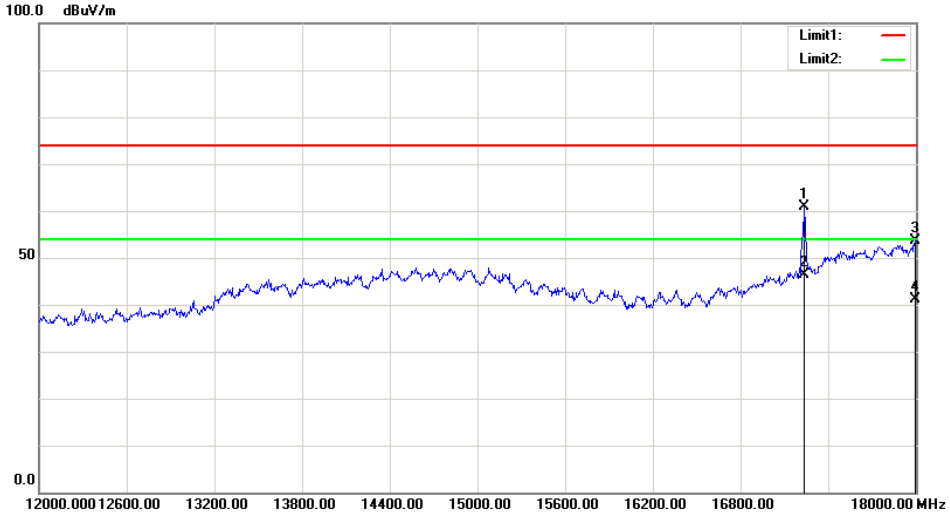
802.11n ht20(2Tx was the worst)

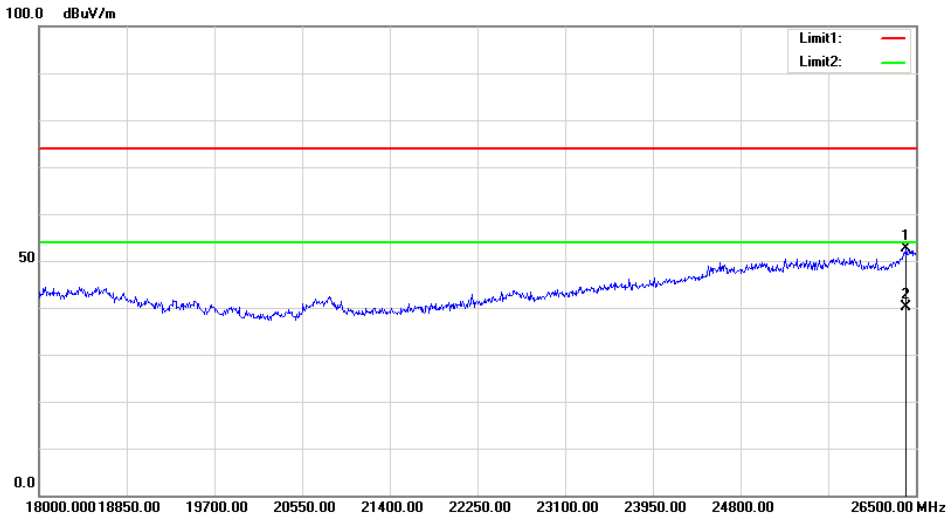
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel: 5745 MHz										
5745.00	72.06	PK	H	34.20	3.69	0.00	109.95	103.93	N/A	N/A
5745.00	63.10	AV	H	34.20	3.69	0.00	100.99	94.97	N/A	N/A
5745.00	74.43	PK	V	34.20	3.69	0.00	112.32	106.3	N/A	N/A
5745.00	65.69	AV	V	34.20	3.69	0.00	103.58	97.56	N/A	N/A
5725.00	43.15	PK	V	34.19	3.69	0.00	81.03	75.01	122.20	47.19
5720.00	35.20	PK	V	34.19	3.69	0.00	73.08	67.06	110.80	43.74
5700.00	27.85	PK	V	34.18	3.68	0.00	65.71	59.69	105.20	45.51
5650.00	26.77	PK	V	34.16	3.63	0.00	64.56	58.54	68.20	9.66
11490.00	57.10	PK	V	38.99	6.59	37.35	65.33	59.31	74.00	14.69
11490.00	44.67	AV	V	38.99	6.59	37.35	52.90	46.88	54.00	7.12
17235.00	48.60	PK	V	41.56	8.78	38.61	60.33	54.31	74.00	19.69
17235.00	36.10	AV	V	41.56	8.78	38.61	47.83	41.81	54.00	12.19
Middle Channel: 5785 MHz										
5785.00	71.65	PK	H	34.21	3.71	0.00	109.57	103.55	N/A	N/A
5785.00	62.50	AV	H	34.21	3.71	0.00	100.42	94.4	N/A	N/A
5785.00	73.78	PK	V	34.21	3.71	0.00	111.70	105.68	N/A	N/A
5785.00	64.65	AV	V	34.21	3.71	0.00	102.57	96.55	N/A	N/A
11570.00	56.52	PK	V	39.00	6.61	37.44	64.69	58.67	74.00	15.33
11570.00	44.34	AV	V	39.00	6.61	37.44	52.51	46.49	54.00	7.51
17355.00	48.50	PK	V	42.26	8.81	38.52	61.05	55.03	74.00	18.97
17355.00	36.10	AV	V	42.26	8.81	38.52	48.65	42.63	54.00	11.37
High Channel: 5825 MHz										
5825.00	71.80	PK	H	34.23	3.73	0.00	109.76	103.74	N/A	N/A
5825.00	62.70	AV	H	34.23	3.73	0.00	100.66	94.64	N/A	N/A
5825.00	74.02	PK	V	34.23	3.73	0.00	111.98	105.96	N/A	N/A
5825.00	65.10	AV	V	34.23	3.73	0.00	103.06	97.04	N/A	N/A
5850.00	33.40	PK	V	34.24	3.75	0.00	71.39	65.37	122.20	56.83
5855.00	32.61	PK	V	34.24	3.75	0.00	70.60	64.58	110.80	46.22
5875.00	28.79	PK	V	34.25	3.77	0.00	66.81	60.79	105.20	44.41
5925.00	27.12	PK	V	34.27	3.80	0.00	65.19	59.17	68.20	9.03
11650.00	56.91	PK	V	39.00	6.64	37.53	65.02	59	74.00	15.00
11650.00	44.73	AV	V	39.00	6.64	37.53	52.84	46.82	54.00	7.18
17475.00	47.98	PK	V	42.96	8.84	38.44	61.34	55.32	74.00	18.68
17475.00	35.46	AV	V	42.96	8.84	38.44	48.82	42.8	54.00	11.20

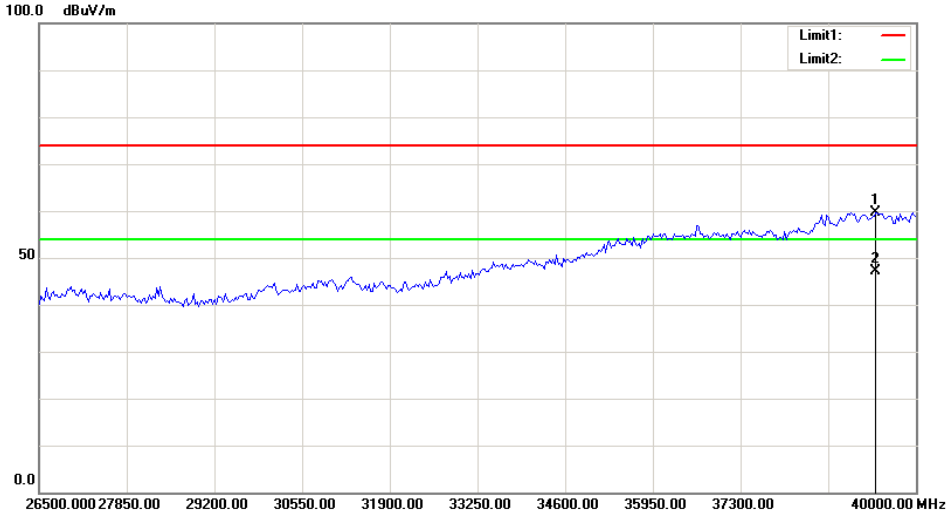
Test Plots(For worst mode 802.11a chain 0 5745MHz)
Horizontal

Fundamental Test with Band Rejection Filter



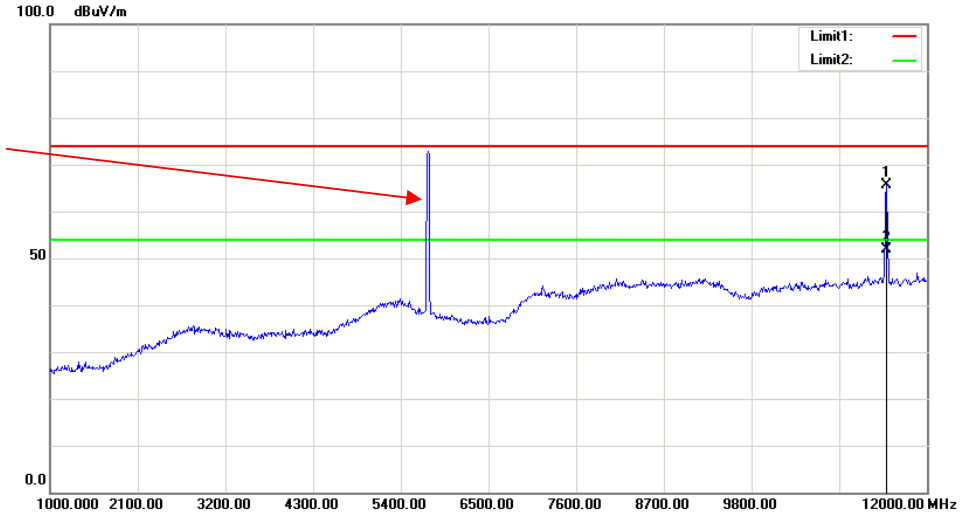


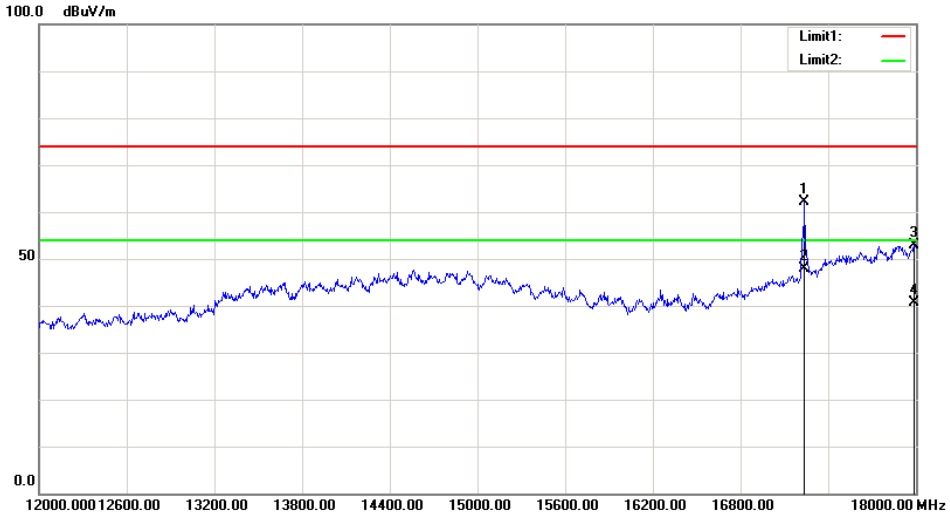


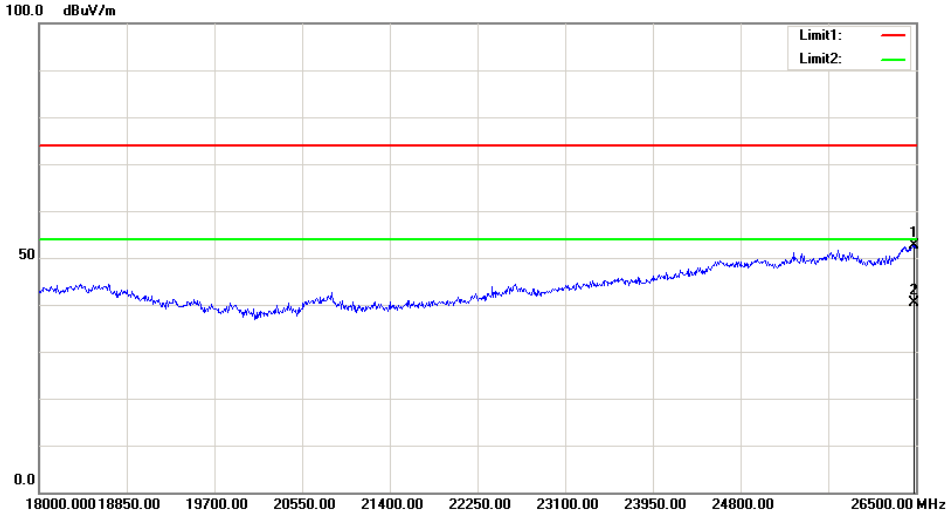


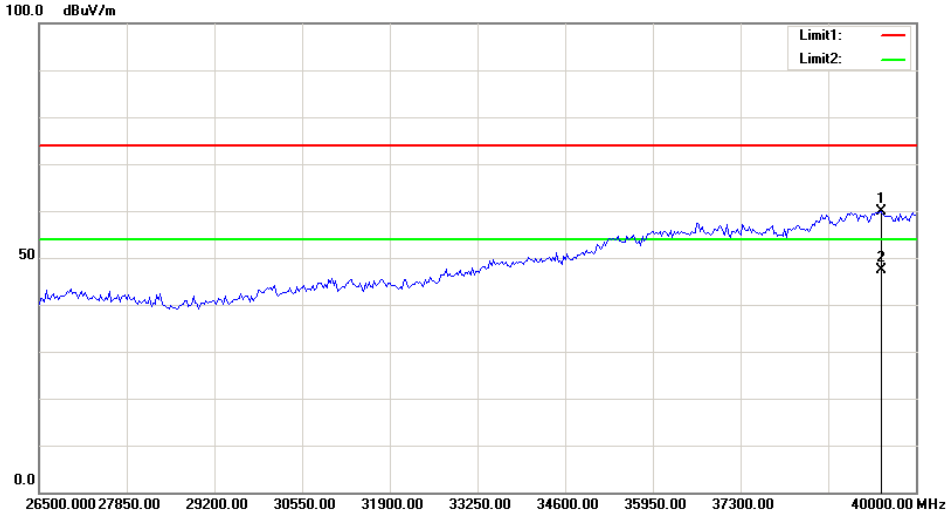
Vertical

Fundamental Test with Band Rejection Filter






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

FCC §15.407(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 UNII Test Procedures New Rules v02r01

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

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

Test Data

Environmental Conditions

Temperature:	26.9~27.6°C
Relative Humidity:	46~49 %
ATM Pressure:	99.7~100.8 kPa

The testing was performed by Tiago Huang, Andy Huang from 2018-11-07 to 2018-11-15.

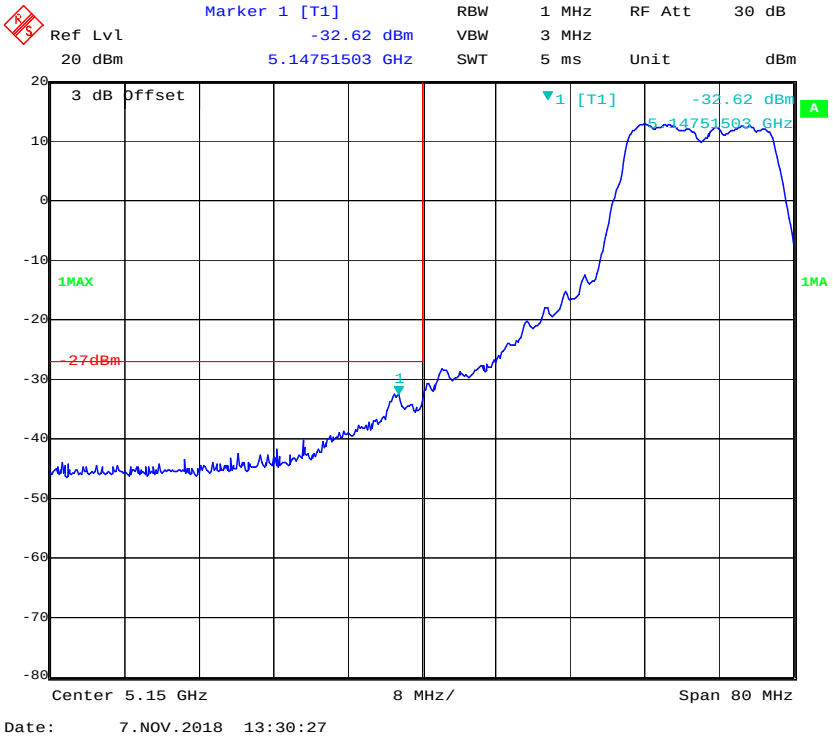
Test Result: Pass.

Please refer to the following plots.

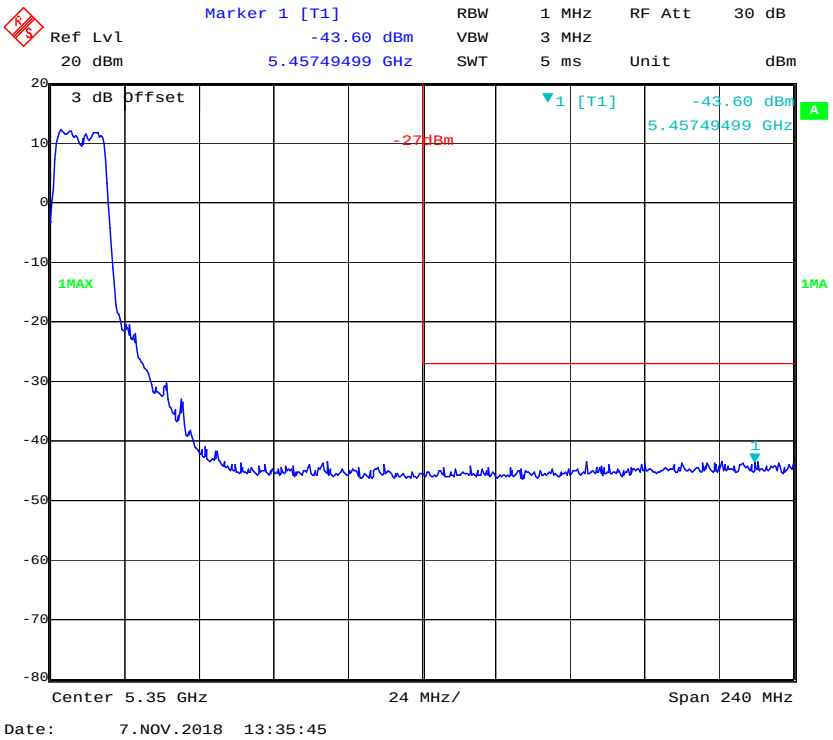
5150-5250MHz(the antenna gain was 4.4dBi, cable loss 0.5dB, offset 3dB, the worst is 2Tx, all the emisions under limit less than -31.9dBm, compliance the requirements)

Chain 0:

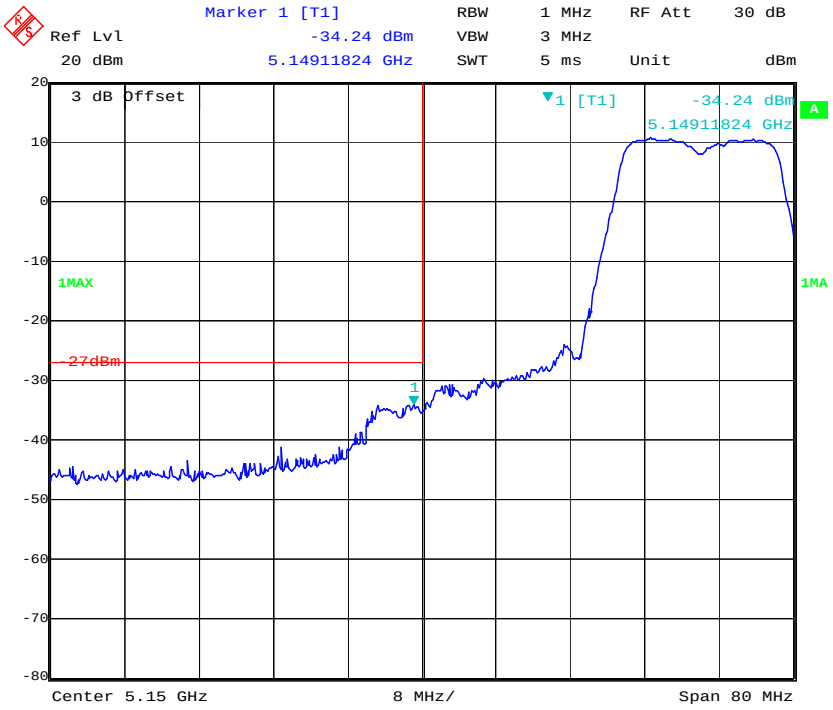
802.11a Low Channel



802.11a High Channel

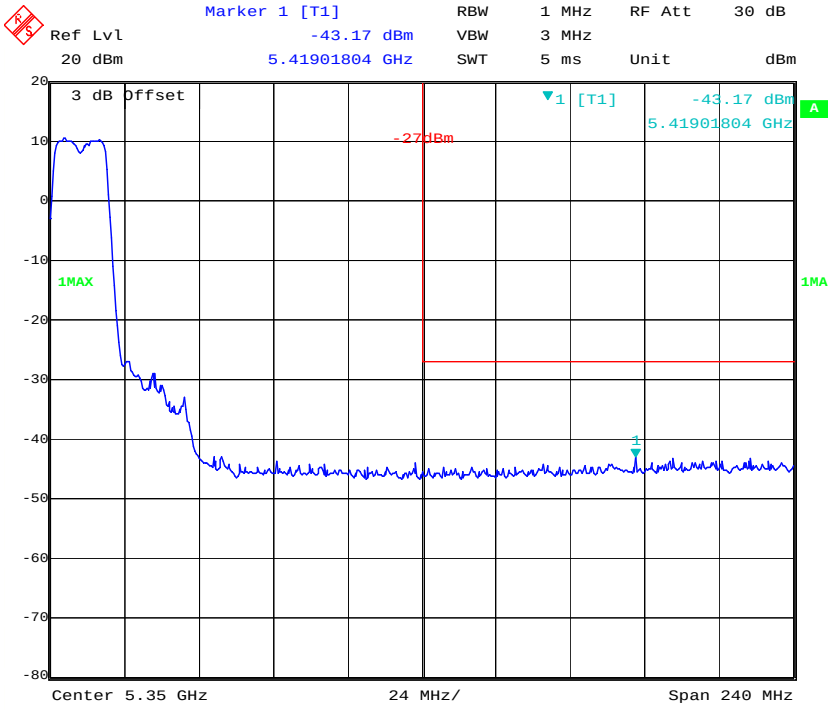


802.11n ht20 Low Channel



Date: 7.NOV.2018 13:40:43

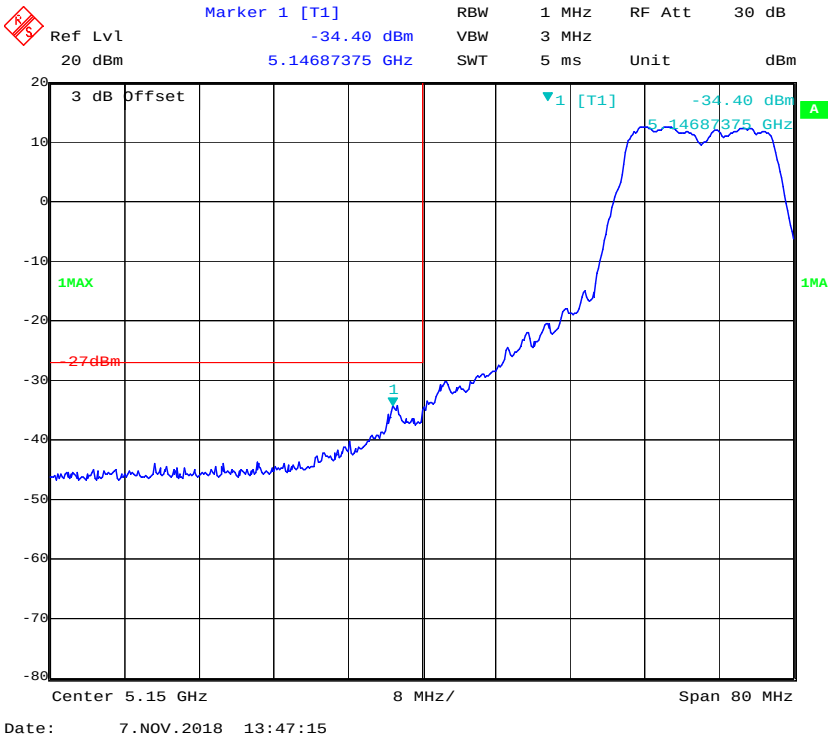
802.11n ht20 High Channel



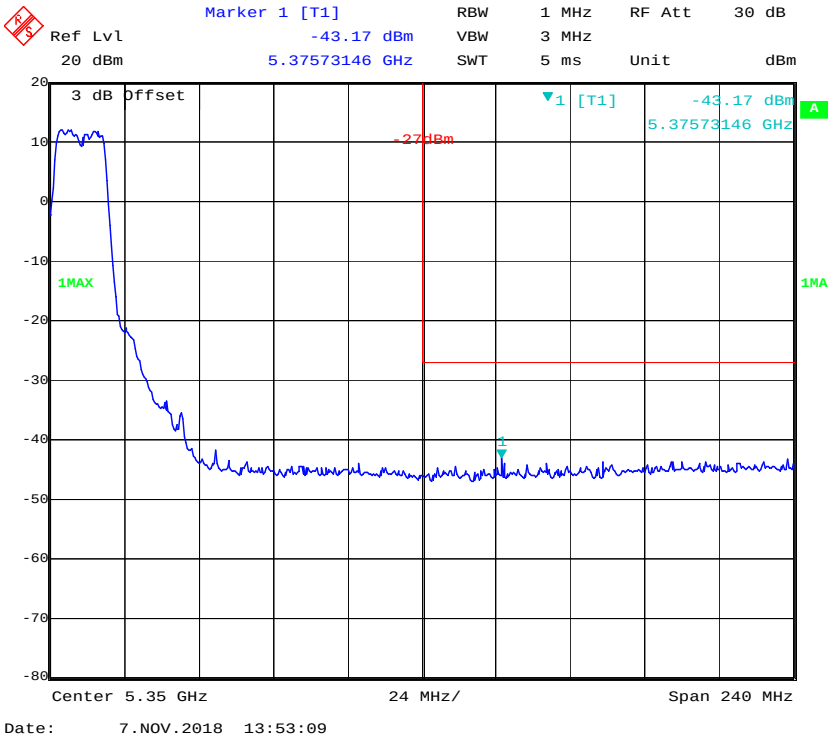
Date: 7.NOV.2018 13:44:07

Chain 1:

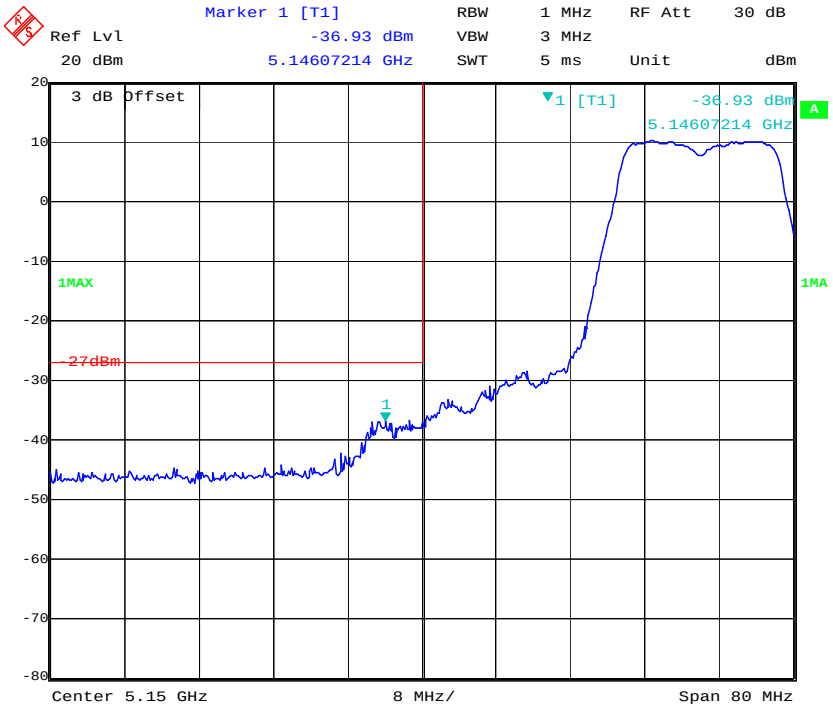
802.11a Low Channel



802.11a High Channel

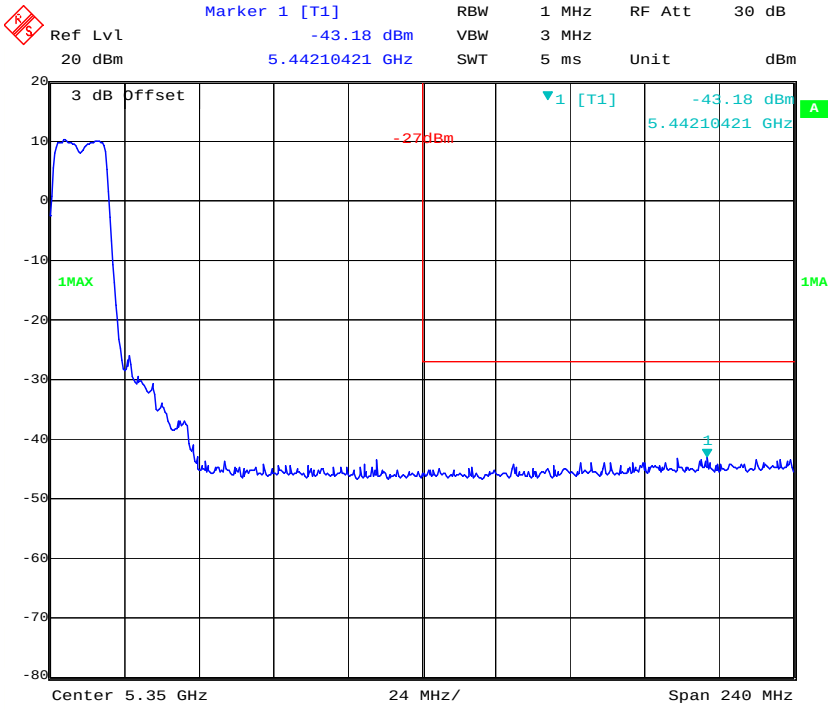


802.11n ht20 Low Channel



Date: 7.NOV.2018 14:01:14

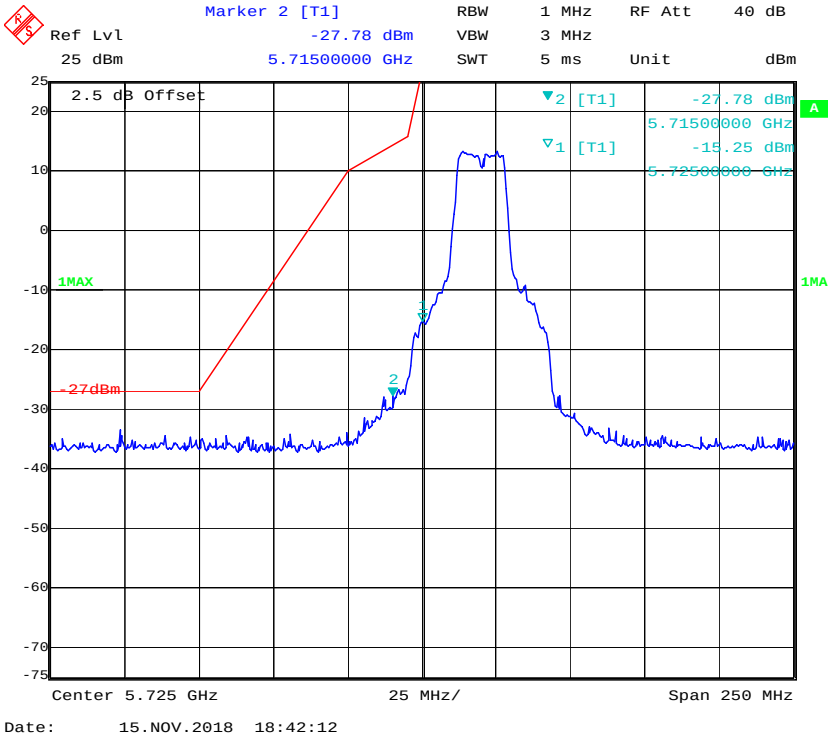
802.11n ht20 High Channel



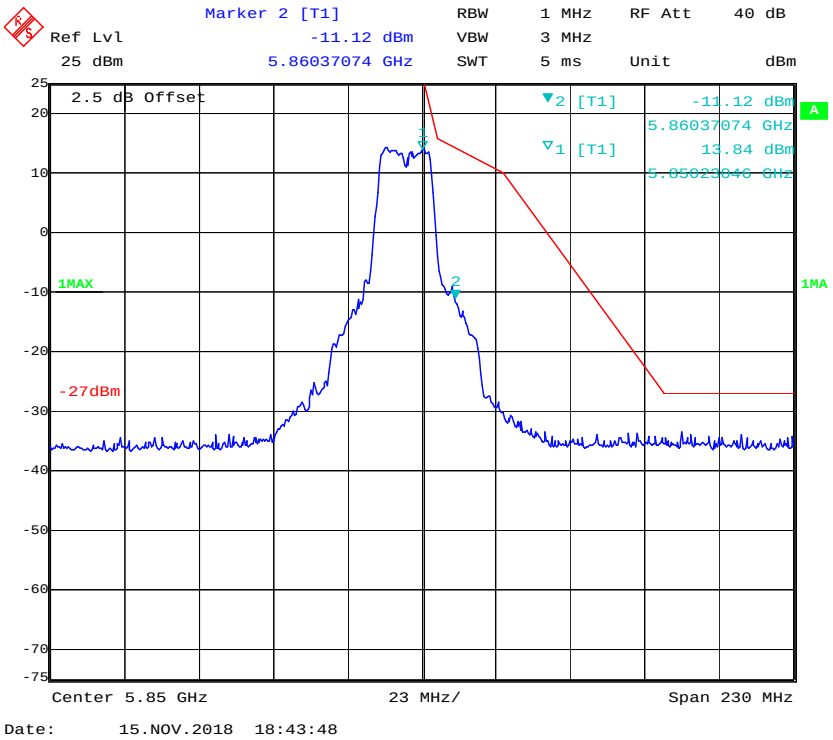
Date: 7.NOV.2018 14:05:02

5725-5850MHz(the antenna gain was 4.4dBi, two chain was the worst, cable loss 0.5dB, offset 2.5dB, all the emisions under limit less than -32.4dBm, compliance the requirements)
Chain 0:

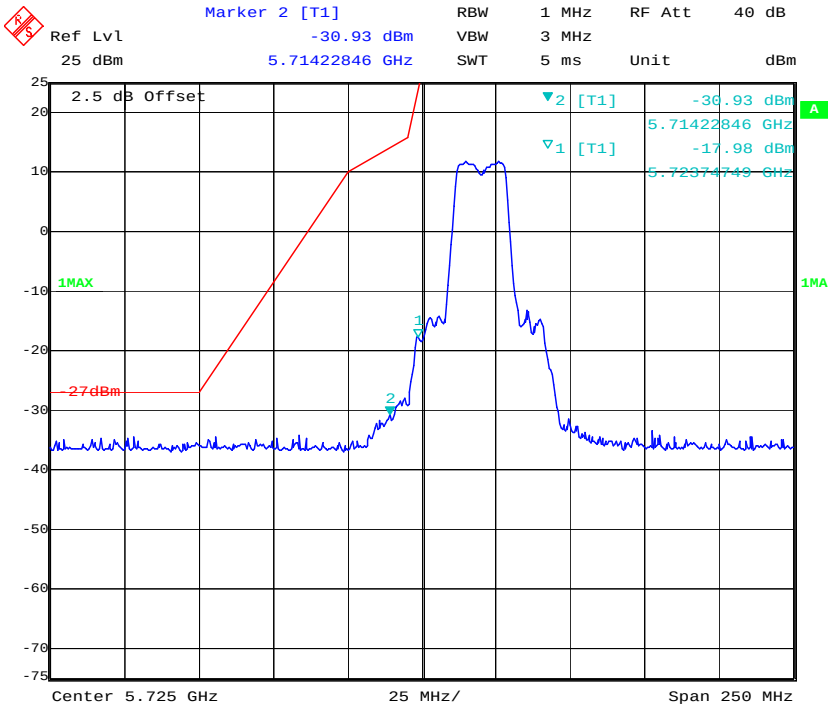
802.11a Low Channel



802.11a High Channel

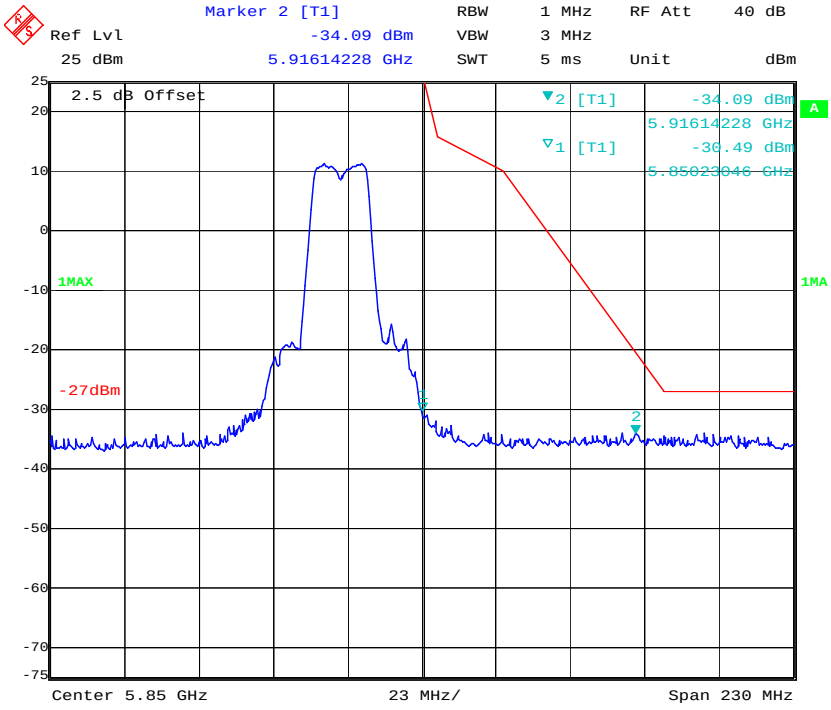


802.11n ht20 Low Channel



Date: 15.NOV.2018 18:40:57

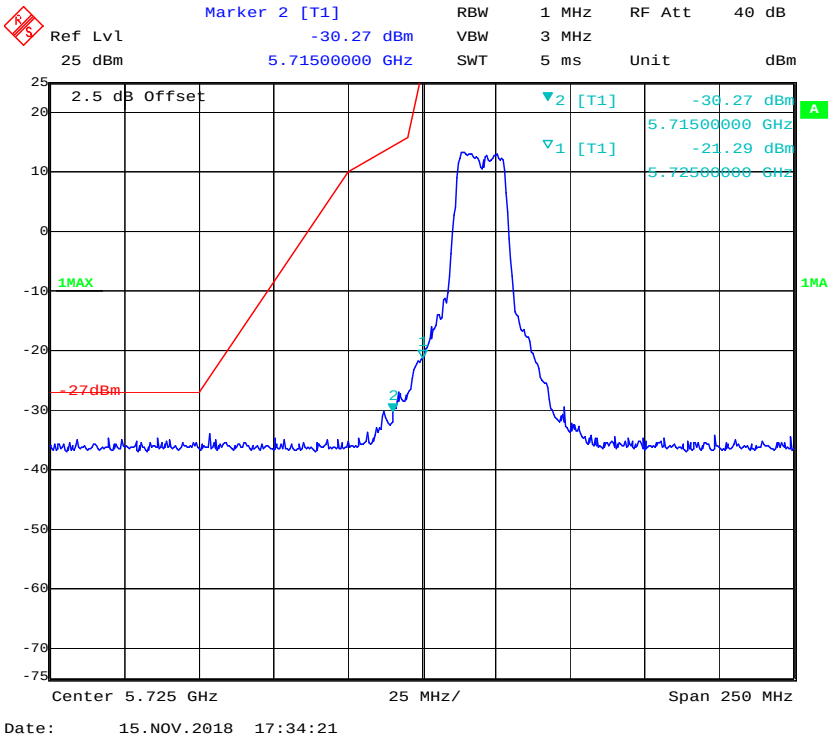
802.11n ht20 High Channel



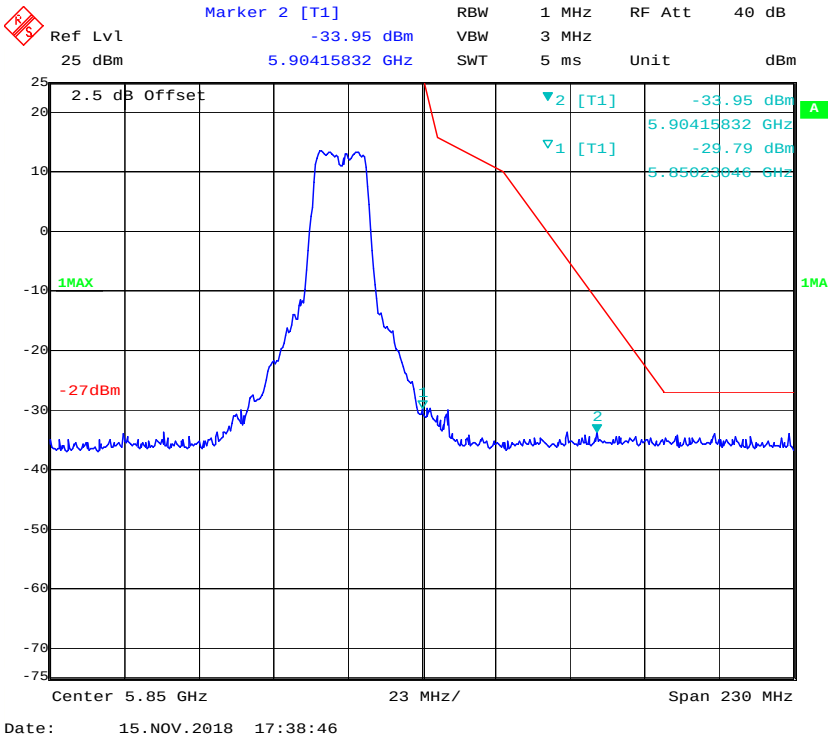
Date: 15.NOV.2018 18:34:22

Chain 1:

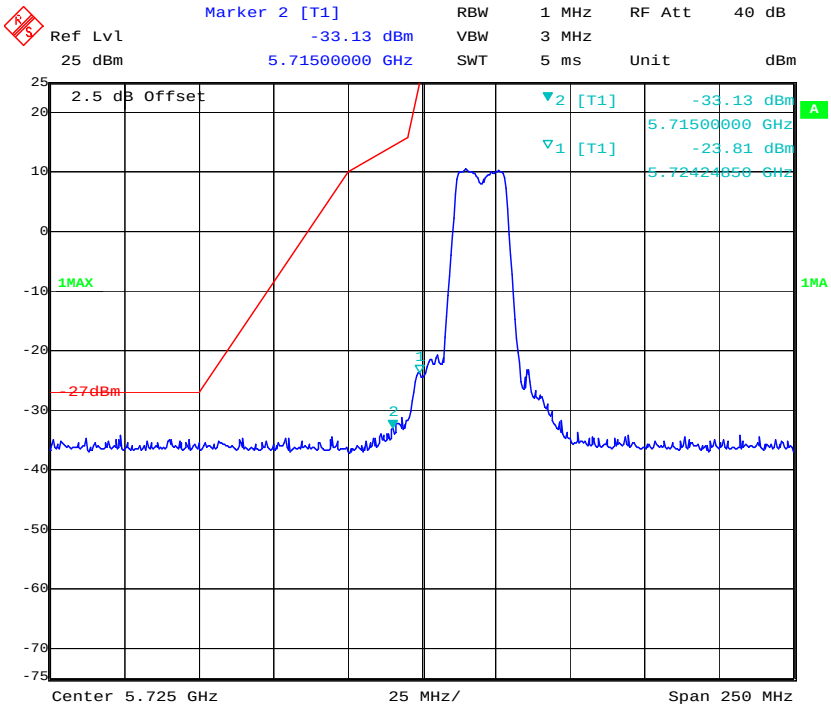
802.11a Low Channel



802.11a High Channel

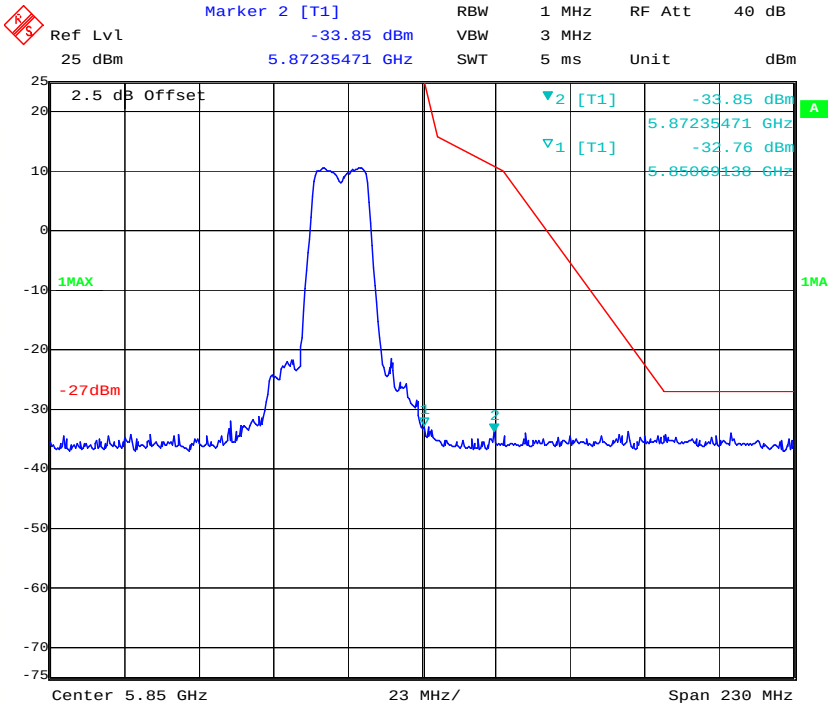


802.11n ht20 Low Channel



Date: 15.NOV.2018 17:42:18

802.11n ht20 High Channel



Date: 15.NOV.2018 18:31:33

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

Applicable Standard

15.407(a) (e)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

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

Test Procedure

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

Test Data

Environmental Conditions

Temperature:	26.9~27.6°C
Relative Humidity:	46~49 %
ATM Pressure:	99.7~100.8 kPa

The testing was performed by Tiago Huang, Andy Huang from 2018-11-07 to 2018-11-15.

Test Result: Pass.

Please refer to the following tables and plots.

Test mode: Transmitting(Test performed at chain 0)

5150-5250MHz:

Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11 a	5180	21.002	16.834
	5200	21.002	16.754
	5240	20.681	16.754
802.11n ht20	5180	21.162	17.715
	5200	21.162	17.715
	5240	21.242	17.715

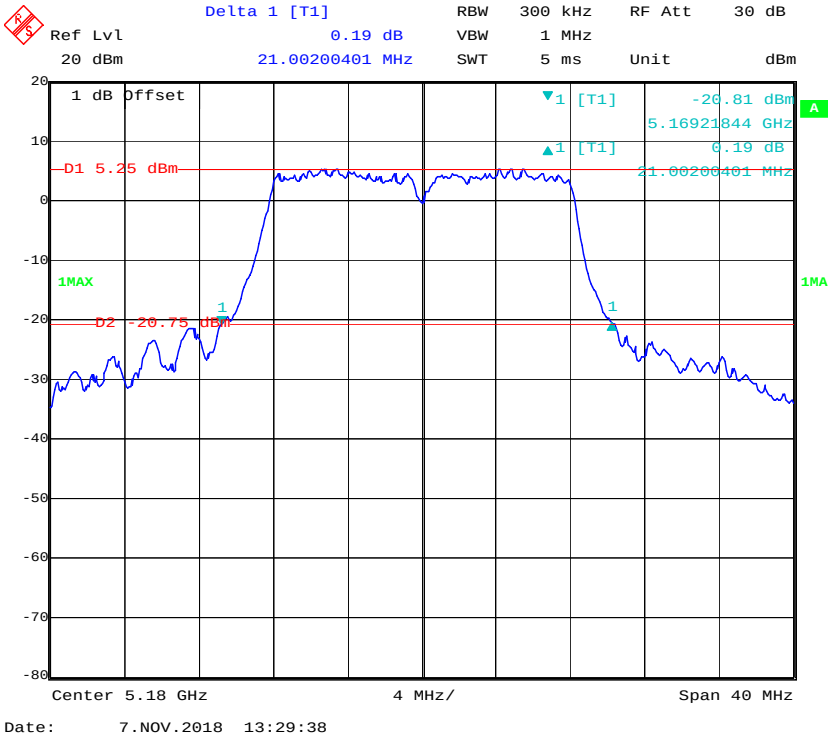
5725-5850MHz:

Mode	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11 a	5745	16.593	16.914
	5785	16.593	16.914
	5825	16.593	16.914
802.11n ht20	5745	17.796	17.956
	5785	17.796	17.876
	5825	17.796	17.876

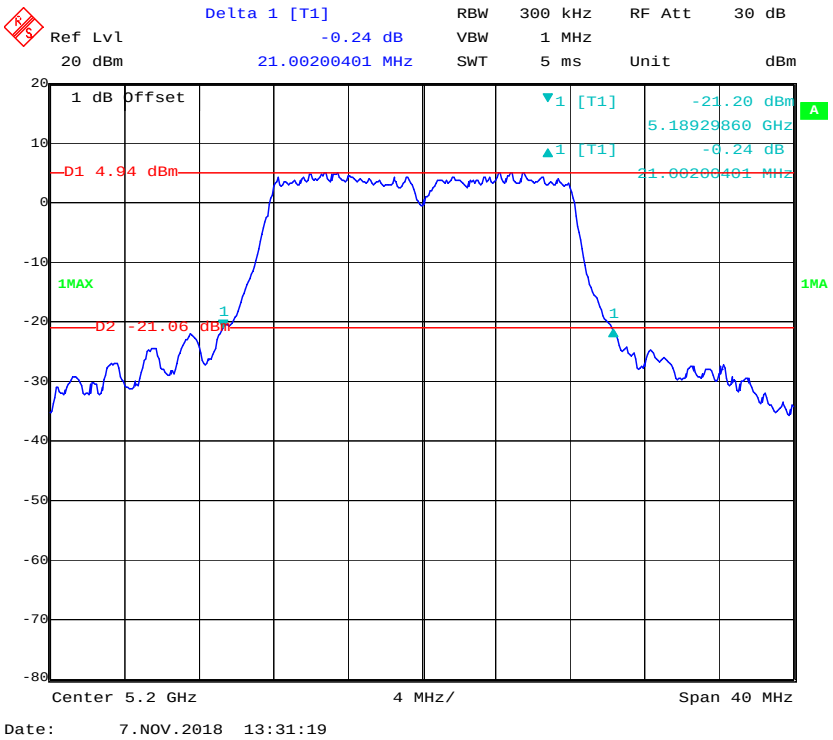
Note: the 99% Occupied Bandwidth have not fall into the band 5150-5250MHz or 5470-5725MHz, please refer to the test plots of 99% Occupied Bandwidth.

5150-5250MHz:
26dB Emission Bandwidth:
Chain0

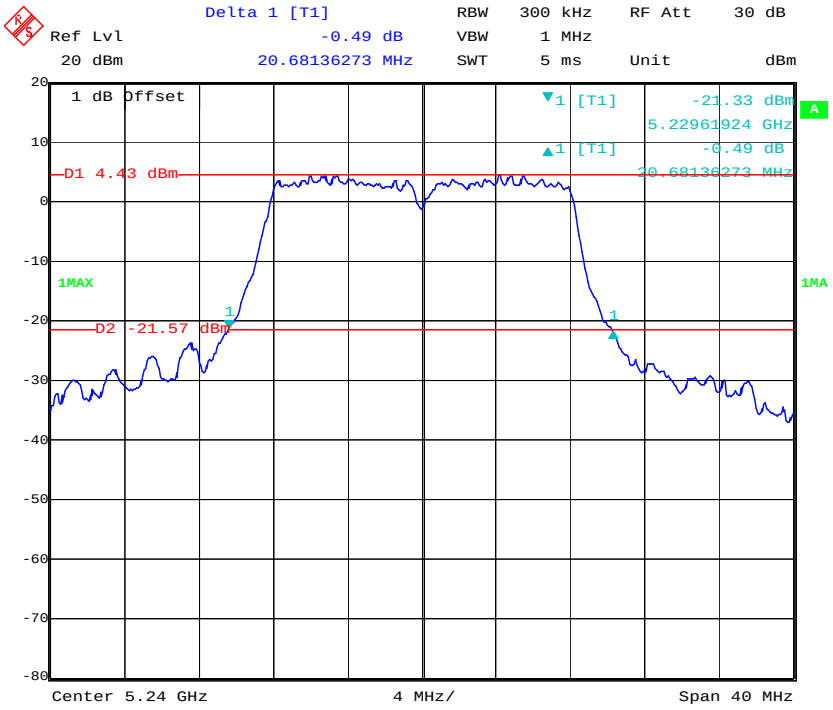
802.11a Low Channel



802.11a Middle Channel

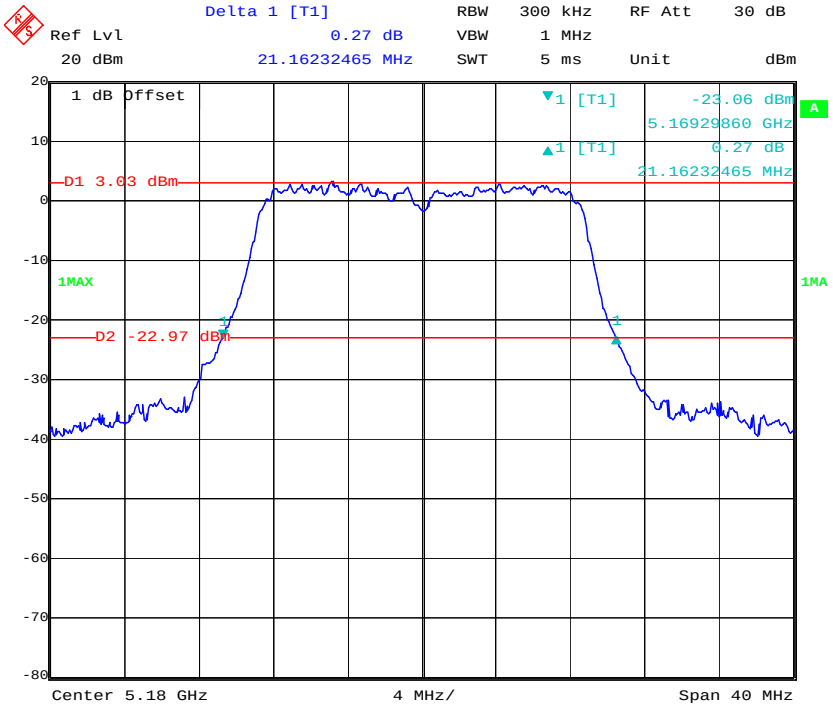


802.11a High Channel



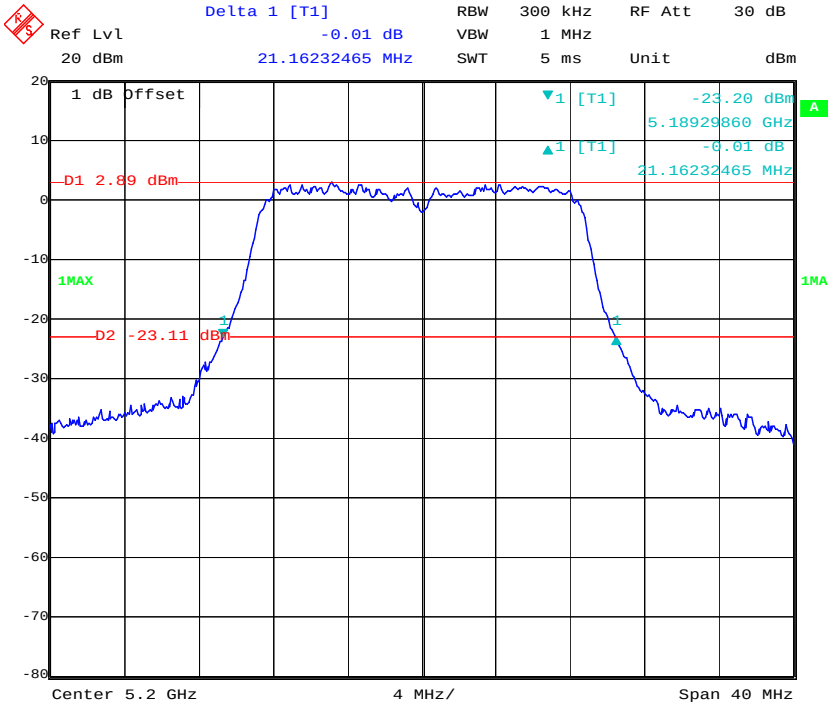
Date: 7.NOV.2018 13:34:50

802.11n ht20 Low Channel



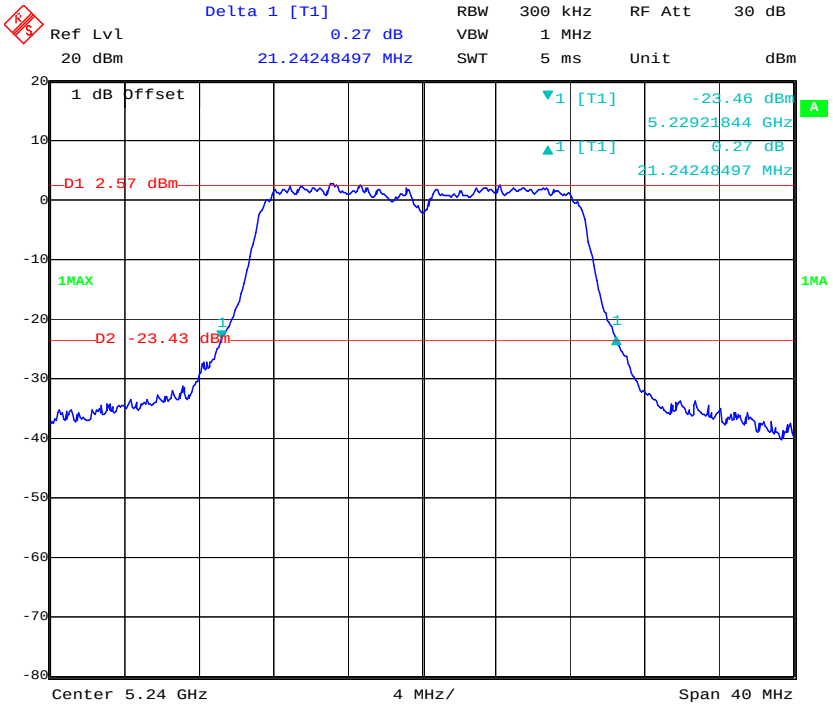
Date: 7.NOV.2018 13:39:42

802.11n ht20 Middle Channel



Date: 7.NOV.2018 13:41:45

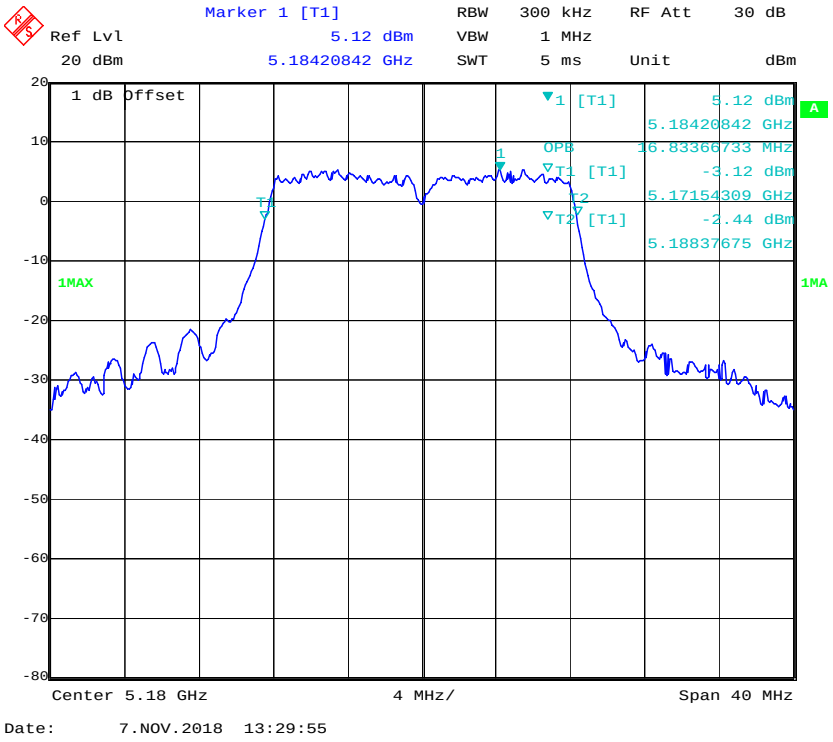
802.11n ht20 High Channel



Date: 7.NOV.2018 13:43:15

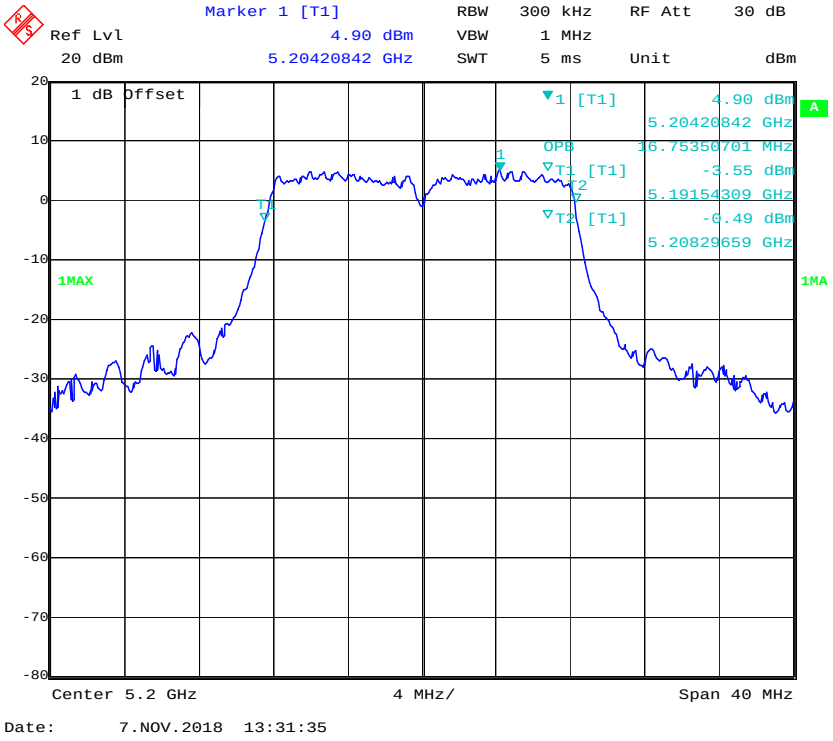
99% Occupied Bandwidth:

802.11a Low Channel



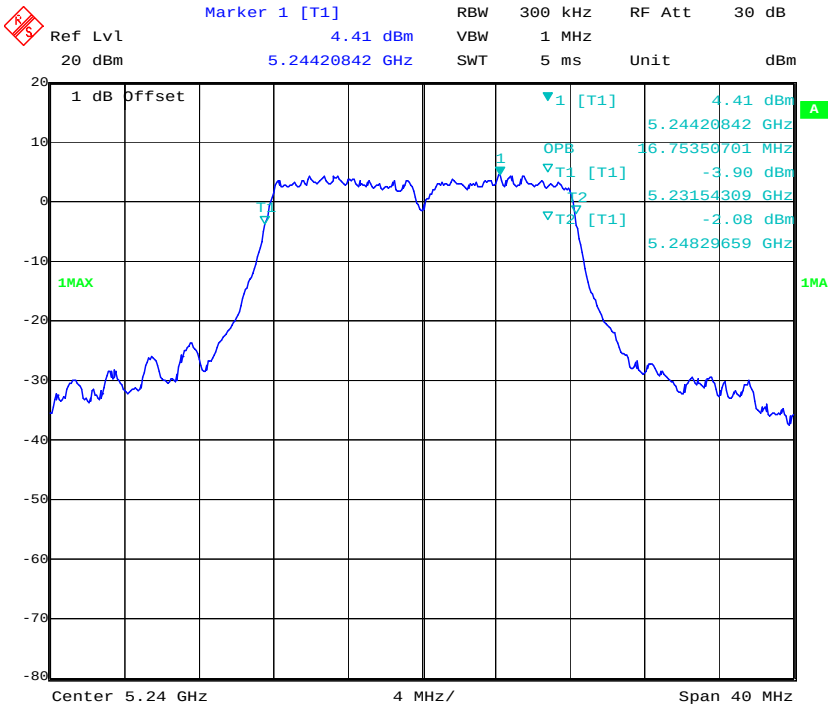
Date: 7.NOV.2018 13:29:55

802.11a Middle Channel



Date: 7.NOV.2018 13:31:35

802.11a High Channel



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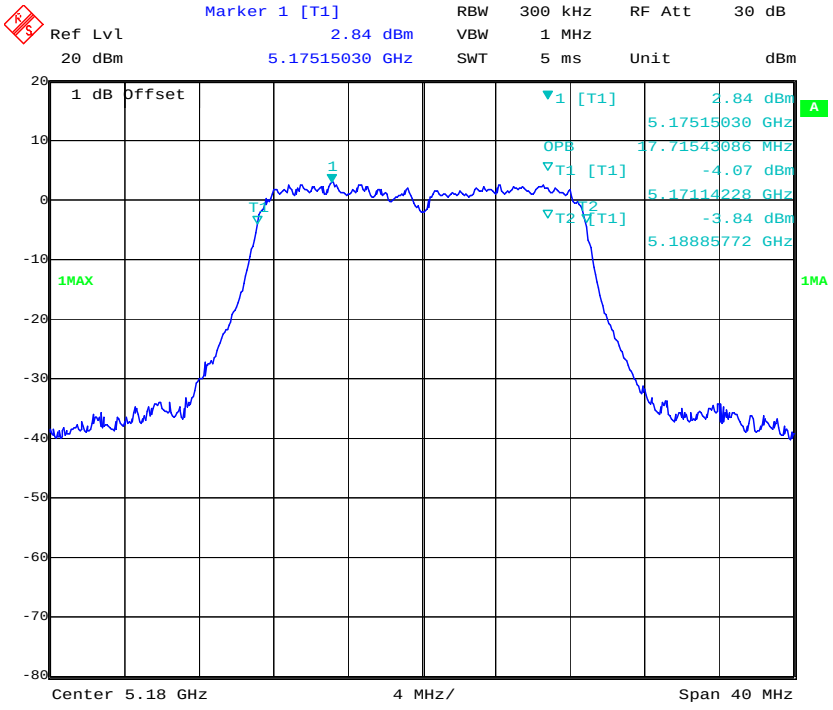
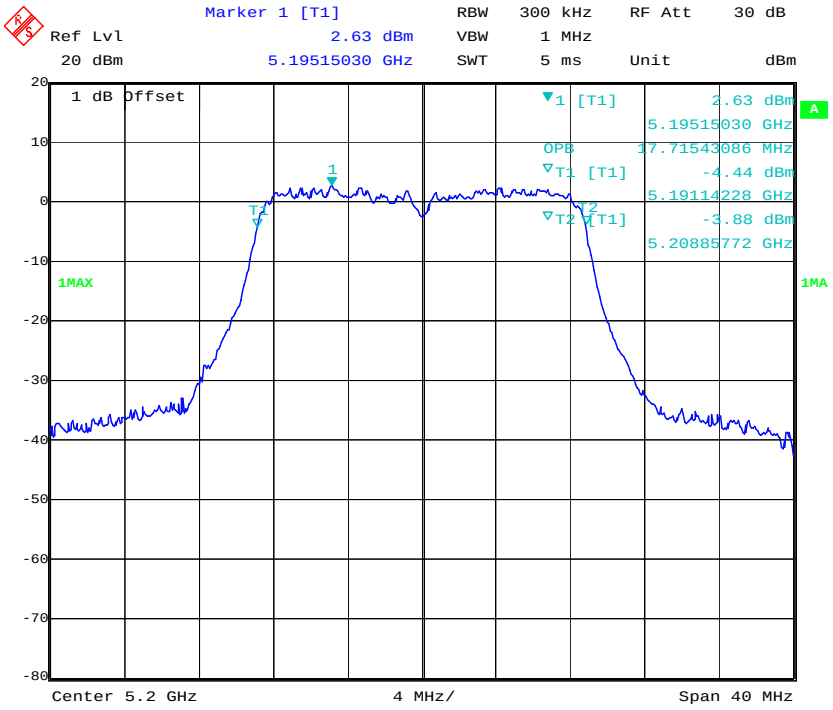
802.11n ht20 Low Channel



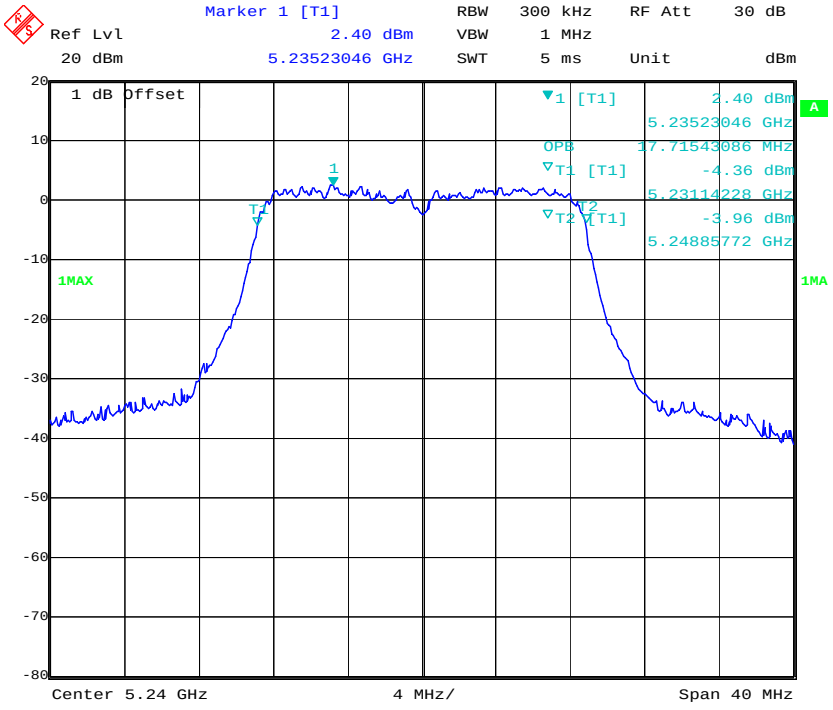
Date: 7.NOV.2018 13:40:05

802.11n ht20 Middle Channel



Date: 7.NOV.2018 13:42:04

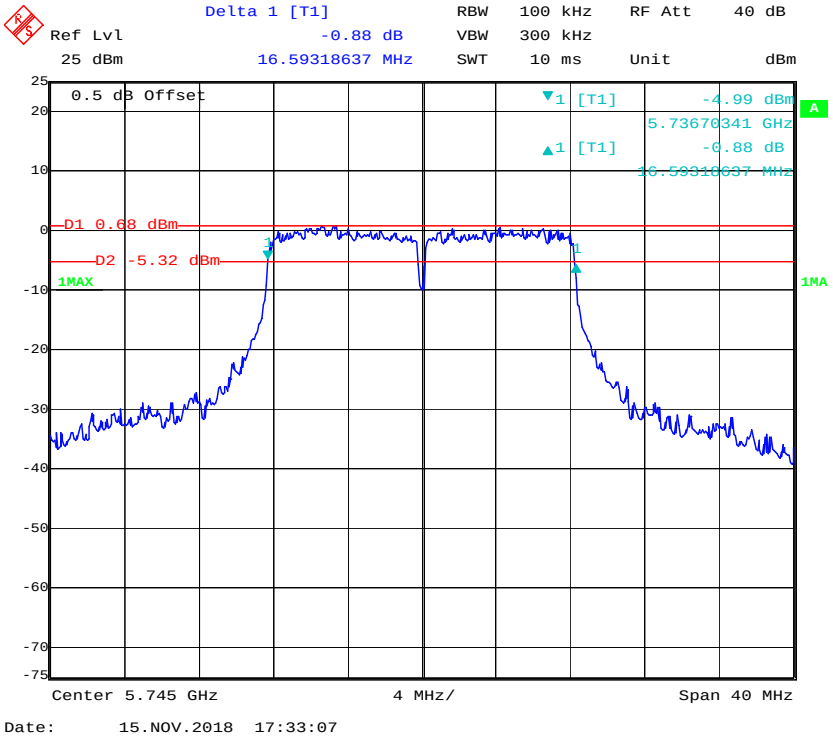
802.11n ht20 High Channel



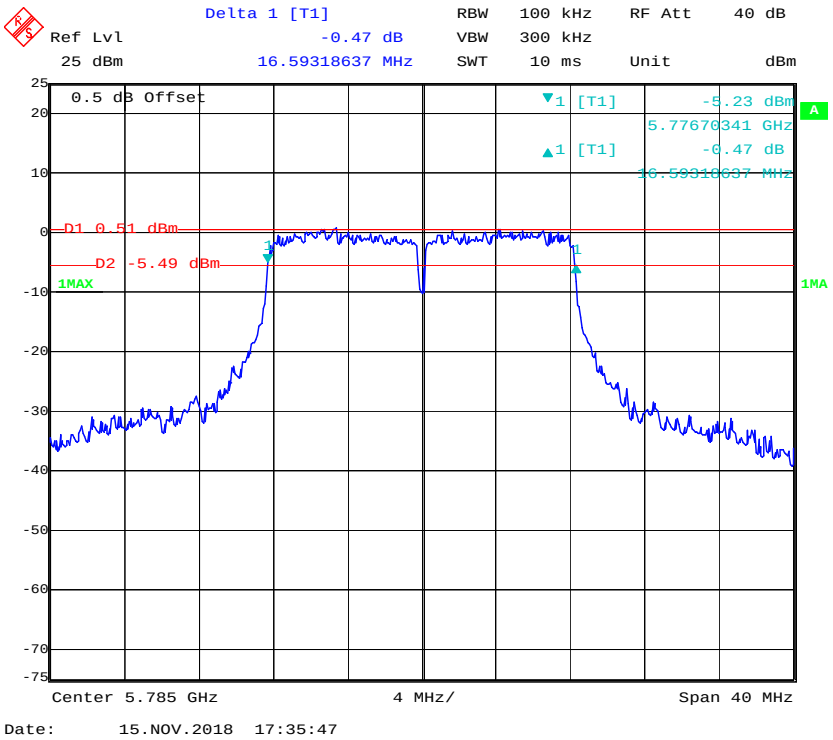
Date: 7.NOV.2018 13:43:32

5725-5850MHz:
6dB Emission Bandwidth:
Chain0

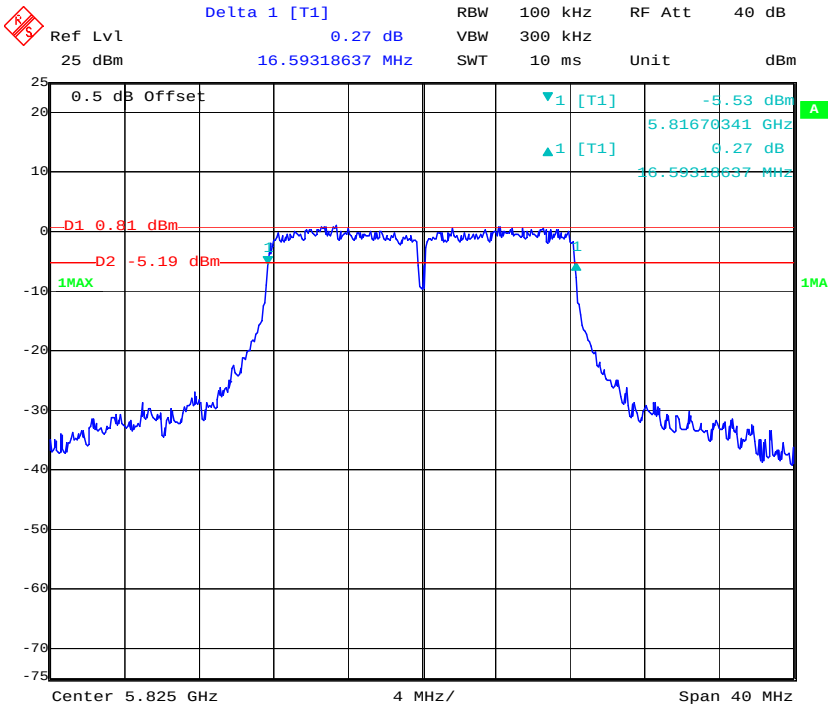
802.11a Low Channel



802.11a Middle Channel

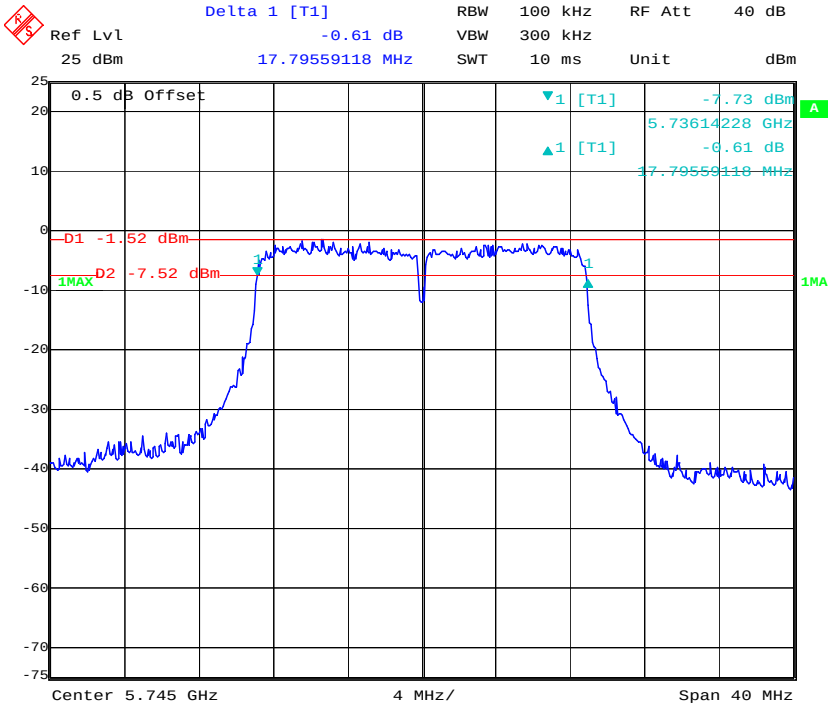


802.11a High Channel



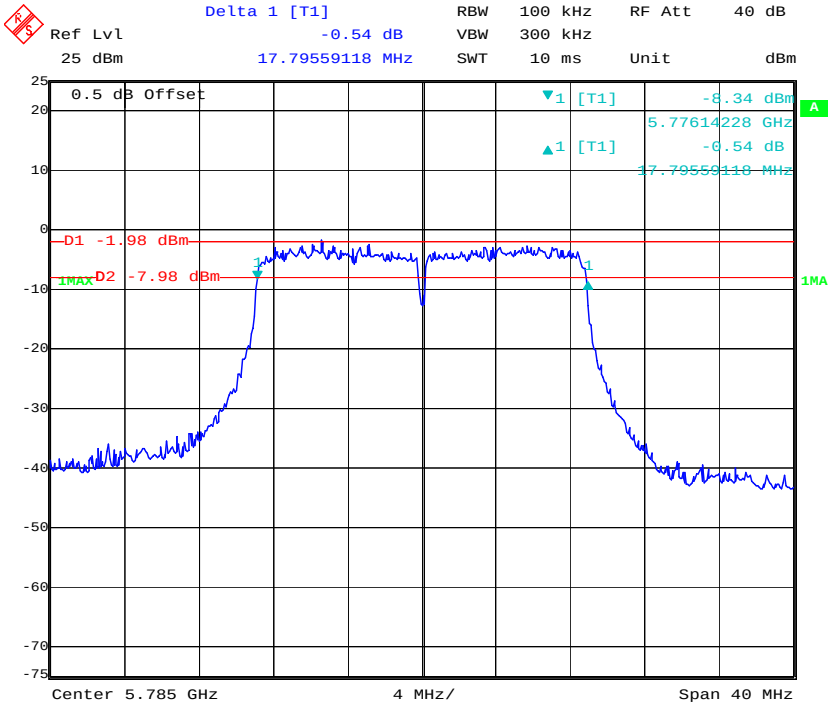
Date: 15.NOV.2018 17:37:32

802.11n ht20 Low Channel

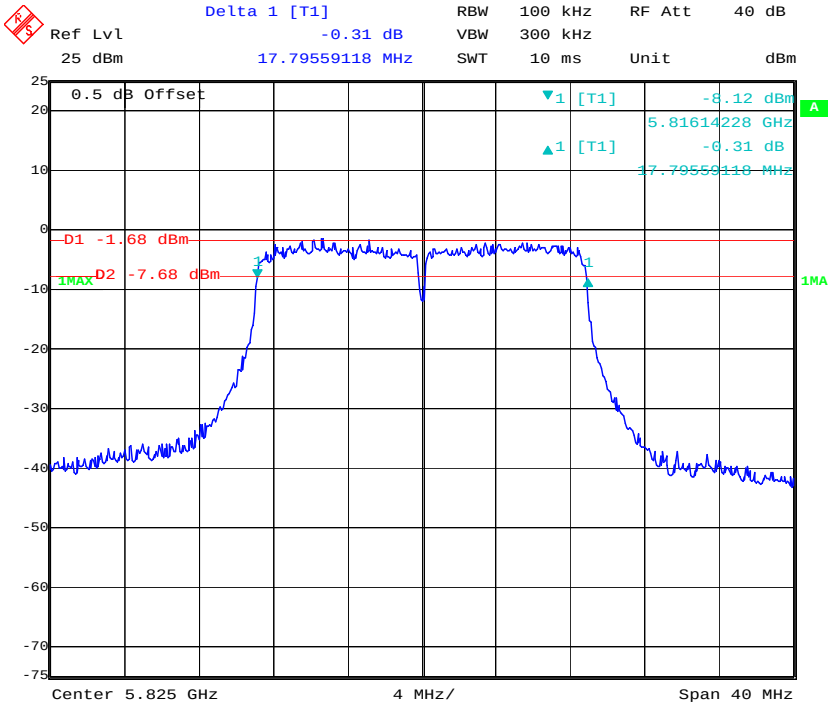


Date: 15.NOV.2018 17:40:54

802.11n ht20 Middle Channel

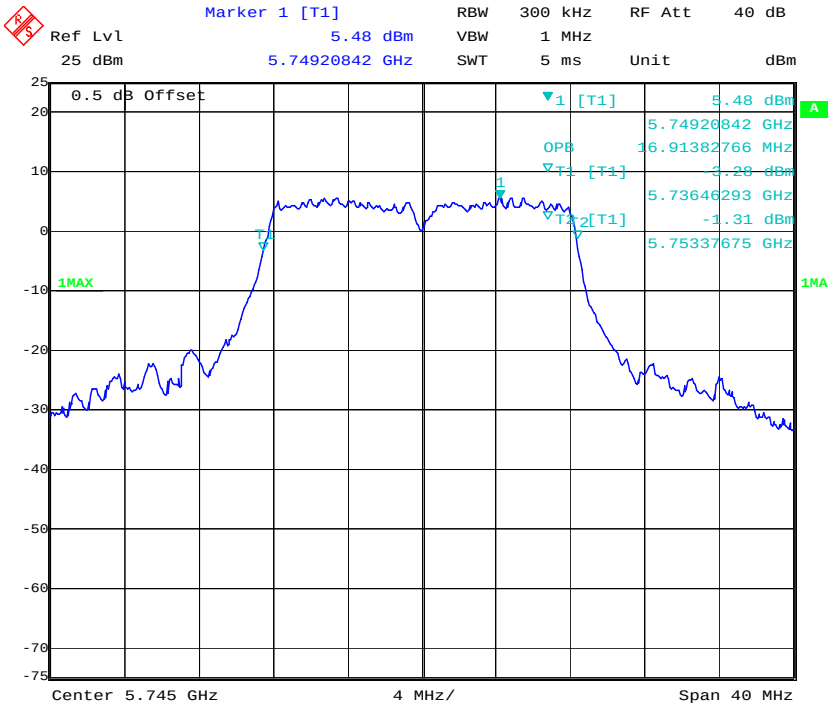


802.11n ht20 High Channel



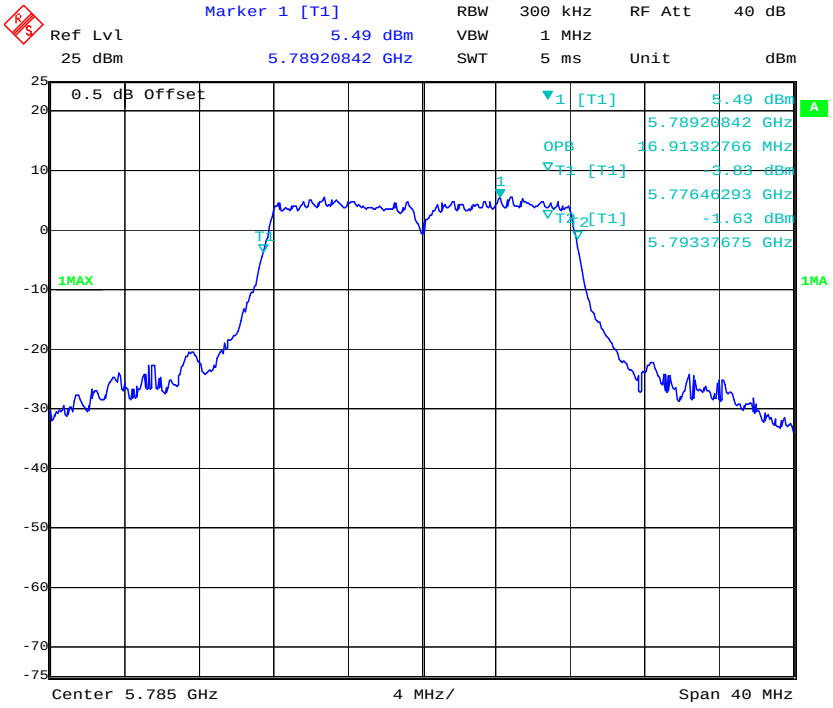
99% Occupied Bandwidth:

802.11a Low Channel



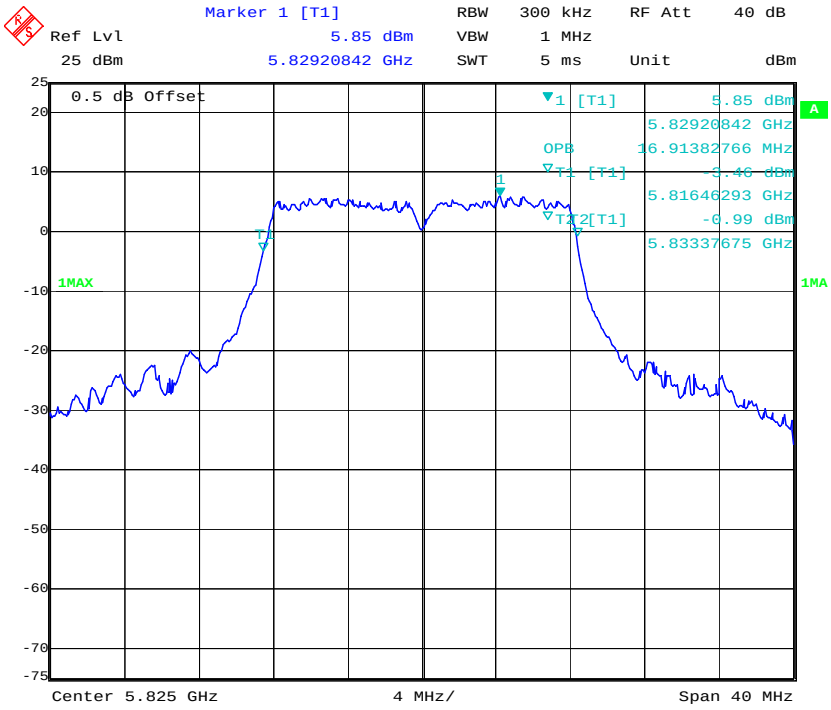
Date: 15.NOV.2018 17:33:25

802.11a Middle Channel



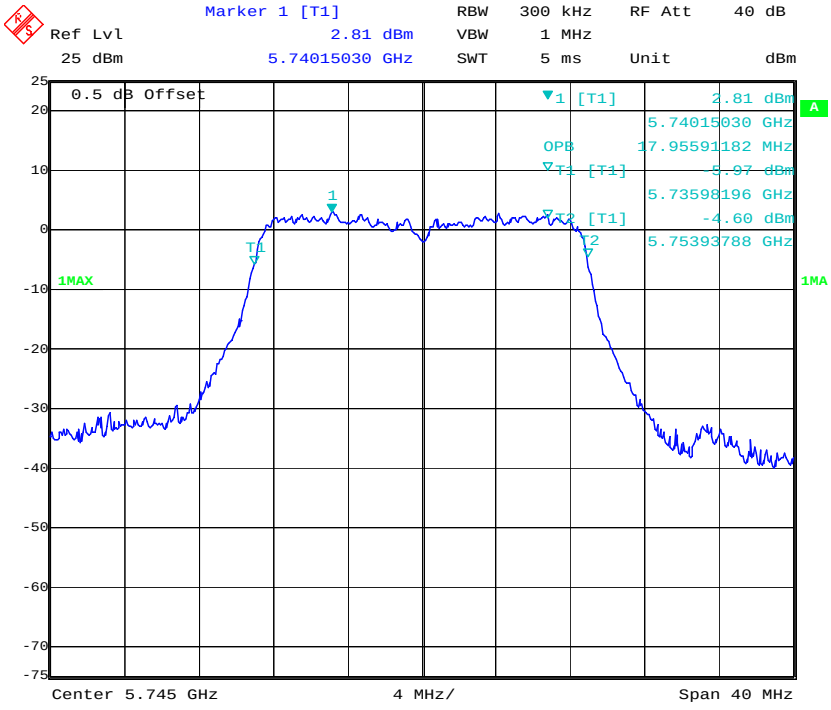
Date: 15.NOV.2018 17:36:01

802.11a High Channel



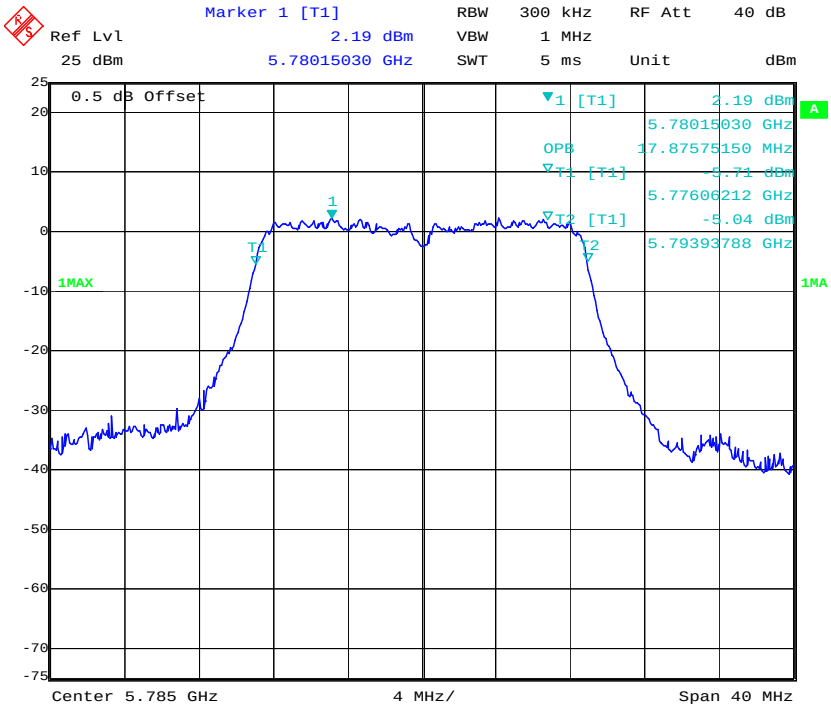
Date: 15.NOV.2018 17:37:48

802.11n ht20 Low Channel



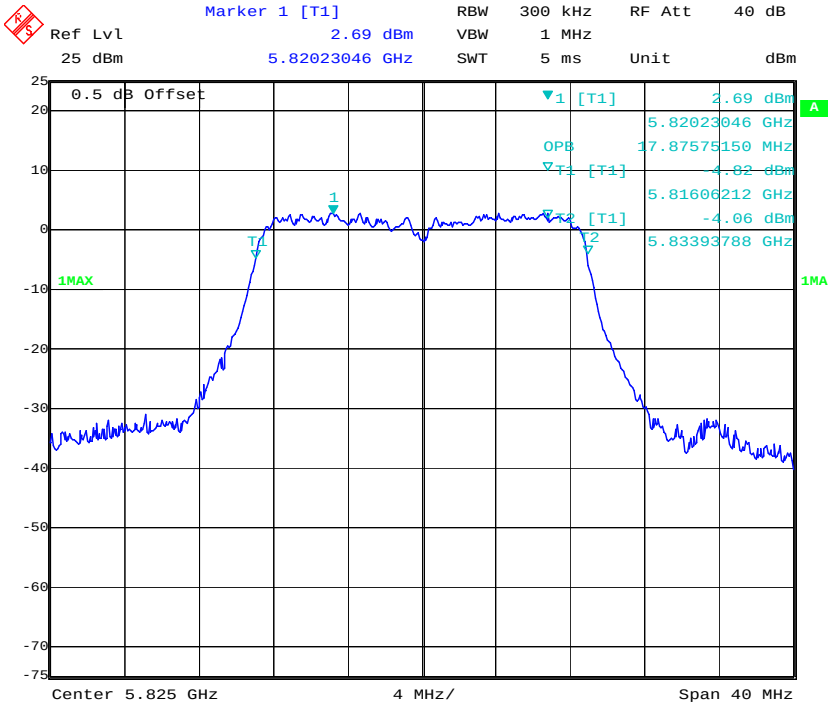
Date: 15.NOV.2018 17:41:11

802.11n ht20 Middle Channel



Date: 15.NOV.2018 17:43:51

802.11n ht20 High Channel



Date: 15.NOV.2018 18:30:34

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
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

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

Test Procedure

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

Test Data

Environmental Conditions

Temperature:	26.9~27.6°C
Relative Humidity:	46~49 %
ATM Pressure:	99.7~100.8 kPa

The testing was performed by Tiago Huang, Andy Huang from 2018-11-07 to 2018-11-15.

Test Mode: Transmitting

UNII Band	Mode	Frequency (MHz)	Conducted Average Output Power (dBm)			Limit (dBm)	Result
			Chain 0	Chain 1	Total		
5150 - 5250 MHz	802.11a	5180	14.04	13.94	/	30	PASS
		5200	14.11	14.16	/	30	PASS
		5240	13.95	13.98	/	30	PASS
	802.11n ht20	5180	12.84	12.75	15.81	30	PASS
		5200	12.93	12.95	15.95	30	PASS
		5240	12.94	12.84	15.90	30	PASS
5725 - 5850 MHz	802.11 a	5745	14.08	14.15	/	30	PASS
		5785	14.03	14.12	/	30	PASS
		5825	13.96	14.01	/	30	PASS
	802.11n ht20	5745	11.53	11.37	14.46	30	PASS
		5785	12.67	12.61	15.65	30	PASS
		5825	11.68	11.84	14.77	30	PASS

Note:
The maximum antenna gain is 4.4dBi 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 = 4.4dBi < 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 UNII Test Procedures New Rules v02r01

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

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

Test Data

Environmental Conditions

Temperature:	26.9~27.6°C
Relative Humidity:	46~49 %
ATM Pressure:	99.7~100.8 kPa

The testing was performed by Tiago Huang, Andy Huang from 2018-11-07 to 2018-11-15.

Test Mode: Transmitting

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

5150-5250MHz:

Mode	Frequency (MHz)	Power Spectral Density (dBm/MHz)			Limit (dBm/MHz)
		Chain 0	Chain 1	Total	
802.11a	5180	3.75	3.55	/	17
	5200	3.56	3.70	/	17
	5240	3.10	3.07	/	17
802.11n ht20	5180	1.38	0.99	4.20	17
	5200	1.20	1.50	4.36	17
	5240	1.00	1.03	4.03	17

5725-5850 MHz:

Mode	Frequency (MHz)	Reading (dBm/300kHz)		Power Spectral Density (dBm/500kHz)			
		Chain 0	Chain 1	Chain 0	Chain 1	Total	Limits
802.11 a	5745	0.91	0.45	3.13	2.67	/	30
	5785	1.04	0.47	3.26	2.69	/	30
	5825	1.34	0.78	3.56	3.00	/	30
802.11n ht20	5745	0.64	-0.56	2.86	1.66	5.31	30
	5785	-0.94	-1.53	1.28	0.69	4.01	30
	5825	-1.14	-0.82	1.08	1.4	4.25	30

Note 1:The maximum antenna gain is 4.4dBi in 5GHz band. The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices:

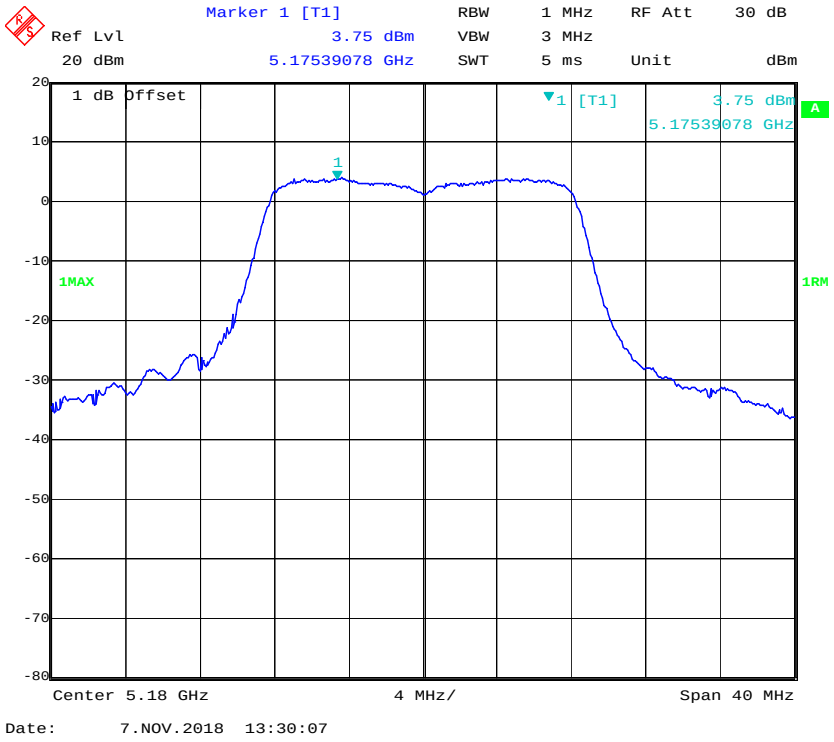
Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

So:

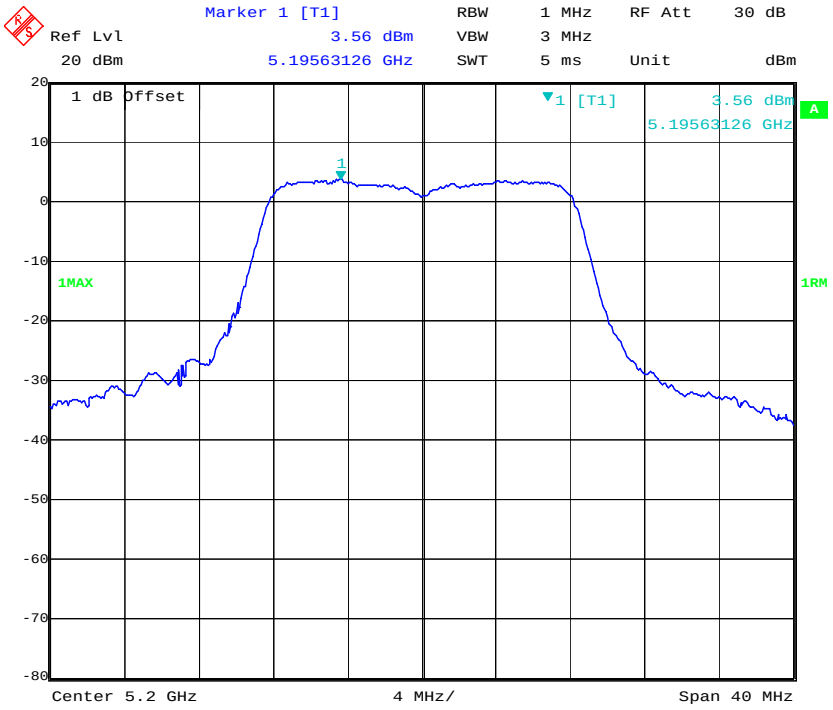
Directional gain = G_{ANT} + Array Gain = 4.4dBi+10*log(2/2)=4.4dBi

5150-5250MHz
Chain 0:

802.11a Low Channel

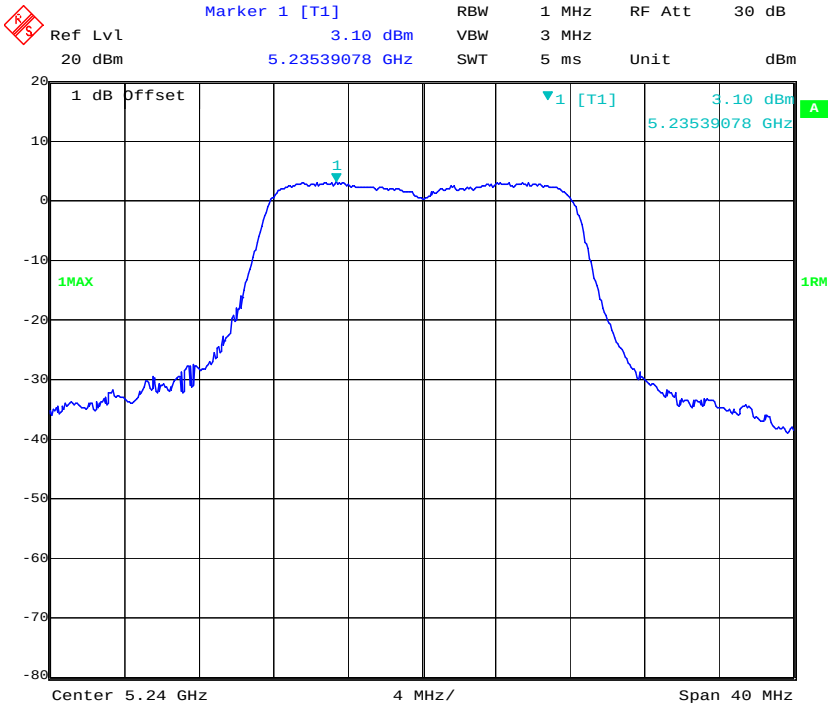


802.11a Middle Channel



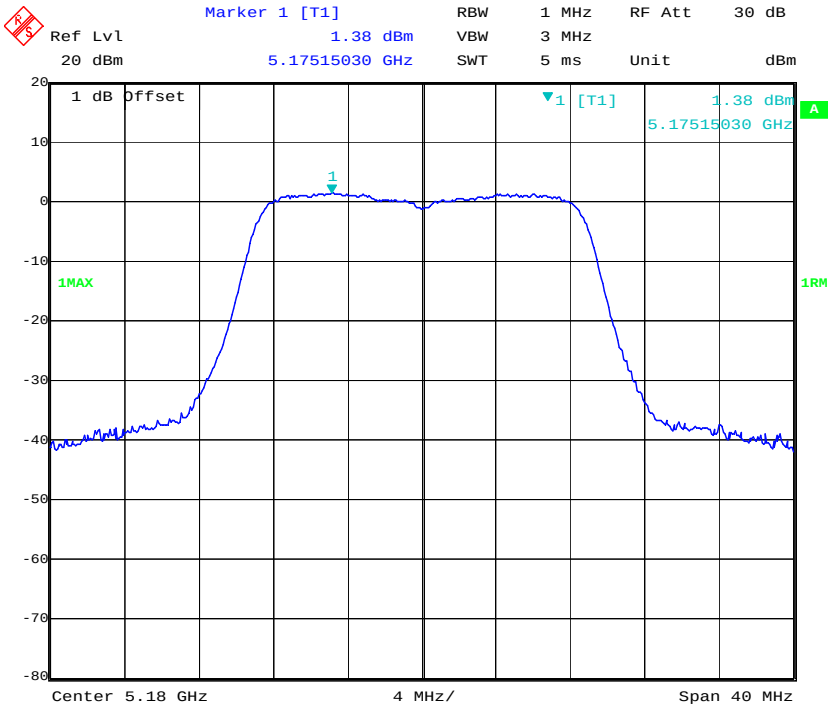
Date: 7.NOV.2018 13:31:54

802.11a High Channel



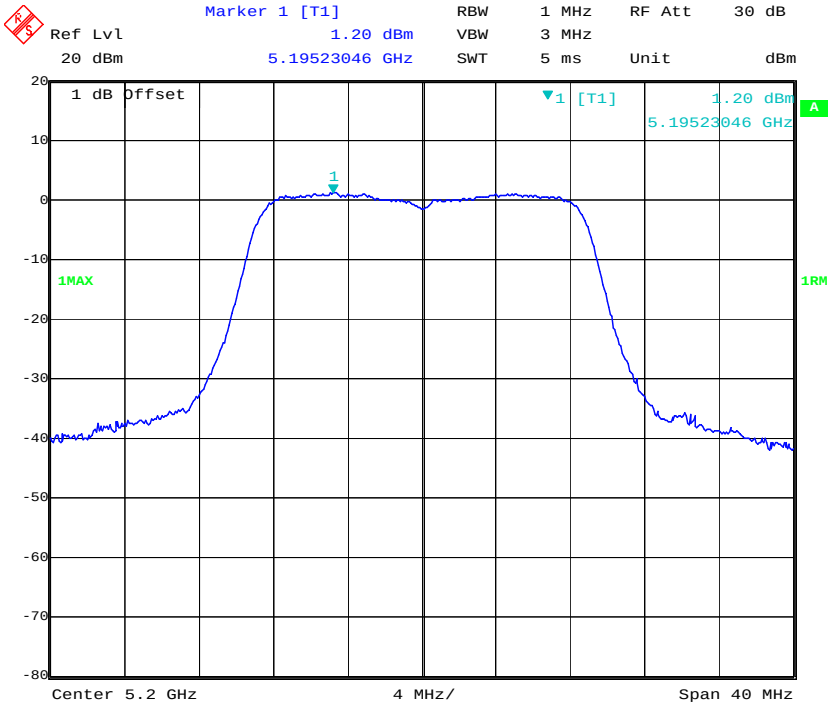
Date: 7.NOV.2018 13:35:19

802.11n ht20 Low Channel



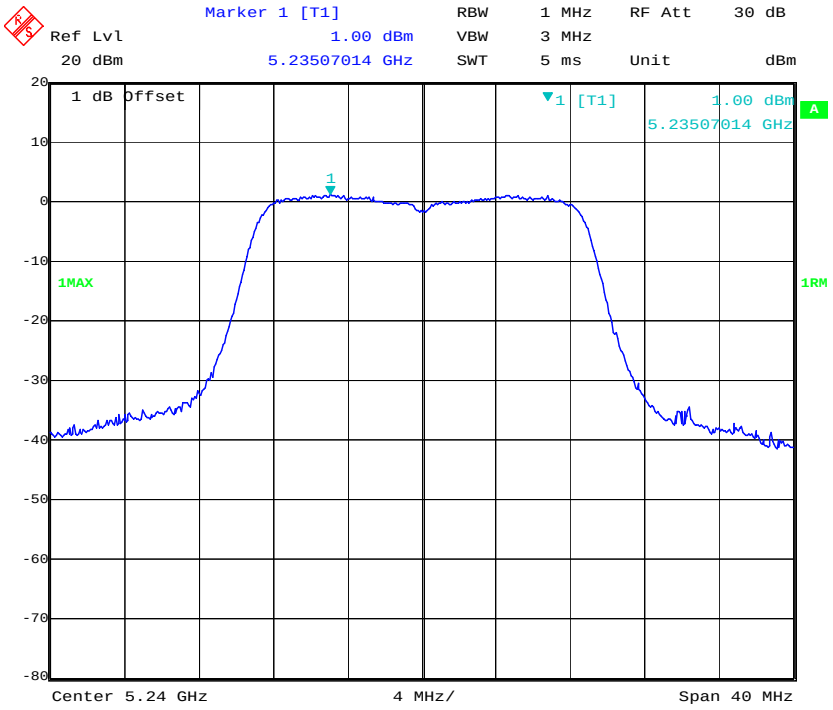
Date: 7.NOV.2018 13:40:21

802.11n ht20 Middle Channel



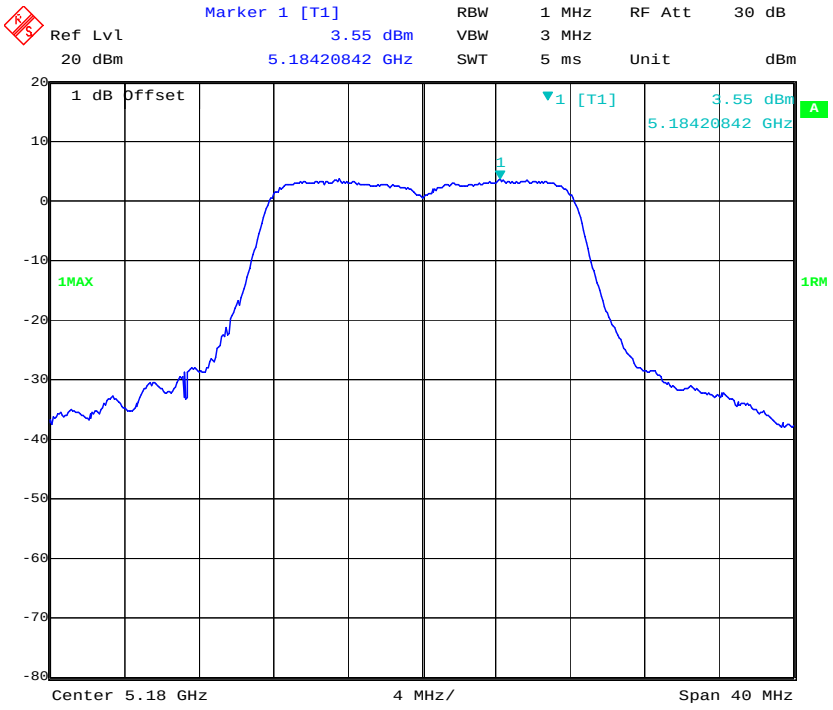
Date: 7.NOV.2018 13:42:23

802.11n ht20 High Channel

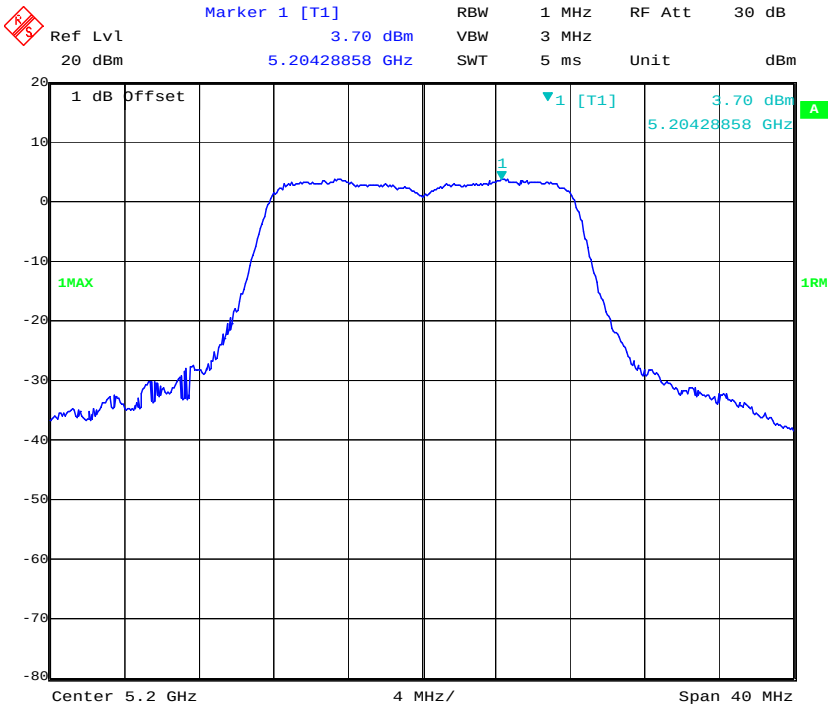


Chain 1:

802.11a Low Channel

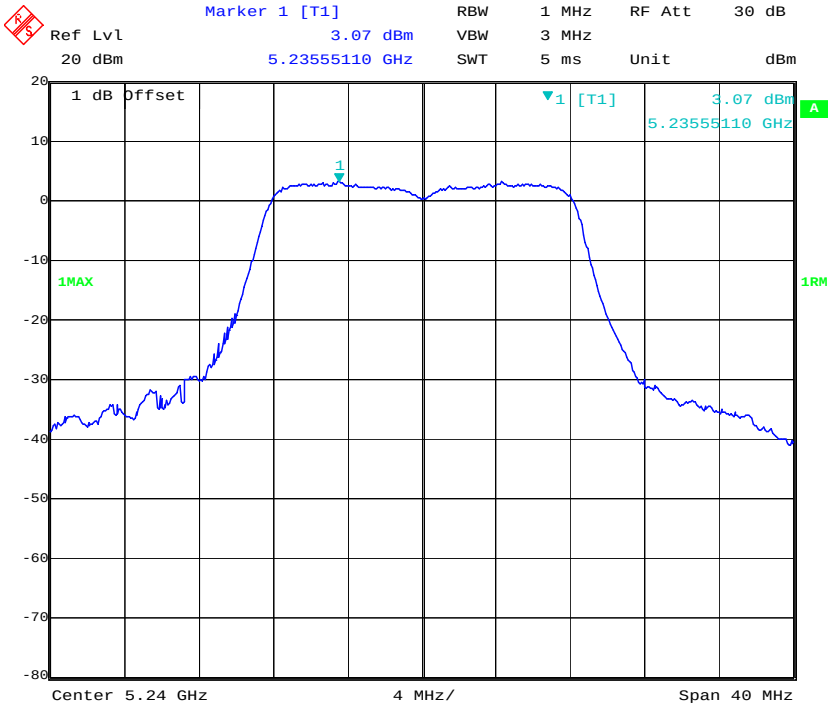


802.11a Middle Channel



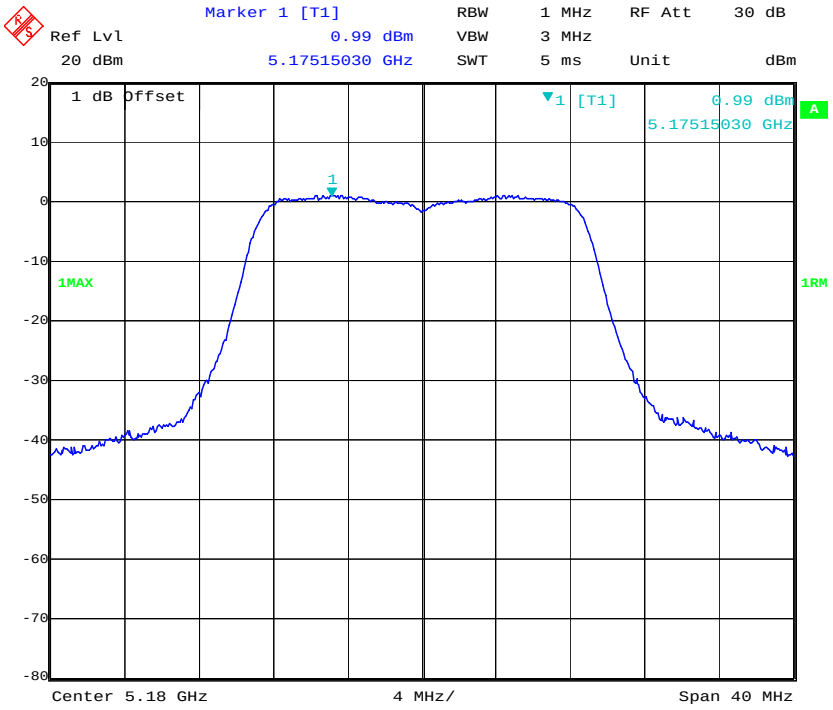
Date: 7.NOV.2018 13:48:34

802.11a High Channel



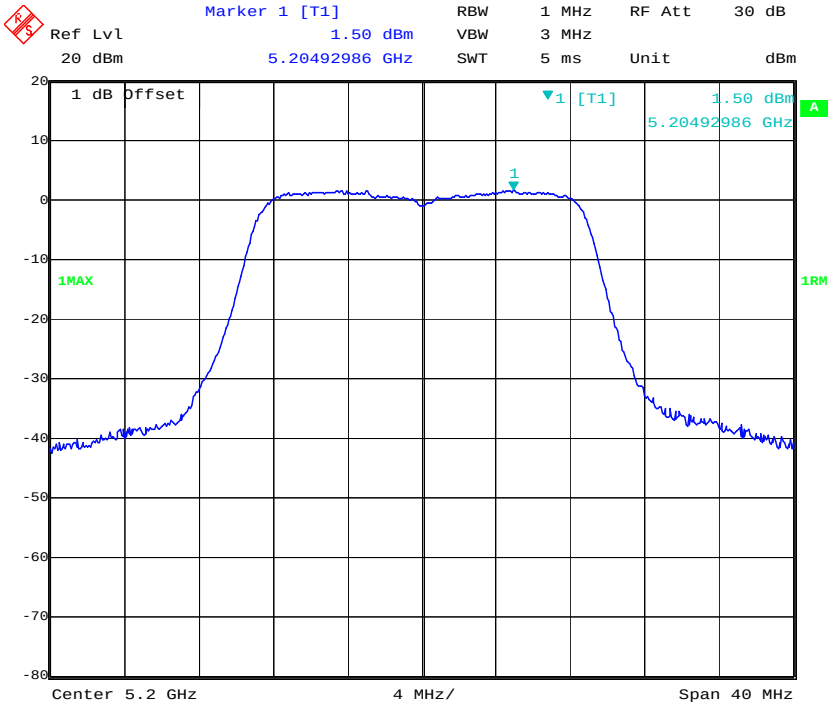
Date: 7.NOV.2018 13:52:49

802.11n ht20 Low Channel



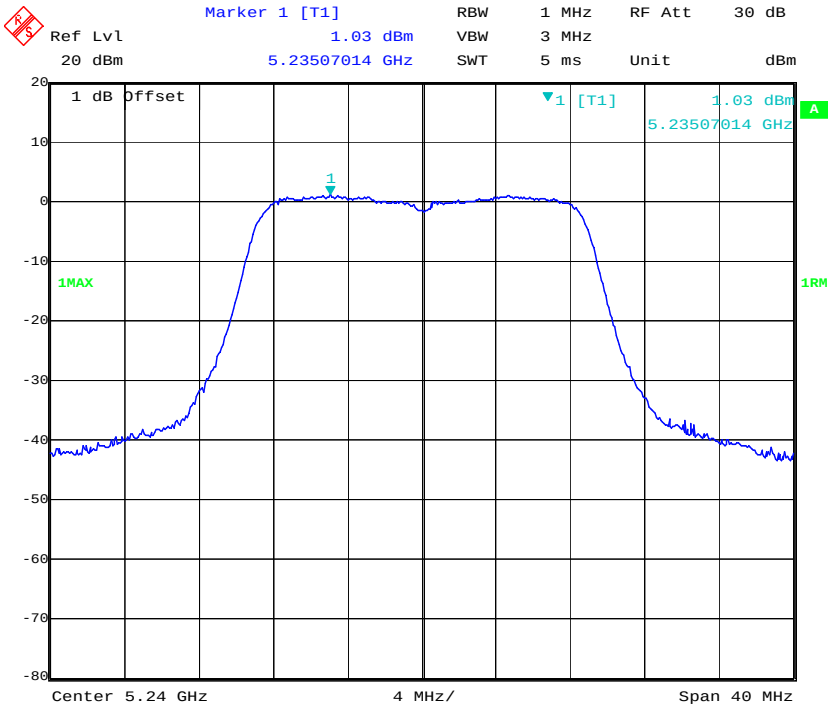
Date: 7.NOV.2018 14:00:48

802.11n ht20 Middle Channel



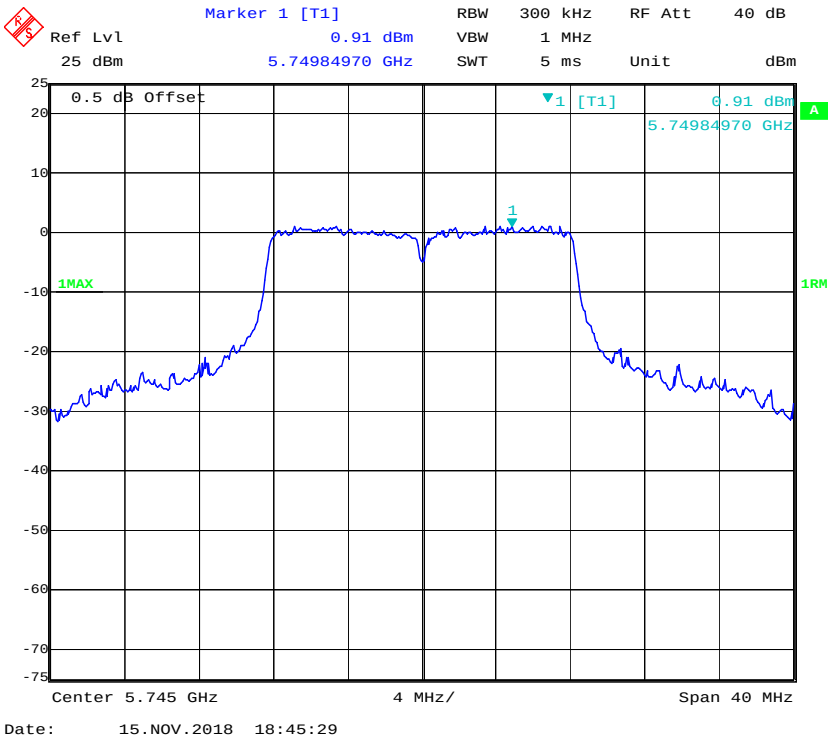
Date: 7.NOV.2018 14:02:59

802.11n ht20 High Channel

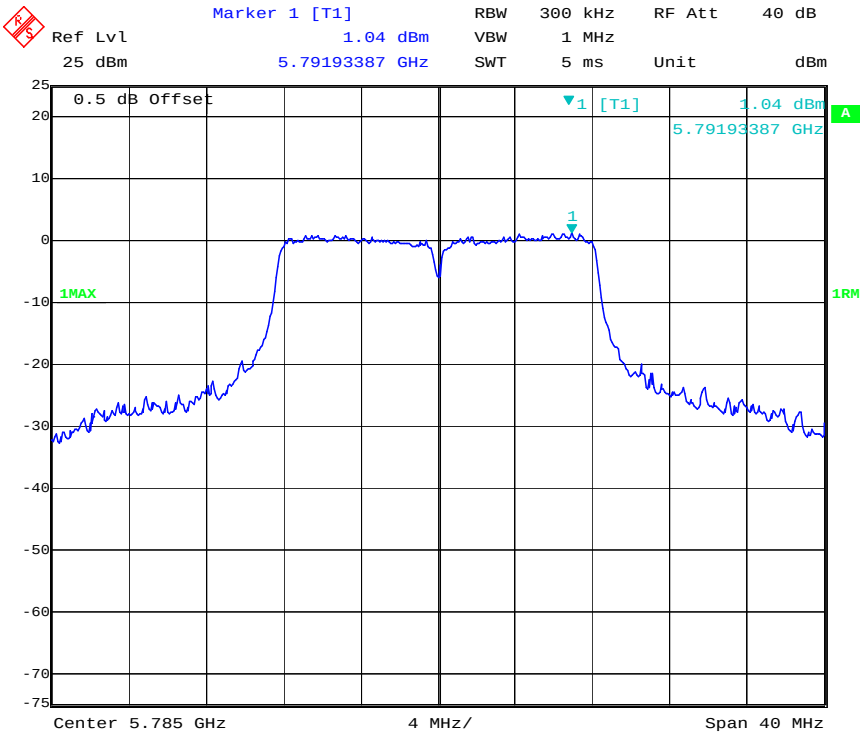


5725-5850MHz
Chain 0:

802.11a Low Channel

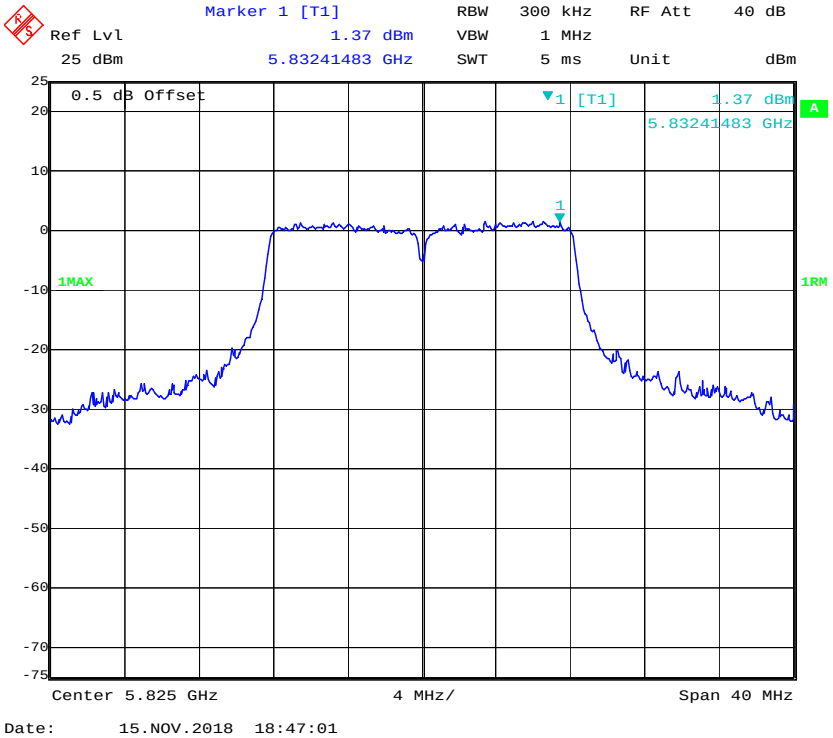


802.11a Middle Channel



Date: 15.NOV.2018 18:46:07

802.11a High Channel



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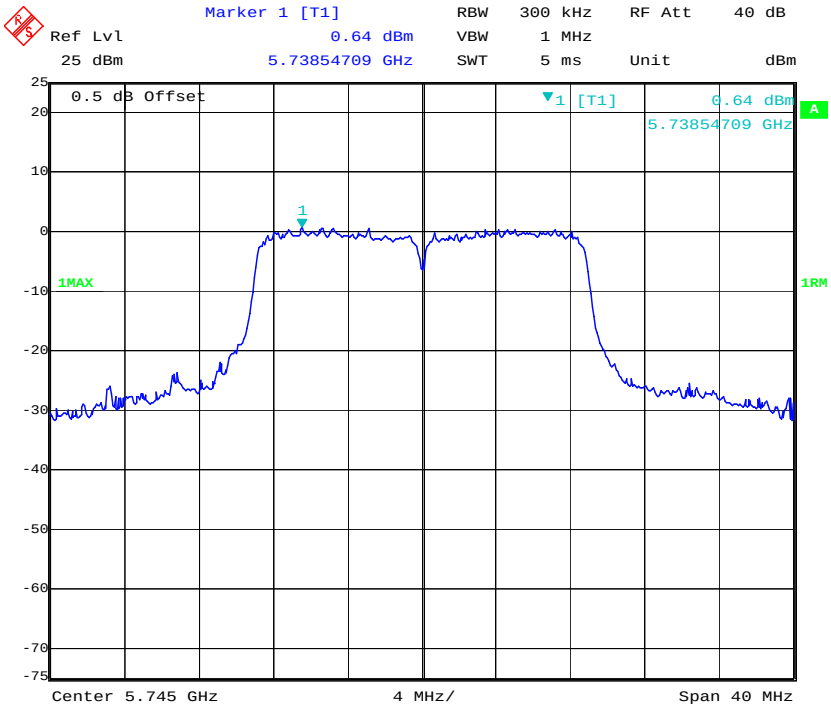
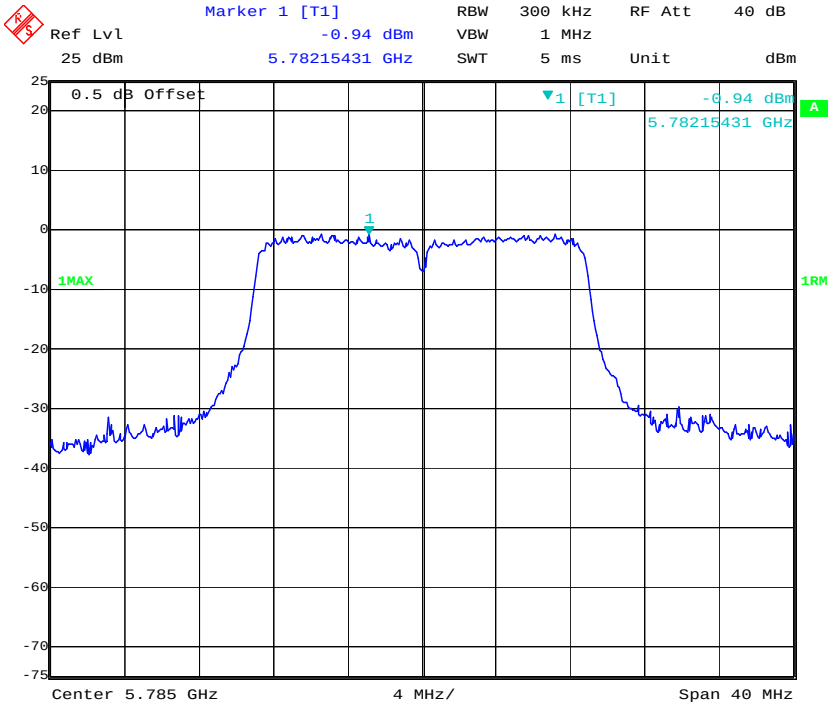
802.11n ht20 Low Channel



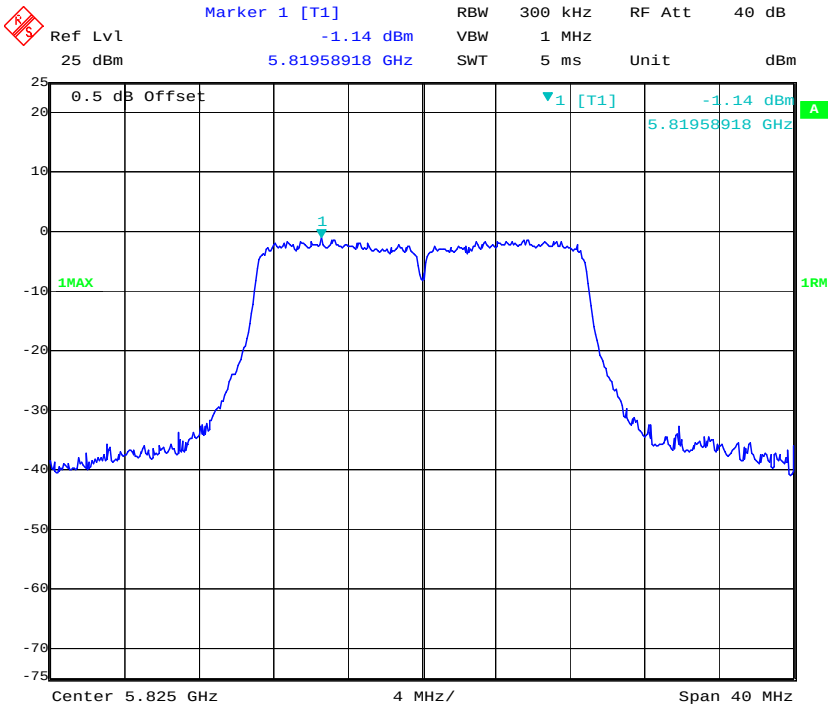
Date: 15.NOV.2018 18:48:18

802.11n ht20 Middle Channel



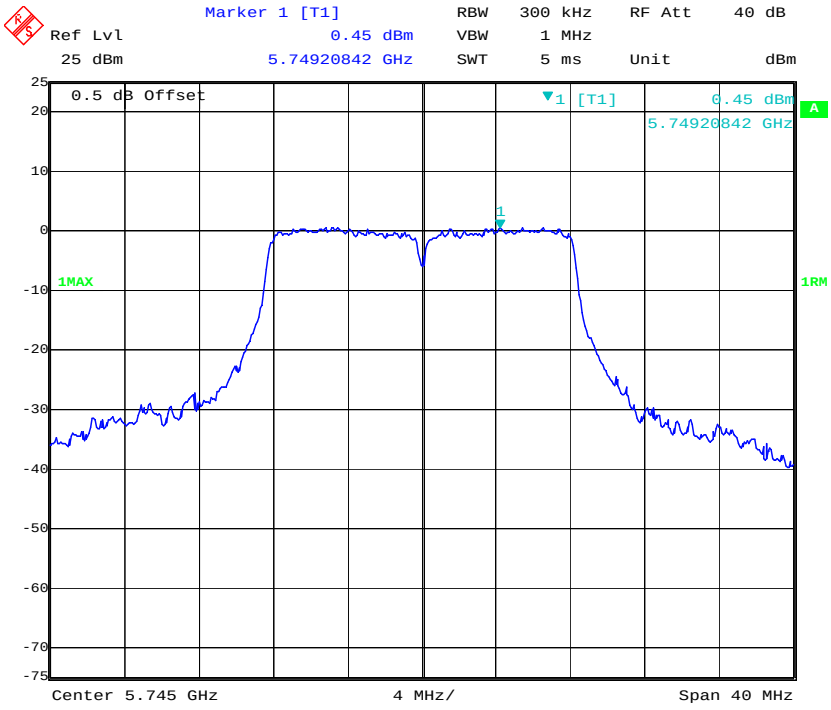
Date: 15.NOV.2018 18:38:32

802.11n ht20 High Channel

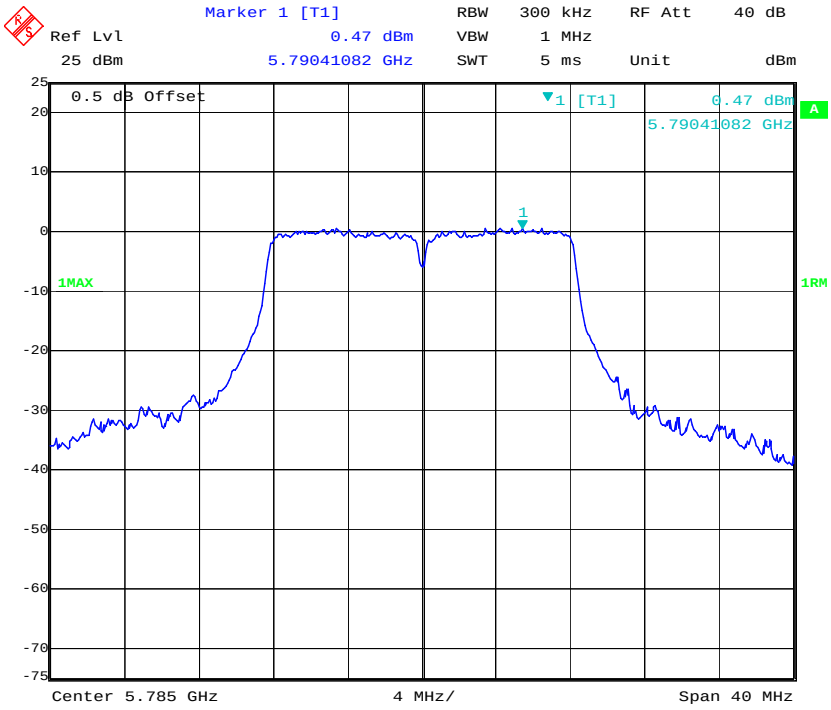


Chain 1:

802.11a Low Channel

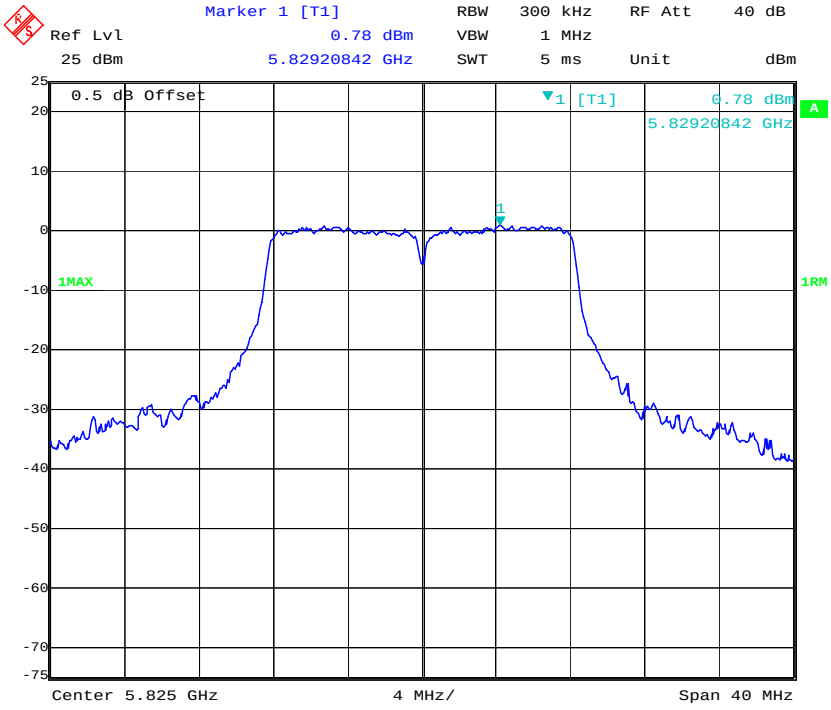


802.11a Middle Channel



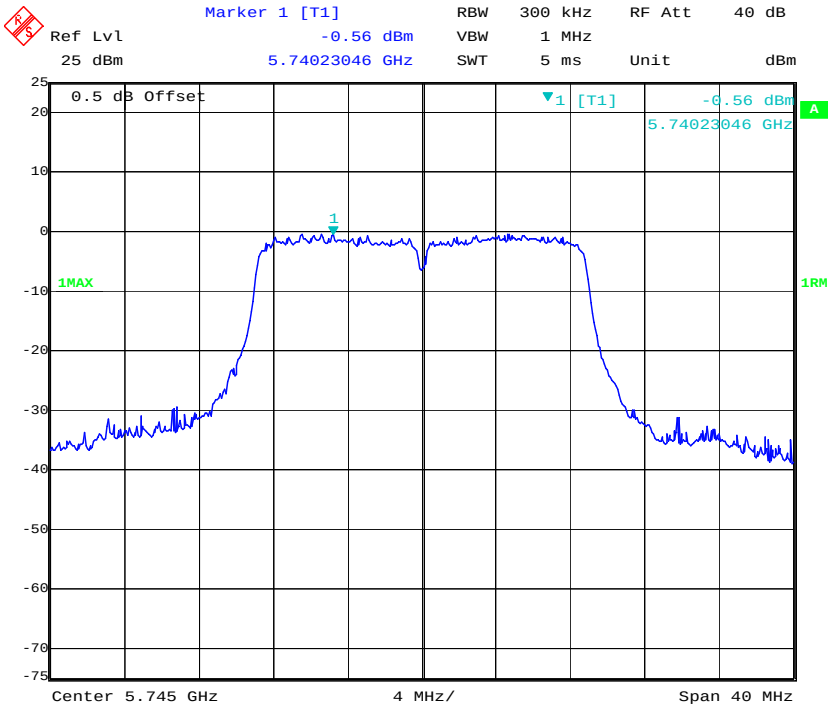
Date: 15.NOV.2018 17:36:22

802.11a High Channel



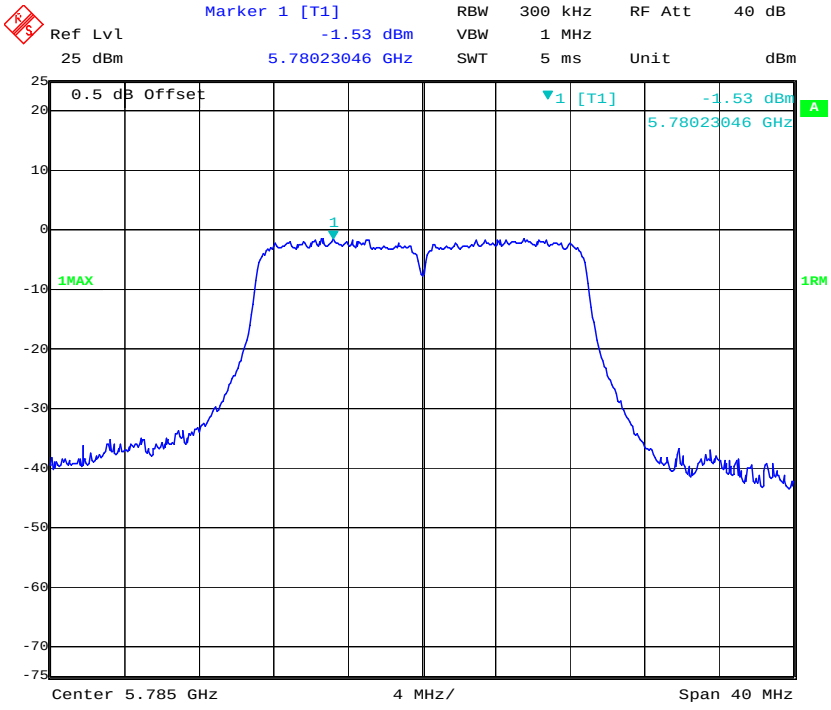
Date: 15.NOV.2018 17:38:07

802.11n ht20 Low Channel



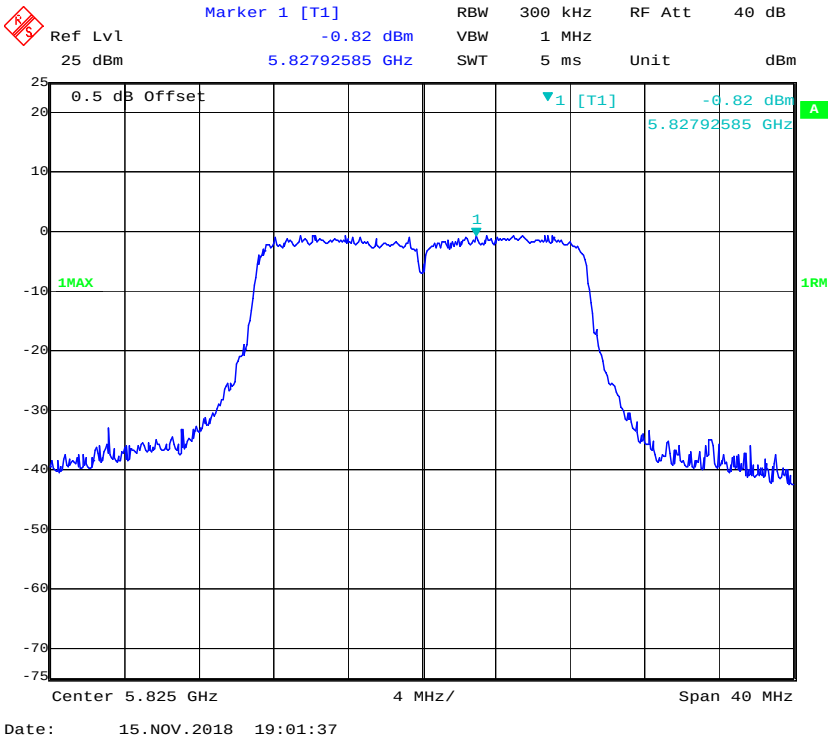
Date: 15.NOV.2018 19:00:55

802.11n ht20 Middle Channel



Date: 15.NOV.2018 18:59:05

802.11n ht20 High Channel



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