TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 15.407
RSS-GEN, ISSUE 5, APRIL 2018
RSS-247, ISSUE 2, FEBRUARY 2017

TEST REPORT

For

SZ DJI Osmo Technology Co.,Ltd.

12th floor,West Wing,Skyworth Semiconductor Design Building NO.18 Gaoxin South 4th Ave, Nanshan District,Shenzhen,China

FCC ID: 2ANDR-OT1121807
IC: 23060-OT1121807

Report Type:	**Product Name:**
Original Report	OSMO POCKET WIRELESS MODULE

Report Number:	RDG180701002-00C
Report Date:	2018-07-20
Reviewed By:	Jerry Zhang EMC Manager
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	OSMO POCKET WIRELESS MODULE
EUT Model:	OT-112
FCC ID:	2ANDR-OT1121807
IC:	23060-OT1121807
Rated Input Voltage:	DC 5V
External Dimension:	40 mm (L) x 40 mm (W) x 25 mm (H)
Serial Number:	180701002
EUT Received Date:	2018-07-01

Objective

This type approval report is prepared on behalf of ***SZ DJI Osmo Technology Co.,Ltd.*** in accordance with Part 2-Subpart J, Part 15-Subparts A and E of the Federal Communications Commission's rules. And RSS-247, Issue 2, February 2017, RSS-Gen Issue 5, April 2018 of the Innovation, Science and Economic Development Canada.

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, and RSS-247, Issue 2, February 2017, RSS-Gen Issue 5, April 2018 of the Innovation, Science and Economic Development Canada.

Related Submittal(s)/Grant(s)

FCC submissions with Part 15.247 DTS, FCC ID: 2ANDR-OT1121807.
FCC submissions with Part 15B JAB, FCC ID: 2ANDR-OT1121807.
ISEDC submissions with RSS-247 DTSs, IC: 23060-OT1121807.

Test Methodology

All measurements detailed in this Test Report were performed in accordance with ANSI C63.10-2013 "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices". RSS-247, Issue 2, February 2017, RSS-Gen Issue 5, April 2018 of the Innovation, Science and Economic Development Canada. 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.

For 5725~5850MHz band, The system support 802.11a/n ht20/n ht40/ac80, 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.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

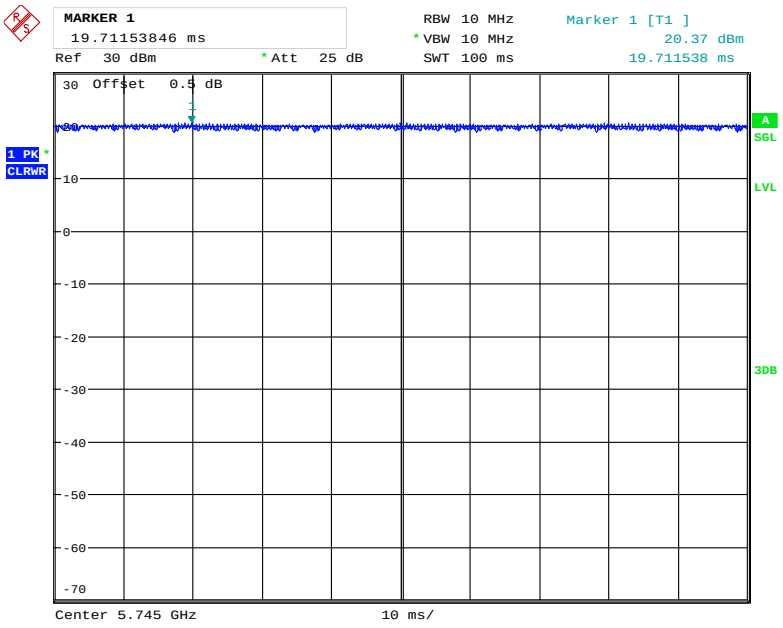
The software "MP_TOOL" was used for testing, which was provided by manufacturer. The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations. The maximum power was configured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

Mode	Channel	Frequency (MHz)	Data rate	Power level
802.11a	Low	5745	6 Mbps	58
	Middle	5785	6 Mbps	58
	High	5825	6 Mbps	58
802.11n ht20	Low	5745	MCS0	58
	Middle	5785	MCS0	58
	High	5825	MCS0	58
802.11n ht 40	Low	5755	MCS0	58
	High	5795	MCS0	58
802.11 ac80	Middle	5775	MCS0	59

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
802.11ac 80	100	100	100

802.11a mode



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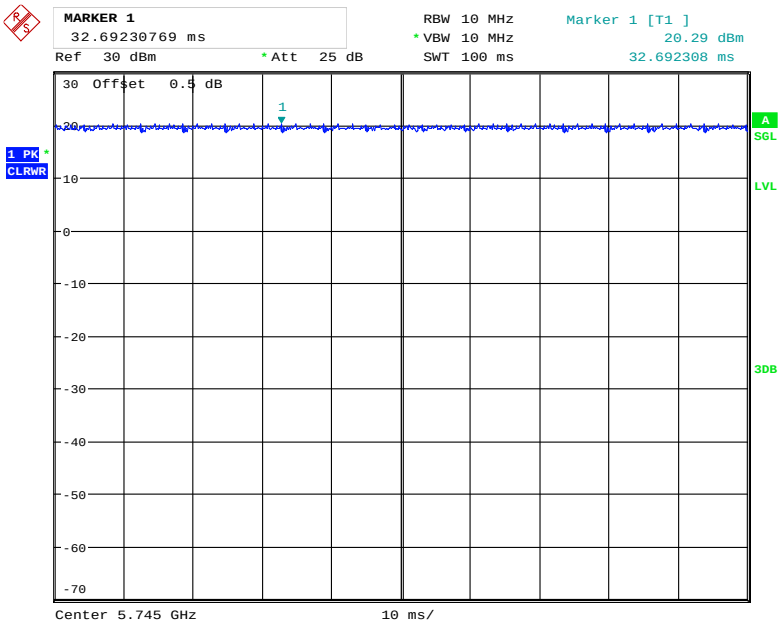
802.11n ht20 mode



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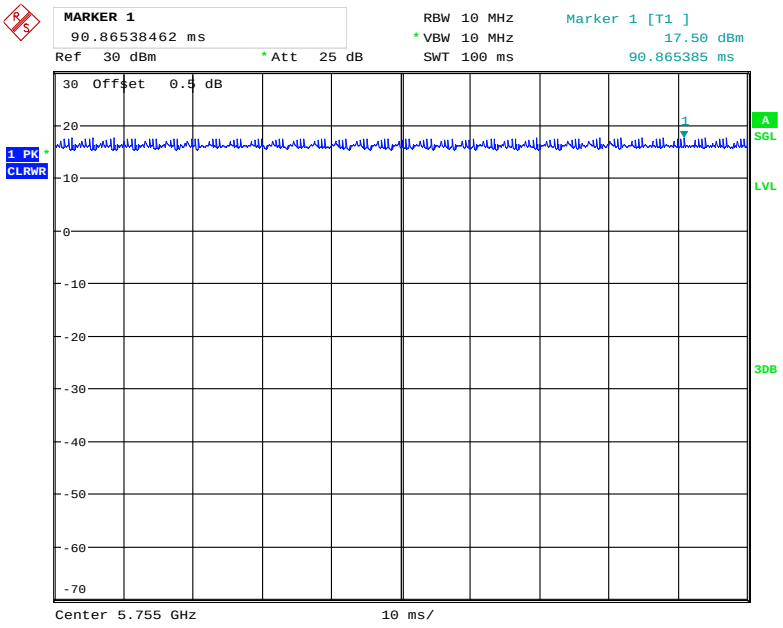
802.11n ht40 mode



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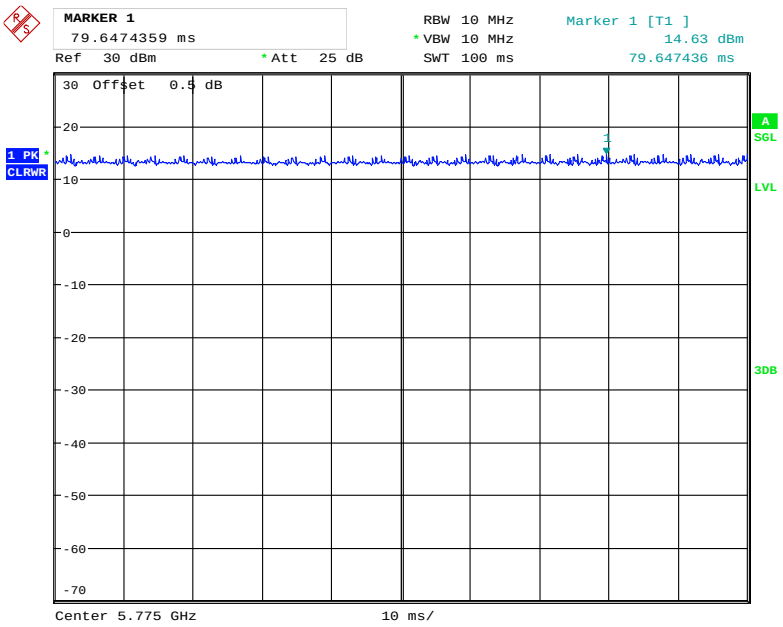
802.11ac80 mode



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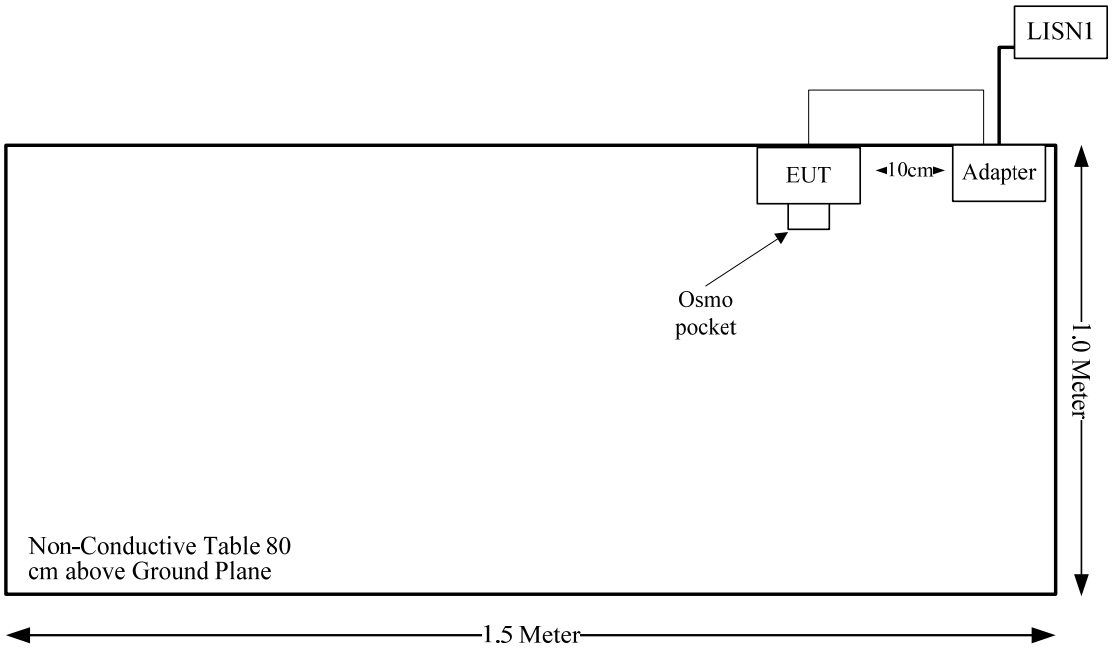
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Dji	Osmo Pocket	OT110	N/A
Soy	Adapter	s005ayu0500101	N/A

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB Cable	Yes	No	1.08	Adapter	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

Rules	Description of Test	Result
FCC §15.407 (f) & §1.1310 & §2.1091	RF Exposure	Compliance
RSS-102 §2.5.2	Exemption Limits For Routine Evaluation-RF Exposure Evaluation	Compliance
FCC§15.203 RSS-GEN§6.8	Antenna Requirement	Compliance
FCC§15.207 (a) RSS-Gen §8.8	AC Line Conducted Emissions	Compliance
FCC§15.205& §15.209 &§15.407(b) RSS-247§6.2	Undesirable Emission& Restricted Bands	Compliance
FCC§15.407(b) (1),(2),(3),(4) RSS-247§6.2	Out Of Band Emissions	Compliance
FCC§15.407(a) RSS-247 §6.2 RSS-Gen§6.7	Emission Bandwidth	Compliance
FCC§15.407(a) RSS-247 §6.2	Conducted Transmitter Output Power	Compliance
FCC§15.407 (a) RSS-247 §6.2	Power Spectral Density	Compliance
FCC§15.407(g)	Frequency stability	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:

Mode	**Frequency (MHz)**	**Antenna Gain**		**Conducted output power including Tune-up Tolerance**		**Evaluation Distance (cm)**	**Power Density (mW/cm^2)**	**MPE Limit (mW/cm^2)**
		(dBi)	**(numeric)**	**(dBm)**	**(mW)**			
Wifi 2.4G	2412-2462	1.71	1.48	24	251.19	20.00	0.07	1.0
BLE	2402-2480	1.71	1.48	4	2.51	20.00	0.001	1.0
Wifi 5.8G	5725-5850	1.89	1.55	17	50.12	20.00	0.02	1.0

The BLE, Wifi 2.4GHz band or 5GHz band can`t transmit simultaneously

Result: The device meet FCC MPE at 20 cm distance

RSS-102 § 2.5.2 - EXEMPTION LIMITS FOR ROUTINE EVALUATION – RF EXPOSURE EVALUATION

Applicable Standard

According to RSS-102 § (2.5.2):

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

Calculated Data:

For Wifi 5.8GHz:

The maximum power including tune-up tolerance is 17dBm @ 5.8 GHz band, the maximum antenna gain is 1.89 dBi, so the maximum e.r.i.p. is 18.89 dBm (0.077W)

Exemption from Routine Evaluation Limit is:
$1.31 \times 10^{-2} f^{0.6834} = 1.31 \times 10^{-2} \times 5745^{0.6834} = 4.86 > 0.077$ W

So the device is compliance exemption from Routine Evaluation Limits –RF exposure Evaluation.

Result: Compliance

FCC §15.203 ,RSS-GEN§6.8- 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

According to RSS-Gen §6.8,

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

> *This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.*

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

Antenna Connector Construction

The EUT has an internal antenna arrangement t, the antenna gain is 1.71 dBi in 2.4GHz band and 1.89 dBi in 5.8GHz band, fulfill the requirement of this section. Please refer to the EUT photos.

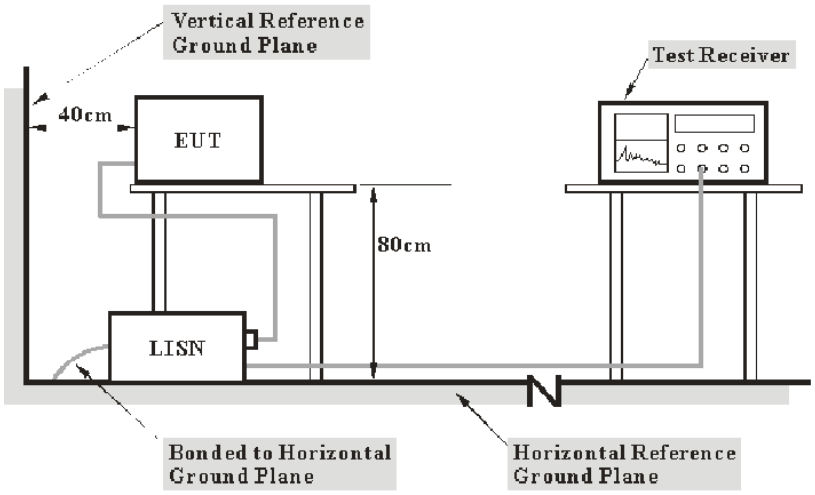
Result: Compliance.

FCC §15.207(a) RSS-GEN CLAUSE 8.8– AC Line Conducted Emissions

Applicable Standard

FCC §15.207(a), §15.407(b) (6), RSS-GEN CLAUSE 8.8.

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 and RSS-Gen clause 8.8 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 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 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
Unknown	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

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

Test Data

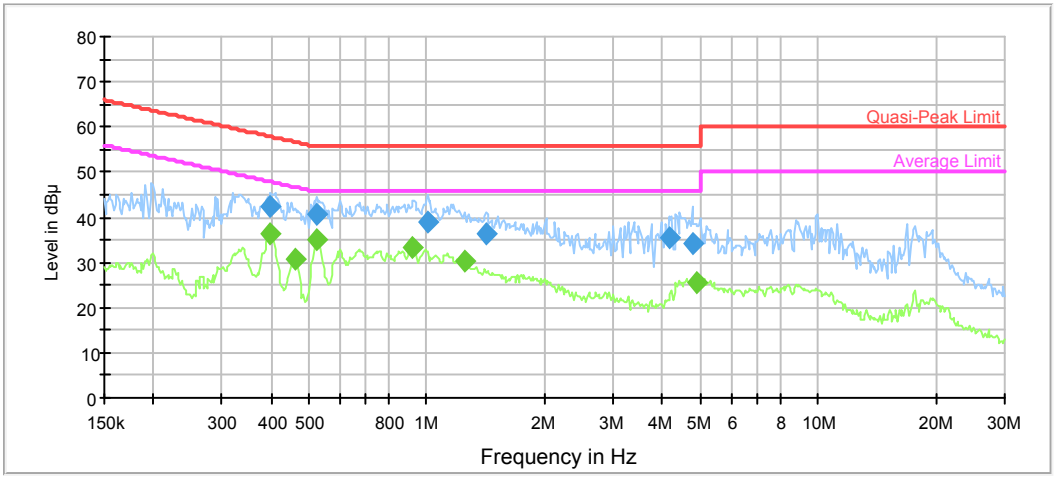
Environmental Conditions

Temperature:	27.6°C
Relative Humidity:	58 %
ATM Pressure:	99.8kPa

The testing was performed by Sider Huang on 2018-07-18.

Test Mode: Transmitting

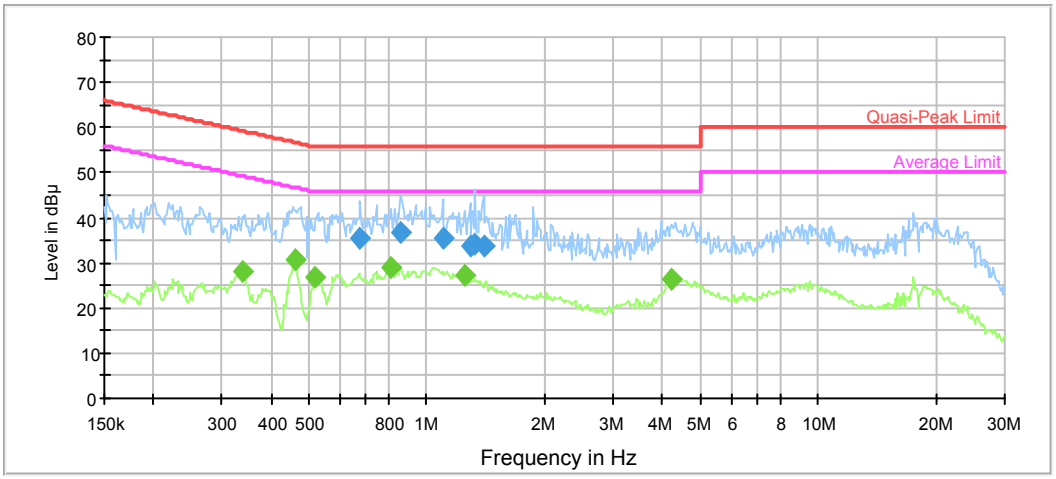
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.399703	42.4	9.000	L1	10.0	15.5	57.9	Compliance
0.524077	40.8	9.000	L1	9.9	15.2	56.0	Compliance
1.007300	38.8	9.000	L1	9.8	17.2	56.0	Compliance
1.418932	36.2	9.000	L1	9.7	19.8	56.0	Compliance
4.160384	35.3	9.000	L1	9.8	20.7	56.0	Compliance
4.763898	34.0	9.000	L1	9.8	22.0	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.399703	36.5	9.000	L1	10.0	11.4	47.9	Compliance
0.461346	30.8	9.000	L1	9.9	15.9	46.7	Compliance
0.524077	34.8	9.000	L1	9.9	11.2	46.0	Compliance
0.922769	33.1	9.000	L1	9.8	12.9	46.0	Compliance
1.249088	30.1	9.000	L1	9.8	15.9	46.0	Compliance
4.879149	25.7	9.000	L1	9.8	20.3	46.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.732382	44.2	9.000	N	9.8	11.8	56.0	Compliance
0.780588	44.4	9.000	N	9.8	11.6	56.0	Compliance
1.039922	48.1	9.000	N	9.8	7.9	56.0	Compliance
1.162648	45.8	9.000	N	9.8	10.2	56.0	Compliance
1.219583	46.0	9.000	N	9.8	10.0	56.0	Compliance
1.341955	41.5	9.000	N	9.7	14.5	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.609741	36.6	9.000	N	9.8	9.4	46.0	Compliance
0.670921	34.1	9.000	N	9.8	11.9	46.0	Compliance
0.732382	33.8	9.000	N	9.8	12.2	46.0	Compliance
0.786832	35.8	9.000	N	9.8	10.2	46.0	Compliance
1.162648	39.6	9.000	N	9.8	6.4	46.0	Compliance
1.259081	38.0	9.000	N	9.8	8.0	46.0	Compliance

FCC §15.209, §15.205 , §15.407(b) &RSS-247 §6.2, RSS-GEN§8.10– UNWANTED EMISSION

Applicable Standard

According to 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.

(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

According to RSS-247§6.2

Frequency band 5150-5250 MHz

6.2.1.2 Unwanted emission limits

For transmitters with operating frequencies in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. Any unwanted emissions that fall into the band 5250-5350 MHz shall be attenuated below the channel power by at least 26 dB, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth (i.e. 99% bandwidth), above 5250 MHz. The 26 dB bandwidth may fall into the 5250-5350 MHz band; however, if the occupied bandwidth also falls within the 5250-5350 MHz band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5250-5350 MHz including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250-5350 MHz band.

Frequency band 5250-5350 MHz

6.2.2.2 Unwanted emission limits

Devices shall comply with the following:

a) All emissions outside the band 5250-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p.; or

b) All emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. and its power shall comply with the spectral power density for operation within the band 5150-5250 MHz. The device, except devices installed in vehicles, shall be labelled or include in the user manual the following text “for indoor use only.”

Frequency bands 5470-5600 MHz and 5650-5725 MHz:

6.2.3.2 Unwanted emission limits

Emissions outside the band 5470-5600 MHz and 5650-5725 MHz shall not exceed -27 dBm/MHz e.i.r.p. However, devices with bandwidth overlapping the band edge of 5725 MHz can meet the emission limit of -27 dBm/MHz e.i.r.p. at 5850 MHz instead of 5725 MHz.

Frequency band 5725-5850 MHz

6.2.4.2 Unwanted emission limits

Devices operating in the band 5725-5850 MHz with antenna gain greater than 10 dBi can have unwanted emissions that comply with either the limits in this section or in section 5.5 until six (6) months after the publication date of this standard for certification. Certified devices that do not comply with emission limits in this section shall not be manufactured, imported, distributed, leased, offered for sale or sold after April 1, 2018.

Devices operating in the band 5725-5850 MHz with antenna gain of 10 dBi or less can have unwanted emissions that comply with either the limits in this section or in section 5.5 until April 1, 2018 for certification. Certified devices that do not comply with emission limits in this section shall not be manufactured, imported, distributed, leased, offered for sale or sold after April 1, 2020.

Devices operating in the band 5725-5850 MHz shall have e.i.r.p. of unwanted emissions comply with the following:

a) 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edges;

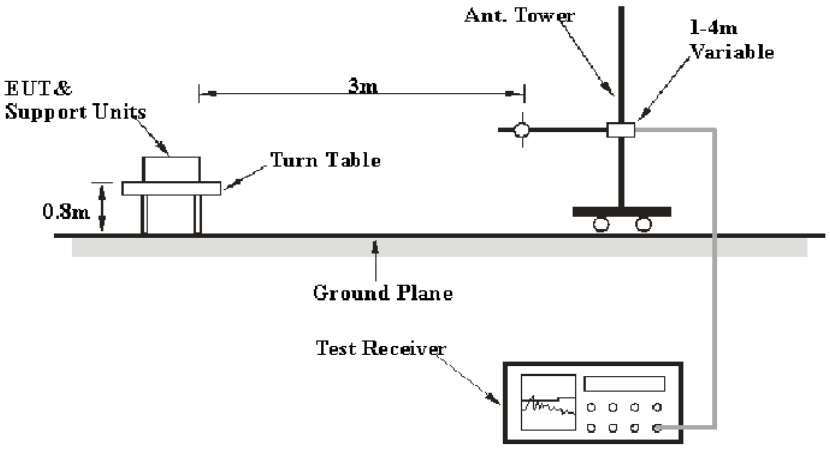
b) 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;

c) 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and

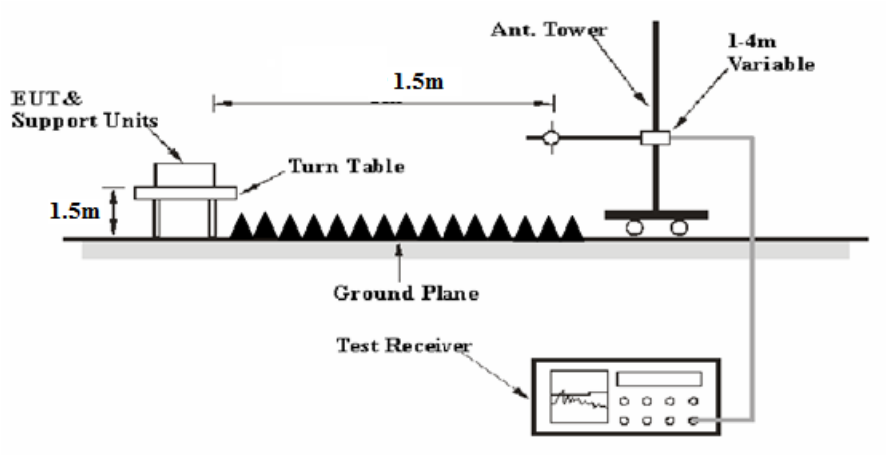
d) -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.

EUT Setup

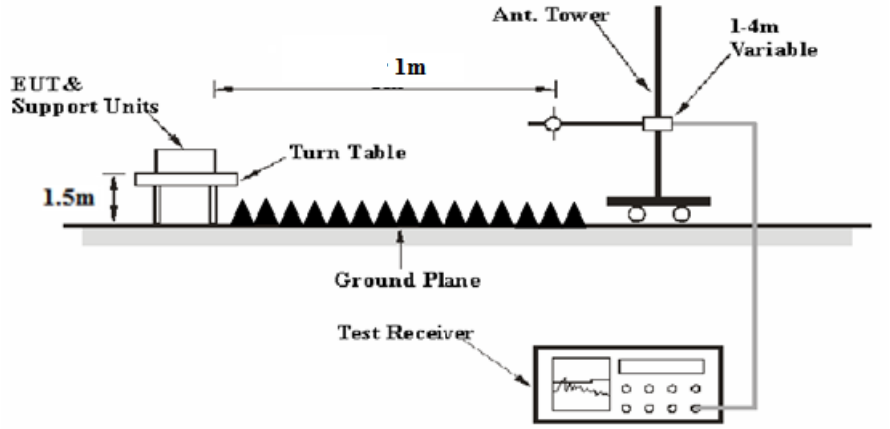
Below 1 GHz:



1-26.5 GHz:



26.5-40 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, FCC 15.407 and RSS-247, RSS-Gen limits.

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

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

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

30-1000MHz:

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

1GHz- 40GHz:

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

Note: T is minimum transmission duration

Test Procedure

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 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, 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:

Extrapolation result
= 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-Extrapolation result

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-12-11	2018-12-11
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2017-09-05	2018-09-05
HP	Amplifier	8447D	2727A05902	2017-09-05	2018-09-05
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	2017-09-05	2018-09-05
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	2017-09-05	2018-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2018-06-27	2019-06-27
Sinoscite	Bandstop Filters	BSF5150-5850MN-0899-003	0899003	2018-05-06	2019-05-06
Mini Circuits	High Pass Filter	VHF-6010+	31118	2018-06-16	2019-06-16

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

Test Data

Environmental Conditions

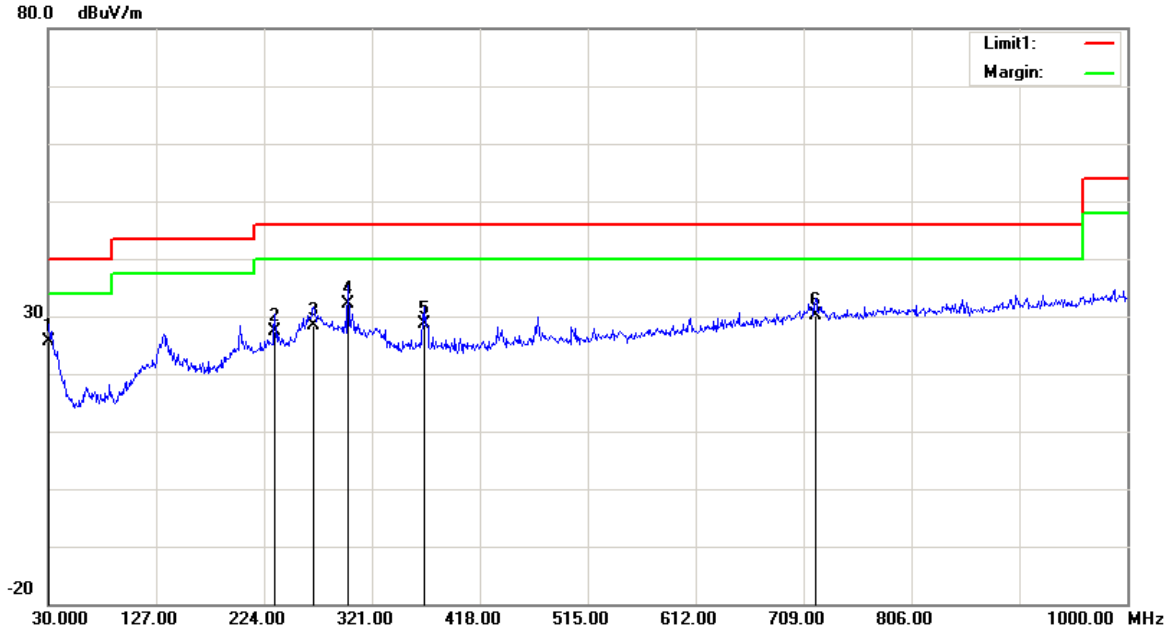
Temperature:	26.5 °C
Relative Humidity:	40 %
ATM Pressure:	99.6 kPa

** The testing was performed by Blake Yang on 2018-07-06*

Test Mode: Transmitting

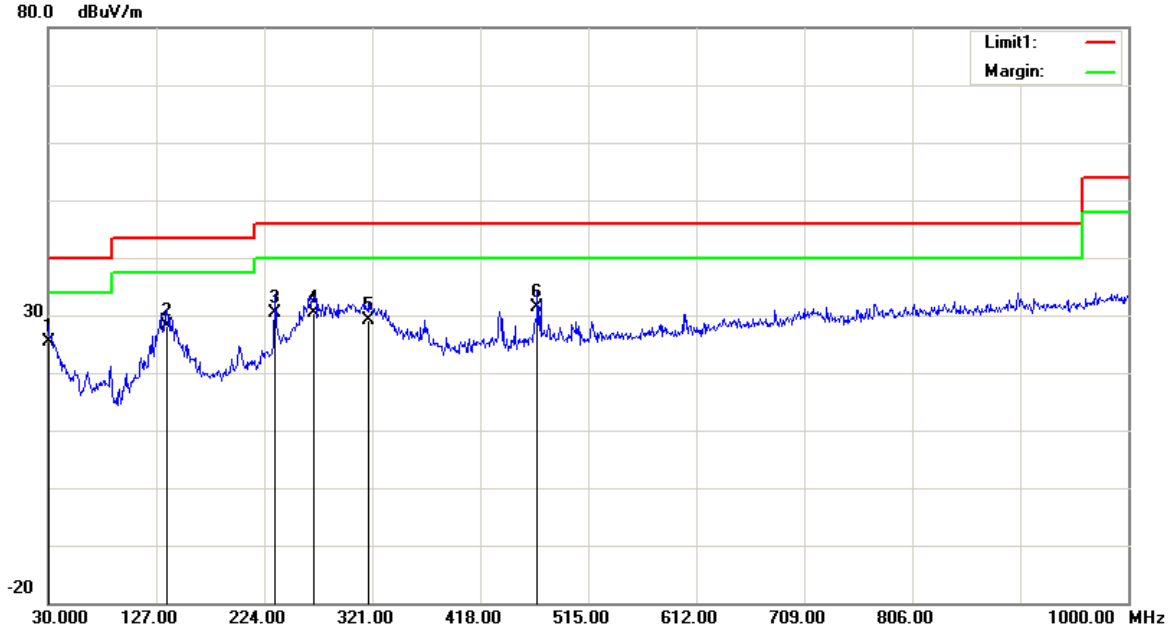
1) 30MHz-1GHz(802.11a Middle channel was the worst):

Horizontal:



Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.9700	24.78	QP	0.82	25.60	40.00	14.40
233.7000	33.89	QP	-6.49	27.40	46.00	18.60
268.6200	32.88	QP	-4.38	28.50	46.00	17.50
299.6600	36.26	QP	-4.06	32.20	46.00	13.80
368.5300	31.36	QP	-2.76	28.60	46.00	17.40
719.6700	26.63	QP	3.47	30.10	46.00	15.90

Vertical:



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.0000	23.75	QP	1.55	25.30	40.00	14.70
136.7000	33.52	QP	-5.42	28.10	43.50	15.40
233.7000	36.99	QP	-6.49	30.50	46.00	15.50
268.6200	34.78	QP	-4.38	30.40	46.00	15.60
318.0900	32.83	QP	-3.63	29.20	46.00	16.80
469.4100	31.77	QP	-0.47	31.30	46.00	14.70

2) 1-40GHz:

802.11a

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Extrapolation result	Limit	Margin
	Reading	Detector	Polar	Factor						
MHz	dBµV	PK/QP/AV	H/V	dB/m	dB	dB	dBµV/m	dBµV/m	dBµV/m	dB
Low Channel: 5745 MHz										
5745.00	74.39	PK	H	34.20	3.69	0.00	112.28	106.26	N/A	N/A
5745.00	65.68	AV	H	34.20	3.69	0.00	103.57	97.55	N/A	N/A
5745.00	69.54	PK	V	34.20	3.69	0.00	107.43	101.41	N/A	N/A
5745.00	60.32	AV	V	34.20	3.69	0.00	98.21	92.19	N/A	N/A
5725.00	41.59	PK	H	34.19	3.69	0.00	79.47	73.45	122.20	48.75
5720.00	36.48	PK	H	34.19	3.69	0.00	74.36	68.34	110.80	42.46
5700.00	25.96	PK	H	34.18	3.68	0.00	63.82	57.8	105.20	47.40
5650.00	26.38	PK	H	34.16	3.63	0.00	64.17	58.15	68.20	10.05
11490.00	48.31	PK	H	38.99	6.59	37.35	56.54	50.52	74.00	23.48
11490.00	35.26	AV	H	38.99	6.59	37.35	43.49	37.47	54.00	16.53
17235.00	47.58	PK	H	41.56	8.78	38.61	59.31	53.29	74.00	20.71
17235.00	35.17	AV	H	41.56	8.78	38.61	46.90	40.88	54.00	13.12
Middle Channel: 5785MHz										
5785.00	74.23	PK	H	34.21	3.71	0.00	112.15	106.13	N/A	N/A
5785.00	65.82	AV	H	34.21	3.71	0.00	103.74	97.72	N/A	N/A
5785.00	69.83	PK	V	34.21	3.71	0.00	107.75	101.73	N/A	N/A
5785.00	60.68	AV	V	34.21	3.71	0.00	98.60	92.58	N/A	N/A
11570.00	48.75	PK	H	39.00	6.61	37.44	56.92	50.9	74.00	23.10
11570.00	35.47	AV	H	39.00	6.61	37.44	43.64	37.62	54.00	16.38
17355.00	47.63	PK	H	42.26	8.81	38.52	60.18	54.16	74.00	19.84
17355.00	36.85	AV	H	42.26	8.81	38.52	49.40	43.38	54.00	10.62
High Channel: 5825MHz										
5825.00	74.42	PK	H	34.23	3.73	0.00	112.38	106.36	N/A	N/A
5825.00	65.71	AV	H	34.23	3.73	0.00	103.67	97.65	N/A	N/A
5825.00	69.53	PK	V	34.23	3.73	0.00	107.49	101.47	N/A	N/A
5825.00	60.82	AV	V	34.23	3.73	0.00	98.78	92.76	N/A	N/A
5850.00	40.44	PK	H	34.24	3.75	0.00	78.43	72.41	122.20	49.79
5855.00	38.42	PK	H	34.24	3.75	0.00	76.41	70.39	110.80	40.41
5875.00	28.95	PK	H	34.25	3.77	0.00	66.97	60.95	105.20	44.25
5925.00	26.31	PK	H	34.27	3.80	0.00	64.38	58.36	68.20	9.84
11650.00	50.91	PK	H	39.00	6.64	37.53	59.02	53	74.00	21.00
11650.00	37.56	AV	H	39.00	6.64	37.53	45.67	39.65	54.00	14.35
17475.00	47.52	PK	H	42.96	8.84	38.44	60.88	54.86	74.00	19.14
17475.00	35.58	AV	H	42.96	8.84	38.44	48.94	42.92	54.00	11.08

802.11n20

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Extrapolation result	Limit	Margin
	Reading	Detector	Polar	Factor						
MHz	dBµV	PK/QP/AV	H/V	dB/m	dB	dB	dBµV/m	dBµV/m	dBµV/m	dB
Low Channel: 5745 MHz										
5745.00	74.93	PK	H	34.20	3.69	0.00	112.82	106.8	N/A	N/A
5745.00	65.57	AV	H	34.20	3.69	0.00	103.46	97.44	N/A	N/A
5745.00	71.30	PK	V	34.20	3.69	0.00	109.19	103.17	N/A	N/A
5745.00	62.79	AV	V	34.20	3.69	0.00	100.68	94.66	N/A	N/A
5725.00	46.35	PK	H	34.19	3.69	0.00	84.23	78.21	122.20	43.99
5720.00	35.21	PK	H	34.19	3.69	0.00	73.09	67.07	110.80	43.73
5700.00	27.94	PK	H	34.18	3.68	0.00	65.80	59.78	105.20	45.42
5650.00	26.81	PK	H	34.16	3.63	0.00	64.60	58.58	68.20	9.62
11490.00	48.55	PK	H	38.99	6.59	37.35	56.78	50.76	74.00	23.24
11490.00	36.03	AV	H	38.99	6.59	37.35	44.26	38.24	54.00	15.76
17235.00	47.72	PK	H	41.56	8.78	38.61	59.45	53.43	74.00	20.57
17235.00	35.68	AV	H	41.56	8.78	38.61	47.41	41.39	54.00	12.61
Middle Channel: 5785 MHz										
5785.00	74.73	PK	H	34.21	3.71	0.00	112.65	106.63	N/A	N/A
5785.00	65.52	AV	H	34.21	3.71	0.00	103.44	97.42	N/A	N/A
5785.00	67.35	PK	V	34.21	3.71	0.00	105.27	99.25	N/A	N/A
5785.00	58.94	AV	V	34.21	3.71	0.00	96.86	90.84	N/A	N/A
11570.00	49.63	PK	H	39.00	6.61	37.44	57.80	51.78	74.00	22.22
11570.00	36.25	AV	H	39.00	6.61	37.44	44.42	38.4	54.00	15.60
17355.00	47.52	PK	H	42.26	8.81	38.52	60.07	54.05	74.00	19.95
17355.00	34.83	AV	H	42.26	8.81	38.52	47.38	41.36	54.00	12.64
High Channel: 5825 MHz										
5825.00	74.65	PK	H	34.23	3.73	0.00	112.61	106.59	N/A	N/A
5825.00	65.44	AV	H	34.23	3.73	0.00	103.40	97.38	N/A	N/A
5825.00	69.85	PK	V	34.23	3.73	0.00	107.81	101.79	N/A	N/A
5825.00	60.86	AV	V	34.23	3.73	0.00	98.82	92.8	N/A	N/A
5850.00	42.53	PK	H	34.24	3.75	0.00	80.52	74.5	122.20	47.70
5855.00	40.12	PK	H	34.24	3.75	0.00	78.11	72.09	110.80	38.71
5875.00	28.31	PK	H	34.25	3.77	0.00	66.33	60.31	105.20	44.89
5925.00	26.43	PK	H	34.27	3.80	0.00	64.50	58.48	68.20	9.72
11650.00	49.97	PK	H	39.00	6.64	37.53	58.08	52.06	74.00	21.94
11650.00	36.52	AV	H	39.00	6.64	37.53	44.63	38.61	54.00	15.39
17475.00	47.28	PK	H	42.96	8.84	38.44	60.64	54.62	74.00	19.38
17475.00	35.13	AV	H	42.96	8.84	38.44	48.49	42.47	54.00	11.53

802.11n40

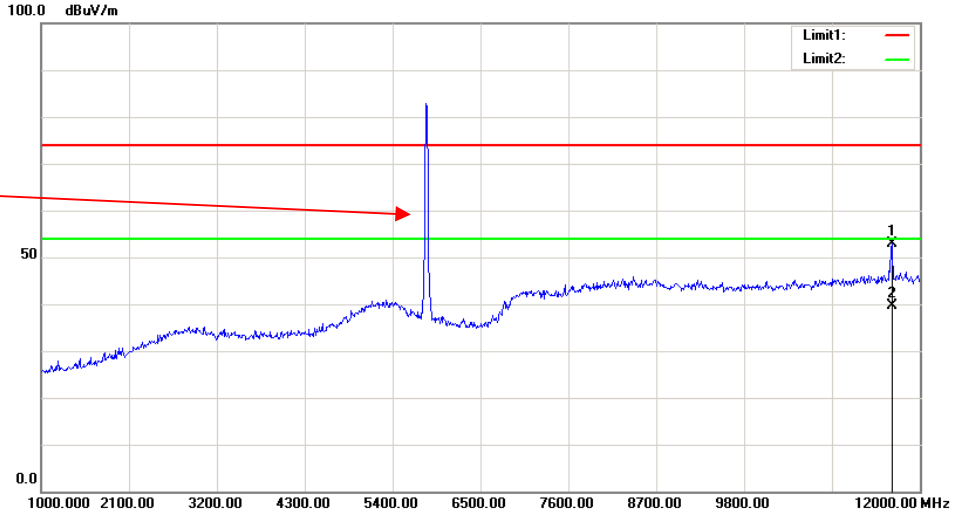
Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Extrapolation result	Limit	Margin
	Reading	Detector	Polar	Factor						
MHz	dBµV	PK/QP/AV	H/V	dB/m	dB	dB	dBµV/m	dBµV/m	dBµV/m	dB
Low Channel: 5755 MHz										
5755.00	70.87	PK	H	34.20	3.70	0.00	108.77	102.75	N/A	N/A
5755.00	62.17	AV	H	34.20	3.70	0.00	100.07	94.05	N/A	N/A
5755.00	65.46	PK	V	34.20	3.70	0.00	103.36	97.34	N/A	N/A
5755.00	56.95	AV	V	34.20	3.70	0.00	94.85	88.83	N/A	N/A
5725.00	42.87	PK	H	34.19	3.69	0.00	80.75	74.73	122.20	47.47
5720.00	40.36	PK	H	34.19	3.69	0.00	78.24	72.22	110.80	38.58
5700.00	28.85	PK	H	34.18	3.68	0.00	66.71	60.69	105.20	44.51
5650.00	26.73	PK	H	34.16	3.63	0.00	64.52	58.5	68.20	9.70
11510.00	48.86	PK	H	39.00	6.59	37.37	57.08	51.06	74.00	22.94
11510.00	35.83	AV	H	39.00	6.59	37.37	44.05	38.03	54.00	15.97
17265.00	47.52	PK	H	41.74	8.79	38.58	59.47	53.45	74.00	20.55
17265.00	34.87	AV	H	41.74	8.79	38.58	46.82	40.8	54.00	13.20
High Channel: 5795 MHz										
5795.00	70.78	PK	H	34.22	3.71	0.00	108.71	102.69	N/A	N/A
5795.00	62.13	AV	H	34.22	3.71	0.00	100.06	94.04	N/A	N/A
5795.00	65.73	PK	V	34.22	3.71	0.00	103.66	97.64	N/A	N/A
5795.00	57.24	AV	V	34.22	3.71	0.00	95.17	89.15	N/A	N/A
5850.00	36.18	PK	H	34.24	3.75	0.00	74.17	68.15	122.20	54.05
5855.00	33.54	PK	H	34.24	3.75	0.00	71.53	65.51	110.80	45.29
5875.00	28.87	PK	H	34.25	3.77	0.00	66.89	60.87	105.20	44.33
5925.00	27.32	PK	H	34.27	3.80	0.00	65.39	59.37	68.20	8.83
11590.00	50.23	PK	H	39.00	6.62	37.46	58.39	52.37	74.00	21.63
11590.00	36.68	AV	H	39.00	6.62	37.46	44.84	38.82	54.00	15.18
17385.00	47.76	PK	H	42.43	8.82	38.50	60.51	54.49	74.00	19.51
17385.00	35.12	AV	H	42.43	8.82	38.50	47.87	41.85	54.00	12.15

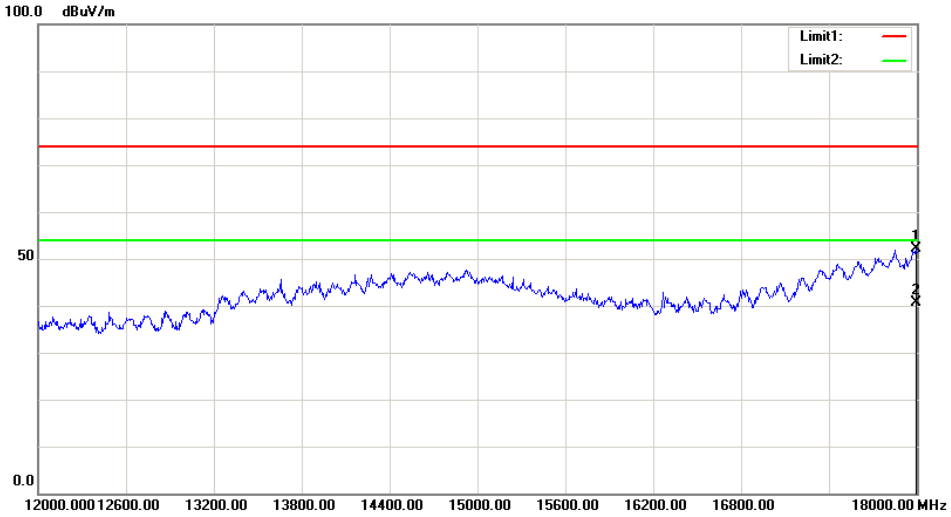
802.11ac80

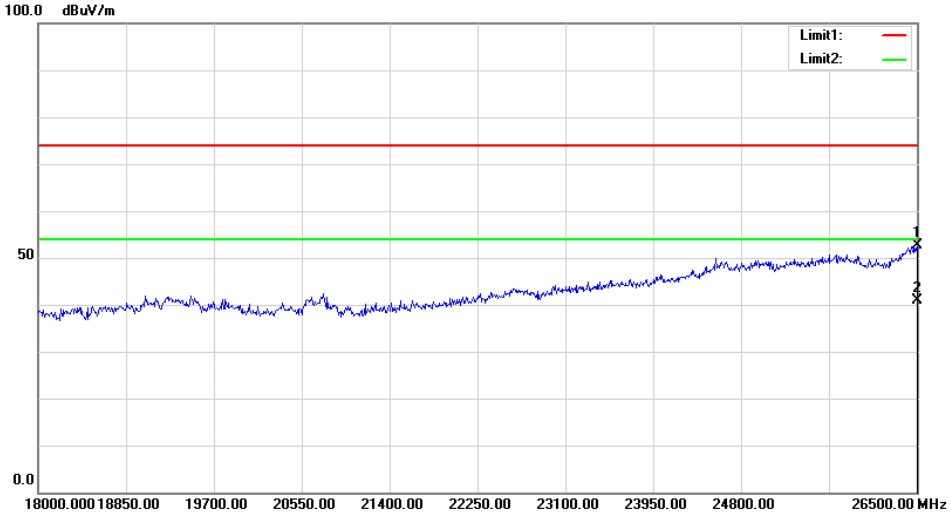
Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Extrapolation result	Limit	Margin
	Reading	Detector	Polar	Factor						
MHz	dBµV	PK/QP/AV	H/V	dB/m	dB	dB	dBµV/m	dBµV/m	dBµV/m	dB
Low Channel: 5775 MHz										
5775.00	68.93	PK	H	34.21	3.70	0.00	106.84	100.82	N/A	N/A
5775.00	60.18	AV	H	34.21	3.70	0.00	98.09	92.07	N/A	N/A
5775.00	64.11	PK	V	34.21	3.70	0.00	102.02	96	N/A	N/A
5775.00	55.67	AV	V	34.21	3.70	0.00	93.58	87.56	N/A	N/A
5725.00	40.86	PK	H	34.19	3.69	0.00	78.74	72.72	122.20	49.48
5720.00	40.05	PK	H	34.19	3.69	0.00	77.93	71.91	110.80	38.89
5700.00	35.74	PK	H	34.18	3.68	0.00	73.60	67.58	105.20	37.62
5650.00	26.98	PK	H	34.16	3.63	0.00	64.77	58.75	68.20	9.45
5850.00	47.36	PK	H	34.24	3.75	0.00	85.35	79.33	122.20	42.87
5855.00	44.81	PK	H	34.24	3.75	0.00	82.80	76.78	110.80	34.02
5875.00	42.31	PK	H	34.25	3.77	0.00	80.33	74.31	105.20	30.89
5925.00	29.46	PK	H	34.27	3.80	0.00	67.53	61.51	68.20	6.69
11550.00	49.63	PK	H	39.00	6.61	37.42	57.82	51.8	74.00	22.20
11550.00	35.12	AV	H	39.00	6.61	37.42	43.31	37.29	54.00	16.71
17325.00	47.85	PK	H	42.09	8.80	38.54	60.20	54.18	74.00	19.82
17325.00	35.03	AV	H	42.09	8.80	38.54	47.38	41.36	54.00	12.64

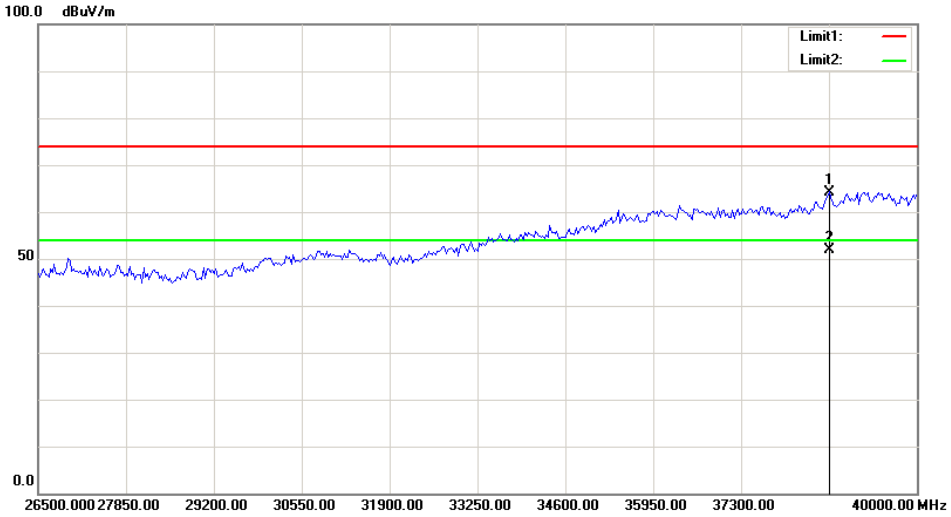
Worst plots(802.11a Middle channel)
Horizontal

Fundamental Test with Band Rejection Filter



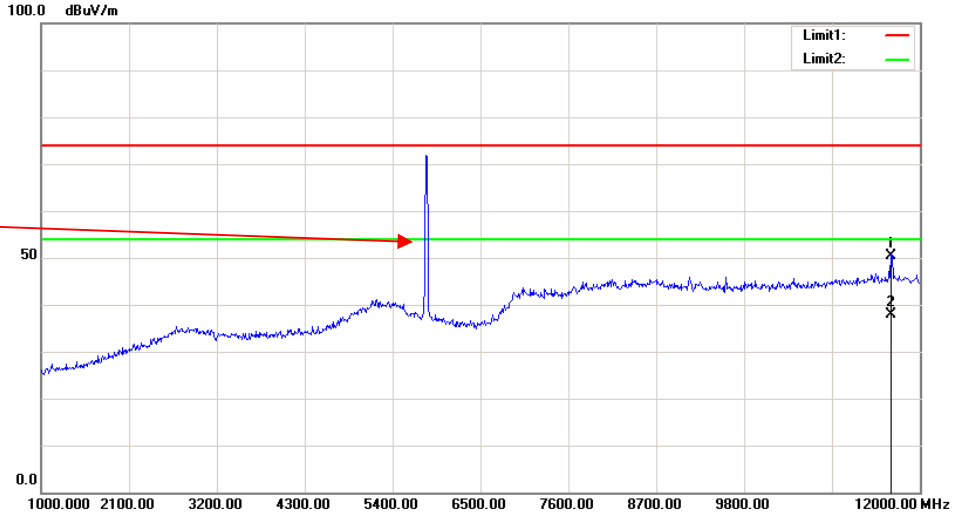


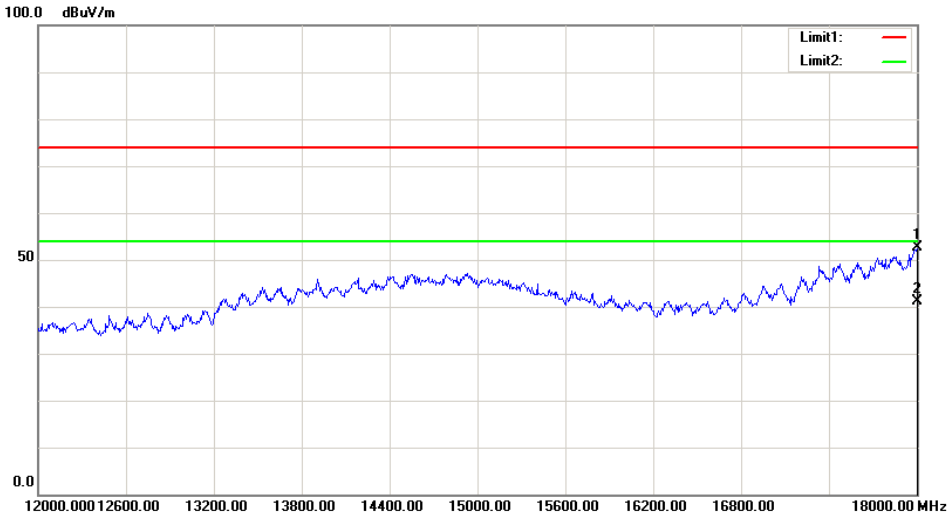


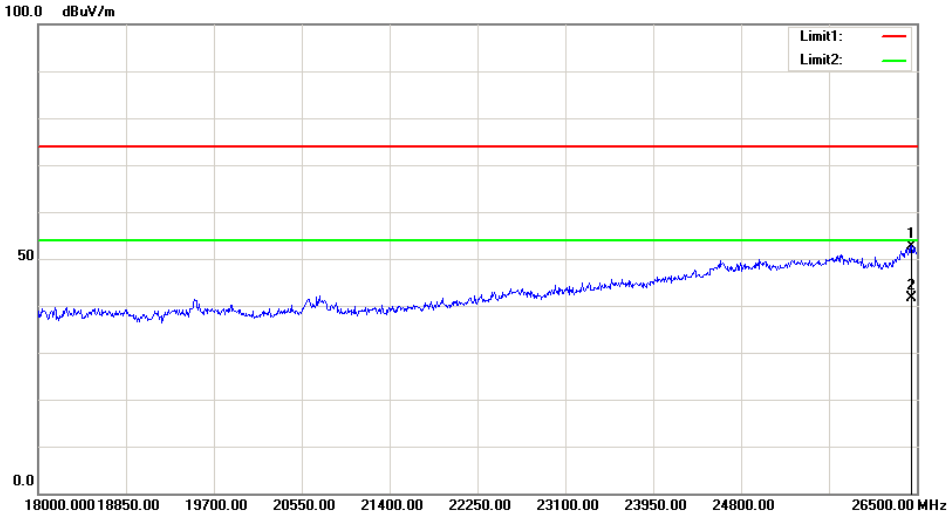


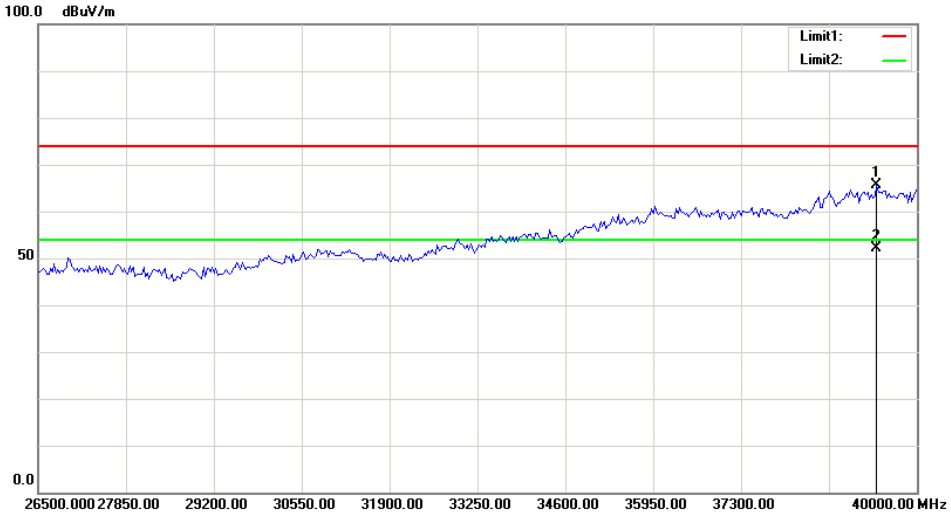
Vertical

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(a)& RSS-247 §6.2,RSS-Gen §6.7– EMISSION BANDWIDTH

Applicable Standard

15.407(a), RSS-247 §6.2 and RSS-Gen §6.7

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
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:	28.8 ~ 28.9 °C
Relative Humidity:	67 ~ 70 %
ATM Pressure:	99.6 ~ 100.6 kPa

** The testing was performed by Nami Quan from 2018-07-04 to 2018-07-05.*

Test Result: Pass.

Please refer to the following tables and plots.

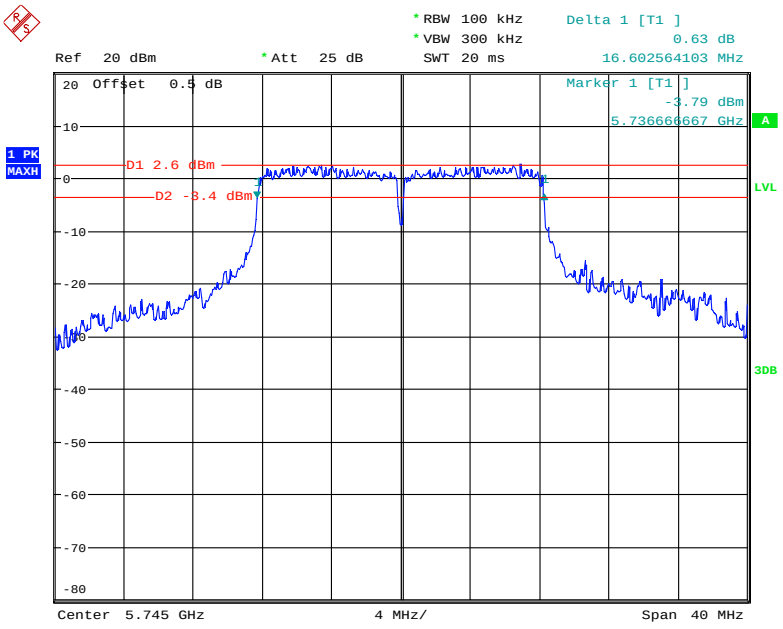
Test mode: Transmitting

Mode	Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limits (MHz)
802.11a	Low	5745	16.60	17.44	≥0.5
	Middle	5785	16.54	17.68	≥0.5
	High	5825	16.60	17.44	≥0.5
802.11n20	Low	5745	17.76	18.40	≥0.5
	Middle	5785	17.82	18.48	≥0.5
	High	5825	17.82	18.48	≥0.5
802.11n40	Low	5755	36.67	37.28	≥0.5
	High	5795	36.67	37.60	≥0.5
802.11ac80	Middle	5775	76.67	78.08	≥0.5

Note: the 99% Occupied bandwidth are not fall into 5470-5725MHz band

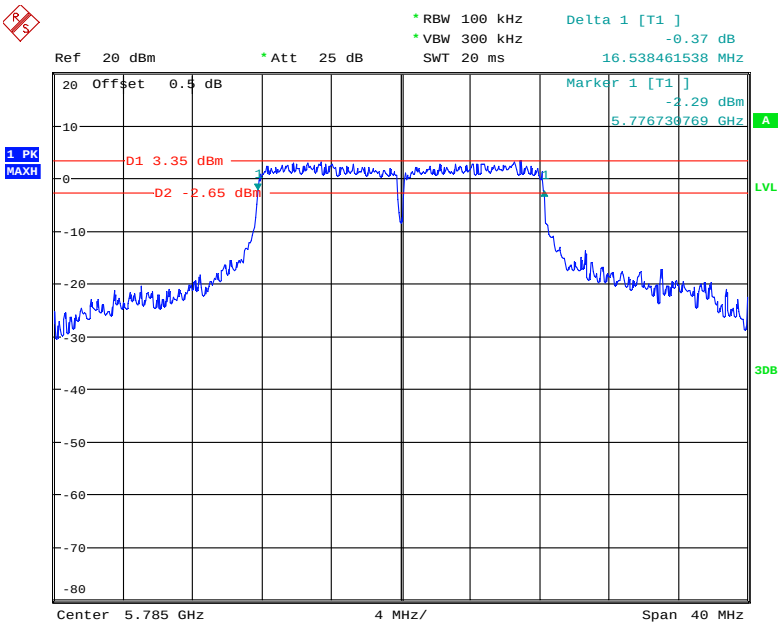
6dB Bandwidth:

802.11a, Low Channel



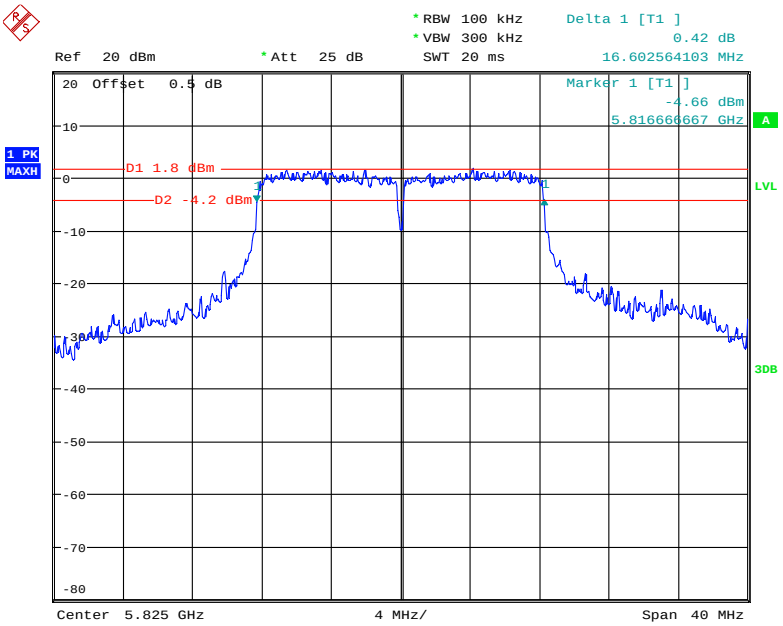
Date: 5.JUL.2018 11:00:26

802.11a, Middle Channel



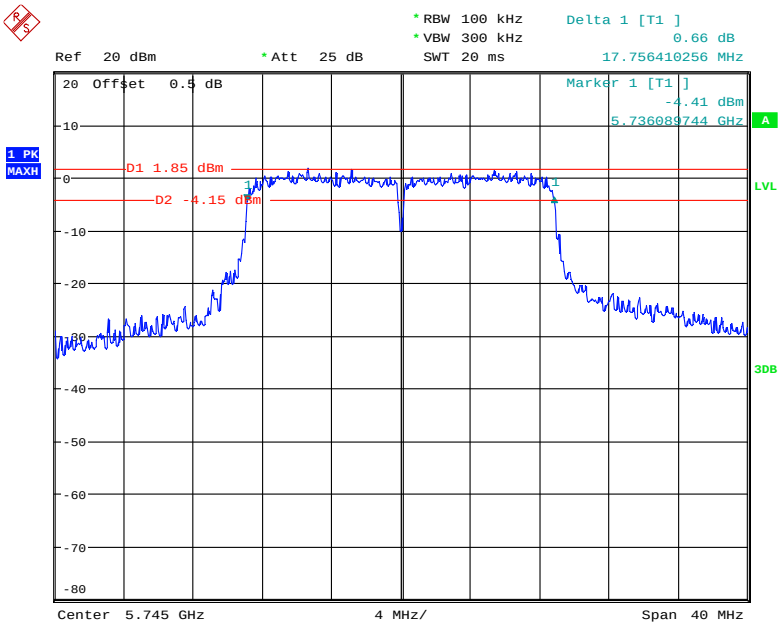
Date: 5.JUL.2018 10:59:30

802.11a, High Channel



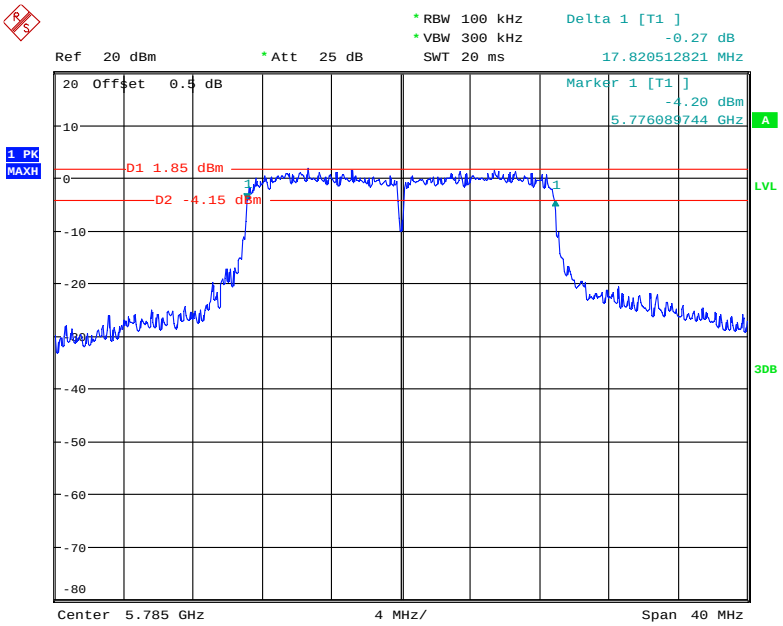
Date: 5.JUL.2018 10:49:09

802.11n20, Low Channel



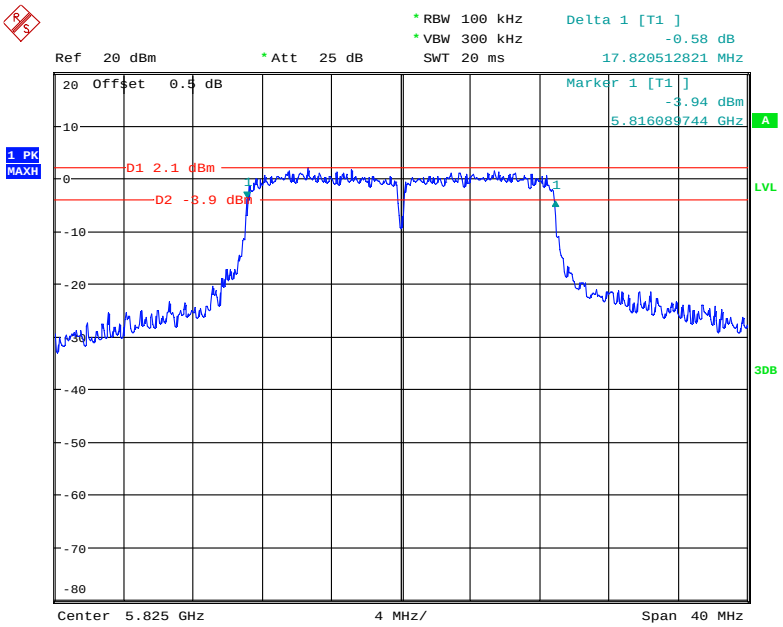
Date: 5.JUL.2018 10:47:00

802.11n20, Middle Channel



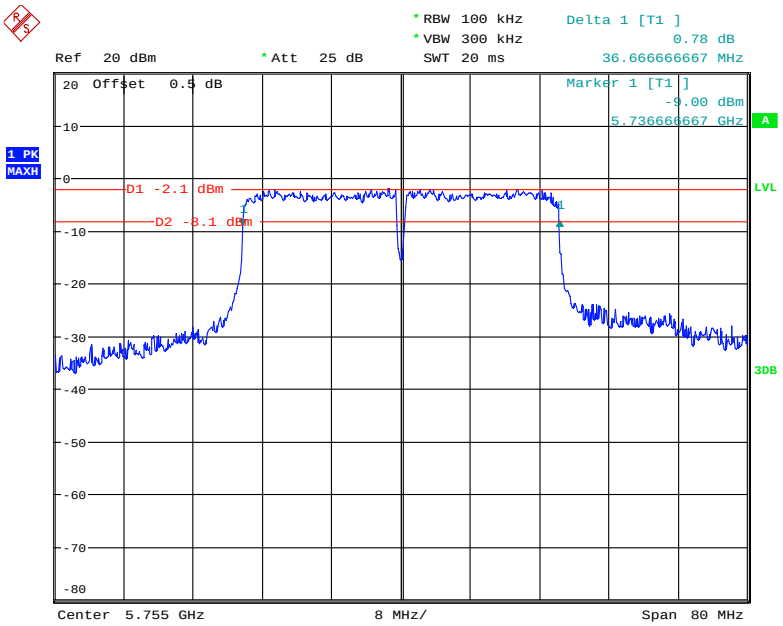
Date: 5.JUL.2018 10:47:35

802.11n20, High Channel



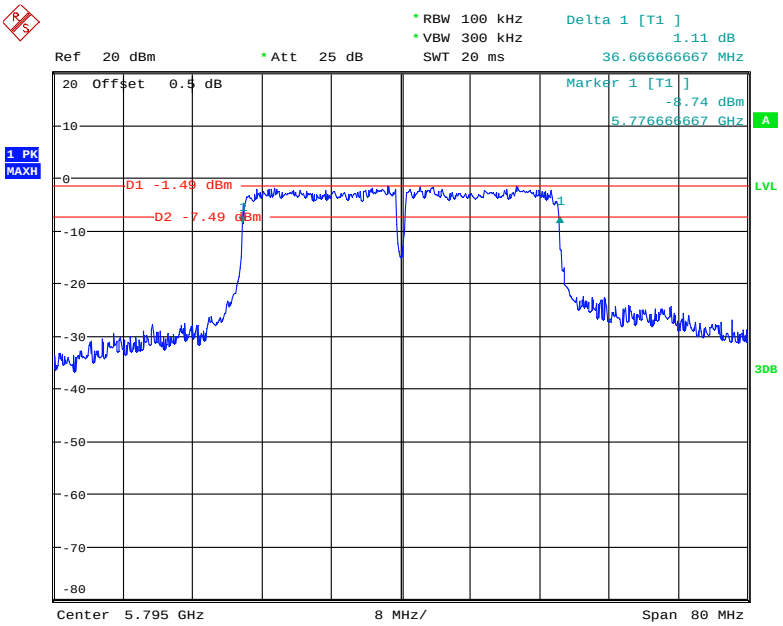
Date: 5.JUL.2018 10:48:35

802.11n40, Low Channel



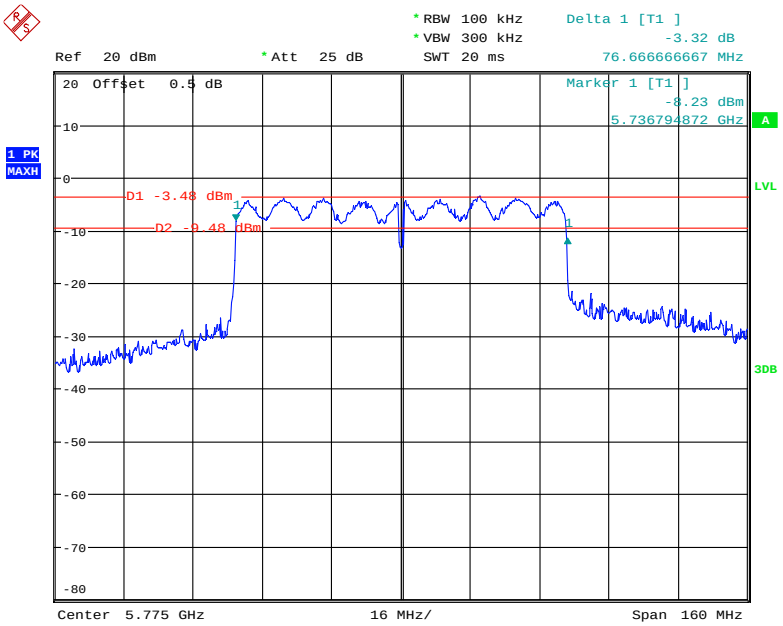
Date: 5.JUL.2018 10:45:28

802.11n40, High Channel



Date: 5.JUL.2018 10:46:05

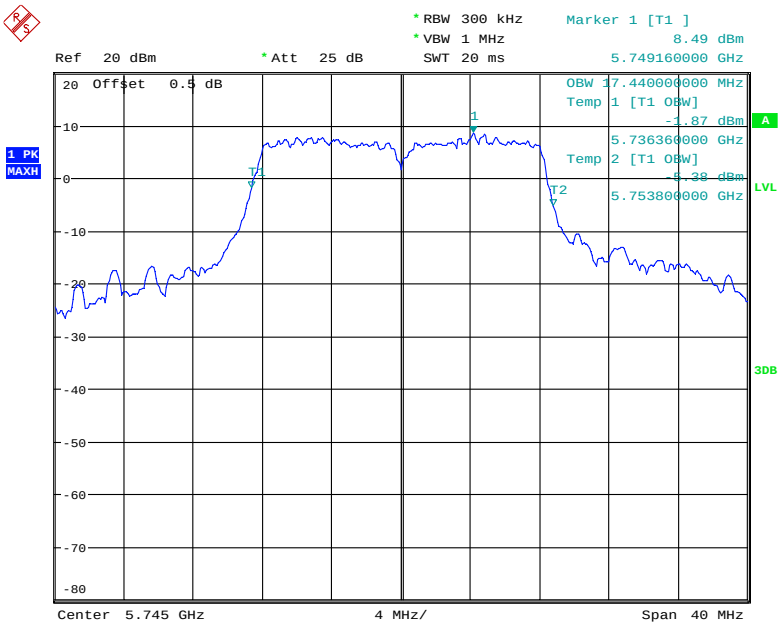
802.11 ac80, Middle Channel



Date: 5.JUL.2018 10:44:48

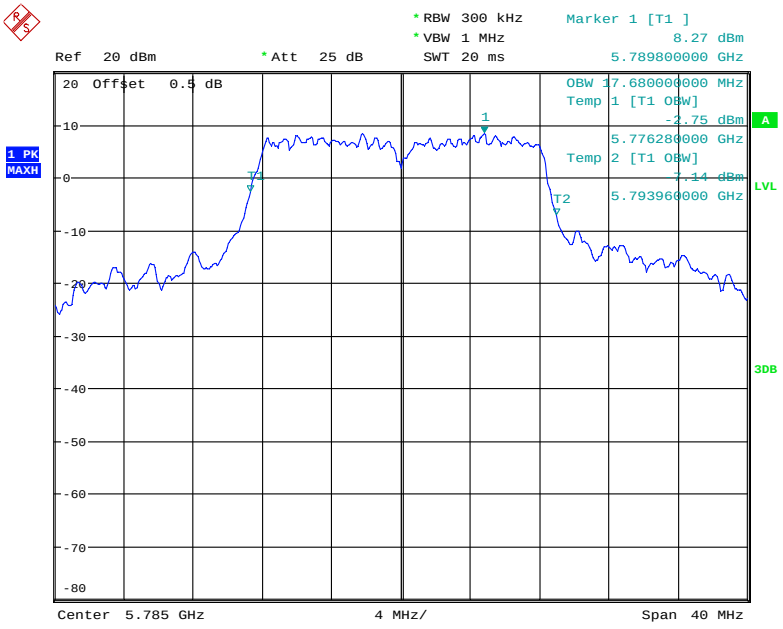
99% Occupied Bandwidth:

802.11a, Low Channel



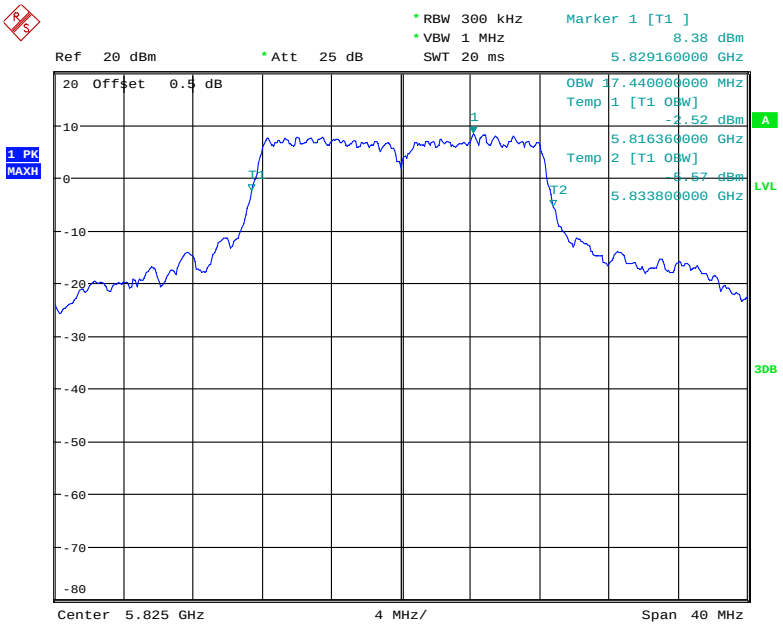
Date: 4.JUL.2018 15:25:12

802.11a, Middle Channel



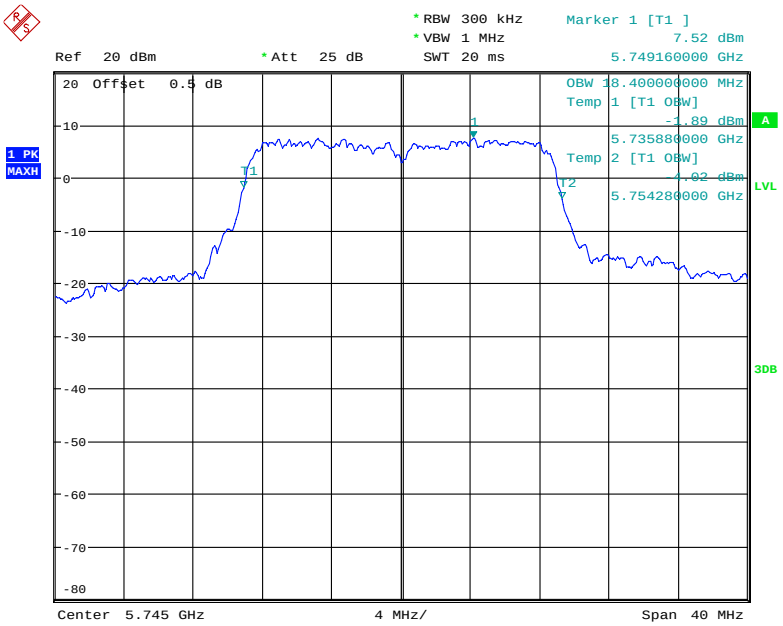
Date: 4.JUL.2018 15:28:10

802.11a, High Channel



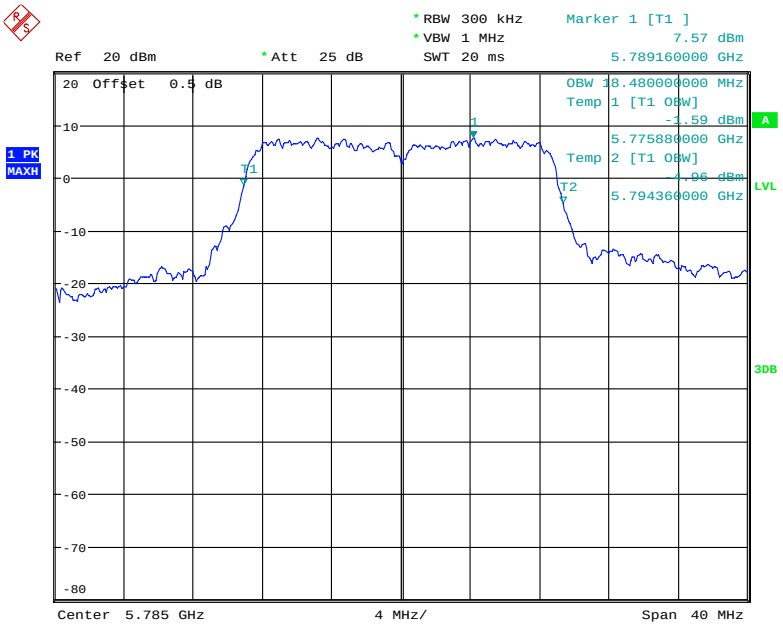
Date: 4.JUL.2018 15:30:44

802.11n20, Low Channel



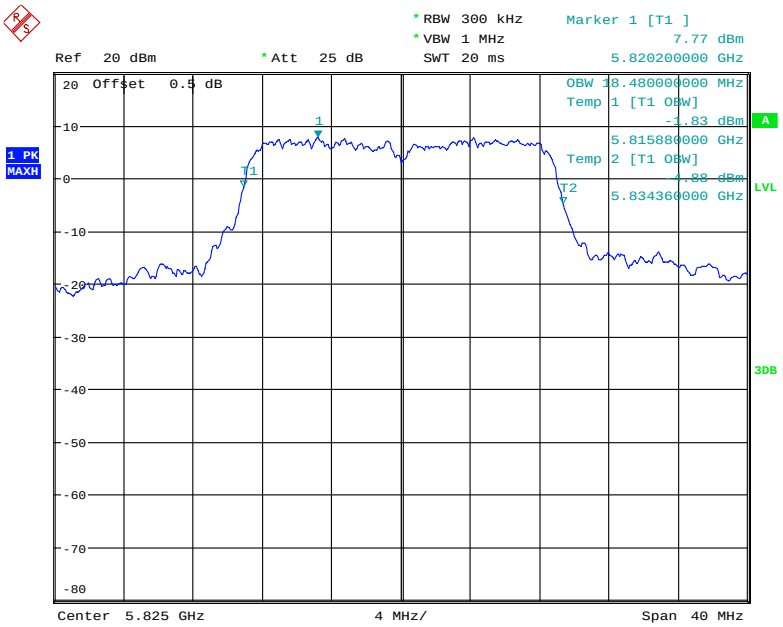
Date: 4.JUL.2018 15:38:12

802.11n20, Middle Channel



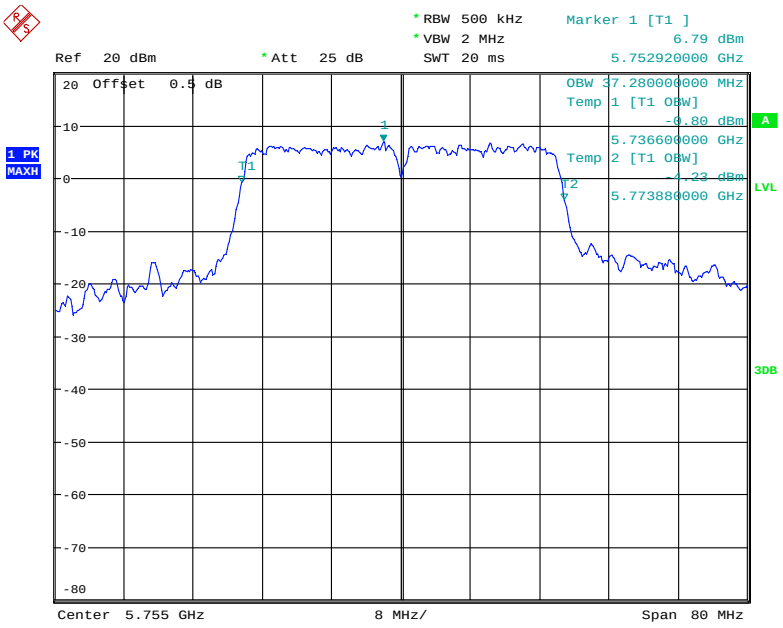
Date: 4.JUL.2018 15:35:40

802.11n20, High Channel



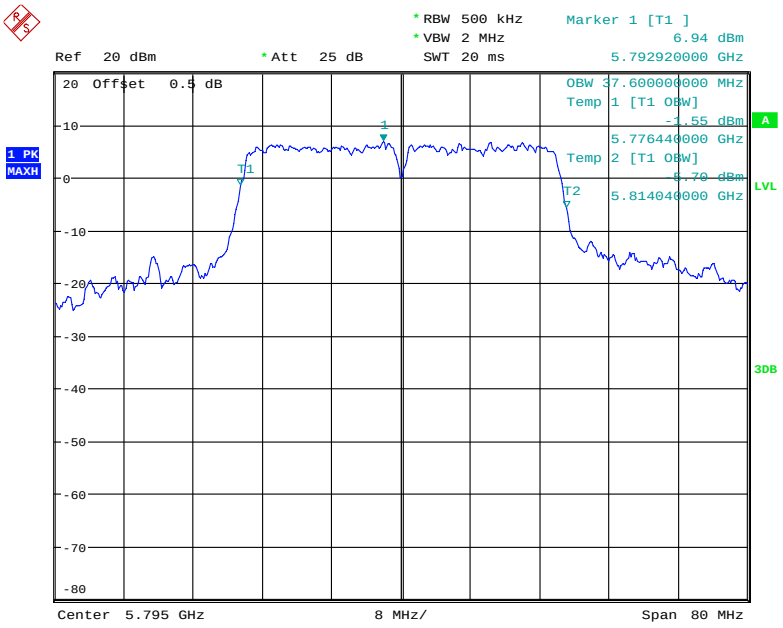
Date: 4.JUL.2018 15:33:06

802.11n40, Low Channel



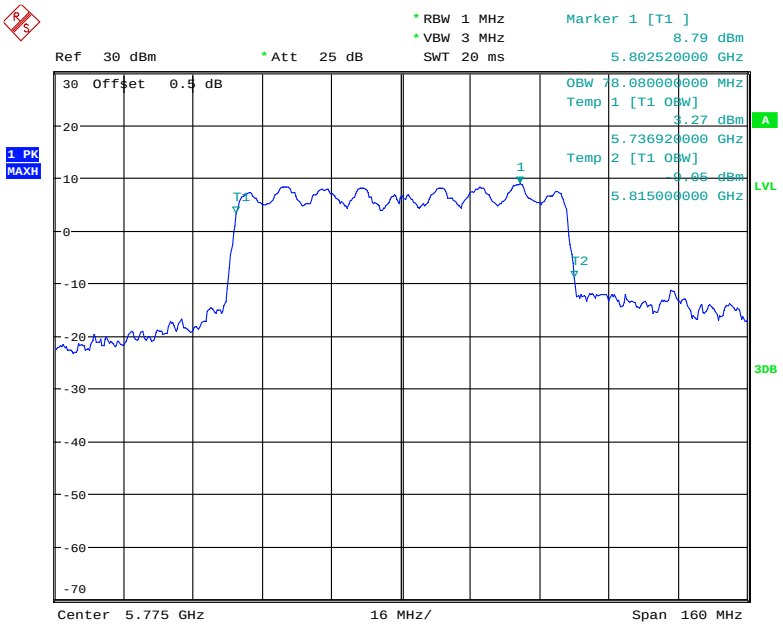
Date: 4.JUL.2018 15:41:53

802.11n40, High Channel



Date: 4.JUL.2018 15:45:39

802.11 ac80, Middle Channel



Date: 4.JUL.2018 15:52:44

FCC §15.407(a) & RSS-247 §6.2– MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.407(a)

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

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

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

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

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

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum

power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

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

According to RSS-247 §6.2:

Frequency band 5150-5250 MHz

6.2.1.1 Power limits

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or 1.76 + 10 $\log_{10}$B, dBm, whichever is less stringent. Devices shall implement transmitter power control (TPC) in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.

For other devices, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 $\log_{10}$B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

Frequency band 5250-5350 MHz

6.2.2.1 Power limits

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or 1.76 + 10 $\log_{10}$B, dBm, whichever is less. Devices shall implement TPC in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.

Devices, other than devices installed in vehicles, shall comply with the following:

a) The maximum conducted output power shall not exceed 250 mW or 11 + 10 $\log_{10}$B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band;

b) The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 $\log_{10}$B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

Frequency bands 5470-5600 MHz and 5650-5725 MHz

6.2.3.1 Power limits

The maximum conducted output power shall not exceed 250 mW or 11 + 10 $\log_{10}$B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 $\log_{10}$B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

Frequency band 5725-5850 MHz

6.2.4.1 Power limits

For equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

The maximum conducted output power shall not exceed 1 W. The output 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 output 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 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[3] systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

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:	28.9 °C
Relative Humidity:	70 %
ATM Pressure:	100.6 kPa

** The testing was performed by Nami Quan on 2018-07-05.*

Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	RMS Conducted Output Power (dBm)	Limit (dBm)
802.11a	Low	5745	16.77	30.00
	Middle	5785	16.88	30.00
	High	5825	16.81	30.00
802.11n20	Low	5745	16.66	30.00
	Middle	5785	16.73	30.00
	High	5825	16.81	30.00
802.11n40	Low	5755	16.69	30.00
	High	5795	16.71	30.00
802.11ac80	Middle	5775	16.29	30.00

Note: the power sensor is a gated RF average power meter.

FCC §15.407(a)& RSS-247 §6.2 - POWER SPECTRAL DENSITY

Applicable Standard

According to FCC §15.407(a)

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

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

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

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

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

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

power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

According to RSS-247 §6.2:

Frequency band 5150-5250 MHz

6.2.1.1 Power limits

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or 1.76 + 10 $\log_{10}$B, dBm, whichever is less stringent. Devices shall implement transmitter power control (TPC) in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.

For other devices, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 $\log_{10}$B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

Frequency band 5250-5350 MHz

6.2.2.1 Power limits

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or 1.76 + 10 $\log_{10}$B, dBm, whichever is less. Devices shall implement TPC in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.

Devices, other than devices installed in vehicles, shall comply with the following:

a) The maximum conducted output power shall not exceed 250 mW or 11 + 10 $\log_{10}$B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band;

b) The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 $\log_{10}$B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

Frequency bands 5470-5600 MHz and 5650-5725 MHz

6.2.3.1 Power limits

The maximum conducted output power shall not exceed 250 mW or 11 + 10 $\log_{10}$B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 $\log_{10}$B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

Frequency band 5725-5850 MHz

6.2.4.1 Power limits

For equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

The maximum conducted output power shall not exceed 1 W. The output 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 output 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 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[3] systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

Test Procedure

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04
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:	28.8 °C
Relative Humidity:	67 %
ATM Pressure:	99.6 kPa

** The testing was performed by Nami Quan on 2018-07-04.*

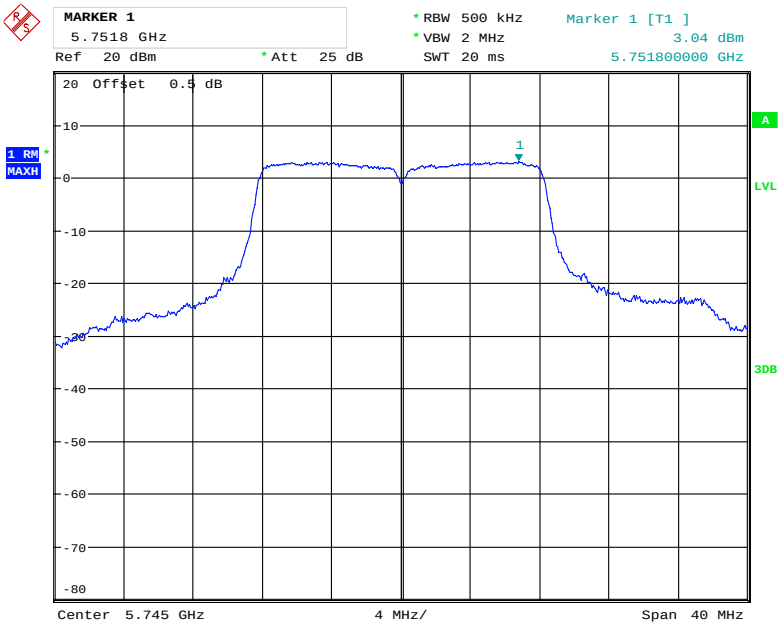
Test Mode: Transmitting

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

Mode	Frequency (MHz)	Reading (dBm/ 500kHz)	FCC/ RSS-247 Conducted Limit (dBm/500kHz)
802.11a	5745	3.04	30
	5785	3.30	
	5825	3.20	
802.11n20	5745	2.58	
	5785	2.59	
	5825	2.78	
802.11n40	5755	-0.74	
	5795	-0.57	
802.11ac80	5775	-2.33	

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

802.11a, Low Channel



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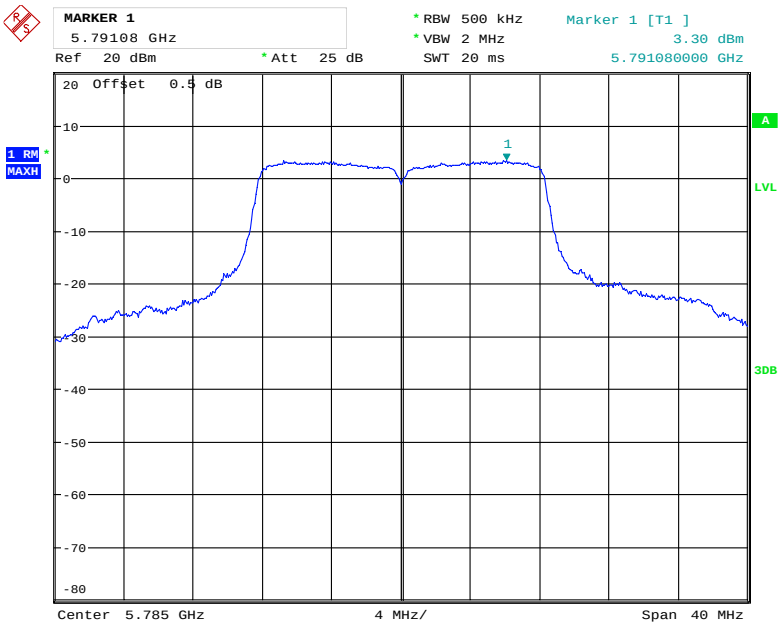
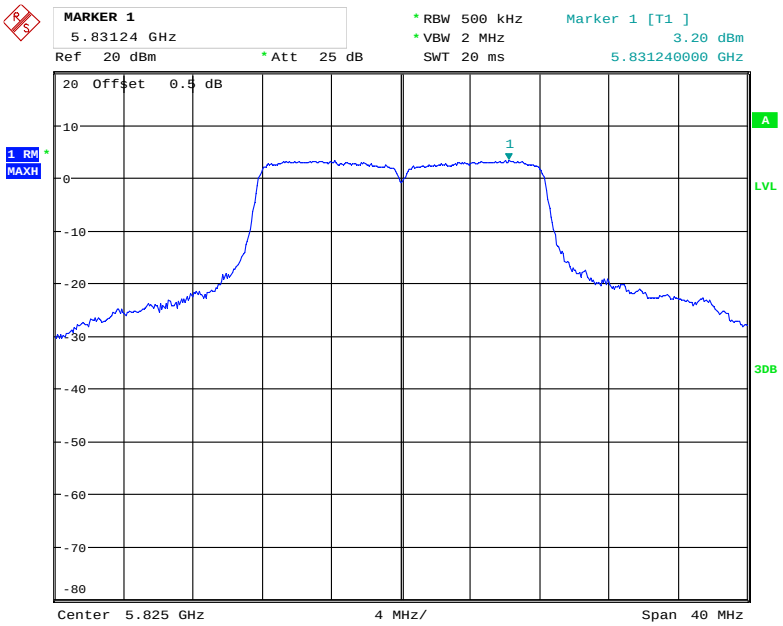
802.11a, Middle Channel



Date: 4.JUL.2018 16:00:24

802.11a, High Channel



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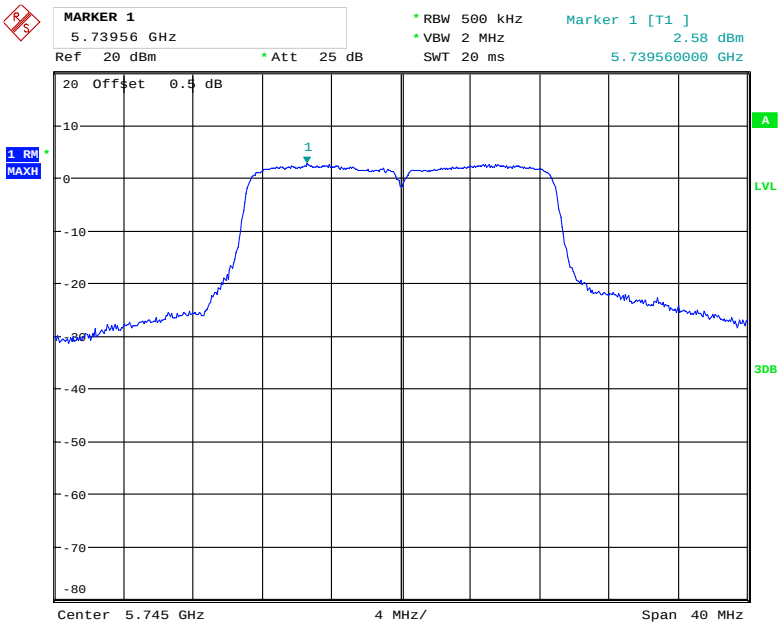
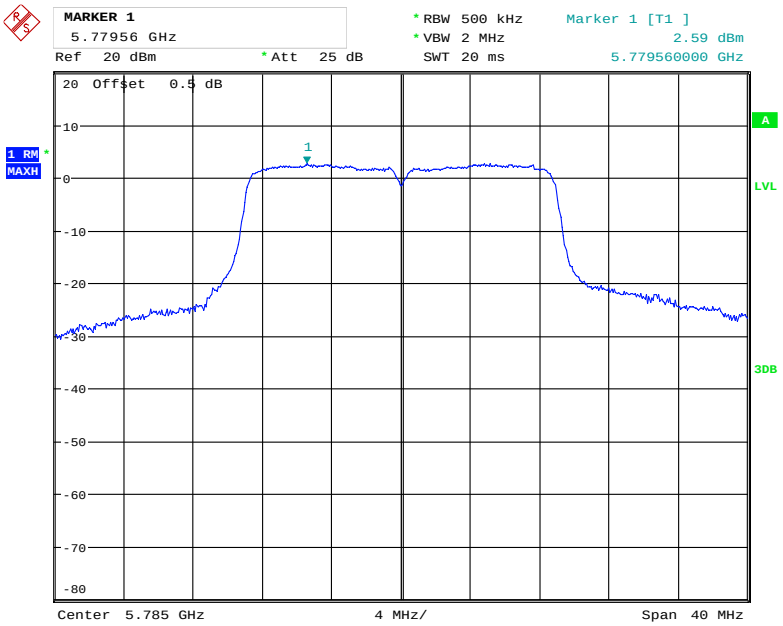
802.11n20, Low Channel



Date: 4.JUL.2018 15:58:45

802.11n20, Middle Channel



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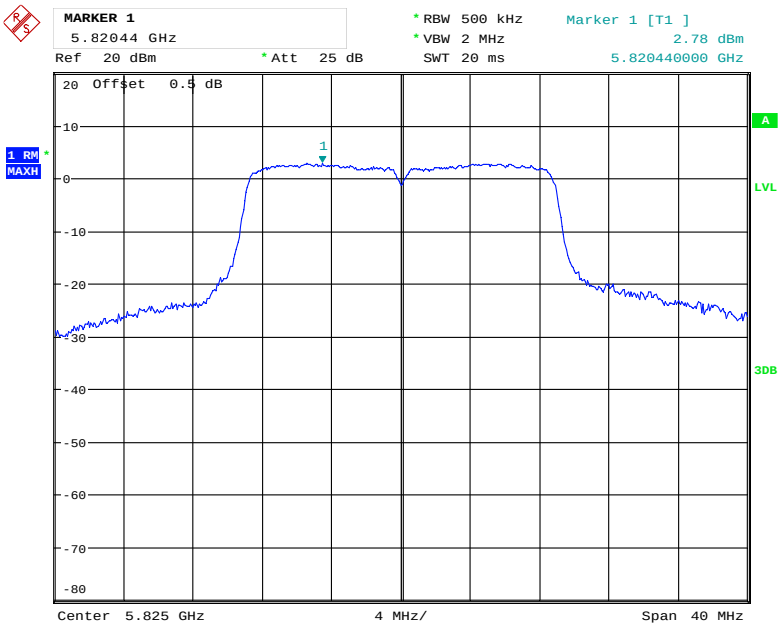
802.11n20, High Channel



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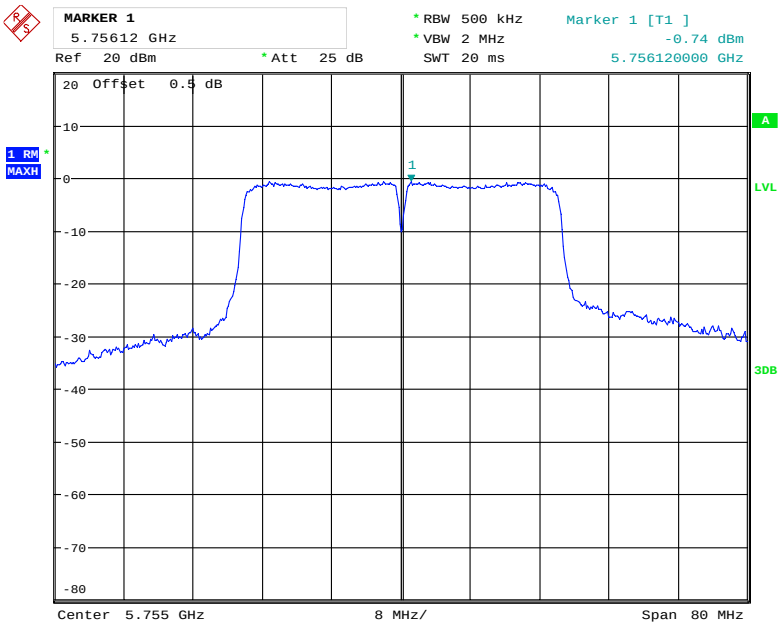
802.11n40, Low Channel



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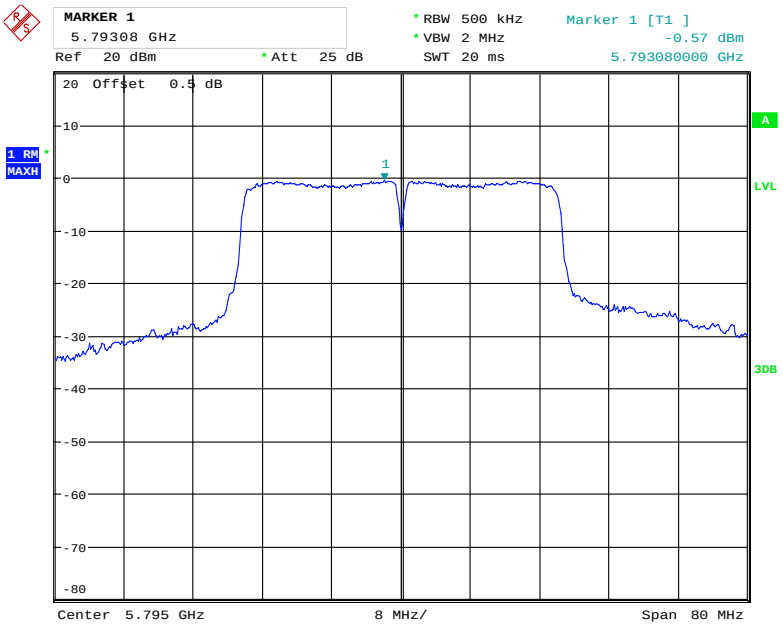
802.11n40, High Channel



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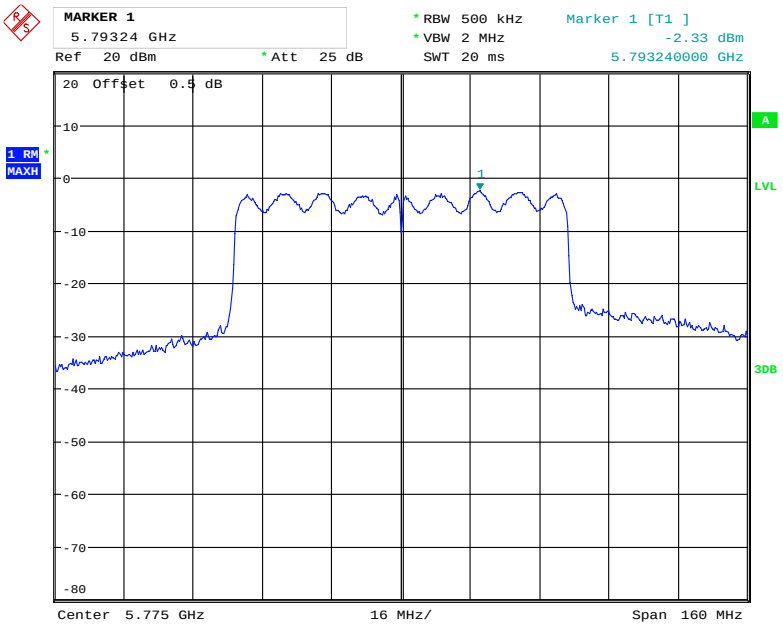
802.11 ac80, Middle Channel



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FCC §15.407(b)& RSS-247 §6.2 – 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.

According to RSS-247§6.2

Frequency band 5150-5250 MHz

6.2.1.2 Unwanted emission limits

For transmitters with operating frequencies in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. Any unwanted emissions that fall into the band 5250-5350 MHz shall be attenuated below the channel power by at least 26 dB, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth (i.e. 99% bandwidth), above 5250 MHz. The 26 dB bandwidth may fall into the 5250-5350 MHz band; however, if the occupied bandwidth also falls within the 5250-5350 MHz band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5250-5350 MHz including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250-5350 MHz band.

Frequency band 5250-5350 MHz

6.2.2.2 Unwanted emission limits

Devices shall comply with the following:

a) All emissions outside the band 5250-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p.; or

b) All emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. and its power shall comply with the spectral power density for operation within the band 5150-5250 MHz. The device, except devices installed in vehicles, shall be labelled or include in the user manual the following text "for indoor use only."

Frequency bands 5470-5600 MHz and 5650-5725 MHz:

6.2.3.2 Unwanted emission limits

Emissions outside the band 5470-5600 MHz and 5650-5725 MHz shall not exceed -27 dBm/MHz e.i.r.p. However, devices with bandwidth overlapping the band edge of 5725 MHz can meet the emission limit of -27 dBm/MHz e.i.r.p. at 5850 MHz instead of 5725 MHz.

Frequency band 5725-5850 MHz

6.2.4.2 Unwanted emission limits

Devices operating in the band 5725-5850 MHz with antenna gain greater than 10 dBi can have unwanted emissions that comply with either the limits in this section or in section 5.5 until six (6) months after the publication date of this standard for certification. Certified devices that do not comply with emission limits in this section shall not be manufactured, imported, distributed, leased, offered for sale or sold after April 1, 2018.

Devices operating in the band 5725-5850 MHz with antenna gain of 10 dBi or less can have unwanted emissions that comply with either the limits in this section or in section 5.5 until April 1, 2018 for certification. Certified devices that do not comply with emission limits in this section shall not be manufactured, imported, distributed, leased, offered for sale or sold after April 1, 2020.

Devices operating in the band 5725-5850 MHz shall have e.i.r.p. of unwanted emissions comply with the following:

a) 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edges;

b) 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;

c) 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and

d) -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.

Test Procedure

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04
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

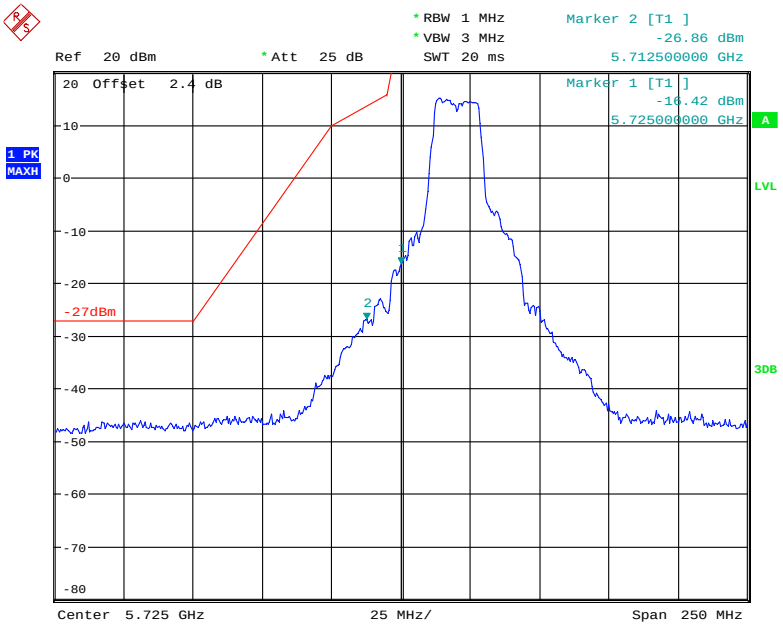
Temperature:	28.8 °C
Relative Humidity:	67 %
ATM Pressure:	99.6 kPa

** The testing was performed by Nami Quan on 2018-07-04.*

Test Result: Pass.

Please refer to the following plots.

802.11a, Low Channel



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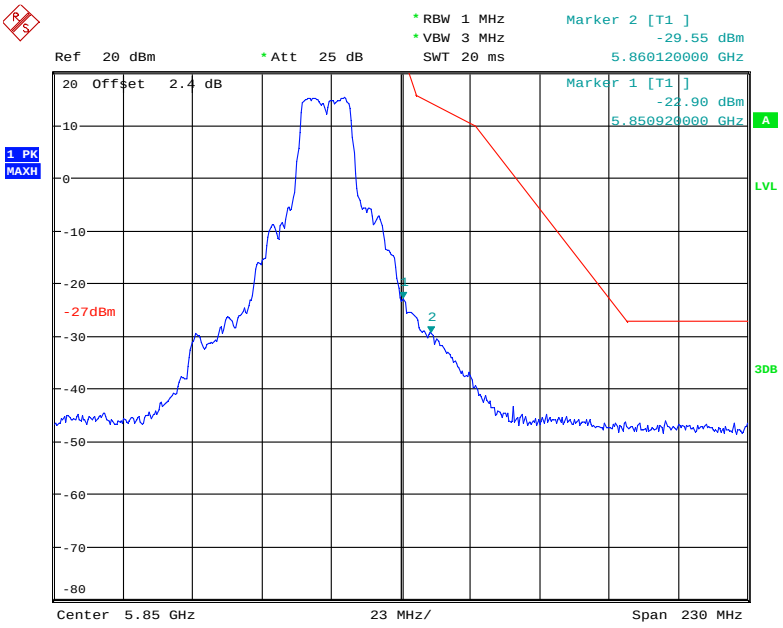
802.11a, High Channel



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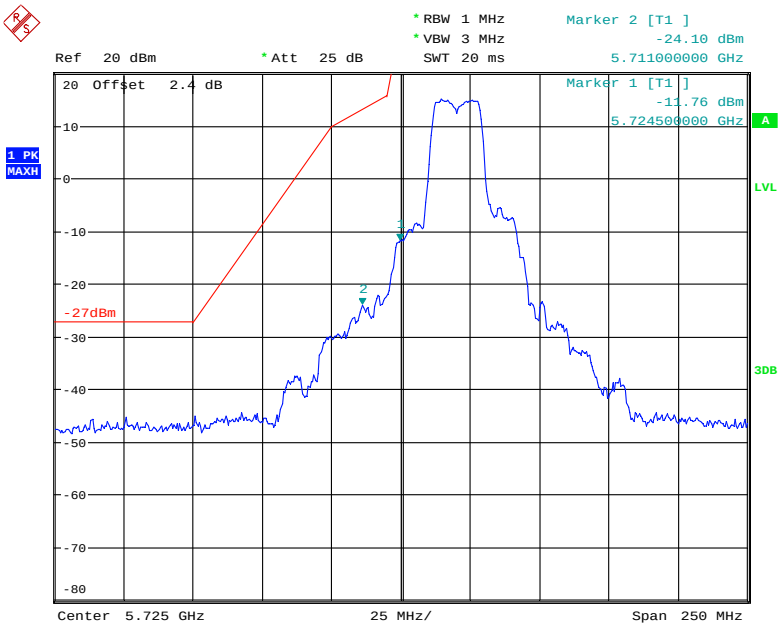
802.11n20, Low Channel



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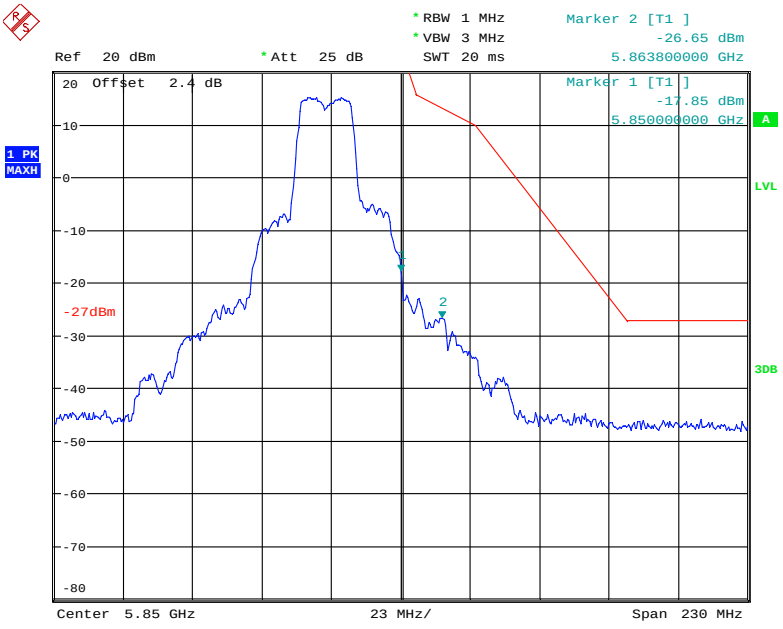
802.11n20, High Channel



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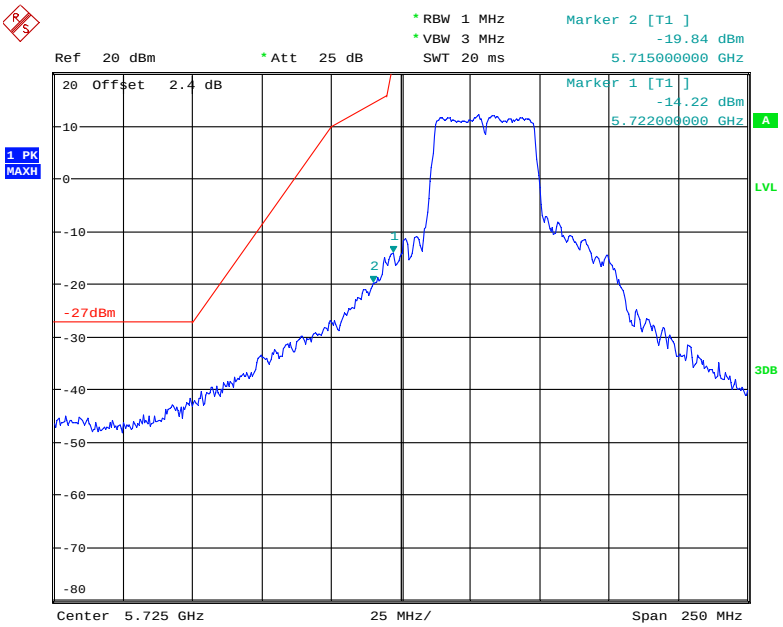
802.11n40, Low Channel



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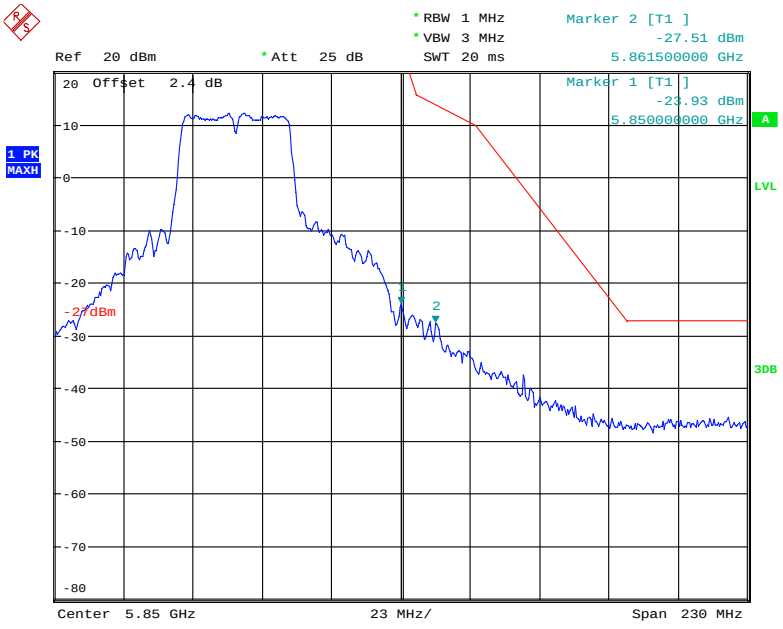
802.11n40, High Channel



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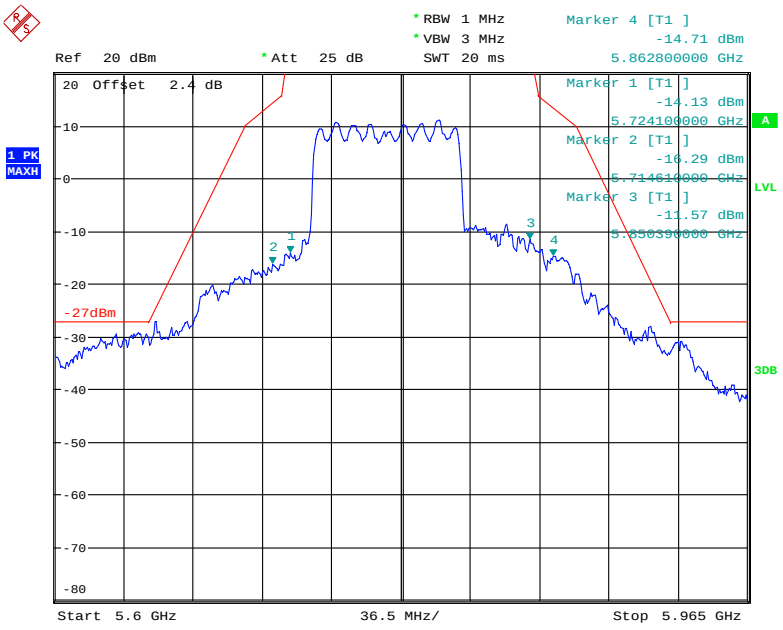
802.11 ac80, Middle Channel



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