FCC PART 15.407

TEST REPORT

For

Shenzhen zero-tech UAV Limited

A,NO.1 qianwan road 1,qianhai Shenzhen-HK Cooperative District,Shenzhen,China

FCC ID: 2AGEPUM2500

Report Type:	Product Name:
Original Report	XPLORER Mini.5G

Test Engineer:	*Kevin Hu*
Report Number:	RDG161216002
Report Date:	2017-07-11
Reviewed By:	Henry Ding EMC Leader
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, China Tel: 028-65523123, Fax: 028-65525125 www.baclcorp.com

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The ***Shenzhen zero-tech UAV Limited***'s product, model number: ***UM2500 (FCC ID: 2AGEPUM2500)*** (the "EUT") in this report was a ***XPLORER Mini.5G***, which was measured approximately: 300 mm (L) x 180 mm (W) x 55 mm (H), rated input voltage: DC 11.4V for battery.

**All measurement and test data in this report was gathered from final production sample, serial number: 161216002 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2016-12-16, and EUT conformed to test requirement.*

Objective

This type approval report is prepared on behalf of ***Shenzhen zero-tech UAV Limited*** in accordance with Part 2-Subpart J, Part 15-Subparts A, B 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)

No related submittal grant.

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".

All of the measurements detailed in this Test Report were performed by Bay Area Compliance Laboratories Corp. (Chengdu).

The Bay Area Compliance Laboratories Corp. Chengdu's measurement Uncertainties (calculated for a k=2 Coverage Factor corresponding to approximately 95% Coverage) were as follows:

-For all of the AC Line Conducted Emissions Tests reported herein: ±3.17 dB.
-For of all of the Direct Antenna Conducted Emissions Tests reported herein: ±0.56 dB.

-For of all of the direct Radiated Emissions Tests reported herein are:
30 MHz to 200 MHz: ±4.7 dB;
200 MHz to 1 GHz: ±6.0 dB;
1 GHz to 6 GHz: ±5.13dB; and,
6 GHz to 40 GHz: ±5.47dB.

And the uncertainty will not be taken into consideration for all test data recorded in the report.

Test Facility

The test site used by BACL to collect test data is located in the 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, China

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

The EUT (device) supports the 802.11a/n ht20/ and n ht40 modes. The EUT supports 802.11a in SISO mode only. The EUT supports 802.11n ht20 and 802.11n ht40 in both SISO and MIMO modes. Based upon pre-scan tests, it was determined that the MIMO mode was the worst case (and the measurements reported in this Test Report are for the MIMO mode). For the 5725 to 5850 MHz band, in the 802.11n ht20 Mode, the following five channels were available for use:

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

For the 5725 to 5850 MHz band, in the 802.11n ht40 Mode, the following two channels were available for use:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795

For the 5725 to 5850 MHz band, in the 802.11a Mode, the following five channels were available for use:

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

The worst-case emissions were determined for each mode by measuring the average power and PSD across all data rates, bandwidths, and modulations.

EUT Exercise Software

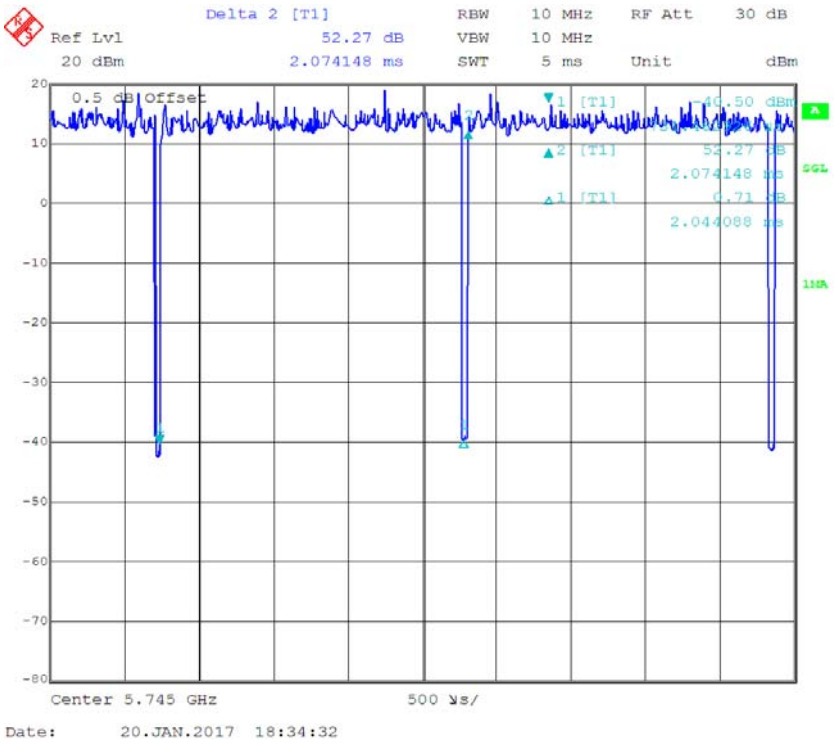
The 'Atheros Radio Test2(ART2-GUT)' was used for testing, that were provided by manufacturer. The maximum power and duty cycle was set by commands as following table:

Antenna 0&Antenna 1				
Test Mode	Test Software Version	Atheros Radio Test2(ART2-GUT)		
802.11a	Test Frequency	5745MHz	5785MHz	5805MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	11	12	12
802.11ht20	Test Frequency	5745MHz	5785MHz	5805MHz
	Data Rate	13Mbps	13Mbps	13Mbps
	Power Level Setting	11.5	12.5	12.5
802.11n ht40	Test Frequency	5755MHz	/	5795MHz
	Data Rate	27Mbps	/	27Mbps
	Power Level Setting	12	/	12.5

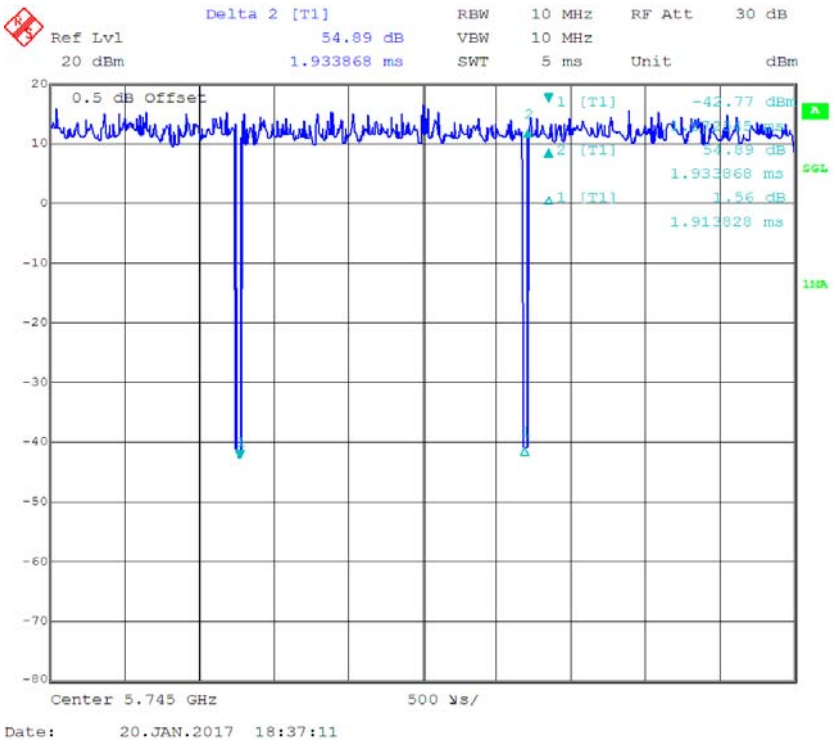
The software configured maximum duty cycle as below:

Mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle (%)	Duty Cycle Factor 10*log(1/x) (dB)	Minimum Transmission Duration (T) (ms)
802.11a	2.04	2.07	98.55	0.06	2.04
802.11n ht20	1.91	1.93	98.96	0.05	1.91
802.11n ht40	9.46	9.76	96.93	0.14	9.46

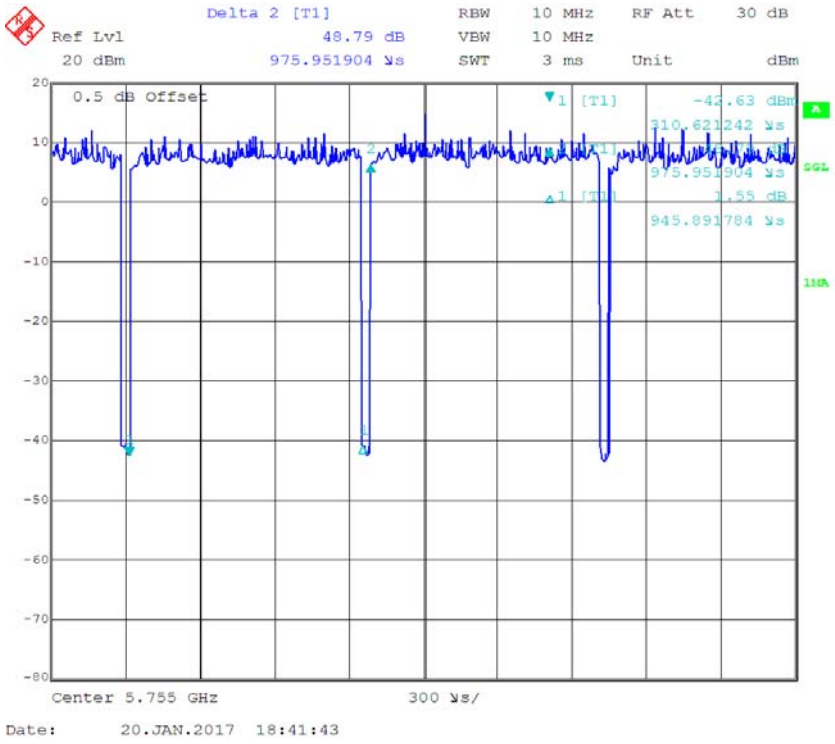
802.11a mode



802.11n ht20 mode



802.11n ht40



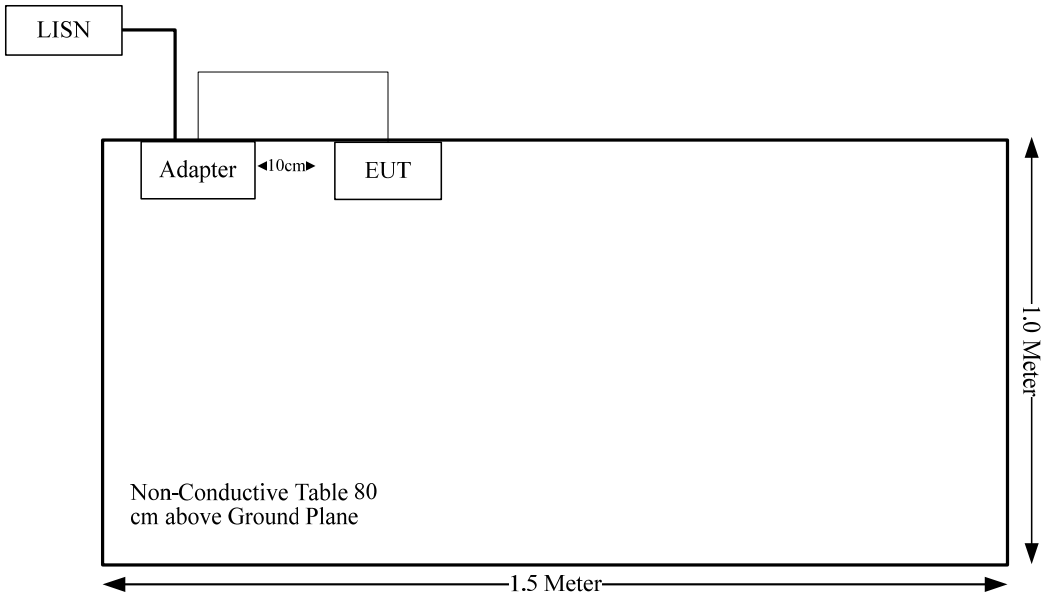
Equipment Modifications

No modification was made to the EUT.

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
DC cable	No	No	1.0	Adapter	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.407 (f) & §1.1310 & §2.1091	Maximum Permissable Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b) & §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)	26 dB Bandwidth and 6dB 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/f²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

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

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

Calculated Formulary:

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

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

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

Calculated Data:

Frequency (MHz)	Antenna Gain		Output Power including Tune-up tolerance		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)			
5725-5850	2	1.58	13	19.95	20.00	0.0063	1.0

Result: Compliance, The device meets MPE requirement for Devices Used by the General Public (Uncontrolled Environment) at distance ≥20 cm.

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

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

Antenna Connector Construction

The EUT have 2 internal antennas and the gain of each antenna is 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

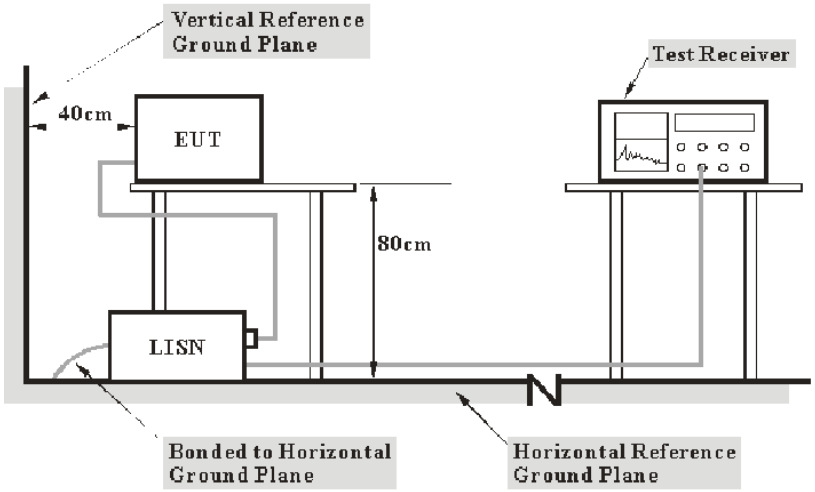
Result: Compliance.

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

Applicable Standard

FCC §15.207, §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 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 maximum 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
Rohde & Schwarz	EMI Test Receiver	ESCS 30	836858/0016	2016-12-02	2017-12-01
Rohde & Schwarz	L.I.S.N.	ENV216	100018	2016-12-02	2017-12-01
Rohde & Schwarz	PULSE LIMITER	ESH3Z2	DE14781	2016-10-31	2017-10-30
Unknown	Conducted Cable	Unknown	NO.5	2016-11-10	2017-11-09
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

Test Procedure

During the AC Line Conducted Emissions Tests, the Adapter was connected to the LISN using an extension cord (power strip), and the EUT was connected to the Adapter via its USB power cable.

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 Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

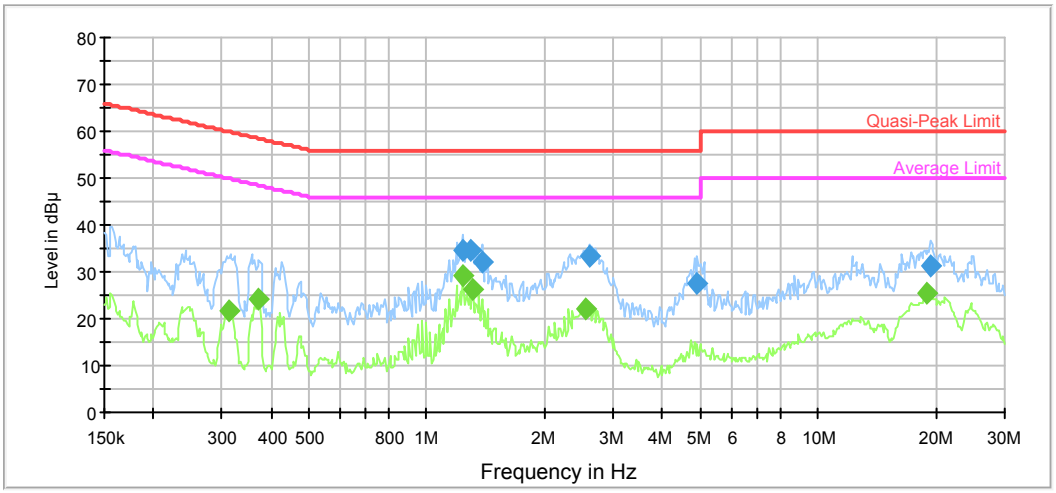
Test Data

Environmental Conditions

Temperature:	21.3 °C
Relative Humidity:	38 %
ATM Pressure:	101.7 kPa

The testing was performed by Kevin Hu on 2017-01-23.

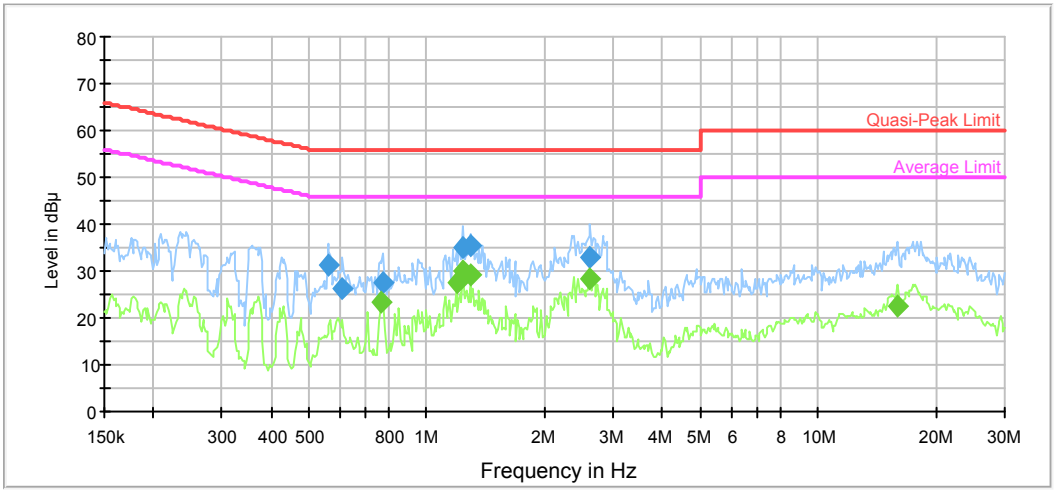
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
1.239175	34.4	9.000	L1	19.7	21.6	56.0	Compliance
1.289541	34.5	9.000	L1	19.7	21.5	56.0	Compliance
1.385415	32.0	9.000	L1	19.7	24.0	56.0	Compliance
2.599932	33.4	9.000	L1	19.7	22.6	56.0	Compliance
4.918182	27.5	9.000	L1	19.7	28.5	56.0	Compliance
19.364939	31.2	9.000	L1	20.0	28.8	60.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.312220	21.5	9.000	L1	19.7	28.4	49.9	Compliance
0.372042	24.0	9.000	L1	19.7	24.5	48.5	Compliance
1.239175	29.4	9.000	L1	19.7	16.6	46.0	Compliance
1.310256	26.4	9.000	L1	19.7	19.6	46.0	Compliance
2.558827	22.2	9.000	L1	19.7	23.8	46.0	Compliance
19.058779	25.2	9.000	L1	20.0	24.8	50.0	Compliance

AC120 V, 60 Hz, Neutral:



requency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.558572	31.3	9.000	N	19.6	24.7	56.0	Compliance
0.609741	26.3	9.000	N	19.6	29.7	56.0	Compliance
0.774393	27.6	9.000	N	19.6	28.4	56.0	Compliance
1.239175	35.0	9.000	N	19.6	21.0	56.0	Compliance
1.289541	35.5	9.000	N	19.6	20.5	56.0	Compliance
2.620732	32.8	9.000	N	19.7	23.2	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.768247	23.3	9.000	N	19.6	22.7	46.0	Compliance
1.190776	27.5	9.000	N	19.6	18.5	46.0	Compliance
1.239175	30.0	9.000	N	19.6	16.0	46.0	Compliance
1.289541	29.3	9.000	N	19.6	16.7	46.0	Compliance
2.620732	28.3	9.000	N	19.7	17.7	46.0	Compliance
15.994231	22.6	9.000	N	19.9	27.4	50.0	Compliance

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

Applicable Standard

FCC §15.407; §15.209; §15.205;

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

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

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

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

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

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

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

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

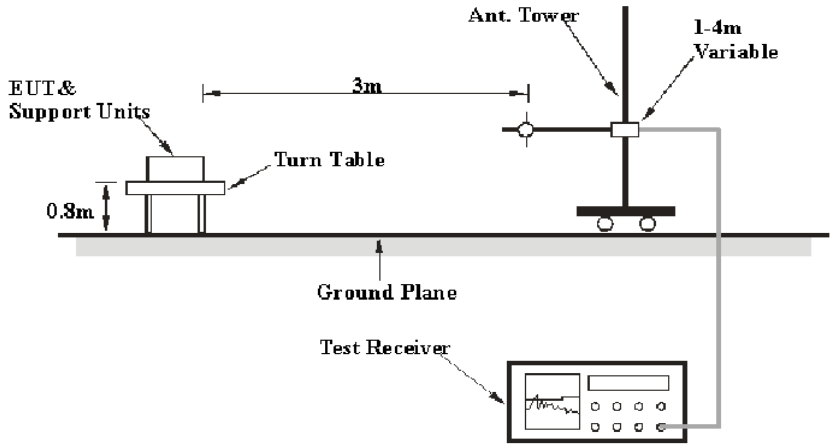
(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

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

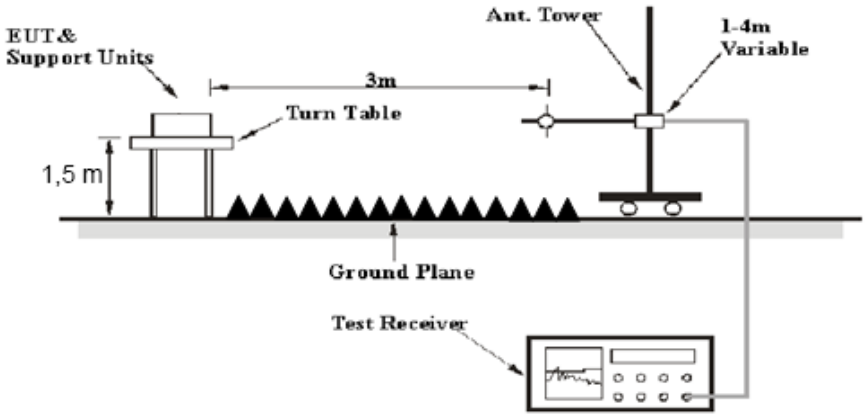
(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

EUT Setup

Below 1 GHz:



Above 1 GHz:



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

The adapter was connected to a 120 V/60 Hz AC power source.

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:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP

1GHz- 40GHz:

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

Test Procedure

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

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

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

According to 789033 D02 General U-NII Test Procedures New Rules v01r03, emission shall be computed as: E [dBμV/m] = EIRP[dBm] + 95.2, for d = 3 meters.

Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Meter Reading + Antenna Loss + 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 = Extrapolation result -Limit

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A121808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-0113024	2014-06-16	2017-06-15
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2016-05-20	2017-05-19
EMCT	Semi-Anechoic Chamber	966	966-1	2015-04-24	2018-04-23
Unknown	RF Cable (below 1GHz)	Unknown	NO.1	2016-11-10	2017-11-09
Unknown	RF Cable (below 1GHz)	Unknown	NO.4	2016-11-10	2017-11-09
Unknown	RF Cable (above 1GHz)	Unknown	NO.2	2016-11-10	2017-11-09
Ducommun Technolagies	Horn Antenna	ARH-2823-02	1007726-01 1312	2016-08-18	2017-08-18
Quinstar	Amplifier	QLW-18405536-JO	15964001032	2016-08-18	2017-08-18
Agilent	Spectrum Analyzer	8564E	5943A01752	2016-08-18	2017-08-18
EM Electronics	Antenna Mast	AM-BS-4500-E	060858A	Not Required	/
EM Electronics	Antenna Mast Controllers	EM1000	060858	Not Required	/
MATURO	Antenna Mast	CAM 4.0-P	EMC-T-1	Not Required	/

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

Environmental Conditions

Temperature:	22.5 °C
Relative Humidity:	57 %
ATM Pressure:	102 kPa

** The testing was performed by Kevin Hu on 2017-01-20.*

Test Mode: Transmitting(Above 1GHz test performed at distance 3.0m from EUT to Antenna)

30MHz-40GHz:
802.11a mode(chain 0 was test worst):

Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel:5745 MHz									
5745	61.72	PK	H	32.59	5.74	0.00	100.05	N/A*	N/A*
5745	52.16	AV	H	32.59	5.74	0.00	90.49	N/A*	N/A*
5745	55.5	PK	V	32.59	5.74	0.00	93.83	N/A*	N/A*
5745	45.78	AV	V	32.59	5.74	0.00	84.11	N/A*	N/A*
5725	21.89	PK	H	32.57	5.72	0.00	60.18	122.2	62.02
5720	22.3	PK	H	32.56	5.71	0.00	60.57	110.8	50.23
5700	21.57	PK	H	32.54	5.70	0.00	59.81	105.2	45.39
5650	21.59	PK	H	32.48	5.65	0.00	59.72	68.2	8.48
11490	26.54	PK	H	37.99	8.22	26.02	46.73	74	27.27
11490	20	AV	H	37.99	8.22	26.02	40.19	54	13.81
17235	26.95	PK	H	42.98	10.82	25.99	54.76	74	19.24
17235	19.78	AV	H	42.98	10.82	25.99	47.59	54	6.41
3468	32.94	PK	H	26.82	4.13	26.58	37.31	74	36.69
3468	21.82	AV	H	26.82	4.13	26.58	26.19	54	27.81
307.42	46.96	QP	H	14.29	1.10	27.57	34.78	46.00	11.22
352.04	49.48	QP	H	15.34	1.36	27.84	38.34	46.00	7.66
Middle Channel:5785 MHz									
5785	61.94	PK	H	32.64	5.77	0.00	100.35	N/A	N/A
5785	52.79	AV	H	32.64	5.77	0.00	91.2	N/A	N/A
5785	55.14	PK	V	32.64	5.77	0.00	93.55	N/A	N/A
5785	46.05	AV	V	32.64	5.77	0.00	84.46	N/A	N/A
11570	26.98	PK	H	38.03	8.21	26.00	47.22	74	26.78
11570	19.49	AV	H	38.03	8.21	26.00	39.73	54	14.27
17355	26.76	PK	H	43.53	11.03	26.16	55.16	74	18.84
17355	19.93	AV	H	43.53	11.03	26.16	48.33	54	5.67
2175	32.05	PK	H	24.31	3.03	26.84	32.55	74	41.45
2175	20.17	AV	H	24.31	3.03	26.84	20.67	54	33.33
3512	32.23	PK	H	27.05	4.20	26.59	36.89	74	37.11
3512	20.6	AV	H	27.05	4.20	26.59	25.26	54	28.74
307.42	47.23	QP	H	14.29	1.10	27.57	35.05	46.00	10.95
352.04	49.62	QP	H	15.34	1.36	27.84	38.48	46.00	7.52

High Channel:5825 MHz									
5825	61.35	PK	H	32.69	5.81	0.00	99.85	N/A*	N/A*
5825	49.7	AV	H	32.69	5.81	0.00	88.2	N/A*	N/A*
5825	54.17	PK	V	32.69	5.81	0.00	92.67	N/A*	N/A*
5825	42.74	AV	V	32.69	5.81	0.00	81.24	N/A*	N/A*
5850	20.53	PK	H	32.72	5.83	0.00	59.08	122.2	63.12
5855	20.51	PK	H	32.73	5.83	0.00	59.07	110.8	51.73
5875	20.48	PK	H	32.75	5.85	0.00	59.08	105.2	46.12
5925	20.56	PK	H	32.81	5.89	0.00	59.26	68.2	8.94
11650	26.98	PK	H	38.06	8.20	25.98	47.26	74	26.74
11650	19.02	AV	H	38.06	8.20	25.98	39.3	54	14.7
17475	26.33	PK	H	44.09	11.23	26.33	55.32	74	18.68
17475	19.95	AV	H	44.09	11.23	26.33	48.94	54	5.06
2243	32.39	PK	H	24.07	3.02	26.85	32.63	74	41.37
2243	21.23	AV	H	24.07	3.02	26.85	21.47	54	32.53
3585	31.44	PK	H	27.34	4.31	26.58	36.51	74	37.49
3585	20.72	AV	H	27.34	4.31	26.58	25.79	54	28.21
307.42	48.07	QP	H	14.29	1.10	27.57	35.89	46.00	10.11
352.04	50.04	QP	H	15.34	1.36	27.84	38.90	46.00	7.10

802.11n ht20 mode(chain 0+Chain1 was the worst):

Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel:5745 MHz									
5745	62.26	PK	H	32.59	5.74	0.00	100.59	N/A*	N/A*
5745	51.3	AV	H	32.59	5.74	0.00	89.63	N/A*	N/A*
5745	55.99	PK	V	32.59	5.74	0.00	94.32	N/A*	N/A*
5745	45.18	AV	V	32.59	5.74	0.00	83.51	N/A*	N/A*
5725	21.24	PK	H	32.57	5.72	0.00	59.53	122.2	62.67
5720	21.75	PK	H	32.56	5.71	0.00	60.02	110.8	50.78
5700	21.12	PK	H	32.54	5.70	0.00	59.36	105.2	45.84
5650	20.66	PK	H	32.48	5.65	0.00	58.79	68.2	9.41
11490	27.29	PK	H	37.99	8.22	26.02	47.48	74	26.52
11490	16.15	AV	H	37.99	8.22	26.02	36.34	54	17.66
17235	27.13	PK	H	42.98	10.82	25.99	54.94	74	19.06
17235	15.24	AV	H	42.98	10.82	25.99	43.05	54	10.95
1455	31.41	PK	H	23.98	2.61	26.37	31.63	74	42.37
1455	19.25	AV	H	23.98	2.61	26.37	19.47	54	34.53
4157	30.83	PK	H	29.25	5.03	26.64	38.47	74	35.53
4157	19.24	AV	H	29.25	5.03	26.64	26.88	54	27.12
307.42	47.6	QP	H	14.29	1.10	27.57	35.42	46.00	10.58
352.04	50.48	QP	H	15.34	1.36	27.84	39.34	46.00	6.66
Middle Channel:5785 MHz									
5785	62.33	PK	H	32.64	5.77	0.00	100.74	N/A*	N/A*
5785	50.72	AV	H	32.64	5.77	0.00	89.13	N/A*	N/A*
5785	56.5	PK	V	32.64	5.77	0.00	94.91	N/A*	N/A*
5785	44.89	AV	V	32.64	5.77	0.00	83.3	N/A*	N/A*
11570	26.82	PK	H	38.03	8.21	26.00	47.06	74	26.94
11570	16.18	AV	H	38.03	8.21	26.00	36.42	54	17.58
17355	26.52	PK	H	43.53	11.03	26.16	54.92	74	19.08
17355	19.56	AV	H	43.53	11.03	26.16	47.96	54	6.04
1523	30.22	PK	H	24.14	2.69	26.35	30.7	74	43.3
1523	18.71	AV	H	24.14	2.69	26.35	19.19	54	34.81
4204	30.65	PK	H	29.33	5.06	26.67	38.37	74	35.63
4204	19.76	AV	H	29.33	5.06	26.67	27.48	54	26.52
307.42	47.13	QP	H	14.29	1.10	27.57	34.95	46.00	11.05
352.04	50.92	QP	H	15.34	1.36	27.84	39.78	46.00	6.22

High Channel:5825 MHz									
5825	62.03	PK	H	32.69	5.81	0.00	100.53	N/A*	N/A*
5825	50.27	AV	H	32.69	5.81	0.00	88.77	N/A*	N/A*
5825	55.76	PK	V	32.69	5.81	0.00	94.26	N/A*	N/A*
5825	44.59	AV	V	32.69	5.81	0.00	83.09	N/A*	N/A*
5850	19.86	PK	H	32.72	5.83	0.00	58.41	122.2	63.79
5855	19.8	PK	H	32.73	5.83	0.00	58.36	110.8	52.44
5875	20.38	PK	H	32.75	5.85	0.00	58.98	105.2	46.22
5925	19.5	PK	H	32.81	5.89	0.00	58.2	68.2	10
11650	27.3	PK	H	38.06	8.20	25.98	47.58	74	26.42
11650	15.69	AV	H	38.06	8.20	25.98	35.97	54	18.03
17475	26.59	PK	H	44.09	11.23	26.33	55.58	74	18.42
17475	19.68	AV	H	44.09	11.23	26.33	48.67	54	5.33
4257	30.56	PK	H	29.41	5.10	26.70	38.37	74	35.63
4257	19.83	AV	H	29.41	5.10	26.70	27.64	54	26.36
307.42	47.26	QP	H	14.29	1.10	27.57	35.08	46.00	10.92
352.04	50.39	QP	H	15.34	1.36	27.84	39.25	46.00	6.75

802.11n ht40 mode(chain 0+Chain1 was the worst)::

Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel:5755 MHz									
5755	61.43	PK	H	32.61	5.74	0.00	99.78	N/A*	N/A*
5755	50.06	AV	H	32.61	5.74	0.00	88.41	N/A*	N/A*
5755	55.72	PK	V	32.61	5.74	0.00	94.07	N/A*	N/A*
5755	44.67	AV	V	32.61	5.74	0.00	83.02	N/A*	N/A*
5725	23.78	PK	H	32.57	5.72	0.00	62.07	122.2	60.13
5720	21.69	PK	H	32.56	5.71	0.00	59.96	110.8	50.84
5700	20.53	PK	H	32.54	5.70	0.00	58.77	105.2	46.43
5650	20.6	PK	H	32.48	5.65	0.00	58.73	68.2	9.47
11510	27.16	PK	H	38.00	8.22	26.02	47.36	74	26.64
11510	16.21	AV	H	38.00	8.22	26.02	36.41	54	17.59
17265	27.34	PK	H	43.12	10.88	26.04	55.3	74	18.7
17265	15.24	AV	H	43.12	10.88	26.04	43.2	54	10.8
1489	30.34	PK	H	24.07	2.65	26.34	30.72	74	43.28
1489	17.92	AV	H	24.07	2.65	26.34	18.3	54	35.7
3586	31.57	PK	H	27.34	4.31	26.58	36.64	74	37.36
3586	21.06	AV	H	27.34	4.31	26.58	26.13	54	27.87
307.42	47.53	QP	H	14.29	1.10	27.57	35.35	46.00	10.65
352.04	50.53	QP	H	15.34	1.36	27.84	39.39	46.00	6.61
High Channel:5795 MHz									
5795	60.76	PK	H	32.65	5.78	0.00	99.19	N/A*	N/A*
5795	49.31	AV	H	32.65	5.78	0.00	87.74	N/A*	N/A*
5795	54.24	PK	V	32.65	5.78	0.00	92.67	N/A*	N/A*
5795	43.62	AV	V	32.65	5.78	0.00	82.05	N/A*	N/A*
5850	20.86	PK	H	32.72	5.83	0.00	59.41	122.2	62.79
5855	20.11	PK	H	32.73	5.83	0.00	58.67	110.8	52.13
5875	19.5	PK	H	32.75	5.85	0.00	58.1	105.2	47.1
5925	21.25	PK	H	32.81	5.89	0.00	59.95	68.2	8.25
11590	26.81	PK	H	38.04	8.21	25.99	47.07	74	26.93
11590	16.35	AV	H	38.04	8.21	25.99	36.61	54	17.39
17385	26.52	PK	H	43.67	11.08	26.21	55.06	74	18.94
17385	15.19	AV	H	43.67	11.08	26.21	43.73	54	10.27
1623	29.81	PK	H	24.30	2.76	26.45	30.42	74	43.58
1623	17.69	AV	H	24.30	2.76	26.45	18.3	54	35.7
3745	30.98	PK	H	27.98	4.54	26.57	36.93	74	37.07
3745	20.67	AV	H	27.98	4.54	26.57	26.62	54	27.38
307.42	48.37	QP	H	14.29	1.10	27.57	36.19	46.00	9.81
352.04	50.95	QP	H	15.34	1.36	27.84	39.81	46.00	6.19

N/A: No radiation limits for the fundamental.*

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 v01r03

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
Unknown	RF Cable	Unknown	C-1	Each Time	/

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

Environmental Conditions

Temperature:	24.2 °C
Relative Humidity:	52 %
ATM Pressure:	102 kPa

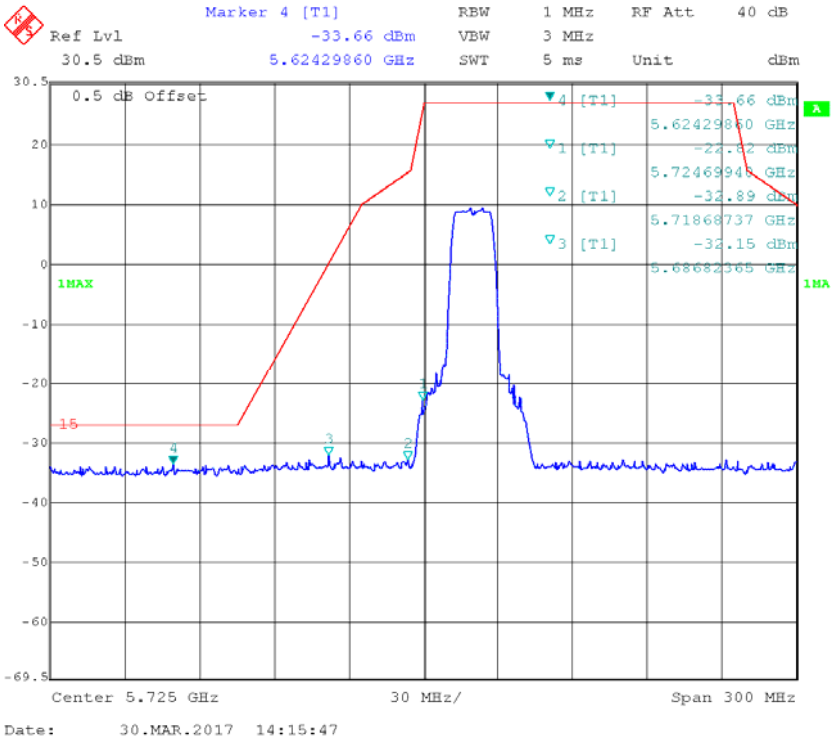
The testing was performed by Kevin Hu on 2017-03-30.

Test Result: Pass. (All emission under limit more than 5dB, so the total EIRP meet the requirement)

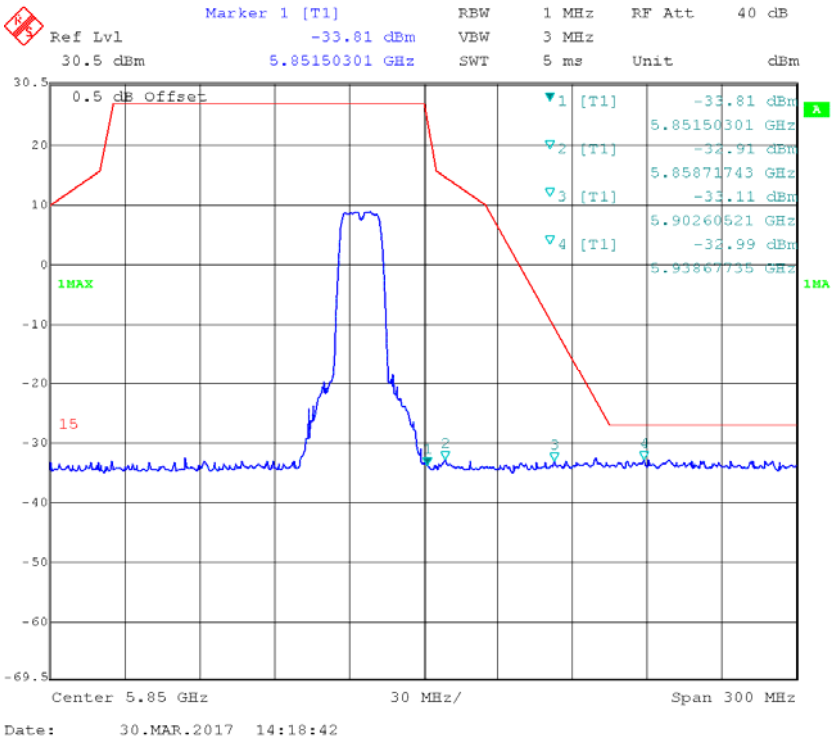
Please refer to the following tables and plots.

5725-5850MHz Chain 0:

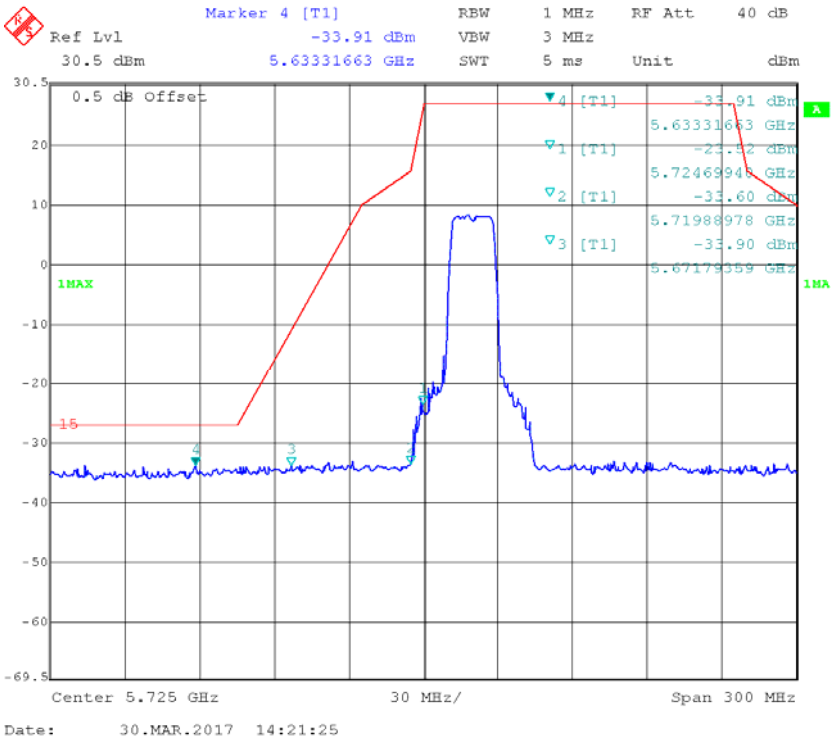
802.11a Low Channel



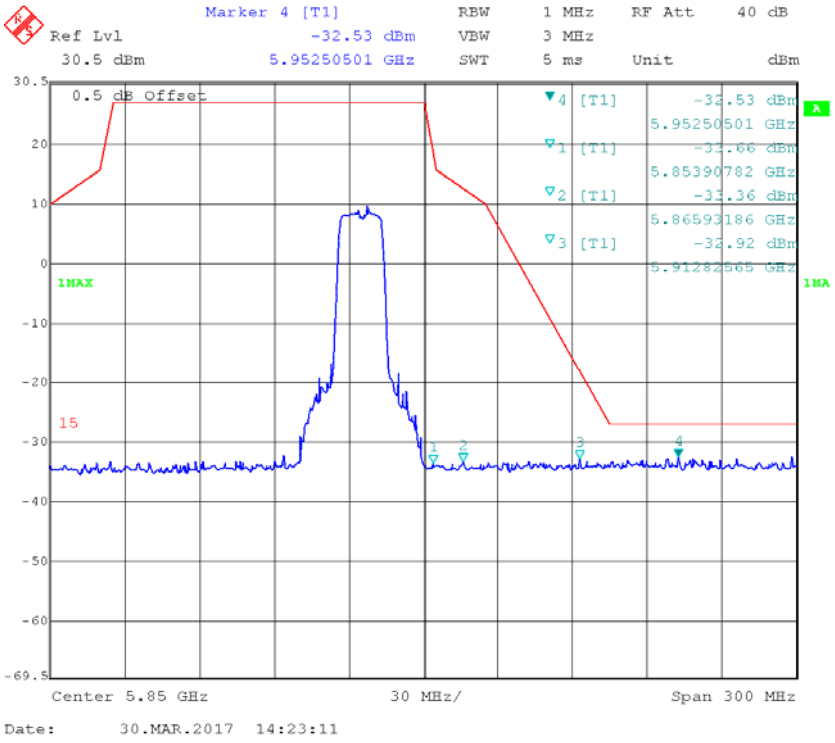
802.11a High Channel



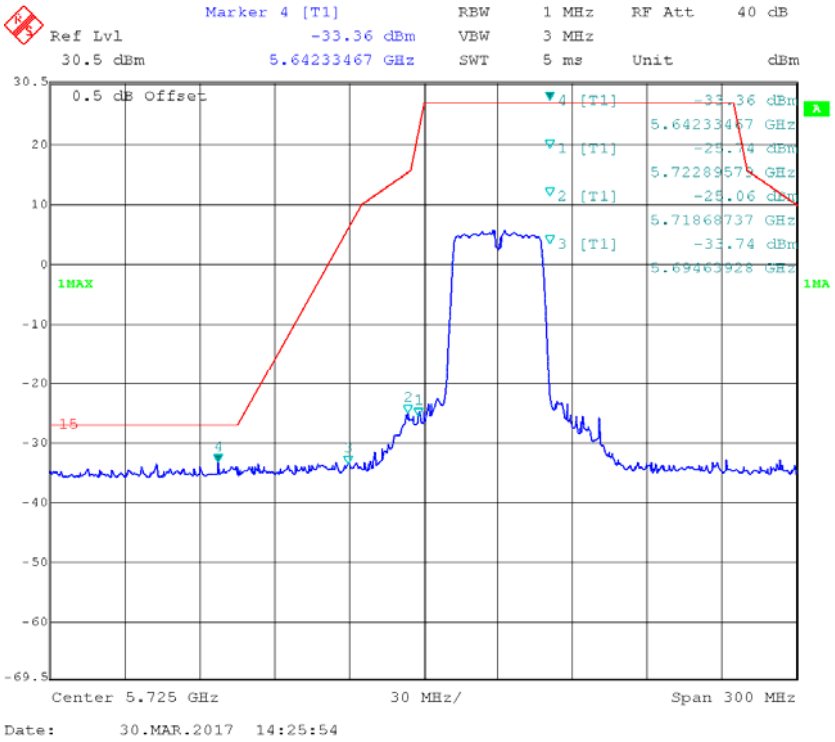
802.11n ht20 Low Channel



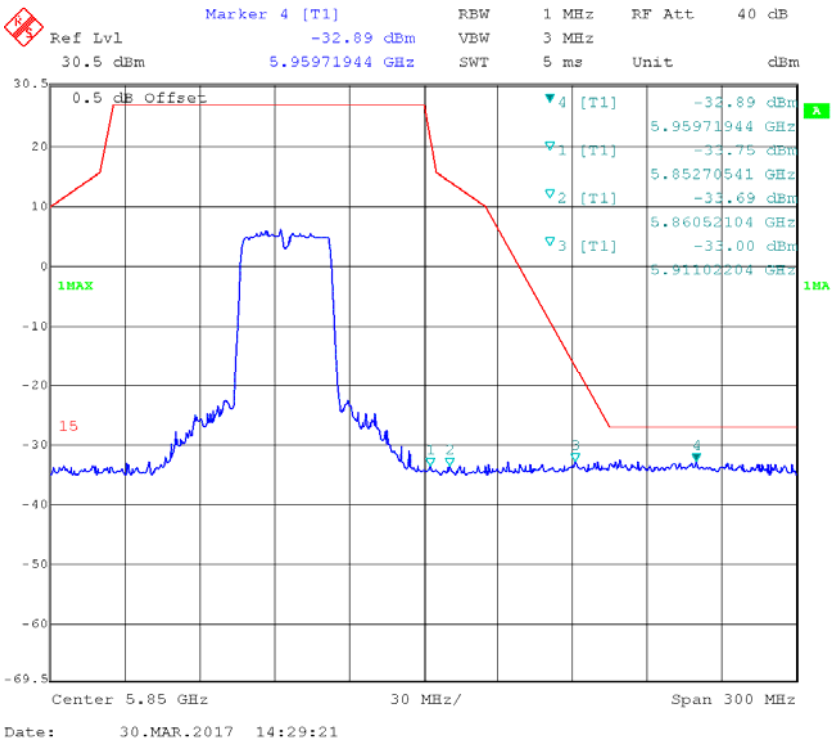
802.11n ht20 High Channel



802.11n ht40 Low Channel

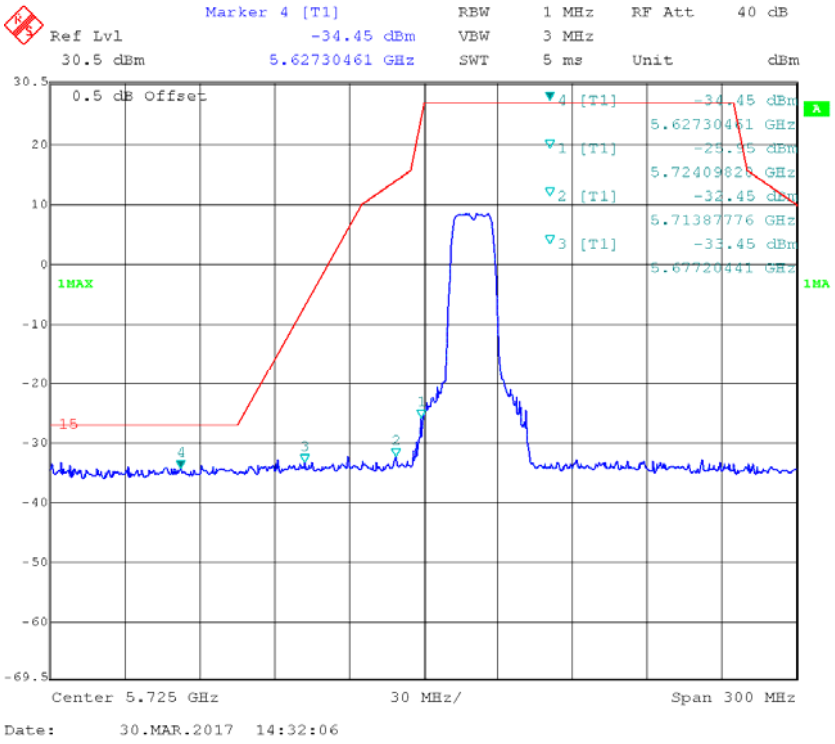


802.11n ht40 High Channel

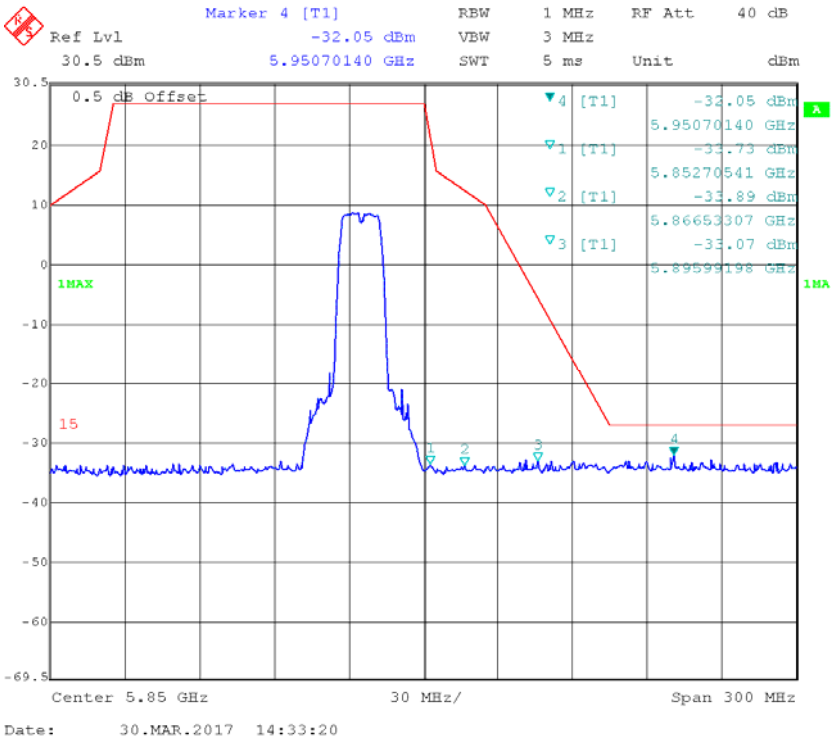


5725-5850MHz Chain 1:

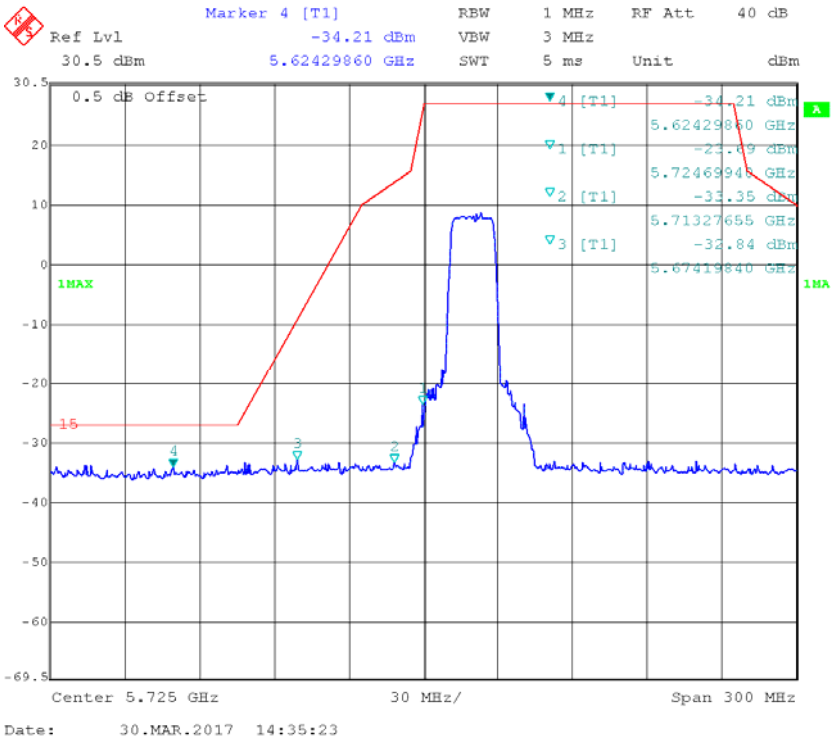
802.11a Low Channel



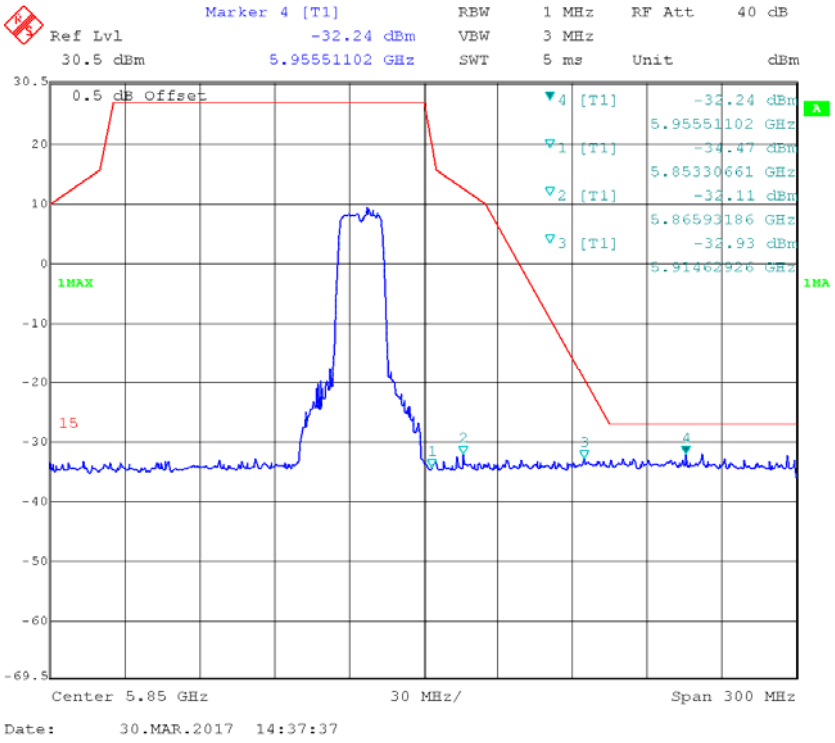
802.11a High Channel



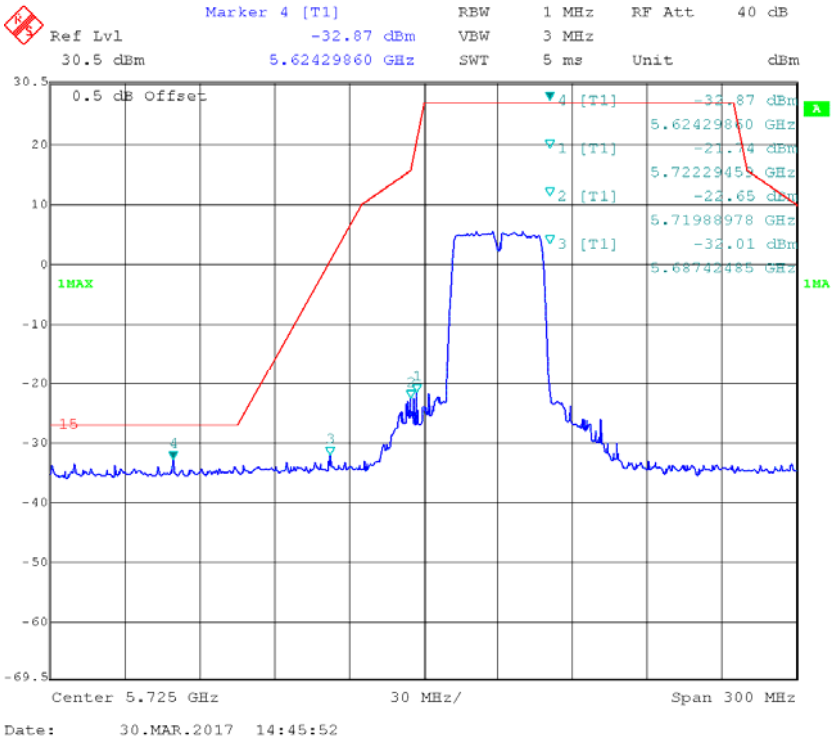
802.11n ht20 Low Channel



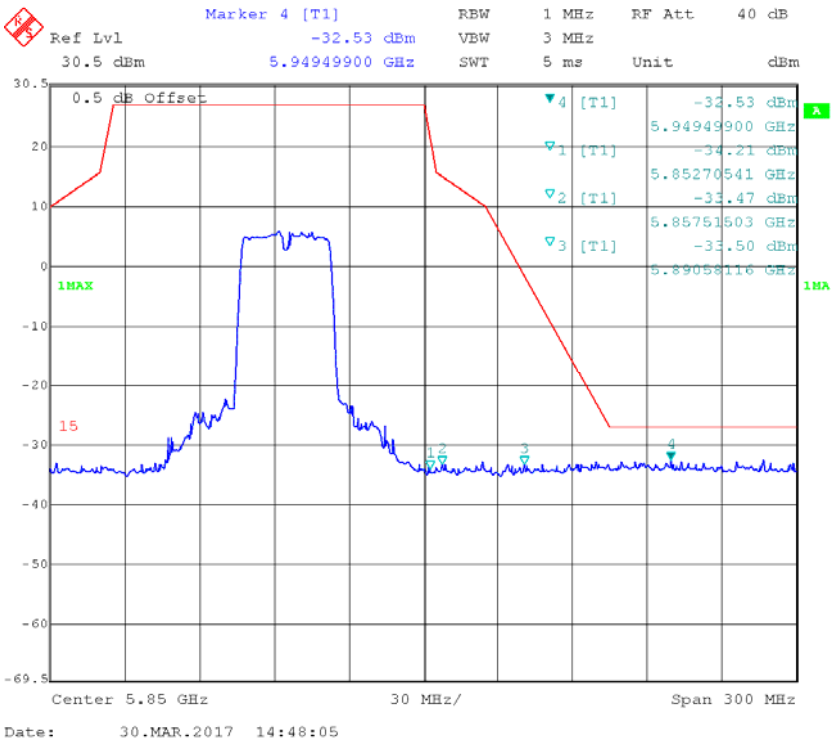
802.11n ht20 High Channel



802.11n ht40 Low Channel



802.11n ht40 High Channel



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	2016-09-21	2017-09-20
Unknown	RF Cable	Unknown	C-1	Each Time	/

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v01r03

Test Data

Environmental Conditions

Temperature:	24.2 °C
Relative Humidity:	52 %
ATM Pressure:	102 kPa

The testing was performed by Kevin Hu on 2017-01-20.

Test Result: Pass.

Please refer to the following tables and plots.

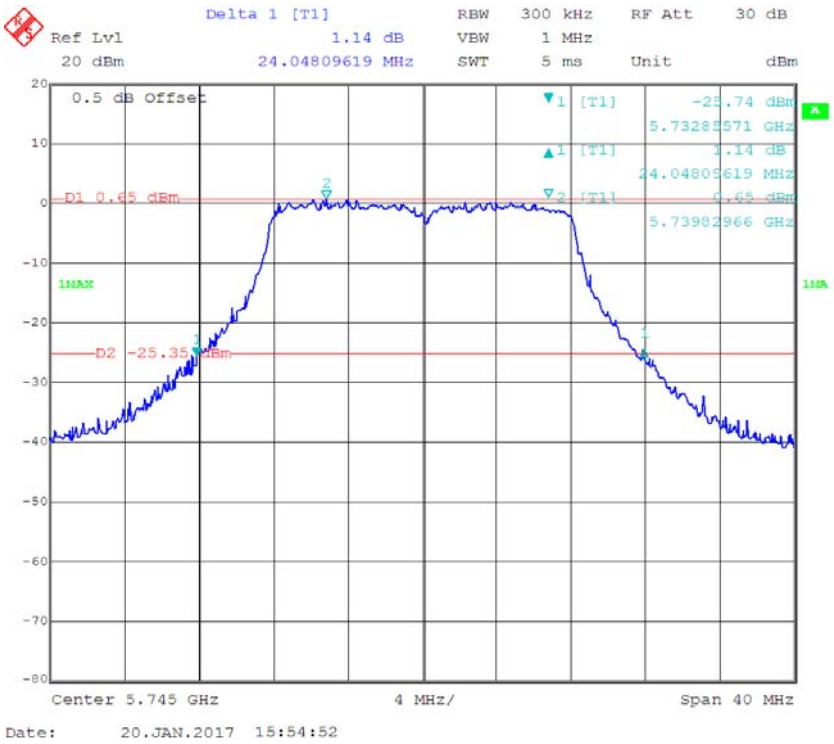
Test mode: Transmitting(Test at chain 0)

Mode	Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)
802.11 a	Low	5745	24.05
	Middle	5785	23.33
	High	5825	23.89
802.11 n20	Low	5745	24.29
	Middle	5785	23.73
	High	5825	24.69
802.11 n40	Low	5755	45.85
	High	5795	44.73

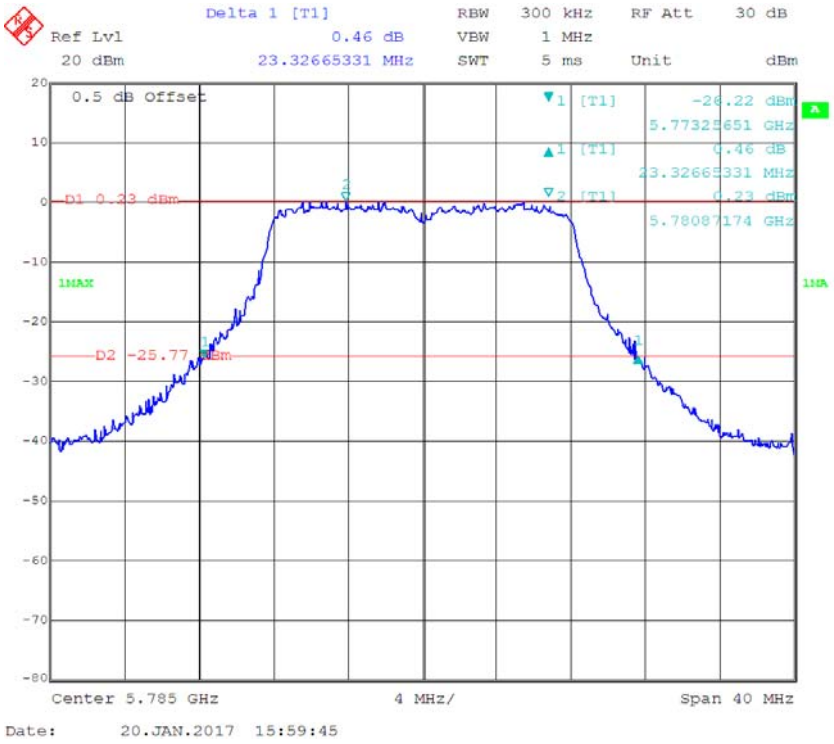
Note: 26dB bandwidth only for reporting.

Mode	Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limits (MHz)	Result
802.11 a	Low	5745	16.43	≥0.5	PASS
	Middle	5785	16.35	≥0.5	PASS
	High	5825	16.35	≥0.5	PASS
802.11 n20	Low	5745	17.39	≥0.5	PASS
	Middle	5785	17.39	≥0.5	PASS
	High	5825	17.39	≥0.5	PASS
802.11 n40	Low	5755	35.91	≥0.5	PASS
	High	5795	35.59	≥0.5	PASS

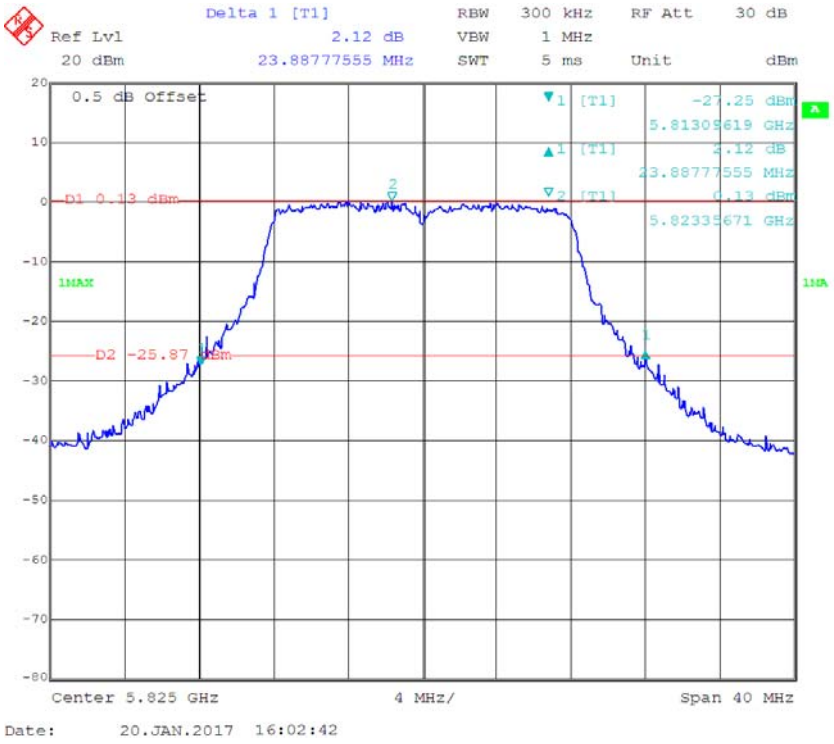
802.11a Low Channel



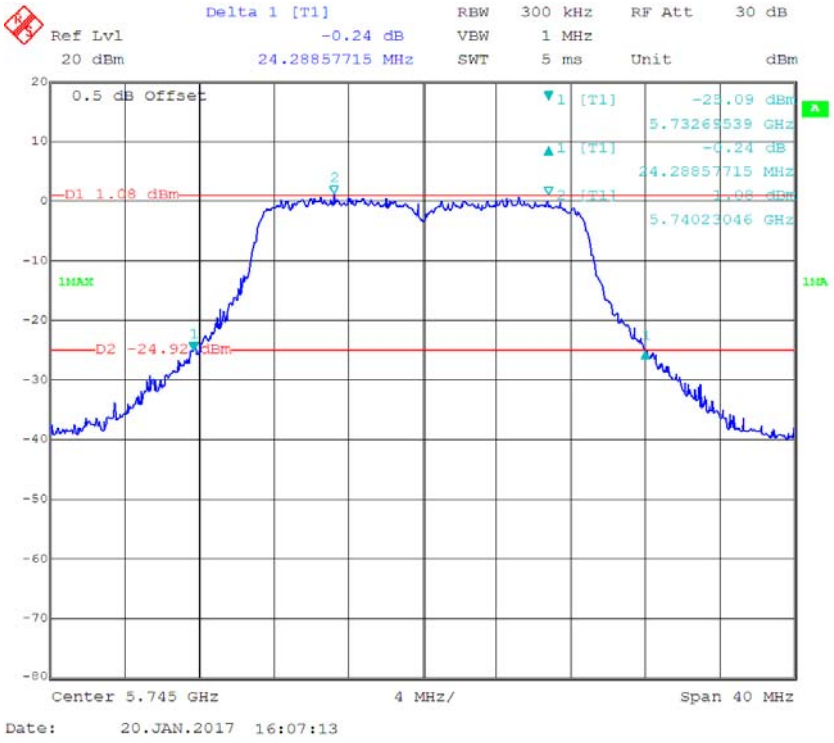
802.11a Middle Channel



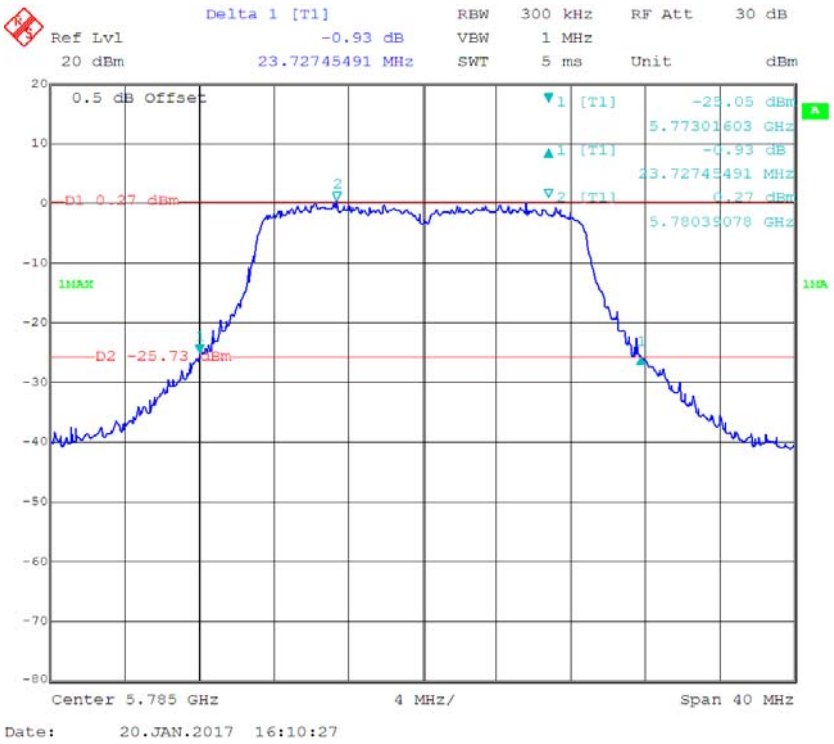
802.11a High Channel



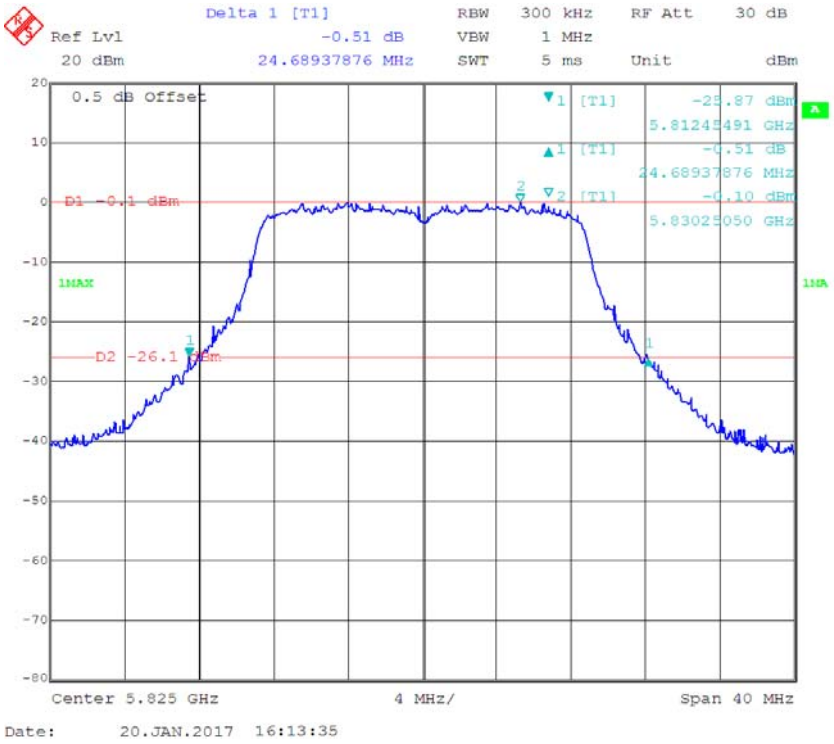
802.11n ht20 Low Channel



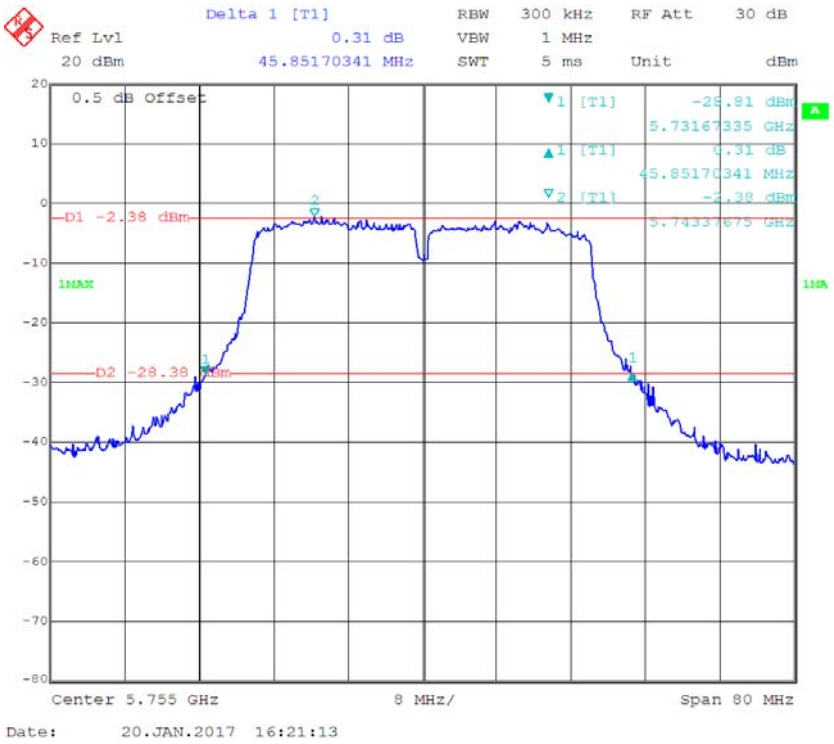
802.11n ht20 Middle Channel



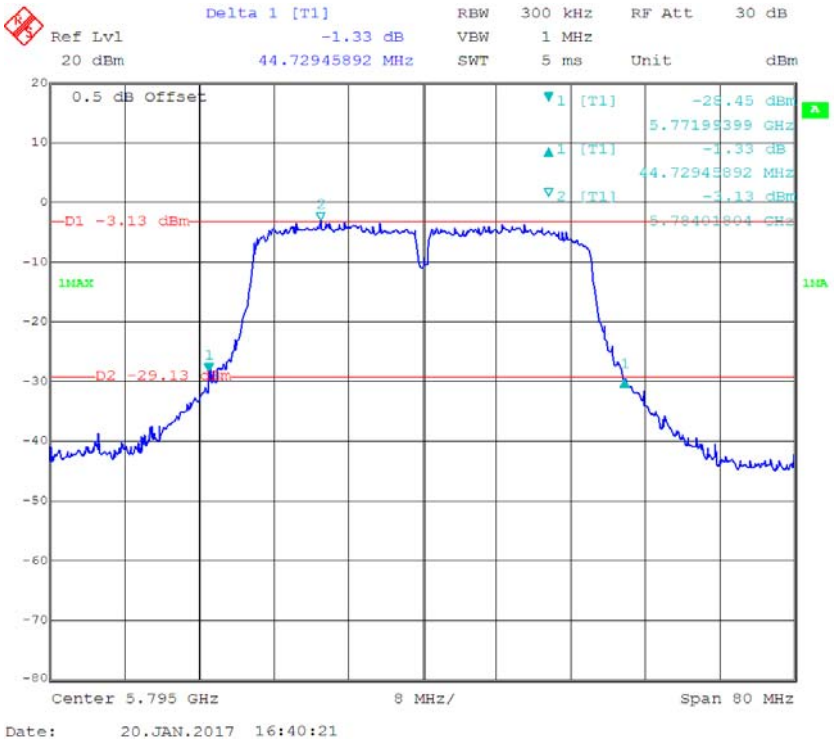
802.11n ht20 High Channel



802.11n ht40 Low Channel

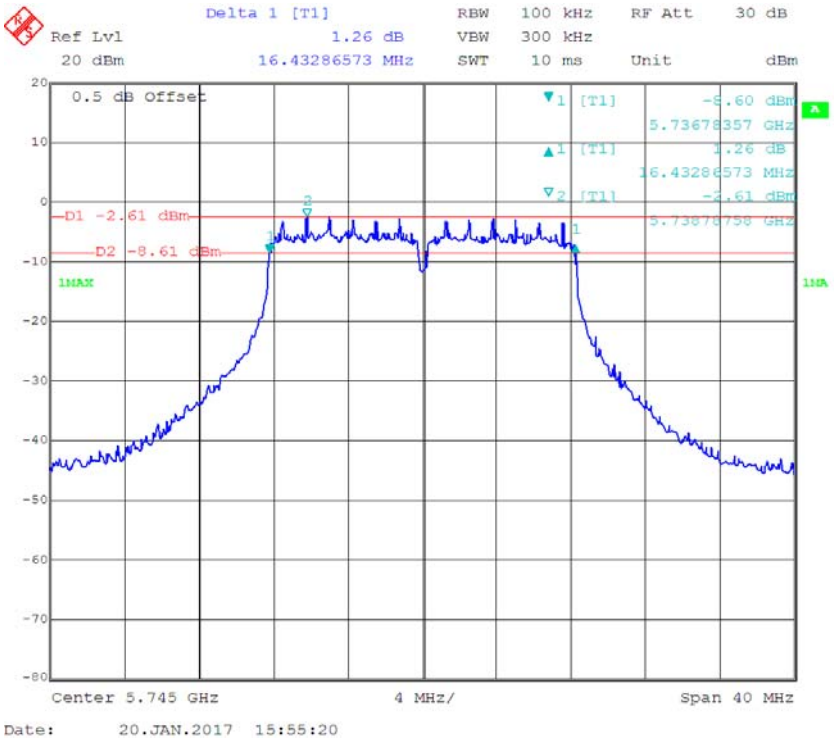


802.11n ht40 High Channel

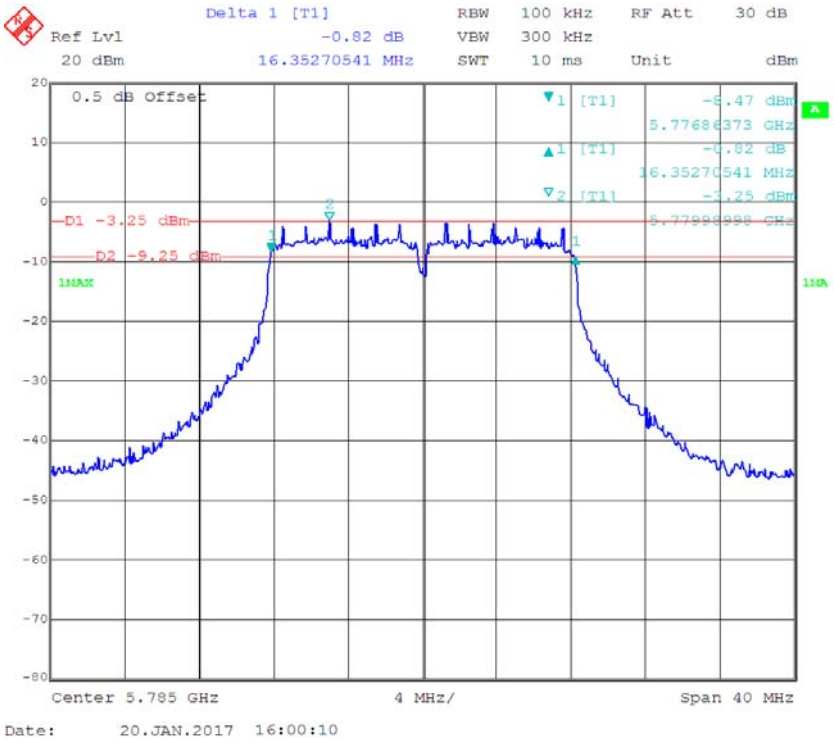


6dB Bandwidth:

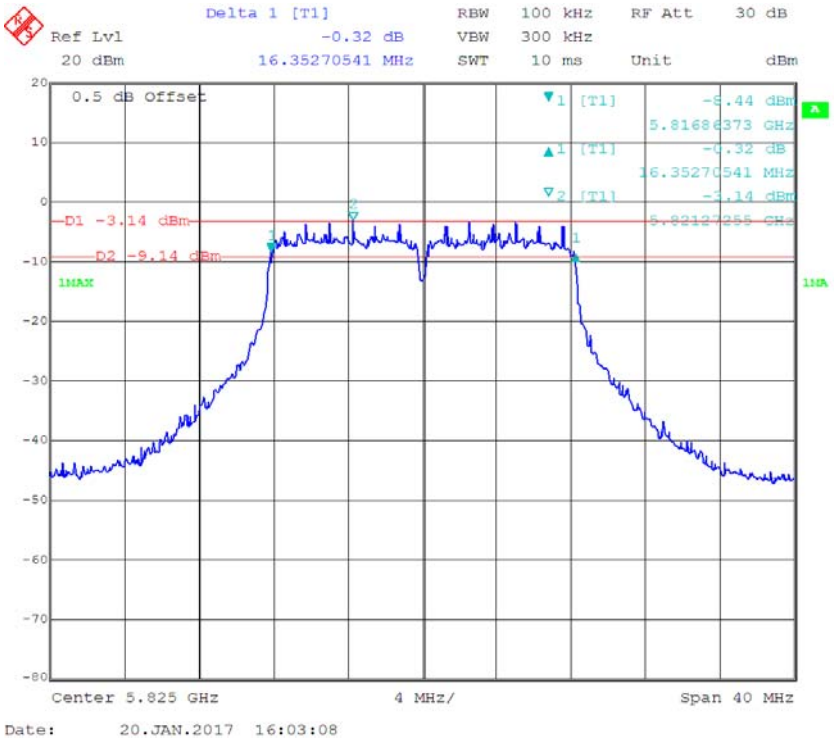
802.11a Low Channel



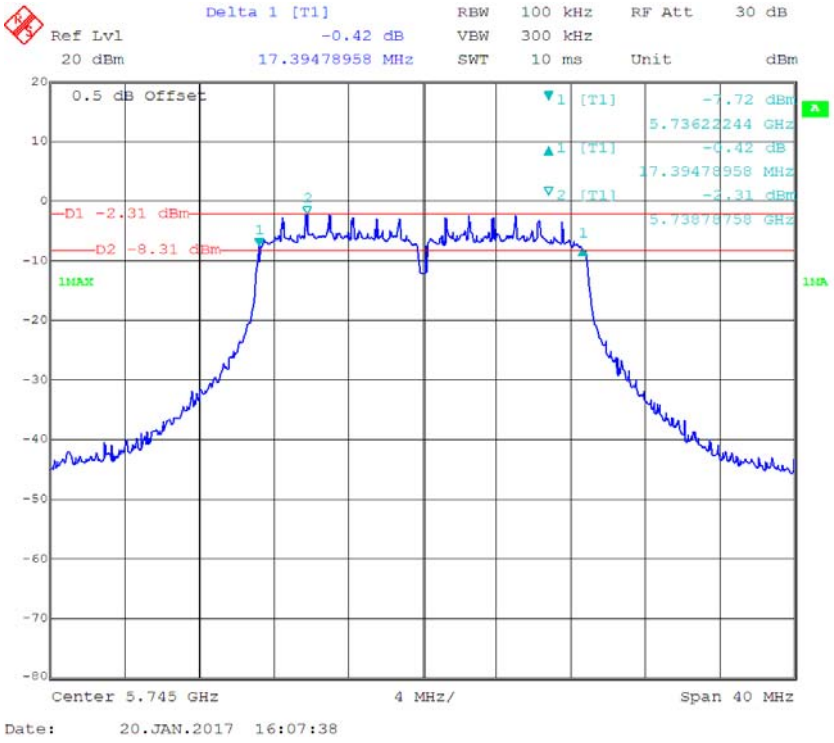
802.11a Middle Channel



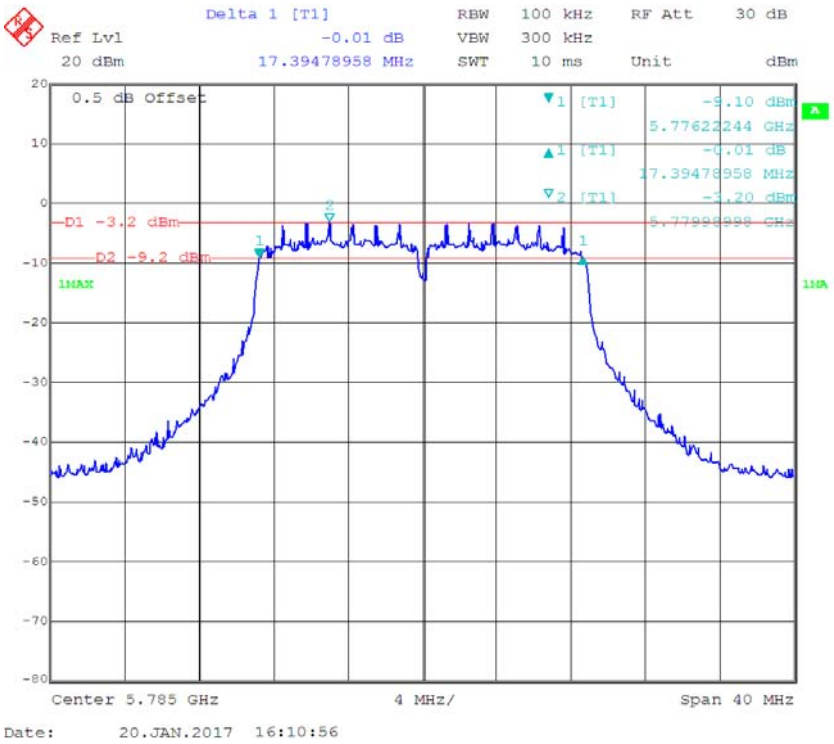
802.11a High Channel



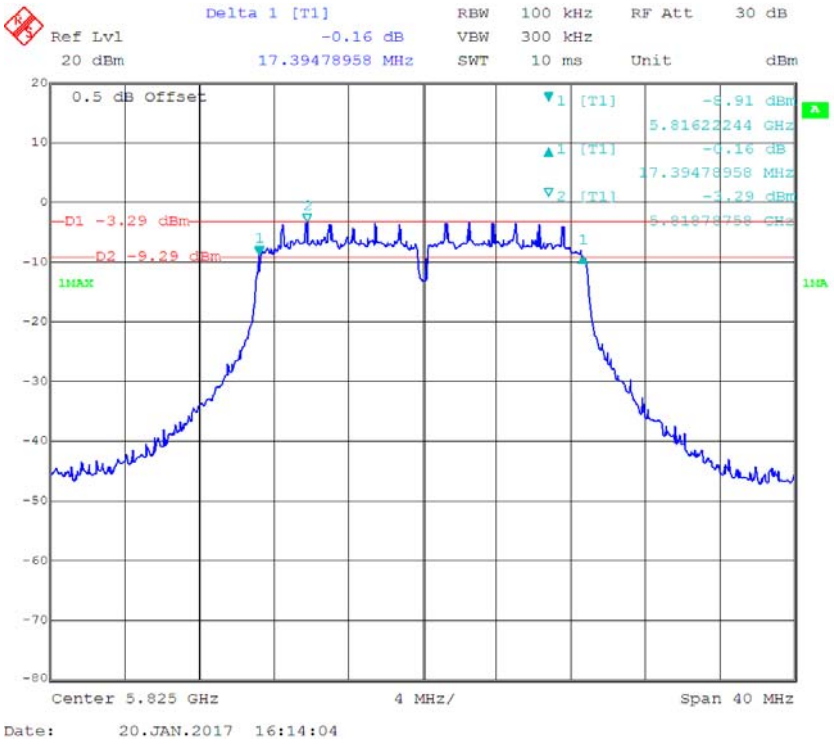
802.11n ht20 Low Channel



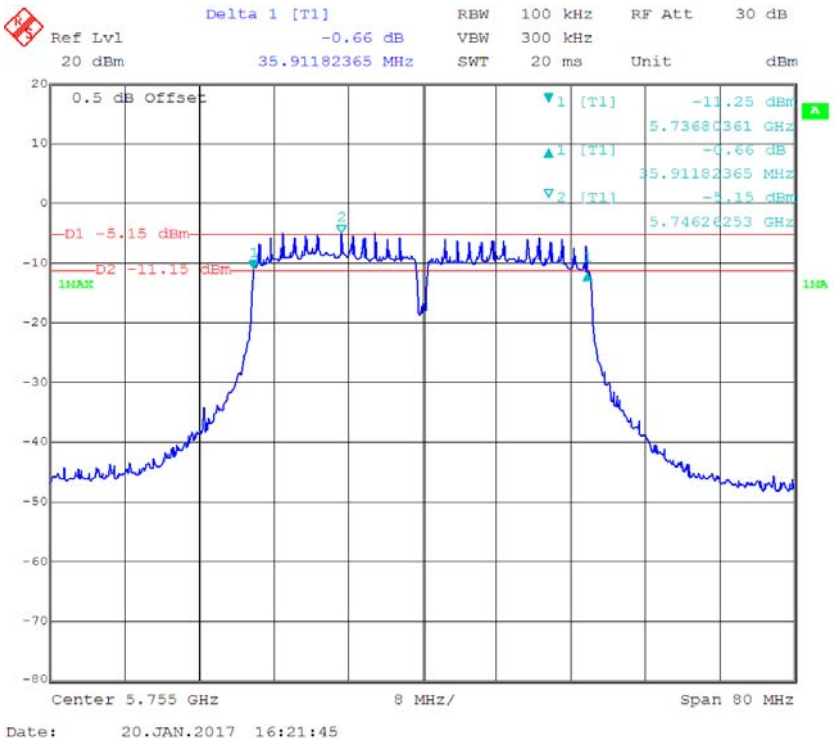
802.11n ht20 Middle Channel



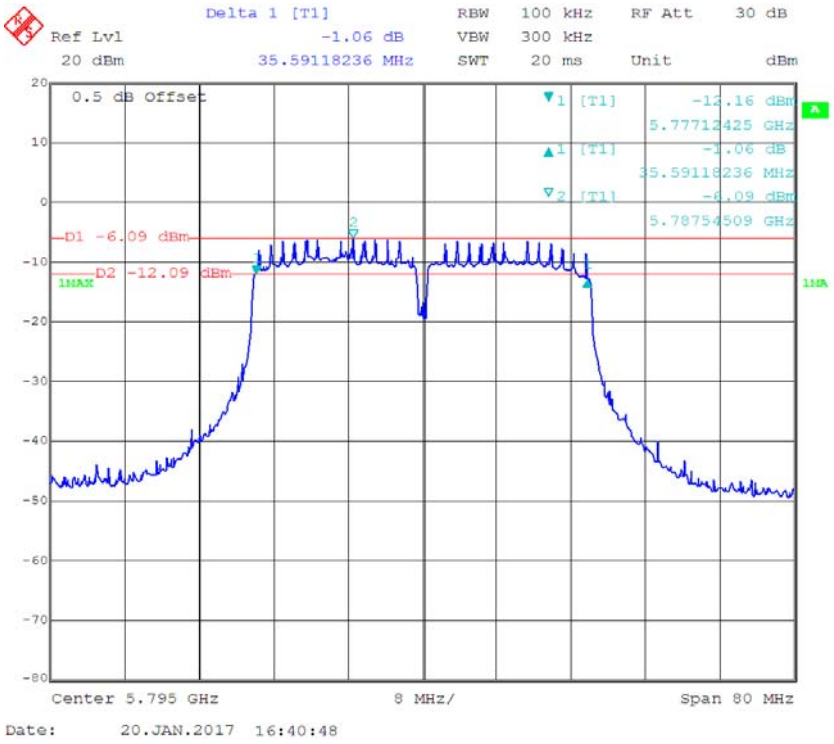
802.11n ht20 High Channel



802.11n ht40 Low Channel



802.11n ht40 High Channel



FCC §15.407(g)–FREQUENCY STABILITY

Applicable Standard

FCC §15.407

(g) Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

Test Procedure

According to C63.10-2013 clause 6.8.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
Unknown	RF Cable	Unknown	C-1	Each Time	/
FLUKE	Multimeter	1587	27870099	2016-12-30	2017-12-29
BACL	High Temperature Test Chamber	BTH-150	30024	2016-12-02	2017-12-01

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

Environmental Conditions

Temperature:	26.3 °C
Relative Humidity:	39 %
ATM Pressure:	95.5 kPa

The testing was performed by Kevin Hu on 2017-03-29.

Test Result: Pass.

Un-modulation, channel 5745MHz			
Temperature	**Voltage**	**Measured Frequency**	**Result**
℃	**V_{DC}**	**MHz**	
-20	7.6	5745.006	Pass
-10		5745.008	
10		5745.007	
20		5745.012	
30		5745.010	
40		5745.010	
25	6.84	5745.012	
25	8.36	5745.010	

Note: the frequency stability range plus the operation bandwidth edge within the operation band.

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	Wideband Power Sensor	N1921A	MY54170074	2017-01-03	2018-01-02
Agilent	P-Series Power Meter	N1912A	MY5000798	2017-01-03	2018-01-02
Unknown	RF Cable	Unknown	C-1	Each Time	/

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Procedure

According to KDB789033 D02 General U-NII Test Procedures New Rules v01r03

Test Data

Environmental Conditions

Temperature:	23.2~ 24.2 °C
Relative Humidity:	50 ~52 %
ATM Pressure:	100~102 kPa

The testing was performed by Kevin Hu on 2017-01-20 and 2017-07-07.

Test Mode: Transmitting(the duty cycle have added in the test results)

SISO:

Mode	Channel	Frequency (MHz)	RMS Channel Power (dBm)		Limit (dBm)	Result
			Chain 0	Chain 1		
802.11 a	Low	5745	9.86	9.27	30	PASS
	Middle	5785	9.19	8.34	30	PASS
	High	5825	9.31	8.65	30	PASS
802.11n ht20	Low	5745	9.24	8.15	30	PASS
	Middle	5785	9.12	9.02	30	PASS
	High	5825	9.21	9.12	30	PASS
802.11n ht40	Low	5755	9.41	8.41	30	PASS
	High	5795	8.26	9.57	30	PASS

MIMO:

Mode	Channel	Frequency (MHz)	RMS Channel Power (dBm)		Total (dBm)	Limit (dBm)	Result
			Chain 0	Chain 1			
802.11n ht20	Low	5745	9.6	8.69	12.18	30	PASS
	Middle	5785	9.17	9.12	12.16	30	PASS
	High	5825	9.25	9.39	12.33	30	PASS
802.11n ht40	Low	5755	9.78	8.85	12.35	30	PASS
	High	5795	8.72	9.76	12.28	30	PASS

Note: the 2 antenna maximum atenna gains are 2dBi, and employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices:

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

So:

Directional gain = GANT + Array Gain = 2dBi < 6dBi

FCC §15.407(a) - POWER SPECTRAL DENSITY

Applicable Standard

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

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

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

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

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

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

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

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

Test Procedure

According to KDB 789033 D02 General U-NII Test Procedures New Rules v01r03

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
Unknown	RF Cable	Unknown	C-1	Each Time	/

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

Environmental Conditions

Temperature:	28.6~29.3 °C
Relative Humidity:	46~47 %
ATM Pressure:	100.8~101.1 kPa

The testing was performed by Kevin Hu from 2016-11-04 to 2016-11-22.

Test Mode: Transmitting

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

Mode	Frequency (MHz)	Power Spectral Density (dBm/300kHz)		Duty cycle Factor (dB)	Power Spectral Density (dBm/500kHz)		Limits (dBm/500kHz)
		Chain 0	Chain 1		Chain 0	Chain 1	
802.11a	5745	-3.2	-4.08	0	-1.00	-1.88	30
	5785	-3.91	-4.53	0	-1.71	-2.33	30
	5825	-3.7	-4.85	0	-1.5	-2.65	30

Mode	Frequency (MHz)	Power Spectral Density (dBm/300kHz)		Duty cycle Factor (dB)	Power Spectral Density (dBm/500kHz)		Total (dBm/500kHz)	Limits (dBm/500kHz)
		Chain 0	Chain 1		Chain 0	Chain 1		
802.11n ht20	5745	-3.89	-3.85	0	-1.69	-1.65	1.34	30
	5785	-3.33	-4.47	0	-1.13	-2.27	1.35	30
	5825	-4.04	-3.86	0	-1.84	-1.66	1.26	30
802.11n ht40	5755	-6.65	-6.49	0.14	-4.31	-4.15	-1.22	30
	5795	-6.74	-6.24	0.14	-4.4	-3.9	-1.13	30

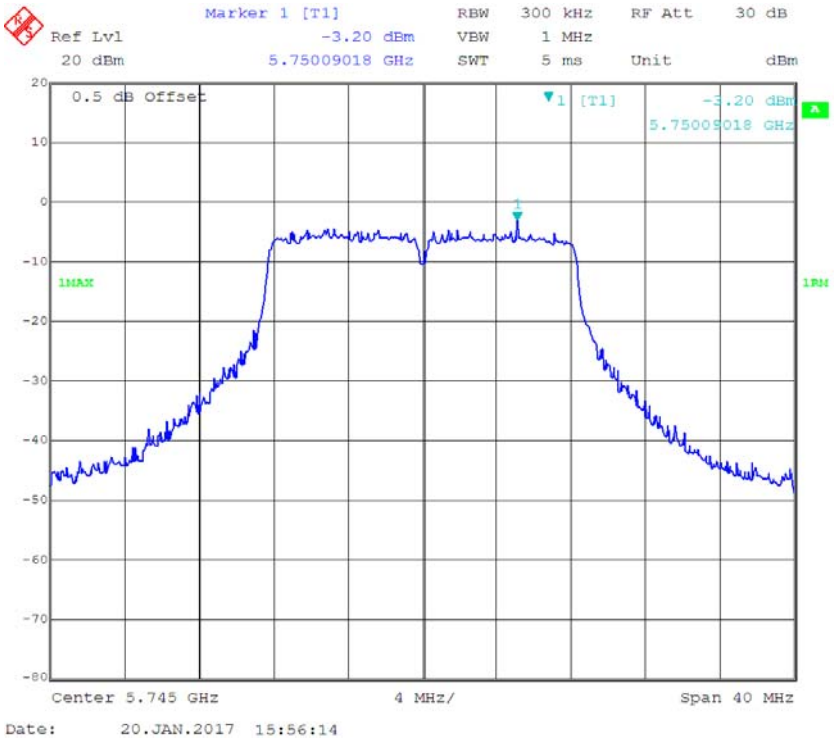
Note 1: If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
Note 2: the 2 antenna maximum atenna gain are 2dBi, and employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices:

Array Gain = 10 log(NANT/NSS) dB.

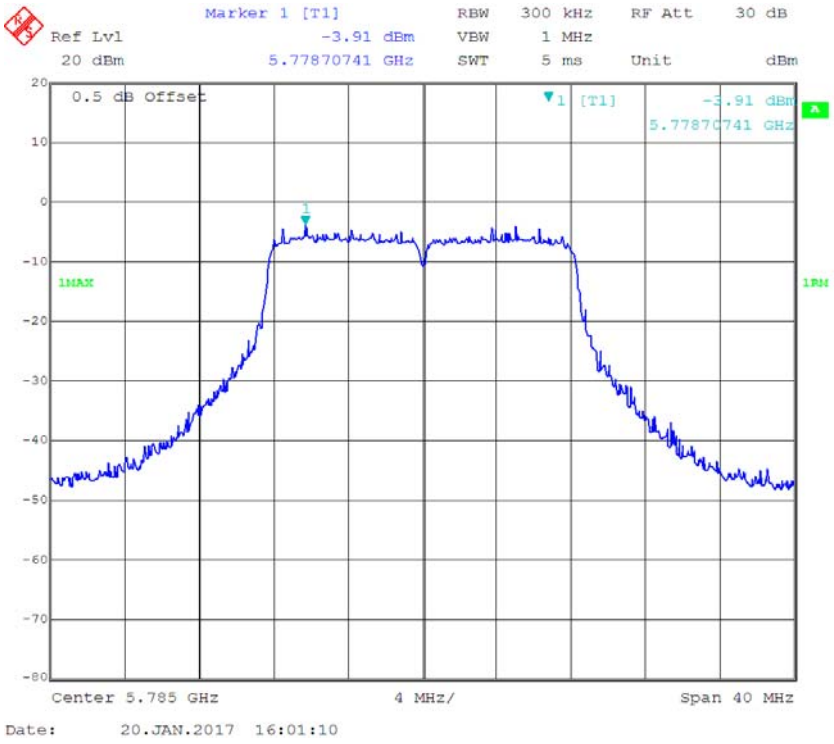
So:

Directional gain = GANT + Array Gain = 2+10*log(2) =5 dBi < 6dBi

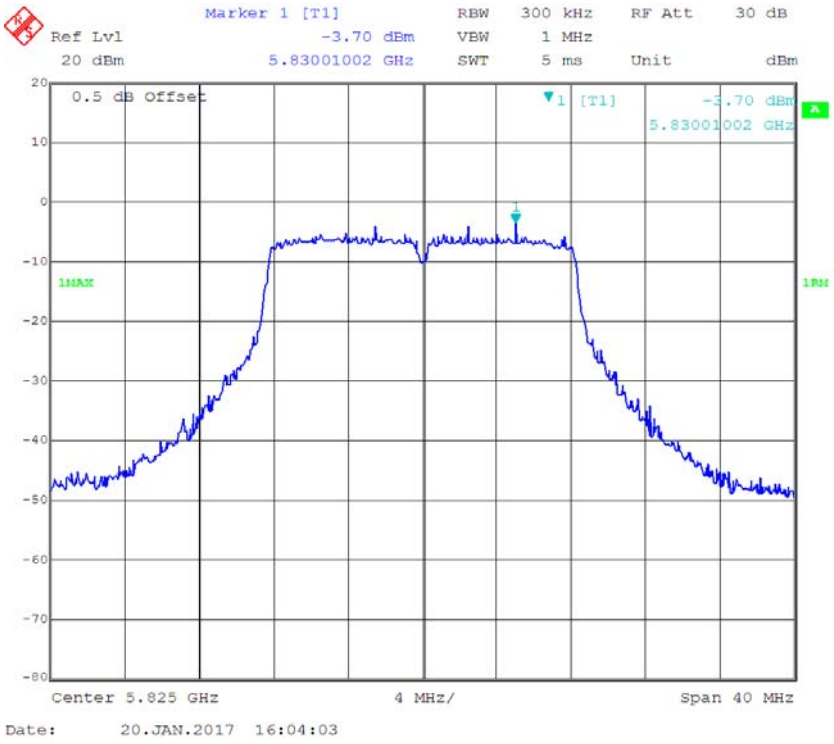
802.11a Low Channel – Chain0



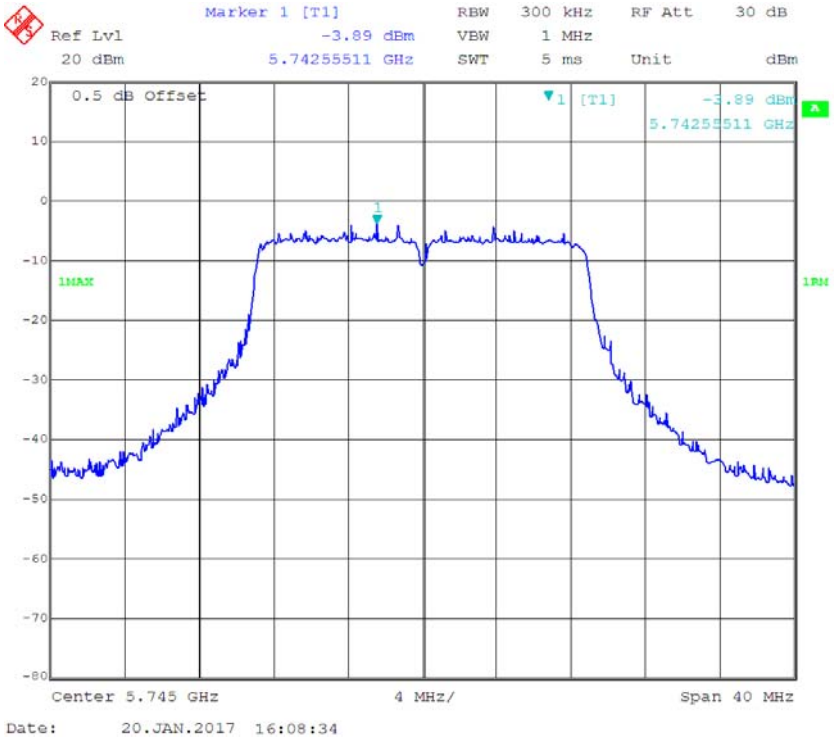
802.11a Middle Channel – Chain0



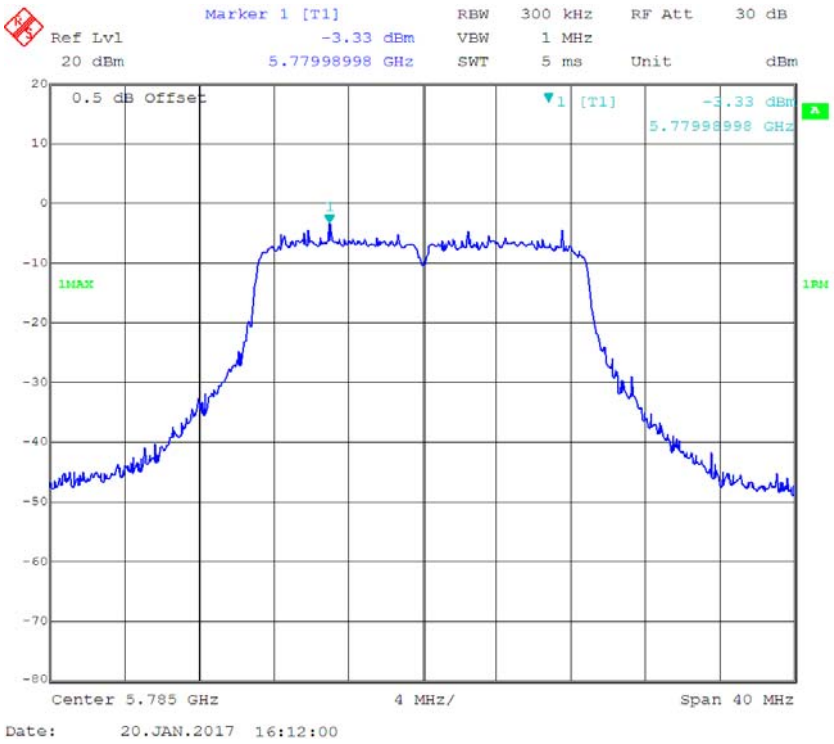
802.11a High Channel – Chain0



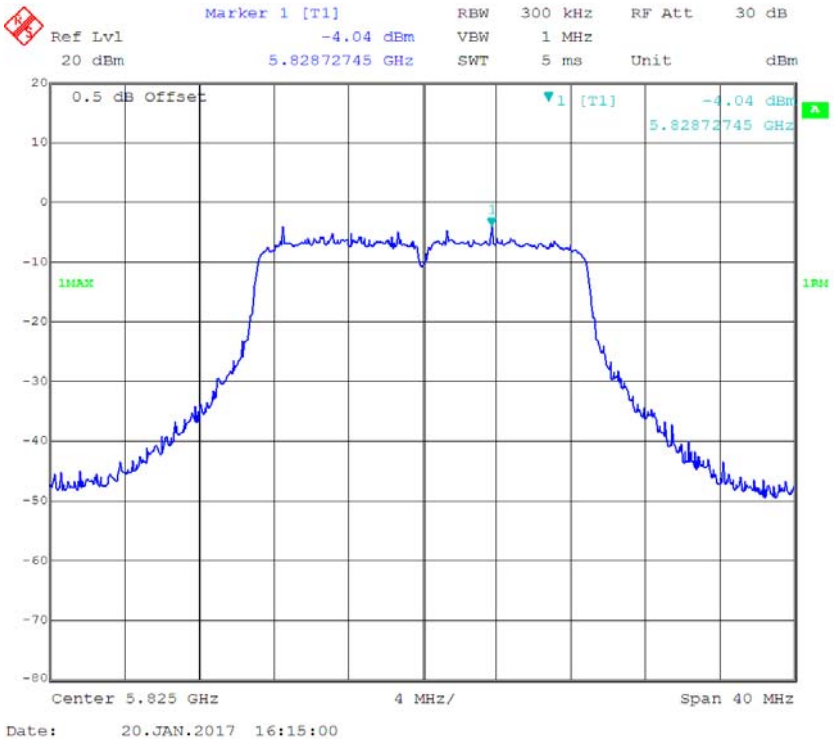
802.11n ht20 Low Channel – Chain0



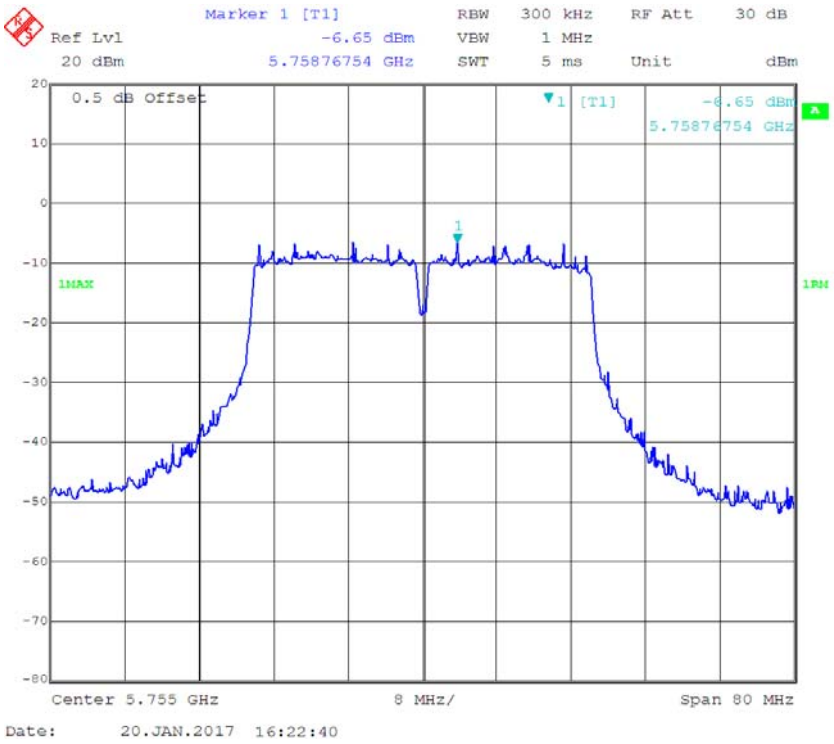
802.11n ht20 Middle Channel – Chain0



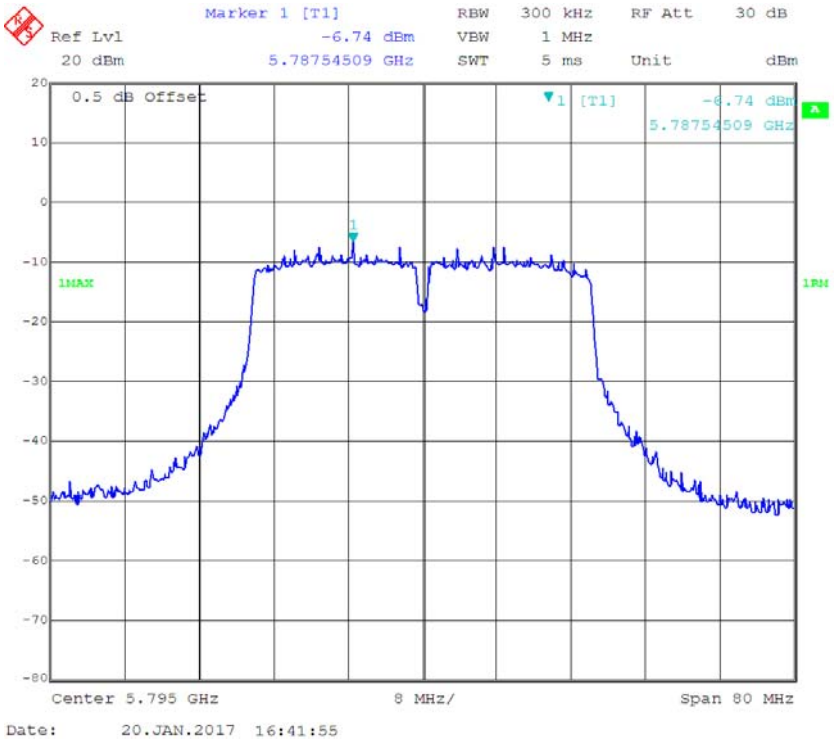
802.11n ht20 High Channel – Chain0



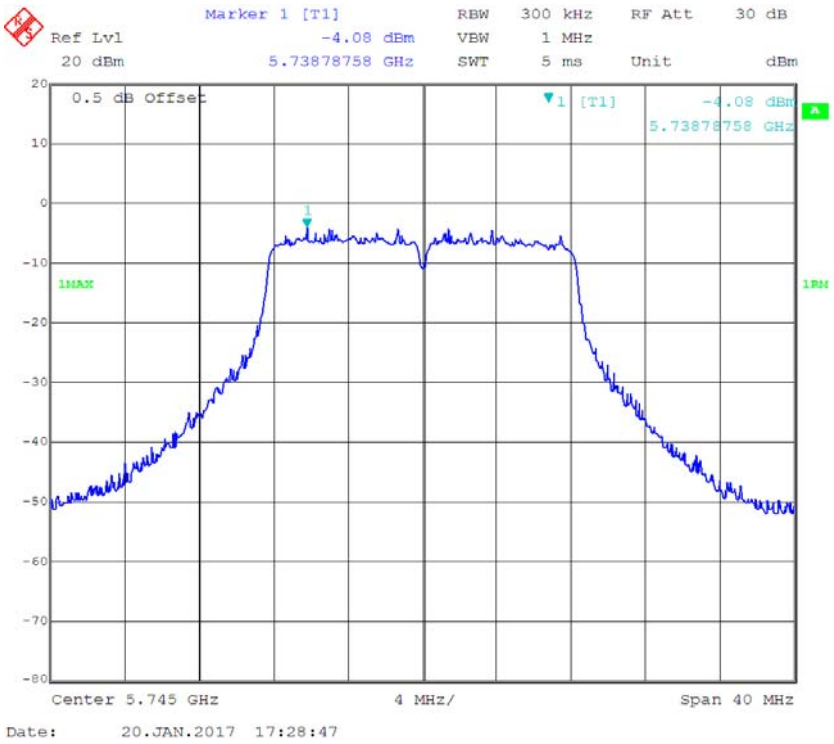
802.11n ht40 Low Channel – Chain0



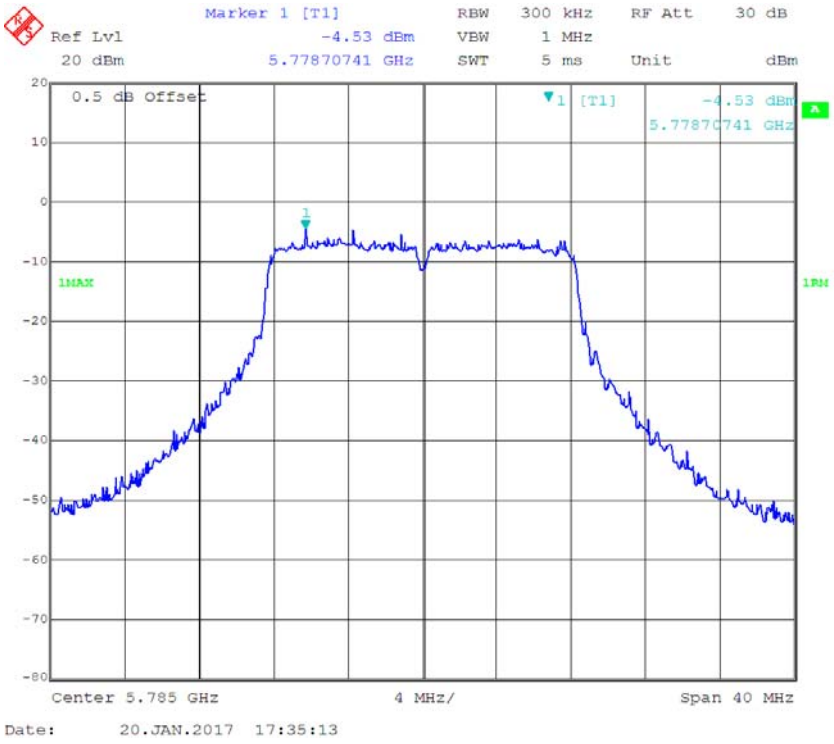
802.11n ht40 High Channel – Chain0



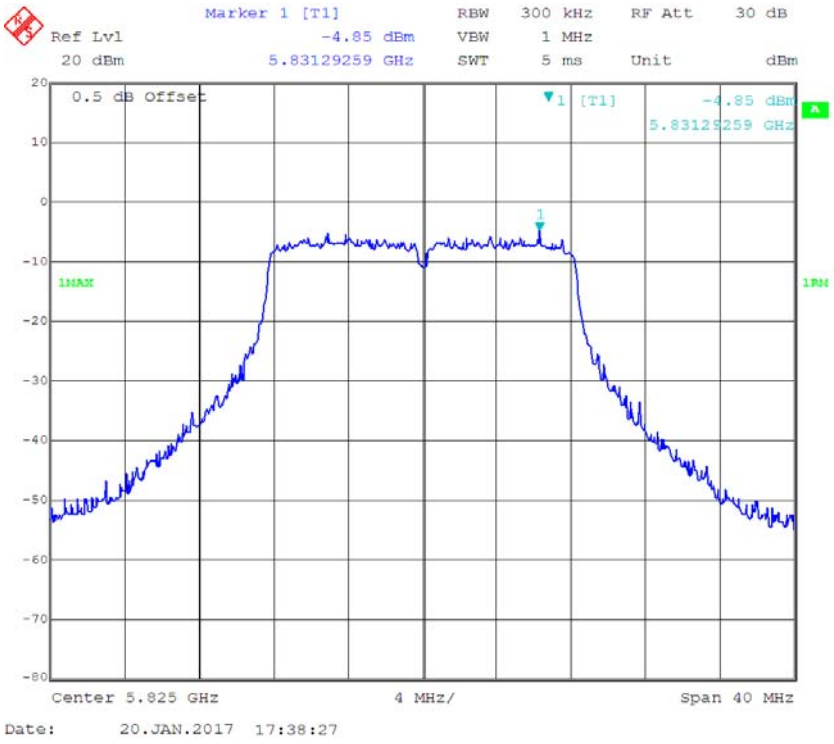
802.11a Low Channel – Chain1



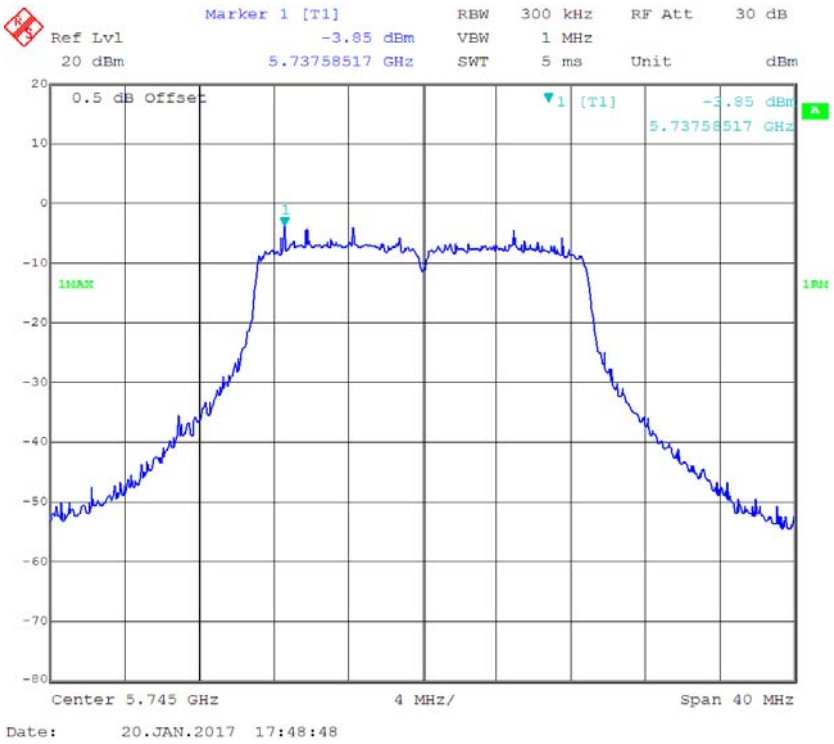
802.11a Middle Channel – Chain1



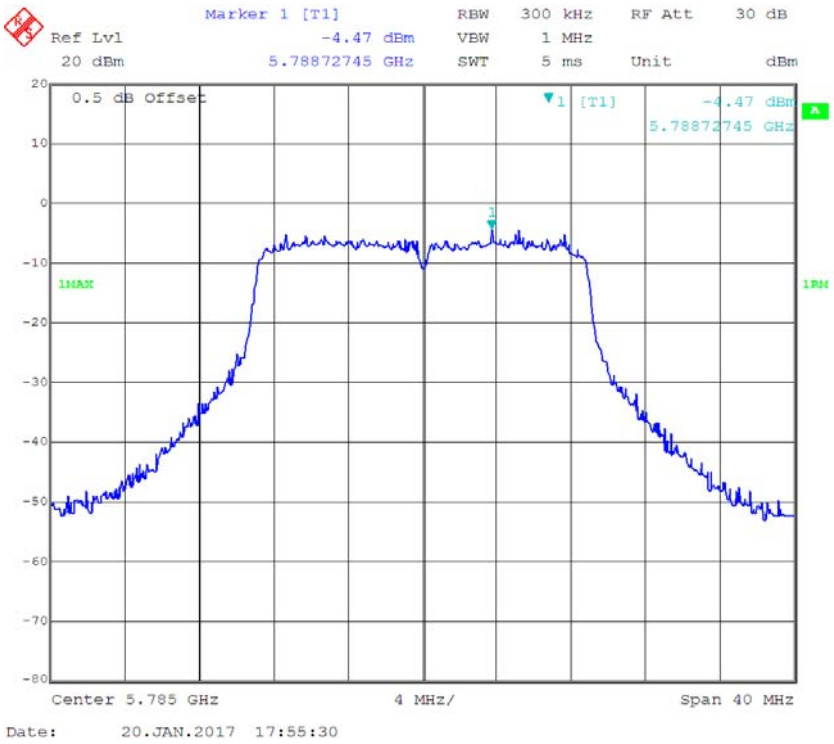
802.11a High Channel – Chain1



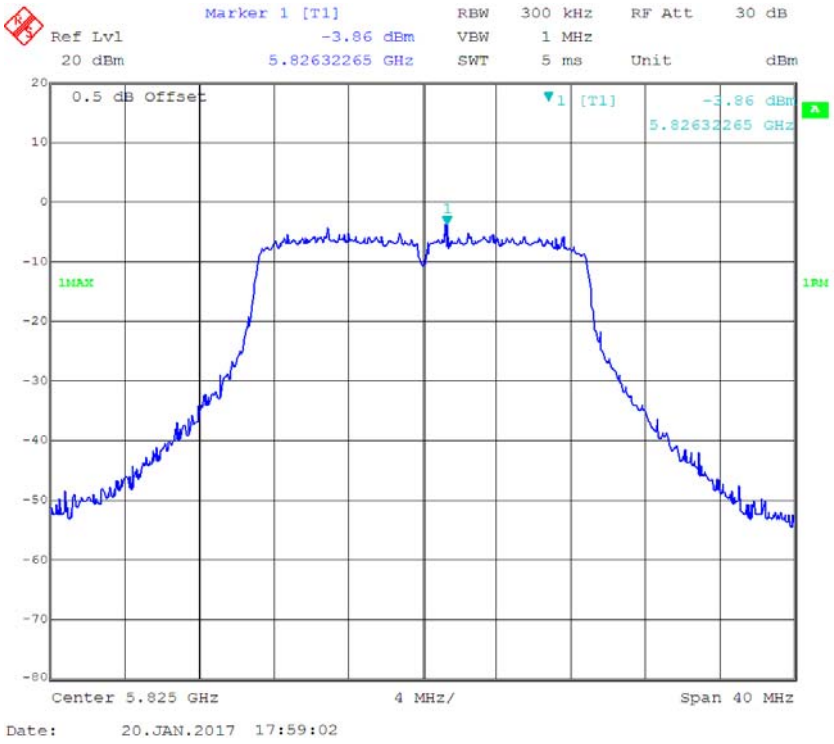
802.11n ht20 Low Channel – Chain1



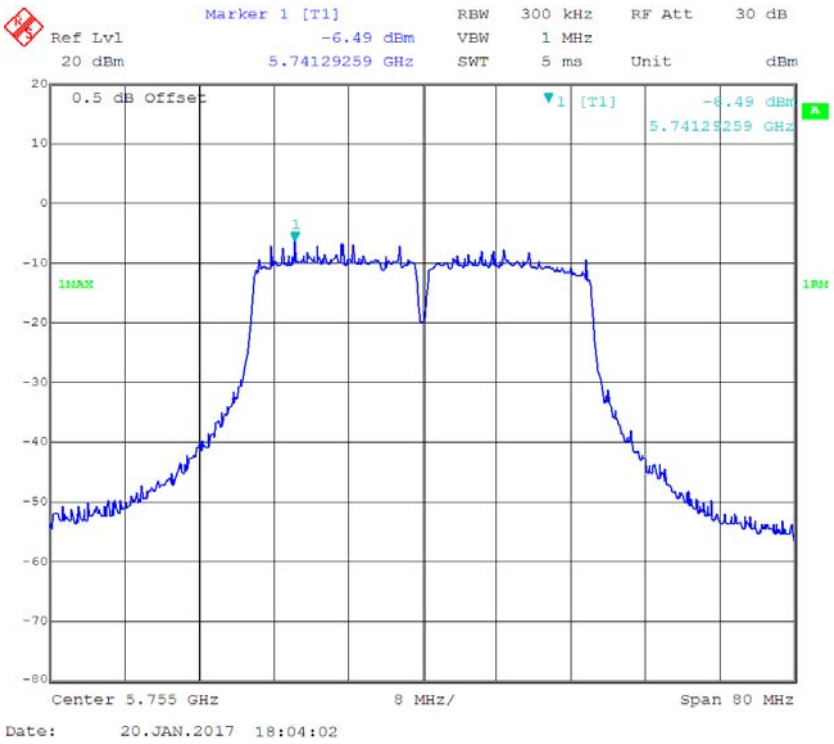
802.11n ht20 Middle Channel – Chain1



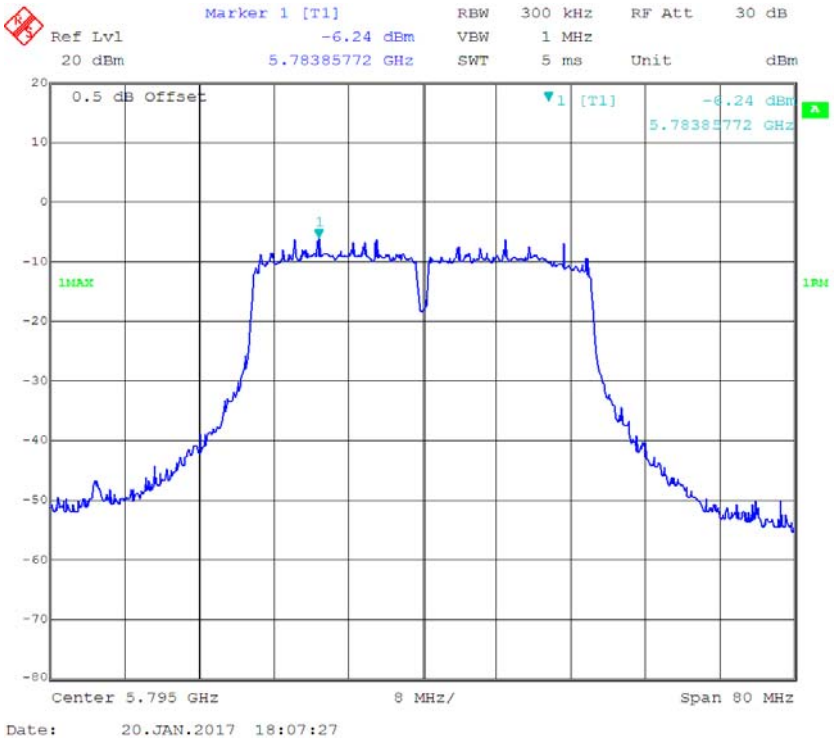
802.11n ht20 High Channel – Chain1



802.11n ht40 Low Channel – Chain1



802.11n ht40 High Channel – Chain1



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