

FCC PART 15.247

TEST REPORT

For

Chuango Security Technology Corporation

6-17, Overseas Students Pioneer Park, No. 108, Jia, Economic & Technological Development Zone,
Fuzhou 350015, China

FCC ID: RJY-W120

Report Type: Original Report	Product Type: WiFi Alarm System
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Report Number: <u>RSHA170801003-00A</u>	
Report Date: <u>2017-08-12</u>	
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TABLE OF CONTENTS

GENERAL INFORMATION.....	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY	4
MEASUREMENT UNCERTAINTY.....	5
TEST FACILITY	5
SYSTEM TEST CONFIGURATION.....	6
DESCRIPTION OF TEST CONFIGURATION	6
EQUIPMENT MODIFICATIONS	6
EUT EXERCISE SOFTWARE	6
SUPPORT EQUIPMENT LIST AND DETAILS	9
EXTERNAL I/O CABLE.....	9
BLOCK DIAGRAM OF TEST SETUP	9
SUMMARY OF TEST RESULTS.....	11
TEST EQUIPMENT LIST	12
FCC§15.247 (i), §1.1310& §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE).....	13
APPLICABLE STANDARD	13
CALCULATED FORMULARY:.....	13
CALCULATED DATA:.....	13
FCC §15.203 - ANTENNA REQUIREMENT.....	14
APPLICABLE STANDARD	14
ANTENNA CONNECTOR CONSTRUCTION	14
FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS	15
APPLICABLE STANDARD	15
EUT SETUP	15
EMI TEST RECEIVER SETUP.....	15
TEST PROCEDURE	15
CORRECTED FACTOR & MARGIN CALCULATION	16
TEST RESULTS SUMMARY	16
TEST DATA	16
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS.....	19
APPLICABLE STANDARD	19
EUT SETUP	19
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	20
TEST PROCEDURE	20
CORRECTED AMPLITUDE & MARGIN CALCULATION	20
TEST RESULTS SUMMARY	20
TEST DATA	21
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH.....	31
APPLICABLE STANDARD	31
TEST PROCEDURE	31
TEST DATA	31
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER.....	38

APPLICABLE STANDARD	38
TEST PROCEDURE	38
TEST DATA	38
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE.....	40
APPLICABLE STANDARD	40
TEST PROCEDURE	40
TEST DATA	40
FCC §15.247(e) - POWER SPECTRAL DENSITY	44
APPLICABLE STANDARD	44
TEST PROCEDURE	44
TEST DATA	44

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Chuango Security Technology Corporation
Tested Model	W120
Product Type	WiFi Alarm System
Dimension	117.0 mm(L)×118.5 mm(W)×40.5 mm(H)
Power Supply	DC 1.5V*4 from AA batteries or DC 12.0V from Adapter

Adapter Information:

Model: SA-US12V

Input: AC100-240 V 60Hz 0.3A

Output: 12.0V, 500mA

**All measurement and test data in this report was gathered from production sample serial number: 20170801010. (Assigned by BACL, Kunshan). The EUT was received on 2017-08-01.*

Objective

This report is prepared on behalf of Chuango Security Technology Corporation in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15.249 DXX submission with FCC ID: RJY-W120, FCC ID: RJYRE2300, and FCC ID: RJYDS2300.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB558074 D01 DTS Meas Guidance v04.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19 dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	4.88dB
Occupied Bandwidth		0.5kHz
Temperature		1.0°C
Humidity		6%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01. 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.: 815570. 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

Channel List for 802.11b, 802.11g and 802.11n-HT20 mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	/	/
6	2437	/	/
7	2442	/	/

EUT was tested with Channel 1, 6 and 11.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

RF test tool : putty.0.67.0.0.exe

Pre-scan with all the data rates, and the worst case was performed as below:

Mode	Data rate	Power level
802.11b	1 Mbps	33
802.11g	6 Mbps	29
802.11n-HT20	MCS0	27

802.11b Mode Middle Channel



[illegible]

Mode	Duty Cycle	T(us)	1/T(kHz)	VBW Setting	10log(1/x)
802.11b	90.50%	4.279	0.234	1kHz	0.43
802.11g	58.87%	0.711	1.406	3kHz	2.30
802.11n-HT20	58.50%	0.689	1.451	3kHz	2.33

Support Equipment List and Details

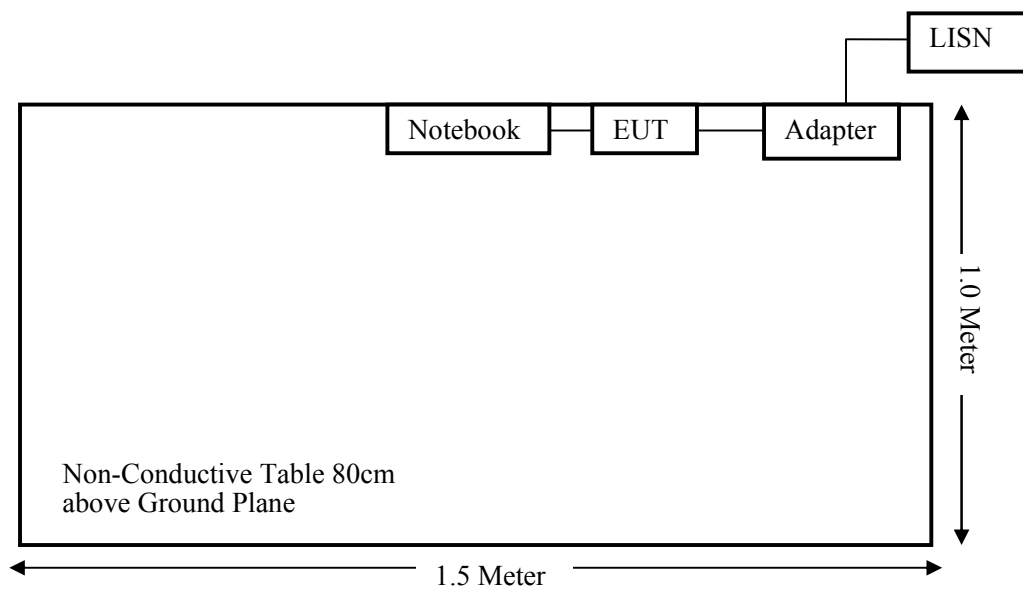
Manufacturer	Description	Model	Serial Number
DELL	Notebook	GX620	D65874152

External I/O Cable

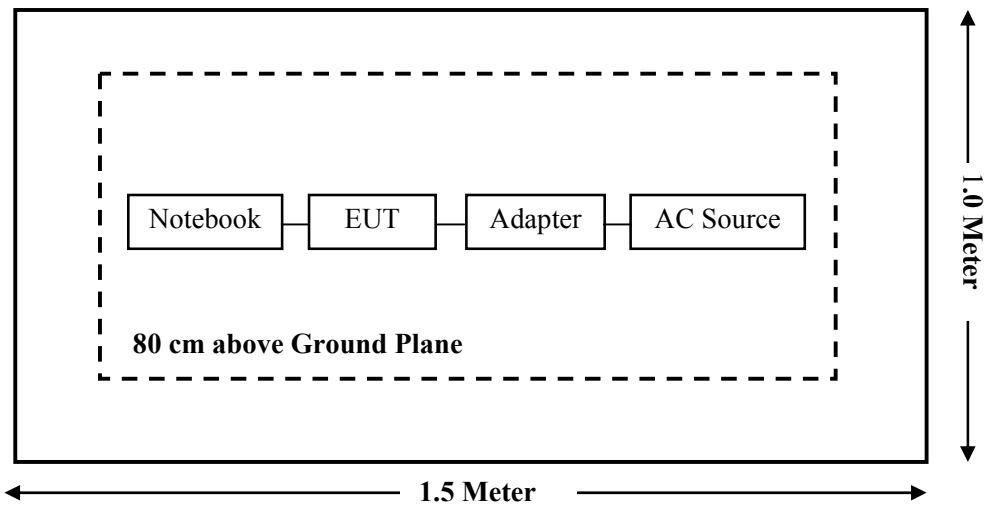
Cable Description	Shielding Type	Length (m)	From Port	To
USB Cable	Un-shielding	0.3	Notebook	EUT

Block Diagram of Test Setup

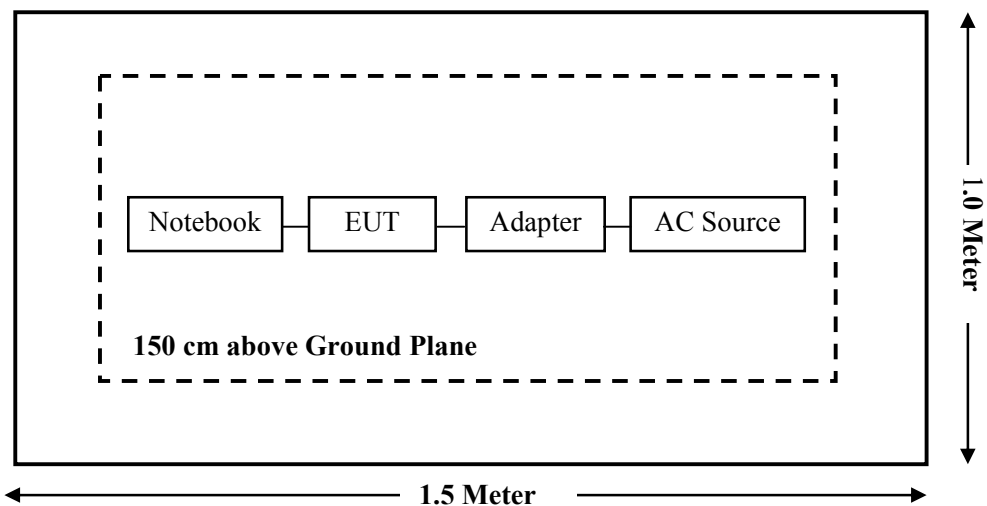
For Conducted Emissions:



For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.247(d)	Spurious Emissions at Antenna Port	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Conducted Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-24
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
ETS	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
Sonoma Instrument	Pre-amplifier	330	171377	2016-12-12	2017-12-11
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
Heatsink Required	Amplifier	QLW-18405536-J0	15964001009	2016-12-12	2017-12-11
R&S	Auto test Software	EMC32	100361	/	/
Haojintech	Coaxial Cable	Cable-1	001	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-2	002	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-3	003	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-4	004	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-5	005	2016-12-12	2017-12-11
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2016-09-21	2017-09-20
Agilent	Power Meter	N1912A	MY5000492	2016-11-18	2017-11-17
Agilent	Power Sensor	N1921A	MY54210024	2016-11-18	2017-11-17
Chuango	RF Cable	/	/	2017-08-04	2018-08-03
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2016-10-10	2017-10-09
ROHDE&SCHWARZ	LISN	ENV216	3560655016	2016-11-25	2017-11-24
Rohde & Schwarz	CE Test software	EMC 32	100357	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2016-09-08	2017-09-07

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

FCC§15.247 (i), §1.1310& §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247(i) 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.

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

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

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

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

Calculated Data:

Mode	Frequency Range	Antenna Gain		Target Output Power		Evaluation Distance	Power Density	MPE Limit
	(MHz)	(dBi)	(numeric)	(dBm)	(mW)	(cm)	(mW/cm ²)	(mW/cm ²)
802.11b	2412~2462	2.0	1.58	18.0	63.10	20	0.0199	1.0
802.11g		2.0	1.58	15.0	31.62	20	0.0100	1.0
802.11n-HT20		2.0	1.58	14.0	25.12	20	0.0079	1.0

Note:

For the above target output power are all declared by the manufacturer.

Result: The device meet FCC MPE at 20 cm distance.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the 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.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

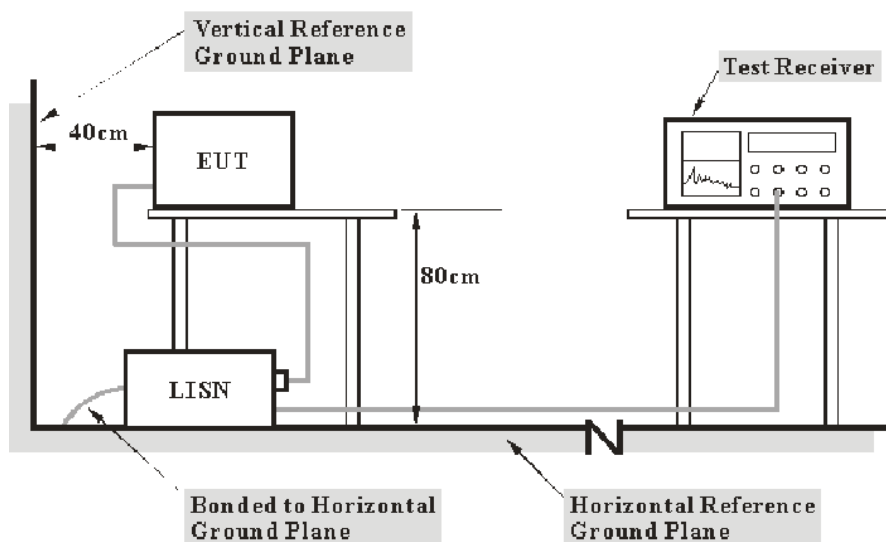
Antenna Connector Construction

The EUT has a PCB antenna arrangement for Wi-Fi, which the antenna gain is 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS**Applicable Standard**

FCC§15.207

EUT Setup

Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 30 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.

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

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the 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.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss}$$

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

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

Test Results Summary

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

Test Data

Environmental Conditions

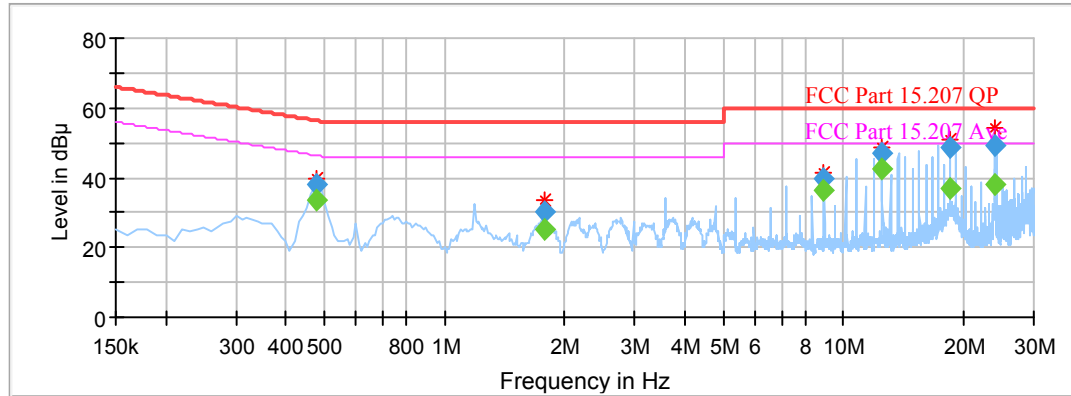
Temperature:	23.8°C
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

The testing was performed by Bernie Zhang on 2017-08-05.

EUT operation mode: Transmitting

AC 120V/60 Hz, Line

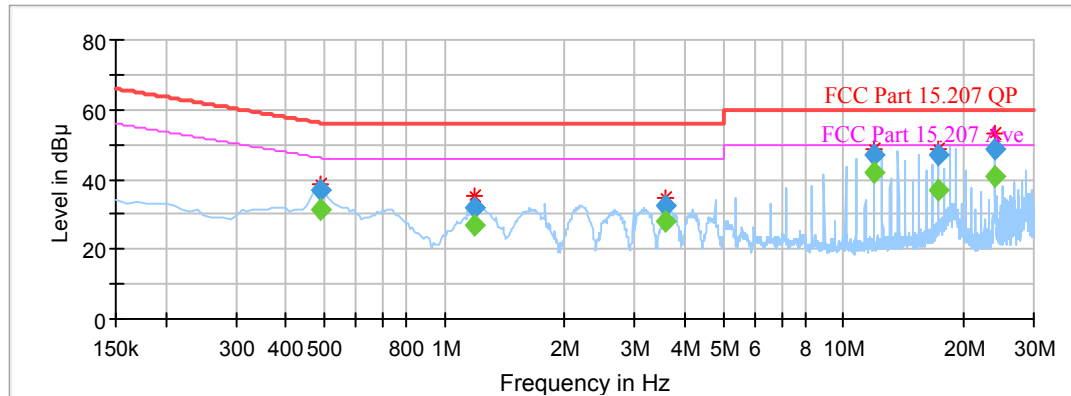
Full Spectrum



Frequency (MHz)	QuasiPeak (dBμV)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.480000	---	33.63	9.000	L1	10.1	12.71	46.34	Compliance
0.480000	38.20	---	9.000	L1	10.1	18.14	56.34	Compliance
1.790000	---	25.36	9.000	L1	9.9	20.64	46.00	Compliance
1.790000	30.48	---	9.000	L1	9.9	25.52	56.00	Compliance
8.950000	---	36.28	9.000	L1	10.0	13.72	50.00	Compliance
8.950000	39.82	---	9.000	L1	10.0	20.18	60.00	Compliance
12.530000	---	42.69	9.000	L1	10.0	7.31	50.00	Compliance
12.530000	47.18	---	9.000	L1	10.0	12.82	60.00	Compliance
18.500000	---	36.76	9.000	L1	10.2	13.24	50.00	Compliance
18.500000	48.66	---	9.000	L1	10.2	11.34	60.00	Compliance
24.000000	---	37.79	9.000	L1	10.2	12.21	50.00	Compliance
24.000000	49.04	---	9.000	L1	10.2	10.96	60.00	Compliance

AC 120V/60 Hz, Neutral

Full Spectrum



Frequency (MHz)	QuasiPeak (dBμV)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.490000	---	31.23	9.000	N	10.1	14.94	46.17	Compliance
0.490000	36.81	---	9.000	N	10.1	19.36	56.17	Compliance
1.190000	---	26.72	9.000	N	9.9	19.28	46.00	Compliance
1.190000	31.75	---	9.000	N	9.9	24.25	56.00	Compliance
3.580000	---	27.81	9.000	N	9.9	18.19	46.00	Compliance
3.580000	32.55	---	9.000	N	9.9	23.45	56.00	Compliance
11.930000	---	41.83	9.000	N	10.0	8.17	50.00	Compliance
11.930000	47.17	---	9.000	N	10.0	12.83	60.00	Compliance
17.300000	---	37.16	9.000	N	10.1	12.84	50.00	Compliance
17.300000	46.76	---	9.000	N	10.1	13.24	60.00	Compliance
24.000000	---	40.66	9.000	N	10.2	9.34	50.00	Compliance
24.000000	48.71	---	9.000	N	10.2	11.29	60.00	Compliance

Note:

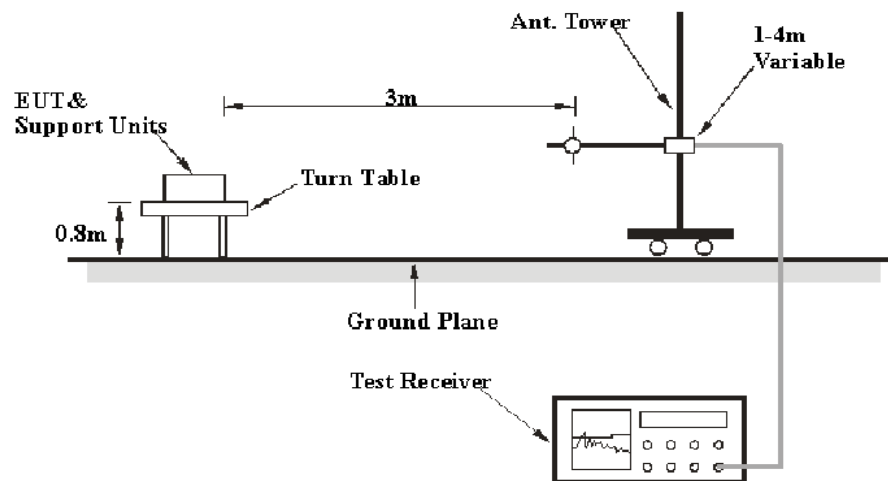
- 1) Corr.=LISN VDF (Voltage Division Factor) + Cable Loss
- 2) Corrected Amplitude = Reading + Corr.
- 3) Margin = Limit –Corrected Amplitude

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS**Applicable Standard**

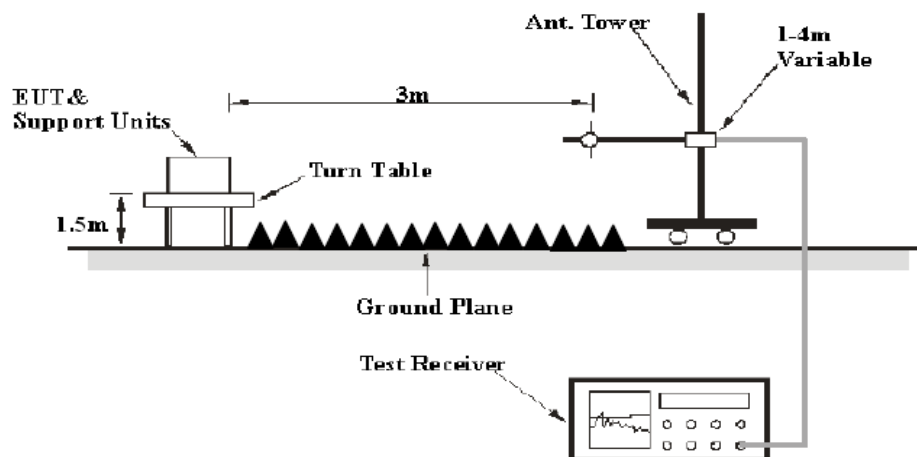
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

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

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

Frequency Range	RBW	Video B/W	Duty cycle	Detector
1GHz – 25GHz	1MHz	3 MHz	Any	PK
	1MHz	10 Hz	>98%	Ave.
	1MHz	1/T	<98%	

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-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

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

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

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

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

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

Test Data**Environmental Conditions**

Temperature:	24.7°C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Bernie Zhang on 2017-08-04.

EUT operation mode: Transmitting(Scan with X-Axis, Y-Axis and Z-Axis position, the worst case X-Axis was recorded)

30MHz-25GHz

802.11b Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
163.23	27.36	QP	356	212	H	-0.66	26.70	43.5	16.80
2412.00	111.43	PK	234	188	V	-4.13	107.30	/	/
2412.00	105.75	Ave	234	188	V	-4.13	101.62	/	/
2412.00	105.38	PK	240	132	H	-4.13	101.25	/	/
2412.00	100.36	Ave	240	132	H	-4.13	96.23	/	/
2390.00	50.32	PK	53	249	V	-4.19	46.13	74	27.87
2390.00	41.29	Ave	53	249	V	-4.19	37.10	54	16.90
2400.00	51.29	PK	349	245	V	-4.16	47.13	74	26.87
2400.00	42.36	Ave	349	245	V	-4.16	38.20	54	15.80
1356.21	44.32	PK	181	217	V	-8.75	35.57	74	38.43
1356.21	34.25	Ave	181	217	V	-8.75	25.50	54	28.50
4824.00	48.62	PK	316	222	V	4.19	52.81	74	21.19
4824.00	38.53	Ave	316	222	V	4.19	42.72	54	11.28
7236.00	45.63	PK	148	215	V	11.50	57.13	74	16.87
7236.00	36.26	Ave	148	215	V	11.50	47.76	54	6.24

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
163.23	27.57	QP	279	178	H	-0.66	26.91	43.5	16.59
2437.00	111.01	PK	359	183	V	-4.07	106.94	/	/
2437.00	105.32	Ave	359	183	V	-4.07	101.25	/	/
2437.00	104.63	PK	211	219	H	-4.07	100.56	/	/
2437.00	99.41	Ave	211	219	H	-4.07	95.34	/	/
1356.21	45.32	PK	205	143	V	-8.75	36.57	74	37.43
1356.21	38.26	Ave	205	143	V	-8.75	29.51	54	24.49
3158.64	44.52	PK	17	118	V	-2.83	41.69	74	32.31
3158.64	36.98	Ave	17	118	V	-2.83	34.15	54	19.85
4874.00	47.26	PK	112	172	V	4.32	51.58	74	22.42
4874.00	39.58	Ave	112	172	V	4.32	43.90	54	10.10
6451.33	45.32	PK	38	211	V	9.06	54.38	74	19.62
6451.33	35.69	Ave	38	211	V	9.06	44.75	54	9.25
7311.00	45.59	PK	347	157	V	11.62	57.21	74	16.79
7311.00	37.23	Ave	347	157	V	11.62	48.85	54	5.15
High Channel (2462 MHz)									
163.23	27.42	QP	209	246	H	-0.66	26.76	43.5	16.74
2462.00	110.75	PK	226	237	V	-4.00	106.75	/	/
2462.00	104.52	Ave	226	237	V	-4.00	100.52	/	/
2462.00	105.32	PK	342	107	H	-4.00	101.32	/	/
2462.00	100.21	Ave	342	107	H	-4.00	96.21	/	/
2483.50	49.62	PK	7	178	V	-6.01	43.61	74	30.39
2483.50	40.59	Ave	7	178	V	-6.01	34.58	54	19.42
1356.21	45.72	PK	29	227	V	-8.75	36.97	74	37.03
1356.21	38.16	Ave	29	227	V	-8.75	29.41	54	24.59
4924.00	48.62	PK	117	168	V	4.45	53.07	74	20.93
4924.00	41.59	Ave	117	168	V	4.45	46.04	54	7.96
6451.33	45.18	PK	49	106	V	9.06	54.24	74	19.76
6451.33	34.95	Ave	49	106	V	9.06	44.01	54	9.99
7386.00	44.94	PK	61	238	V	11.74	56.68	74	17.32
7386.00	34.59	Ave	61	238	V	11.74	46.33	54	7.67

802.11g Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
163.23	26.32	QP	347	140	H	-0.66	25.66	43.5	17.84
2412.00	105.75	PK	151	186	V	-4.13	101.62	/	/
2412.00	95.48	Ave	151	186	V	-4.13	91.35	/	/
2412.00	100.75	PK	273	107	H	-4.13	96.62	/	/
2412.00	91.38	Ave	273	107	H	-4.13	87.25	/	/
2390.00	49.62	PK	185	218	V	-4.19	45.43	74	28.57
2390.00	34.32	Ave	185	218	V	-4.19	30.13	54	23.87
2400.00	50.21	PK	240	103	V	-4.16	46.05	74	27.95
2400.00	34.69	Ave	240	103	V	-4.16	30.53	54	23.47
1356.21	46.23	PK	98	150	V	-8.75	37.48	74	36.52
1356.21	32.62	Ave	98	150	V	-8.75	23.87	54	30.13
4824.00	48.62	PK	324	106	V	4.19	52.81	74	21.19
4824.00	33.21	Ave	324	106	V	4.19	37.40	54	16.60
7236.00	45.23	PK	308	132	V	11.50	56.73	74	17.27
7236.00	31.26	Ave	308	132	V	11.50	42.76	54	11.24
Middle Channel (2437 MHz)									
163.23	26.78	QP	66	118	H	-0.66	26.12	43.5	17.38
2437.00	105.30	PK	149	187	V	-4.07	101.23	/	/
2437.00	95.04	Ave	149	187	V	-4.07	90.97	/	/
2437.00	100.32	PK	297	196	H	-4.07	96.25	/	/
2437.00	91.05	Ave	297	196	H	-4.07	86.98	/	/
1356.21	45.26	PK	65	132	V	-8.75	36.51	74	37.49
1356.21	30.11	Ave	65	132	V	-8.75	21.36	54	32.64
3158.64	44.26	PK	67	192	V	-2.83	41.43	74	32.57
3158.64	31.29	Ave	67	192	V	-2.83	28.46	54	25.54
4874.00	47.86	PK	165	201	V	4.32	52.18	74	21.82
4874.00	30.29	Ave	165	201	V	4.32	34.61	54	19.39
6451.33	44.62	PK	301	217	V	9.06	53.68	74	20.32
6451.33	30.02	Ave	301	217	V	9.06	39.08	54	14.92
7311.00	45.26	PK	342	114	V	11.62	56.88	74	17.12
7311.00	29.62	Ave	342	114	V	11.62	41.24	54	12.76

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
163.23	26.47	QP	279	180	H	-0.66	25.81	43.5	17.69
2462.00	106.64	PK	124	197	V	-6.06	100.58	/	/
2462.00	96.68	Ave	124	197	V	-6.06	90.62	/	/
2462.00	101.68	PK	20	249	H	-6.06	95.62	/	/
2462.00	90.42	Ave	20	249	H	-6.06	84.36	/	/
2483.50	50.23	PK	292	109	V	-6.01	44.22	74	29.78
2483.50	35.21	Ave	292	109	V	-6.01	29.20	54	24.80
1356.21	45.12	PK	164	217	V	-8.75	36.37	74	37.63
1356.21	31.62	Ave	164	217	V	-8.75	22.87	54	31.13
4924.00	47.69	PK	323	108	V	4.45	52.14	74	21.86
4924.00	32.11	Ave	323	108	V	4.45	36.56	54	17.44
6451.33	45.23	PK	178	248	V	9.06	54.29	74	19.71
6451.33	30.96	Ave	178	248	V	9.06	40.02	54	13.98
7386.00	44.62	PK	47	136	V	11.74	56.36	74	17.64
7386.00	29.21	Ave	47	136	V	11.74	40.95	54	13.05

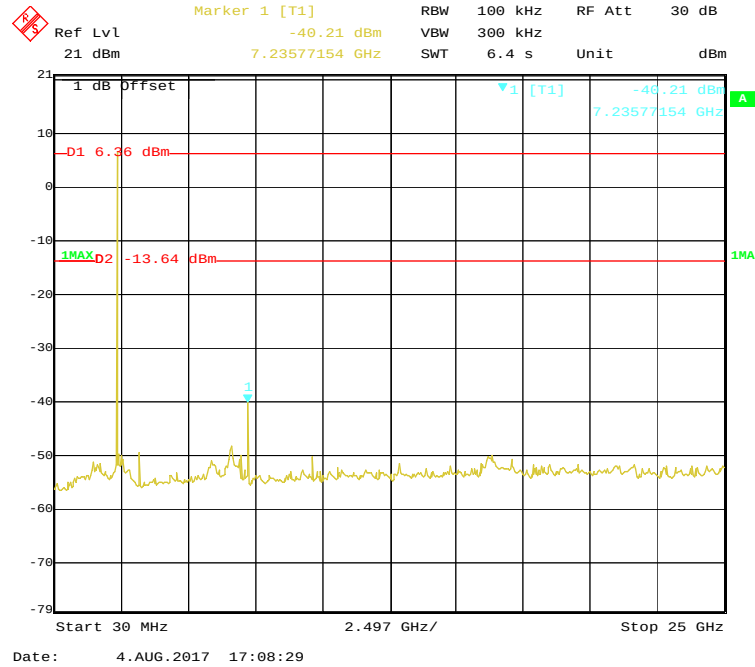
802.11n-HT20 Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
163.23	27.96	QP	341	240	H	-0.66	27.30	43.5	16.20
2412.00	104.55	PK	335	145	V	-4.13	100.42	/	/
2412.00	93.82	Ave	335	145	V	-4.13	89.69	/	/
2412.00	99.75	PK	47	217	H	-4.13	95.62	/	/
2412.00	89.49	Ave	47	217	H	-4.13	85.36	/	/
2390.00	48.62	PK	271	142	V	-4.19	44.43	74	29.57
2390.00	33.19	Ave	271	142	V	-4.19	29.00	54	25.00
2400.00	49.62	PK	257	185	V	-4.16	45.46	74	28.54
2400.00	34.69	Ave	257	185	V	-4.16	30.53	54	23.47
1356.21	45.31	PK	68	168	V	-8.75	36.56	74	37.44
1356.21	31.62	Ave	68	168	V	-8.75	22.87	54	31.13
4824.00	48.26	PK	252	155	V	4.19	52.45	74	21.55
4824.00	33.21	Ave	252	155	V	4.19	37.40	54	16.60
7236.00	45.32	PK	277	122	V	11.50	56.82	74	17.18
7236.00	31.26	Ave	277	122	V	11.50	42.76	54	11.24

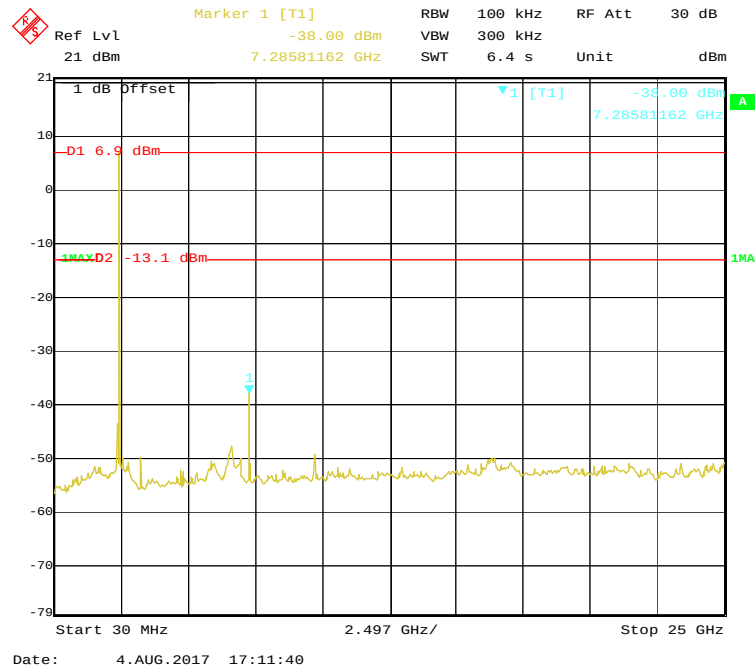
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
163.23	27.41	QP	149	234	H	-0.66	26.75	43.5	16.75
2437.00	104.12	PK	108	102	V	-4.07	100.05	/	/
2437.00	93.69	Ave	108	102	V	-4.07	89.62	/	/
2437.00	98.93	PK	99	121	H	-4.07	94.86	/	/
2437.00	88.05	Ave	99	121	H	-4.07	83.98	/	/
1356.21	45.26	PK	64	178	V	-8.75	36.51	74	37.49
1356.21	30.11	Ave	64	178	V	-8.75	21.36	54	32.64
3158.64	43.26	PK	261	244	V	-2.83	40.43	74	33.57
3158.64	30.11	Ave	261	244	V	-2.83	27.28	54	26.72
4874.00	47.69	PK	155	158	V	4.32	52.01	74	21.99
4874.00	32.62	Ave	155	158	V	4.32	36.94	54	17.06
6451.33	44.62	PK	311	170	V	9.06	53.68	74	20.32
6451.33	29.62	Ave	311	170	V	9.06	38.68	54	15.32
7311.00	45.26	PK	12	105	V	11.62	56.88	74	17.12
7311.00	29.62	Ave	12	105	V	11.62	41.24	54	12.76
High Channel (2462 MHz)									
163.23	27.62	QP	145	139	H	-0.66	26.96	43.5	16.54
2462.00	105.69	PK	303	107	V	-6.06	99.63	/	/
2462.00	95.31	Ave	303	107	V	-6.06	89.25	/	/
2462.00	100.68	PK	163	142	H	-6.06	94.62	/	/
2462.00	89.74	Ave	163	142	H	-6.06	83.68	/	/
2483.50	49.62	PK	186	123	V	-6.01	43.61	74	30.39
2483.50	35.21	Ave	186	123	V	-6.01	29.20	54	24.80
1356.21	45.12	PK	30	231	V	-8.75	36.37	74	37.63
1356.21	32.11	Ave	30	231	V	-8.75	23.36	54	30.64
4924.00	47.69	PK	72	128	V	4.45	52.14	74	21.86
4924.00	32.29	Ave	72	128	V	4.45	36.74	54	17.26
6451.33	45.23	PK	25	209	V	9.06	54.29	74	19.71
6451.33	30.96	Ave	25	209	V	9.06	40.02	54	13.98
7386.00	44.26	PK	321	137	V	11.74	56.00	74	18.00
7386.00	29.32	Ave	321	137	V	11.74	41.06	54	12.94

Conducted Spurious Emissions at Antenna Port

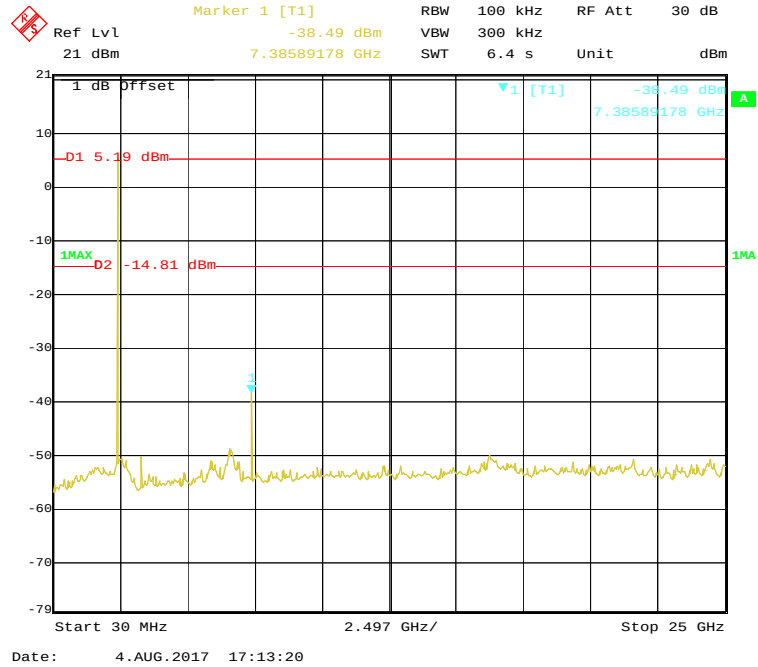
802.11b Low Channel



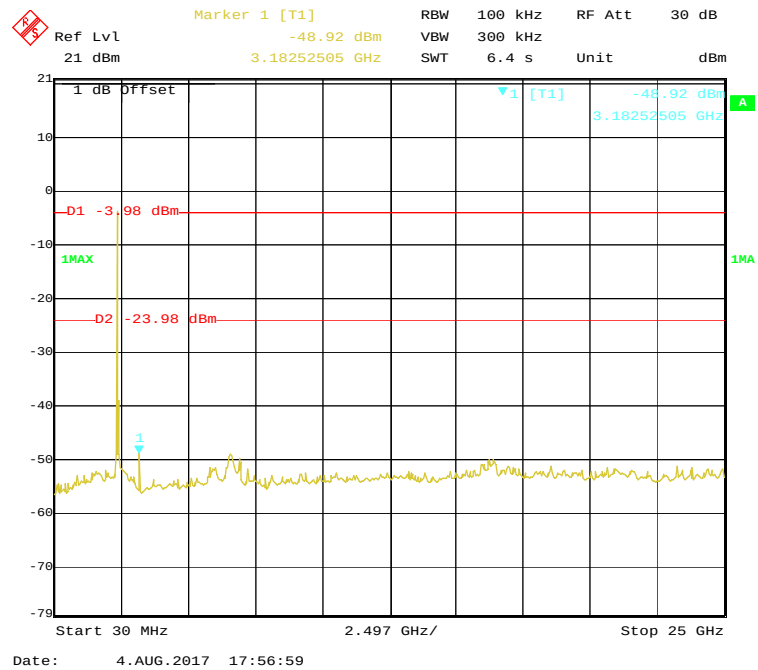
802.11b Middle Channel



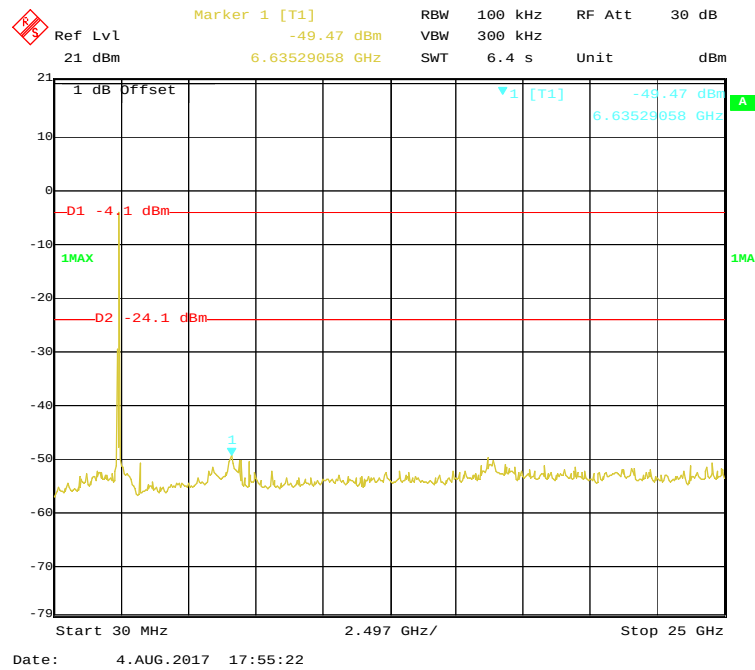
802.11b High Channel



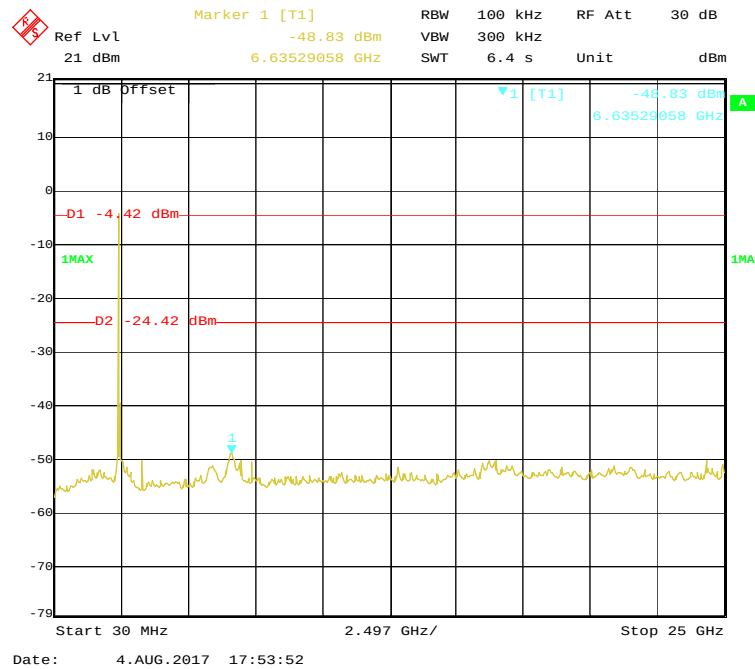
802.11g Low Channel



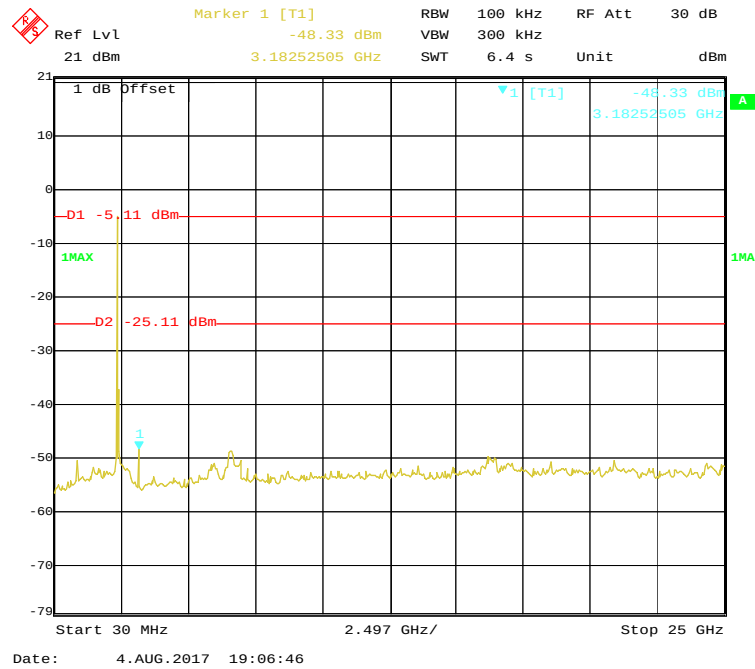
802.11g Middle Channel



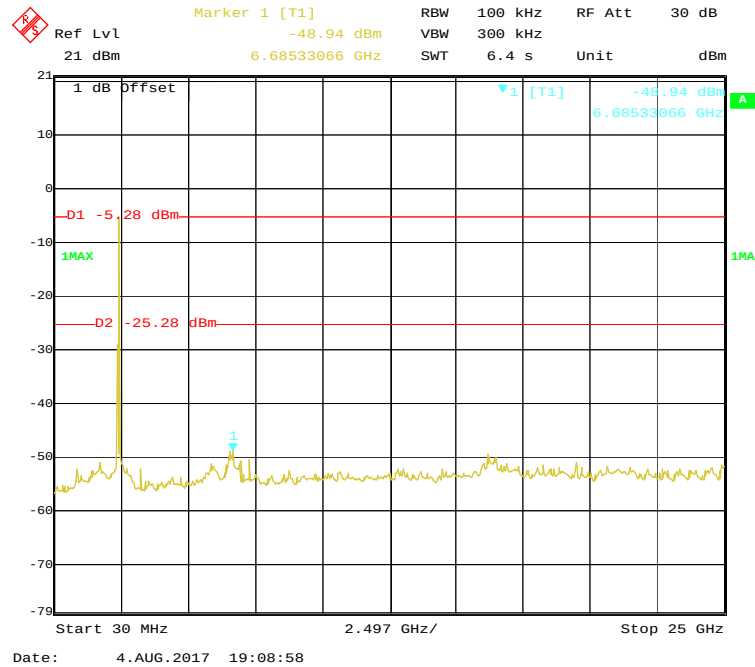
802.11g High Channel



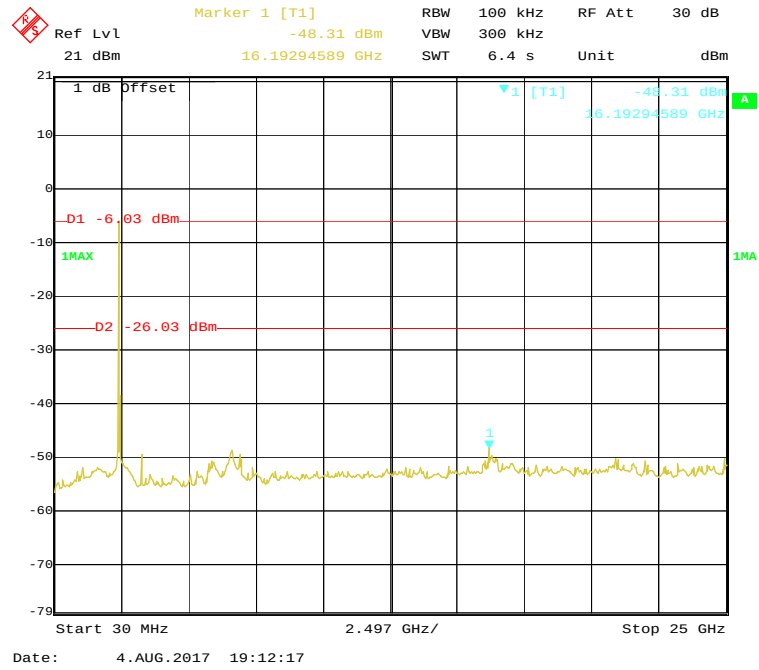
802.11n-HT20 Low Channel



802.11n-HT20 Middle Channel



802.11n-HT20 High Channel



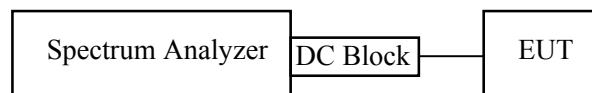
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



Test Data

Environmental Conditions

Temperature:	24.7°C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

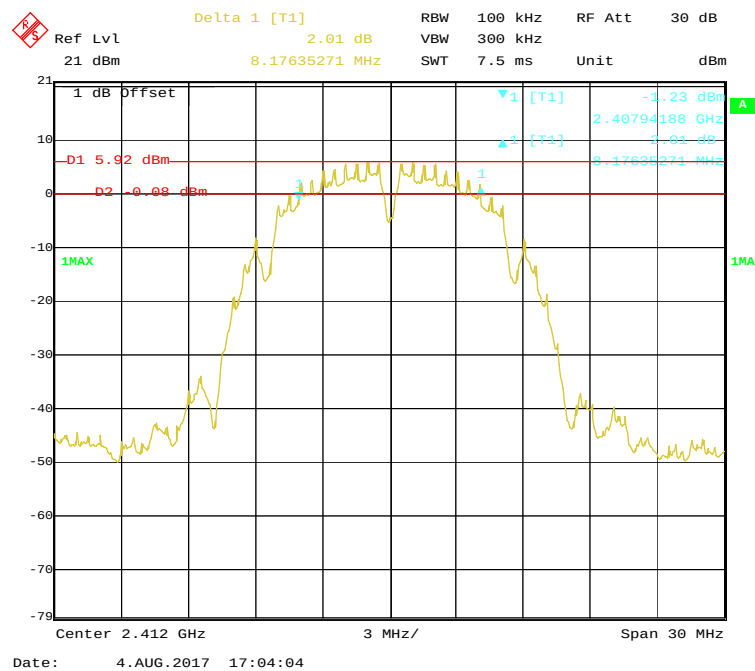
The testing was performed by Bernie Zhang on 2017-08-04.

Test Result: Pass.

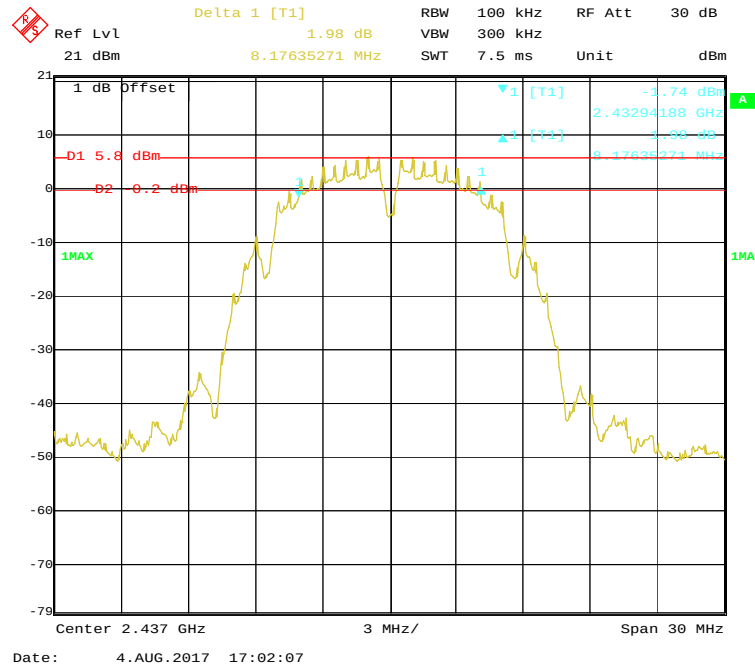
EUT operation mode: Transmitting

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b mode			
Low	2412	8.18	≥ 0.5
Middle	2437	8.18	≥ 0.5
High	2462	8.18	≥ 0.5
802.11g mode			
Low	2412	16.47	≥ 0.5
Middle	2437	16.47	≥ 0.5
High	2462	16.53	≥ 0.5
802.11n-HT20 mode			
Low	2412	17.74	≥ 0.5
Middle	2437	17.74	≥ 0.5
High	2462	17.74	≥ 0.5

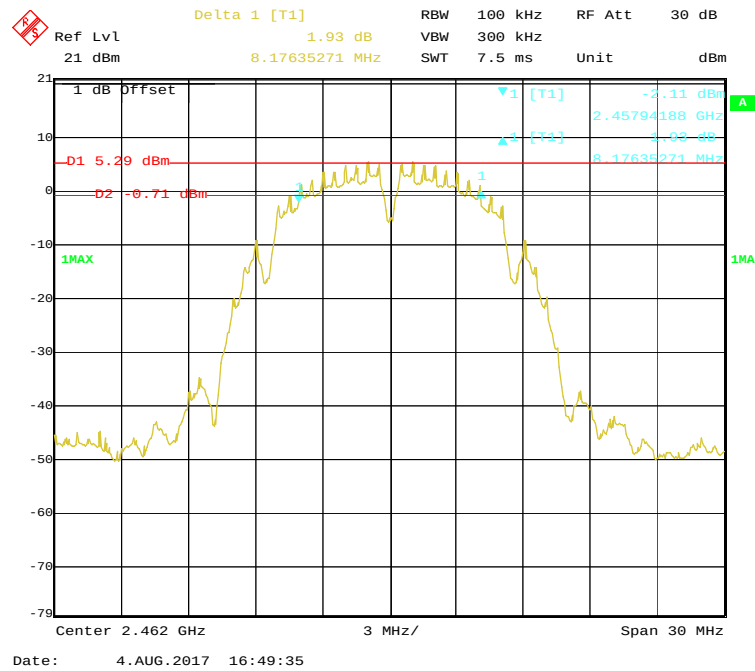
802.11b Low Channel



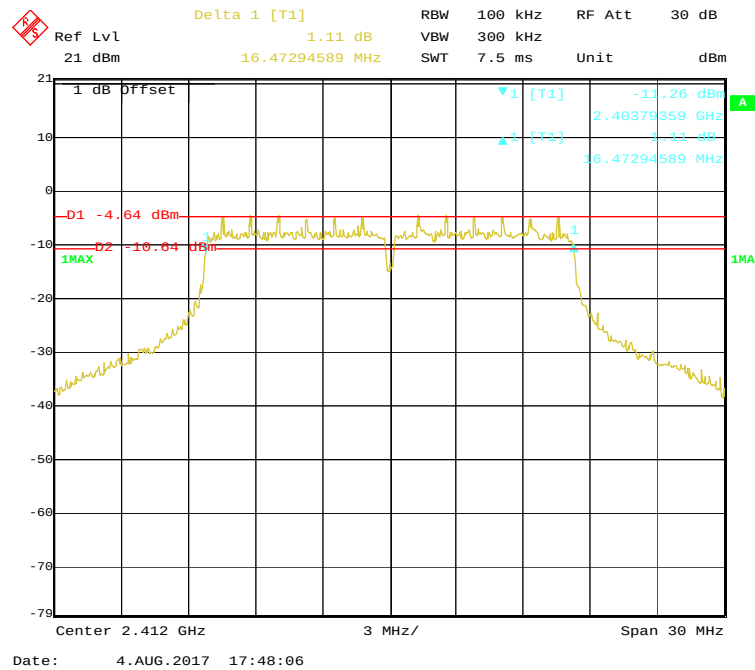
802.11b Middle Channel



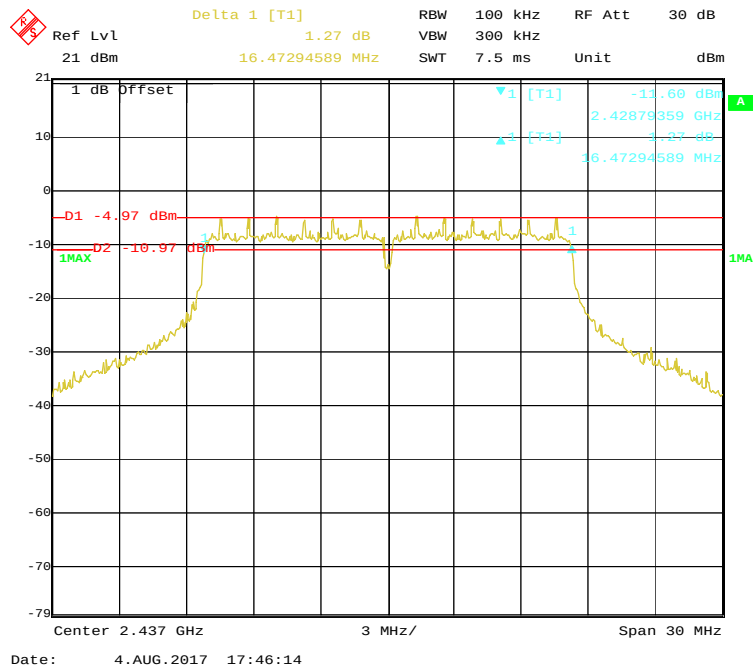
802.11b High Channel



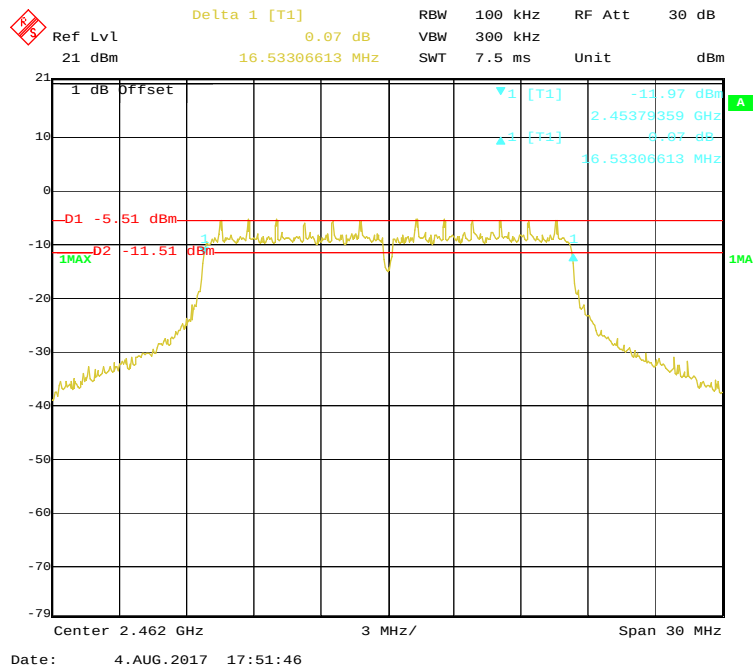
802.11g Low Channel



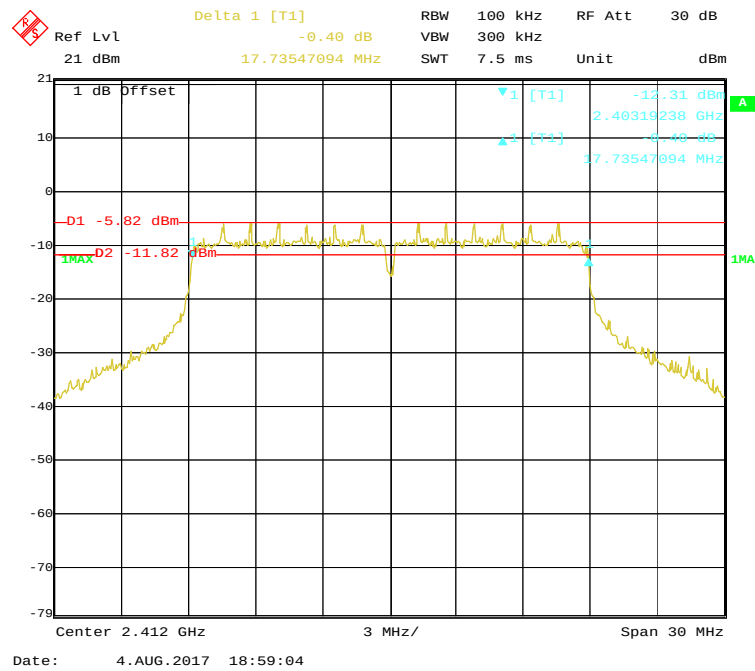
802.11g Middle Channel



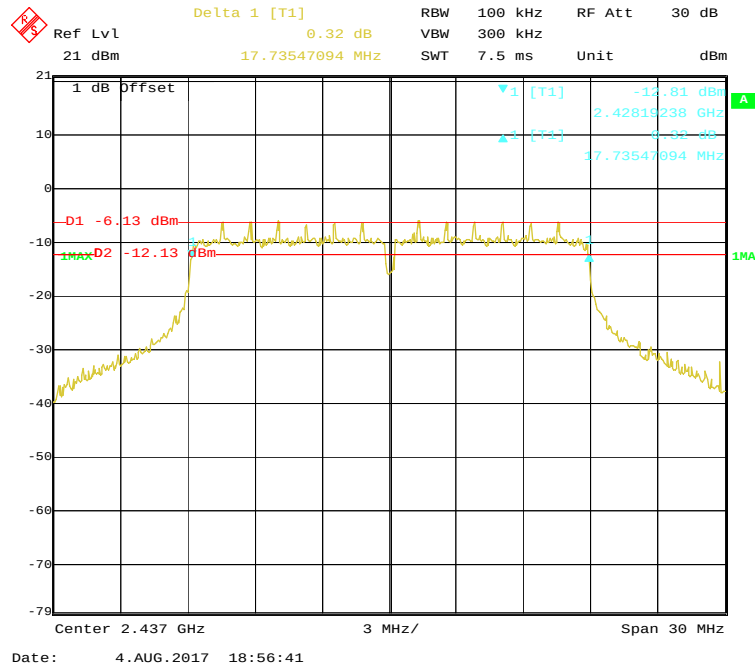
802.11g High Channel



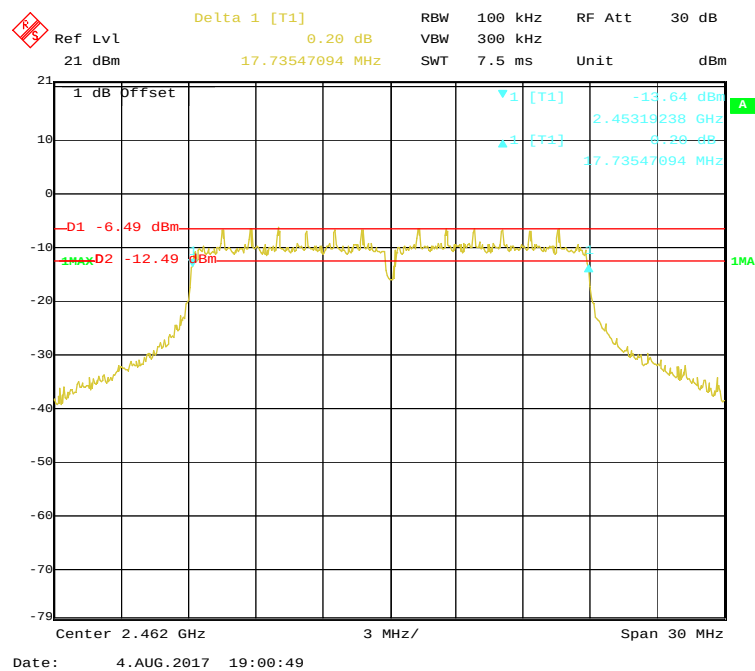
802.11n-HT20 Low Channel



802.11n-HT20 Middle Channel



802.11n-HT20 High Channel



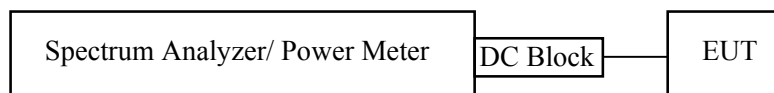
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.



Note: We use signal Analyzer for peak power test and power meter for average power test.

Test Data

Environmental Conditions

Temperature:	24.7°C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Bernie Zhang on 2017-08-04.

EUT operation mode: Transmitting

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Limit (dBm)	Result
802.11b				
Low	2412	17.57	30	Pass
Middle	2437	17.30	30	Pass
High	2462	16.87	30	Pass
802.11g				
Low	2412	14.91	30	Pass
Middle	2437	14.55	30	Pass
High	2462	14.21	30	Pass
802.11n-HT20				
Low	2412	13.50	30	Pass
Middle	2437	13.25	30	Pass
High	2462	12.83	30	Pass

FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE**Applicable Standard**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Data**Environmental Conditions**

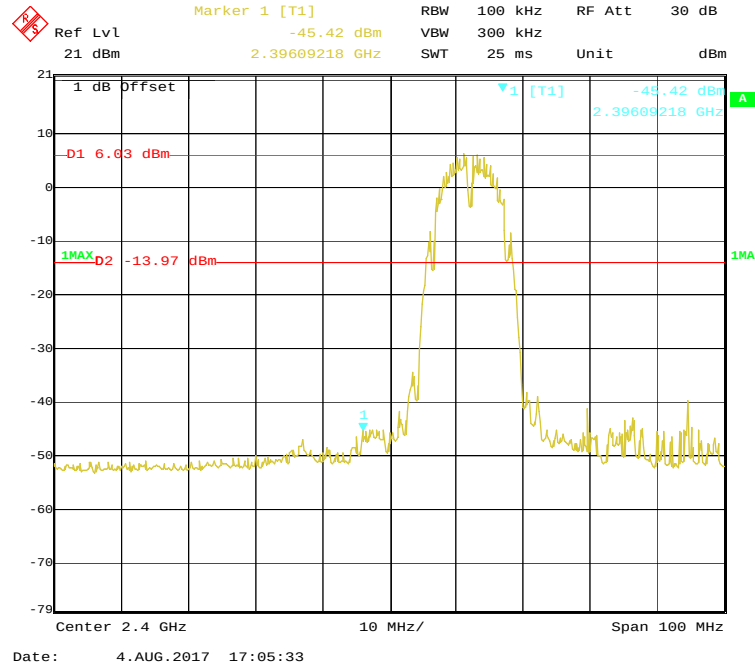
Temperature:	24.7°C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Bernie Zhang on 2017-08-04.

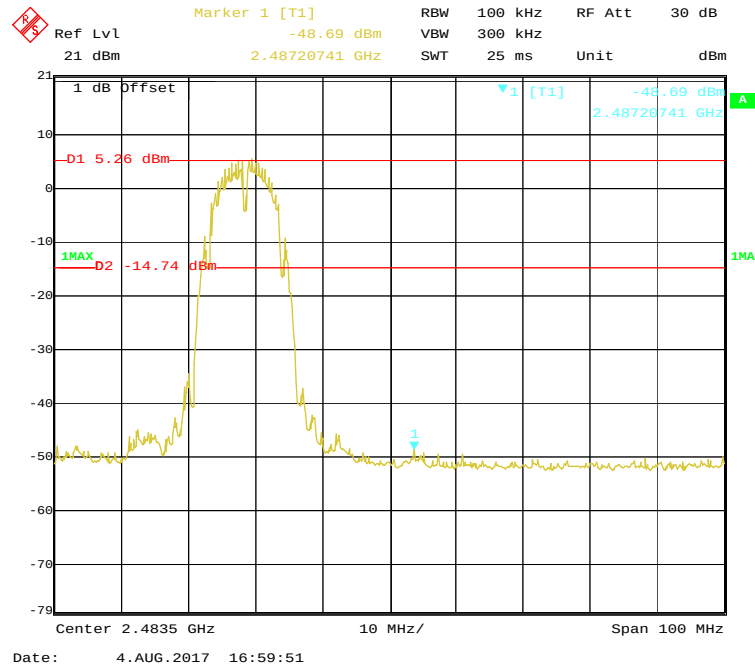
Test Result: *Compliance*

Band Edge

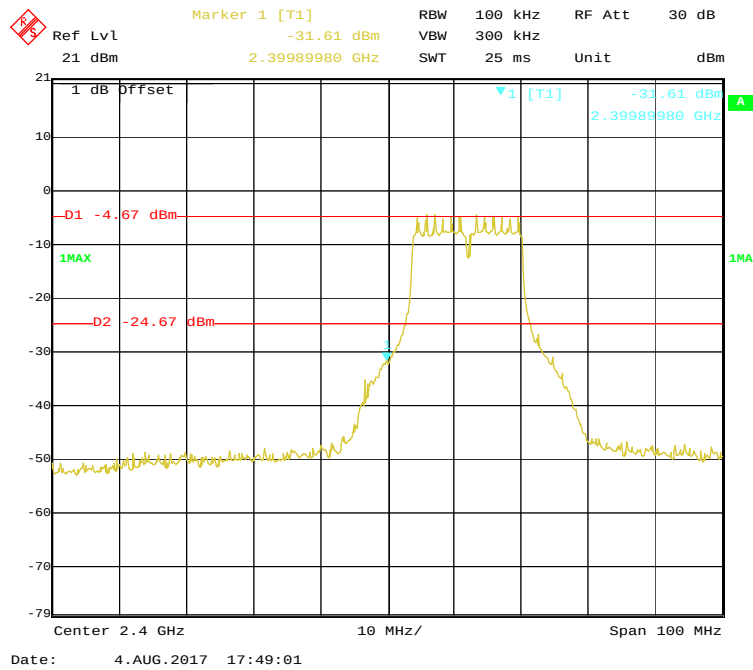
802.11b Mode Left Side



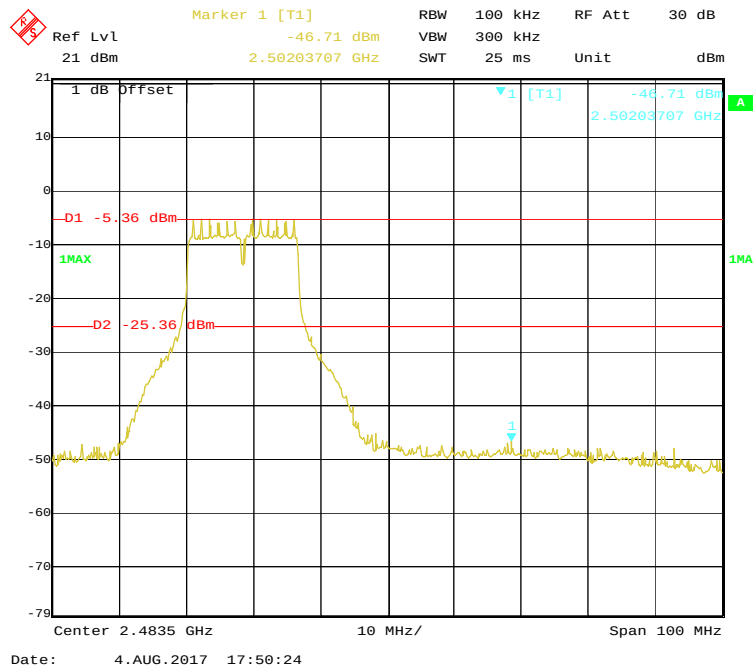
802.11b Mode Right Side



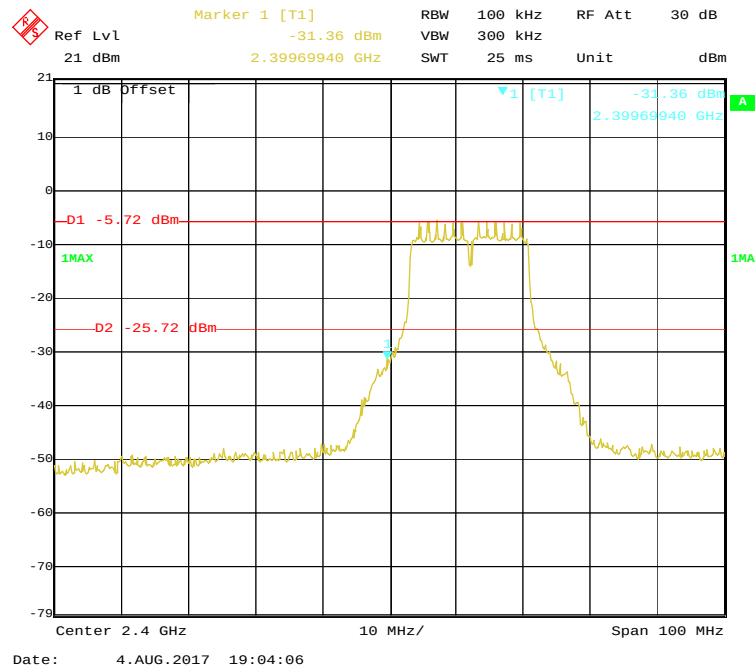
802.11g Mode Left Side



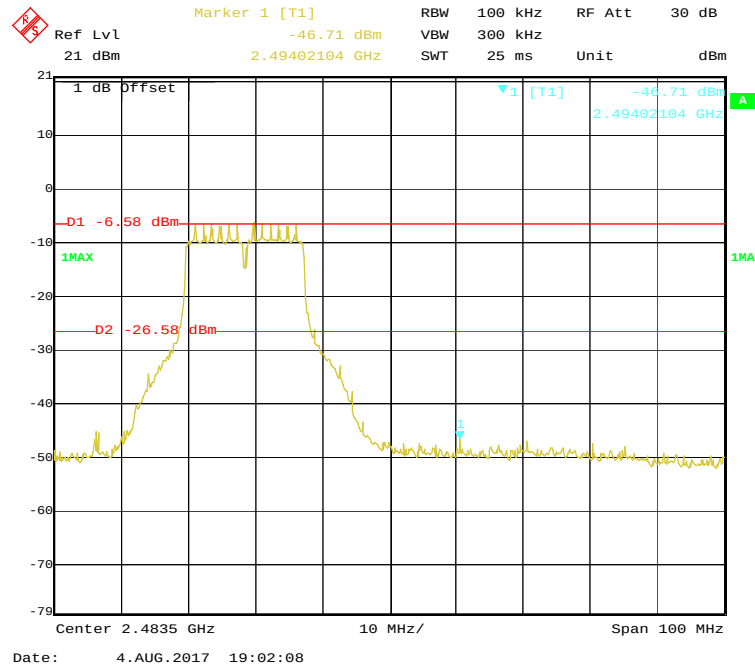
802.11g Mode Right Side



802.11n-HT20 Mode Left Side



802.11n-HT20 Mode Right Side



FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

According to KDB558074 D01 DTS Meas Guidance v04 sub-clause 10.2

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: $3\text{kHz} \leq \text{RBW} \leq 100\text{ kHz}$.
3. Set the VBW $\geq 3 \times \text{RBW}$.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Data

Environmental Conditions

Temperature:	24.7°C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

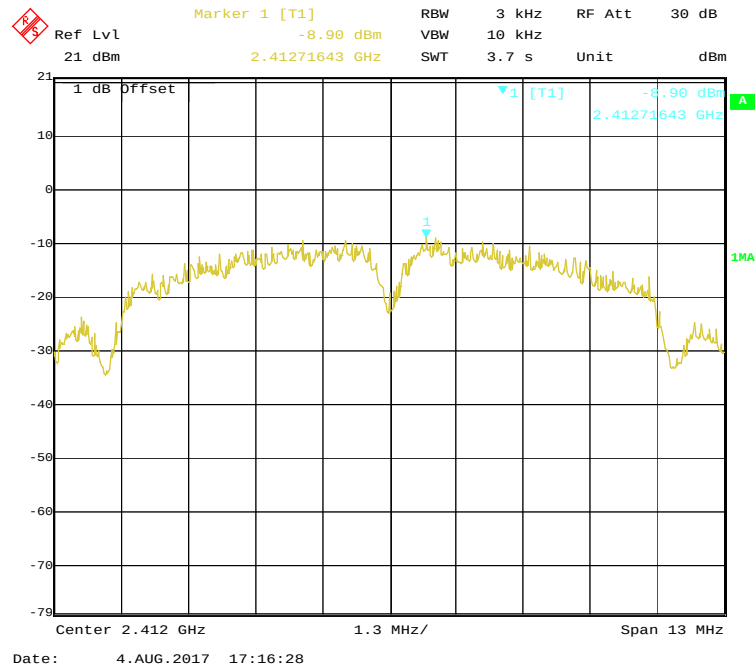
The testing was performed by Bernie Zhang on 2017-08-04.

EUT operation mode: Transmitting

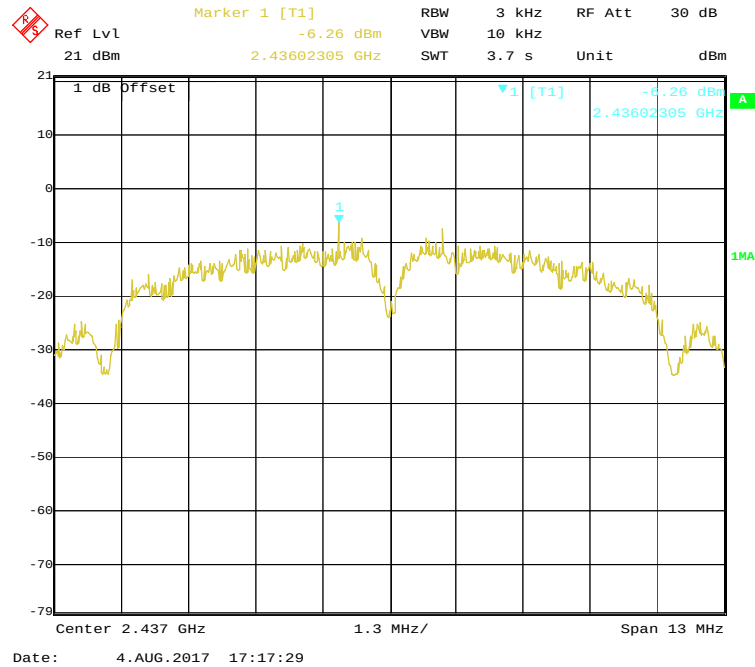
Test Result: Pass

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b mode			
Low	2412	-8.90	≤ 8
Middle	2437	-6.26	≤ 8
High	2462	-7.77	≤ 8
802.11g mode			
Low	2412	-19.37	≤ 8
Middle	2437	-18.84	≤ 8
High	2462	-19.61	≤ 8
802.11n-HT20 mode			
Low	2412	-19.38	≤ 8
Middle	2437	-20.44	≤ 8
High	2462	-21.58	≤ 8

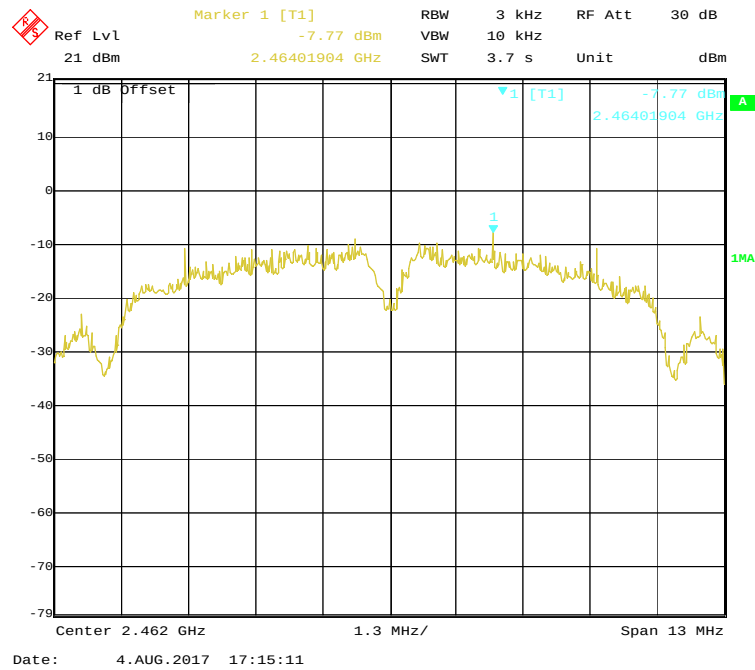
802.11b Low Channel



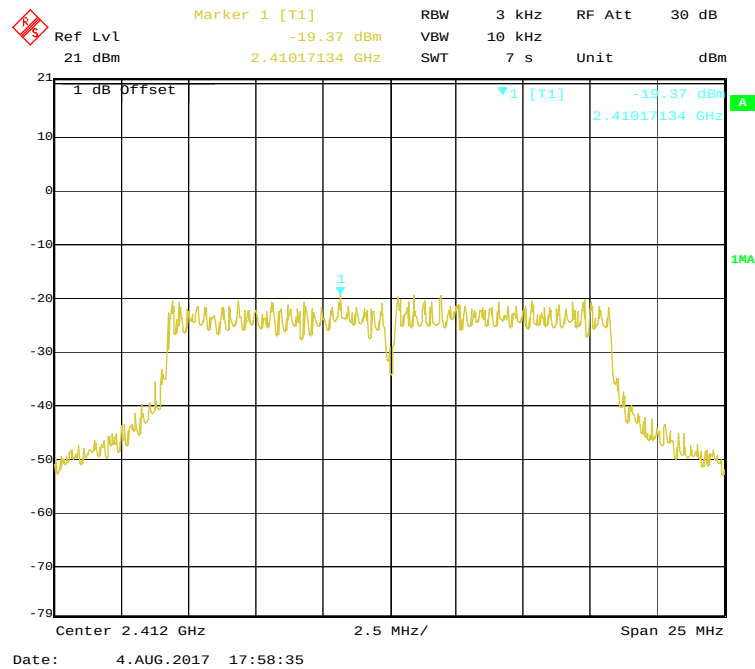
802.11b Middle Channel



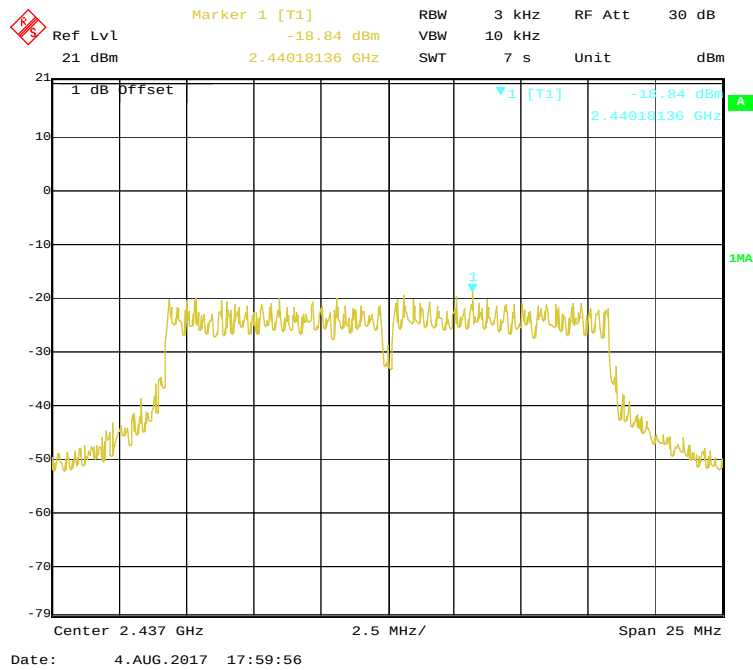
802.11b High Channel



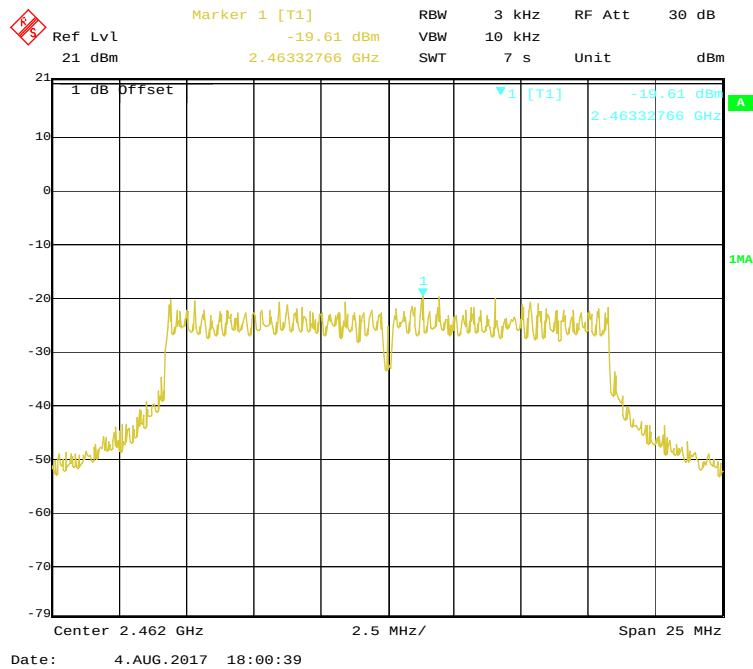
802.11g Low Channel



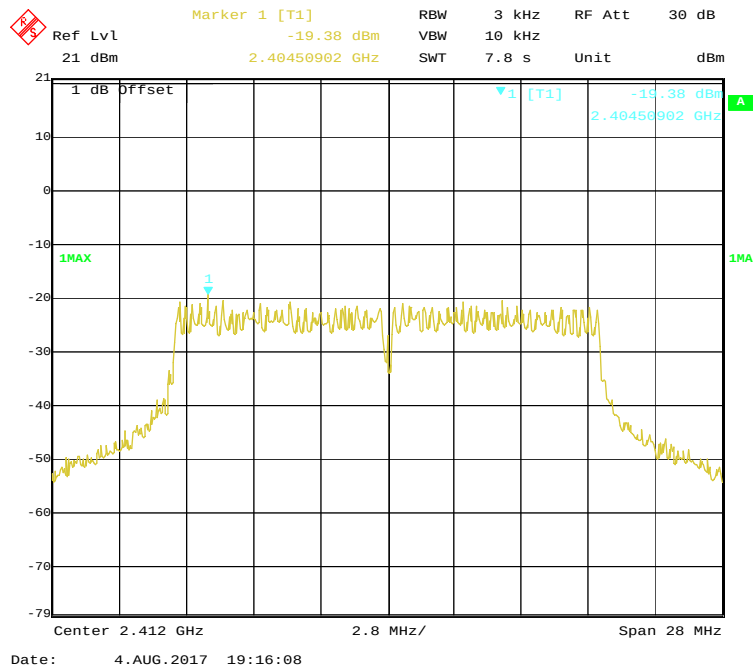
802.11g Middle Channel



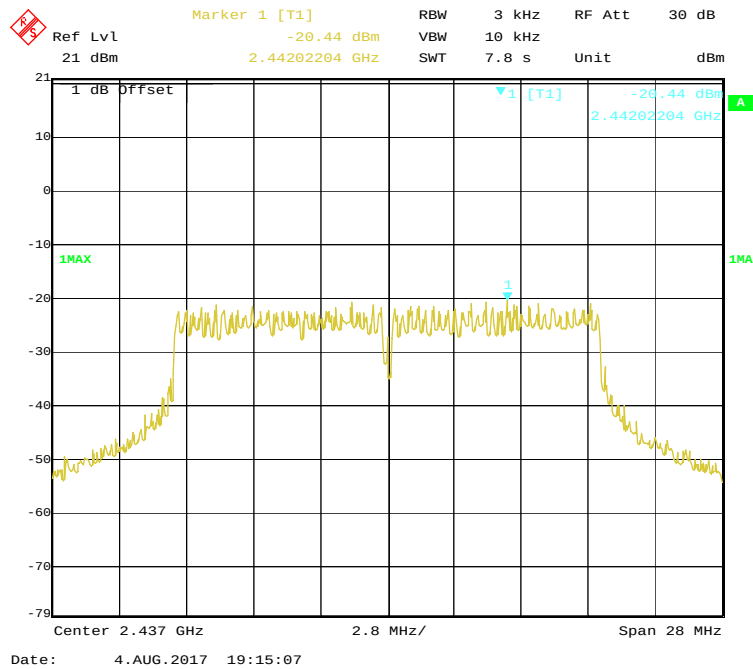
802.11g High Channel



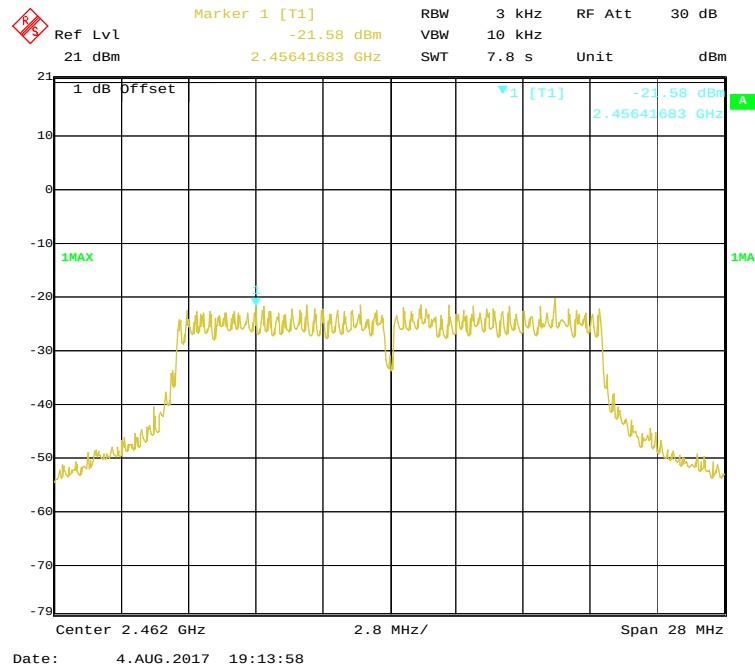
802.11n-HT20 Low Channel



802.11n-HT20 Middle Channel



802.11n-HT20 High Channel



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