

FCC PART 15.247

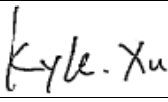
TEST REPORT

For

Healthcare Co., Ltd

No 999, gaonan road, rugao city, jiangsu pro, China

FCC ID: 2ANDQMSP-003

Report Type: Original Report	Product Type: imattress
Test Engineer: Kyle Xu 	
Report Number: RSHA170807001-00B	
Report Date: 2017-08-25	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Healthcare Co., Ltd
Tested Model	MSP-003
Product Type	imattress
Dimension	120 mm(L) × 62 mm(W) × 40 mm(H)
Power Supply	DC 5V from adapter

Adapter Information:

Model: DRC05A0510-E

Input: AC100-240 V, 50/60Hz, 0.2A

Output: 5V, 1A

**All measurement and test data in this report was gathered from production sample serial number: 20170807004. (Assigned by BACL, Kunshan). The EUT was received on 2017-08-07.*

Objective

This report is prepared on behalf of Healthcare Co., Ltd 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)

N/A

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

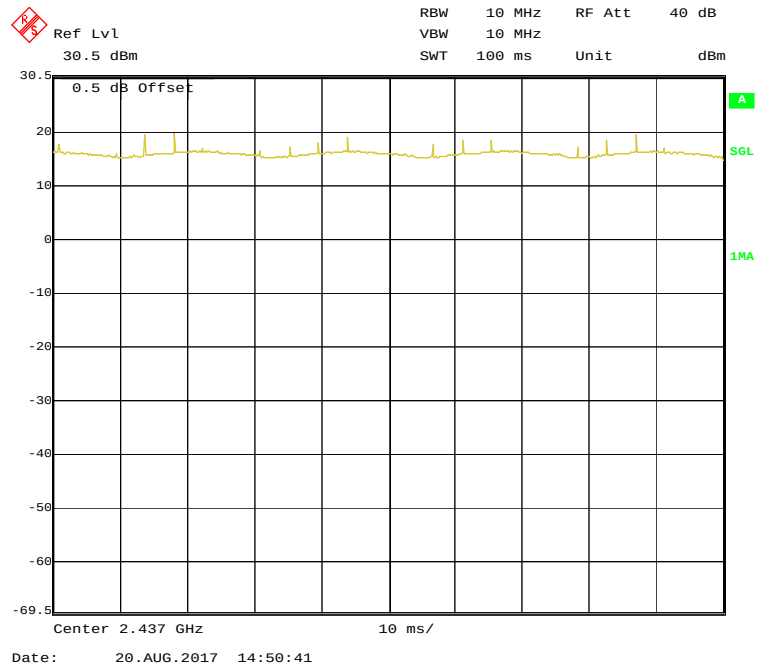
RF test tool: sscom5.09a

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

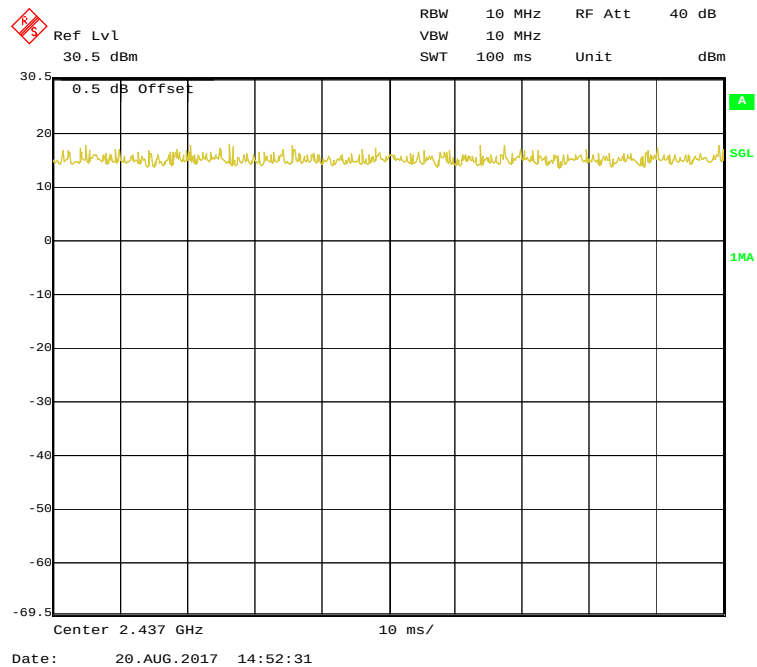
Mode	Data rate	Power level
802.11b	1 Mbps	17
802.11g	6 Mbps	16
802.11n-HT20	MCS0	16

Duty Cycle:

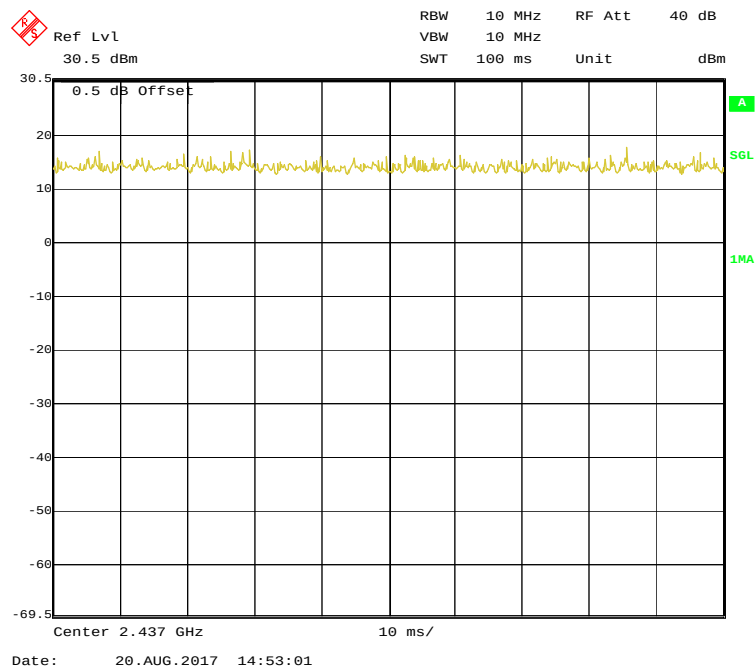
802.11b Mode Middle Channel



802.11g Mode Middle Channel



802.11n-HT20 Mode Middle Channel



Mode	Duty Cycle (%)	T(us)	1/T(kHz)	VBW Setting	10log(1/x)
802.11b	100	/	/	10Hz	0
802.11g	100	/	/	10Hz	0
802.11n-HT20	100	/	/	10Hz	0

Support Equipment List and Details

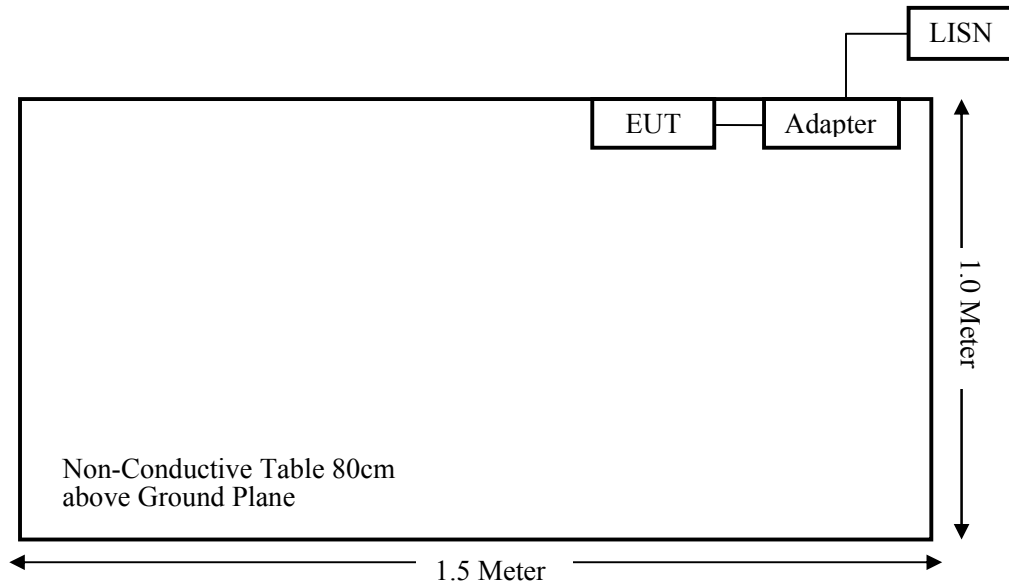
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

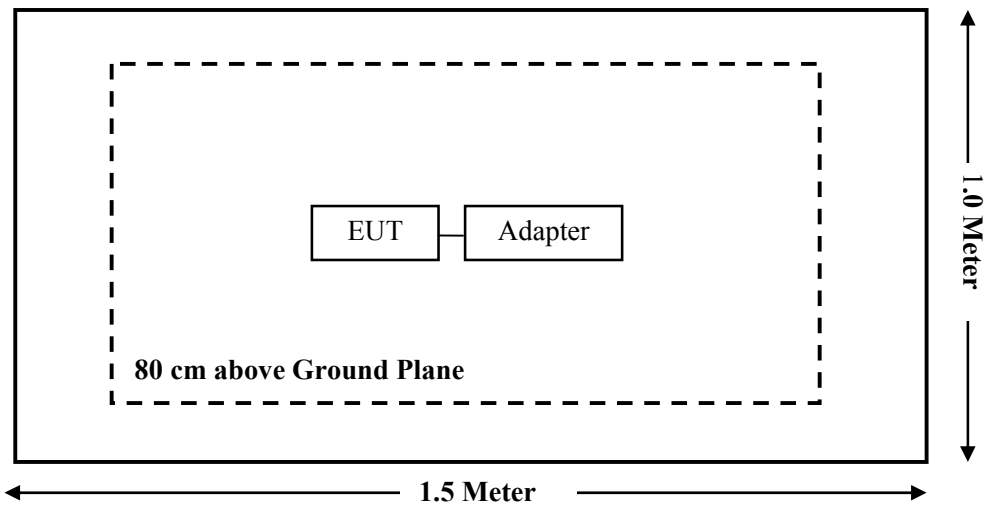
Cable Description	Shielding Type	Length (m)	From Port	To
/	/	/	/	/

Block Diagram of Test Setup

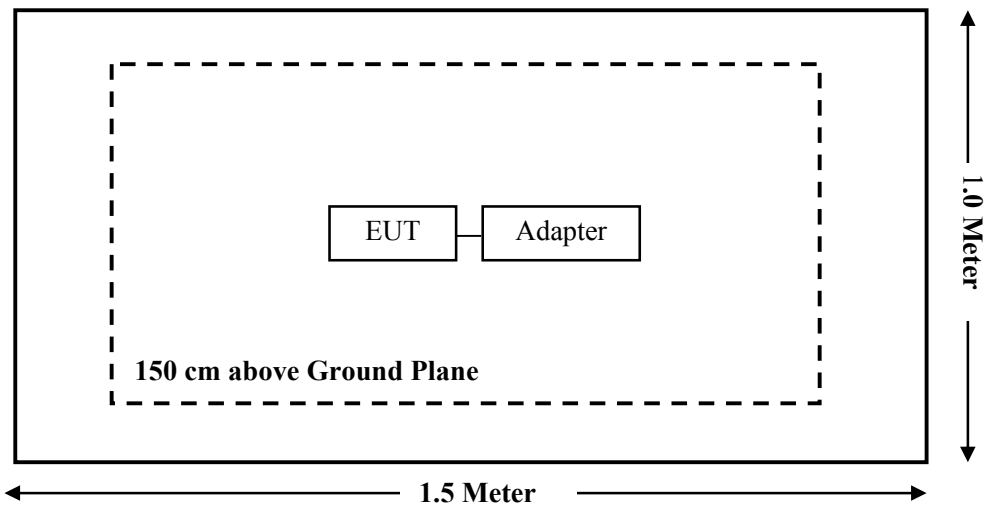
For Conducted Emissions:



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 (Chamber 1#)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Sunol Sciences	Broadband Antenna	JB3	A040914-2	2016-01-09	2019-01-08
Sonoma Instrument	Pre-amplifier	310N	171205	2017-08-15	2018-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2017-08-15	2018-08-14
Radiated Emission Test (Chamber 2#)					
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-24
ETS-LINDGREN	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
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
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2017-08-15	2018-08-14
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
Healthcare	RF Cable	N/A	N/A	2017-08-20	2018-08-19
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
BACL	BACL-EMC	V1.0	CE001	/	/
Narda	Attenuator/6dB	10690812-2	26850-6	2017-01-10	2018-01-09
MICRO-COAX	Coaxial Cable	Cable-15	015	2017-08-15	2018-08-14

*** 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	1.20	1.32	17.00	50.12	20	0.0131	1
802.11g		1.20	1.32	17.00	50.12	20	0.0131	1
802.11n-HT20		1.20	1.32	16.00	39.81	20	0.0104	1

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 1.2dBi; fulfill the requirement of this section. Please refer to the EUT photos.

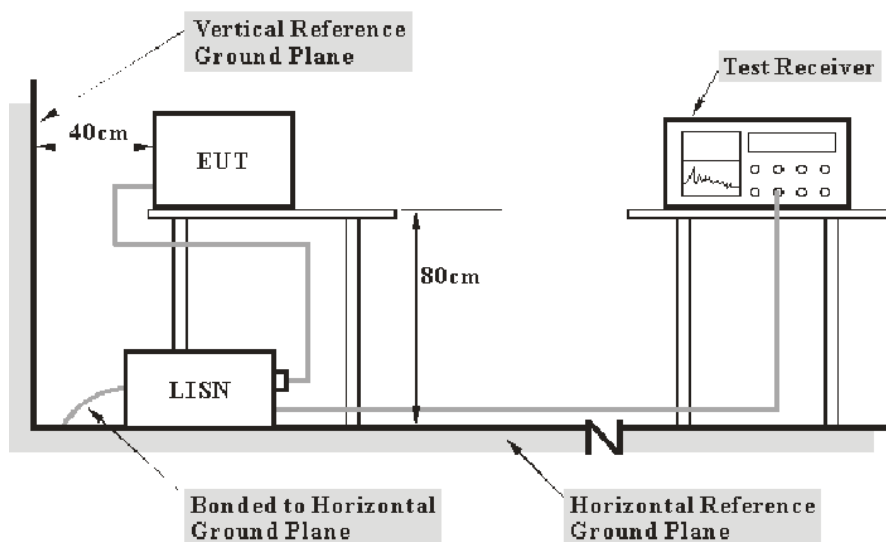
Result: Compliance.

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

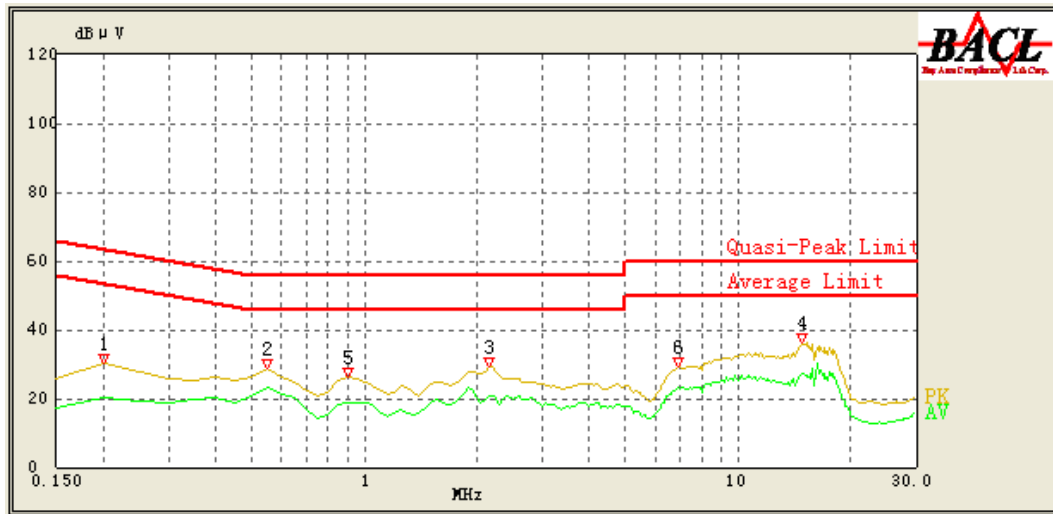
Environmental Conditions

Temperature:	24.5 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Kyle Xu on 2017-08-25.

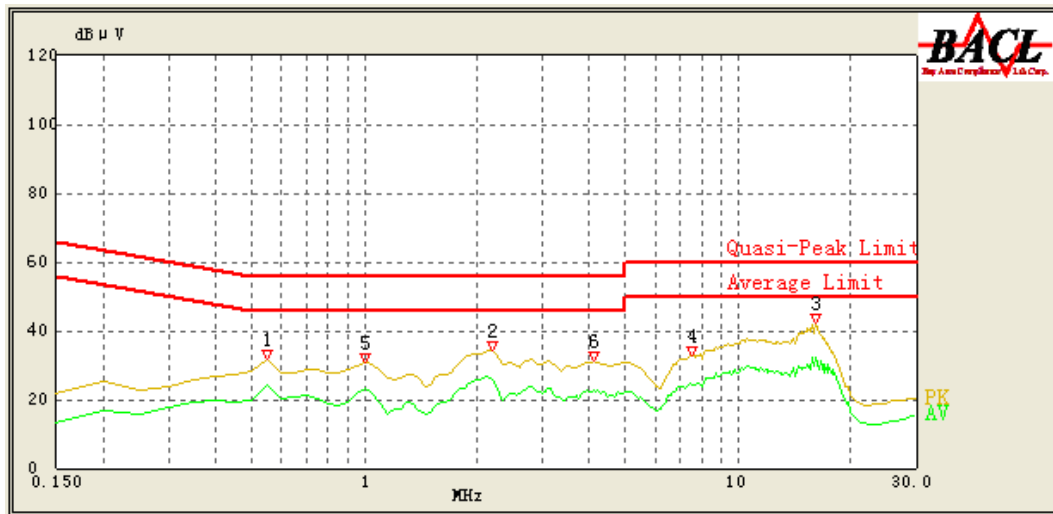
EUT operation mode: Transmitting in 802.11b mode high channel. (Worst case)

AC 120V/60 Hz, Line



Frequency (MHz)	Reading (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.200	30.07	QP	9.000	L1	16.01	34.50	64.57	Compliance
0.200	20.35	AV	9.000	L1	16.01	34.22	54.57	Compliance
0.550	28.54	QP	9.000	L1	16.05	27.46	56.00	Compliance
0.550	23.32	AV	9.000	L1	16.05	22.68	46.00	Compliance
2.150	29.20	QP	9.000	L1	15.85	26.80	56.00	Compliance
2.150	20.55	AV	9.000	L1	15.85	25.45	46.00	Compliance
14.900	36.38	QP	9.000	L1	16.21	23.62	60.00	Compliance
14.900	27.33	AV	9.000	L1	16.21	22.67	50.00	Compliance
0.900	26.03	QP	9.000	L1	15.90	29.97	56.00	Compliance
0.900	18.89	AV	9.000	L1	15.90	27.11	46.00	Compliance
6.900	29.23	QP	9.000	L1	15.97	30.77	60.00	Compliance
6.900	23.02	AV	9.000	L1	15.97	26.98	50.00	Compliance

AC 120V/60 Hz, Neutral



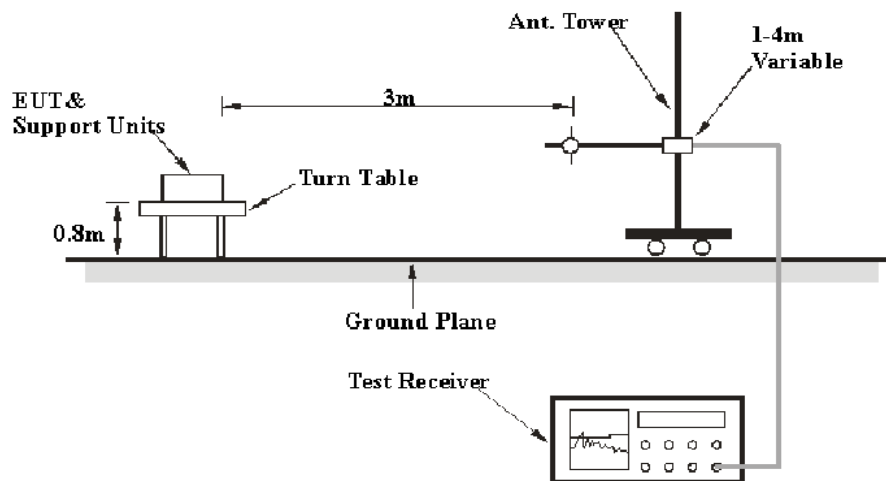
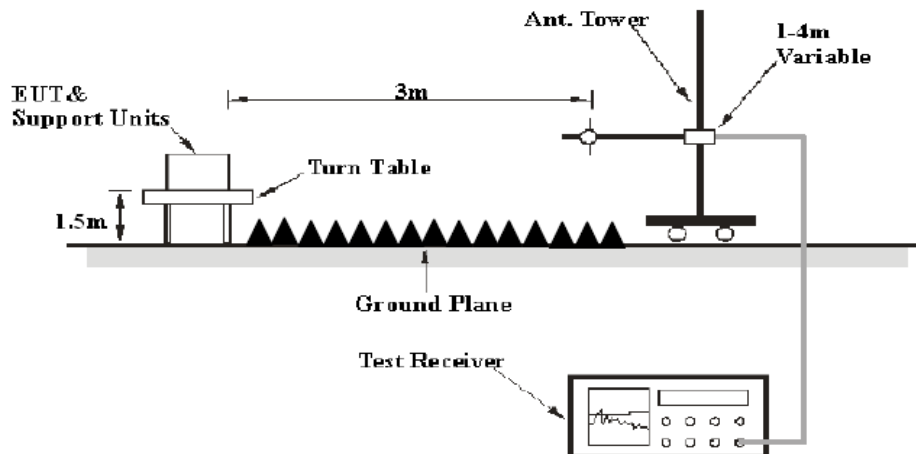
Frequency (MHz)	Reading (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.550	31.88	QP	9.000	N	16.08	24.12	56.00	Compliance
0.550	24.10	AV	9.000	N	16.08	21.90	46.00	Compliance
2.200	34.22	QP	9.000	N	15.91	21.78	56.00	Compliance
2.200	25.98	AV	9.000	N	15.91	20.02	46.00	Compliance
16.150	42.32	QP	9.000	N	16.04	17.68	60.00	Compliance
16.100	32.14	AV	9.000	N	16.04	17.86	50.00	Compliance
7.500	32.59	QP	9.000	N	15.93	27.41	60.00	Compliance
7.500	24.09	AV	9.000	N	15.93	25.91	50.00	Compliance
1.000	30.97	QP	9.000	N	15.94	25.03	56.00	Compliance
1.000	23.06	AV	9.000	N	15.94	22.94	46.00	Compliance
4.100	31.21	QP	9.000	N	15.88	24.79	56.00	Compliance
4.100	22.68	AV	9.000	N	15.88	23.32	46.00	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:	24.8 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Kyle Xu on 2017-08-20.

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)									
32.43	30.02	QP	121	246	H	6.50	36.52	40	3.48
2412.00	109.53	PK	223	227	V	-6.17	103.36	/	/
2412.00	104.32	Ave	223	227	V	-6.17	98.15	/	/
2412.00	108.77	PK	245	232	H	-6.17	102.60	/	/
2412.00	103.35	Ave	245	232	H	-6.17	97.18	/	/
2390.00	60.31	PK	289	218	V	-6.22	54.09	74	19.91
2390.00	50.12	Ave	289	218	V	-6.22	43.90	54	10.10
1271.00	43.56	PK	230	132	V	-10.83	32.73	74	41.27
1271.00	29.59	Ave	230	132	V	-10.83	18.76	54	35.24
1534.20	43.05	PK	324	150	V	-9.30	33.75	74	40.25
1534.20	33.82	Ave	324	150	V	-9.30	24.52	54	29.48
4824.00	42.36	PK	269	153	V	1.66	44.02	74	29.98
4824.00	33.23	Ave	269	153	V	1.66	34.89	54	19.11
7236.00	40.03	PK	112	154	V	7.58	47.61	74	26.39
7236.00	29.18	Ave	112	154	V	7.58	36.76	54	17.24

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)									
32.43	30.16	QP	259	106	H	6.50	36.66	40	3.34
2437.00	110.06	PK	180	231	V	-6.11	103.95	/	/
2437.00	105.32	Ave	180	231	V	-6.11	99.21	/	/
2437.00	109.36	PK	340	114	H	-6.11	103.25	/	/
2437.00	104.45	Ave	340	114	H	-6.11	98.34	/	/
1425.60	43.92	PK	289	220	H	-9.90	34.02	74	39.98
1425.60	33.71	Ave	289	220	H	-9.90	23.81	54	30.19
3674.50	44.52	PK	35	134	V	-1.37	43.15	74	30.85
3674.50	34.41	Ave	35	134	V	-1.37	33.04	54	20.96
4874.00	42.35	PK	56	112	V	1.77	44.12	74	29.88
4874.00	32.02	Ave	56	112	V	1.77	33.79	54	20.21
6177.55	41.32	PK	237	211	V	4.80	46.12	74	27.88
6177.55	31.65	Ave	237	211	V	4.80	36.45	54	17.55
7311.00	40.35	PK	38	168	V	7.66	48.01	74	25.99
7311.00	31.11	Ave	38	168	V	7.66	38.77	54	15.23
High Channel (2462 MHz)									
32.43	30.36	QP	172	147	H	6.50	36.86	40	3.14
2462.00	111.23	PK	169	128	V	-6.06	105.17	/	/
2462.00	106.12	Ave	169	128	V	-6.06	100.06	/	/
2462.00	109.36	PK	70	121	H	-6.06	103.30	/	/
2462.00	104.52	Ave	70	121	H	-6.06	98.46	/	/
2483.50	59.32	PK	343	210	V	-6.01	53.31	74	20.69
2483.50	49.93	Ave	343	210	V	-6.01	43.92	54	10.08
1711.20	44.16	PK	28	237	V	-8.35	35.81	74	38.19
1711.20	34.12	Ave	28	237	V	-8.35	25.77	54	28.23
4924.00	46.33	PK	268	180	V	1.89	48.22	74	25.78
4924.00	38.73	Ave	268	180	V	1.89	40.62	54	13.38
6386.50	44.26	PK	177	179	V	5.58	49.84	74	24.16
6386.50	36.17	Ave	177	179	V	5.58	41.75	54	12.25
7386.00	41.55	PK	159	113	V	7.73	49.28	74	24.72
7386.00	30.17	Ave	159	113	V	7.73	37.90	54	16.10

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)									
32.43	30.08	QP	64	221	H	6.50	36.58	40	3.42
2412.00	106.32	PK	185	230	V	-6.17	100.15	/	/
2412.00	101.23	Ave	185	230	V	-6.17	95.06	/	/
2412.00	104.21	PK	35	225	H	-6.17	98.04	/	/
2412.00	98.93	Ave	35	225	H	-6.17	92.76	/	/
2390.00	59.32	PK	339	163	V	-6.22	53.10	74	20.90
2390.00	49.12	Ave	339	163	V	-6.22	42.90	54	11.10
1268.00	43.32	PK	227	115	V	-10.85	32.47	74	41.53
1268.00	30.07	Ave	227	115	V	-10.85	19.22	54	34.78
1531.22	42.07	PK	289	157	V	-9.31	32.76	74	41.24
1531.22	34.10	Ave	289	157	V	-9.31	24.79	54	29.21
4824.00	41.21	PK	180	223	V	1.66	42.87	74	31.13
4824.00	32.36	Ave	180	223	V	1.66	34.02	54	19.98
7236.00	39.31	PK	214	191	V	7.58	46.89	74	27.11
7236.00	30.24	Ave	214	191	V	7.58	37.82	54	16.18
Middle Channel (2437 MHz)									
32.43	30.23	QP	327	114	H	6.50	36.73	40	3.27
2437.00	107.11	PK	49	229	V	-6.11	101.00	/	/
2437.00	101.68	Ave	49	229	V	-6.11	95.57	/	/
2437.00	104.32	PK	205	120	H	-6.11	98.21	/	/
2437.00	99.21	Ave	205	120	H	-6.11	93.10	/	/
1531.22	42.93	PK	287	175	H	-9.31	33.62	74	40.38
1531.22	33.05	Ave	287	175	H	-9.31	23.74	54	30.26
3275.52	40.21	PK	49	203	V	-2.69	37.52	74	36.48
3275.52	30.32	Ave	49	203	V	-2.69	27.63	54	26.37
4874.00	43.21	PK	303	235	V	1.77	44.98	74	29.02
4874.00	33.45	Ave	303	235	V	1.77	35.22	54	18.78
6412.25	42.51	PK	36	108	V	5.73	48.24	74	25.76
6412.25	32.54	Ave	36	108	V	5.73	38.27	54	15.73
7311.00	39.52	PK	319	212	V	7.66	47.18	74	26.82
7311.00	29.83	Ave	319	212	V	7.66	37.49	54	16.51

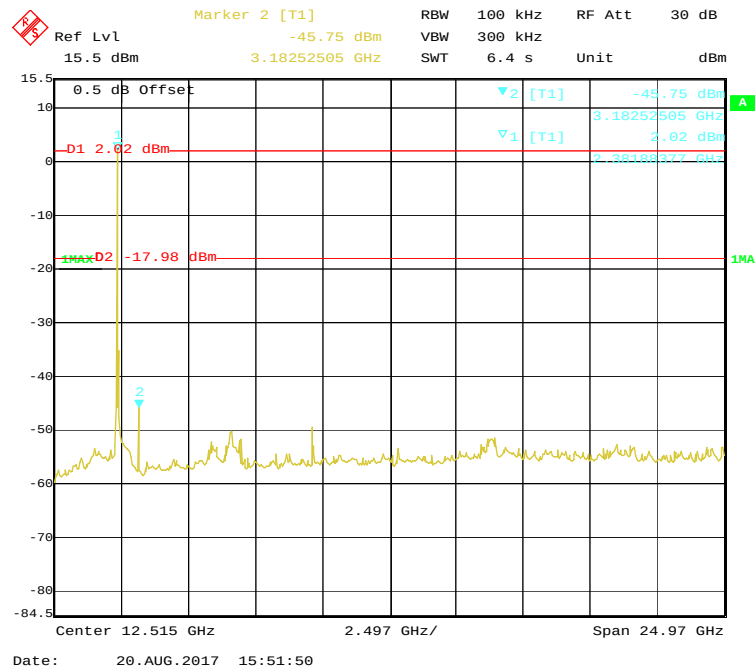
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
32.43	30.46	QP	98	154	H	6.50	36.96	40	3.04
2462.00	107.96	PK	317	107	V	-6.06	101.90	/	/
2462.00	102.25	Ave	317	107	V	-6.06	96.19	/	/
2462.00	105.22	PK	318	132	H	-6.06	99.16	/	/
2462.00	99.78	Ave	318	132	H	-6.06	93.72	/	/
2483.50	59.36	PK	136	136	V	-6.01	53.35	74	20.65
2483.50	49.36	Ave	136	136	V	-6.01	43.35	54	10.65
1531.22	44.25	PK	283	115	V	-7.56	36.69	74	37.31
1531.22	34.16	Ave	283	115	V	-7.56	26.60	54	27.40
4924.00	44.52	PK	74	110	V	1.89	46.41	74	27.59
4924.00	35.02	Ave	74	110	V	1.89	36.91	54	17.09
6412.25	44.32	PK	200	223	V	5.73	50.05	74	23.95
6412.25	36.20	Ave	200	223	V	5.73	41.93	54	12.07
7386.00	39.32	PK	308	115	V	7.73	47.05	74	26.95
7386.00	29.93	Ave	308	115	V	7.73	37.66	54	16.34

802.11n-HT20 Mode:

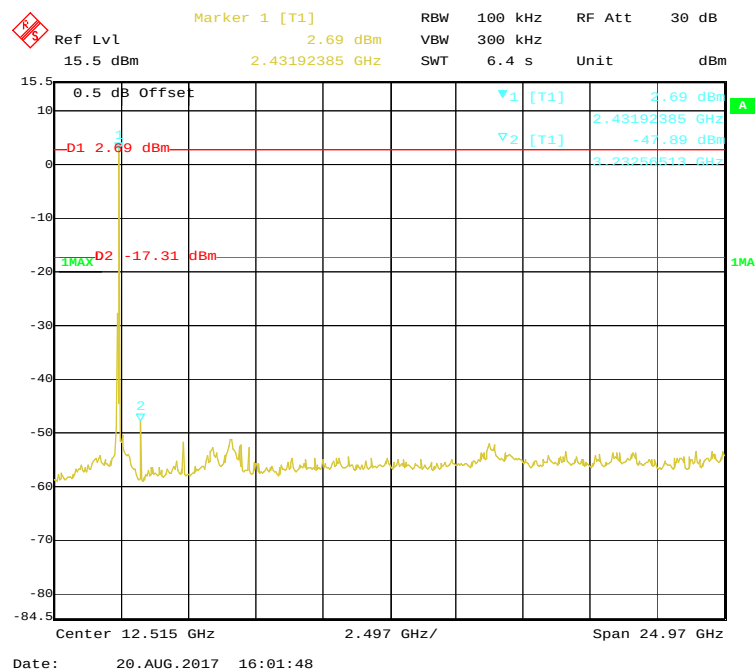
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
32.43	30.32	QP	102	200	H	6.50	36.82	40	3.18
2412.00	106.32	PK	9	118	V	-6.17	100.15	/	/
2412.00	101.32	Ave	9	118	V	-6.17	95.15	/	/
2412.00	102.52	PK	147	244	H	-6.17	96.35	/	/
2412.00	97.36	Ave	147	244	H	-6.17	91.19	/	/
2390.00	55.35	PK	254	192	V	-6.22	49.13	74	24.87
2390.00	45.63	Ave	254	192	V	-6.22	39.41	54	14.59
1270.50	45.32	PK	167	223	V	-10.83	34.49	74	39.51
1270.50	31.36	Ave	167	223	V	-10.83	20.53	54	33.47
1531.22	44.86	PK	261	225	H	-9.31	35.55	74	38.45
1531.22	35.08	Ave	261	225	H	-9.31	25.77	54	28.23
4824.00	40.36	PK	249	212	V	1.66	42.02	74	31.98
4824.00	30.35	Ave	249	212	V	1.66	32.01	54	21.99
7236.00	39.35	PK	81	184	V	7.58	46.93	74	27.07
7236.00	29.36	Ave	81	184	V	7.58	36.94	54	17.06

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)									
32.43	30.25	QP	81	130	H	6.50	36.75	40	3.25
2437.00	106.64	PK	320	186	V	-6.11	100.53	/	/
2437.00	101.37	Ave	320	186	V	-6.11	95.26	/	/
2437.00	102.33	PK	148	143	H	-6.11	96.22	/	/
2437.00	96.32	Ave	148	143	H	-6.11	90.21	/	/
1531.22	43.77	PK	181	163	H	-9.31	34.46	74	39.54
1531.22	33.46	Ave	181	163	H	-9.31	24.15	54	29.85
3275.52	43.25	PK	285	204	V	-2.69	40.56	74	33.44
3275.52	32.58	Ave	285	204	V	-2.69	29.89	54	24.11
4874.00	41.63	PK	59	130	V	1.77	43.40	74	30.60
4874.00	31.23	Ave	59	130	V	1.77	33.00	54	21.00
6412.25	40.32	PK	283	241	H	5.73	46.05	74	27.95
6412.25	31.25	Ave	283	241	H	5.73	36.98	54	17.02
7311.00	39.36	PK	269	143	V	7.66	47.02	74	26.98
7311.00	30.08	Ave	269	143	V	7.66	37.74	54	16.26
High Channel (2462 MHz)									
32.43	30.42	QP	185	120	H	6.50	36.92	40	3.08
2462.00	107.66	PK	170	111	V	-6.06	101.60	/	/
2462.00	102.52	Ave	170	111	V	-6.06	96.46	/	/
2462.00	103.52	PK	5	185	H	-6.06	97.46	/	/
2462.00	97.69	Ave	5	185	H	-6.06	91.63	/	/
2483.50	56.32	PK	276	221	V	-6.01	50.31	74	23.69
2483.50	47.36	Ave	276	221	V	-6.01	41.35	54	12.65
1531.22	42.32	PK	289	175	V	-9.31	34.76	74	39.24
1531.22	32.66	Ave	289	175	V	-9.31	25.10	54	28.90
4924.00	43.32	PK	125	244	V	1.89	45.21	74	28.79
4924.00	34.32	Ave	125	244	V	1.89	36.21	54	17.79
6412.25	42.12	PK	249	220	H	5.73	47.85	74	26.15
6412.25	33.58	Ave	249	220	H	5.73	39.31	54	14.69
7386.00	39.36	PK	102	246	V	7.73	47.09	74	26.91
7386.00	29.32	Ave	102	246	V	7.73	37.05	54	16.95

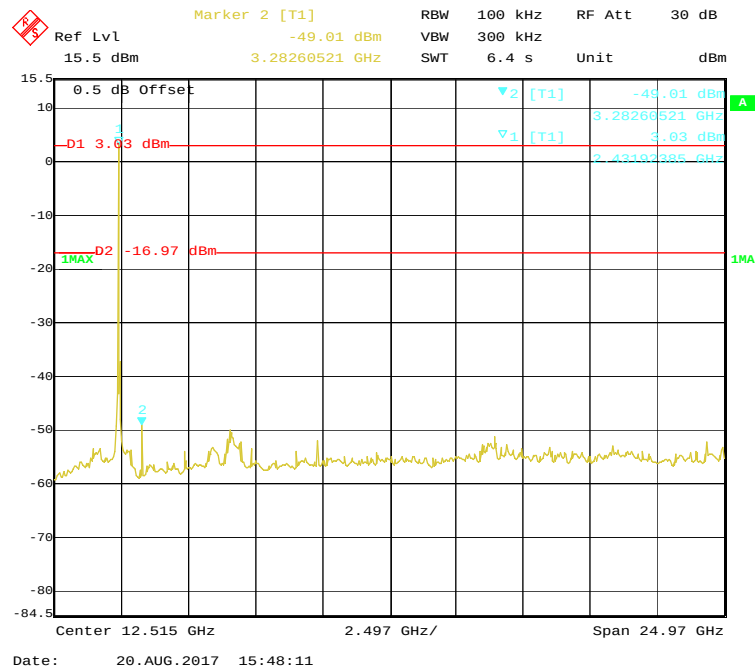
802.11b Low Channel



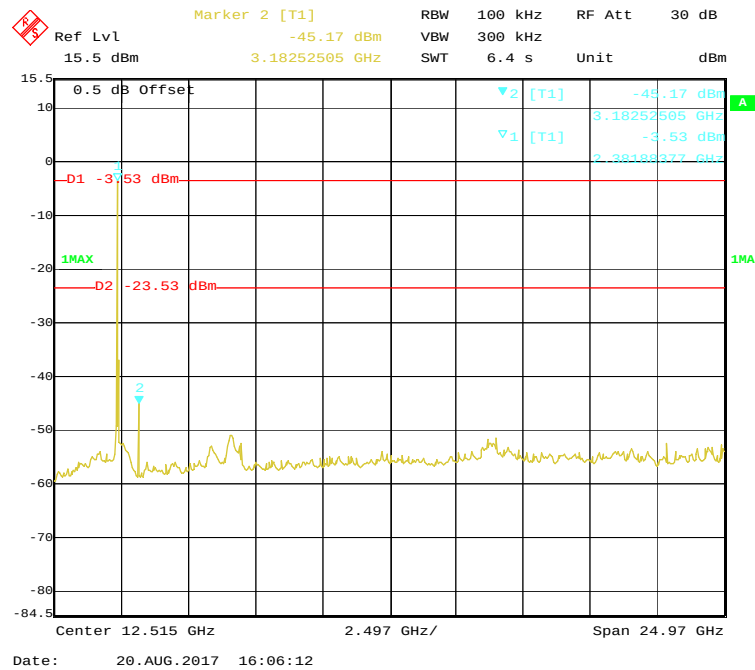
802.11b Middle Channel



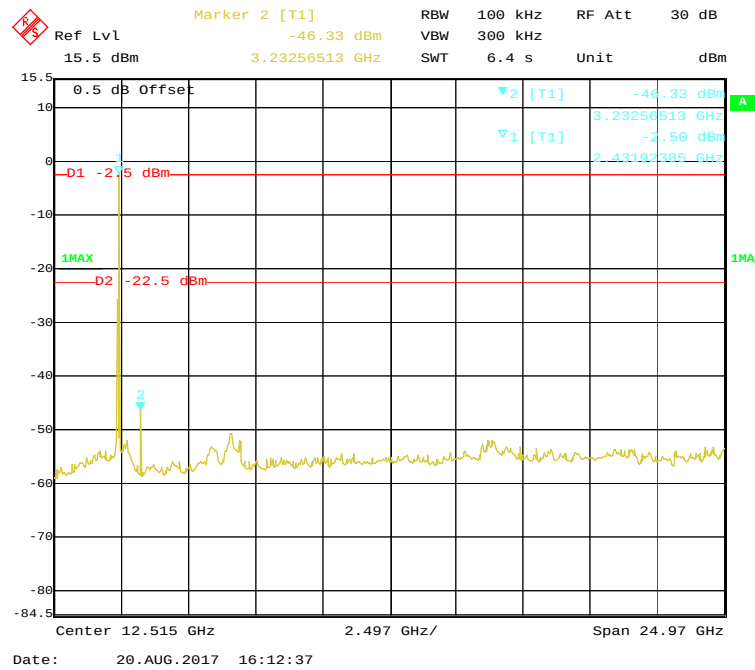
802.11b High Channel



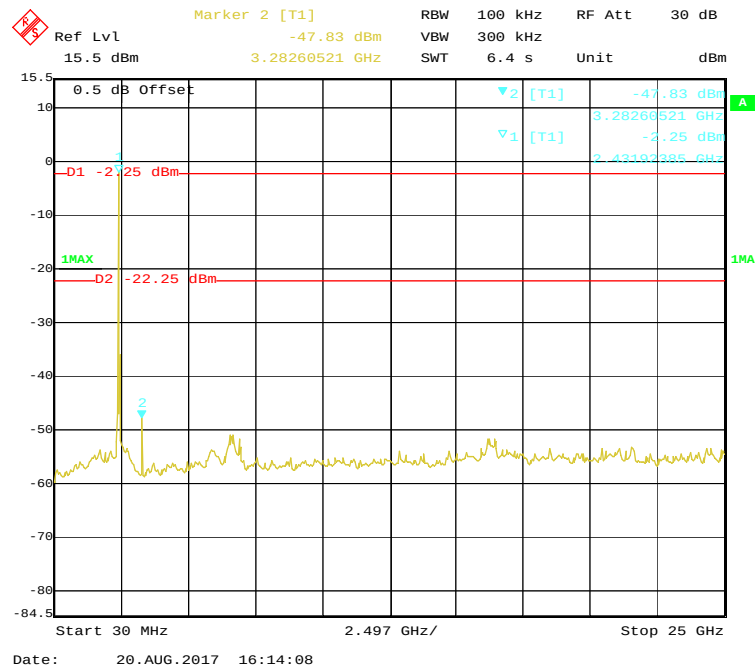
802.11g Low Channel



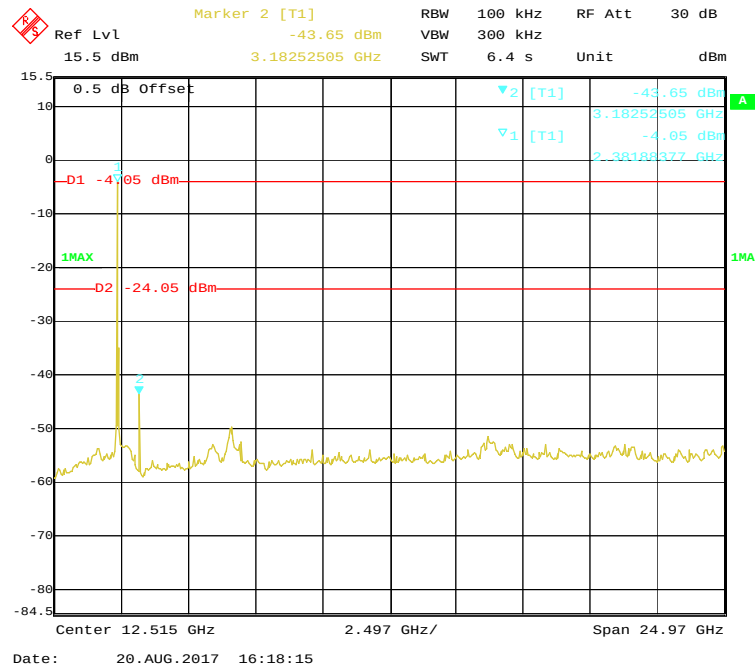
802.11g Middle Channel



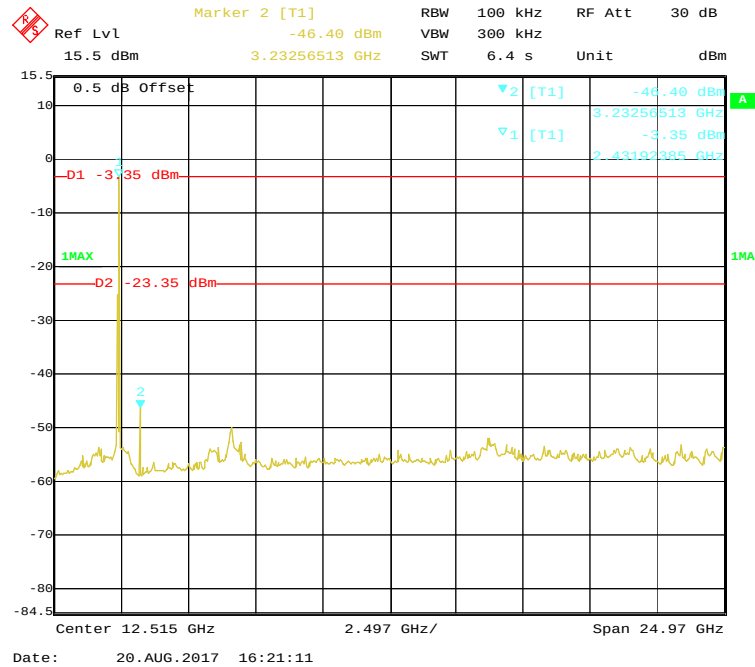
802.11g High Channel



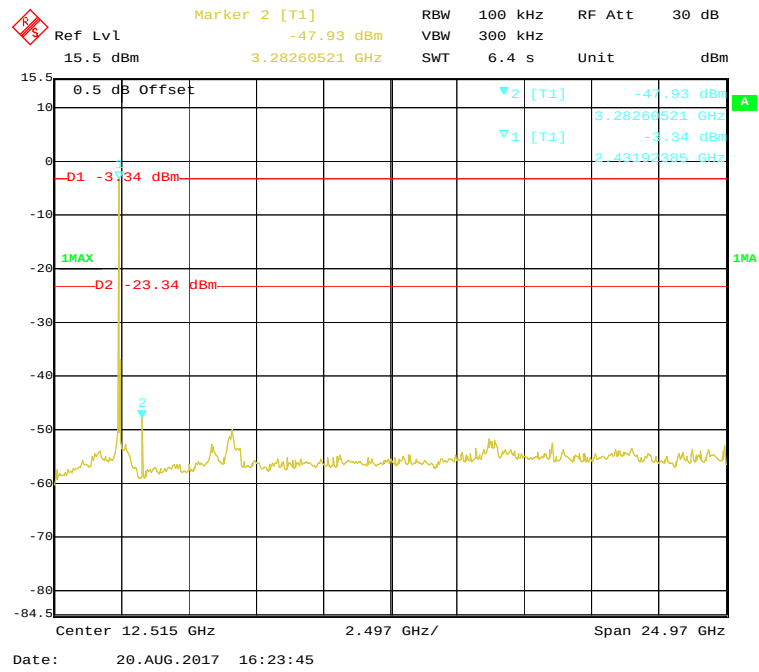
802.11n-HT20 Low Channel



802.11n-HT20 Middle Channel



802.11n-HT20 High Channel

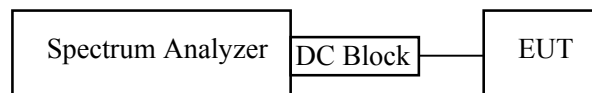


FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH**Applicable Standard**

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. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

**Test Data****Environmental Conditions**

Temperature:	24.8 °C
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

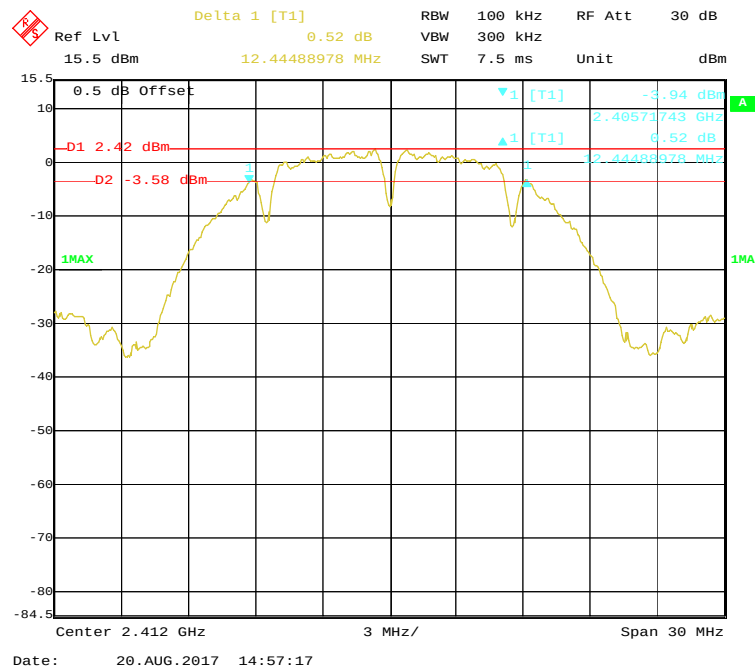
The testing was performed by Kyle Xu on 2017-08-20.

EUT operation mode: Transmitting

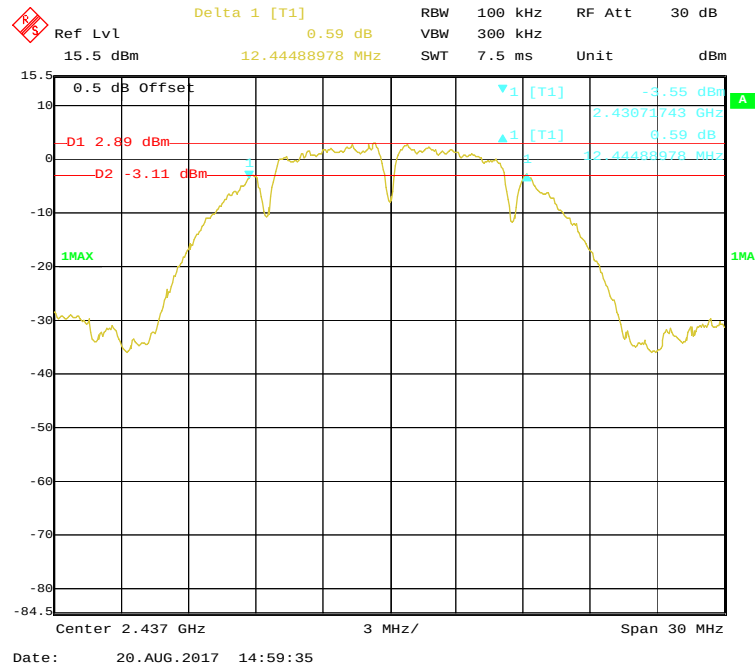
Test Result: Pass.

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b mode			
Low	2412	12.44	≥ 0.5
Middle	2437	12.44	≥ 0.5
High	2462	12.44	≥ 0.5
802.11g mode			
Low	2412	16.47	≥ 0.5
Middle	2437	16.41	≥ 0.5
High	2462	16.47	≥ 0.5
802.11n-HT20 mode			
Low	2412	17.74	≥ 0.5
Middle	2437	17.74	≥ 0.5
High	2462	17.74	≥ 0.5

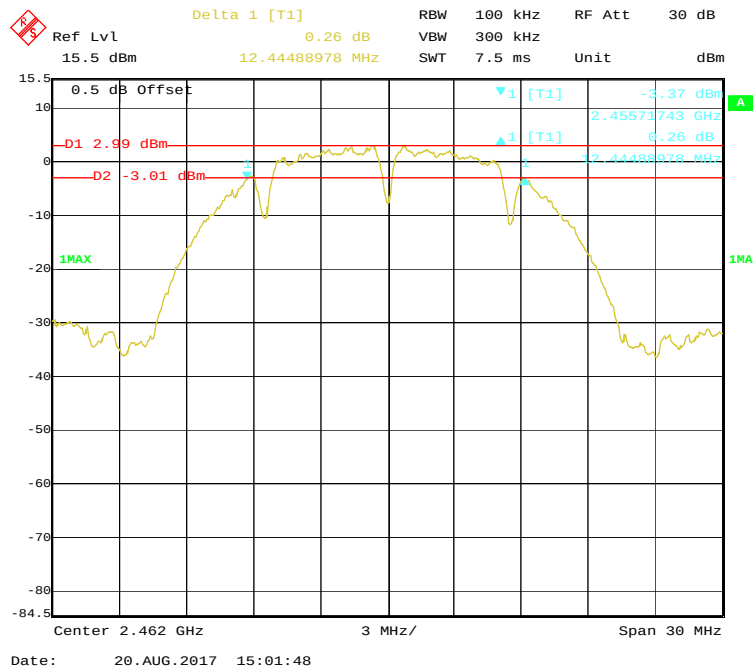
802.11b Low Channel



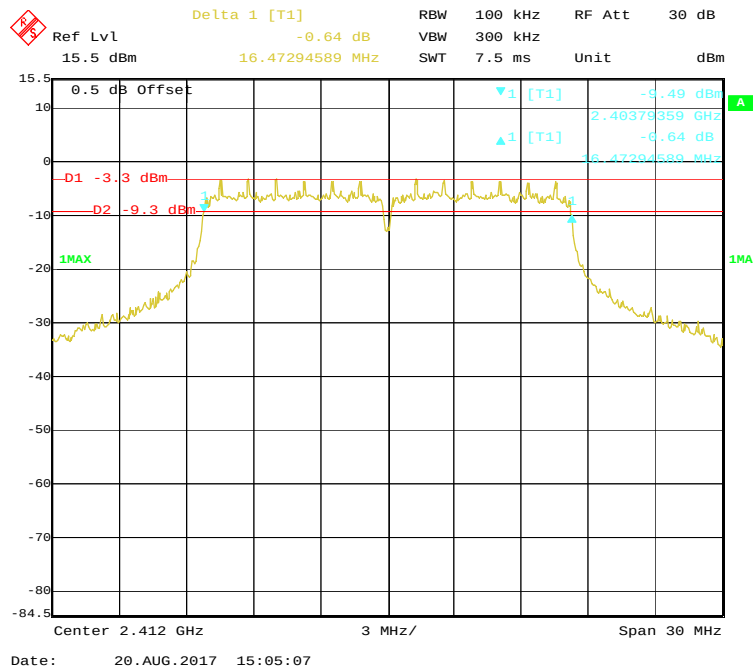
802.11b Middle Channel



802.11b High Channel



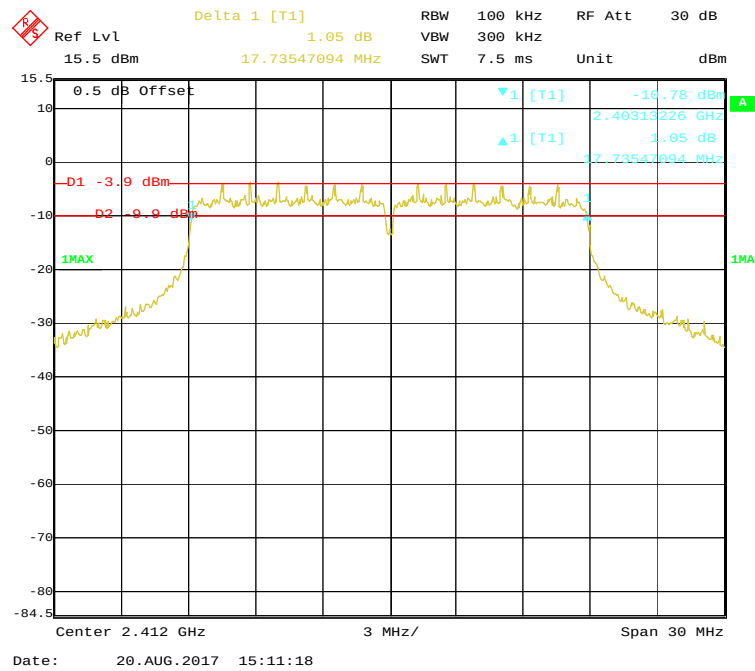
802.11g Low Channel



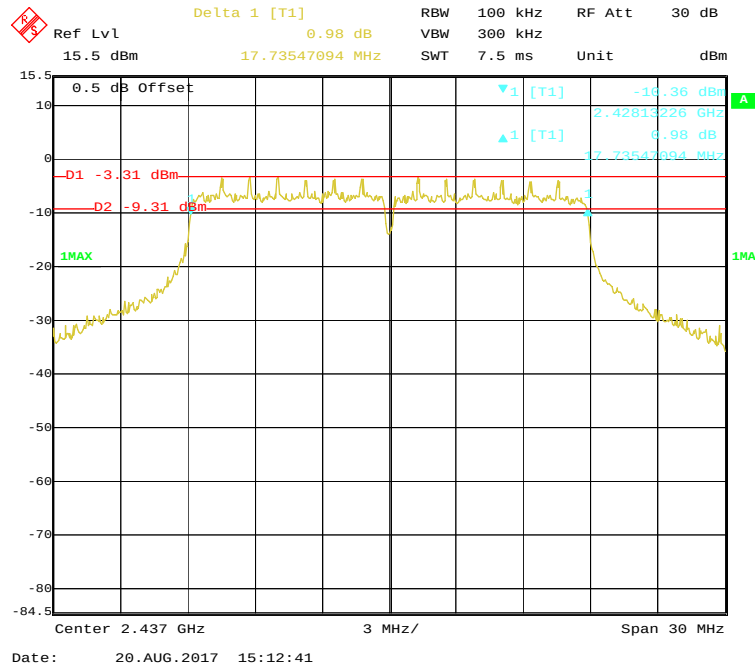
Delta 1 [T1] RBW 100 kHz RF Att 30 dB
 Ref Lvl 15.5 dBm 16.41282565 MHz VBW 300 kHz
 0.5 dB Offset Unit dBm
 15.5
 10
 0
 -10
 -20
 -30
 -40
 -50
 -60
 -70
 -80
 -84.5
 Center 2.437 GHz 3 MHz/ Span 30 MHz
 Date: 20.AUG.2017 15:07:03

Delta 1 [T1] 1.63 dB
 Ref Lvl 15.5 dBm
 RBW 100 kHz
 RF Att 30 dB
 VBW 300 kHz
 Unit dBm
 SWT 7.5 ms
 16.47294589 MHz
 0.5 dB Offset
 -D1 -2.51 dBm
 -D2 -8.51 dBm
 1MAX
 2.45373347 GHz
 1.63 dB
 16.47294589 MHz
 -2.12 dBm
 1 [T1]
 1 [T1]
 Center 2.462 GHz
 3 MHz/
 Span 30 MHz
 Date: 20.AUG.2017 15:08:20

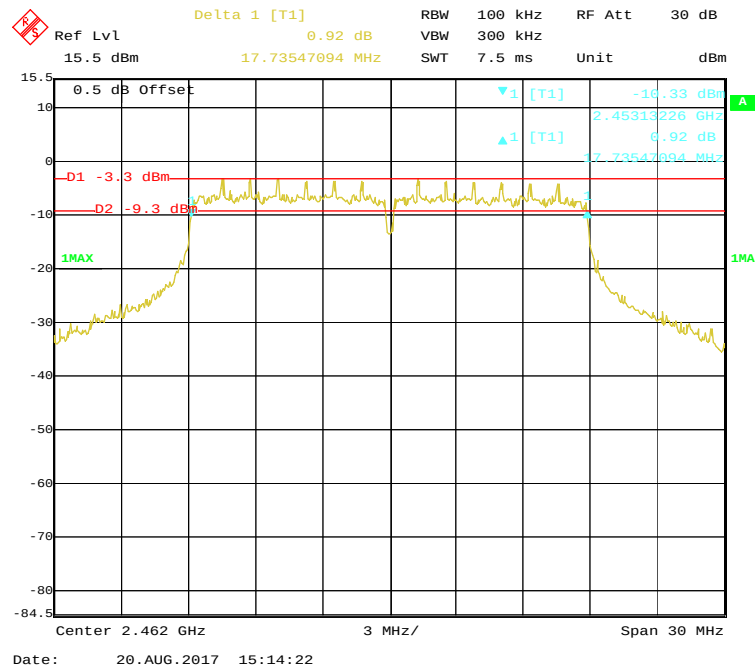
802.11n-HT20 Low Channel



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.



Test Data

Environmental Conditions

Temperature:	24.5 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Kyle Xu on 2017-08-20.

EUT operation mode: Transmitting

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Limit (dBm)	Result
802.11b				
Low	2412	15.77	30	Pass
Middle	2437	16.06	30	Pass
High	2462	16.70	30	Pass
802.11g				
Low	2412	15.68	30	Pass
Middle	2437	16.06	30	Pass
High	2462	16.52	30	Pass
802.11n-HT20				
Low	2412	15.26	30	Pass
Middle	2437	15.43	30	Pass
High	2462	16.00	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**

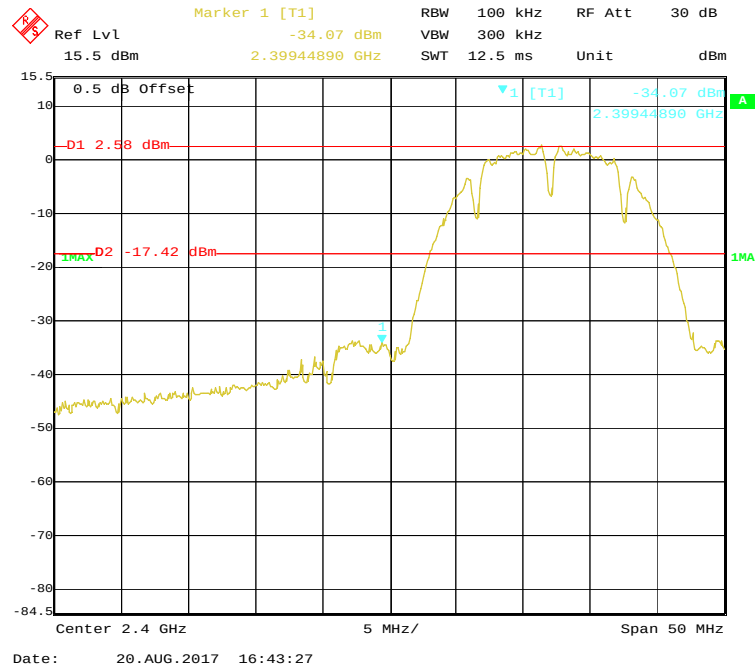
Temperature:	24.5 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Kyle Xu on 2017-08-20.

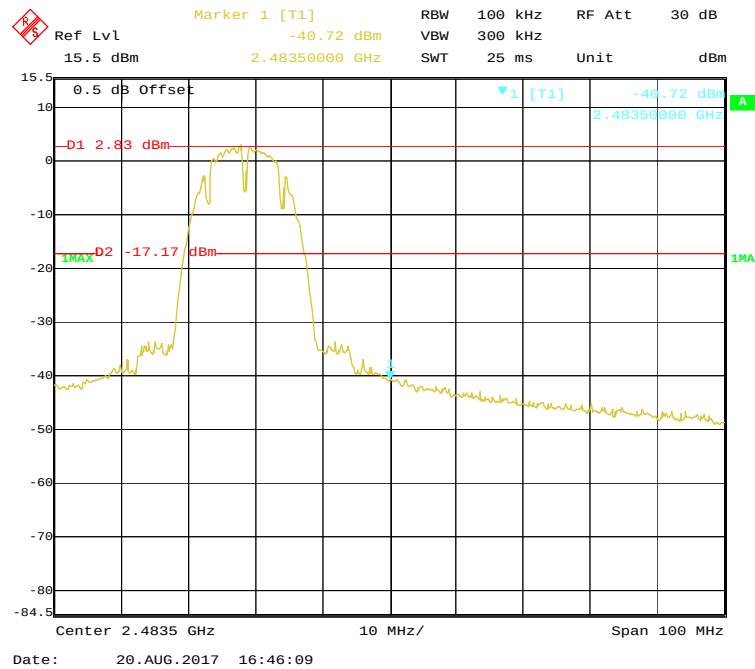
Test Result: *Compliance*

Band Edge

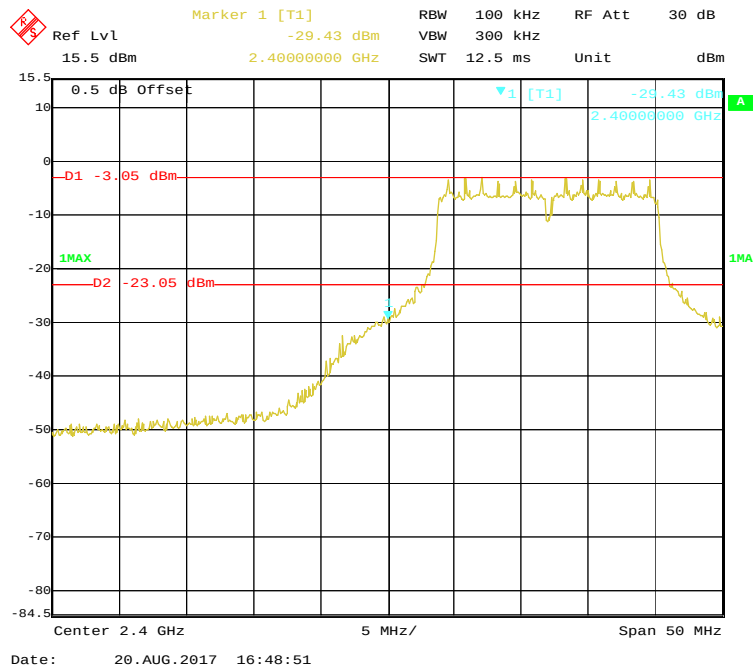
802.11b Mode Left Side



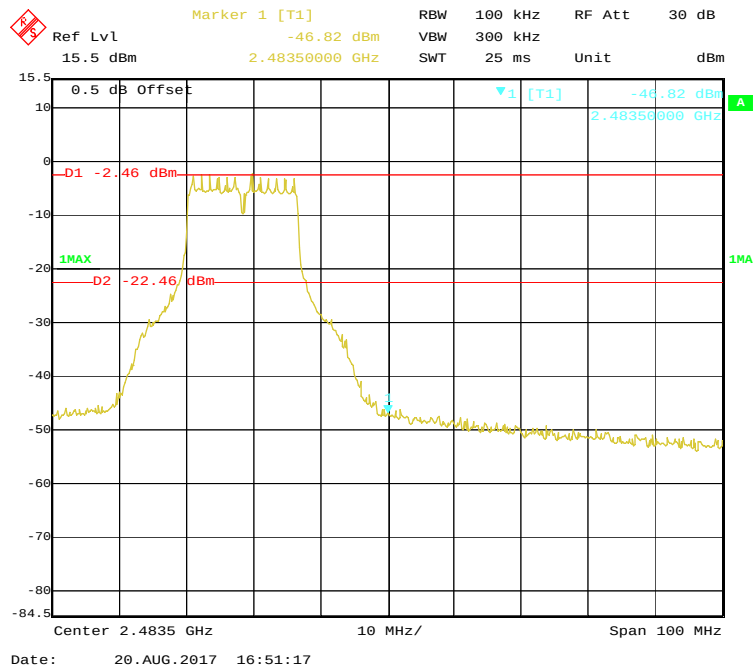
802.11b Mode Right Side



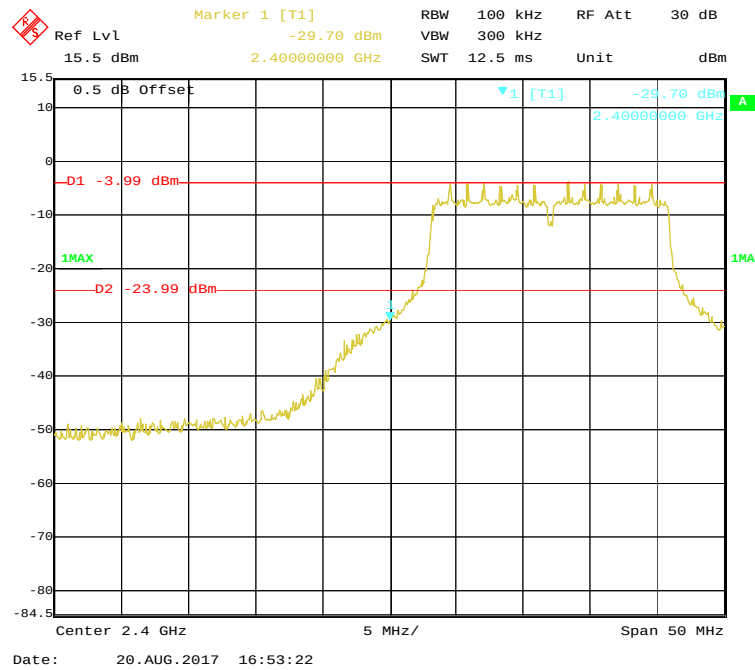
802.11g Mode Left Side



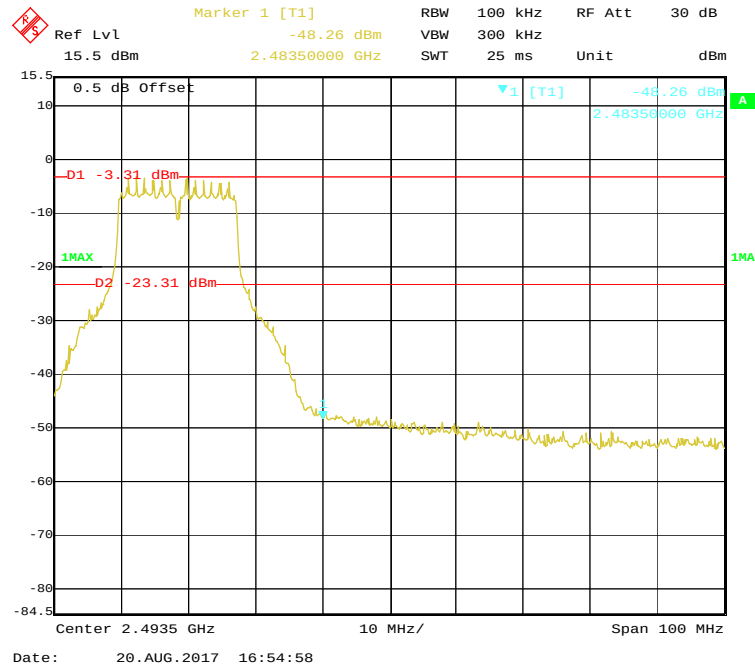
802.11g Mode Right Side



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:	24.6°C
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

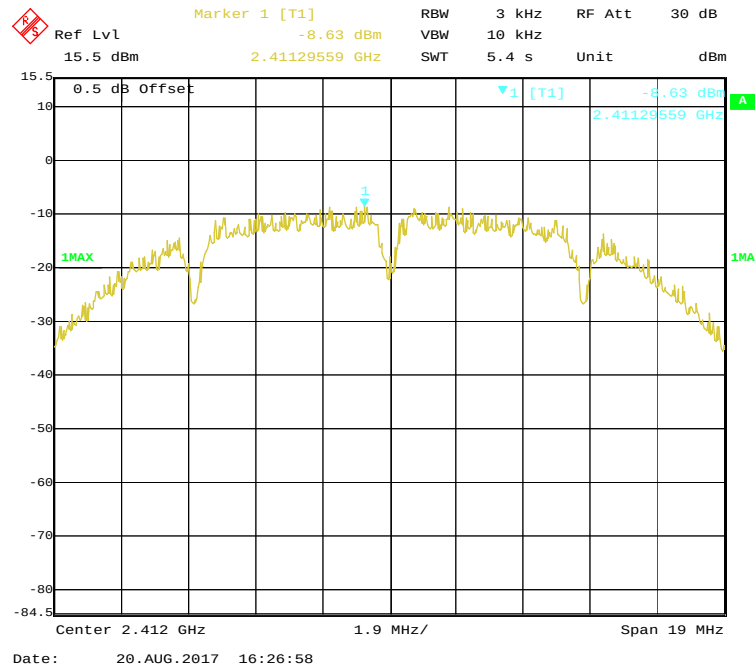
The testing was performed by Kyle Xu on 2017-08-20.

EUT operation mode: Transmitting

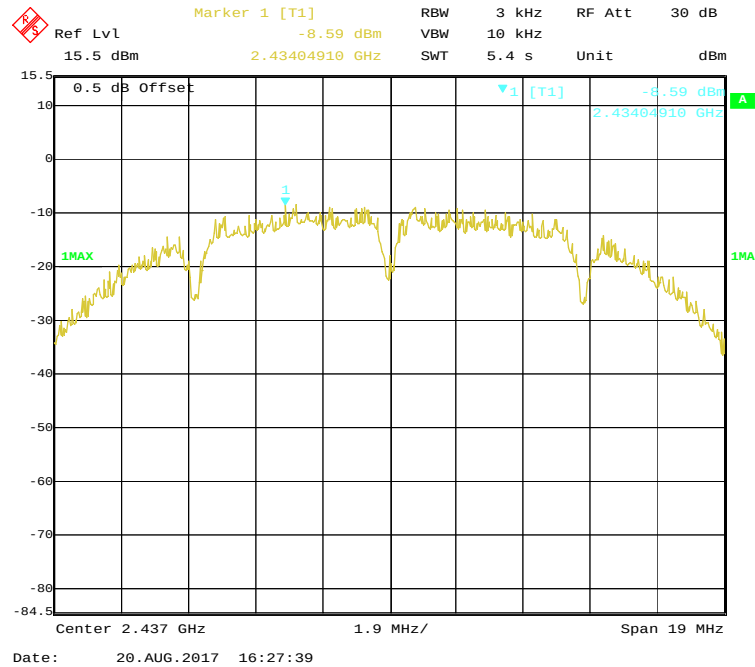
Test Result: Pass

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b mode			
Low	2412	-8.63	≤ 8
Middle	2437	-8.59	≤ 8
High	2462	-8.31	≤ 8
802.11g mode			
Low	2412	-14.72	≤ 8
Middle	2437	-14.38	≤ 8
High	2462	-13.76	≤ 8
802.11n-HT20 mode			
Low	2412	-16.09	≤ 8
Middle	2437	-15.39	≤ 8
High	2462	-14.94	≤ 8

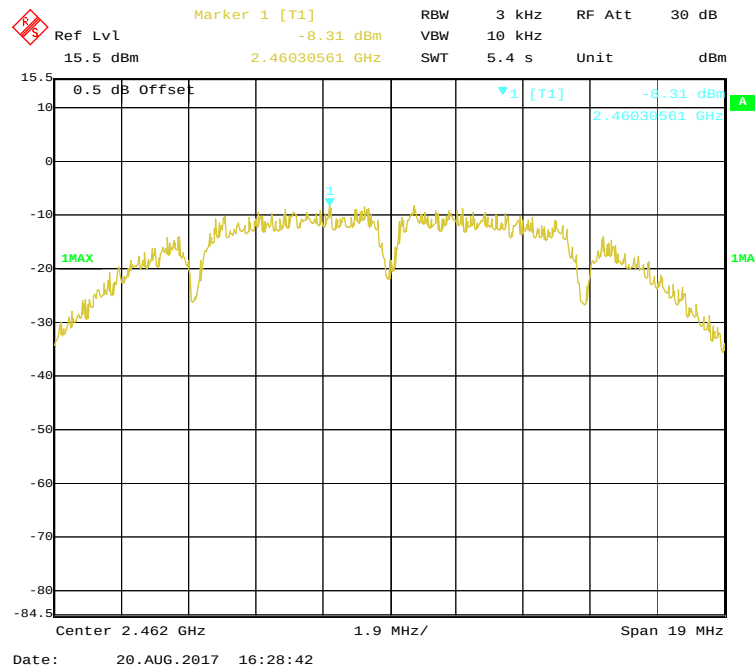
802.11b Low Channel



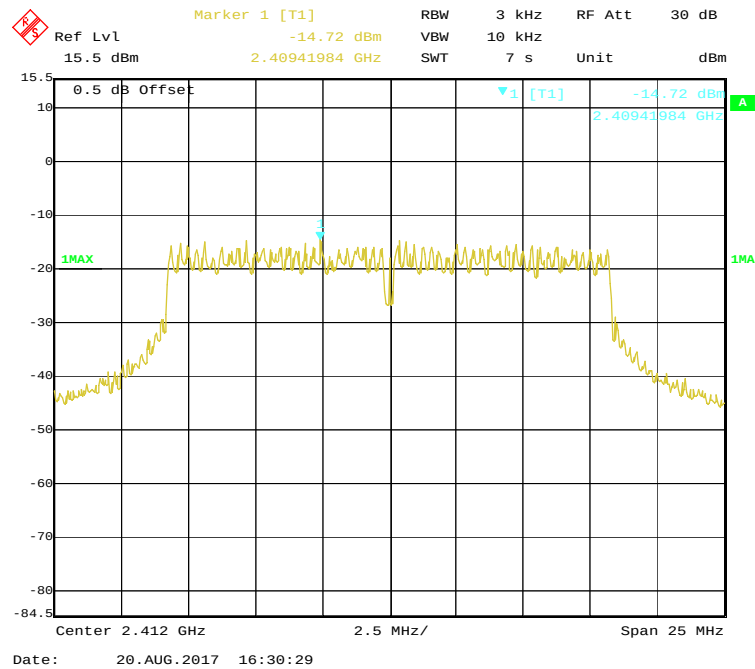
802.11b Middle Channel



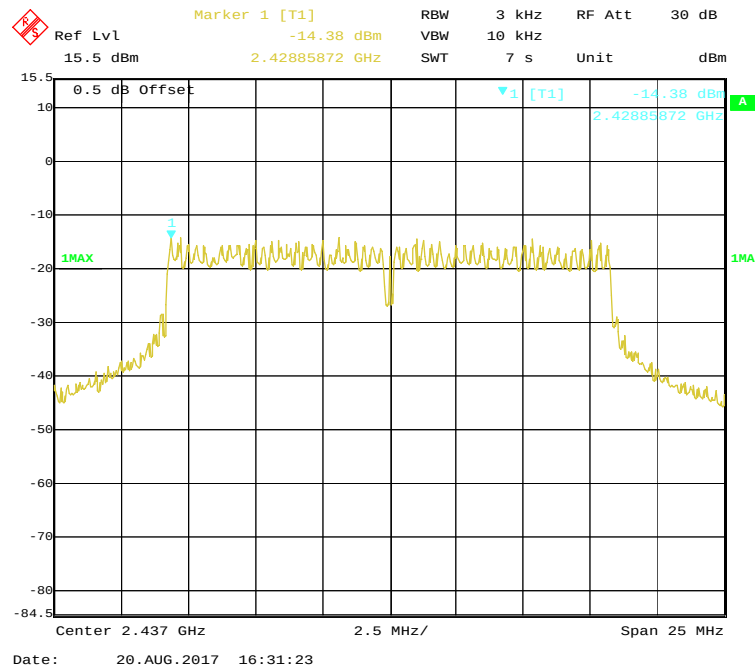
802.11b High Channel



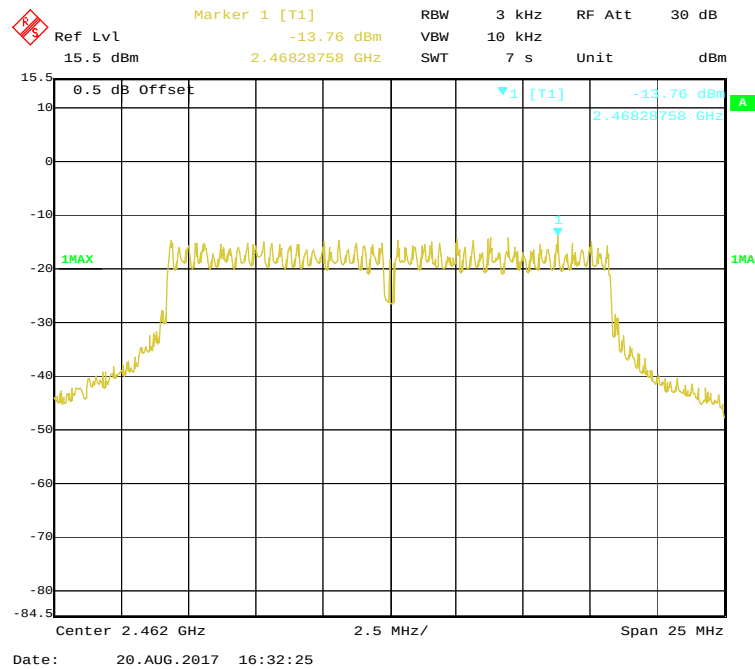
802.11g Low Channel



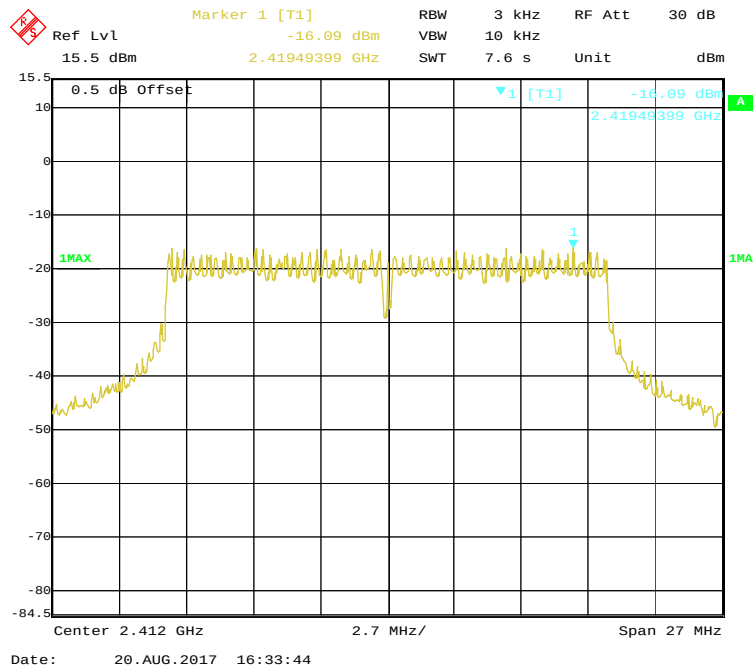
802.11g Middle Channel



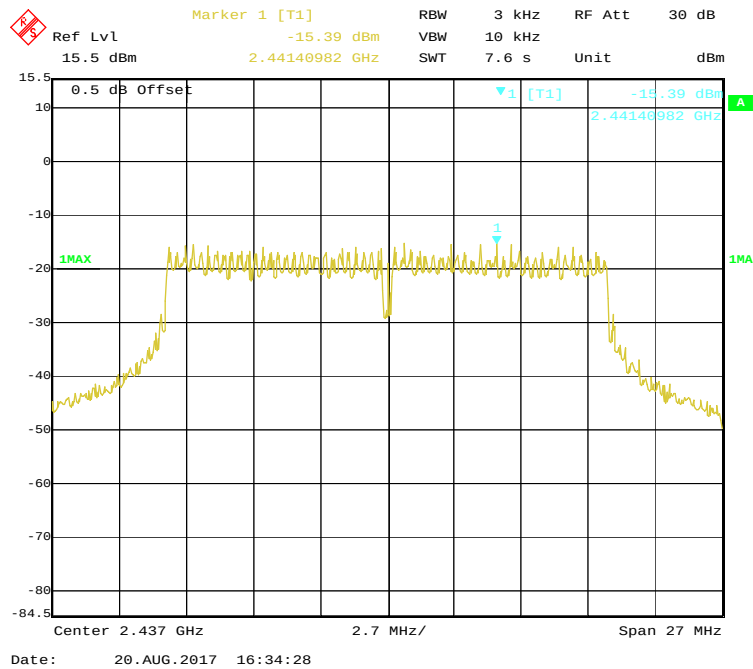
802.11g High Channel



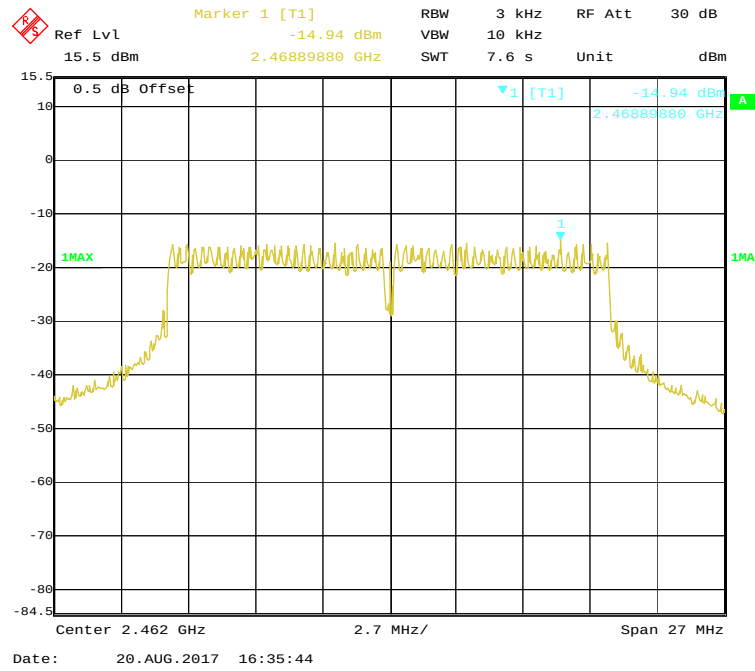
802.11n-HT20 Low Channel



802.11n-HT20 Middle Channel



802.11n-HT20 High Channel



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