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-P70

Report Type:	**Product Type:**
Original Report	HD WiFi Camera

Test Engineer:	Bernie Zhang
Report Number:	RSHA170801001-00B
Report Date:	2017-08-07
Reviewed By:	Oscar Ye RF Leader
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road,Kunshan,Jiangsu province,China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Chuango Security Technology Corporation
Tested Model	P70
Product Type	HD WiFi Camera
Dimension	80 mm(L)×80 mm(W)×150 mm(H)
Power Supply	DC 5V From Adapter

Adapter Information:
Model: SA-US5V
Input: AC100-240 V, 60Hz, 0.3A
Output:5V, 1.0A

**All measurement and test data in this report was gathered from production sample serial number: 20170801007. (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)

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℃
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.

Channel list for 802.11n-HT40 mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	8	2447
4	2427	9	2452
5	2432	/	/
6	2437	/	/
7	2442	/	/

EUT was tested with Channel 3, 6 and 9.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

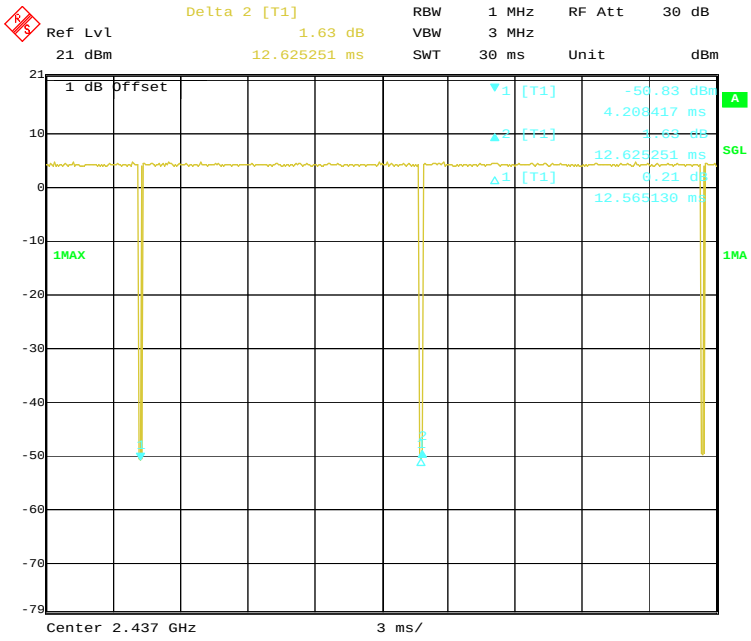
RF test tool : putty.0.67.0.0.exe

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

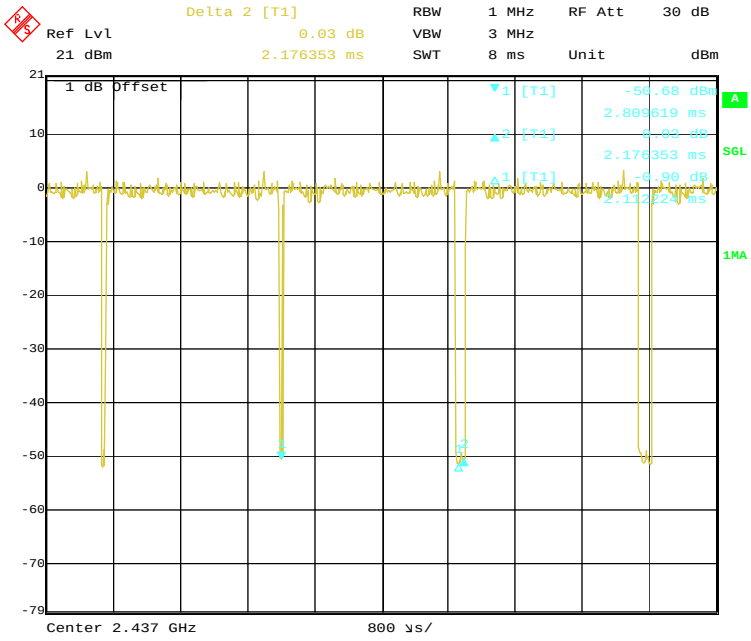
Mode	Data rate	Power level
802.11b	1 Mbps	18
802.11g	6 Mbps	52
802.11n-HT20	MCS0	56
802.11n-HT40	MCS0	58

Duty Cycle:

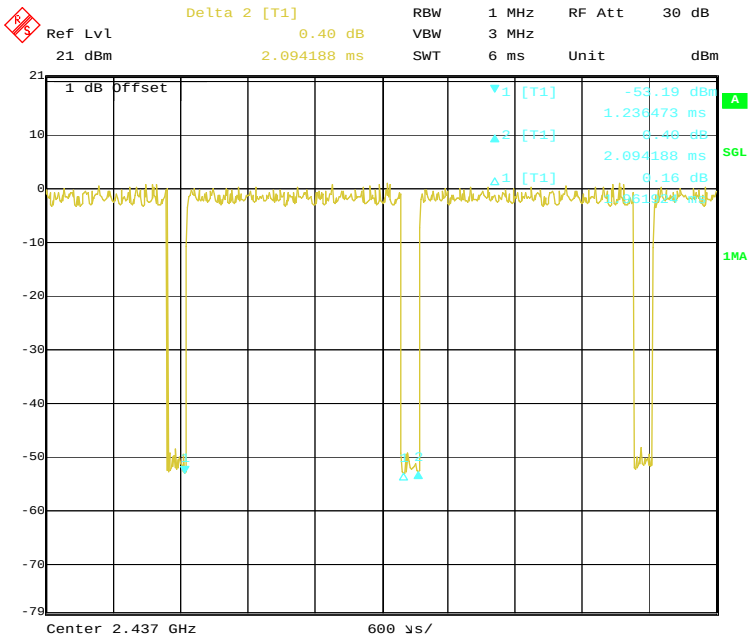
802.11b Mode Middle Channel



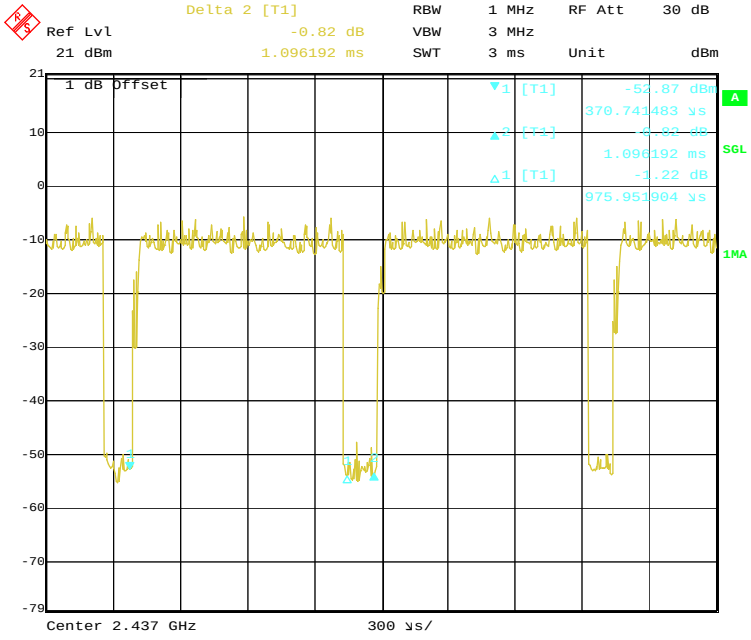
802.11g Mode Middle Channel



802.11n-HT20 Mode Middle Channel



802.11n-HT40 Mode Middle Channel



Mode	Duty Cycle (%)	T(us)	1/T(kHz)	VBW Setting	10log(1/x)
802.11b	99.52	/	/	10Hz	0.021
802.11g	97.06	2112	0.47	1kHz	0.130
802.11n-HT20	93.70	1962	0.51	1kHz	0.283
802.11n-HT40	89.05	976	1.02	3kHz	0.504

Support Equipment List and Details

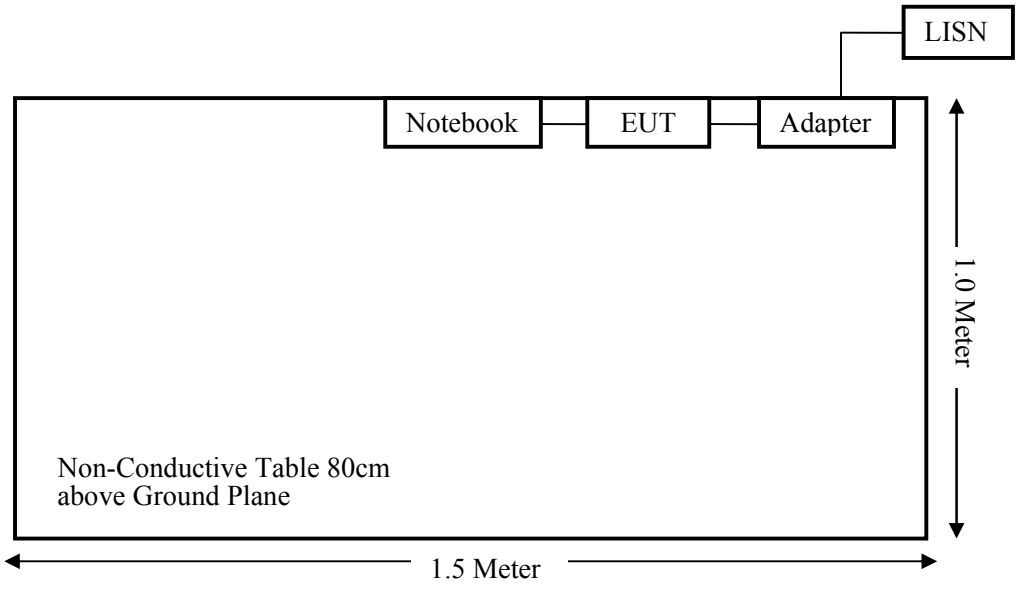
Manufacturer	Description	Model	Serial Number
DELL	PC	GX620	D65874152

External I/O Cable

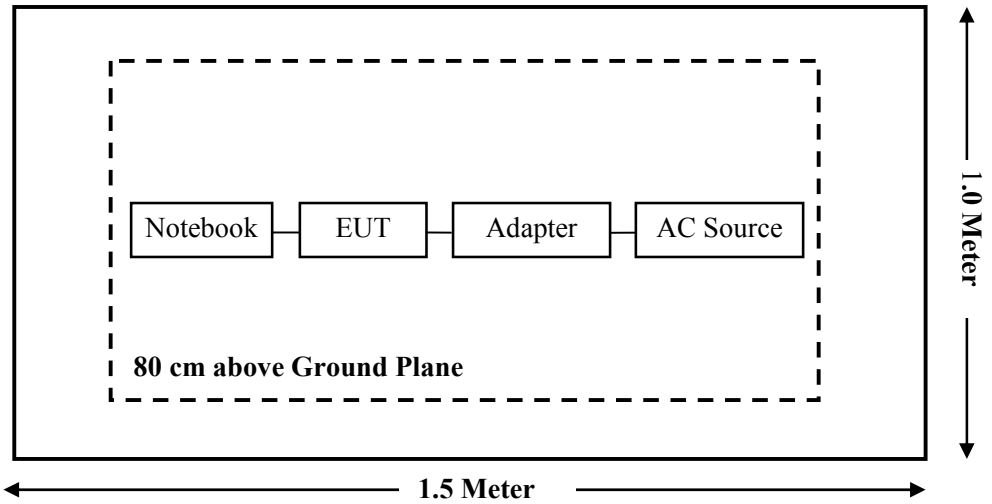
Cable Description	Shielding Type	Length (m)	From Port	To
USB Cable	Un-shielding	0.3	Notebook	EUT

Block Diagram of Test Setup

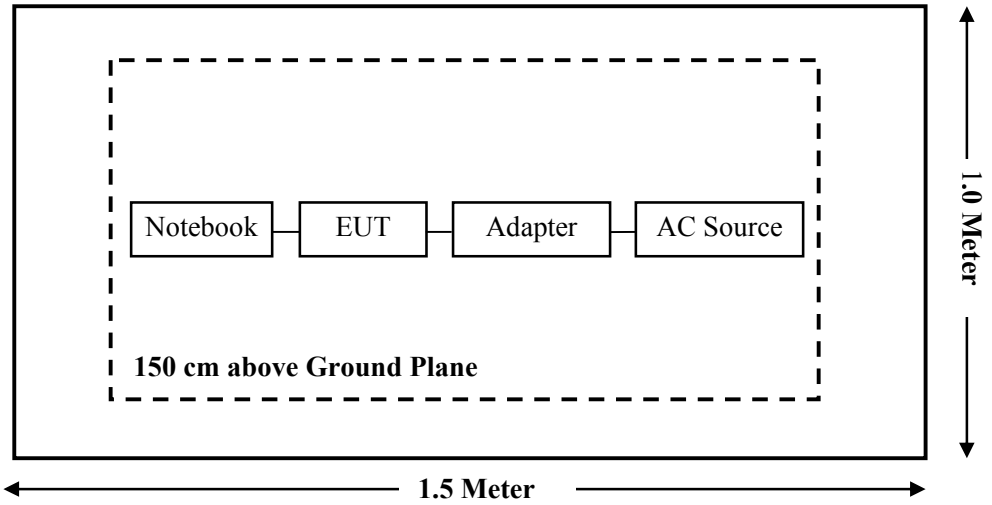
For Conducted Emissions:



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 Instrunent	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 Security	RF Cable	N/A	N/A	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/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

Mode	Frequency 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	2.00	1.58	18.00	63.10	20	0.0199	1
802.11g		2.00	1.58	15.00	31.62	20	0.0100	1
802.11 n-HT20		2.00	1.58	13.50	22.39	20	0.0071	1
802.11 n-HT40	2422~2452	2.00	1.58	12.50	17.78	20	0.0056	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 an internal integrated antenna arrangement for Wi-Fi, which the antenna gain is 2dBi, fulfill the requirement of this section. Please refer to the EUT photos.

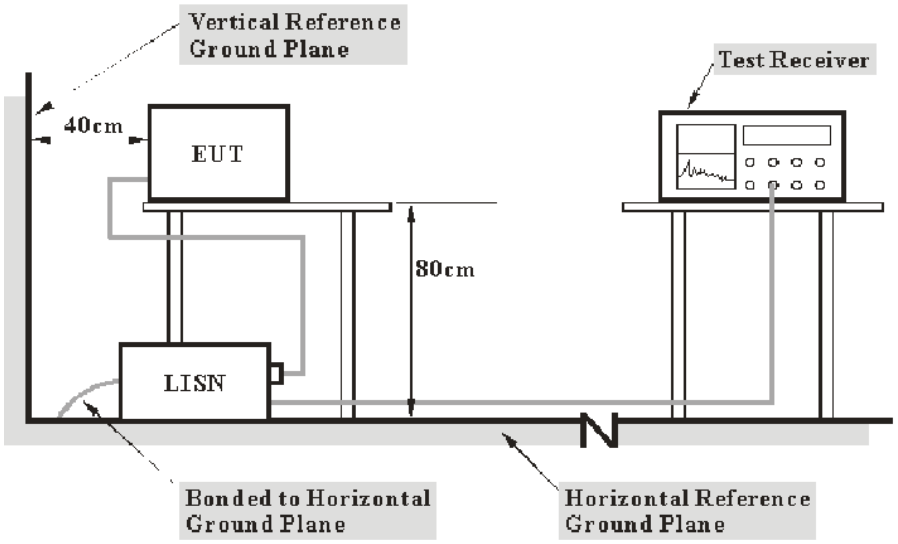
Result: Compliance.

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 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.

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:

Correction Factor = LISN VDF + 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:

Margin = Limit – Corrected Amplitude

Test Results Summary

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

Test Data

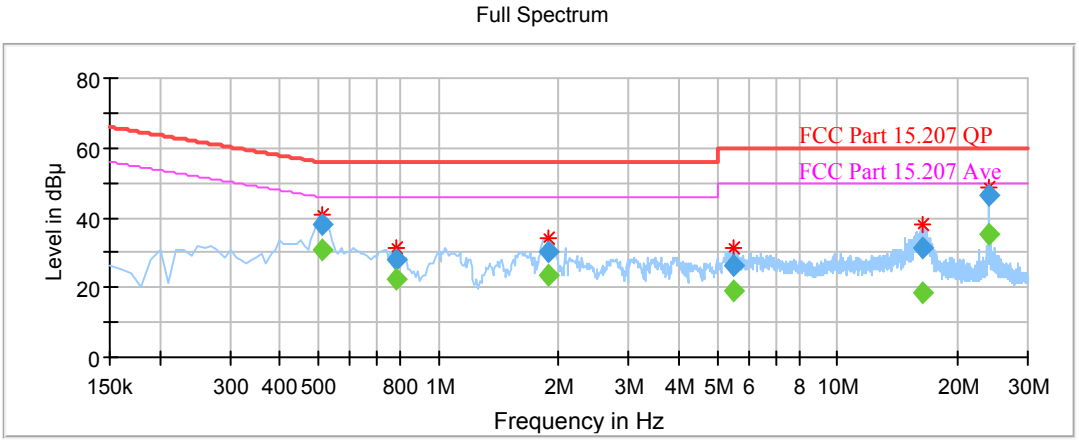
Environmental Conditions

Temperature:	24.5 ℃
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Bernie Zhang on 2017-08-06.

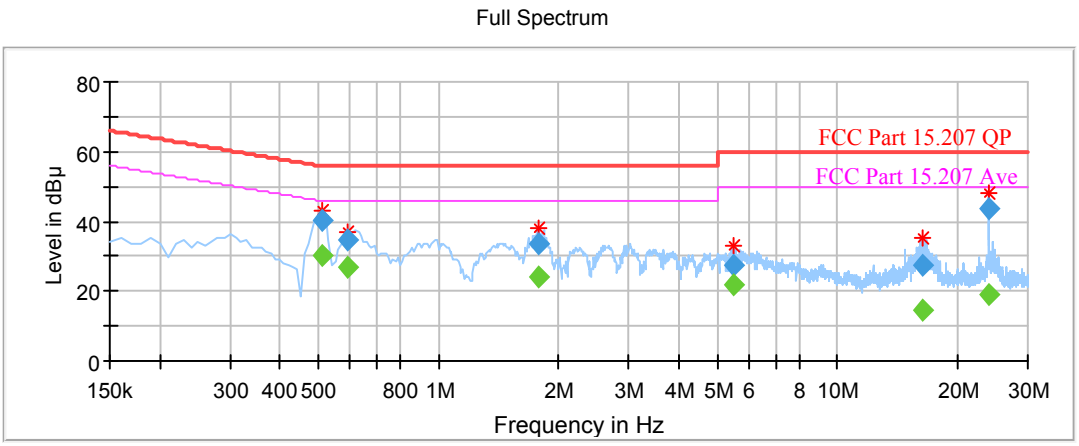
EUT operation mode: Transmitting

AC 120V/60 Hz, Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.510000	---	30.88	9.000	L1	10.1	15.12	46.00	Compliance
0.510000	38.14	---	9.000	L1	10.1	17.86	56.00	Compliance
0.780000	---	22.23	9.000	L1	9.9	23.77	46.00	Compliance
0.780000	27.94	---	9.000	L1	9.9	28.06	56.00	Compliance
1.880000	---	23.76	9.000	L1	9.9	22.24	46.00	Compliance
1.880000	30.28	---	9.000	L1	9.9	25.72	56.00	Compliance
5.460000	---	19.14	9.000	L1	9.9	30.86	50.00	Compliance
5.460000	26.55	---	9.000	L1	9.9	33.45	60.00	Compliance
16.340000	---	18.27	9.000	L1	10.1	31.73	50.00	Compliance
16.340000	31.06	---	9.000	L1	10.1	28.94	60.00	Compliance
24.020000	---	35.46	9.000	L1	10.2	14.54	50.00	Compliance
24.020000	46.20	---	9.000	L1	10.2	13.80	60.00	Compliance

AC 120V/60 Hz, Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.510000	---	30.16	9.000	N	10.1	15.84	46.00	Compliance
0.510000	40.45	---	9.000	N	10.1	15.55	56.00	Compliance
0.590000	---	26.69	9.000	N	10.1	19.31	46.00	Compliance
0.590000	34.44	---	9.000	N	10.1	21.56	56.00	Compliance
1.780000	---	24.32	9.000	N	9.9	21.68	46.00	Compliance
1.780000	33.82	---	9.000	N	9.9	22.18	56.00	Compliance
5.500000	---	21.92	9.000	N	9.9	28.08	50.00	Compliance
5.500000	27.38	---	9.000	N	9.9	32.62	60.00	Compliance
16.320000	---	14.64	9.000	N	10.1	35.36	50.00	Compliance
16.320000	27.18	---	9.000	N	10.1	32.82	60.00	Compliance
23.920000	---	19.12	9.000	N	10.2	30.88	50.00	Compliance
23.920000	43.84	---	9.000	N	10.2	16.16	60.00	Compliance

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

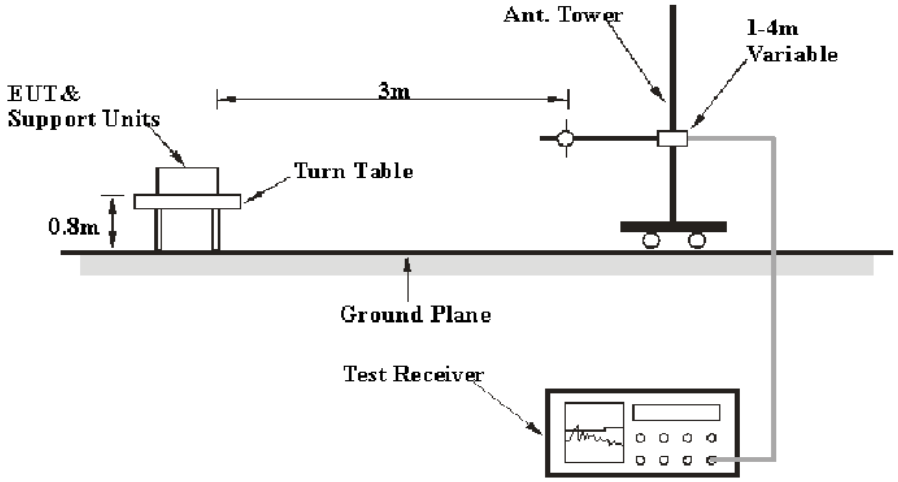
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

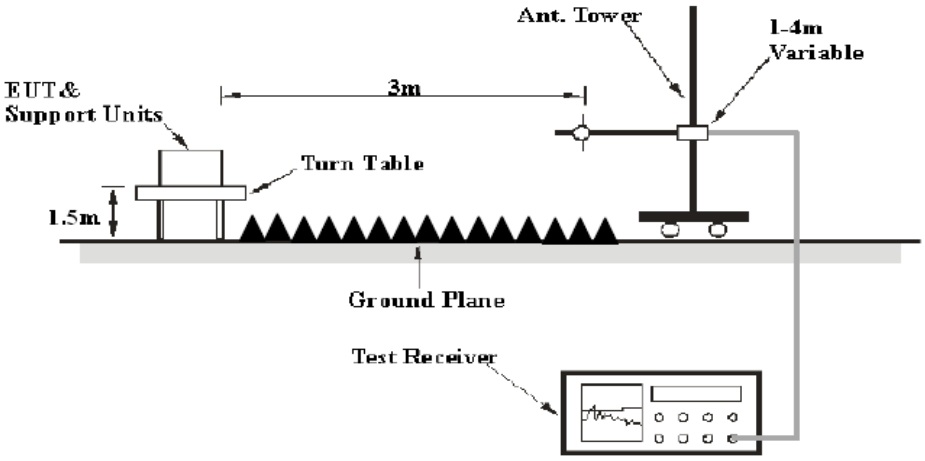
FCC §15.247 (d); §15.209; §15.205;

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:

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

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

Margin = Limit – Corrected Amplitude

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 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 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	266	224	H	-0.66	26.70	43.50	16.80
2412.00	110.32	PK	271	192	V	-4.13	106.19	/	/
2412.00	109.52	Ave	271	192	V	-4.13	105.39	/	/
2412.00	105.52	PK	317	160	H	-4.13	101.39	/	/
2412.00	104.34	Ave	317	160	H	-4.13	100.21	/	/
2390.00	54.29	PK	26	137	V	-4.19	50.10	74	23.90
2390.00	48.62	Ave	26	137	V	-4.19	44.43	54	9.57
2400.00	57.63	PK	6	100	V	-4.16	53.47	74	20.53
2400.00	49.62	Ave	6	100	V	-4.16	45.46	54	8.54
1729.43	48.62	PK	225	125	V	-6.57	42.05	74	31.95
1729.43	38.62	Ave	225	125	V	-6.57	32.05	54	21.95
4824.00	53.24	PK	134	248	V	4.19	57.43	74	16.57
4824.00	42.62	Ave	134	248	V	4.19	46.81	54	7.19
7236.00	45.63	PK	32	244	V	11.50	57.13	74	16.87
7236.00	32.62	Ave	32	244	V	11.50	44.12	54	9.88

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	28.28	QP	172	144	H	-0.66	27.62	43.50	15.88
2437.00	110.89	PK	275	229	V	-4.07	106.82	/	/
2437.00	109.62	Ave	275	229	V	-4.07	105.55	/	/
2437.00	105.62	PK	133	164	H	-4.07	101.55	/	/
2437.00	104.56	Ave	133	164	H	-4.07	100.49	/	/
1729.43	48.46	PK	188	193	V	-6.57	41.89	74	32.11
1729.43	39.62	Ave	188	193	V	-6.57	33.05	54	20.95
3158.64	44.52	PK	286	247	V	-0.62	43.90	74	30.10
3158.64	35.15	Ave	286	247	V	-0.62	34.53	54	19.47
4874.00	52.13	PK	57	240	V	4.32	56.45	74	17.55
4874.00	43.62	Ave	57	240	V	4.32	47.94	54	6.06
6451.33	45.32	PK	127	227	V	9.06	54.38	74	19.62
6451.33	34.62	Ave	127	227	V	9.06	43.68	54	10.32
7311.00	45.59	PK	221	175	V	11.62	57.21	74	16.79
7311.00	36.21	Ave	221	175	V	11.62	47.83	54	6.17
High Channel (2462 MHz)									
163.23	27.42	QP	39	191	H	-0.66	26.76	43.50	16.74
2462.00	111.23	PK	340	151	V	-4.00	107.23	/	/
2462.00	110.87	Ave	340	151	V	-4.00	106.87	/	/
2462.00	106.35	PK	286	105	H	-4.00	102.35	/	/
2462.00	105.25	Ave	286	105	H	-4.00	101.25	/	/
2483.50	58.62	PK	338	233	V	-6.01	52.61	74	21.39
2483.50	49.62	Ave	338	233	V	-6.01	43.61	54	10.39
1729.43	49.44	PK	229	171	V	-6.57	42.87	74	31.13
1729.43	38.82	Ave	229	171	V	-6.57	32.25	54	21.75
4924.00	53.89	PK	316	129	V	4.45	58.34	74	15.66
4924.00	44.26	Ave	316	129	V	4.45	48.71	54	5.29
6451.33	46.02	PK	113	237	V	9.06	55.08	74	18.92
6451.33	34.36	Ave	113	237	V	9.06	43.42	54	10.58
7386.00	44.94	PK	181	162	V	11.74	56.68	74	17.32
7386.00	31.26	Ave	181	162	V	11.74	43.00	54	11.00

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	211	235	H	-0.66	25.66	43.50	17.84
2412.00	104.56	PK	8	237	V	-4.13	100.43	/	/
2412.00	101.25	Ave	8	237	V	-4.13	97.12	/	/
2412.00	99.62	PK	352	226	H	-4.13	95.49	/	/
2412.00	96.31	Ave	352	226	H	-4.13	92.18	/	/
2390.00	54.32	PK	21	242	V	-4.19	50.13	74	23.87
2390.00	45.69	Ave	21	242	V	-4.19	41.50	54	12.50
2400.00	57.21	PK	75	206	V	-4.16	53.05	74	20.95
2400.00	49.62	Ave	75	206	V	-4.16	45.46	54	8.54
1729.43	46.23	PK	123	123	V	-6.57	39.66	74	34.34
1729.43	35.26	Ave	123	123	V	-6.57	28.69	54	25.31
4824.00	50.29	PK	253	211	V	4.19	54.48	74	19.52
4824.00	41.21	Ave	253	211	V	4.19	45.40	54	8.60
7236.00	45.23	PK	164	219	V	11.50	56.73	74	17.27
7236.00	34.26	Ave	164	219	V	11.50	45.76	54	8.24
Middle Channel (2437 MHz)									
163.23	26.78	QP	327	120	H	-0.66	26.12	43.50	17.38
2437.00	105.35	PK	32	123	V	-4.07	101.28	/	/
2437.00	102.12	Ave	32	123	V	-4.07	98.05	/	/
2437.00	100.25	PK	352	240	H	-4.07	96.18	/	/
2437.00	97.62	Ave	352	240	H	-4.07	93.55	/	/
1729.43	46.58	PK	3	100	V	-6.57	40.01	74	33.99
1729.43	35.16	Ave	3	100	V	-6.57	28.59	54	25.41
3158.64	44.26	PK	1	217	V	-0.62	43.64	74	30.36
3158.64	33.29	Ave	1	217	V	-0.62	32.67	54	21.33
4874.00	50.89	PK	267	111	V	4.32	55.21	74	18.79
4874.00	39.66	Ave	267	111	V	4.32	43.98	54	10.02
6451.33	44.62	PK	145	161	V	9.06	53.68	74	20.32
6451.33	34.69	Ave	145	161	V	9.06	43.75	54	10.25
7311.00	45.26	PK	119	193	V	11.62	56.88	74	17.12
7311.00	36.21	Ave	119	193	V	11.62	47.83	54	6.17

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	278	123	H	-0.66	25.81	43.50	17.69
2462.00	105.62	PK	163	111	V	-4.00	101.62	/	/
2462.00	102.21	Ave	163	111	V	-4.00	98.21	/	/
2462.00	99.62	PK	188	181	H	-4.00	95.62	/	/
2462.00	96.31	Ave	188	181	H	-4.00	92.31	/	/
2483.50	56.32	PK	68	107	V	-6.01	50.31	74	23.69
2483.50	45.36	Ave	68	107	V	-6.01	39.35	54	14.65
1729.43	46.23	PK	337	115	V	-8.33	37.90	74	36.10
1729.43	36.26	Ave	337	115	V	-8.33	27.93	54	26.07
4924.00	51.42	PK	96	180	V	4.45	55.87	74	18.13
4924.00	41.26	Ave	96	180	V	4.45	45.71	54	8.29
6451.33	45.23	PK	120	155	V	9.06	54.29	74	19.71
6451.33	32.26	Ave	120	155	V	9.06	41.32	54	12.68
7386.00	45.96	PK	313	213	V	11.74	57.70	74	16.30
7386.00	34.28	Ave	313	213	V	11.74	46.02	54	7.98

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	290	170	H	-0.66	27.30	43.50	16.20
2412.00	102.56	PK	191	146	V	-4.13	98.43	/	/
2412.00	97.62	Ave	191	146	V	-4.13	93.49	/	/
2412.00	97.52	PK	97	132	H	-4.13	93.39	/	/
2412.00	92.31	Ave	97	132	H	-4.13	88.18	/	/
2390.00	54.32	PK	145	242	V	-4.19	50.13	74	23.87
2390.00	42.21	Ave	145	242	V	-4.19	38.02	54	15.98
2400.00	56.32	PK	215	134	V	-4.16	52.16	74	21.84
2400.00	44.62	Ave	215	134	V	-4.16	40.46	54	13.54
1729.43	45.21	PK	147	114	V	-6.57	38.64	74	35.36
1729.43	33.26	Ave	147	114	V	-6.57	26.69	54	27.31
4824.00	48.32	PK	255	204	V	4.19	52.51	74	21.49
4824.00	36.21	Ave	255	204	V	4.19	40.40	54	13.60
7236.00	45.31	PK	346	109	V	11.50	56.81	74	17.19
7236.00	31.25	Ave	346	109	V	11.50	42.75	54	11.25

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	310	143	H	-0.66	26.75	43.50	16.75
2437.00	102.89	PK	299	249	V	-4.07	98.82	/	/
2437.00	97.78	Ave	299	249	V	-4.07	93.71	/	/
2437.00	98.12	PK	127	168	H	-4.07	94.05	/	/
2437.00	93.04	Ave	127	168	H	-4.07	88.97	/	/
1729.43	45.98	PK	235	166	V	-6.57	39.41	74	34.59
1729.43	32.16	Ave	235	166	V	-6.57	25.59	54	28.41
3158.64	44.92	PK	195	128	V	-0.62	44.30	74	29.70
3158.64	31.69	Ave	195	128	V	-0.62	31.07	54	22.93
4874.00	48.62	PK	208	212	V	4.32	52.94	74	21.06
4874.00	35.29	Ave	208	212	V	4.32	39.61	54	14.39
6451.33	45.69	PK	296	141	V	9.06	54.75	74	19.25
6451.33	31.96	Ave	296	141	V	9.06	41.02	54	12.98
7311.00	44.63	PK	98	151	V	11.62	56.25	74	17.75
7311.00	31.28	Ave	98	151	V	11.62	42.90	54	11.10
High Channel (2462 MHz)									
163.23	27.62	QP	70	223	H	-0.66	26.96	43.50	16.54
2462.00	103.12	PK	263	127	V	-4.00	99.12	/	/
2462.00	98.56	Ave	263	127	V	-4.00	94.56	/	/
2462.00	97.99	PK	319	125	H	-4.00	93.99	/	/
2462.00	91.62	Ave	319	125	H	-4.00	87.62	/	/
2483.50	59.62	PK	116	244	V	-6.01	53.61	74	20.39
2483.50	47.62	Ave	116	244	V	-6.01	41.61	54	12.39
1729.43	45.23	PK	36	225	V	-6.57	38.66	74	35.34
1729.43	32.29	Ave	36	225	V	-6.57	25.72	54	28.28
4924.00	49.32	PK	188	225	V	4.45	53.77	74	20.23
4924.00	36.99	Ave	188	225	V	4.45	41.44	54	12.56
6451.33	46.32	PK	57	130	V	9.06	55.38	74	18.62
6451.33	34.12	Ave	57	130	V	9.06	43.18	54	10.82
7386.00	45.32	PK	177	227	V	11.74	57.06	74	16.94
7386.00	32.29	Ave	177	227	V	11.74	44.03	54	9.97

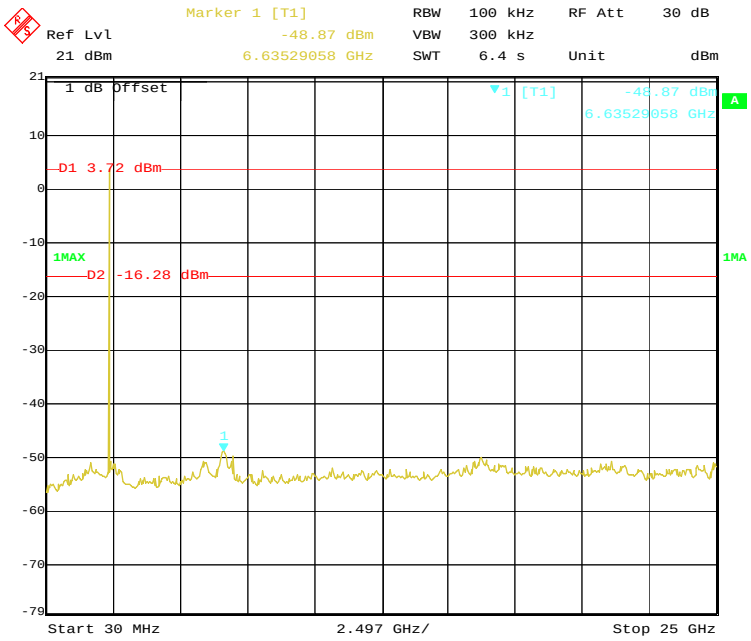
802.11n-HT40 Mode:

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 (2422 MHz)									
163.23	28.61	QP	330	101	H	-0.66	27.95	43.50	15.55
2422.00	98.62	PK	173	220	V	-4.11	94.51	/	/
2422.00	91.63	Ave	173	220	V	-4.11	87.52	/	/
2422.00	93.62	PK	23	236	H	-4.11	89.51	/	/
2422.00	88.28	Ave	23	236	H	-4.11	84.17	/	/
2390.00	54.23	PK	217	121	V	-4.19	50.04	74	23.96
2390.00	40.21	Ave	217	121	V	-4.19	36.02	54	17.98
2400.00	55.23	PK	315	200	V	-4.16	51.07	74	22.93
2400.00	39.21	Ave	315	200	V	-4.16	35.05	54	18.95
1729.43	45.13	PK	320	111	V	-6.57	38.56	74	35.44
1729.43	30.26	Ave	320	111	V	-6.57	23.69	54	30.31
4844.00	48.32	PK	231	139	V	1.70	50.02	74	23.98
4844.00	32.25	Ave	231	139	V	1.70	33.95	54	20.05
7266.00	45.13	PK	342	150	V	11.55	56.68	74	17.32
7266.00	30.01	Ave	342	150	V	11.55	41.56	54	12.44
Middle Channel (2437 MHz)									
163.23	28.12	QP	92	184	H	-0.66	27.46	43.50	16.04
2437.00	98.96	PK	212	160	V	-4.07	94.89	/	/
2437.00	91.69	Ave	212	160	V	-4.07	87.62	/	/
2437.00	93.54	PK	269	235	H	-4.07	89.47	/	/
2437.00	88.66	Ave	269	235	H	-4.07	84.59	/	/
1729.43	44.31	PK	115	187	V	-6.57	37.74	74	36.26
1729.43	31.21	Ave	115	187	V	-6.57	24.64	54	29.36
3158.64	45.32	PK	196	212	V	-0.62	44.70	74	29.30
3158.64	32.11	Ave	196	212	V	-0.62	31.49	54	22.51
4874.00	49.62	PK	302	225	V	4.32	53.94	74	20.06
4874.00	35.13	Ave	302	225	V	4.32	39.45	54	14.55
6451.33	45.62	PK	244	177	V	9.06	54.68	74	19.32
6451.33	31.12	Ave	244	177	V	9.06	40.18	54	13.82
7311.00	45.31	PK	278	165	V	11.62	56.93	74	17.07
7311.00	30.59	Ave	278	165	V	11.62	42.21	54	11.79

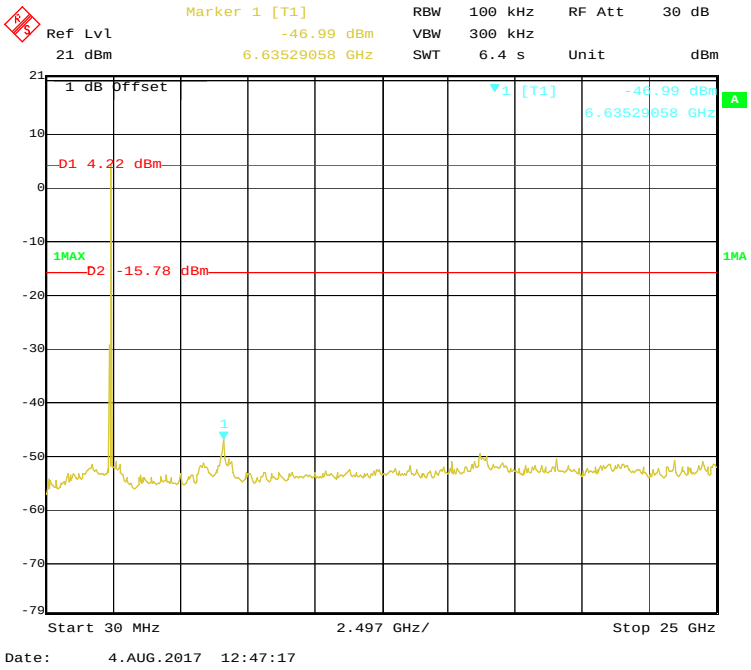
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2452 MHz)									
163.23	28.34	QP	247	145	H	-0.66	27.68	43.50	15.82
2452.00	99.25	PK	15	155	V	-4.03	95.22	/	/
2452.00	94.69	Ave	15	155	V	-4.03	90.66	/	/
2452.00	93.62	PK	233	242	H	-4.03	89.59	/	/
2452.00	87.96	Ave	233	242	H	-4.03	83.93	/	/
2483.50	54.32	PK	63	150	V	-6.01	48.31	74	25.69
2483.50	43.52	Ave	63	150	V	-6.01	37.51	54	16.49
1729.43	46.32	PK	160	101	V	-6.57	39.75	74	34.25
1729.43	34.26	Ave	160	101	V	-6.57	27.69	54	26.31
4904.00	48.69	PK	325	196	V	4.40	53.09	74	20.91
4904.00	35.69	Ave	325	196	V	4.40	40.09	54	13.91
6451.33	45.32	PK	256	232	V	9.06	54.38	74	19.62
6451.33	32.69	Ave	256	232	V	9.06	41.75	54	12.25
7356.00	45.21	PK	340	159	V	11.69	56.90	74	17.10
7356.00	31.11	Ave	340	159	V	11.69	42.80	54	11.20

Conducted Spurious Emissions at Antenna Port

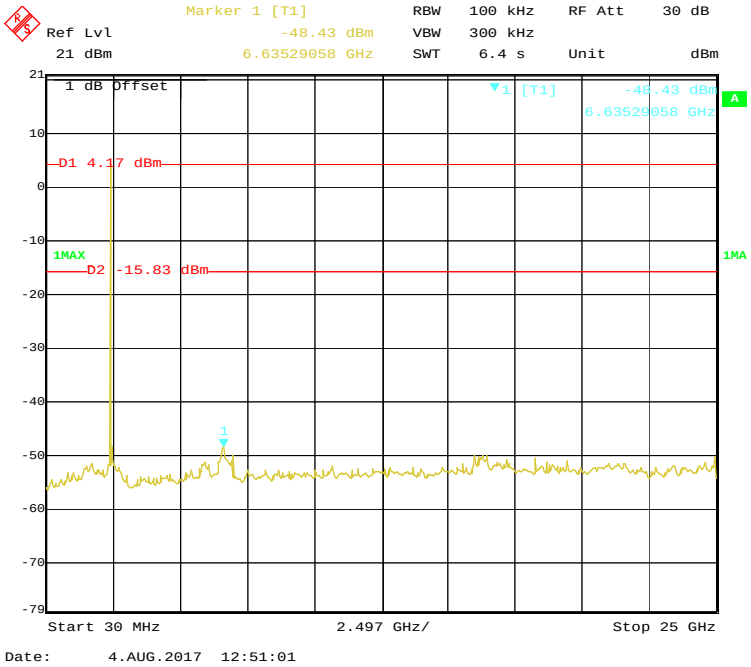
802.11b Low Channel



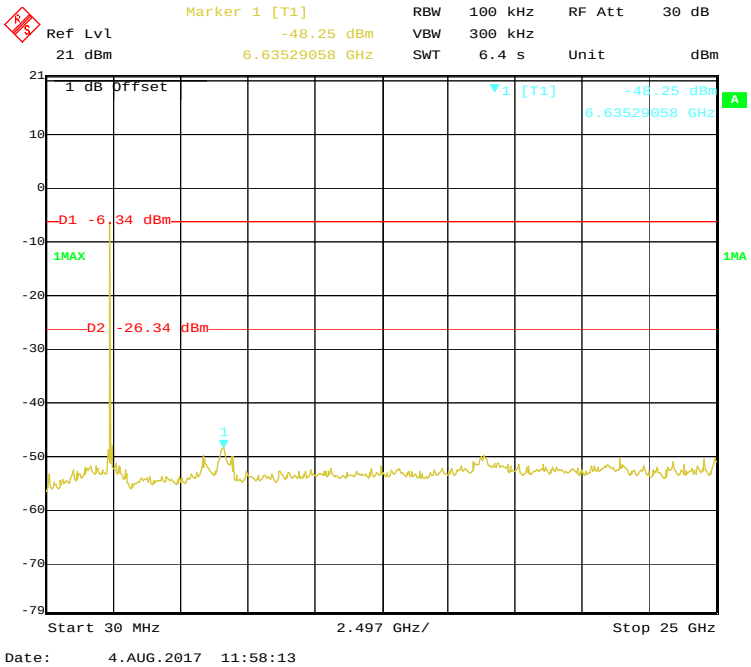
802.11b Middle Channel



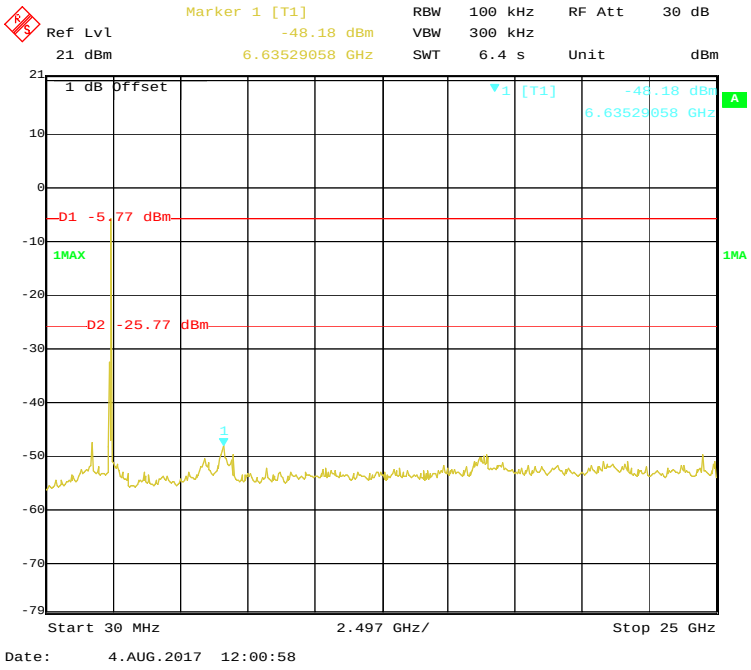
802.11b High Channel



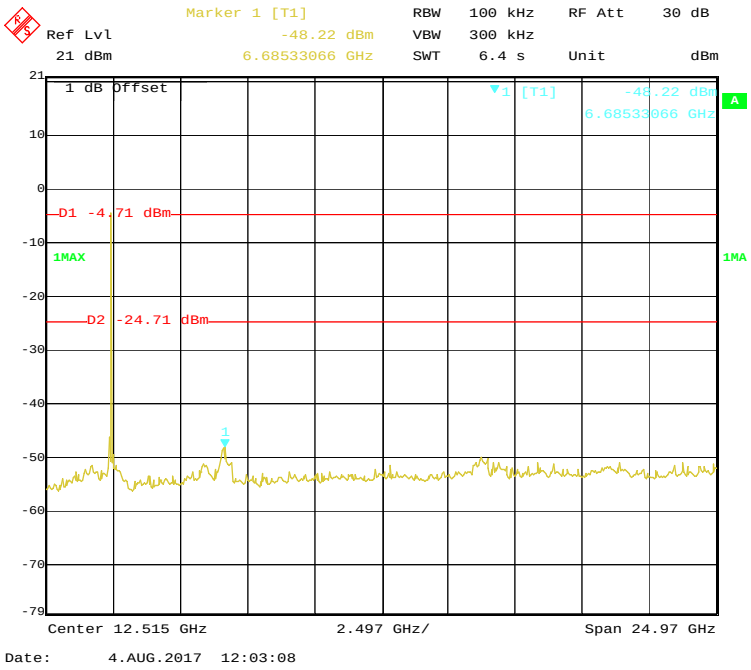
802.11g Low Channel



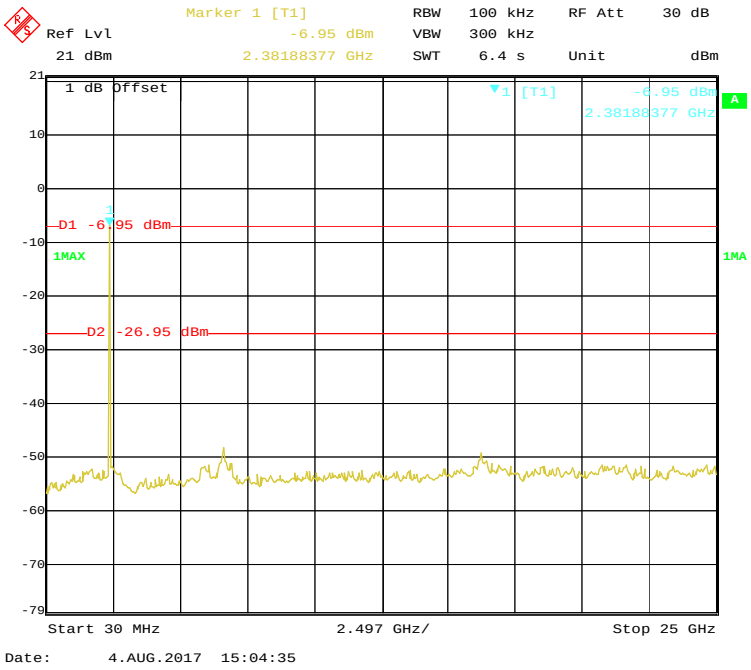
802.11g Middle Channel



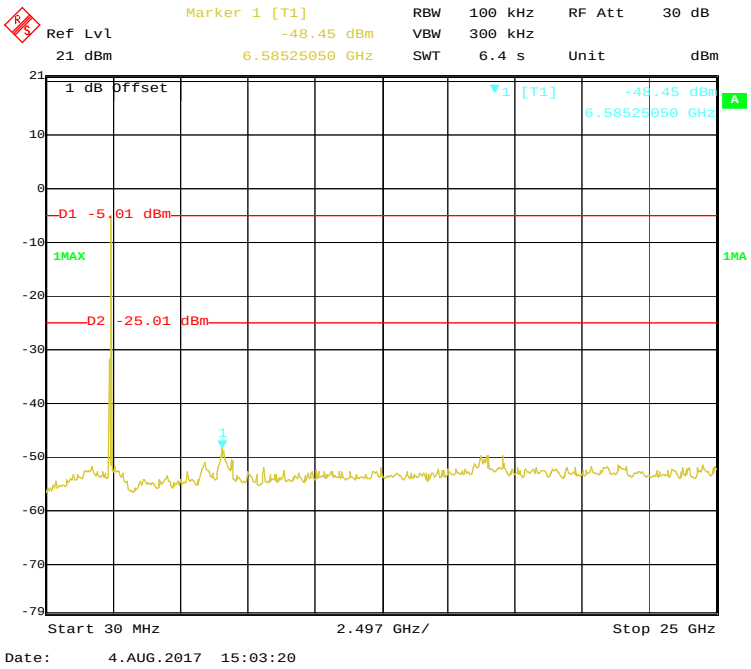
802.11g High Channel



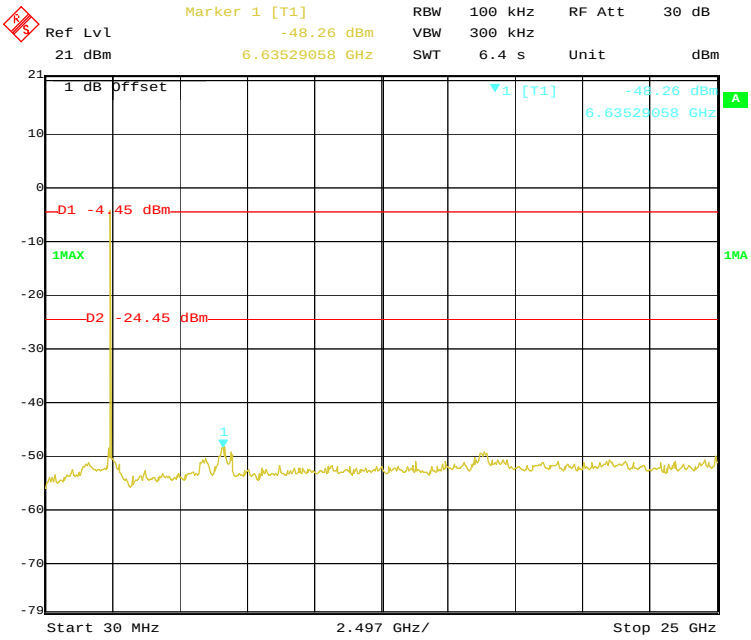
802.11n-HT20 Low Channel



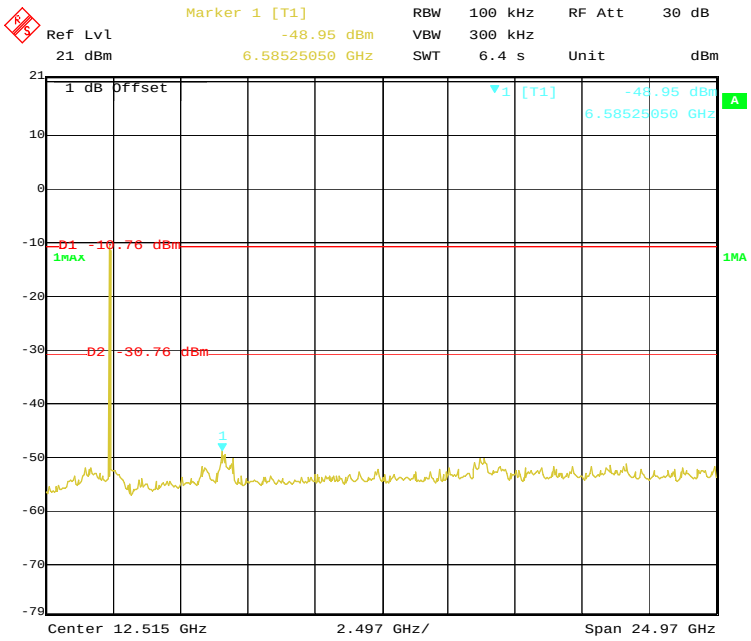
802.11n-HT20 Middle Channel



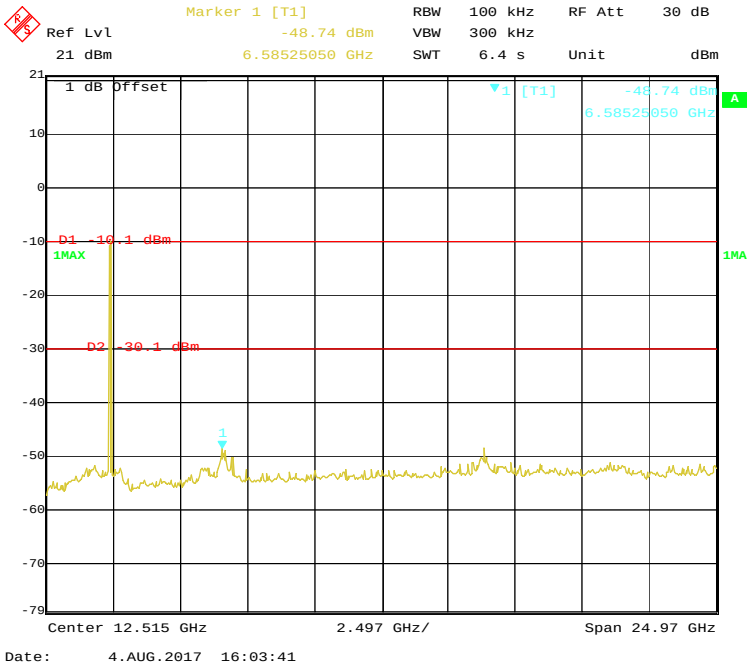
802.11n-HT20 High Channel



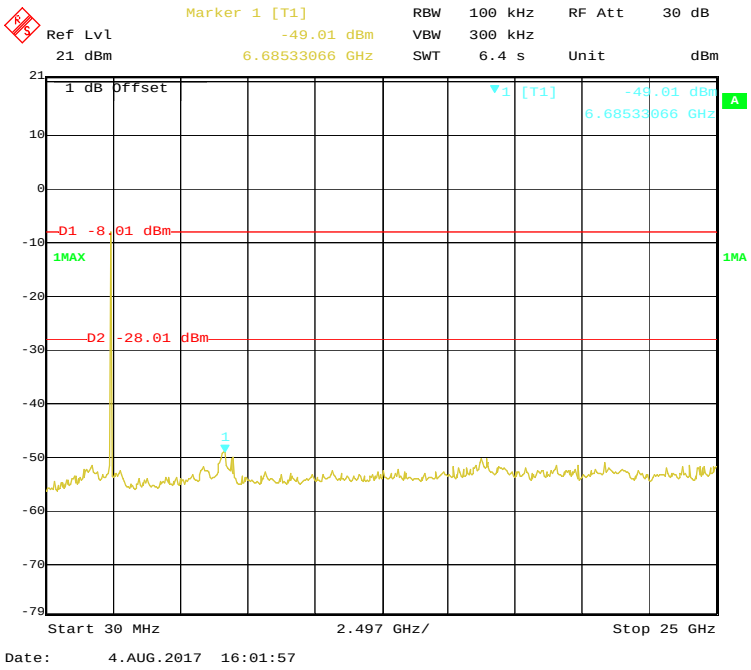
802.11n-HT40 Low Channel



802.11n-HT40 Middle Channel



802.11n-HT40 High Channel



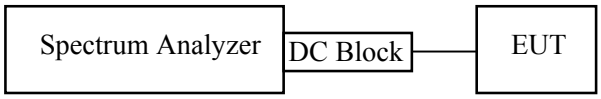
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

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:	24.8 ℃
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

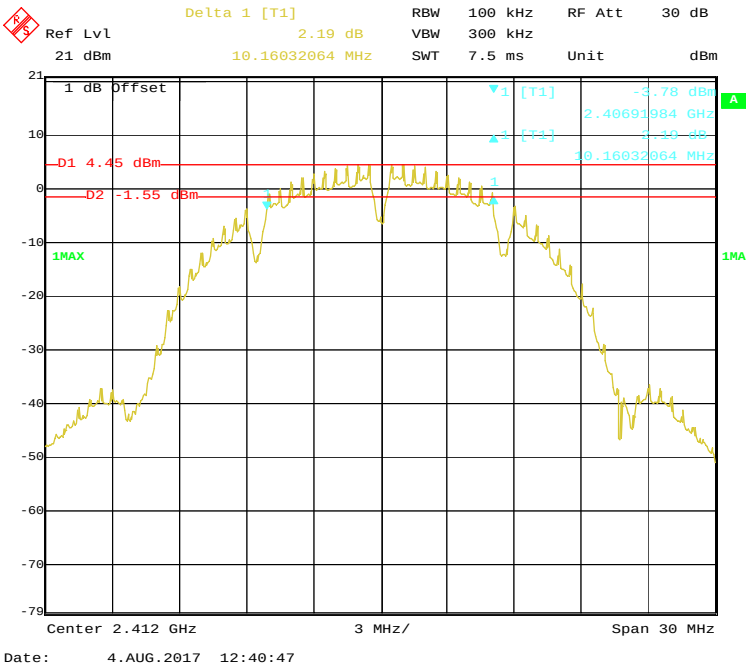
The testing was performed by Bernie Zhang on 2017-08-04.

Test Result: Pass.

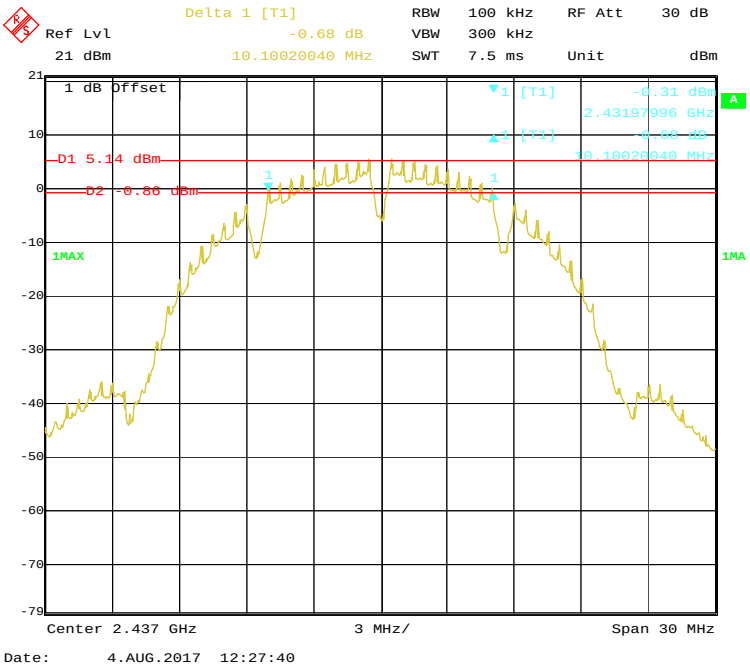
EUT operation mode: Transmitting

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b mode			
Low	2412	10.16	≥0.5
Middle	2437	10.10	≥0.5
High	2462	10.16	≥0.5
802.11g mode			
Low	2412	16.47	≥0.5
Middle	2437	16.47	≥0.5
High	2462	16.47	≥0.5
802.11n-HT20 mode			
Low	2412	17.62	≥0.5
Middle	2437	17.62	≥0.5
High	2462	17.62	≥0.5
802.11n-HT40 mode			
Low	2422	35.47	≥0.5
Middle	2437	35.48	≥0.5
High	2452	35.47	≥0.5

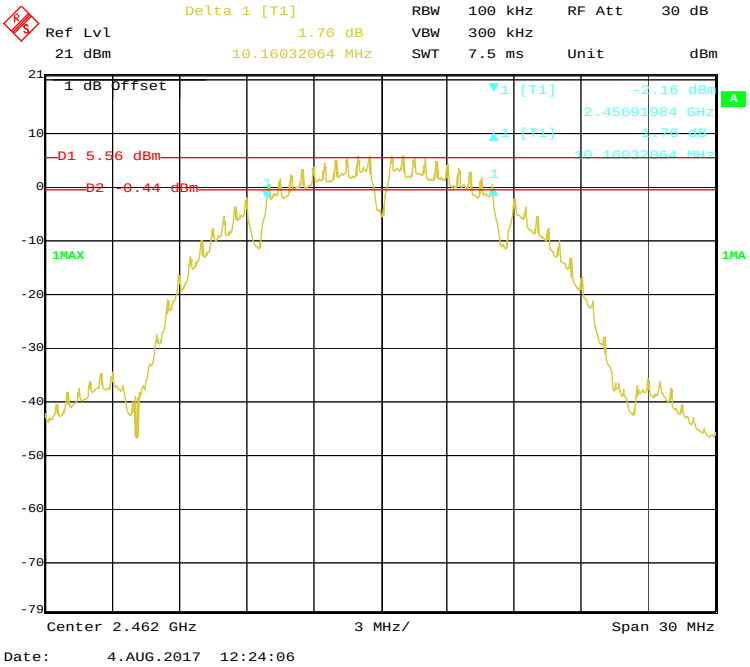
802.11b Low Channel



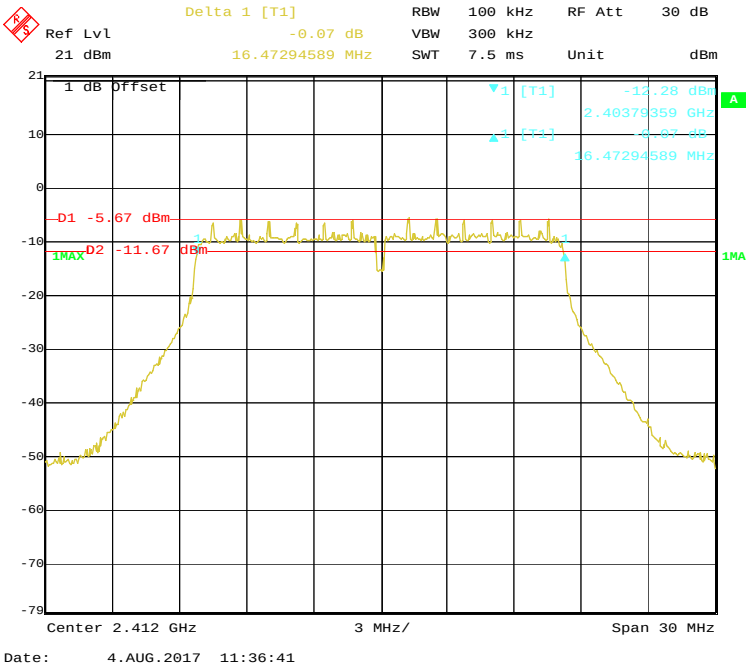
802.11b Middle Channel



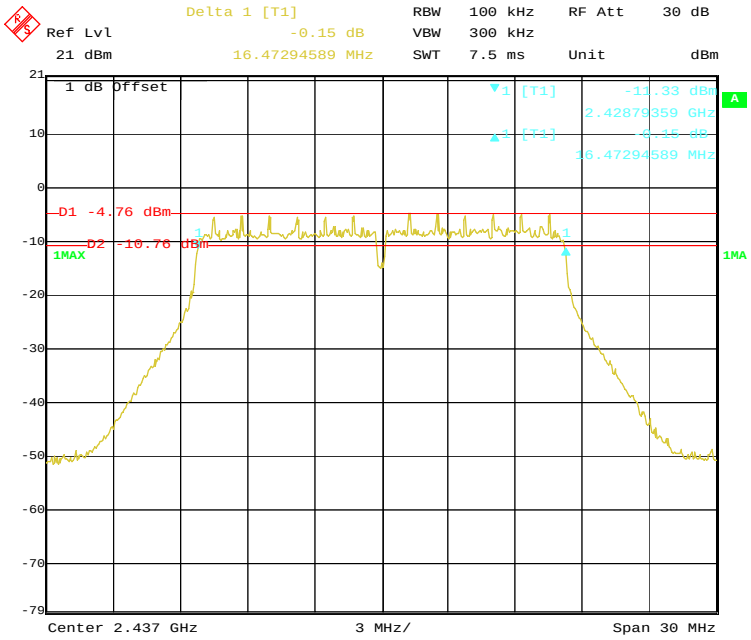
802.11b High Channel



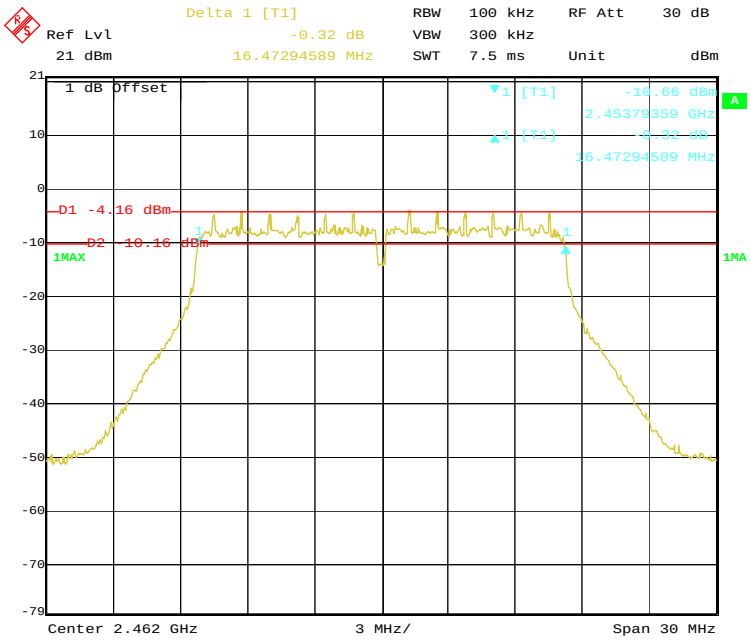
802.11g Low Channel



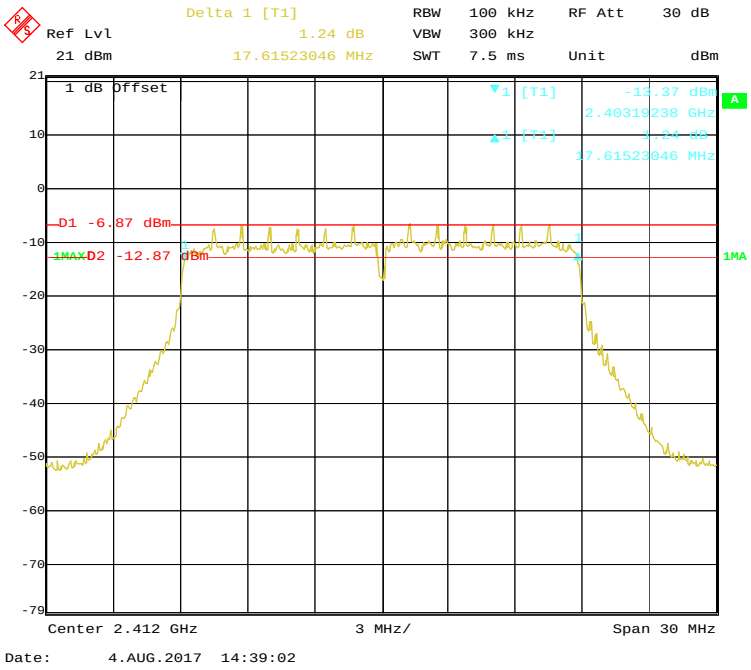
802.11g Middle Channel



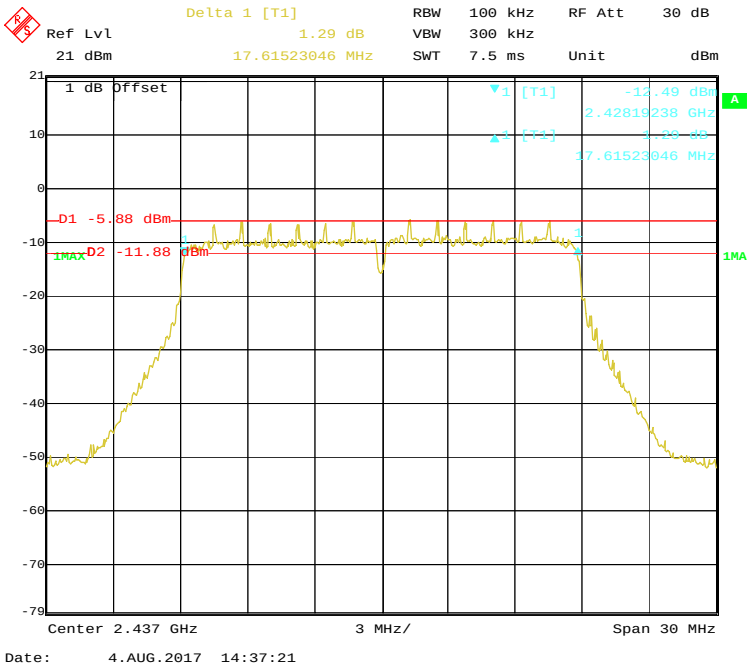
802.11g High Channel



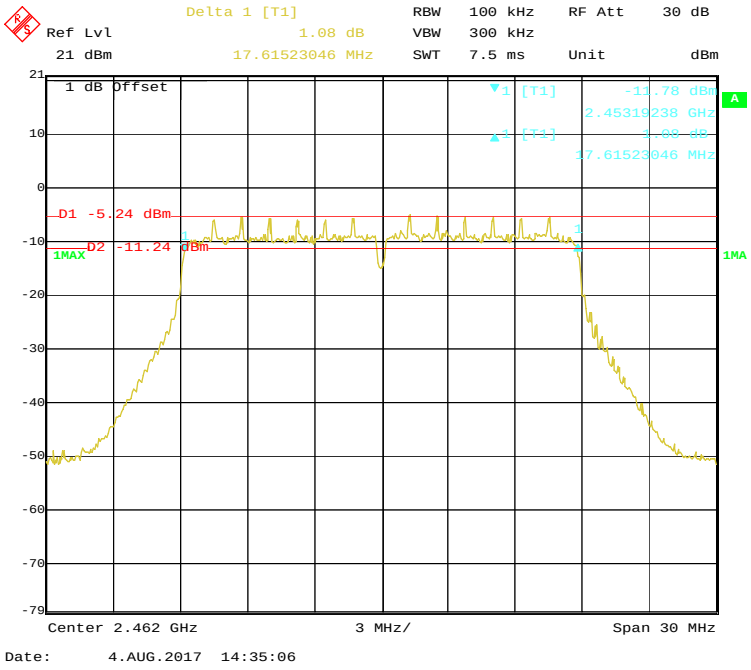
802.11n-HT20 Low Channel



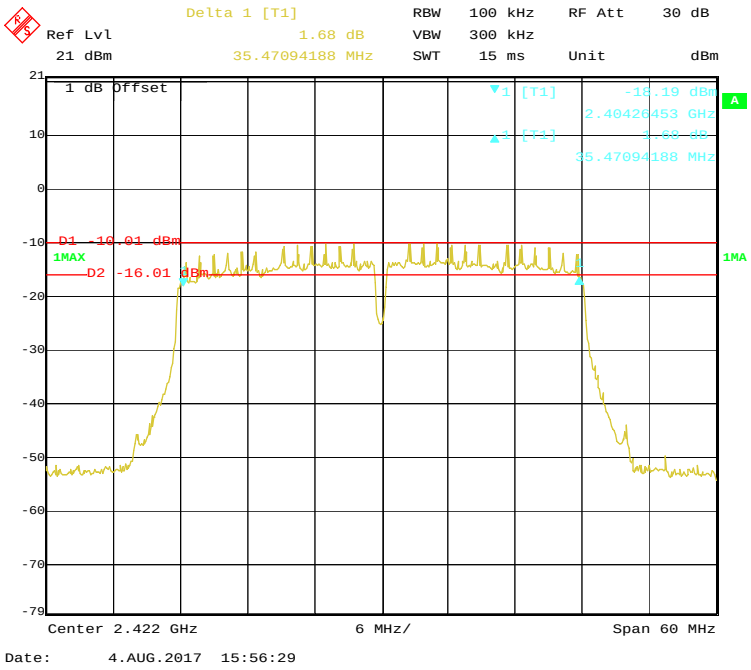
802.11n-HT20 Middle Channel



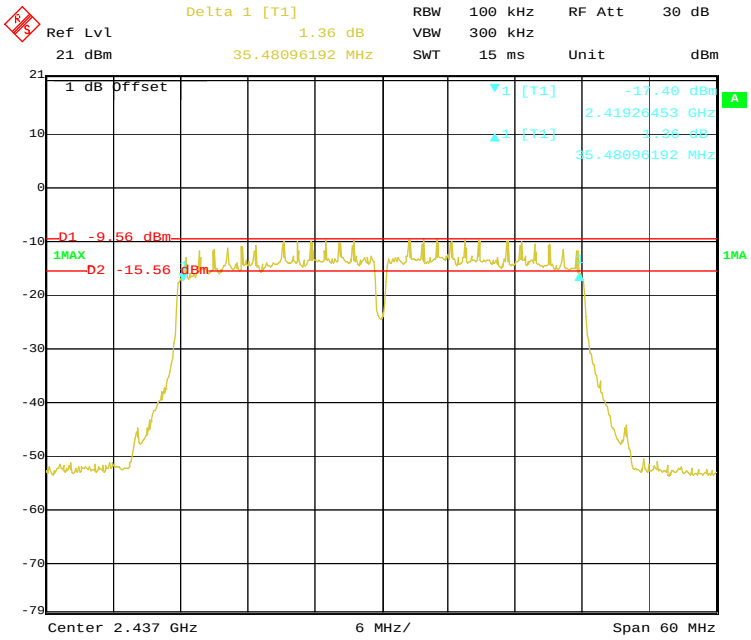
802.11n-HT20 High Channel



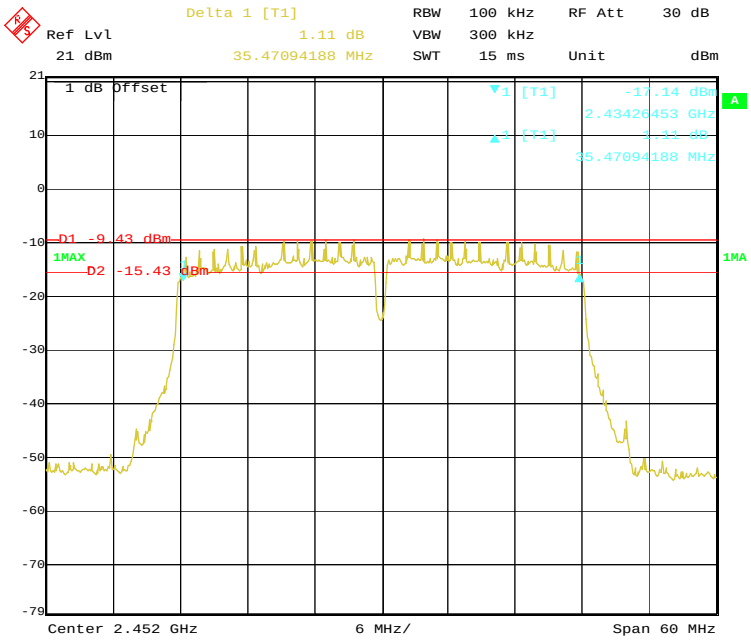
802.11n-HT40 Low Channel



802.11n-HT40 Middle Channel



802.11n-HT40 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:	24.5 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 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	16.90	30	Pass
Middle	2437	17.43	30	Pass
High	2462	17.90	30	Pass
802.11g				
Low	2412	14.14	30	Pass
Middle	2437	14.34	30	Pass
High	2462	14.79	30	Pass
802.11n-HT20				
Low	2412	11.99	30	Pass
Middle	2437	12.63	30	Pass
High	2462	13.05	30	Pass
802.11n-HT40				
Low	2422	11.65	30	Pass
Middle	2437	12.00	30	Pass
High	2452	12.48	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

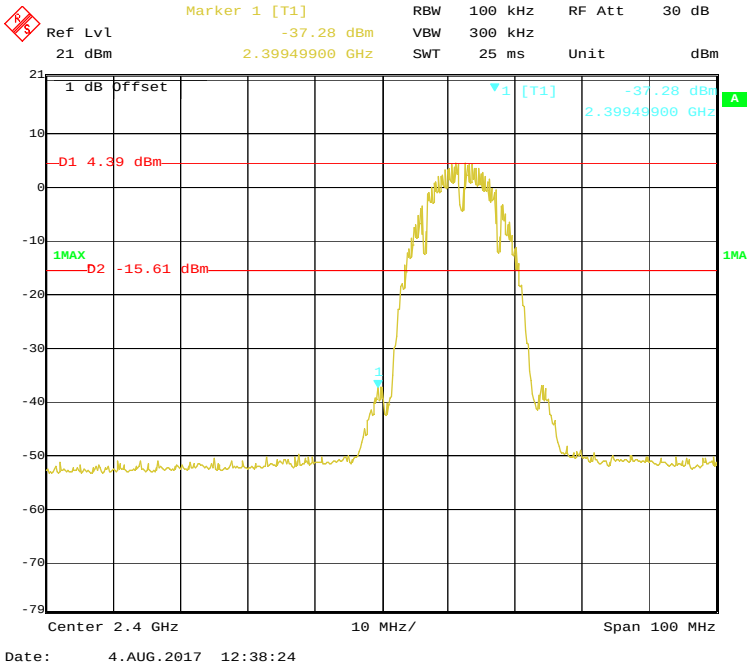
Temperature:	24.5 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

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

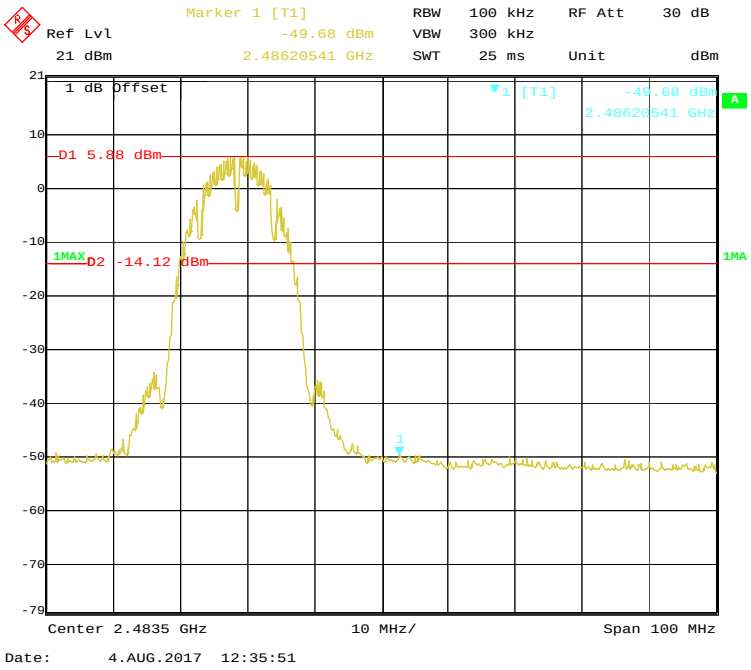
Test Result: *Compliance*

Band Edge

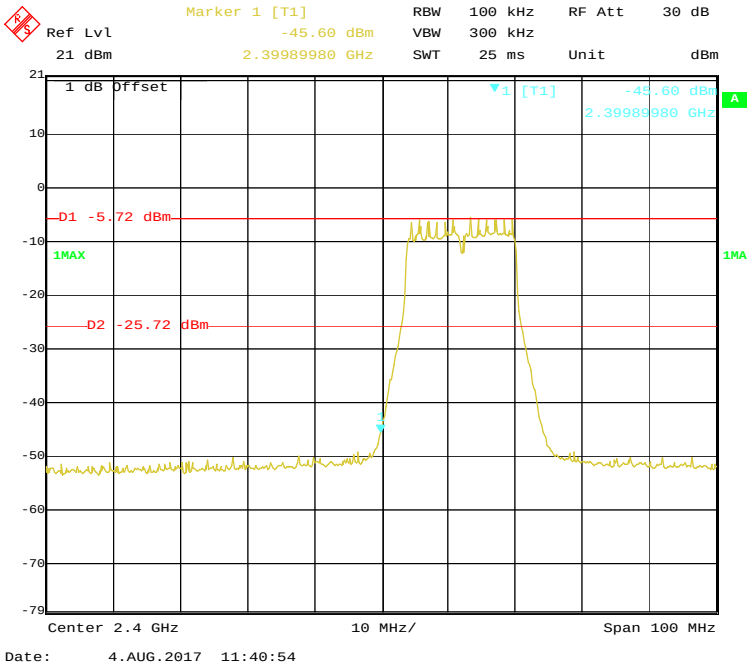
802.11b Mode Left Side



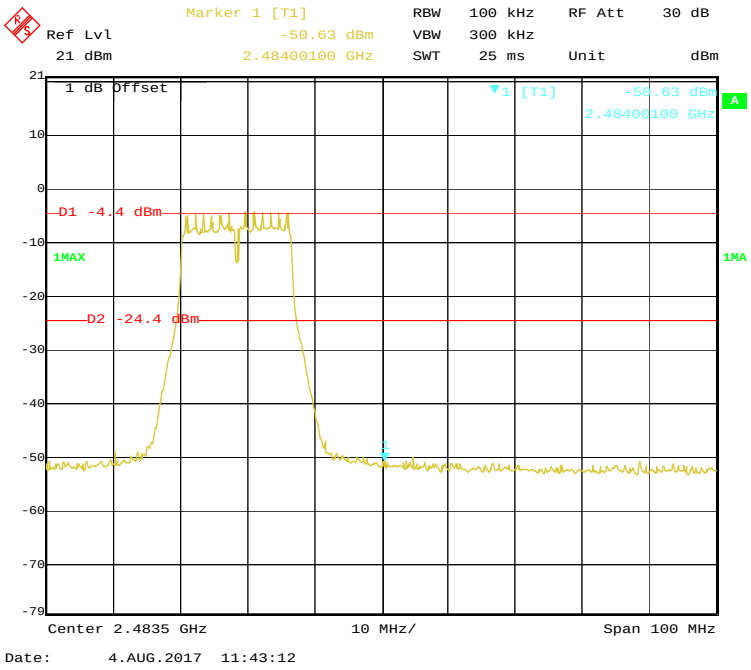
802.11b Mode Right Side



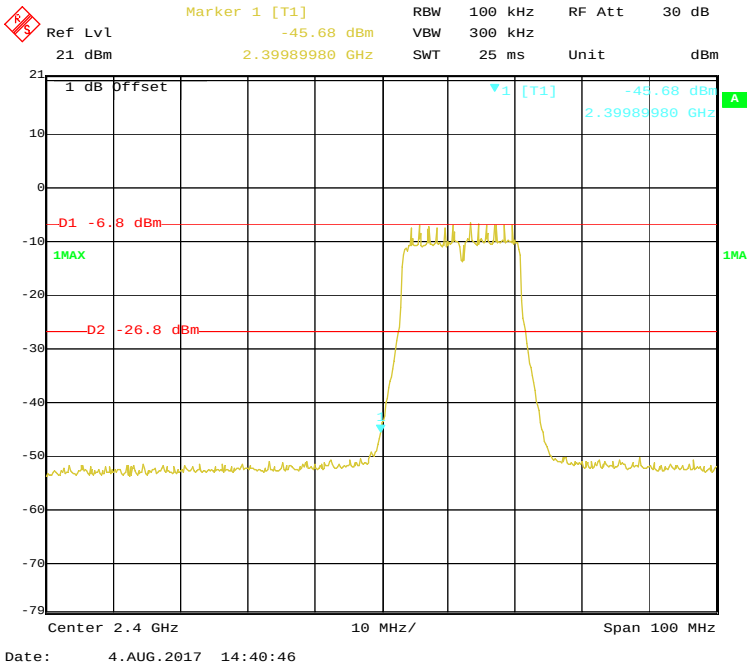
802.11g Mode Left Side



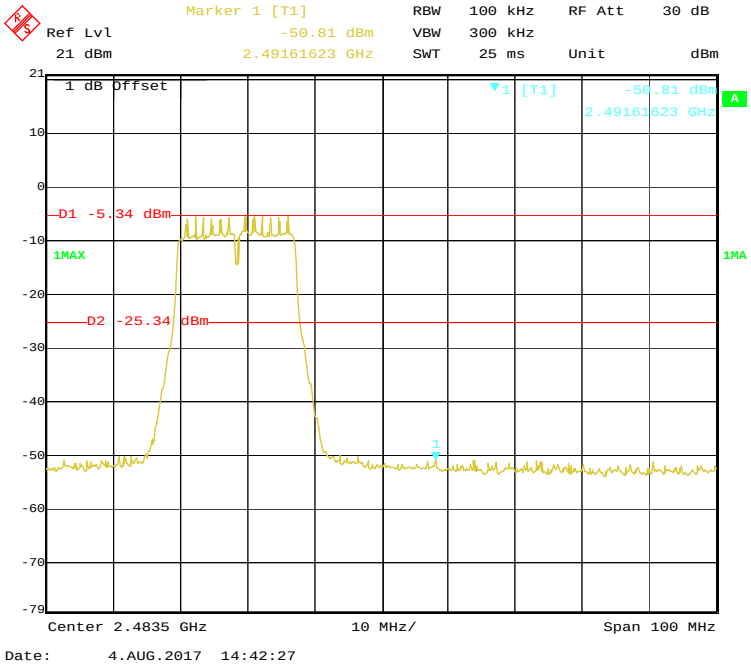
802.11g Mode Right Side



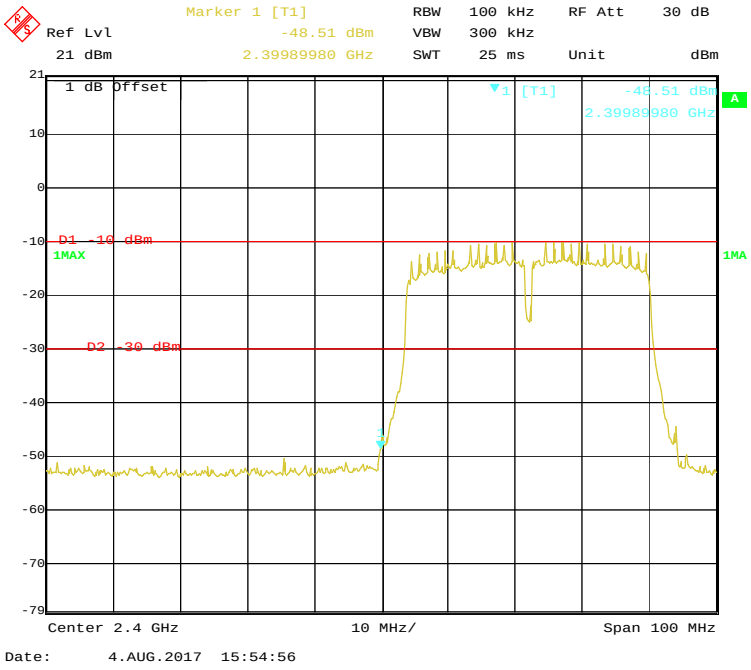
802.11n-HT20 Mode Left Side



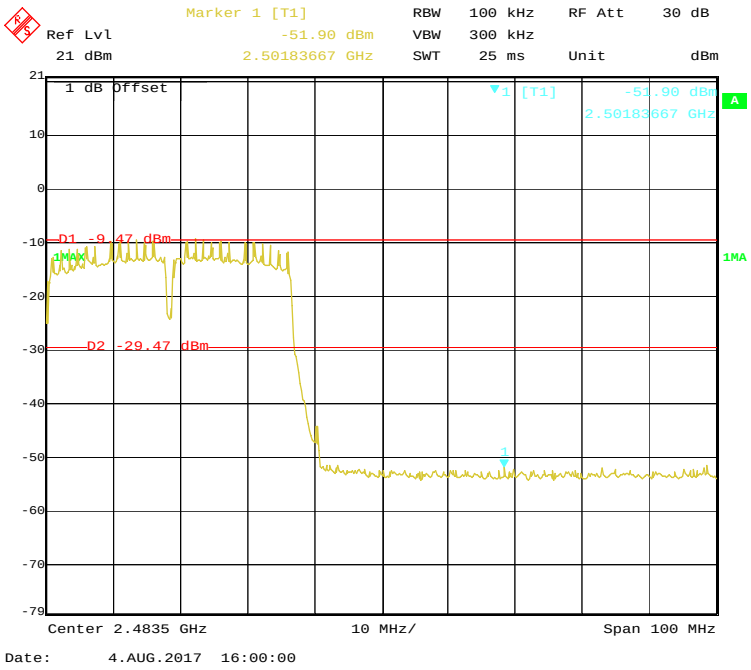
802.11n-HT20 Mode Right Side



802.11n-HT40 Mode Left Side



802.11n-HT40 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: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×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℃
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

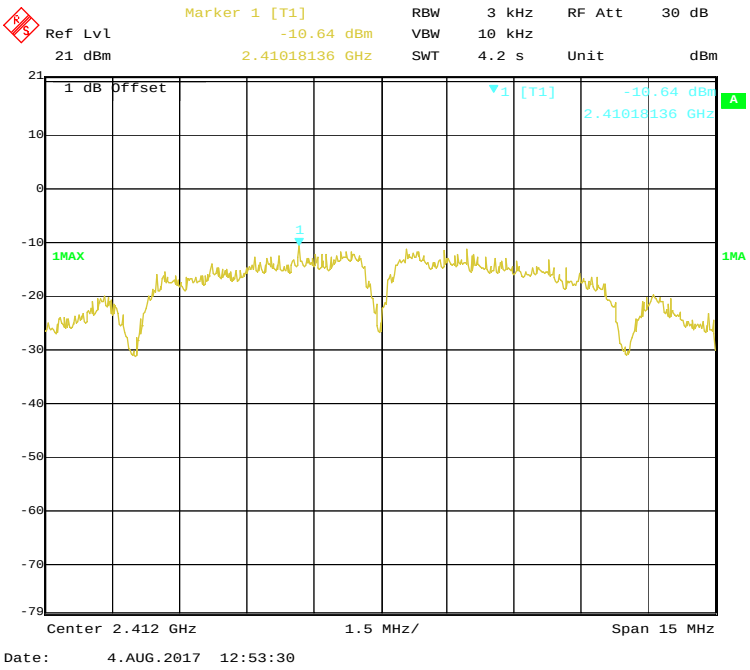
The testing was performed by Bernie Zhang on 2017-08-04.

EUT operation mode: Transmitting

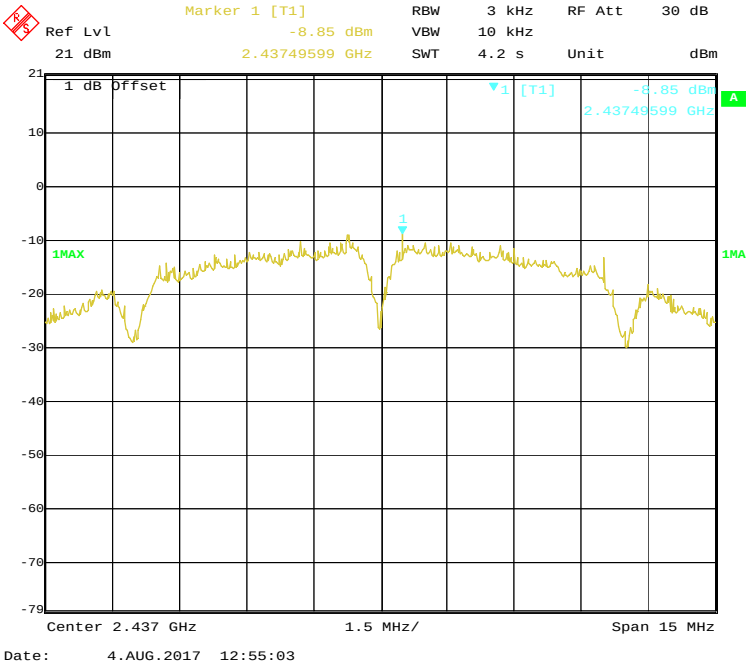
Test Result: Pass

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b mode			
Low	2412	-10.64	≤8
Middle	2437	-8.85	≤8
High	2462	-9.20	≤8
802.11g mode			
Low	2412	-20.13	≤8
Middle	2437	-18.31	≤8
High	2462	-17.88	≤8
802.11n-HT20 mode			
Low	2412	-18.07	≤8
Middle	2437	-17.53	≤8
High	2462	-17.51	≤8
802.11n-HT40 mode			
Low	2422	-23.96	≤8
Middle	2437	-23.48	≤8
High	2452	-23.23	≤8

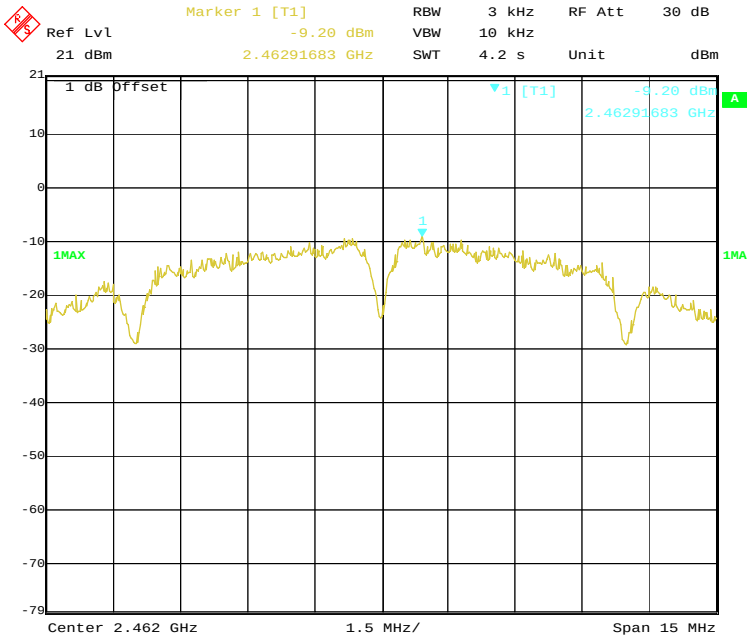
802.11b Low Channel



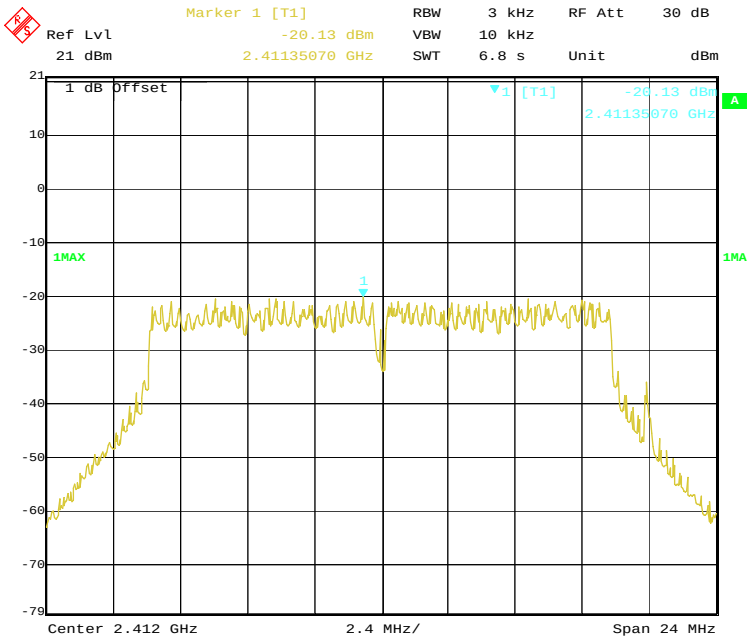
802.11b Middle Channel



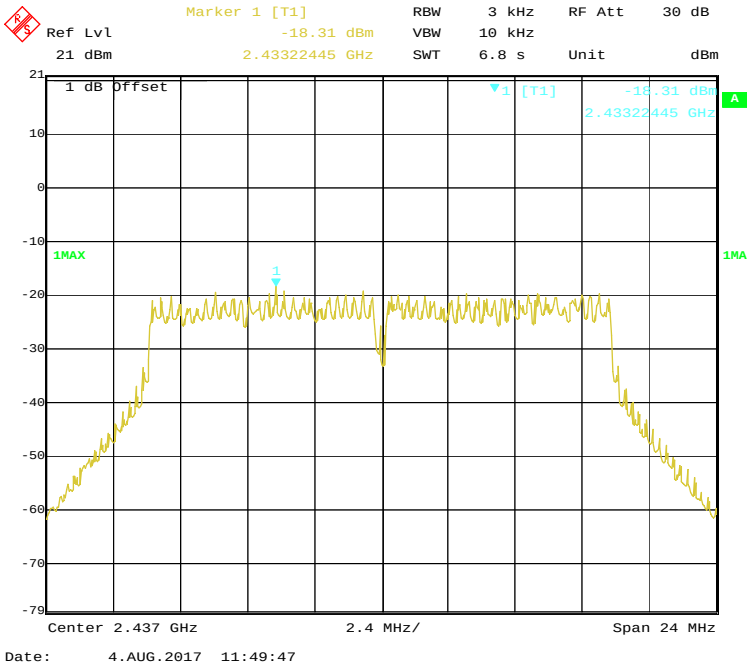
802.11b High Channel



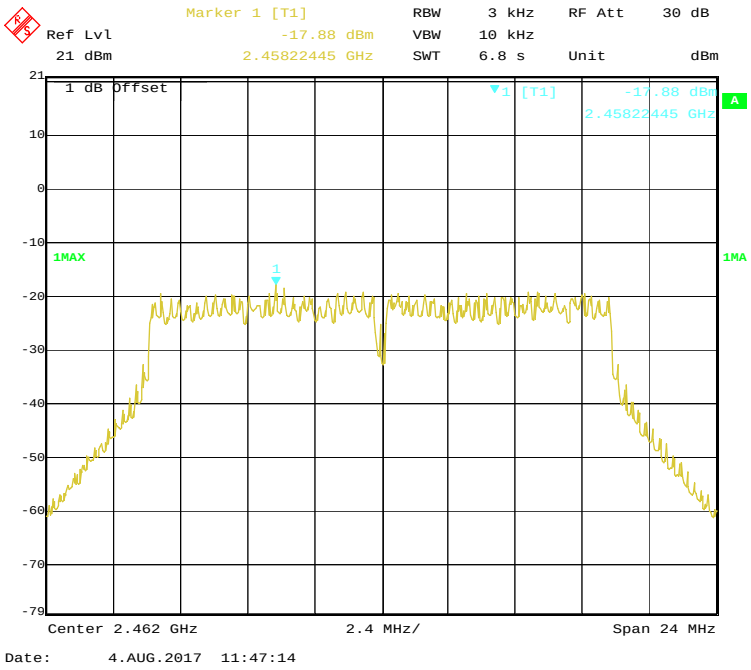
802.11g Low Channel



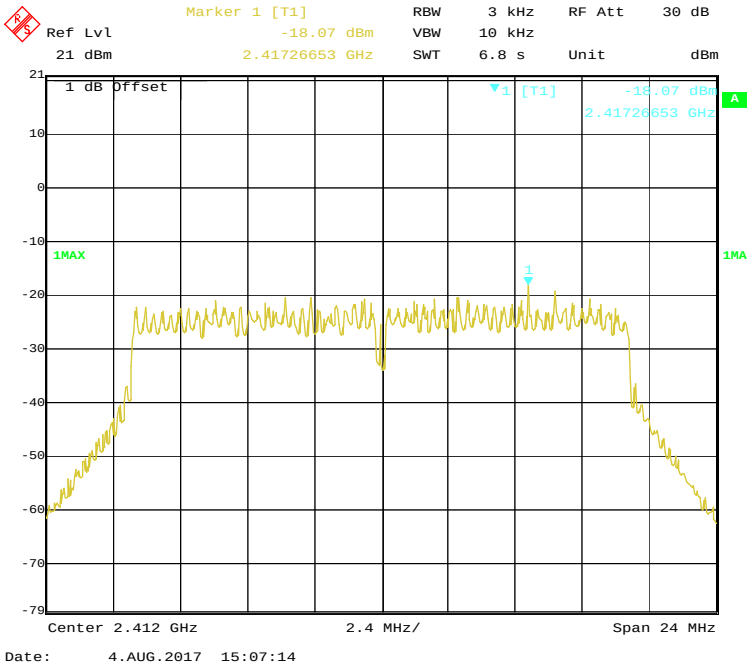
802.11g Middle Channel



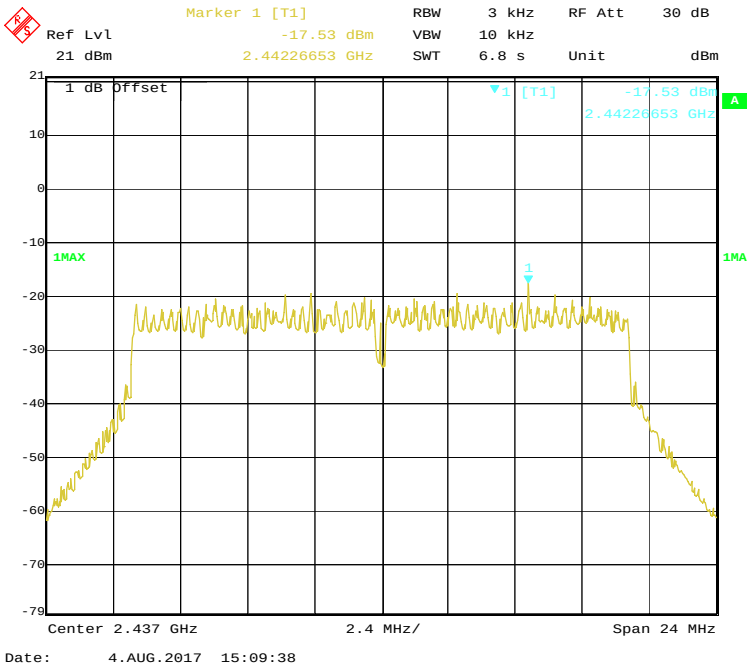
802.11g High Channel



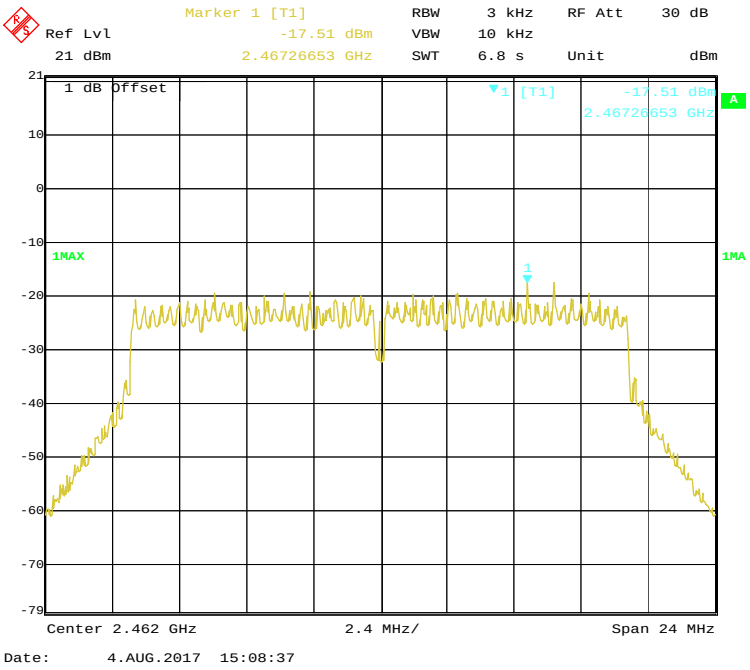
802.11n-HT20 Low Channel



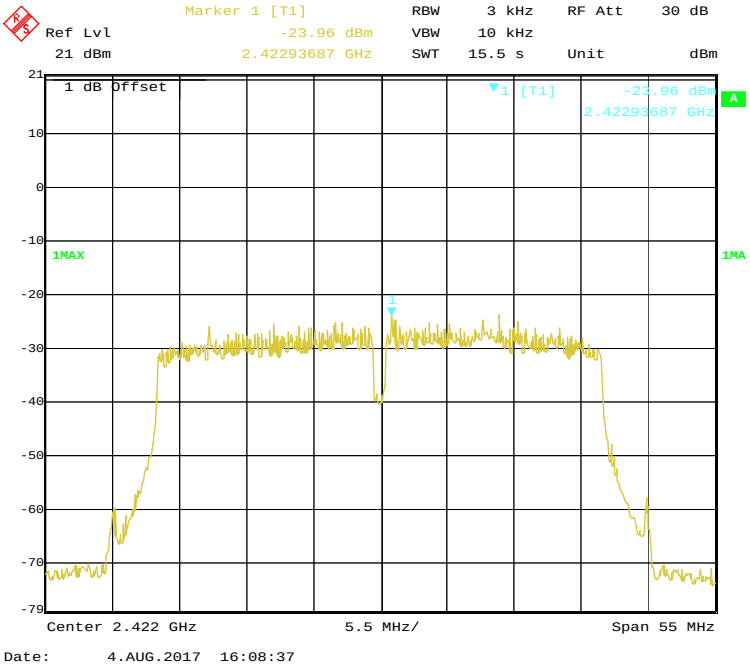
802.11n-HT20 Middle Channel



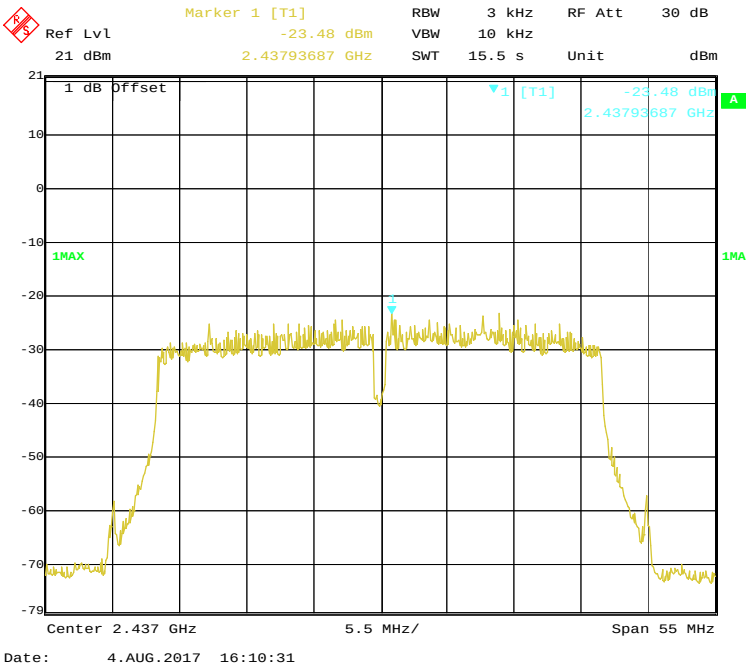
802.11n-HT20 High Channel



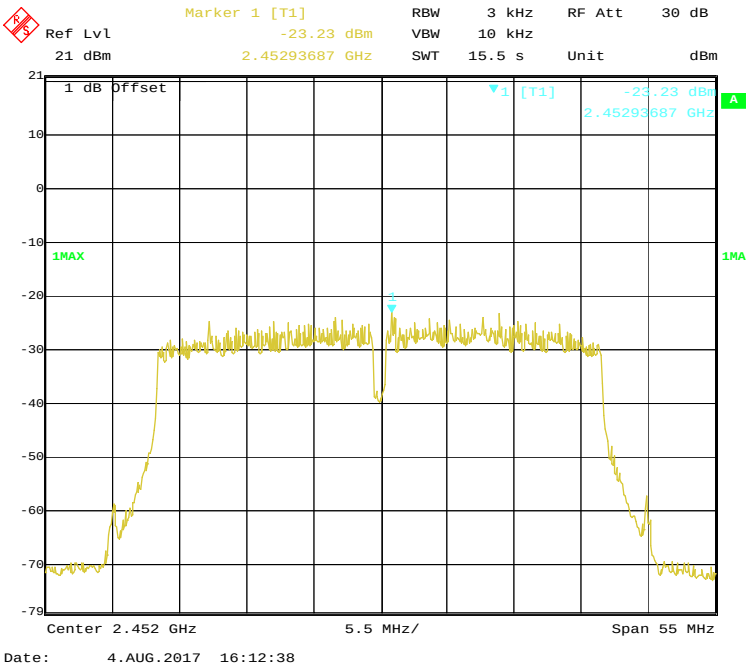
802.11n-HT40 Low Channel



802.11n-HT40 Middle Channel



802.11n-HT40 High Channel



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