FCC PART 15.247

TEST REPORT

For

VIRTUAL TRUNK PTE LTD

12 Kallang Avenue The Annex #04-30 Aperia, Singapore 339511

FCC ID: 2AKDA-VT36

Report Type:	**Product Type:**
Original Report	IP WALKIE TALKIE

Test Engineer:	Chris Wang
Report Number:	RKSA170915005-00D
Report Date:	2017-11-24
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	VIRTUAL TRUNK PTE LTD
Tested Model	VT36
Product Type	IP WALKIE TALKIE
Dimension	26.5 mm(L)×61.5 mm(W)×119.5 mm(H)
Power Supply	IP Walkie Talkie: DC 3.8V from battery and DC 5.0V charging by adapter Desktop Charger: DC 5.0V charging by adapter

Adapter Information:
Model: K2001U-1004UL
Input: AC 100-240V, 50/60 Hz, 0.35A Max
Output: DC 5V, 2000mA

**All measurement and test data in this report was gathered from production sample serial number: 20170915005. (Assigned by the BACL. The EUT supplied by the applicant was received on 2017-09-15)*

Objective

This report is prepared on behalf of VIRTUAL TRUNK PTE 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)

FCC Part 15.247 DSS, Part 15.247 DTS and Part 22H24E27 PCB submissions with FCC ID: 2AKDA-VT36.

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
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.

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SYSTEM TEST CONFIGURATION

Description of Test Configuration

Channel List For Wi-Fi:

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

For 802.11b, 802.11g and 802.11n-HT20 mode, EUT was tested with Channel 1, 6 and 11;

For 802.11n-HT40 mode, EUT was tested with Channel 3, 6 and 9.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

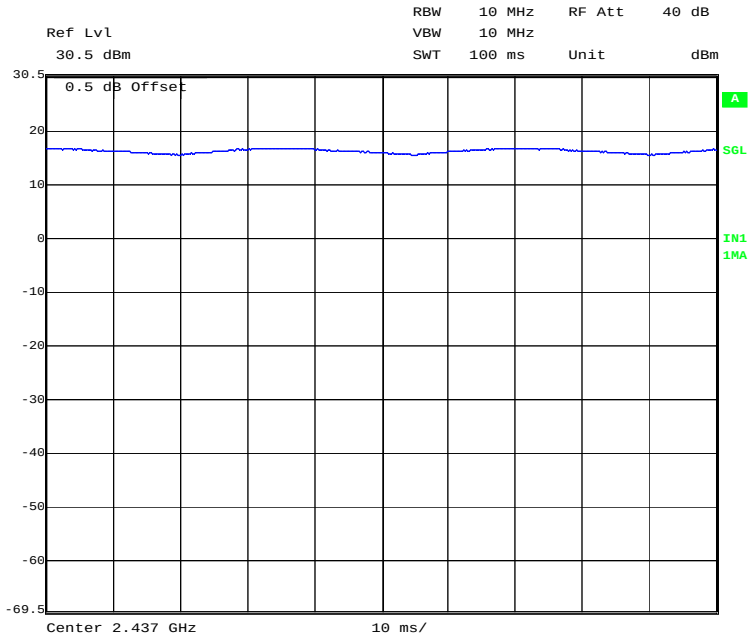
The EUT is tested in the engineering mode.

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

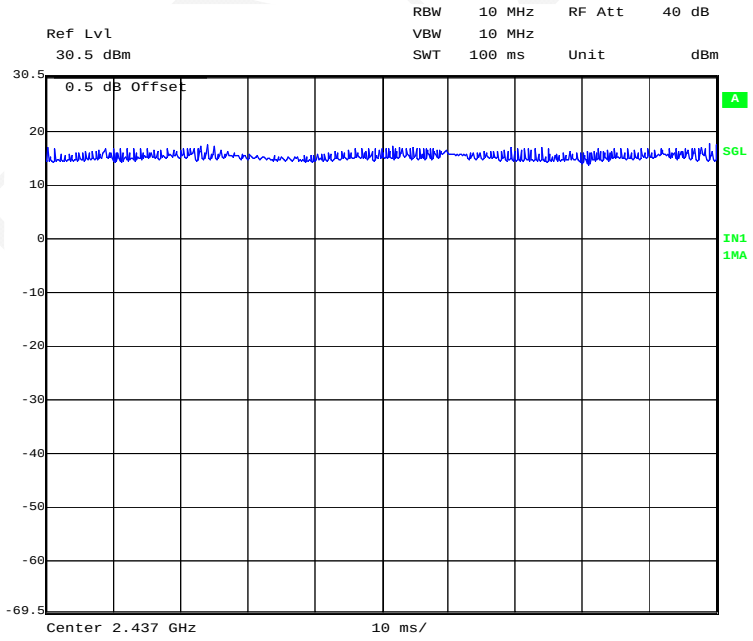
Mode	Data rate	Power level
802.11b	1 Mbps	19
802.11g	6 Mbps	17
802.11n-HT20	MCS0	17
802.11n-HT40	MCS0	17

Duty Cycle:

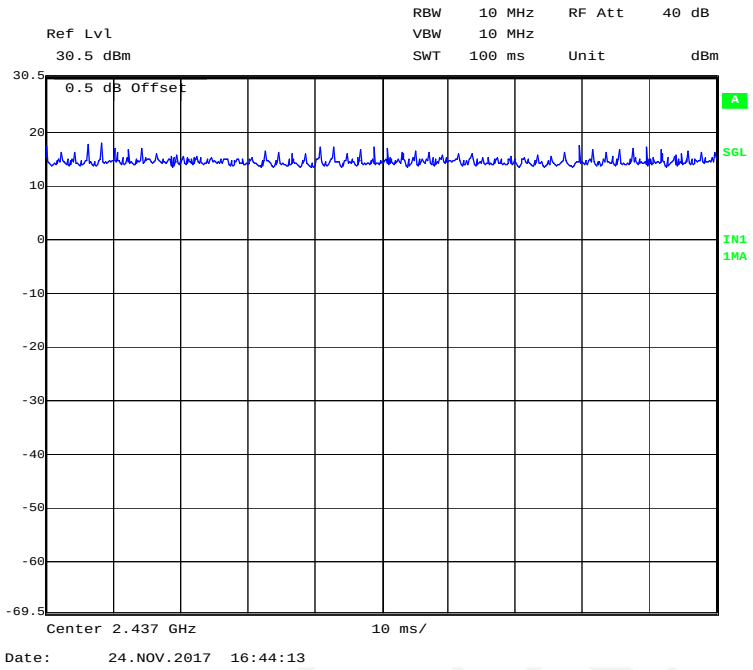
802.11b Mode Middle Channel



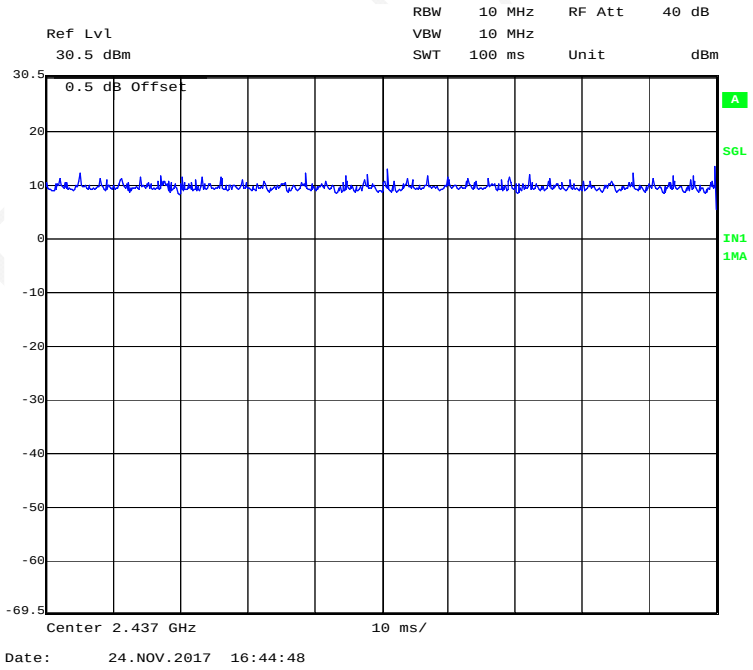
802.11g Mode Middle Channel



802.11n-HT20 Mode Middle Channel



802.11n-HT40 Mode Middle Channel



Mode	Duty Cycle	T(ms)	1/T(kHz)	VBW Setting	10log(1/x)
802.11b	100%	/	/	10Hz	0.00
802.11g	100%	/	/	10Hz	0.00
802.11n-HT20	100%	/	/	10Hz	0.00
802.11n-HT40	100%	/	/	10Hz	0.00

Note: "x" means the Duty Cycle.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

Cable Description	Shielding Type	Length (m)	From Port	To
USB Cable	Unshielding	0.8	EUT	Adapter

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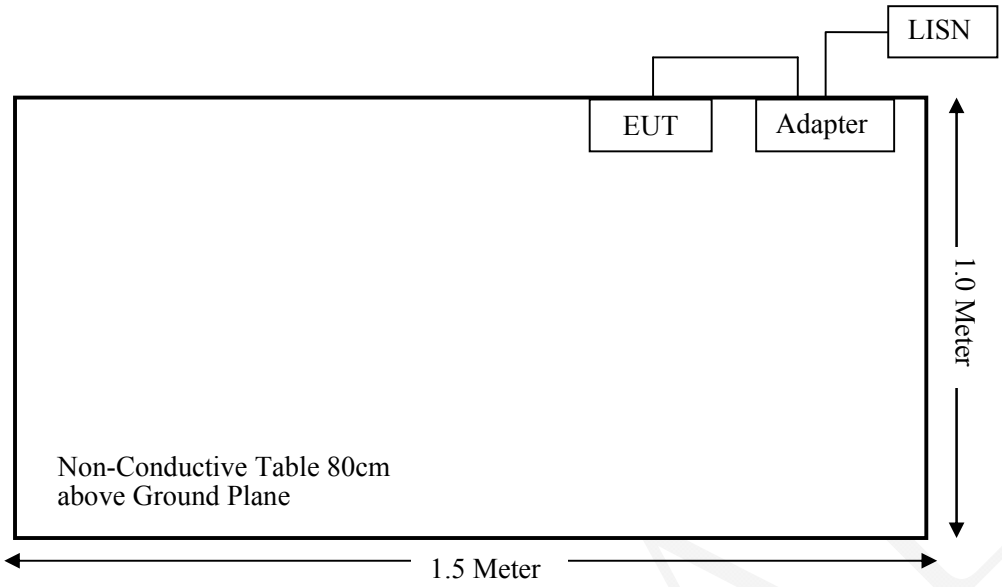
Block Diagram of Test Setup

For Conducted Emissions:



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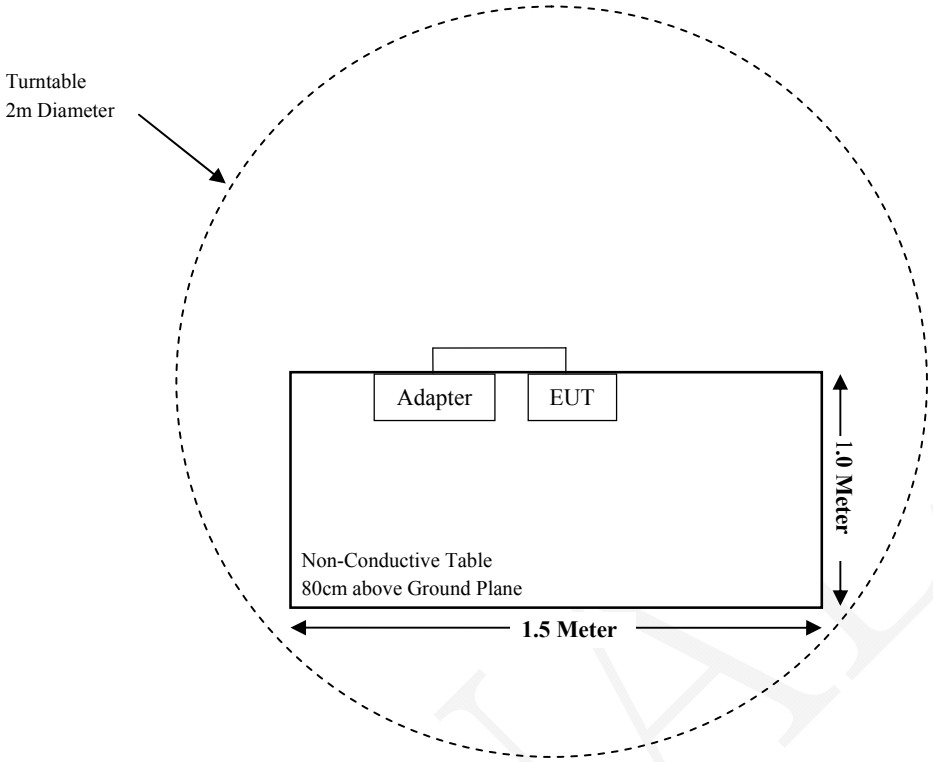
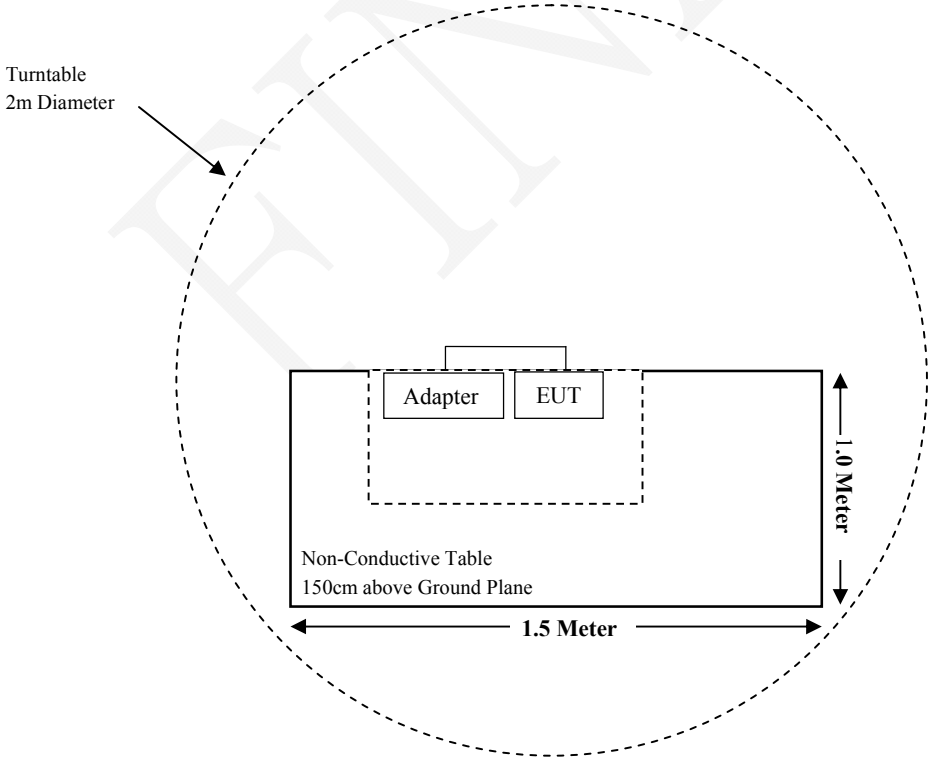
For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310& §2.1093	RF Exposure	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

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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 Instrunent	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	EMI Test Receiver	ESIB26	100146	2017-09-05	2018-09-04
Agilent	Power Meter	N1912A	MY5000492	2016-12-12	2017-12-11
Agilent	Power Sensor	N1921A	MY54210024	2016-12-12	2017-12-11
VIRTUAL	RF Cable	/	/	/	/
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 §1.1307(b) & §2.1093 - RF EXPOSURE INFORMATION

Applicable Standard

FCC§1.1307,§2.1093.

Test Result

Compliance, please refer to the SAR report: RSH170921050-20.

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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 Monopole antenna arrangement for Wi-Fi, which the antenna gain is 0 dBi; fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

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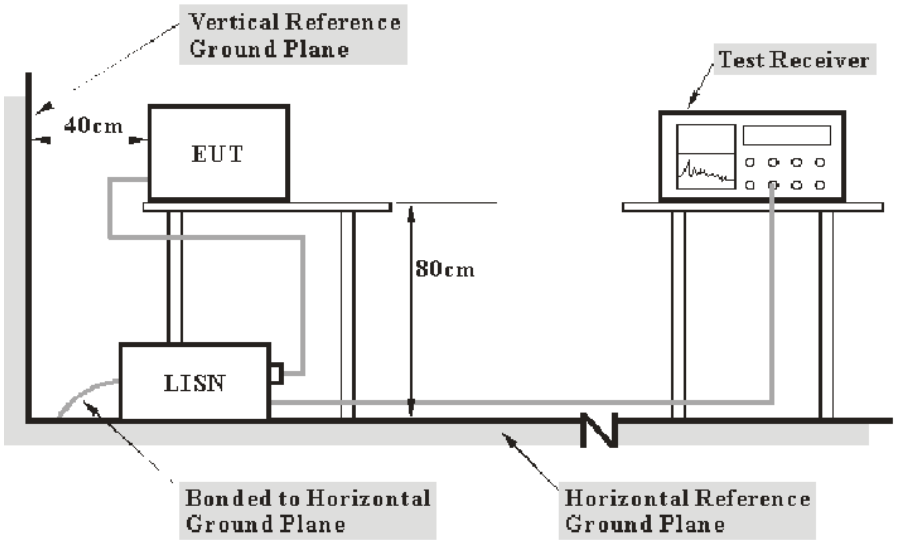
FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

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 – Reading

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:	24.6℃
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

The testing was performed by Chris Wang on 2017-09-28.

EUT operation mode: Transmitting in 802.11n-HT20 mode middle channel. (worst case)

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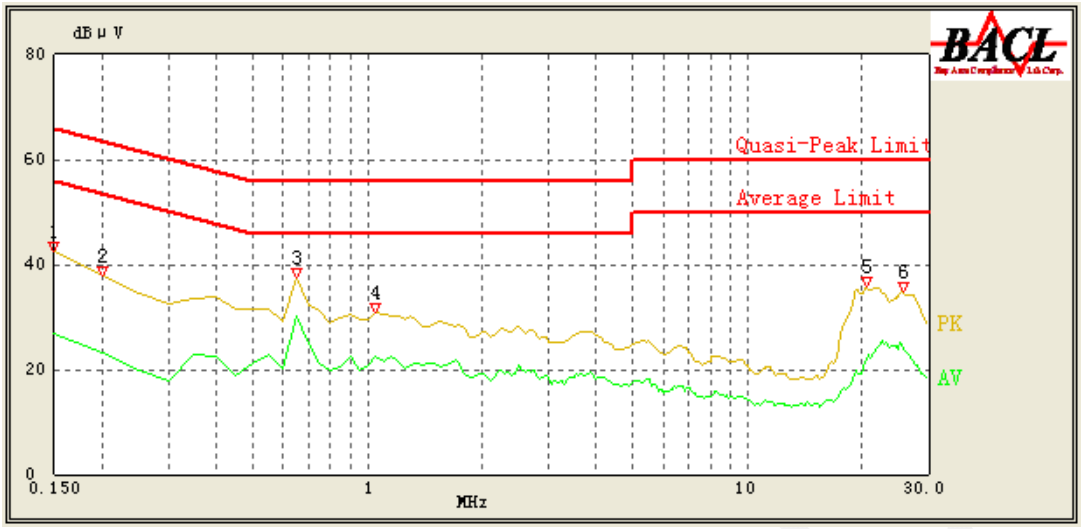
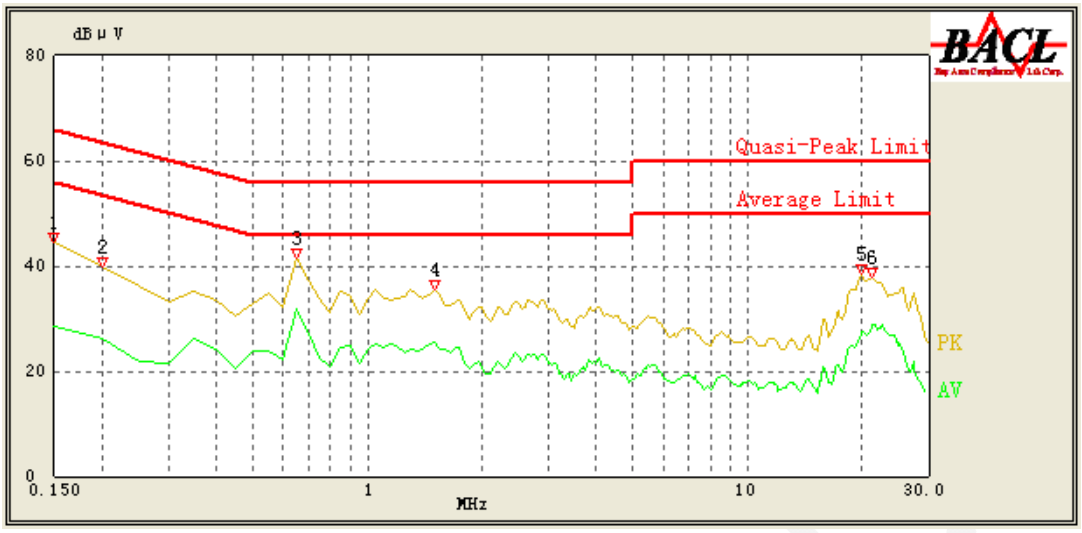
AC 120V/60 Hz, Line



Frequency (MHz)	Reading (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corr. (dB)	Limit (dB μ V)	Margin (dB)	Comment
0.150	42.52	QP	9.000	L1	16.06	66.00	23.48	Compliance
0.150	26.75	AV	9.000	L1	16.06	56.00	29.25	Compliance
0.200	37.83	QP	9.000	L1	16.01	64.57	26.74	Compliance
0.200	23.29	AV	9.000	L1	16.01	54.57	31.28	Compliance
0.650	37.49	QP	9.000	L1	15.98	56.00	18.51	Compliance
0.650	30.15	AV	9.000	L1	15.98	46.00	15.85	Compliance
1.050	30.85	QP	9.000	L1	15.88	56.00	25.15	Compliance
1.050	22.43	AV	9.000	L1	15.88	46.00	23.57	Compliance
20.550	35.78	QP	9.000	L1	16.44	60.00	24.22	Compliance
20.550	21.89	AV	9.000	L1	16.44	50.00	28.11	Compliance
25.700	34.69	QP	9.000	L1	16.48	60.00	25.31	Compliance
25.700	24.05	AV	9.000	L1	16.48	50.00	25.95	Compliance

AC 120V/60 Hz, Neutral



Frequency (MHz)	Reading (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corr. (dB)	Limit (dB μ V)	Margin (dB)	Comment
0.150	44.59	QP	9.000	N	16.06	66.00	21.41	Compliance
0.150	28.60	AV	9.000	N	16.06	56.00	27.40	Compliance
0.200	39.77	QP	9.000	N	16.05	64.57	24.80	Compliance
0.200	26.30	AV	9.000	N	16.05	54.57	28.27	Compliance
0.650	41.39	QP	9.000	N	16.02	56.00	14.61	Compliance
0.650	31.94	AV	9.000	N	16.02	46.00	14.06	Compliance
1.500	35.64	QP	9.000	N	15.92	56.00	20.36	Compliance
1.500	25.43	AV	9.000	N	15.92	46.00	20.57	Compliance
19.900	38.46	QP	9.000	N	16.16	60.00	21.54	Compliance
19.900	27.39	AV	9.000	N	16.16	50.00	22.61	Compliance
21.250	37.81	QP	9.000	N	16.18	60.00	22.19	Compliance
21.250	28.32	AV	9.000	N	16.18	50.00	21.68	Compliance

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

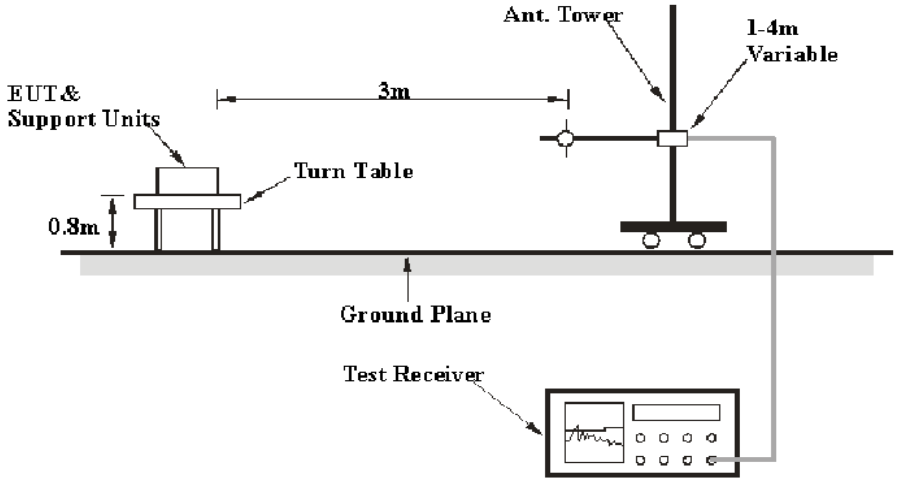
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

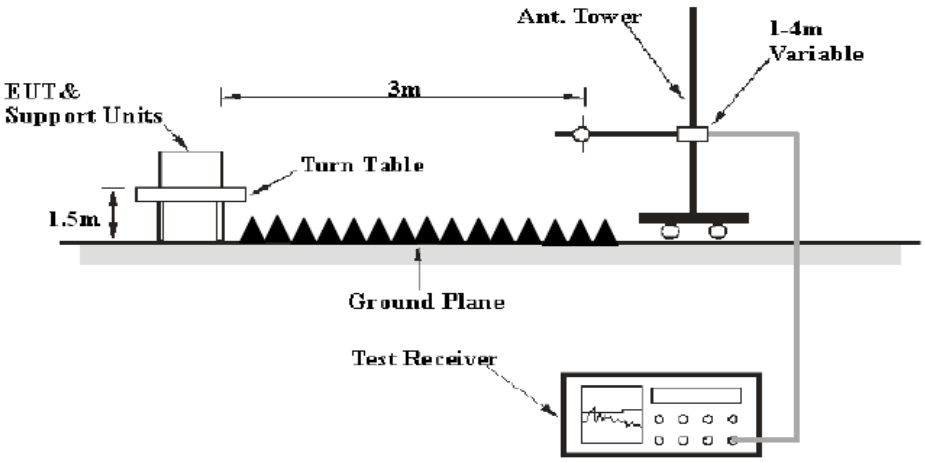
FCC §15.247 (d); §15.209; §15.205;

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	Item	RBW	Video B/W	Duty cycle	Detector
1GHz – 25GHz	PK Value	1MHz	3 MHz	Any	PK
	AV Value	1MHz	10 Hz	>98%	
		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 detection mode 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:	24.6℃
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

The testing was performed by Chris Wang on 2017-11-24.

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)	PK/QP/Ave.		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
261.64	34.78	QP	179	207	H	-12.22	22.56	46.00	23.44
2412.00	107.61	PK	172	244	V	-4.90	102.71	/	/
2412.00	105.05	Ave	172	244	V	-4.90	100.15	/	/
2412.00	109.09	PK	205	136	H	-4.90	104.19	/	/
2412.00	106.53	Ave	205	136	H	-4.90	101.63	/	/
2390.00	43.68	PK	118	163	H	-4.96	38.72	74.00	35.28
2390.00	34.66	Ave	118	163	H	-4.96	29.70	54.00	24.30
1673.40	38.59	PK	240	247	V	-7.35	31.24	74.00	42.76
1673.40	27.13	Ave	240	247	V	-7.35	19.78	54.00	34.22
3774.80	39.96	PK	304	155	V	0.03	39.99	74.00	34.01
3774.80	28.92	Ave	304	155	V	0.03	28.95	54.00	25.05
4824.00	47.60	PK	170	174	H	2.52	50.12	74.00	23.88
4824.00	37.33	Ave	170	174	H	2.52	39.85	54.00	14.15
7236.00	36.19	PK	32	153	H	9.83	46.02	74.00	27.98
7236.00	25.05	Ave	32	153	H	9.83	34.88	54.00	19.12

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
261.64	34.43	QP	196	212	H	-12.22	22.21	46.00	23.79
2437.00	107.37	PK	95	182	V	-4.83	102.54	/	/
2437.00	104.81	Ave	95	182	V	-4.83	99.98	/	/
2437.00	108.72	PK	238	217	H	-4.83	103.89	/	/
2437.00	106.16	Ave	238	217	H	-4.83	101.33	/	/
1673.40	38.57	PK	153	214	V	-7.35	31.22	74.00	42.78
1673.40	27.10	Ave	153	214	V	-7.35	19.75	54.00	34.25
3774.80	40.00	PK	245	203	V	0.03	40.03	74.00	33.97
3774.80	28.94	Ave	245	203	V	0.03	28.97	54.00	25.03
4874.00	47.31	PK	177	101	H	2.63	49.94	74.00	24.06
4874.00	42.47	Ave	177	101	H	2.63	45.10	54.00	8.90
6742.80	38.40	PK	277	124	H	8.86	47.26	74.00	26.74
6742.80	26.67	Ave	277	124	H	8.86	35.53	54.00	18.47
7311.00	35.81	PK	50	242	H	9.95	45.76	74.00	28.24
7311.00	24.58	Ave	50	242	H	9.95	34.53	54.00	19.47
High Channel (2462 MHz)									
261.64	34.44	QP	209	216	H	-12.22	22.22	46.00	23.78
2462.00	107.57	PK	212	113	V	-4.76	102.81	/	/
2462.00	105.01	Ave	212	113	V	-4.76	100.25	/	/
2462.00	109.00	PK	298	237	H	-4.76	104.24	/	/
2462.00	106.44	Ave	298	237	H	-4.76	101.68	/	/
2483.50	47.89	PK	164	106	H	-4.71	43.18	74.00	30.82
2483.50	39.81	Ave	164	106	H	-4.71	35.10	54.00	18.90
3774.80	40.08	PK	145	210	V	0.03	40.11	74.00	33.89
3774.80	29.02	Ave	145	210	V	0.03	29.05	54.00	24.95
4924.00	47.27	PK	360	145	H	2.74	50.01	74.00	23.99
4924.00	42.40	Ave	360	145	H	2.74	45.14	54.00	8.86
6742.80	38.39	PK	68	147	V	8.86	47.25	74.00	26.75
6742.80	26.68	Ave	68	147	V	8.86	35.54	54.00	18.46
7386.00	35.72	PK	11	193	H	10.06	45.78	74.00	28.22
7386.00	24.55	Ave	11	193	H	10.06	34.61	54.00	19.39

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)	PK/QP/Ave.		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
261.64	34.64	QP	110	245	H	-12.22	22.42	46.00	23.58
2412.00	101.38	PK	88	151	V	-4.90	96.48	/	/
2412.00	93.79	Ave	88	151	V	-4.90	88.89	/	/
2412.00	103.51	PK	197	247	H	-4.90	98.61	/	/
2412.00	95.92	Ave	197	247	H	-4.90	91.02	/	/
2390.00	58.01	PK	86	209	H	-4.96	53.05	74.00	20.95
2390.00	42.30	Ave	86	209	H	-4.96	37.34	54.00	16.66
1455.00	40.22	PK	14	158	V	-8.38	31.84	74.00	42.16
1455.00	29.03	Ave	14	158	V	-8.38	20.65	54.00	33.35
3807.00	40.44	PK	328	245	V	0.14	40.58	74.00	33.42
3807.00	29.00	Ave	328	245	V	0.14	29.14	54.00	24.86
4824.00	43.53	PK	312	192	H	2.52	46.05	74.00	27.95
4824.00	33.02	Ave	312	192	H	2.52	35.54	54.00	18.46
7236.00	35.42	PK	61	154	H	9.83	45.25	74.00	28.75
7236.00	24.62	Ave	61	154	H	9.83	34.45	54.00	19.55
Middle Channel (2437 MHz)									
261.64	34.52	QP	20	160	H	-12.22	22.30	46.00	23.70
2437.00	101.07	PK	95	221	V	-4.83	96.24	/	/
2437.00	93.23	Ave	95	221	V	-4.83	88.40	/	/
2437.00	103.11	PK	321	132	H	-4.83	98.28	/	/
2437.00	95.27	Ave	321	132	H	-4.83	90.44	/	/
1455.00	40.20	PK	302	158	V	-8.38	31.82	74.00	42.18
1455.00	29.06	Ave	302	158	V	-8.38	20.68	54.00	33.32
3807.00	40.37	PK	25	233	H	0.14	40.51	74.00	33.49
3807.00	28.93	Ave	25	233	H	0.14	29.07	54.00	24.93
4874.00	43.22	PK	72	191	H	2.63	45.85	74.00	28.15
4874.00	32.68	Ave	72	191	H	2.63	35.31	54.00	18.69
6573.40	39.04	PK	162	140	V	8.45	47.49	74.00	26.51
6573.40	27.24	Ave	162	140	V	8.45	35.69	54.00	18.31
7311.00	35.39	PK	154	135	H	9.95	45.34	74.00	28.66
7311.00	24.53	Ave	154	135	H	9.95	34.48	54.00	19.52

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
261.64	34.66	QP	251	227	H	-12.22	22.44	46.00	23.56
2462.00	100.62	PK	131	120	V	-4.76	95.86	/	/
2462.00	92.78	Ave	131	120	V	-4.76	88.02	/	/
2462.00	102.99	PK	251	124	H	-4.76	98.23	/	/
2462.00	95.15	Ave	251	124	H	-4.76	90.39	/	/
2483.50	66.72	PK	345	173	H	-4.71	62.01	74.00	11.99
2483.50	51.34	Ave	345	173	H	-4.71	46.63	54.00	7.37
3807.00	40.40	PK	222	229	V	0.14	40.54	74.00	33.46
3807.00	28.91	Ave	222	229	V	0.14	29.05	54.00	24.95
4924.00	43.22	PK	341	128	H	2.74	45.96	74.00	28.04
4924.00	32.71	Ave	341	128	H	2.74	35.45	54.00	18.55
6573.40	39.02	PK	312	248	V	8.45	47.47	74.00	26.53
6573.40	27.16	Ave	312	248	V	8.45	35.61	54.00	18.39
7386.00	35.26	PK	34	170	H	10.06	45.32	74.00	28.68
7386.00	24.44	Ave	34	170	H	10.06	34.50	54.00	19.50

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)	PK/QP/Ave.		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
261.64	34.36	QP	310	127	H	-12.22	22.14	46.00	23.86
2412.00	99.51	PK	160	109	V	-4.90	94.61	/	/
2412.00	91.84	Ave	160	109	V	-4.90	86.94	/	/
2412.00	101.29	PK	19	238	H	-4.90	96.39	/	/
2412.00	93.62	Ave	19	238	H	-4.90	88.72	/	/
2390.00	62.63	PK	20	124	H	-4.96	57.67	74.00	16.33
2390.00	41.92	Ave	20	124	H	-4.96	36.96	54.00	17.04
1562.80	39.18	PK	54	180	V	-7.80	31.38	74.00	42.62
1562.80	28.57	Ave	54	180	V	-7.80	20.77	54.00	33.23
3921.80	41.66	PK	60	162	V	0.53	42.19	74.00	31.81
3921.80	28.85	Ave	60	162	V	0.53	29.38	54.00	24.62
4824.00	41.01	PK	340	135	H	2.52	43.53	74.00	30.47
4824.00	29.73	Ave	340	135	H	2.52	32.25	54.00	21.75
7236.00	36.32	PK	212	221	H	9.83	46.15	74.00	27.85
7236.00	24.49	Ave	212	221	H	9.83	34.32	54.00	19.68

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
261.64	34.34	QP	103	233	H	-12.22	22.12	46.00	23.88
2437.00	99.73	PK	297	222	V	-4.83	94.90	/	/
2437.00	92.06	Ave	297	222	V	-4.83	87.23	/	/
2437.00	101.49	PK	185	213	H	-4.83	96.66	/	/
2437.00	93.82	Ave	185	213	H	-4.83	88.99	/	/
1562.80	39.13	PK	64	171	V	-7.80	31.33	74.00	42.67
1562.80	28.53	Ave	64	171	V	-7.80	20.73	54.00	33.27
3921.80	41.69	PK	1	198	V	0.53	42.22	74.00	31.78
3921.80	28.82	Ave	1	198	V	0.53	29.35	54.00	24.65
4874.00	40.73	PK	157	174	H	2.63	43.36	74.00	30.64
4874.00	29.72	Ave	157	174	H	2.63	32.35	54.00	21.65
6588.80	38.19	PK	17	140	V	8.48	46.67	74.00	27.33
6588.80	27.39	Ave	17	140	V	8.48	35.87	54.00	18.13
7311.00	36.46	PK	107	156	H	9.95	46.41	74.00	27.59
7311.00	24.56	Ave	107	156	H	9.95	34.51	54.00	19.49
High Channel (2462 MHz)									
261.64	34.73	QP	328	149	H	-12.22	22.51	46.00	23.49
2462.00	98.91	PK	129	232	V	-4.76	94.15	/	/
2462.00	91.24	Ave	129	232	V	-4.76	86.48	/	/
2462.00	100.95	PK	296	223	H	-4.76	96.19	/	/
2462.00	93.28	Ave	296	223	H	-4.76	88.52	/	/
2483.50	69.17	PK	34	182	H	-4.71	64.46	74.00	9.54
2483.50	52.72	Ave	34	182	H	-4.71	48.01	54.00	5.99
3921.80	41.89	PK	130	243	V	0.53	42.42	74.00	31.58
3921.80	28.94	Ave	130	243	V	0.53	29.47	54.00	24.53
4924.00	40.51	PK	87	137	H	2.74	43.25	74.00	30.75
4924.00	29.45	Ave	87	137	H	2.74	32.19	54.00	21.81
6588.80	38.25	PK	332	176	V	8.48	46.73	74.00	27.27
6588.80	27.40	Ave	332	176	V	8.48	35.88	54.00	18.12
7386.00	36.22	PK	335	111	H	10.06	46.28	74.00	27.72
7386.00	24.38	Ave	335	111	H	10.06	34.44	54.00	19.56

802.11n-HT40 Mode:

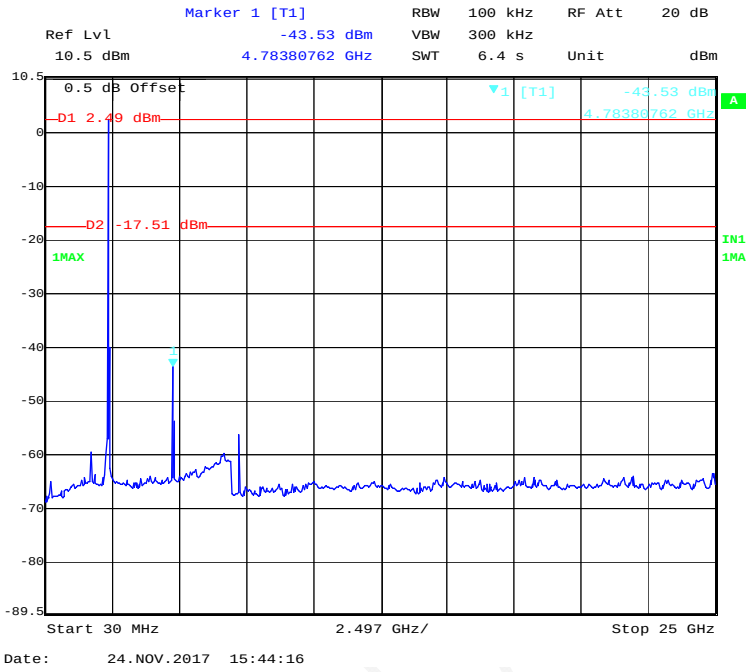
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2422 MHz)									
261.64	34.53	QP	80	226	H	-12.22	22.31	46.00	23.69
2422.00	95.53	PK	53	229	V	-4.88	90.65	/	/
2422.00	86.85	Ave	53	229	V	-4.88	81.97	/	/
2422.00	98.34	PK	169	193	H	-4.88	93.46	/	/
2422.00	89.66	Ave	169	193	H	-4.88	84.78	/	/
2390.00	66.32	PK	188	181	H	-4.96	61.36	74.00	12.64
2390.00	54.48	Ave	188	181	H	-4.96	49.52	54.00	4.48
1488.60	40.37	PK	48	193	V	-8.13	32.24	74.00	41.76
1488.60	28.95	Ave	48	193	V	-8.13	20.82	54.00	33.18
3903.60	41.18	PK	144	241	V	0.47	41.65	74.00	32.35
3903.60	28.78	Ave	144	241	V	0.47	29.25	54.00	24.75
4844.00	42.05	PK	158	248	H	2.56	44.61	74.00	29.39
4844.00	31.16	Ave	158	248	H	2.56	33.72	54.00	20.28
7266.00	35.58	PK	186	206	H	9.88	45.46	74.00	28.54
7266.00	24.62	Ave	186	206	H	9.88	34.50	54.00	19.50
Middle Channel (2437 MHz)									
261.64	34.62	QP	287	216	H	-12.22	22.40	46.00	23.60
2437.00	95.12	PK	38	169	V	-4.83	90.29	/	/
2437.00	86.44	Ave	38	169	V	-4.83	81.61	/	/
2437.00	98.13	PK	8	191	H	-4.83	93.30	/	/
2437.00	89.45	Ave	8	191	H	-4.83	84.62	/	/
1488.60	40.34	PK	127	131	V	-8.13	32.21	74.00	41.79
1488.60	28.93	Ave	127	131	V	-8.13	20.80	54.00	33.20
3903.60	41.13	PK	272	204	V	0.47	41.60	74.00	32.40
3903.60	28.75	Ave	272	204	V	0.47	29.22	54.00	24.78
4874.00	41.93	PK	359	224	H	2.63	44.56	74.00	29.44
4874.00	31.08	Ave	359	224	H	2.63	33.71	54.00	20.29
6843.60	38.03	PK	163	248	V	9.10	47.13	74.00	26.87
6843.60	26.77	Ave	163	248	V	9.10	35.87	54.00	18.13
7311.00	35.60	PK	320	166	H	9.95	45.55	74.00	28.45
7311.00	24.60	Ave	320	166	H	9.95	34.55	54.00	19.45

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2452 MHz)									
261.64	34.81	QP	230	203	H	-12.22	22.59	46.00	23.41
2452.00	95.54	PK	272	147	V	-4.79	90.75	/	/
2452.00	86.86	Ave	272	147	V	-4.79	82.07	/	/
2452.00	98.47	PK	30	125	H	-4.79	93.68	/	/
2452.00	89.79	Ave	30	125	H	-4.79	85.00	/	/
2483.50	63.34	PK	302	133	H	-4.71	58.63	74.00	15.37
2483.50	50.96	Ave	302	133	H	-4.71	46.25	54.00	7.75
3903.60	41.21	PK	200	191	V	0.47	41.68	74.00	32.32
3903.60	28.84	Ave	200	191	V	0.47	29.31	54.00	24.69
4904.00	41.84	PK	178	124	H	2.70	44.54	74.00	29.46
4904.00	31.04	Ave	178	124	H	2.70	33.74	54.00	20.26
6843.60	38.26	PK	339	149	V	9.10	47.36	74.00	26.64
6843.60	26.87	Ave	339	149	V	9.10	35.97	54.00	18.03
7356.00	35.58	PK	77	207	H	10.01	45.59	74.00	28.41
7356.00	24.65	Ave	77	207	H	10.01	34.66	54.00	19.34

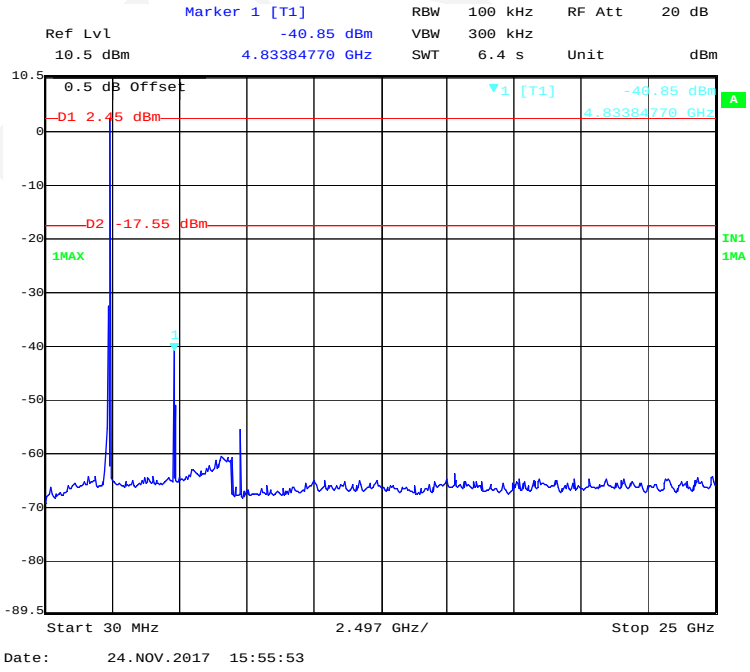
FINAL

Conducted Spurious Emissions at Antenna Port

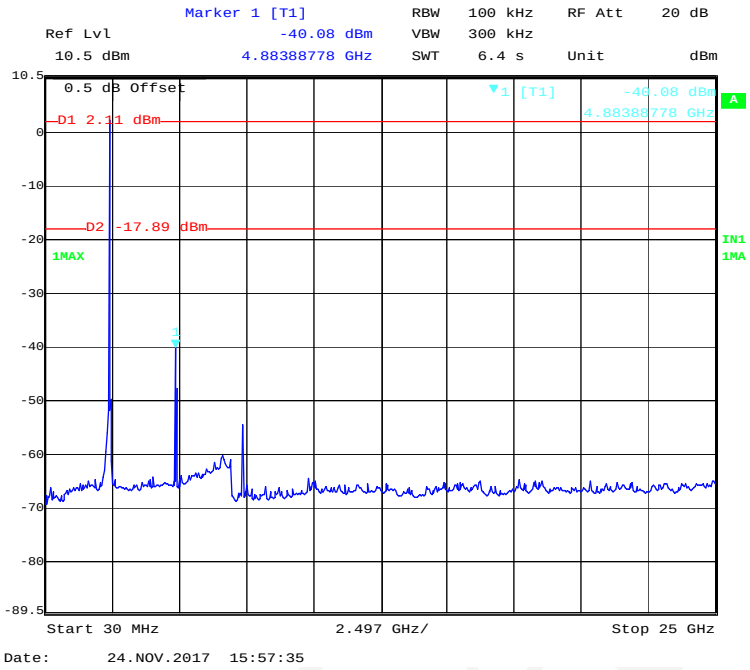
802.11b Low Channel



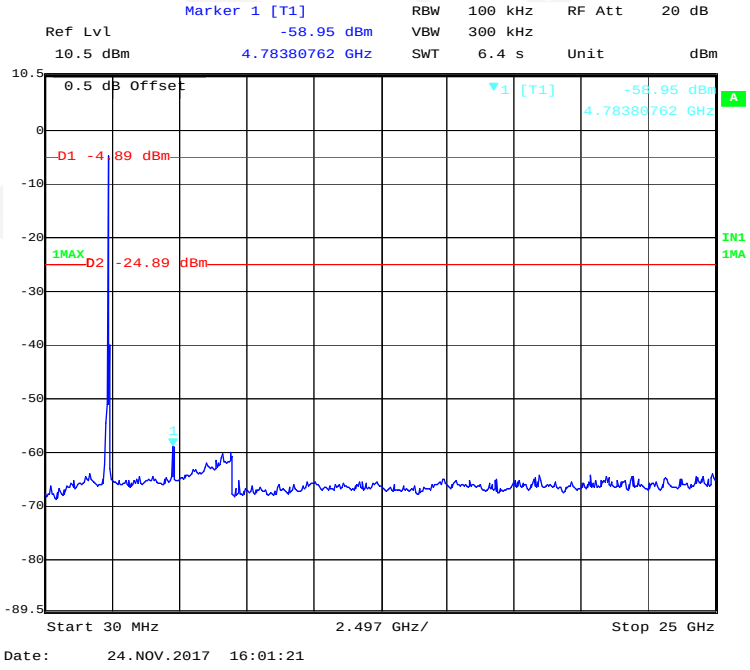
802.11b Middle Channel



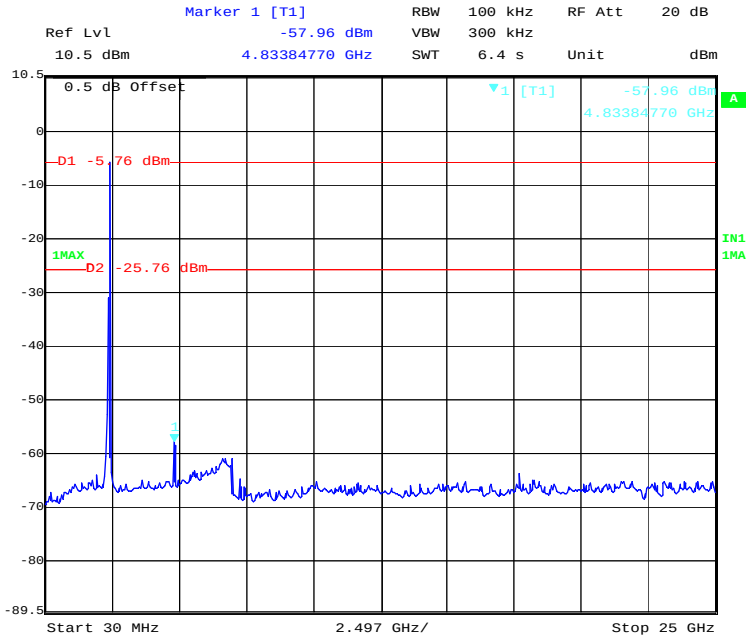
802.11b High Channel



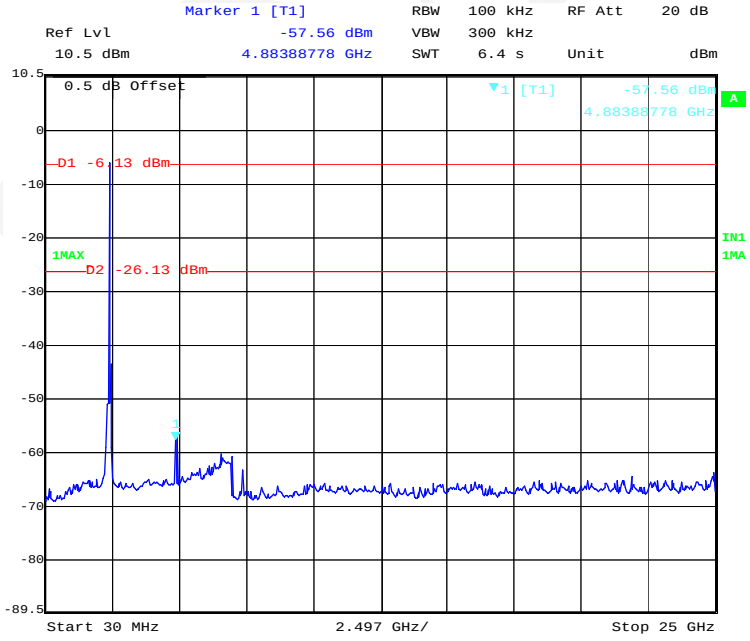
802.11g Low Channel



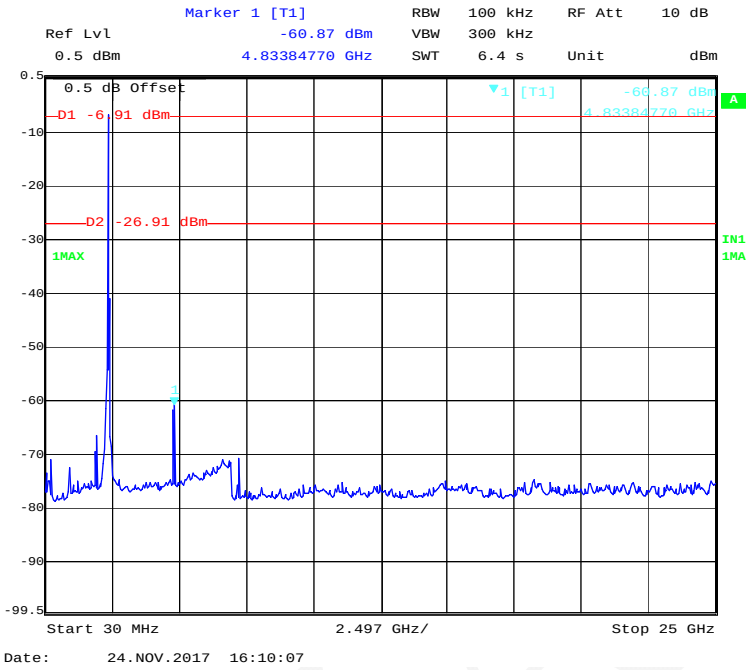
802.11g Middle Channel



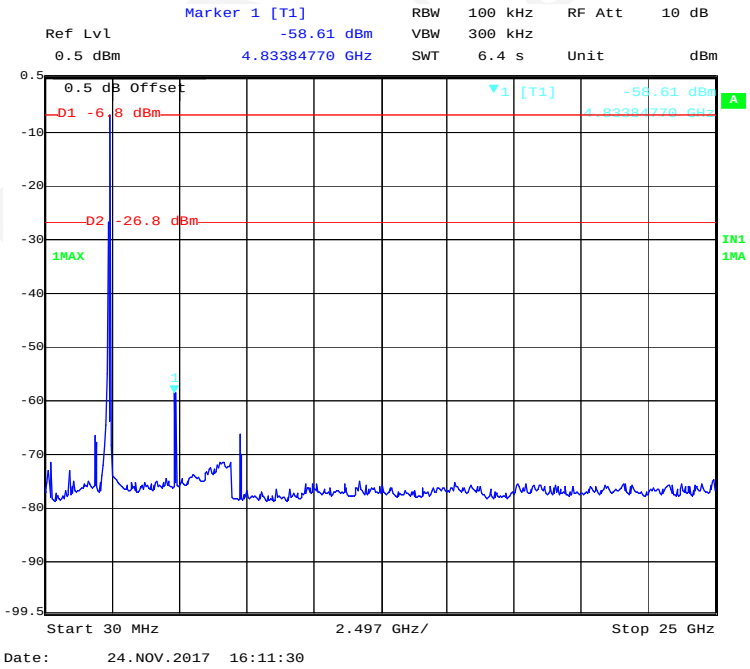
802.11g High Channel



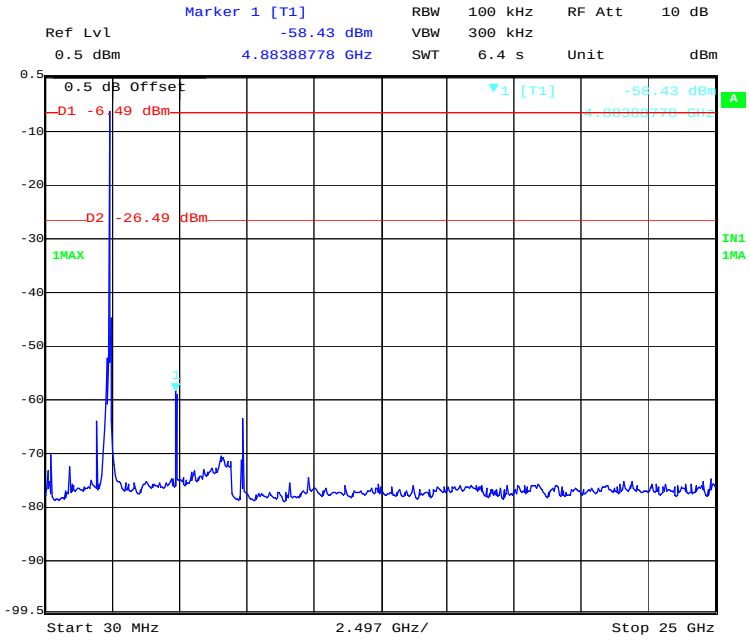
802.11n-HT20 Low Channel



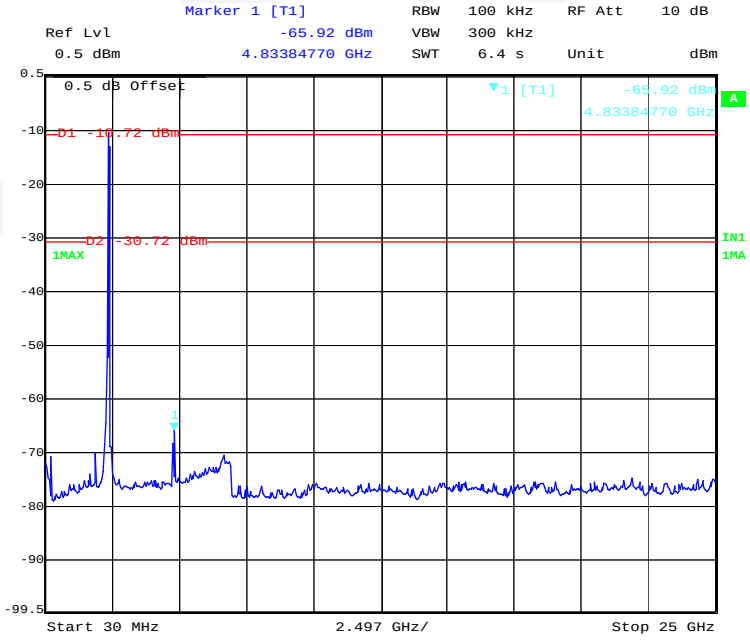
802.11n-HT20 Middle Channel



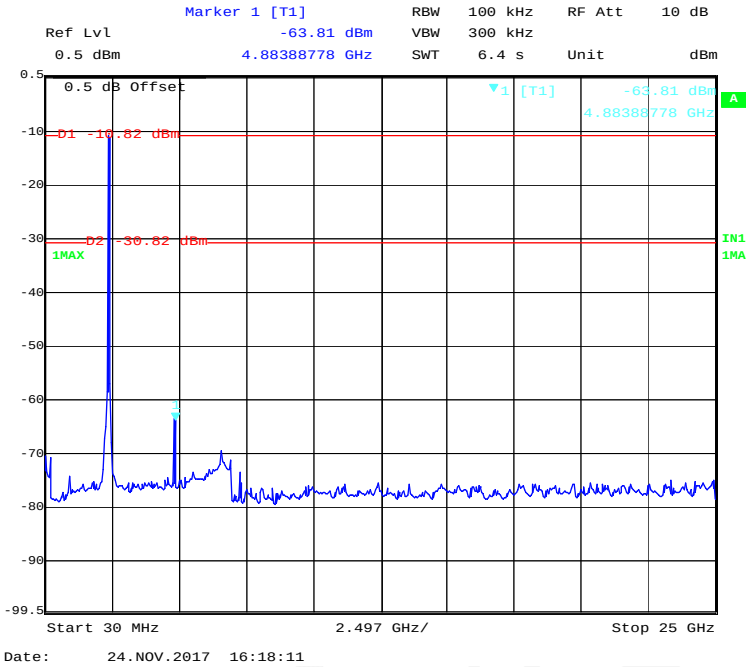
802.11n-HT20 High Channel



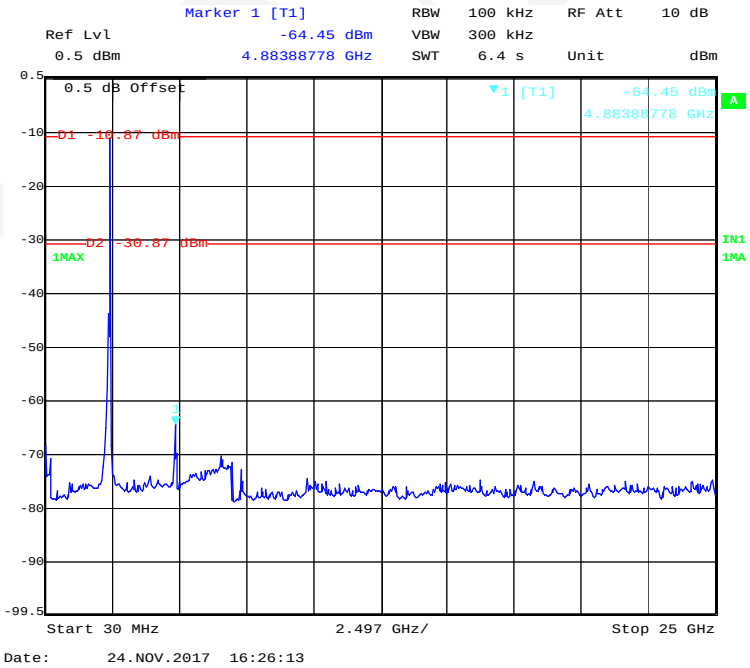
802.11n-HT40 Low Channel



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:	24.6℃
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

The testing was performed by Chris Wang on 2017-11-24.

EUT operation mode: Transmitting

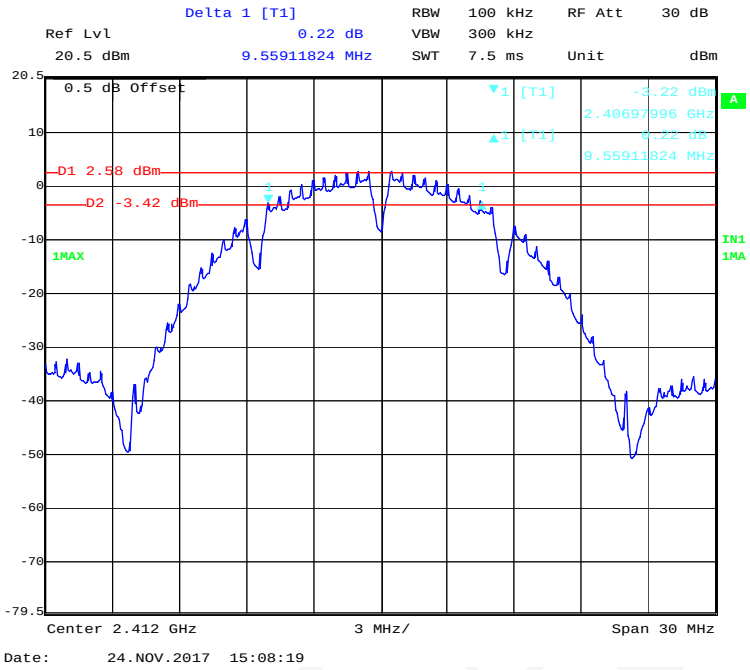
Test Result: Pass.

FINAL

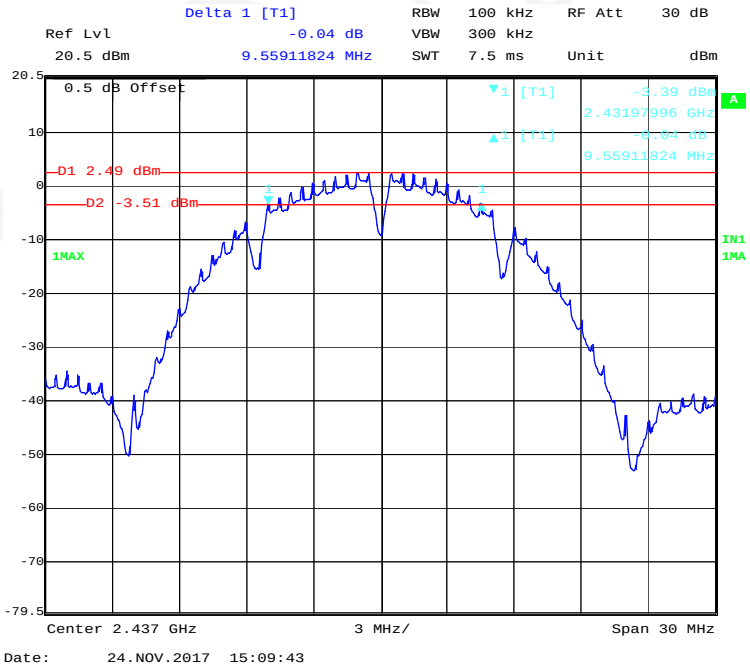
Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b mode			
Low	2412	9.56	≥0.5
Middle	2437	9.56	≥0.5
High	2462	9.56	≥0.5
802.11g mode			
Low	2412	16.59	≥0.5
Middle	2437	16.59	≥0.5
High	2462	16.59	≥0.5
802.11n-HT20 mode			
Low	2412	17.80	≥0.5
Middle	2437	17.80	≥0.5
High	2462	17.80	≥0.5
802.11n-HT40 mode			
Low	2422	36.55	≥0.5
Middle	2437	36.55	≥0.5
High	2452	36.55	≥0.5

FINAL

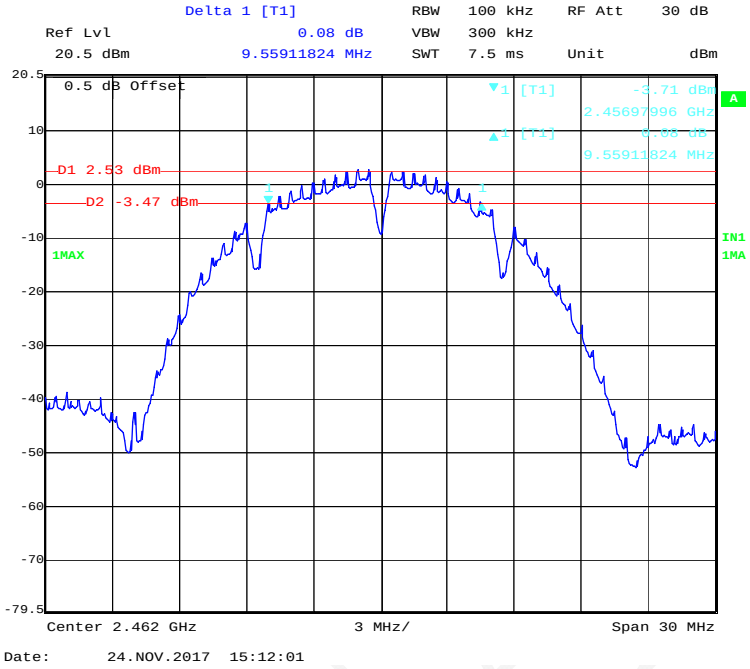
802.11b Low Channel



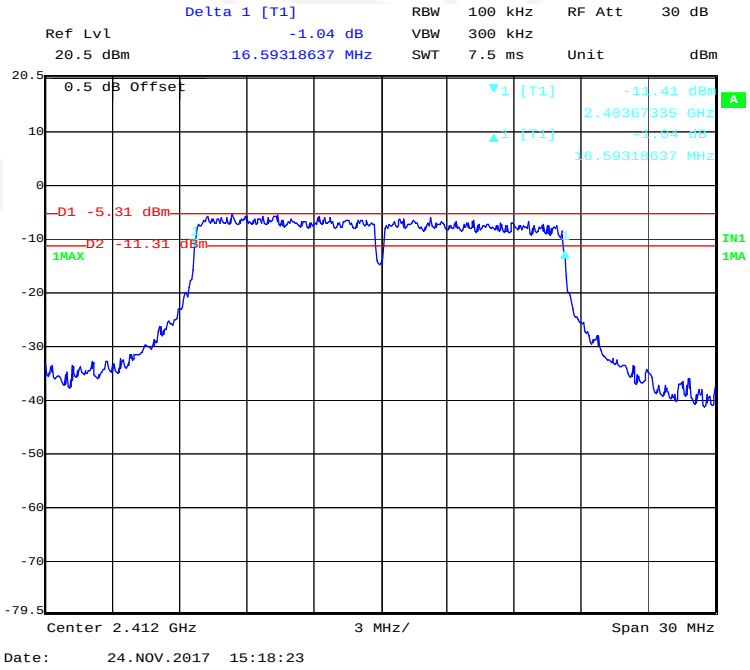
802.11b Middle Channel



802.11b High Channel



802.11g Low Channel



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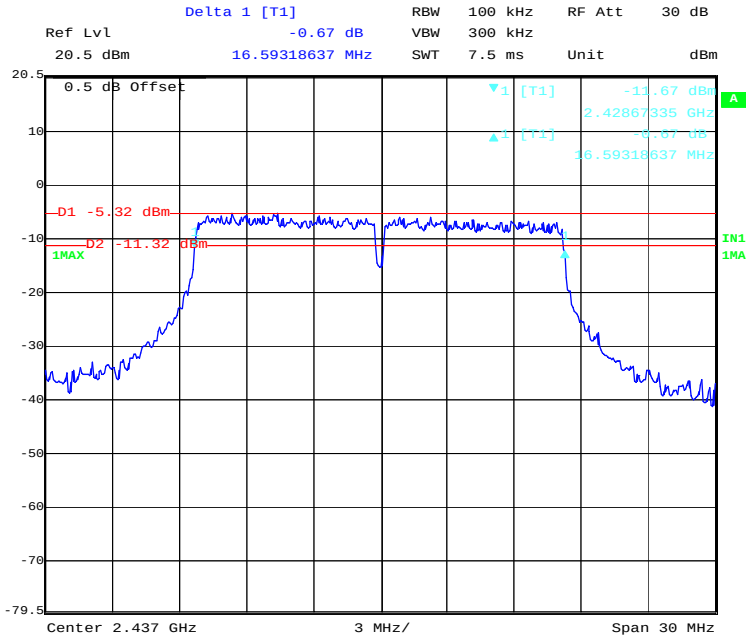

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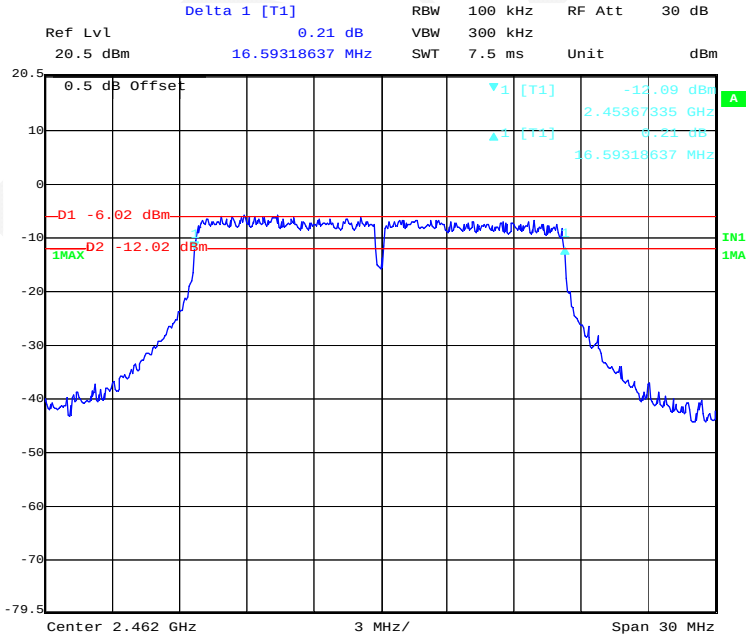
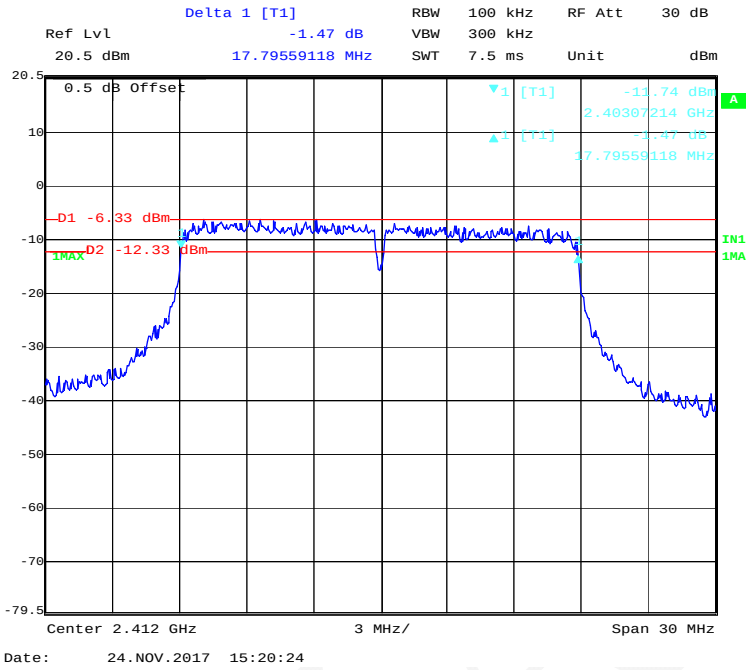


802.11n-HT20 Low Channel



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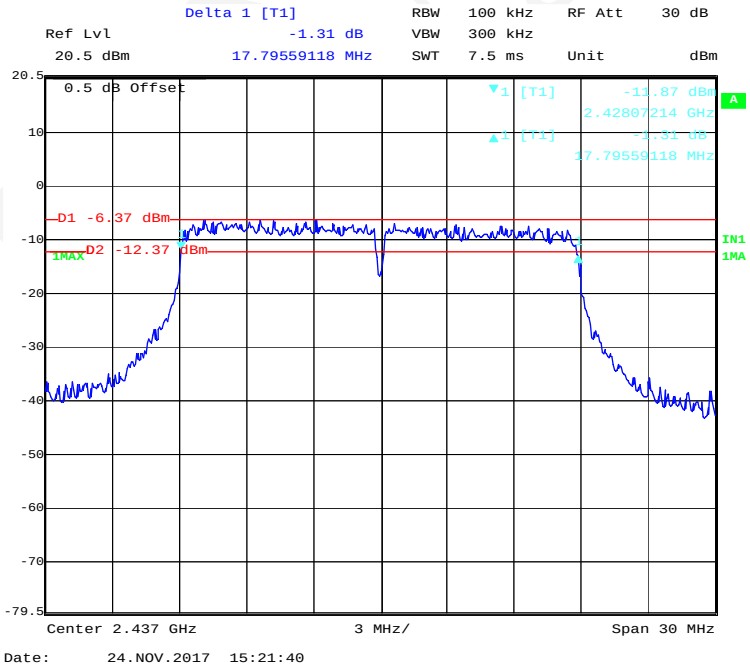
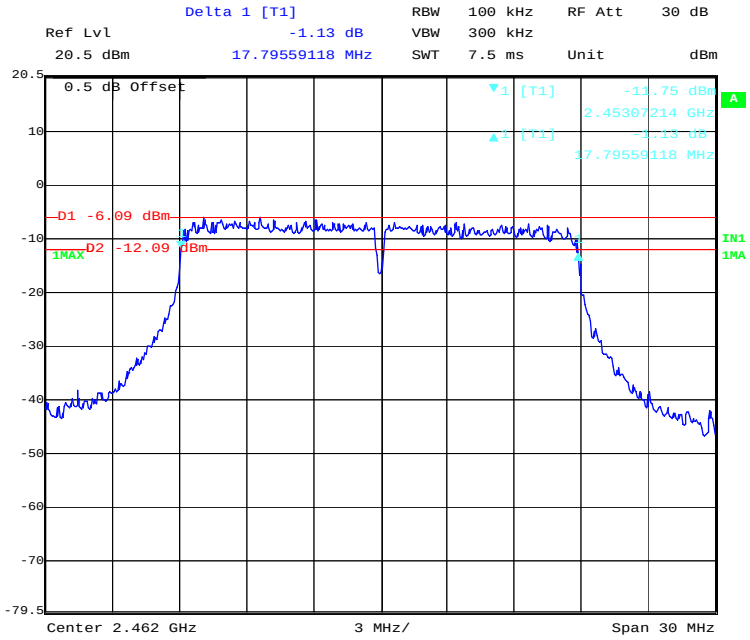
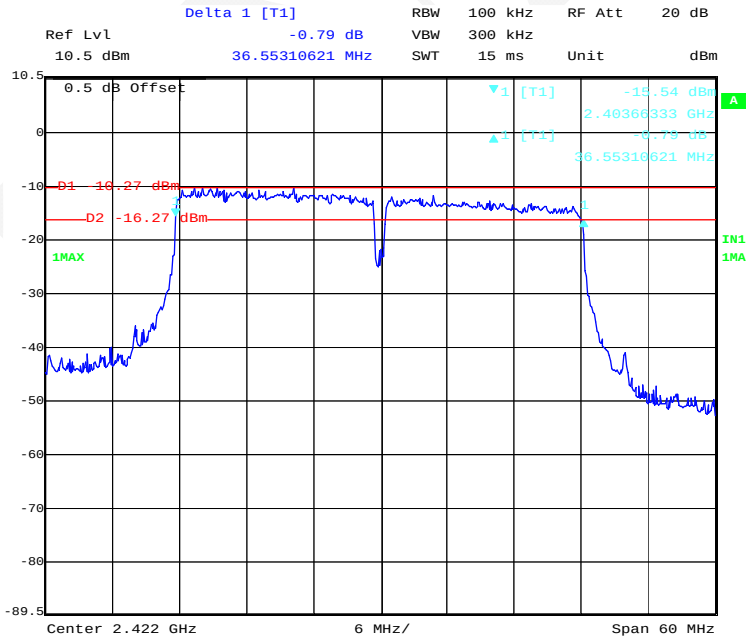


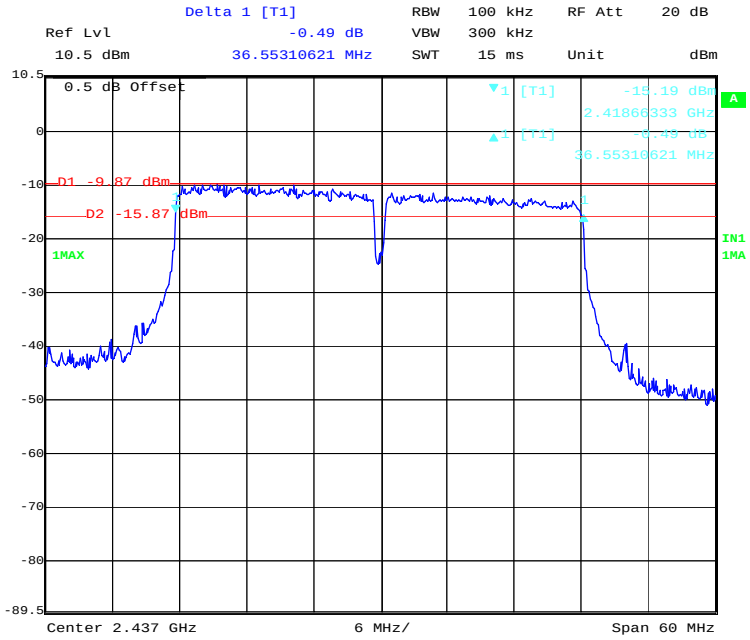
802.11n-HT20 High Channel



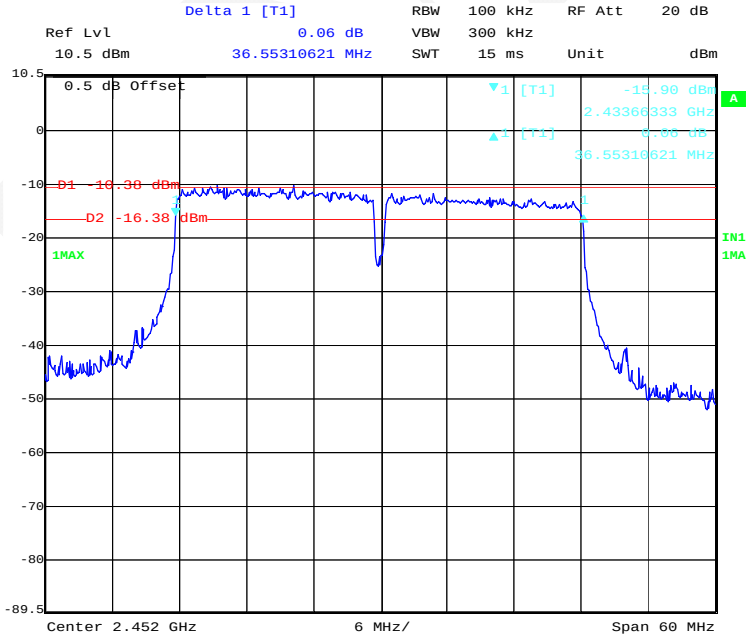
802.11n-HT40 Low Channel



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.

Test Data

Environmental Conditions

Temperature:	24.6℃
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

The testing was performed by Chris Wang on 2017-11-24.

EUT operation mode: Transmitting

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Max Conducted Average Output Power (dBm)	Limit (dBm)	Result
802.11b mode					
Low	2412	16.88	13.99	30	Pass
Middle	2437	16.88	13.91	30	Pass
High	2462	16.56	13.63	30	Pass
802.11g mode					
Low	2412	19.46	11.90	30	Pass
Middle	2437	19.45	11.88	30	Pass
High	2462	18.03	10.33	30	Pass
802.11n-HT20 mode					
Low	2412	19.72	11.82	30	Pass
Middle	2437	19.99	11.96	30	Pass
High	2462	19.95	11.84	30	Pass
802.11n-HT40 mode					
Low	2422	19.01	11.09	30	Pass
Middle	2437	19.38	11.57	30	Pass
High	2452	19.09	11.20	30	Pass

FINAL

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:	24.6℃
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

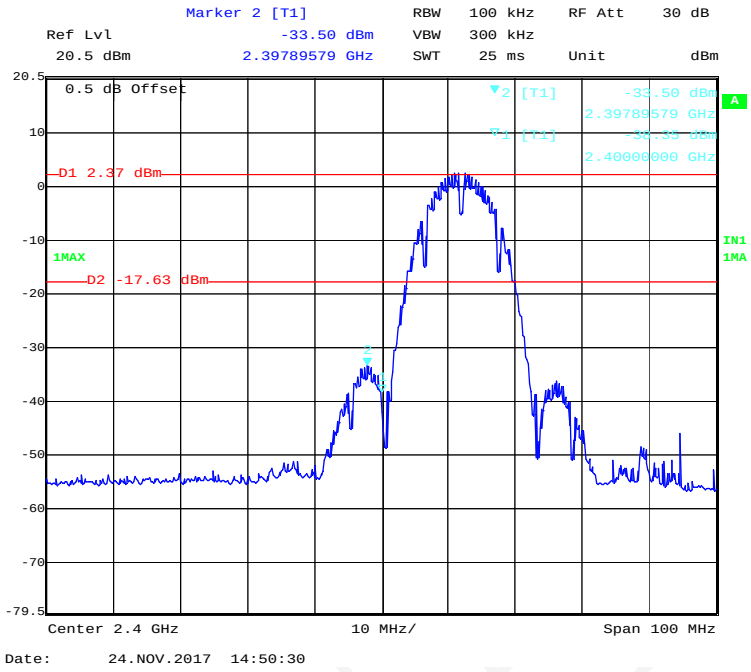
The testing was performed by Chris Wang on 2017-11-24.

EUT operation mode: Transmitting

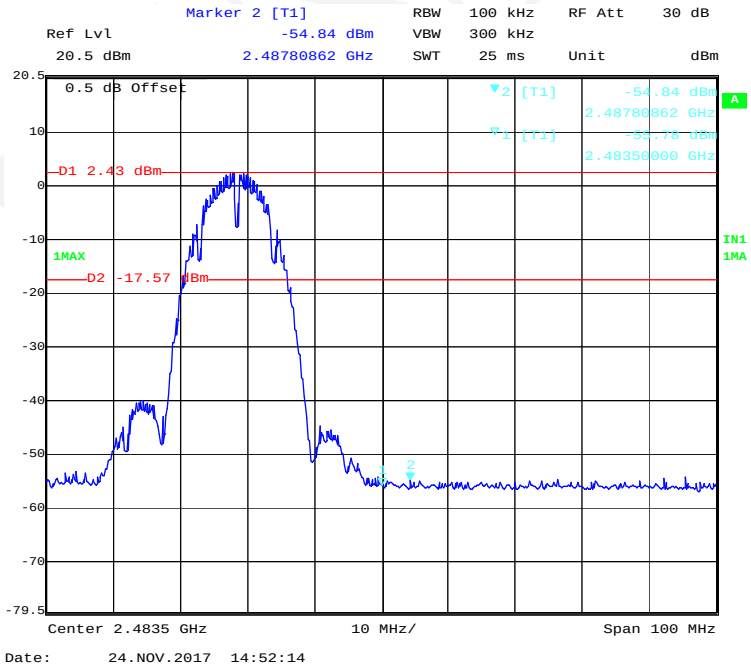
Test Result: *Compliance*

Band Edge

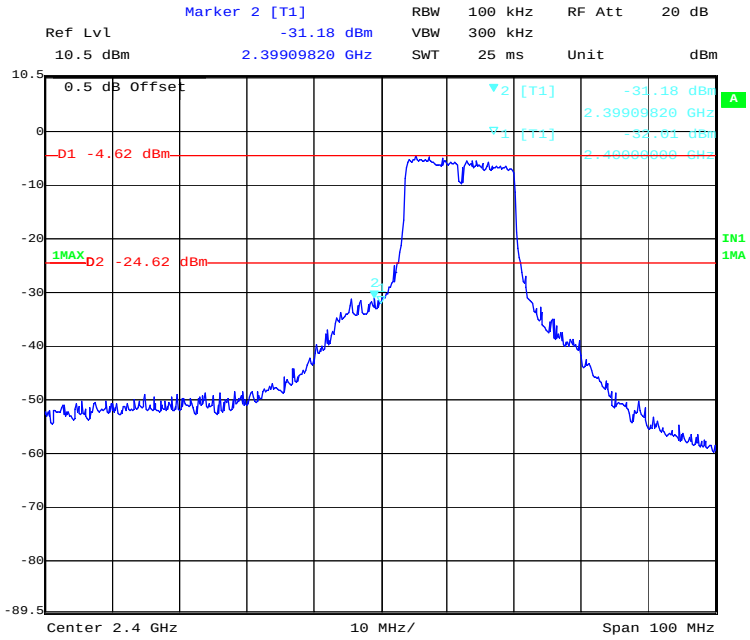
802.11b Mode Left Side



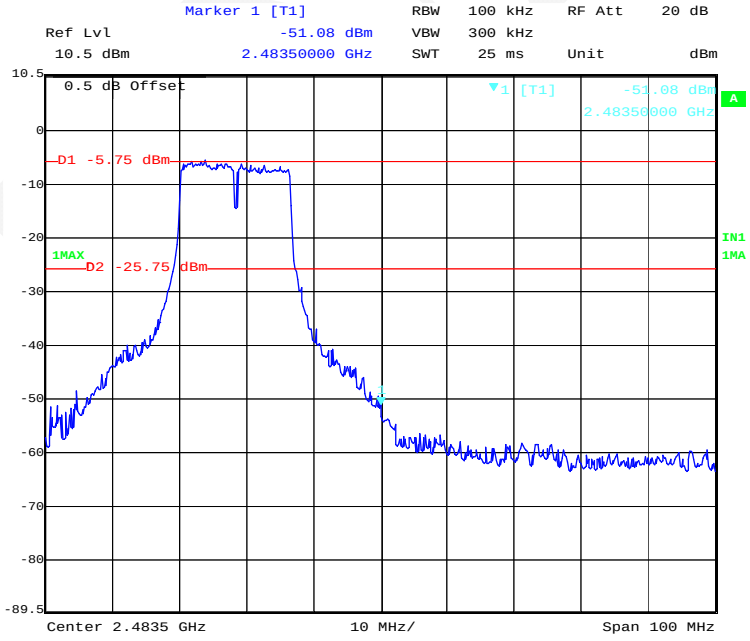
802.11b Mode Right Side



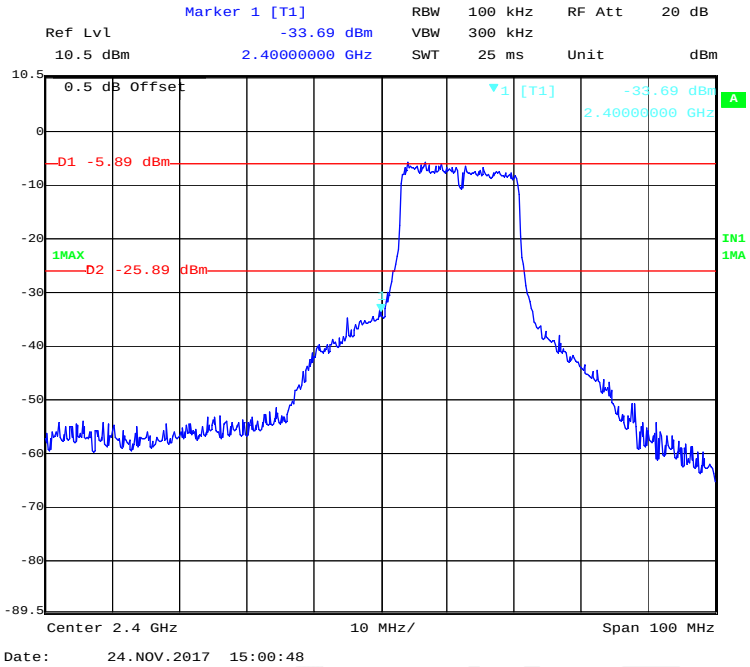
802.11g Mode Left Side



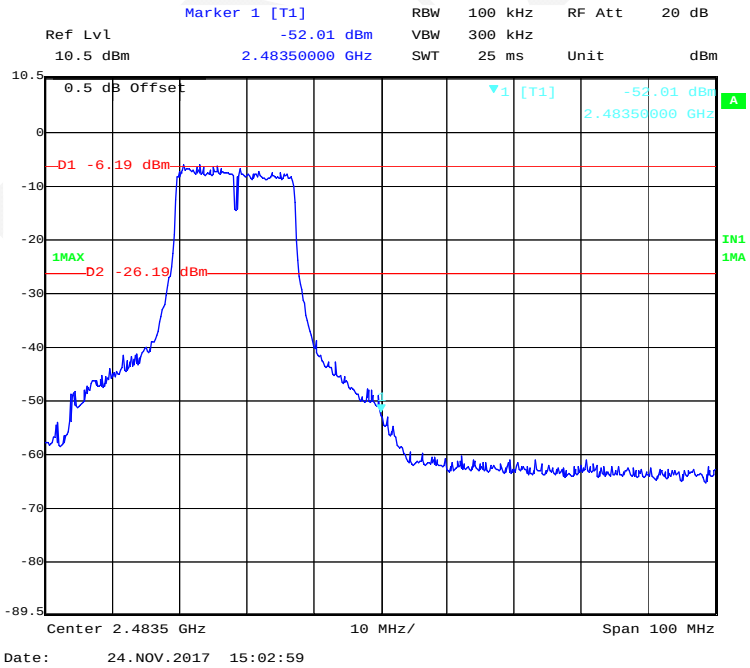
802.11g Mode Right Side



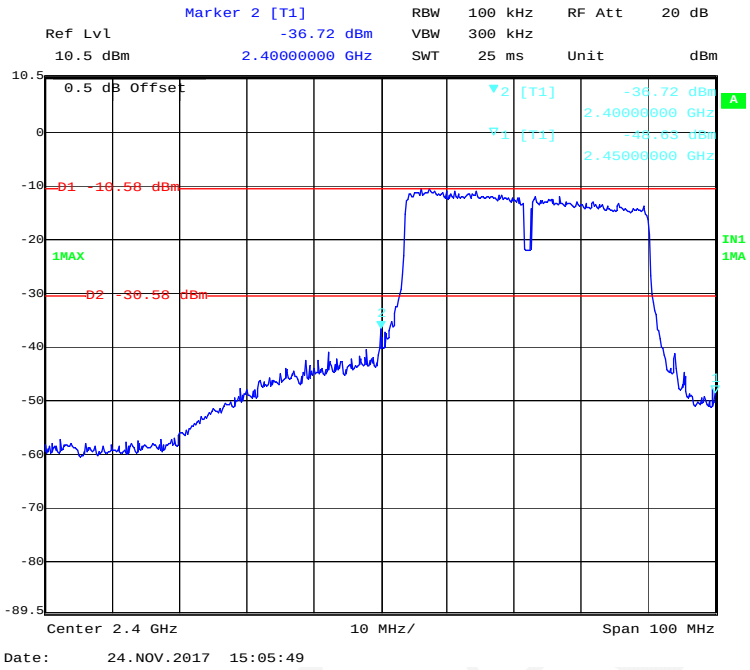
802.11n-HT20 Mode Left Side



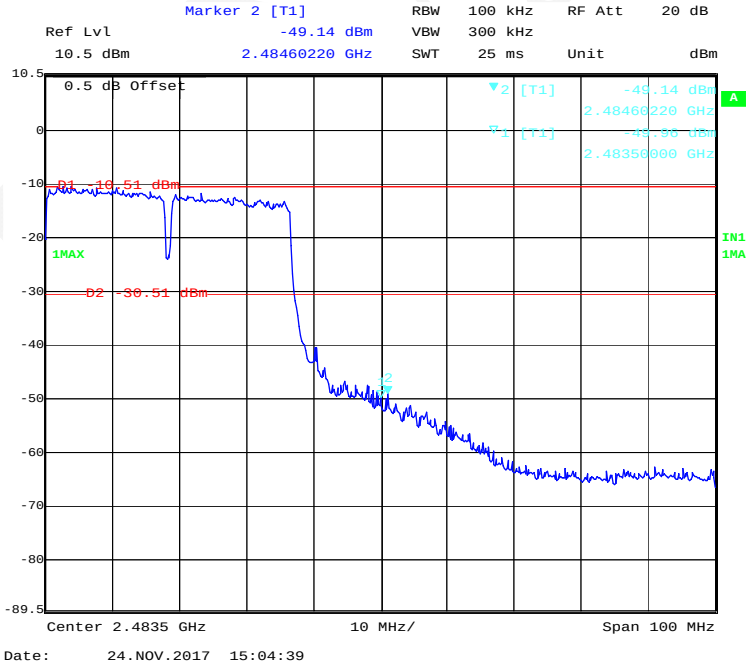
802.11n-HT20 Mode Right Side



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 Chris Wang on 2017-11-24.

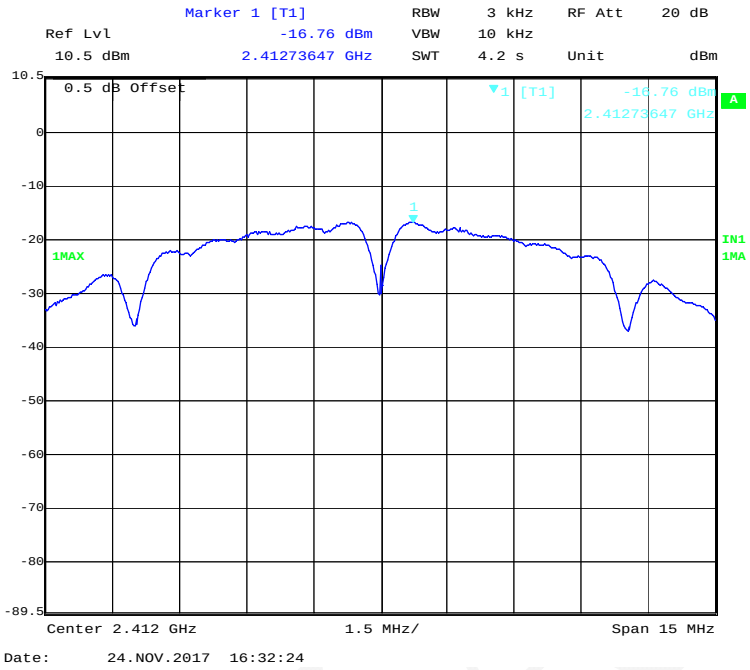
EUT operation mode: Transmitting

Test Result: Pass

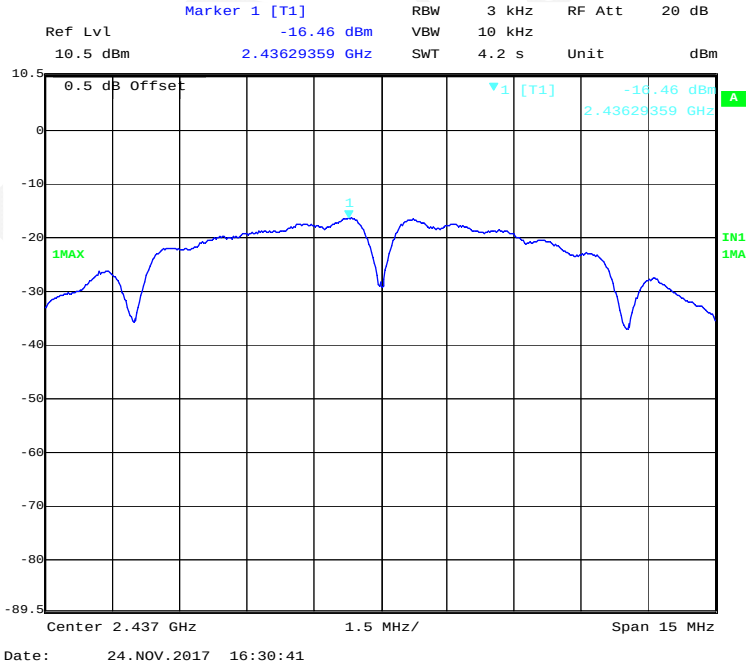
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b mode			
Low	2412	-16.76	≤8
Middle	2437	-16.46	≤8
High	2462	-16.32	≤8
802.11g mode			
Low	2412	-19.49	≤8
Middle	2437	-19.45	≤8
High	2462	-19.64	≤8
802.11n-HT20 mode			
Low	2412	-19.46	≤8
Middle	2437	-19.46	≤8
High	2462	-19.52	≤8
802.11n-HT40 mode			
Low	2422	-23.76	≤8
Middle	2437	-23.15	≤8
High	2452	-23.57	≤8

FINAL

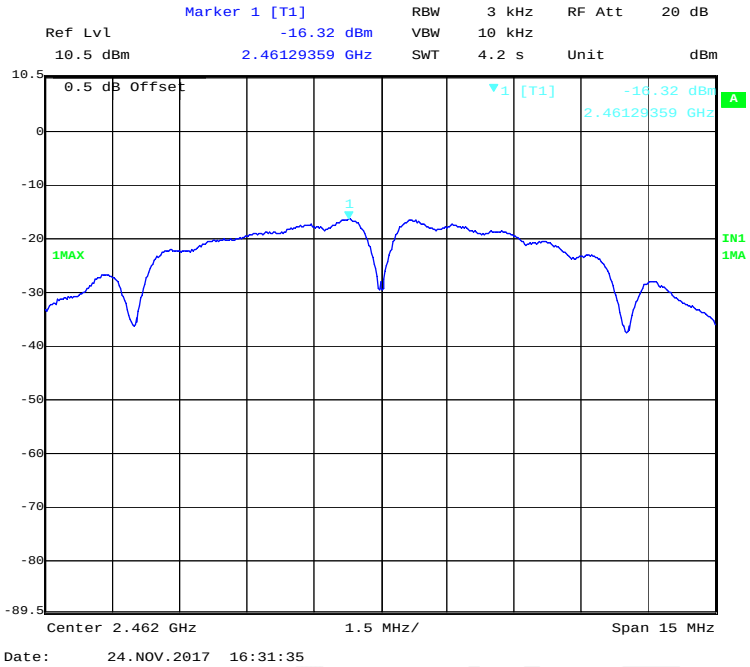
802.11b Low Channel



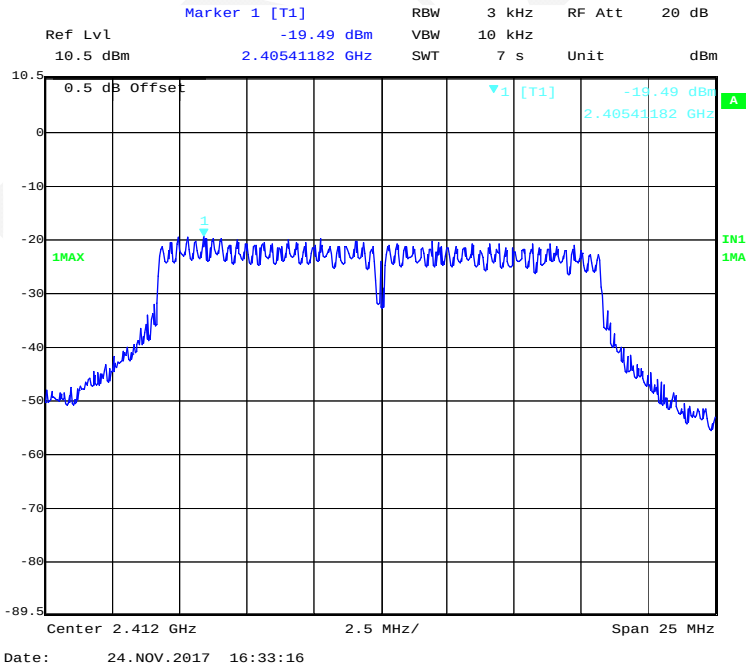
802.11b Middle Channel



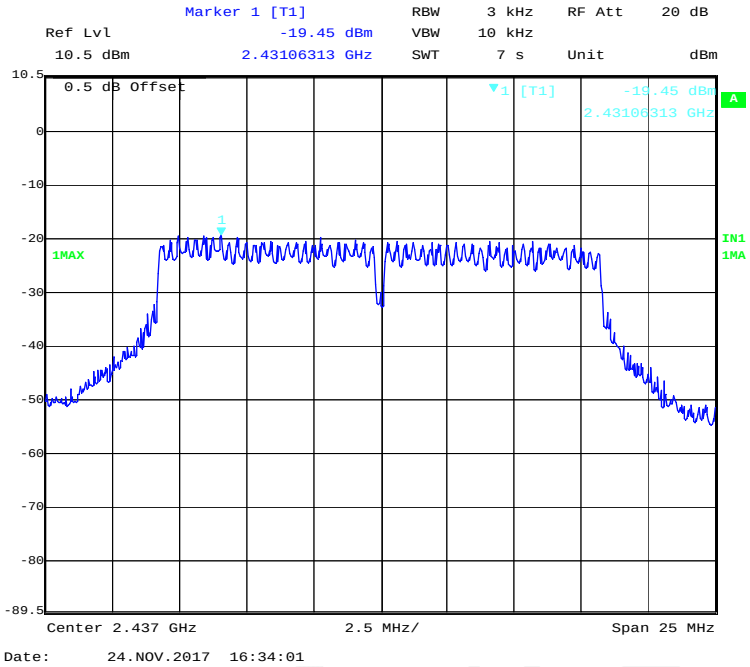
802.11b High Channel



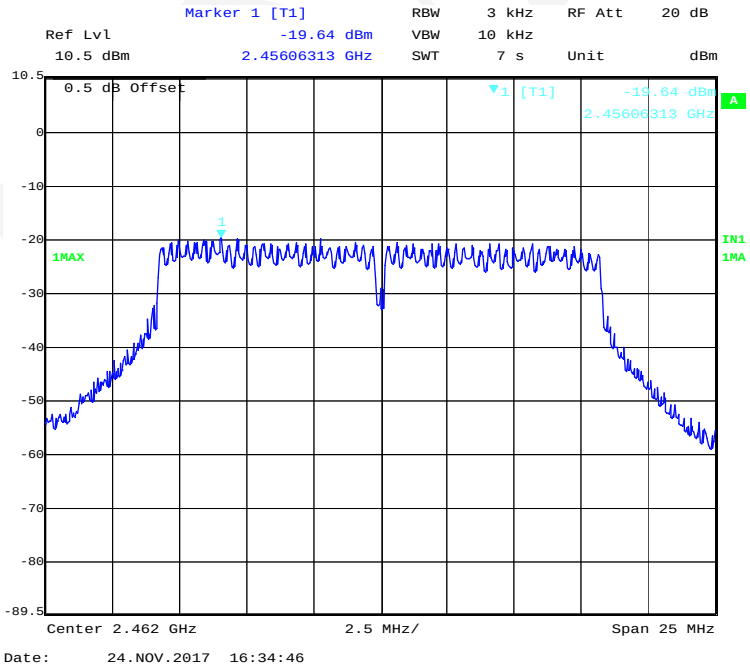
802.11g Low Channel



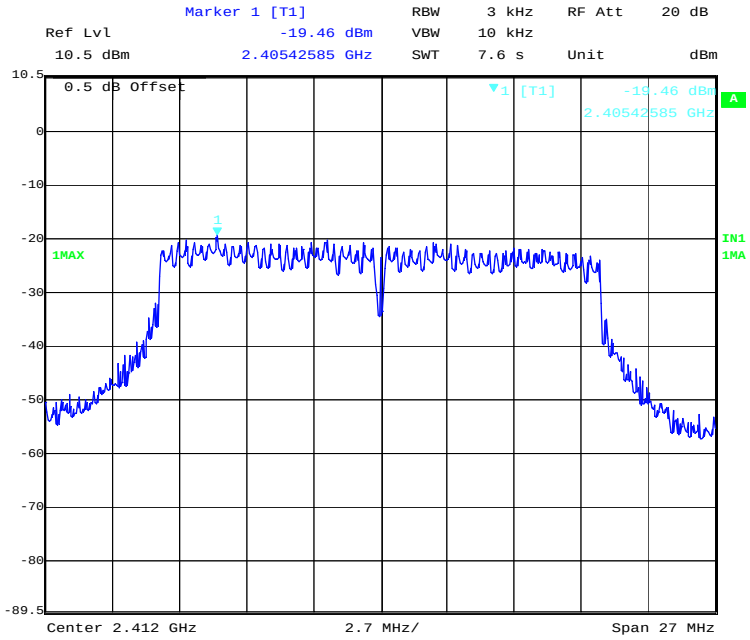
802.11g Middle Channel



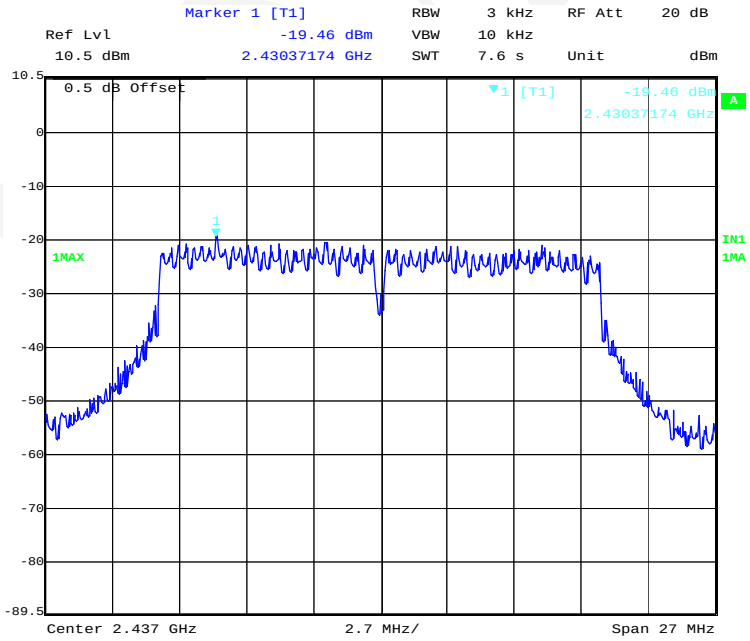
802.11g High Channel



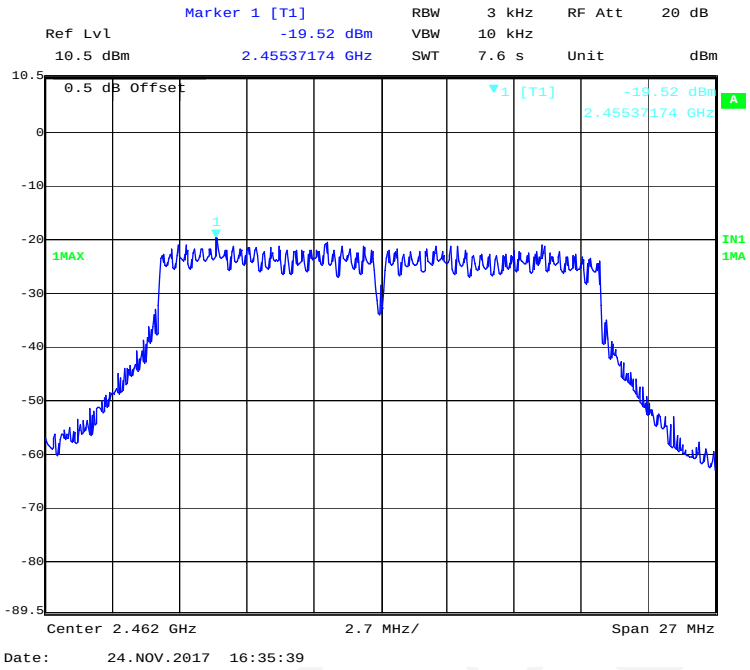
802.11n-HT20 Low Channel



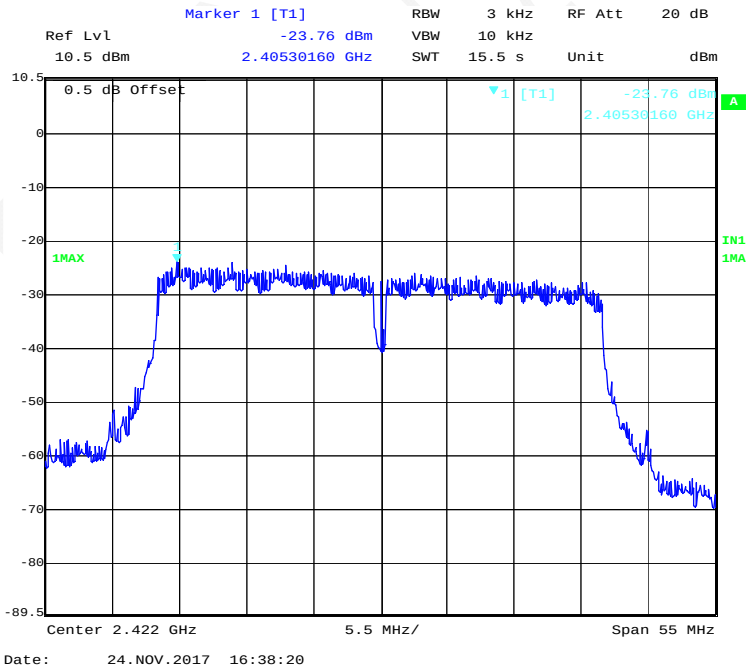
802.11n-HT20 Middle Channel



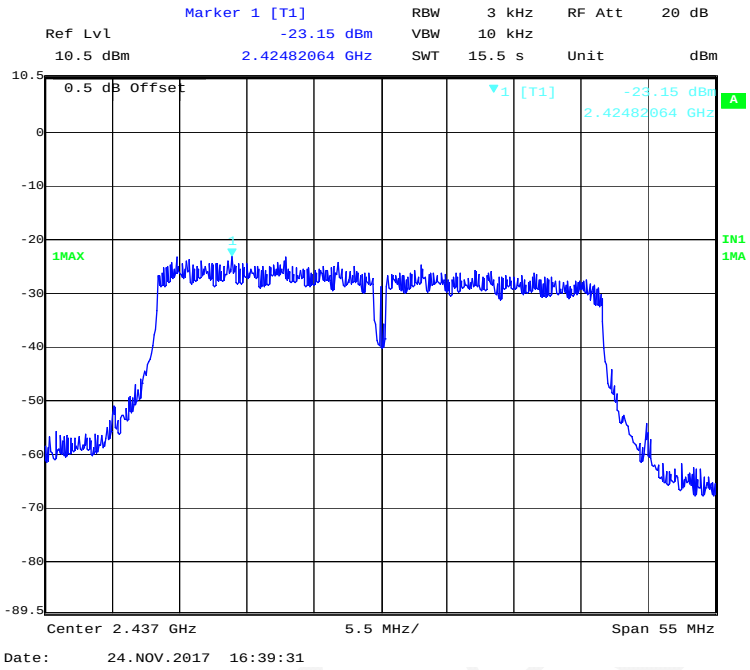
802.11n-HT20 High Channel



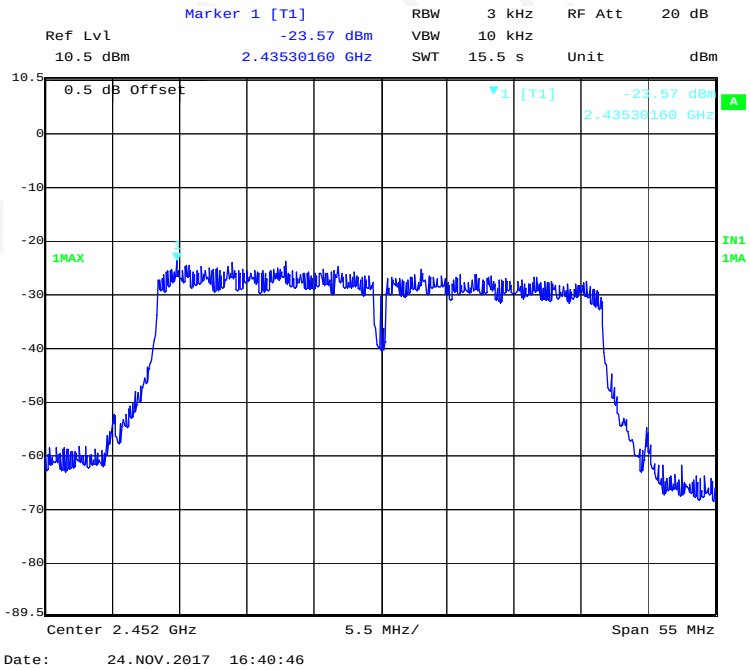
802.11n-HT40 Low Channel



802.11n-HT40 Middle Channel



802.11n-HT40 High Channel



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