TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 15.247

TEST REPORT

For

ZIONCOM ELECTRONICS (SHENZHEN) LTD.

Building A1~A2,Lantian Science and Technology Park,Xinyu Road Xinqiao Henggang Block
Shajing Street,Baoan District.Shenzhen City,China, 518125

FCC ID: X7DWX019

Report Type:	**Product Name:**
Original Report	300Mbps USB Wi-Fi Range Extender

Report Number:	RDG180205003-00A
Report Date:	2018-02-26
Reviewed By:	Jerry Zhang EMC Manager
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	300Mbps USB Wi-Fi Range Extender
EUT Model:	EX200U
Multiple Models:	WX019
FCC ID:	X7DWX019
Rated Input Voltage:	5Vdc from USB charge port
External Dimension:	110mm(L)*45mm(W)*12mm(H)
Serial Number:	180205003
EUT Received Date:	2018.02.07

Note: The series product, model EX200U, WX019 are electrically identical, the difference them is the model name, we selected EX200U for fully testing, the details was explained in the attached declaration letter.

Objective

This report is prepared on behalf of ***ZIONCOM ELECTRONICS (SHENZHEN) LTD.*** in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communications Commission's rules.

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

Related Submittal(s)/Grant(s)

No related submittal(s)/grant(s).

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 KDB 558074 D01 DTS Meas Guidance v04

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical 1G~6GHz: 4.45 dB, 6G~26.5GHz: 5.23 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218,the FCC Designation No. : CN1220.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in Engineering Mode, which was provided by the manufacturer.

For 2.4GHz band, total 11 channels are provided:

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 802.11 n20 modes were test with channel 1,6,11. For 802.11 n40 mode were test with channel 3,6,9.

The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations. The device supports SISO in all modes, and MIMO in 802.11n modes, per pretest, MIMO was the worst mode for 802.11n.

EUT Exercise Software

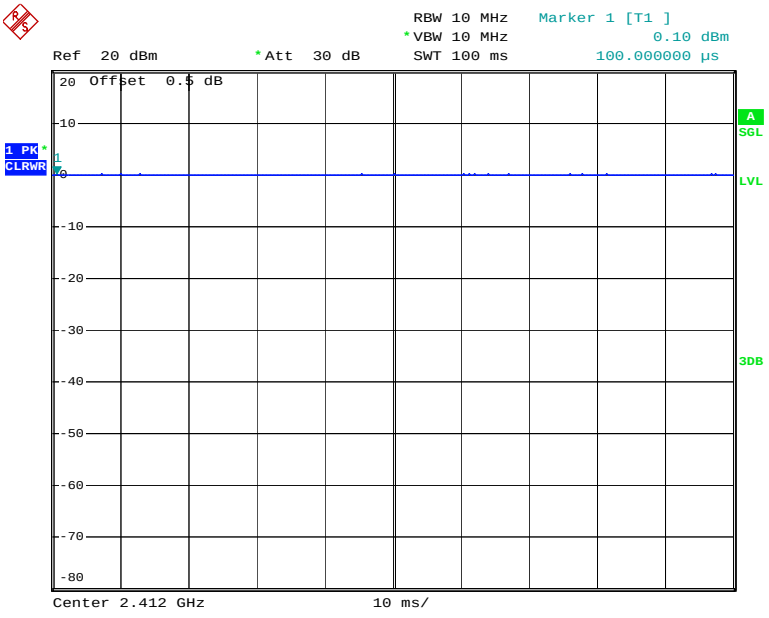
The software "MP_TEST.exe" was used for testing, which was provided by manufacturer. The maximum power was configured as below table, that provided by the manufacturer:

Antenna 0/Antenna 1				
Test Mode	Test Software Version	MP_TEST.exe		
802.11b	Test Frequency	2412MHz	2442MHz	2472MHz
	Data Rate	1Mbps	1Mbps	1Mbps
	Power Level Setting	40/46	40/45	41/45
802.11g	Test Frequency	2412MHz	2442MHz	2472MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	40/46	41/45	42/45
802.11n ht20	Test Frequency	2412MHz	2442MHz	2472MHz
	Data Rate	MCS8	MCS8	MCS8
	Power Level Setting	43/46	43/46	44/46
802.11n ht40	Test Frequency	2422MHz	2442MHz	2462MHz
	Data Rate	MCS8	MCS8	MCS8
	Power Level Setting	44/49	42/46	39/43

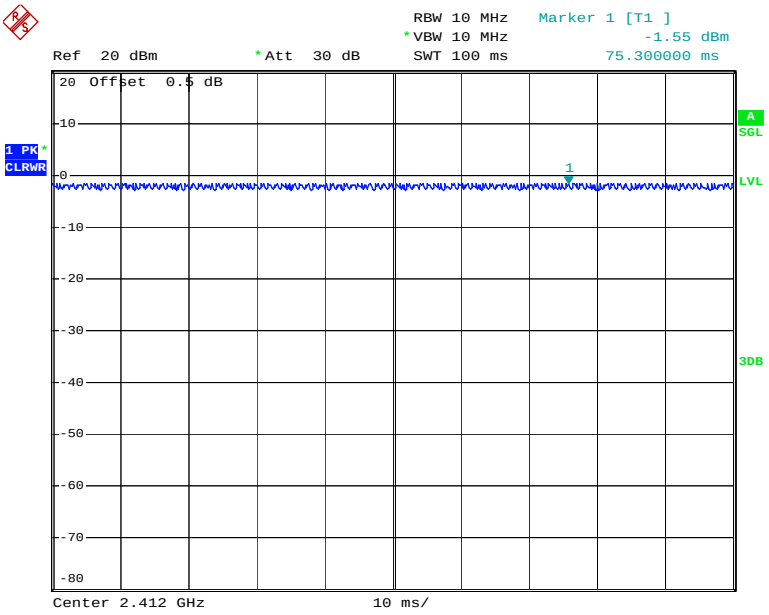
The maximum duty cycle as following table:

Test mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle (%)
802.11b	100	100	100
802.11g	100	100	100
802.11 n20	100	100	100
802.11 n40	100	100	100

802.11b



802.11g



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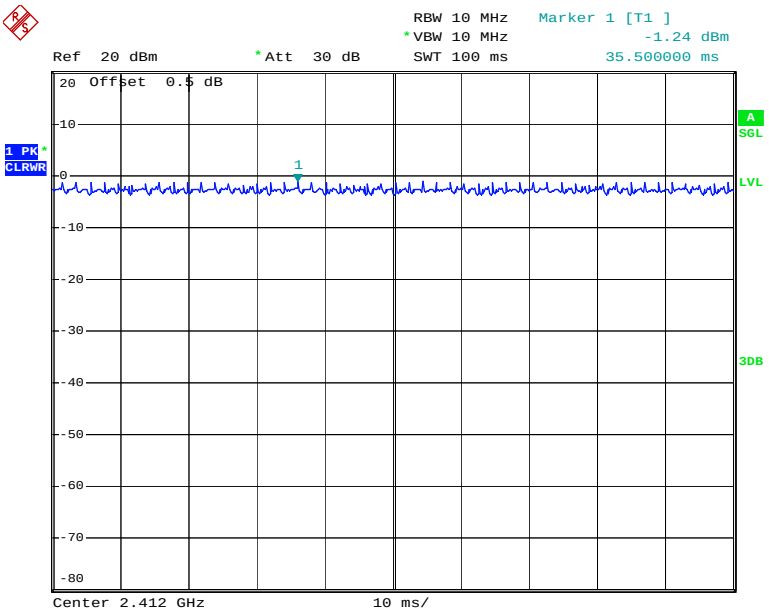
802.11 n20



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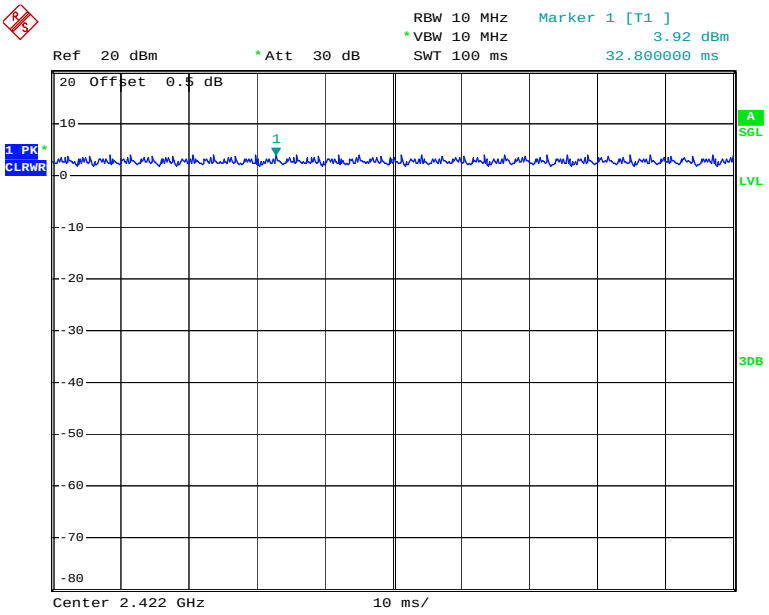
802.11 n40



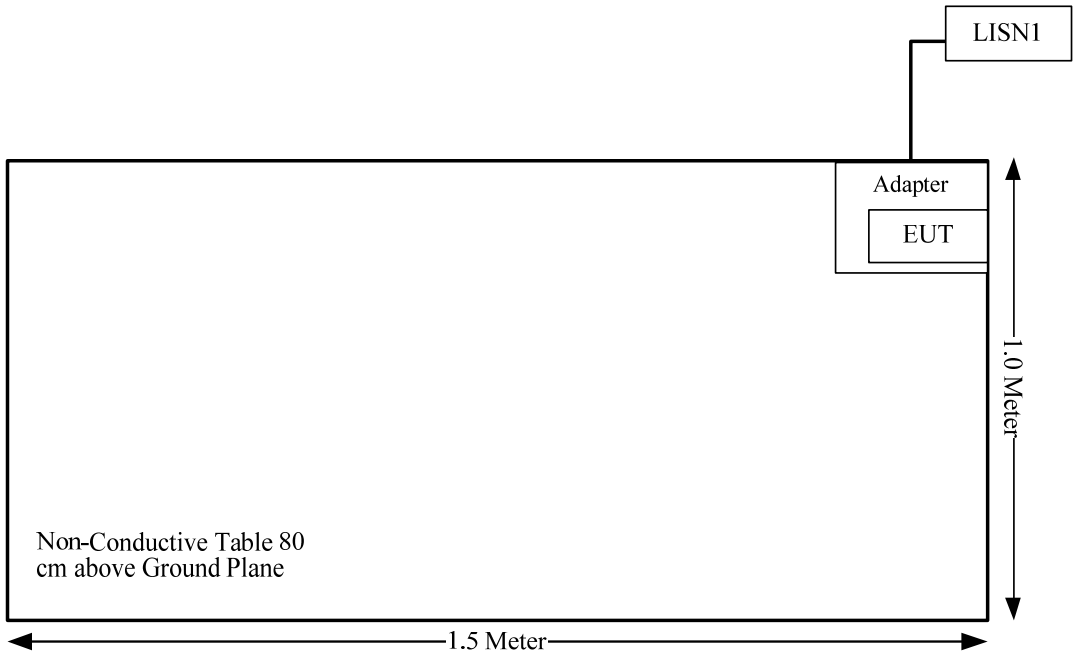
Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Huawei	Adapter	HW-050200C01	N/A

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB 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

FCC §15.247 (i) & §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

According to§15.247(i),§1.1310 and §2.1093.

Test Result

Compliant, please refer to the SAR report: RDG180205003-20.

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.
c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Antenna Connector Construction

The EUT has one internal antenna arrangement, and the antenna gain is 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

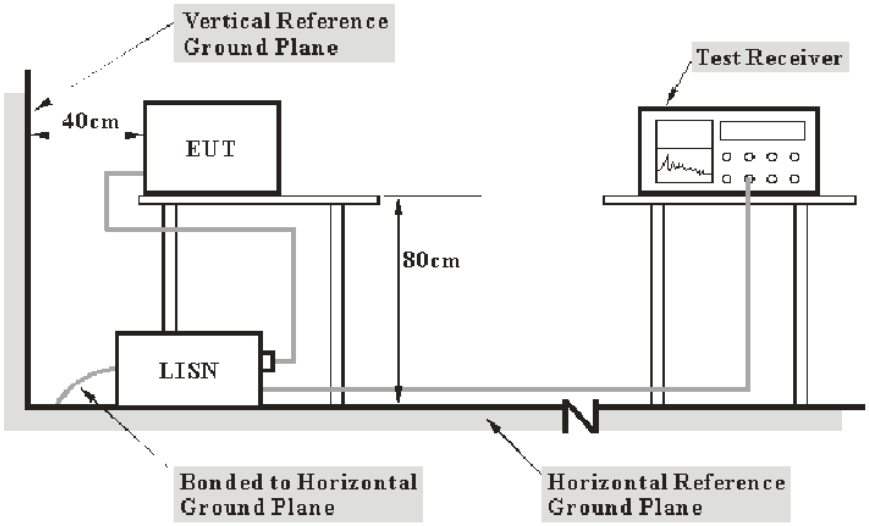
Result: Compliance.

FCC §15.207 (a)– AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207(a)

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.

The spacing between the peripherals was 10 cm.

The adapter was connected to the main lisn with a 120 V/60 Hz AC power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the first 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 Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$
$C_f = A_C + VDF$

Herein,
V_C (cord. Reading): corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN
C_f: Correction Factor

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

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2017-12-08	2018-12-08
R&S	L.I.S.N	ESH2-Z5	892107/021	2017-09-25	2018-09-25
R&S	Two-line V-network	ENV 216	3560.6550.12	2017-12-08	2018-12-08
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
N/A	Coaxial Cable	C-NJNJ-50	C-0200-01	2017-09-05	2018-09-05

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

Test Data

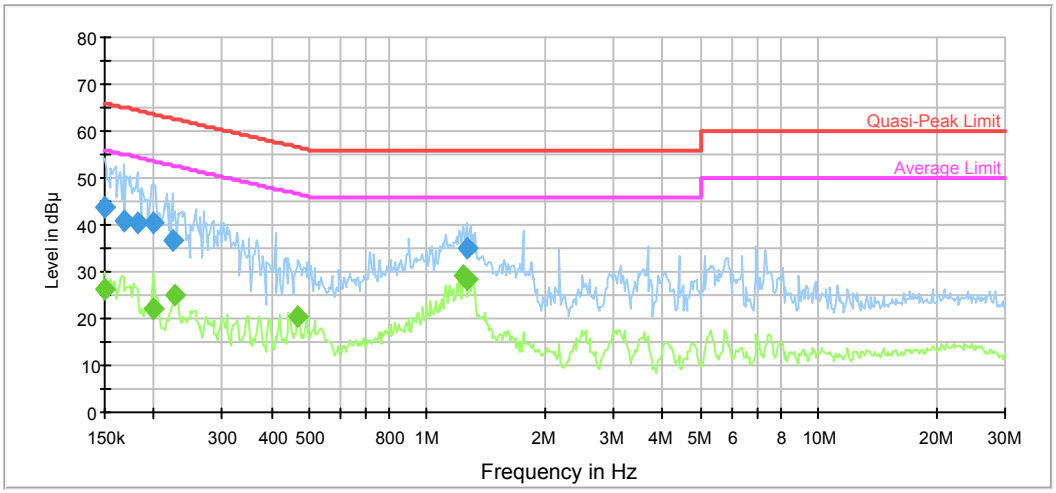
Environmental Conditions

Temperature:	21.4°C
Relative Humidity:	35%
ATM Pressure:	101.4 kPa

The testing was performed by Jim Zhang on 2018-02-09.

Test Mode: Transmitting (Wi-Fi 802.11b mode Middle channel was the worst)

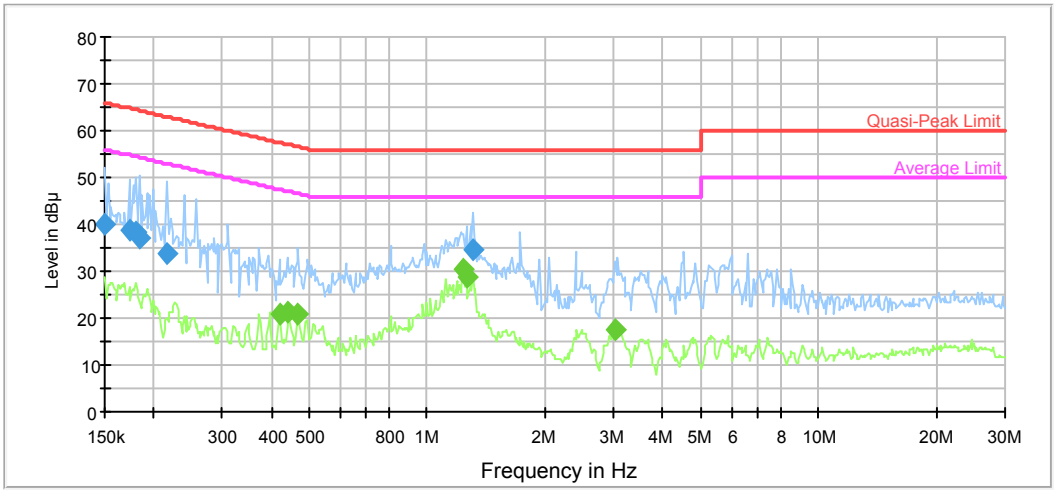
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	43.7	9.000	L1	11.2	22.3	66.0	Compliance
0.167702	40.8	9.000	L1	10.9	24.3	65.1	Compliance
0.181612	40.3	9.000	L1	10.8	24.1	64.4	Compliance
0.199835	40.4	9.000	L1	10.6	23.2	63.6	Compliance
0.223418	36.9	9.000	L1	10.5	25.8	62.7	Compliance
1.259081	35.0	9.000	L1	9.8	21.0	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	26.1	9.000	L1	11.2	29.9	56.0	Compliance
0.199835	22.0	9.000	L1	10.6	31.6	53.6	Compliance
0.227007	24.8	9.000	L1	10.5	27.8	52.6	Compliance
0.468757	20.6	9.000	L1	9.9	25.9	46.5	Compliance
1.239175	29.2	9.000	L1	9.8	16.8	46.0	Compliance
1.259081	28.3	9.000	L1	9.8	17.7	46.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	40.1	9.000	N	11.2	25.9	66.0	Compliance
0.173134	38.8	9.000	N	10.9	26.0	64.8	Compliance
0.180171	38.4	9.000	N	10.8	26.1	64.5	Compliance
0.184529	37.1	9.000	N	10.8	27.2	64.3	Compliance
0.216409	34.0	9.000	N	10.5	29.0	63.0	Compliance
1.310256	34.7	9.000	N	9.8	21.3	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.419276	21.0	9.000	N	10.0	26.5	47.5	Compliance
0.443327	21.3	9.000	N	9.9	25.7	47.0	Compliance
0.468757	20.9	9.000	N	9.9	25.6	46.5	Compliance
1.239175	30.6	9.000	N	9.8	15.4	46.0	Compliance
1.259081	28.6	9.000	N	9.8	17.4	46.0	Compliance
3.024908	17.5	9.000	N	9.8	28.5	46.0	Compliance

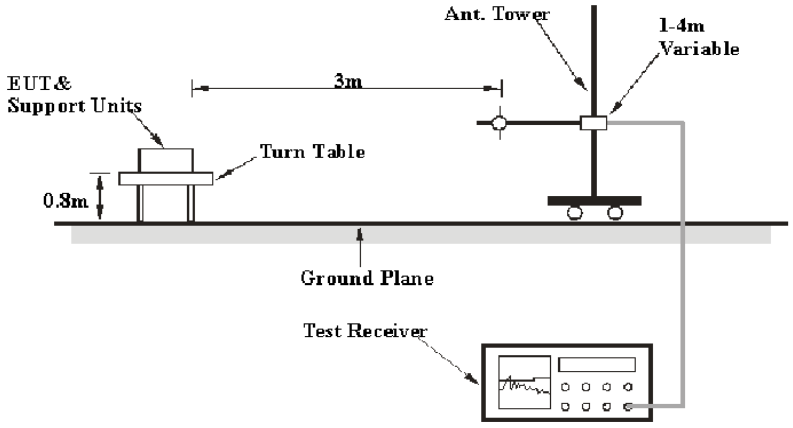
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

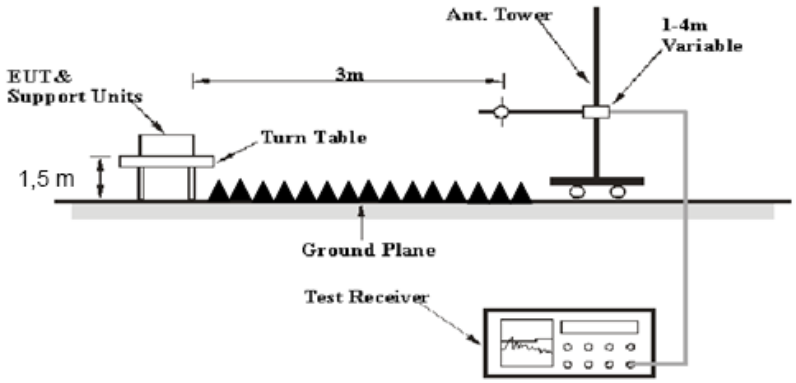
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1GHz:



Above 1GHz:



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

The spacing between the peripherals was 10 cm.

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:

30MHz-1000MHz:

Detector	RBW	Video B/W	IF B/W
QP	120 kHz	300 kHz	120kHz

1GHz- 25GHz:

Measurement	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
AV	>98%	1MHz	10 Hz
	<98%	1MHz	1/T

Note: T is minimum transmission duration

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-09-01	2018-09-01
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
HP	Amplifier	8447D	2727A05902	2017-09-05	2018-09-05
N/A	Coaxial Cable	C-NJNJ-50	C-0400-01	2017-09-05	2018-09-05
N/A	Coaxial Cable	C-NJNJ-50	C-0075-01	2017-09-05	2018-09-05
N/A	Coaxial Cable	C-NJNJ-50	C-1000-01	2017-09-05	2018-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2017-12-08	2018-12-08
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-05
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2017-09-05	2018-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2017-06-27	2018-06-27
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-02 1304	2017-06-16	2020-06-15
N/A	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Chengdu Ouli	Band Rejection Filter	2400-2483.5	002	2017-09-05	2018-09-05

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

Test Data

Environmental Conditions

Temperature:	19.6 °C
Relative Humidity:	34 %
ATM Pressure:	101.3 kPa

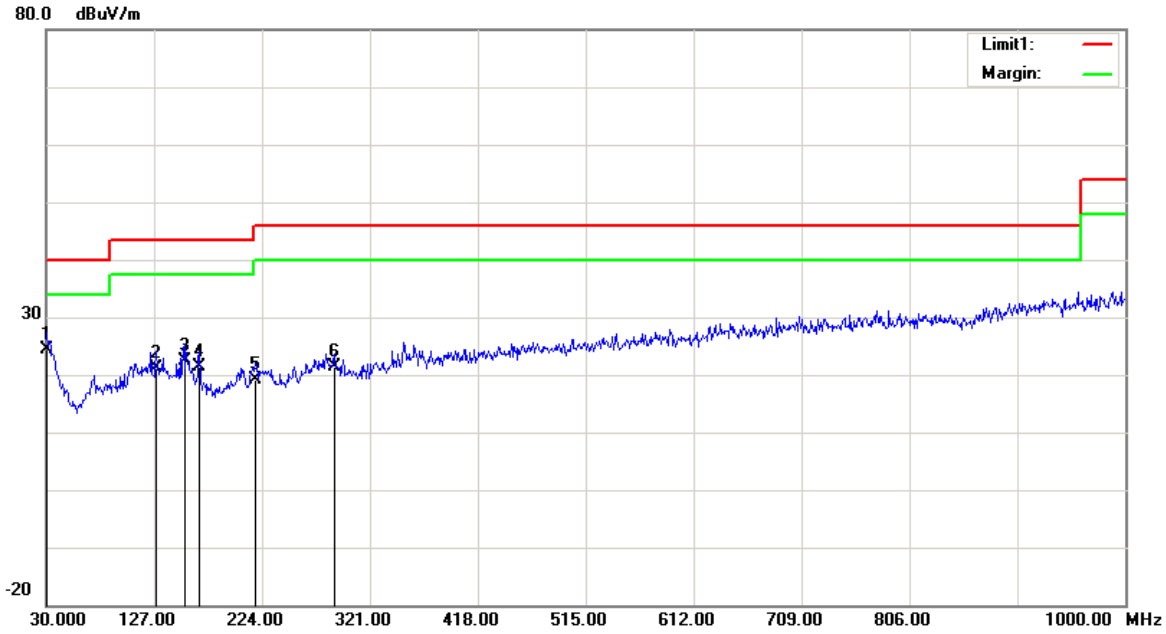
The testing was performed by Eric Xiao on 2018-02-11

Test Result: Compliance, please Refer to the following data

Test Mode: Transmitting

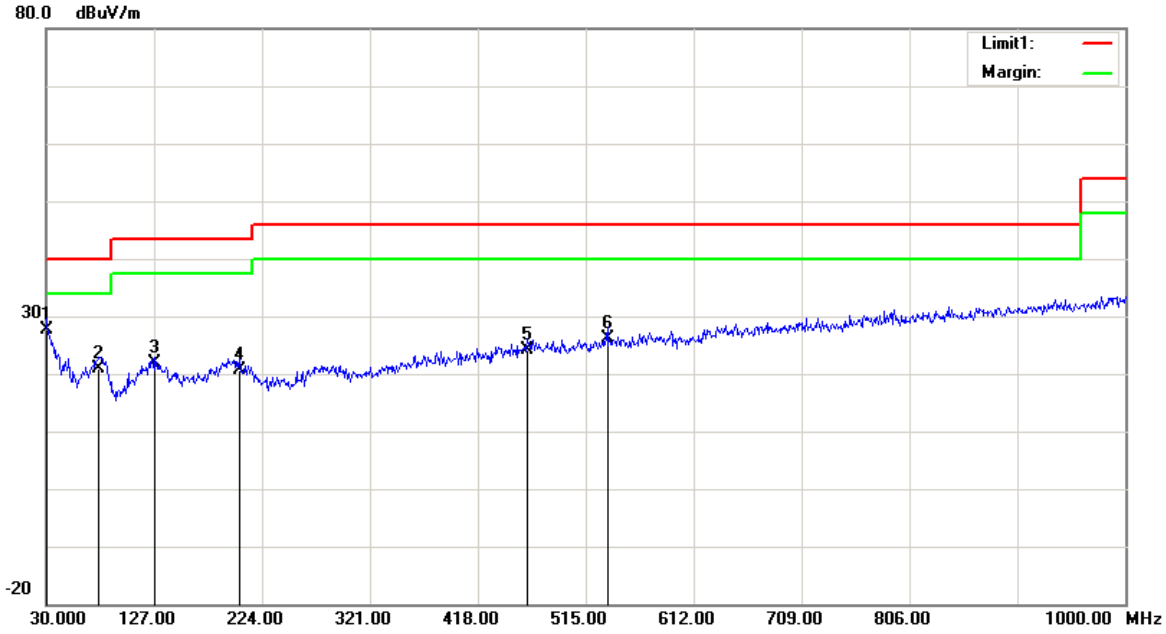
1) 30MHz-1GHz(802.11b mode Middle channel was the worst)

Horizontal:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.0000	23.22	QP	1.08	24.30	40.00	15.70
128.9400	26.28	QP	-5.08	21.20	43.50	22.30
155.1300	28.81	QP	-6.51	22.30	43.50	21.20
167.7400	28.39	QP	-7.09	21.30	43.50	22.20
218.1800	26.17	QP	-6.97	19.20	46.00	26.80
288.9900	25.41	QP	-3.91	21.50	46.00	24.50

Vertical:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.0000	26.62	QP	1.08	27.70	40.00	12.30
77.5300	31.98	QP	-11.08	20.90	40.00	19.10
127.9700	26.91	QP	-5.01	21.90	43.50	21.60
203.6300	27.17	QP	-6.47	20.70	43.50	22.80
462.6200	25.06	QP	-0.96	24.10	46.00	21.90
534.4000	26.36	QP	-0.26	26.10	46.00	19.90

2) 1-25GHz:
802.11b Mode(Chain 0 was the worst):

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2412.00	66.78	PK	H	24.84	5.41	0.00	97.03	N/A	N/A
2412.00	61.25	AV	H	24.84	5.41	0.00	91.50	N/A	N/A
2412.00	75.47	PK	V	24.84	5.41	0.00	105.72	N/A	N/A
2412.00	69.89	AV	V	24.84	5.41	0.00	100.14	N/A	N/A
2390.00	24.10	PK	V	24.80	5.36	0.00	54.26	74.00	19.74
2390.00	13.65	AV	V	24.80	5.36	0.00	43.81	54.00	10.19
4824.00	38.46	PK	V	29.75	7.34	27.41	48.14	74.00	25.86
4824.00	23.34	AV	V	29.75	7.34	27.41	33.02	54.00	20.98
7236.00	39.05	PK	V	33.98	9.08	27.22	54.89	74.00	19.11
7236.00	23.96	AV	V	33.98	9.08	27.22	39.80	54.00	14.20
Middle Channel: 2437 MHz									
2437.00	66.47	PK	H	24.89	5.41	0.00	96.77	N/A	N/A
2437.00	62.57	AV	H	24.89	5.41	0.00	92.87	N/A	N/A
2437.00	76.99	PK	V	24.89	5.41	0.00	107.29	N/A	N/A
2437.00	70.36	AV	V	24.89	5.41	0.00	100.66	N/A	N/A
4874.00	39.34	PK	V	29.85	7.56	27.54	49.21	74.00	24.79
4874.00	26.14	AV	V	29.85	7.56	27.54	36.01	54.00	17.99
7311.00	38.41	PK	V	34.10	9.33	27.28	54.56	74.00	19.44
7311.00	25.37	AV	V	34.10	9.33	27.28	41.52	54.00	12.48
High Channel: 2462 MHz									
2462.00	66.77	PK	H	24.93	5.41	0.00	97.11	N/A	N/A
2462.00	61.29	AV	H	24.93	5.41	0.00	91.63	N/A	N/A
2462.00	75.44	PK	V	24.93	5.41	0.00	105.78	N/A	N/A
2462.00	69.28	AV	V	24.93	5.41	0.00	99.62	N/A	N/A
2483.50	26.50	PK	V	24.97	5.41	0.00	56.88	74.00	17.12
2483.50	14.90	AV	V	24.97	5.41	0.00	45.28	54.00	8.72
4924.00	39.60	PK	V	29.95	7.65	27.51	49.69	74.00	24.31
4924.00	25.14	AV	V	29.95	7.65	27.51	35.23	54.00	18.77
7386.00	38.74	PK	V	34.22	9.08	27.18	54.86	74.00	19.14
7386.00	24.68	AV	V	34.22	9.08	27.18	40.80	54.00	13.20

802.11g Mode(Chain 0 was the worst):

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2412.00	68.35	PK	H	24.84	5.41	0.00	98.60	N/A	N/A
2412.00	59.31	AV	H	24.84	5.41	0.00	89.56	N/A	N/A
2412.00	78.41	PK	V	24.84	5.41	0.00	108.66	N/A	N/A
2412.00	69.68	AV	V	24.84	5.41	0.00	99.93	N/A	N/A
2390.00	37.53	PK	V	24.80	5.36	0.00	67.69	74.00	6.31
2390.00	20.68	AV	V	24.80	5.36	0.00	50.84	54.00	3.16
4824.00	38.34	PK	V	29.75	7.34	27.41	48.02	74.00	25.98
4824.00	25.18	AV	V	29.75	7.34	27.41	34.86	54.00	19.14
7236.00	39.08	PK	V	33.98	9.08	27.22	54.92	74.00	19.08
7236.00	25.61	AV	V	33.98	9.08	27.22	41.45	54.00	12.55
Middle Channel: 2437 MHz									
2437.00	67.95	PK	H	24.89	5.41	0.00	98.25	N/A	N/A
2437.00	58.41	AV	H	24.89	5.41	0.00	88.71	N/A	N/A
2437.00	77.18	PK	V	24.89	5.41	0.00	107.48	N/A	N/A
2437.00	66.40	AV	V	24.89	5.41	0.00	96.70	N/A	N/A
4874.00	38.64	PK	V	29.85	7.56	27.54	48.51	74.00	25.49
4874.00	24.05	AV	V	29.85	7.56	27.54	33.92	54.00	20.08
7311.00	38.71	PK	V	34.10	9.33	27.28	54.86	74.00	19.14
7311.00	24.13	AV	V	34.10	9.33	27.28	40.28	54.00	13.72
High Channel: 2462 MHz									
2462.00	68.28	PK	H	24.93	5.41	0.00	98.62	N/A	N/A
2462.00	58.13	AV	H	24.93	5.41	0.00	88.47	N/A	N/A
2462.00	77.18	PK	V	24.93	5.41	0.00	107.52	N/A	N/A
2462.00	67.19	AV	V	24.93	5.41	0.00	97.53	N/A	N/A
2483.50	30.36	PK	V	24.97	5.41	0.00	60.74	74.00	13.26
2483.50	15.70	AV	V	24.97	5.41	0.00	46.08	54.00	7.92
4924.00	38.61	PK	V	29.95	7.65	27.51	48.70	74.00	25.30
4924.00	24.24	AV	V	29.95	7.65	27.51	34.33	54.00	19.67
7386.00	39.13	PK	V	34.22	9.08	27.18	55.25	74.00	18.75
7386.00	25.03	AV	V	34.22	9.08	27.18	41.15	54.00	12.85

802.11n20 Mode(2TX was the worst):

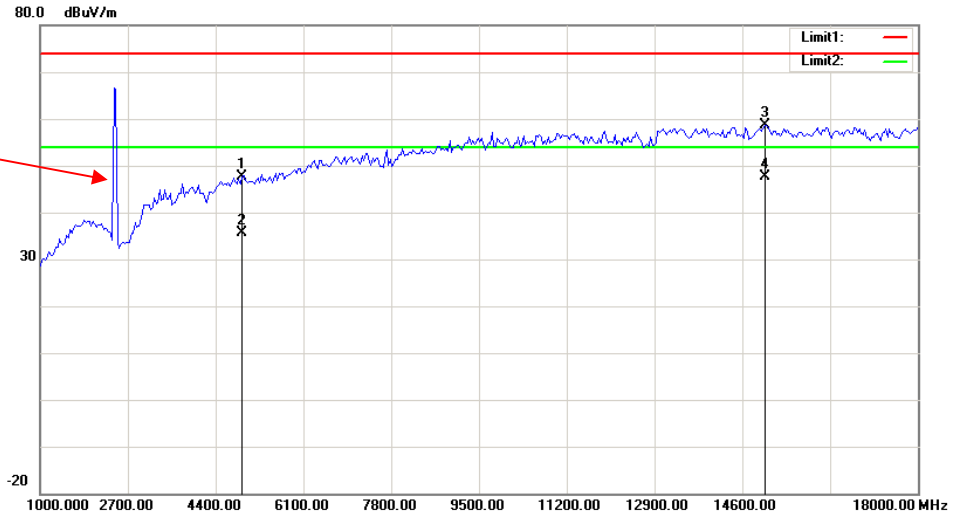
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2412.00	68.28	PK	H	24.84	5.41	0.00	98.53	N/A	N/A
2412.00	58.13	AV	H	24.84	5.41	0.00	88.38	N/A	N/A
2412.00	80.87	PK	V	24.84	5.41	0.00	111.12	N/A	N/A
2412.00	70.67	AV	V	24.84	5.41	0.00	100.92	N/A	N/A
2390.00	38.91	PK	V	24.80	5.36	0.00	69.07	74.00	4.93
2390.00	22.46	AV	V	24.80	5.36	0.00	52.62	54.00	1.38
4824.00	39.54	PK	V	29.75	7.34	27.41	49.22	74.00	24.78
4824.00	25.34	AV	V	29.75	7.34	27.41	35.02	54.00	18.98
7236.00	38.90	PK	V	33.98	9.08	27.22	54.74	74.00	19.26
7236.00	24.68	AV	V	33.98	9.08	27.22	40.52	54.00	13.48
Middle Channel: 2437 MHz									
2437.00	67.56	PK	H	24.89	5.41	0.00	97.86	N/A	N/A
2437.00	56.17	AV	H	24.89	5.41	0.00	86.47	N/A	N/A
2437.00	77.84	PK	V	24.89	5.41	0.00	108.14	N/A	N/A
2437.00	67.14	AV	V	24.89	5.41	0.00	97.44	N/A	N/A
4874.00	39.51	PK	V	29.85	7.56	27.54	49.38	74.00	24.62
4874.00	24.48	AV	V	29.85	7.56	27.54	34.35	54.00	19.65
7311.00	38.78	PK	V	34.10	9.33	27.28	54.93	74.00	19.07
7311.00	24.06	AV	V	34.10	9.33	27.28	40.21	54.00	13.79
High Channel: 2462 MHz									
2462.00	70.32	PK	H	24.93	5.41	0.00	100.66	N/A	N/A
2462.00	59.21	AV	H	24.93	5.41	0.00	89.55	N/A	N/A
2462.00	81.08	PK	V	24.93	5.41	0.00	111.42	N/A	N/A
2462.00	71.27	AV	V	24.93	5.41	0.00	101.61	N/A	N/A
2483.50	38.12	PK	V	24.97	5.41	0.00	68.50	74.00	5.50
2483.50	20.15	AV	V	24.97	5.41	0.00	50.53	54.00	3.47
4924.00	38.67	PK	V	29.95	7.65	27.51	48.76	74.00	25.24
4924.00	23.15	AV	V	29.95	7.65	27.51	33.24	54.00	20.76
7386.00	39.31	PK	V	34.22	9.08	27.18	55.43	74.00	18.57
7386.00	24.33	AV	V	34.22	9.08	27.18	40.45	54.00	13.55

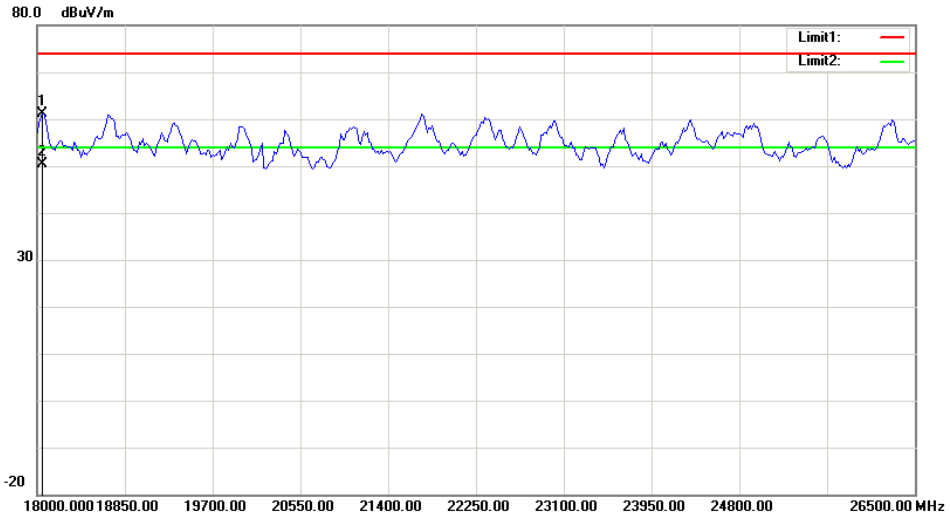
802.11n40 Mode(2TX was the worst):

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB/m)					
Low Channel: 2422 MHz									
2422.00	65.04	PK	H	24.86	5.41	0.00	95.31	N/A	N/A
2422.00	54.85	AV	H	24.86	5.41	0.00	85.12	N/A	N/A
2422.00	74.58	PK	V	24.86	5.41	0.00	104.85	N/A	N/A
2422.00	64.19	AV	V	24.86	5.41	0.00	94.46	N/A	N/A
2390.00	39.31	PK	V	24.80	5.36	0.00	69.47	74.00	4.53
2390.00	21.30	AV	V	24.80	5.36	0.00	51.46	54.00	2.54
4844.00	39.12	PK	V	29.79	7.42	27.46	48.87	74.00	25.13
4844.00	25.17	AV	V	29.79	7.42	27.46	34.92	54.00	19.08
7266.00	38.57	PK	V	34.03	9.21	27.25	54.56	74.00	19.44
7266.00	24.03	AV	V	34.03	9.21	27.25	40.02	54.00	13.98
Middle Channel: 2437 MHz									
2437.00	67.90	PK	H	24.89	5.41	0.00	98.20	N/A	N/A
2437.00	56.18	AV	H	24.89	5.41	0.00	86.48	N/A	N/A
2437.00	76.83	PK	V	24.89	5.41	0.00	107.13	N/A	N/A
2437.00	68.41	AV	V	24.89	5.41	0.00	98.71	N/A	N/A
4874.00	38.64	PK	V	29.85	7.56	27.54	48.51	74.00	25.49
4874.00	24.61	AV	V	29.85	7.56	27.54	34.48	54.00	19.52
7311.00	39.12	PK	V	34.10	9.33	27.28	55.27	74.00	18.73
7311.00	25.31	AV	V	34.10	9.33	27.28	41.46	54.00	12.54
High Channel: 2452 MHz									
2452.00	72.38	PK	H	24.91	5.41	0.00	102.70	N/A	N/A
2452.00	62.31	AV	H	24.91	5.41	0.00	92.63	N/A	N/A
2452.00	75.22	PK	V	24.91	5.41	0.00	105.54	N/A	N/A
2452.00	64.98	AV	V	24.91	5.41	0.00	95.30	N/A	N/A
2483.50	38.89	PK	V	24.97	5.41	0.00	69.27	74.00	4.73
2483.50	22.52	AV	V	24.97	5.41	0.00	52.90	54.00	1.10
4904.00	38.99	PK	V	29.91	7.67	27.58	48.99	74.00	25.01
4904.00	25.67	AV	V	29.91	7.67	27.58	35.67	54.00	18.33
7356.00	39.67	PK	V	34.17	9.18	27.22	55.80	74.00	18.20
7356.00	24.57	AV	V	34.17	9.18	27.22	40.70	54.00	13.30

Test plots(802.11b Middle channel was the worst)
Horizontal:

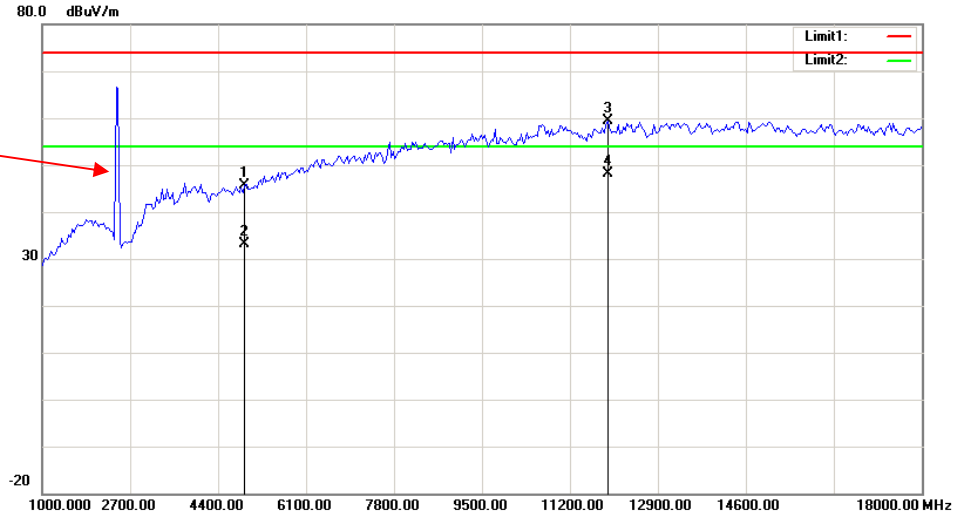
Fundamental Test with Band Rejection Filter

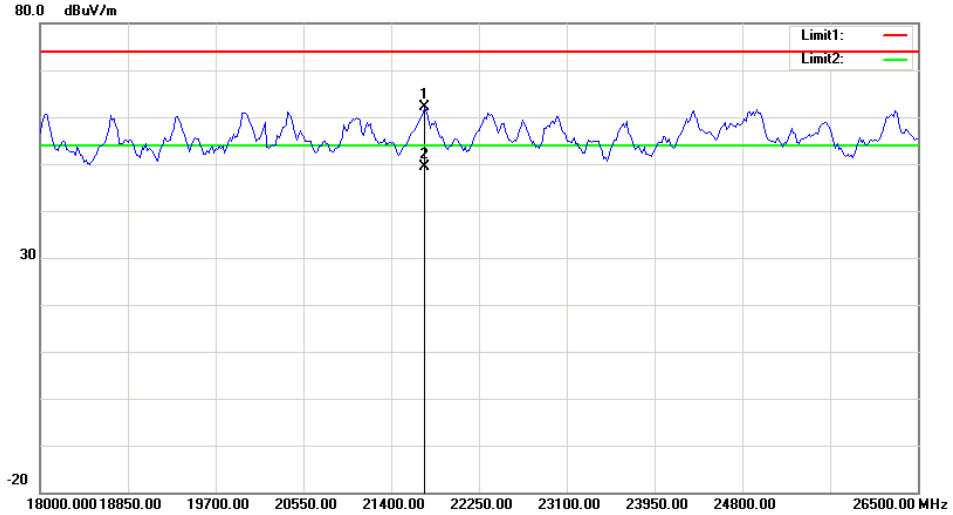




Vertical:

Fundamental
Test with Band
Rejection Filter





FCC §15.247(a) (2)& RSS-247 §5.2 a)–6 dB EMISSION BANDWIDTH

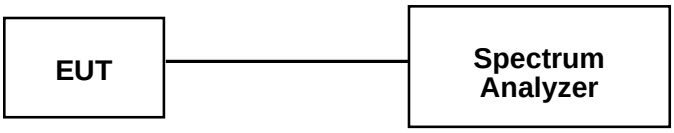
Applicable Standard

According to FCC §15.247(a) (2)

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

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3×RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-08	2018-12-08
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each Time	/

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

Test Data

Environmental Conditions

Temperature:	22.1 °C
Relative Humidity:	35 %
ATM Pressure:	102 kPa

** The testing was performed by Mark Pan on 2018-02-13.*

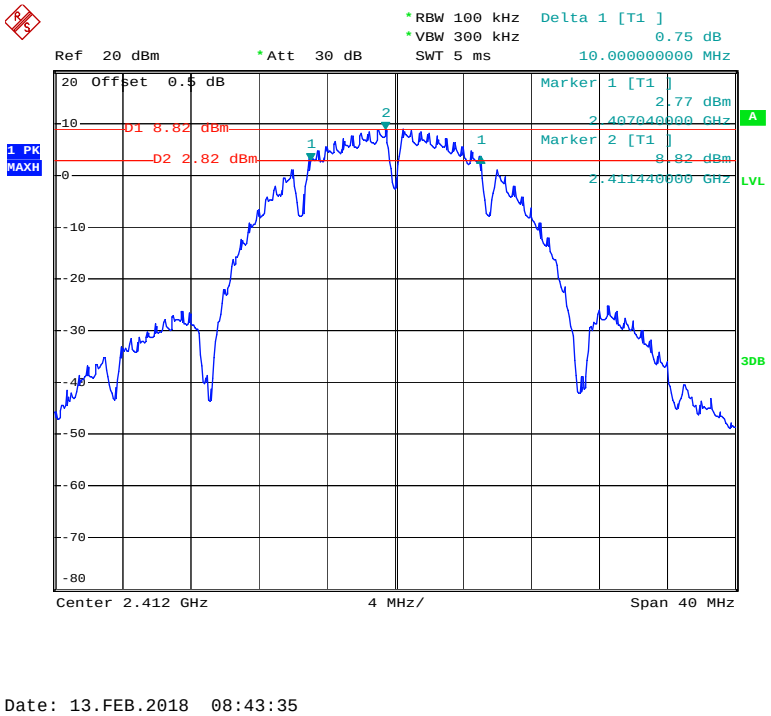
Test Mode: Transmitting(Test was performed at chain 0)

Test Result: Compliant. Please refer to the following table and plots.

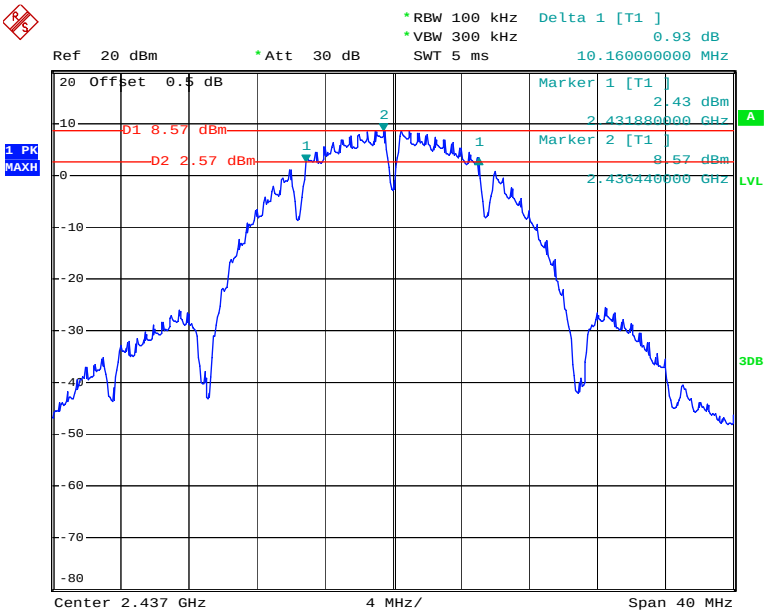
Test mode	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	10.00	≥0.5
	Middle	2437	10.16	≥0.5
	High	2462	10.08	≥0.5
802.11g	Low	2412	16.64	≥0.5
	Middle	2437	16.64	≥0.5
	High	2462	16.64	≥0.5
802.11n20	Low	2412	17.84	≥0.5
	Middle	2437	17.84	≥0.5
	High	2462	17.84	≥0.5
802.11n40	Low	2422	36.8	≥0.5
	Middle	2437	36.48	≥0.5
	High	2452	36.48	≥0.5

6dB bandwidth:

802.11b Low Channel

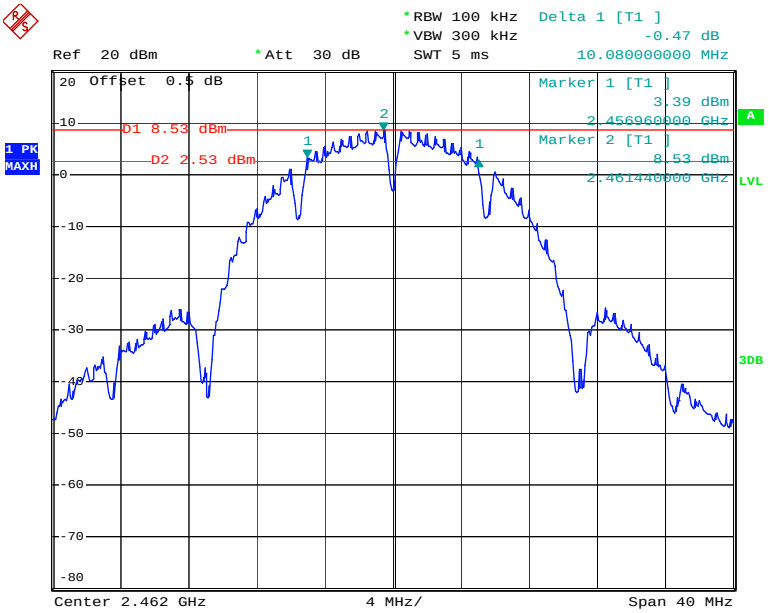


802.11b Middle Channel



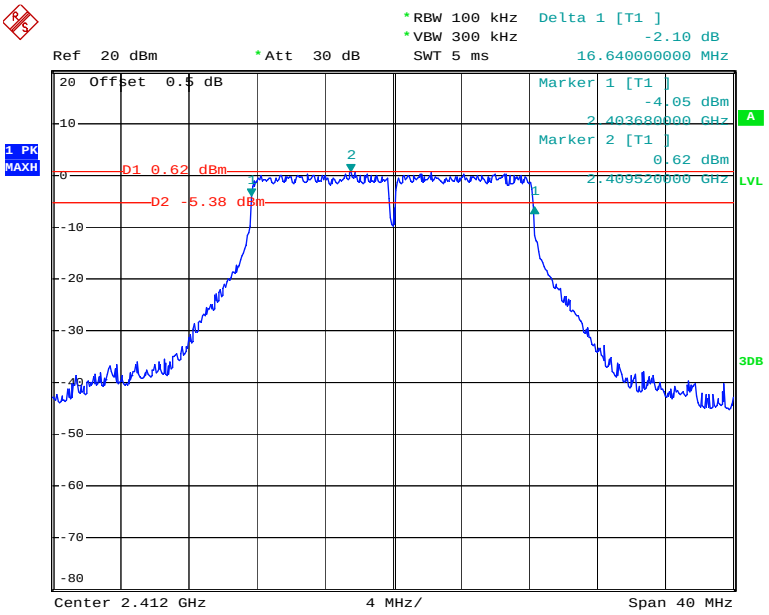
Date: 13.FEB.2018 08:50:22

802.11b High Channel



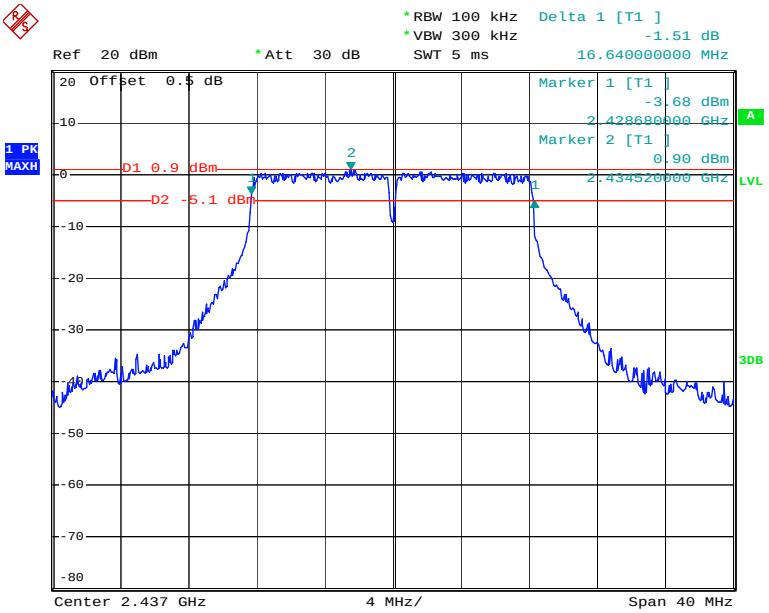
Date: 13.FEB.2018 08:55:57

802.11g Low Channel



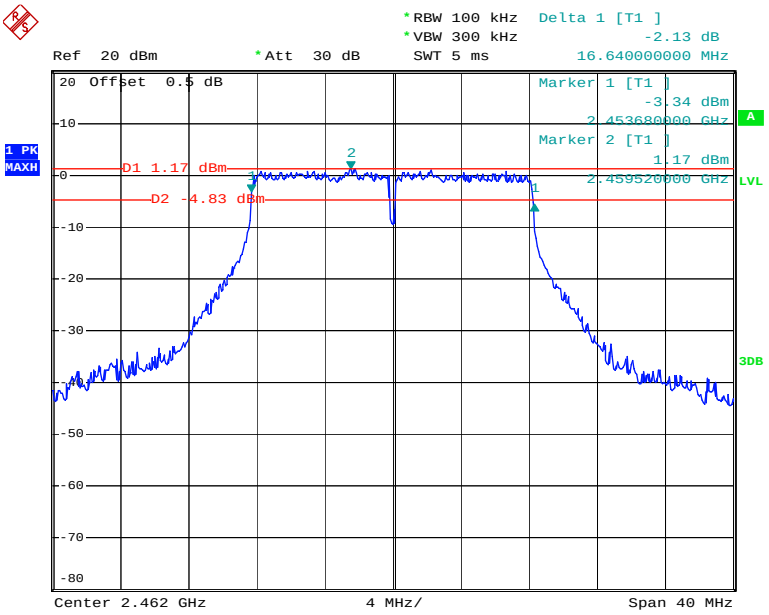
Date: 13.FEB.2018 09:09:35

802.11g Middle Channel



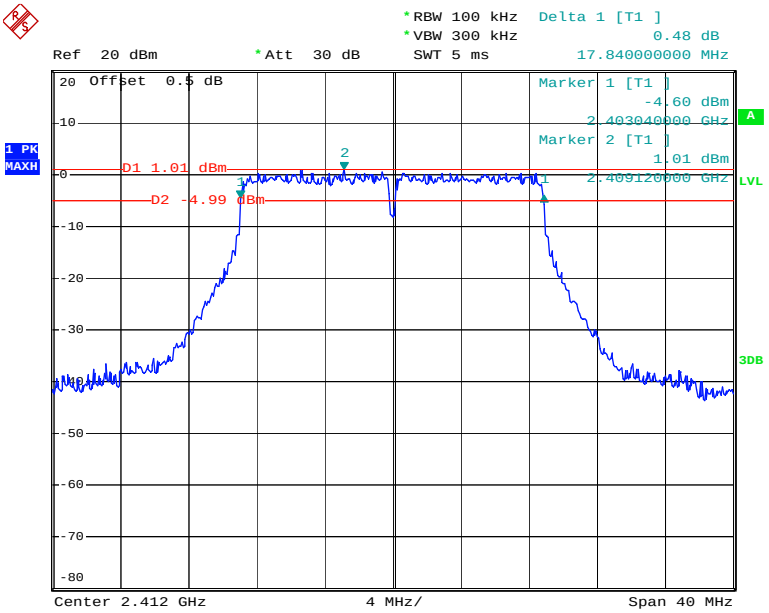
Date: 13.FEB.2018 09:06:02

802.11g High Channel



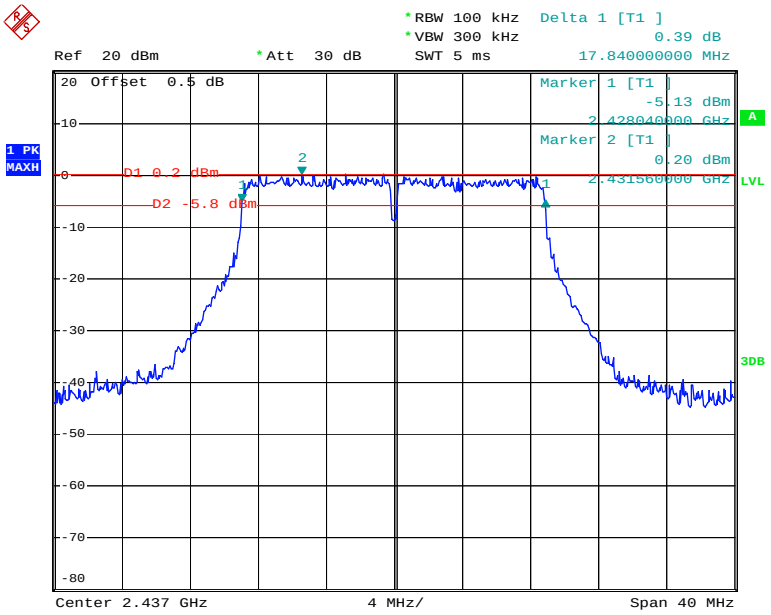
Date: 13.FEB.2018 09:01:32

802.11n ht20 Low Channel



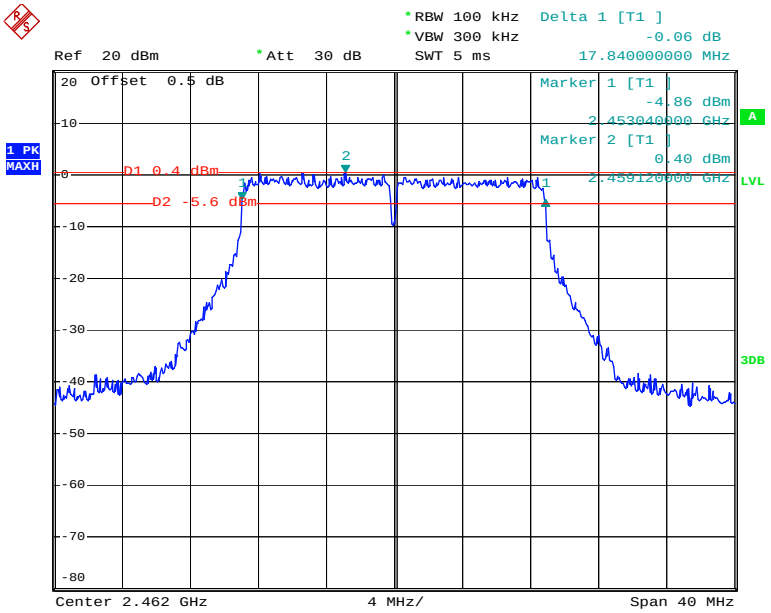
Date: 13.FEB.2018 09:55:43

802.11n ht20 Middle Channel



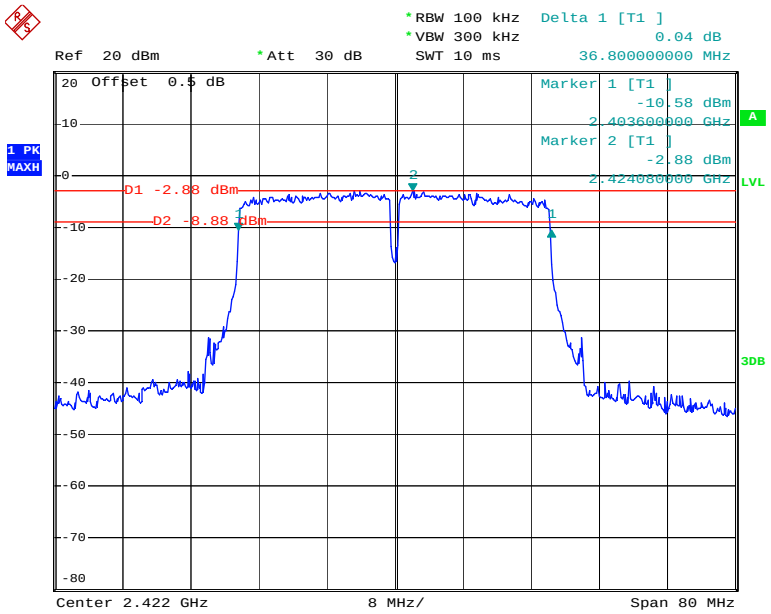
Date: 13.FEB.2018 10:08:16

802.11n ht20 High Channel



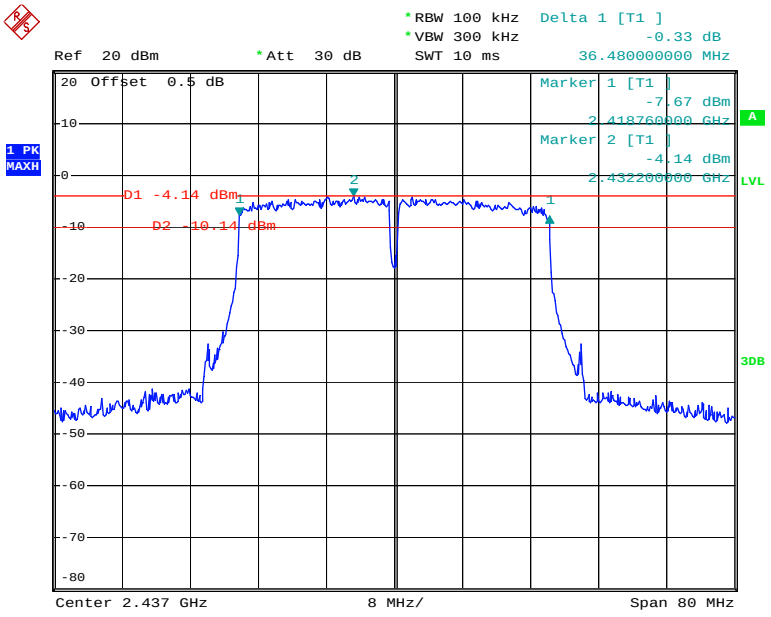
Date: 13.FEB.2018 10:10:56

802.11n ht40 Low Channel



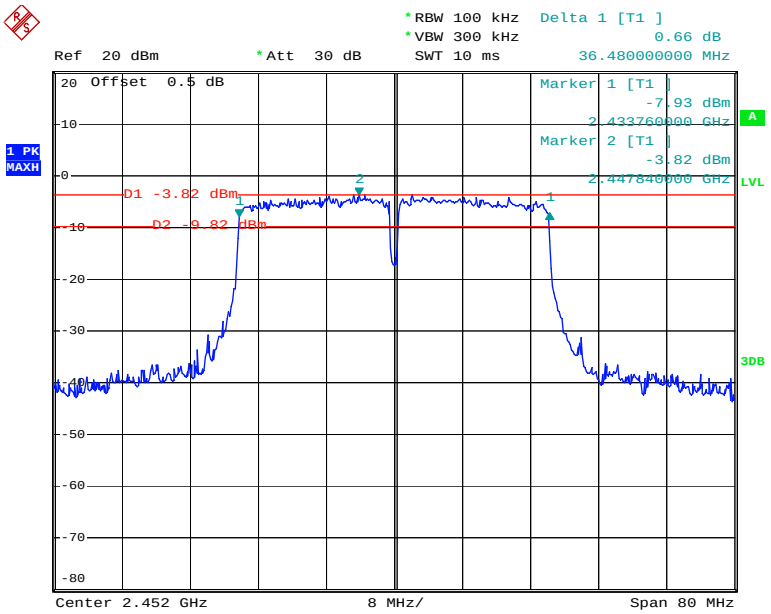
Date: 13.FEB.2018 10:15:17

802.11n ht40 Middle Channel



Date: 13.FEB.2018 10:20:25

802.11n ht40 High Channel



Date: 13.FEB.2018 13:07:48

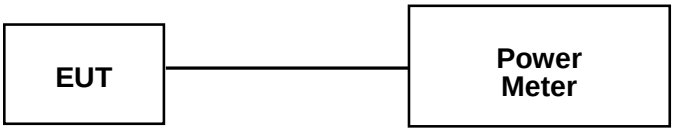
FCC §15.247(b) (3) - MAXIMUM PEAK CONDUCTED OUTPUT POWER

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 test equipment.
3. Add a correction factor to the display.
4. Set the power Meter to test Peak output power, record the result as peak power.
5. Set the power meter to test average output power, record the result as average power.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Wideband Power Sensor	N1921A	MY54210016	2017-11-03	2018-11-03
Agilent	Wideband Power Sensor	N1921A	MY54170013	2017-11-03	2018-11-03
Agilent	P-Series Power Meter	N1912A	MY5000448	2017-11-03	2018-11-03
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each Time	/

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

Test Data

Environmental Conditions

Temperature:	22.1 °C
Relative Humidity:	35 %
ATM Pressure:	102 kPa

** The testing was performed by Mark Pan on 2018-02-13.*

Test Mode: Transmitting

Test Result: Compliant. Please refer to the following table.

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)		Total (dBm)	Limit (dBm)
			Chain 0	Chain 1		
802.11 b	Low	2412	18.79	18.87	/	30
	Middle	2437	18.36	18.62	/	30
	High	2462	18.33	18.36	/	30
802.11 g	Low	2412	22.64	22.86	/	30
	Middle	2437	22.82	22.82	/	30
	High	2462	22.71	23.16	/	30
802.11 n20	Low	2412	22.77	22.89	25.84	30
	Middle	2437	22.48	23.36	25.95	30
	High	2462	22.37	23.54	26.00	30
802.11 n40	Low	2422	22.06	21.53	24.81	30
	Middle	2437	20.91	22.24	24.64	30
	High	2452	21.03	20.91	23.98	30

Mode	Channel	Frequency (MHz)	Average Conducted Output Power (dBm)		Total (dBm)	Limit (dBm)
			Chain 0	Chain 1		
802.11 b	Low	2412	15.32	15.39	/	30
	Middle	2437	**15.41**	**15.65**	/	30
	High	2462	15.26	15.63	/	30
802.11 g	Low	2412	15.04	15.47	/	30
	Middle	2437	15.24	15.37	/	30
	High	2462	15.06	15.69	/	30
802.11 n20	Low	2412	14.91	15.13	18.03	30
	Middle	2437	14.77	15.56	18.19	30
	High	2462	14.55	15.67	18.16	30
802.11 n40	Low	2422	14.39	14.18	17.3	30
	Middle	2437	13.43	14.56	17.04	30
	High	2452	13.36	13.31	16.35	30

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

Applicable Standard

According to FCC§15.247(d):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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-08	2018-12-08
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each Time	/

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

Test Data

Environmental Conditions

Temperature:	22.1°C
Relative Humidity:	35 %
ATM Pressure:	102 kPa

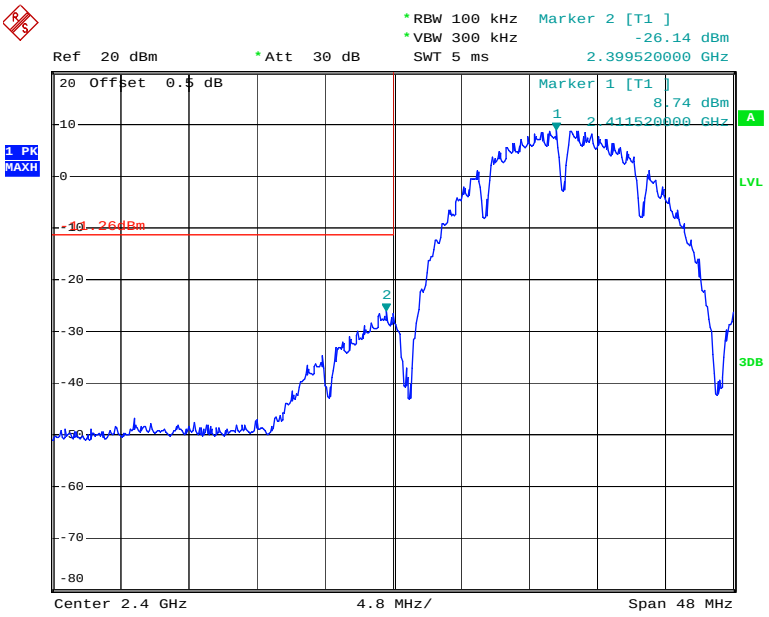
** The testing was performed by Mark Pan on 2018-02-13.*

Test mode: Transmitting

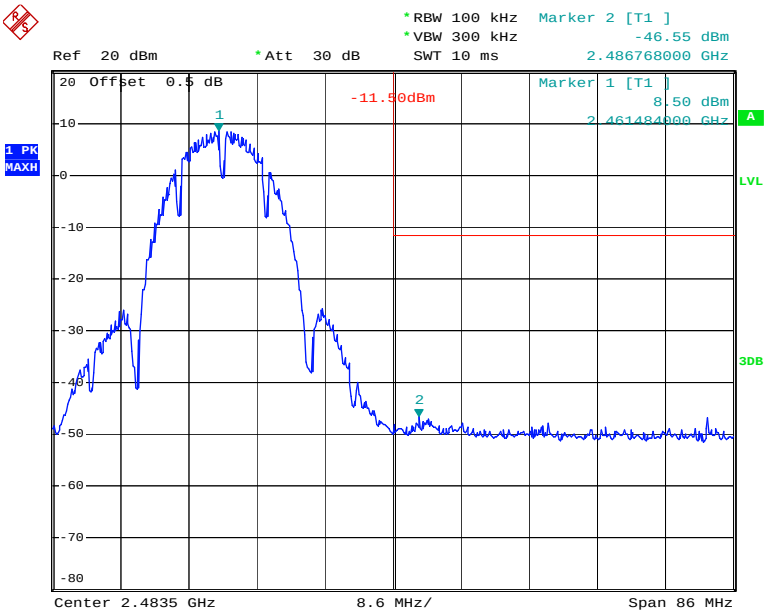
Test Result: Compliant. Please refer to following plots.

Chain 0

802.11b: Band Edge, Left Side

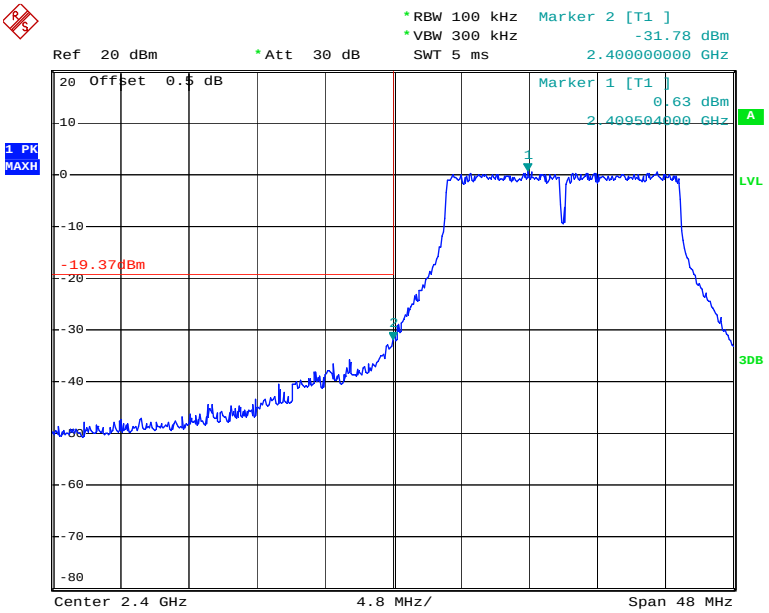


802.11b: Band Edge, Right Side



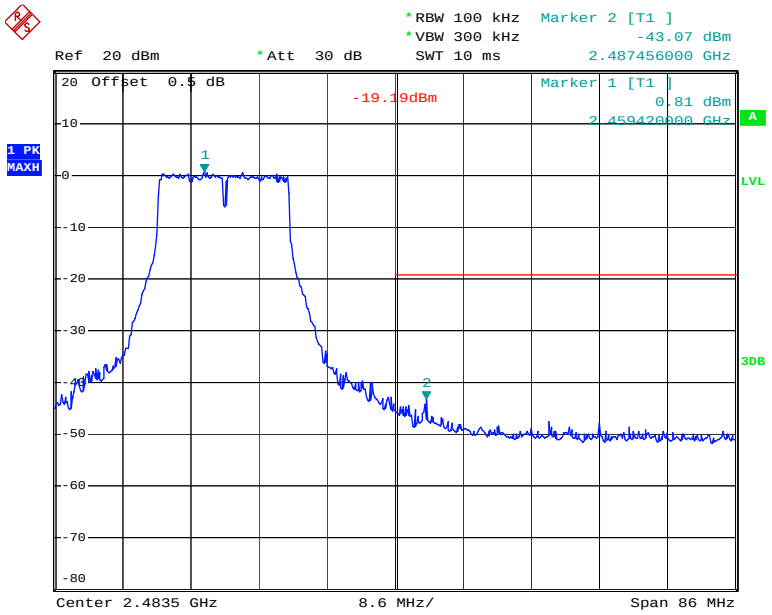
Date: 13.FEB.2018 08:58:06

802.11g: Band Edge, Left Side



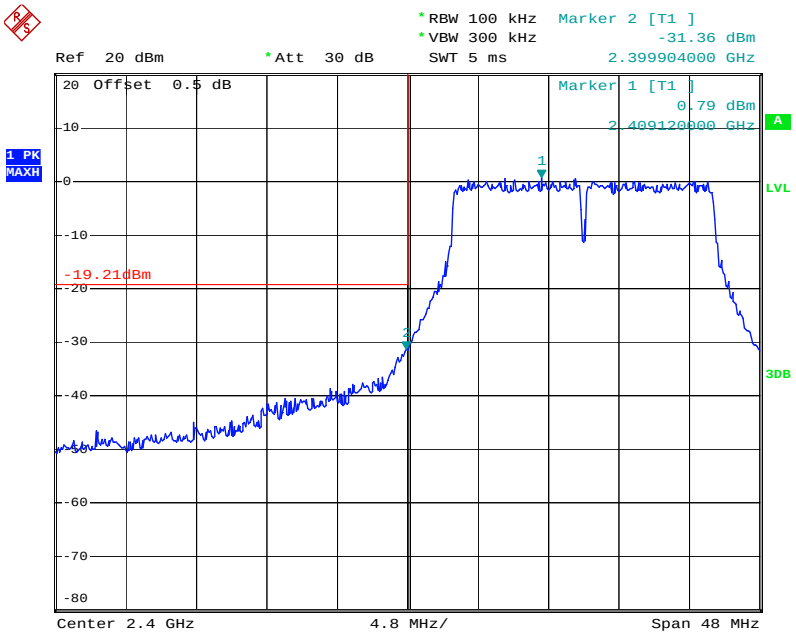
Date: 13.FEB.2018 09:11:39

802.11g: Band Edge, Right Side



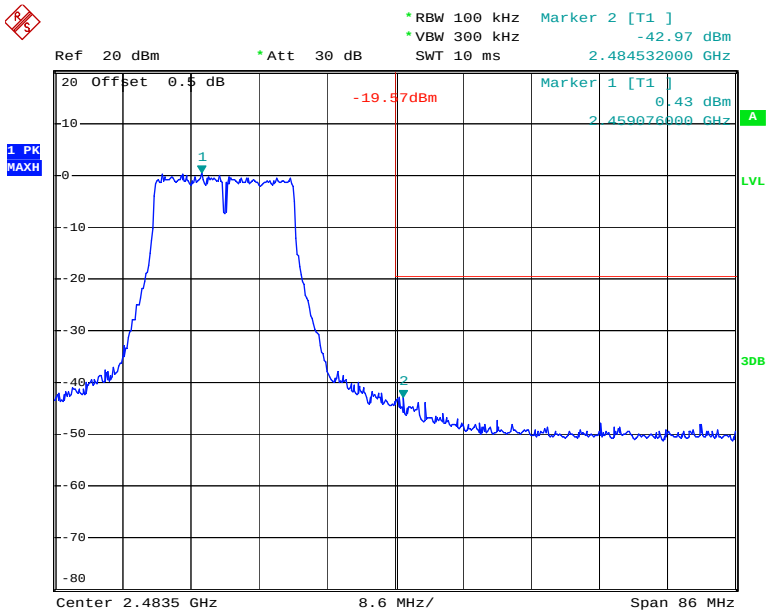
Date: 13.FEB.2018 09:03:37

802.11n ht20 Band Edge, Left Side



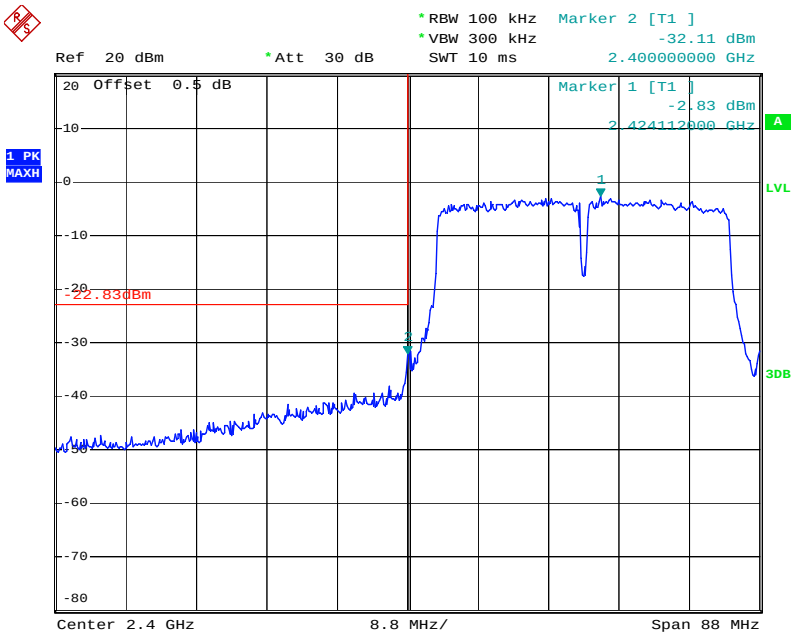
Date: 13.FEB.2018 09:57:34

802.11n ht20 Band Edge, Right Side



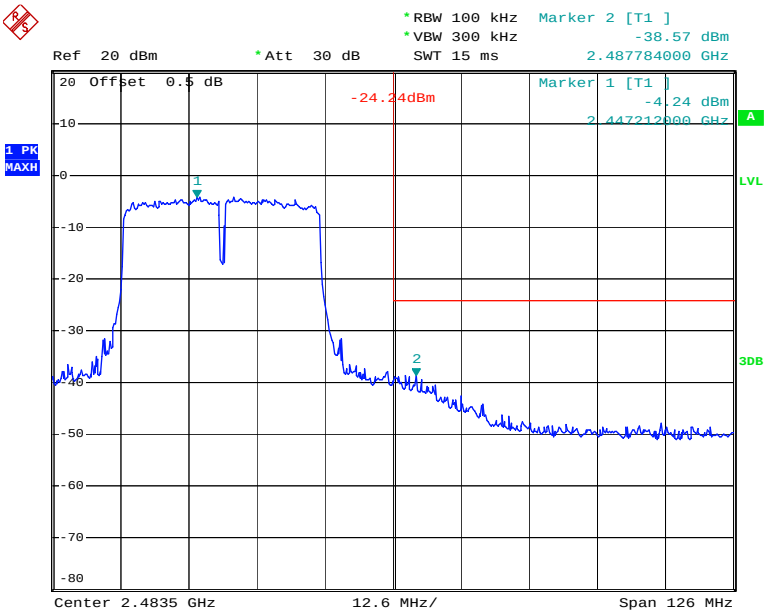
Date: 13.FEB.2018 10:12:57

802.11n ht40 Band Edge, Left Side



Date: 13.FEB.2018 10:17:36

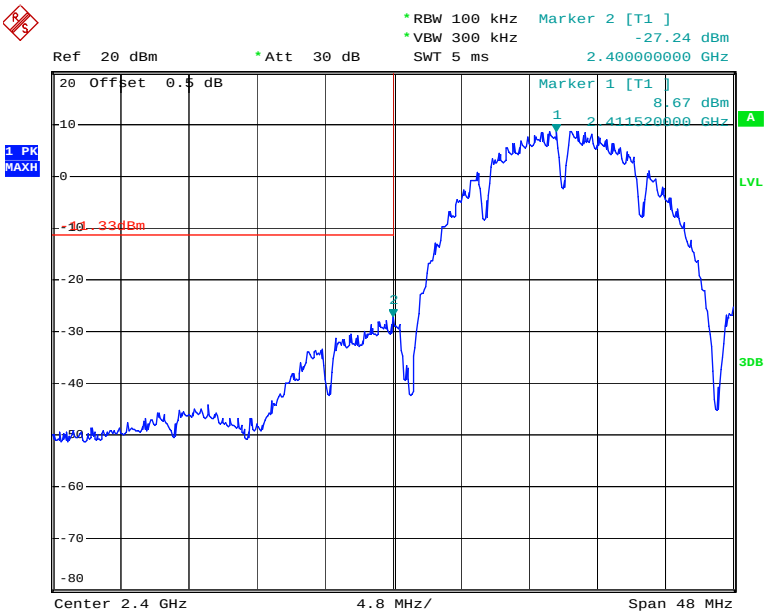
802.11n ht40 Band Edge, Right Side



Date: 13.FEB.2018 13:09:59

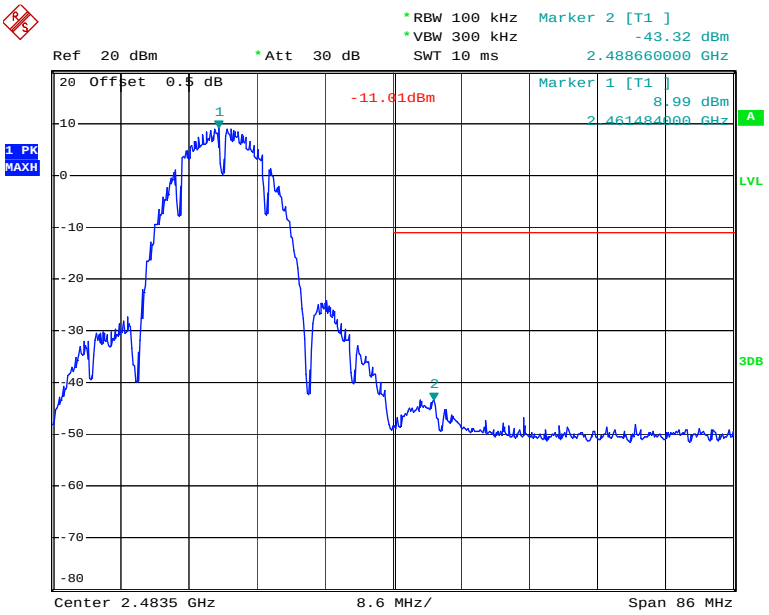
Chain 1

802.11b: Band Edge, Left Side



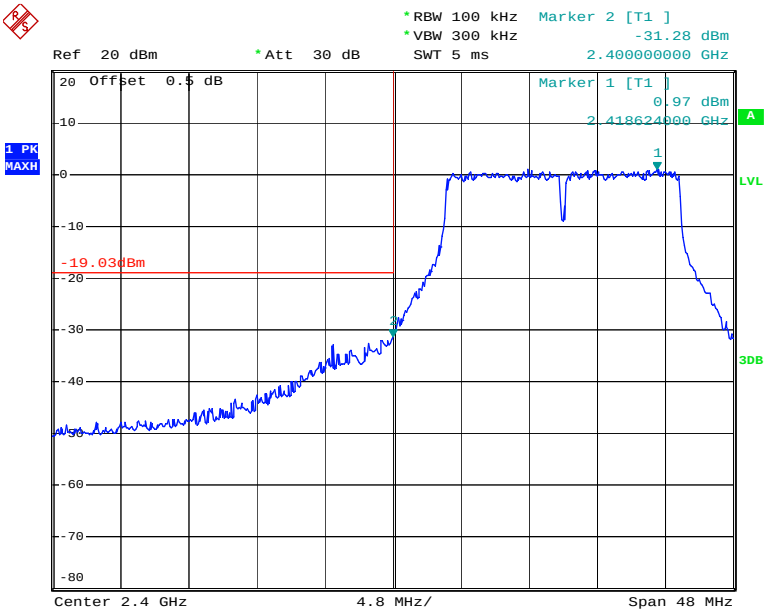
Date: 13.FEB.2018 11:12:12

802.11b: Band Edge, Right Side



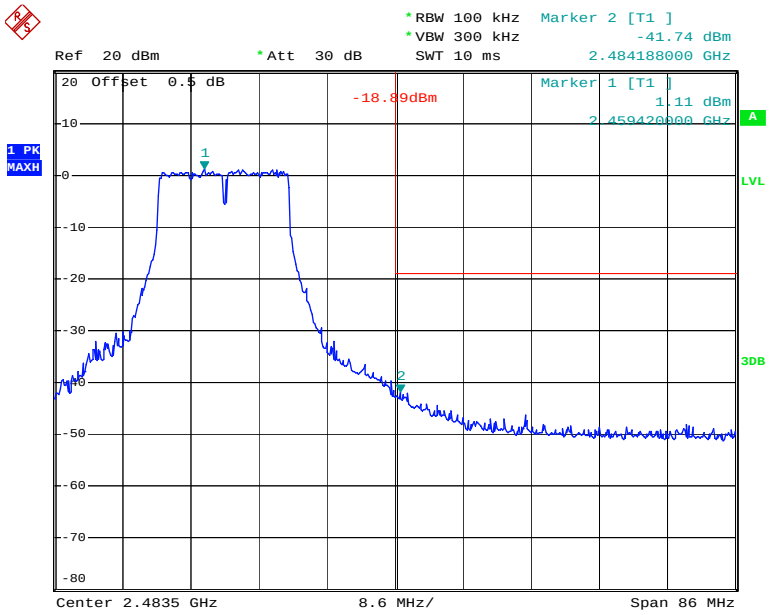
Date: 13.FEB.2018 11:18:38

802.11g: Band Edge, Left Side



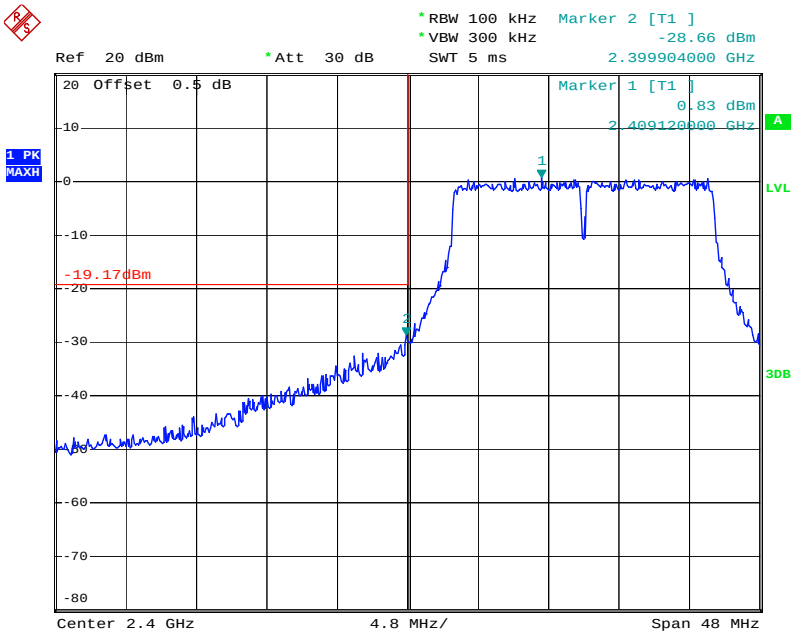
Date: 13.FEB.2018 11:31:24

802.11g: Band Edge, Right Side



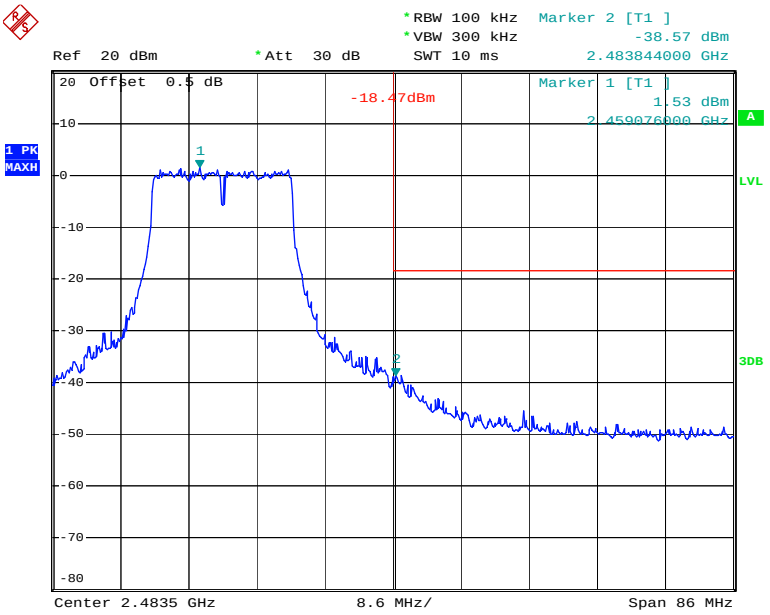
Date: 13.FEB.2018 11:24:31

802.11n ht20 Band Edge, Left Side



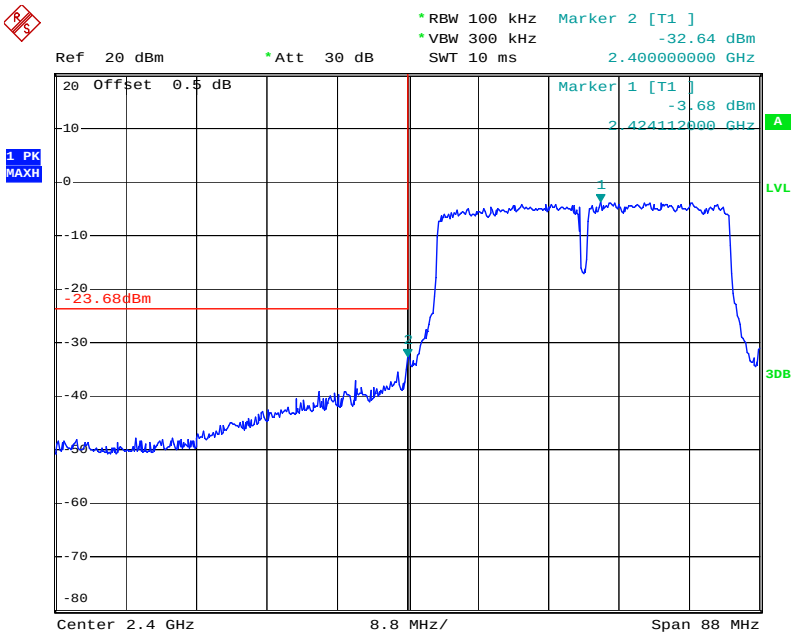
Date: 13.FEB.2018 10:58:01

802.11n ht20 Band Edge, Right Side



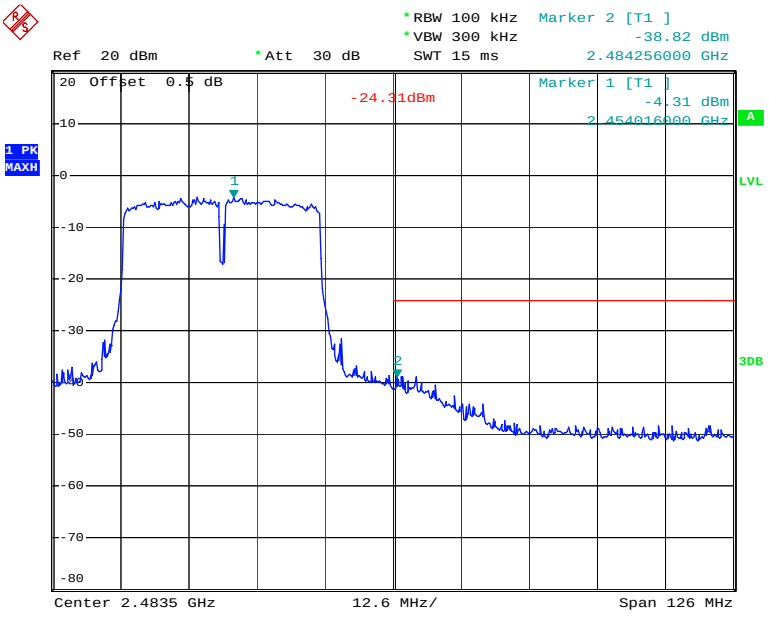
Date: 13.FEB.2018 11:05:49

802.11n ht40 Band Edge, Left Side



Date: 13.FEB.2018 10:42:42

802.11n ht40 Band Edge, Right Side



Date: 13.FEB.2018 10:50:31

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

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 was set 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 the RBW = 3 kHz, VBW = 10 kHz, Set the span to 1.5 times the DTS bandwidth.
4. Use the peak marker function to determine the maximum amplitude level.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-08	2018-12-08
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each Time	/

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

Test Data

Environmental Conditions

Temperature:	22.1C
Relative Humidity:	35 %
ATM Pressure:	102 kPa

** The testing was performed by Mark Pan on 2018-02-13.*

Test Result: Compliance

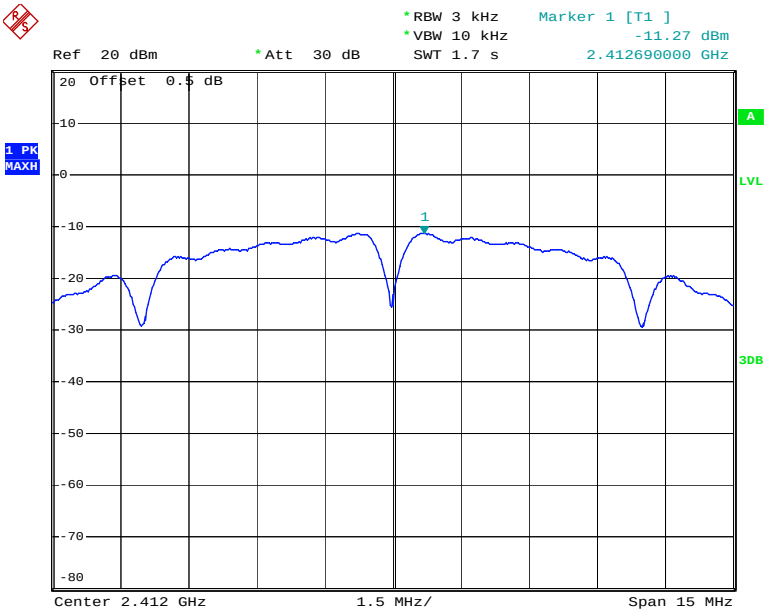
Test Mode: Transmitting

Test Result: Compliant. Please refer to the following table and plots

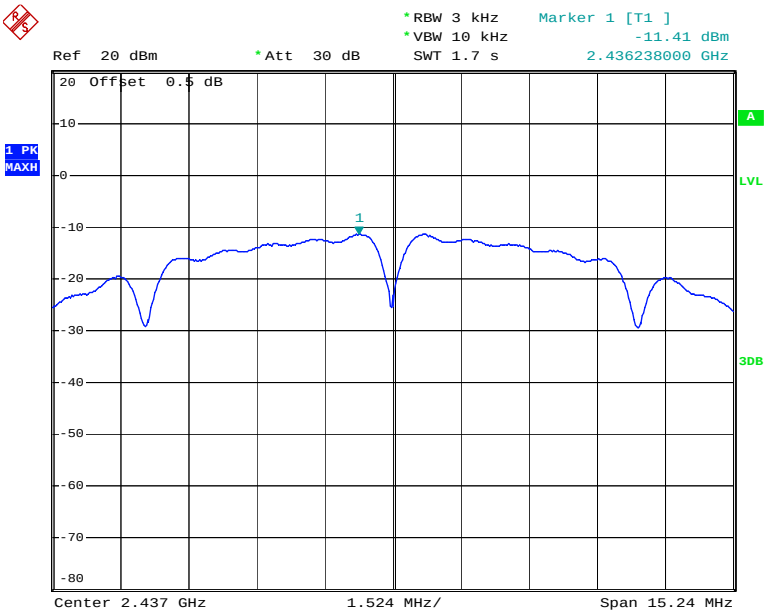
Mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)		Total (dBm/3kHz)	Limit (dBm/3kHz)
			Chain 0	Chain 1		
802.11 b	Low	2412	-11.27	-11.27	/	≤8.00
	Middle	2437	-11.41	-11.31	/	≤8.00
	High	2462	-11.59	-11.05	/	≤8.00
802.11 g	Low	2412	-13.91	-13.04	/	≤8.00
	Middle	2437	-13.54	-13.61	/	≤8.00
	High	2462	-13.27	-13.19	/	≤8.00
802.11 n20	Low	2412	-13.57	-13.78	-10.66	≤8.00
	Middle	2437	-14.08	-12.33	-10.11	≤8.00
	High	2462	-14.25	-13.08	-10.62	≤8.00
802.11 n40	Low	2422	-16.46	-16.34	-13.39	≤8.00
	Middle	2437	-16.97	-16.44	-13.69	≤8.00
	High	2452	-17.3	-17.75	-14.51	≤8.00

Chain 0

Power Spectral Density, 802.11b Low Channel

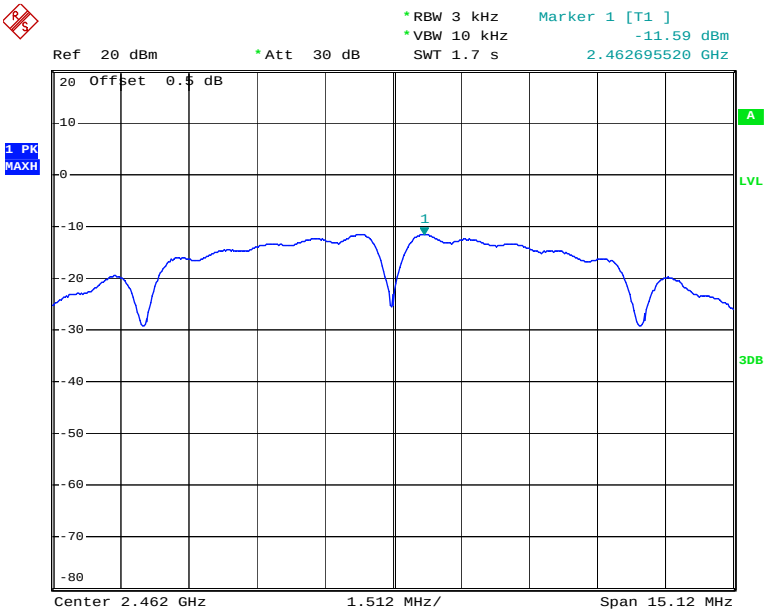


Power Spectral Density, 802.11b Middle Channel



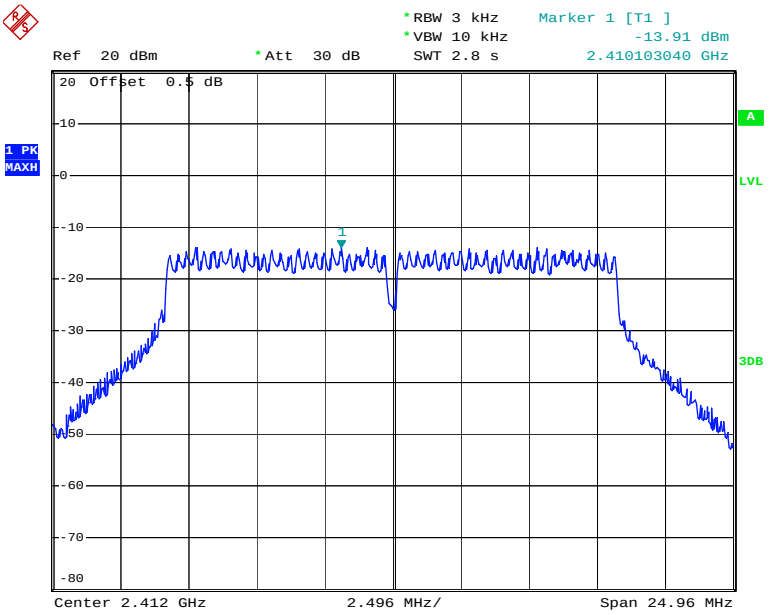
Date: 13.FEB.2018 08:51:31

Power Spectral Density, 802.11b High Channel



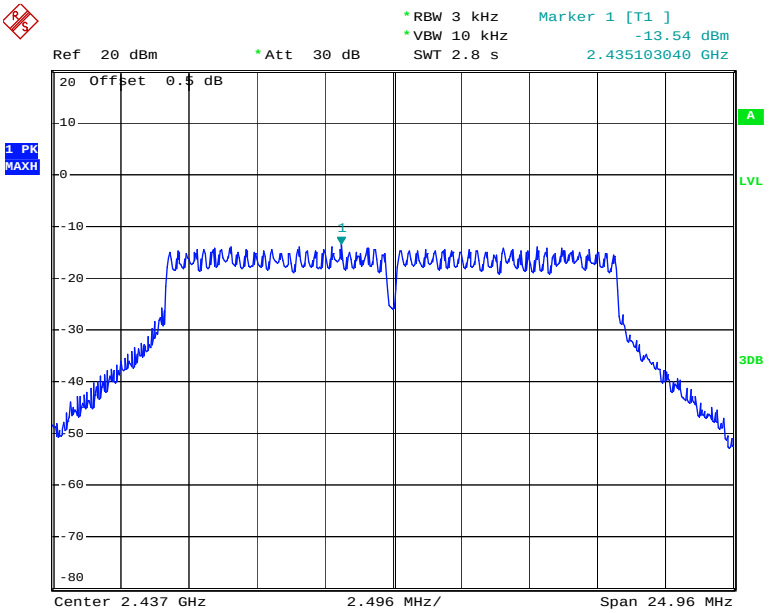
Date: 13.FEB.2018 08:57:12

Power Spectral Density, 802.11g Low Channel



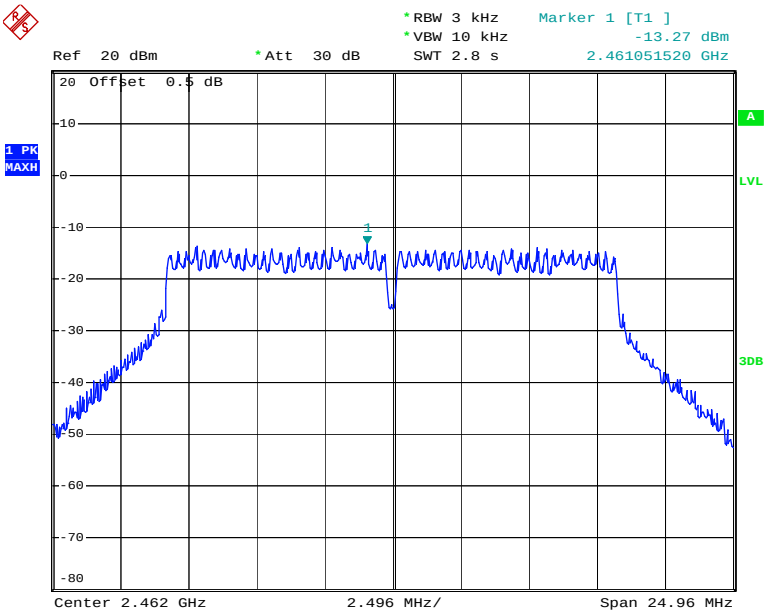
Date: 13.FEB.2018 09:10:48

Power Spectral Density, 802.11g Middle Channel



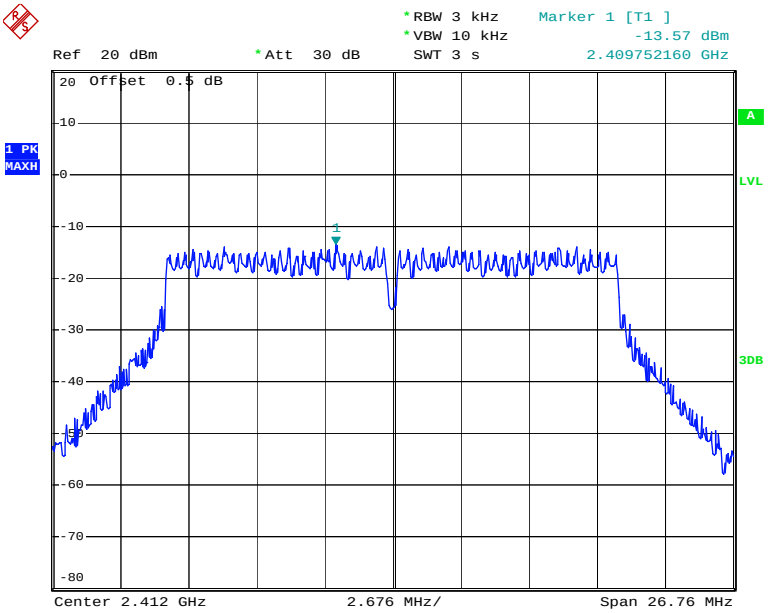
Date: 13.FEB.2018 09:07:12

Power Spectral Density, 802.11g High Channel



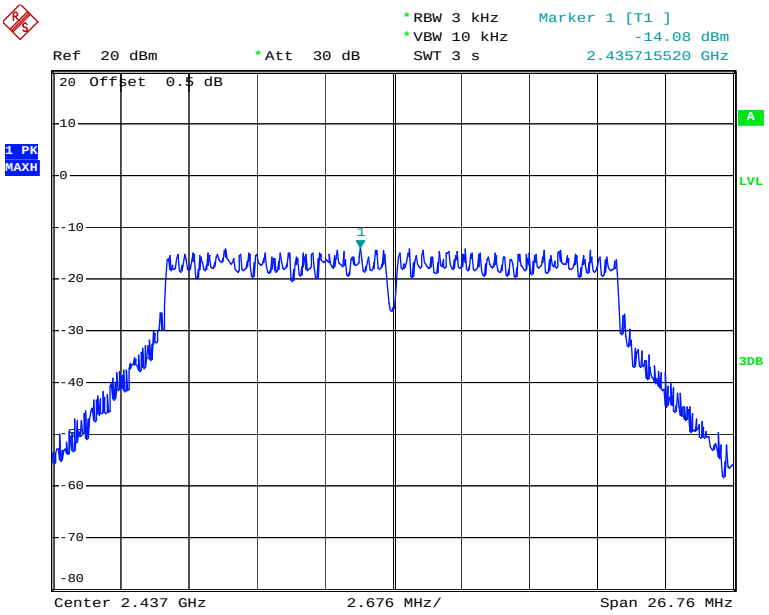
Date: 13.FEB.2018 09:02:45

Power Spectral Density, 802.11n ht20 Low Channel



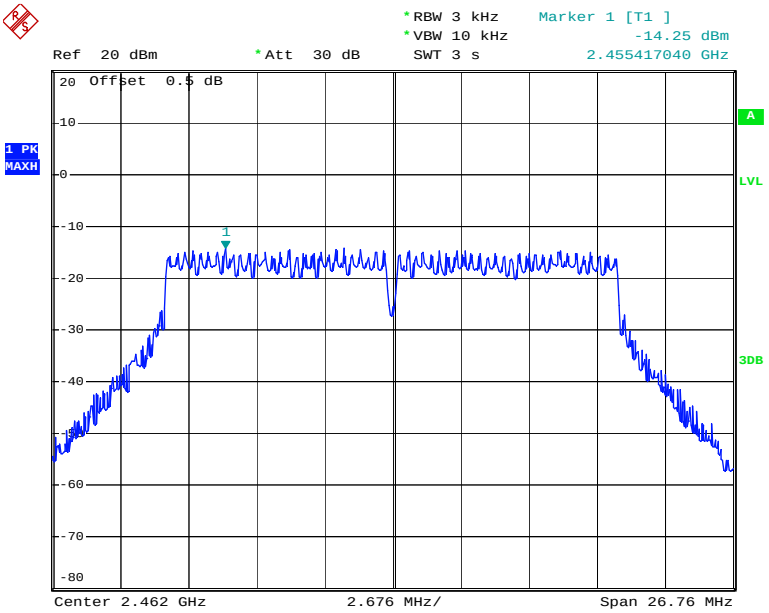
Date: 13.FEB.2018 09:56:47

Power Spectral Density, 802.11n ht20 Middle Channel



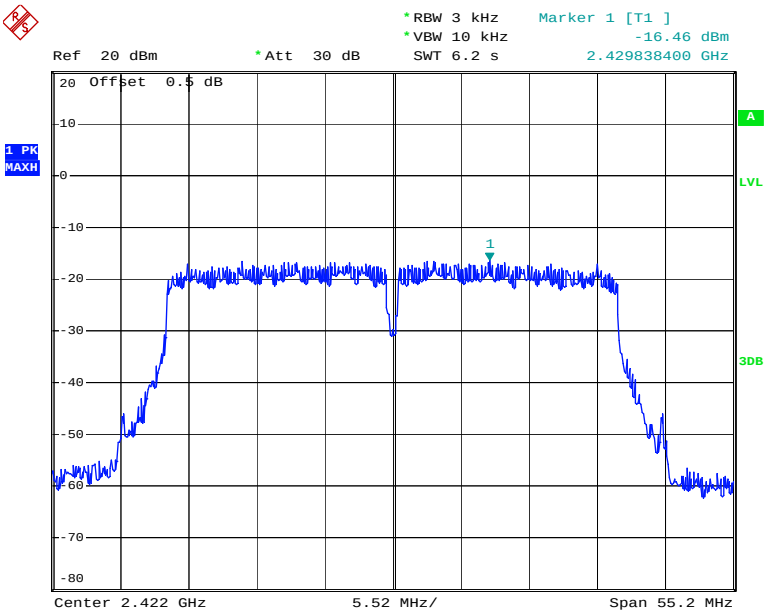
Date: 13.FEB.2018 10:09:20

Power Spectral Density, 802.11n ht20 High Channel



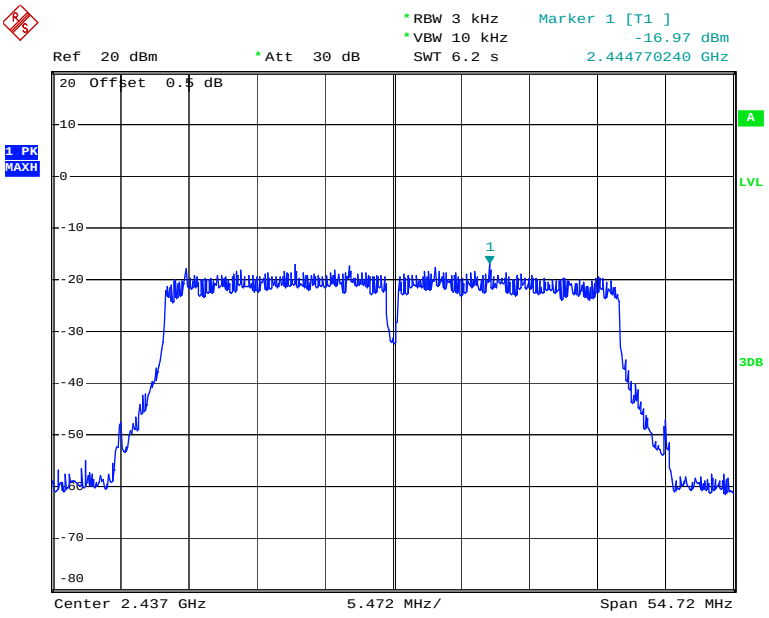
Date: 13.FEB.2018 10:12:00

Power Spectral Density, 802.11n ht40 Low Channel



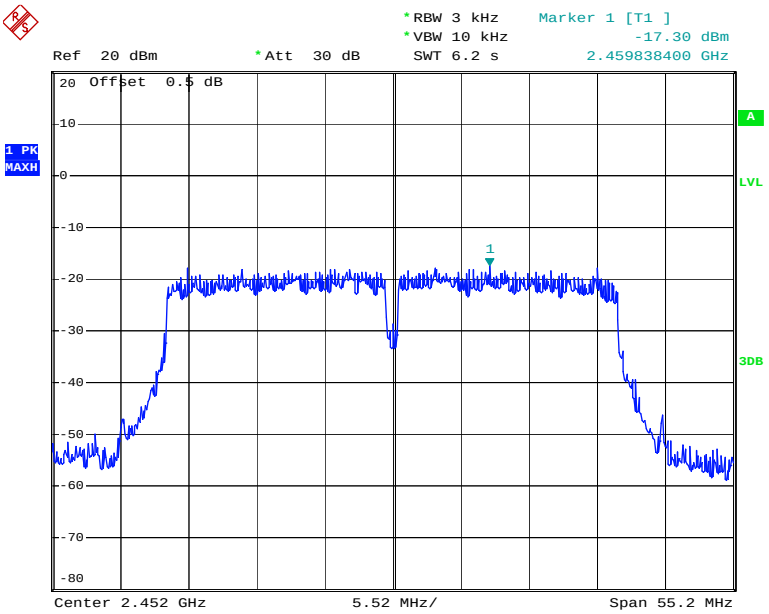
Date: 13.FEB.2018 13:35:12

Power Spectral Density, 802.11n ht40 Middle Channel



Date: 13.FEB.2018 10:21:48

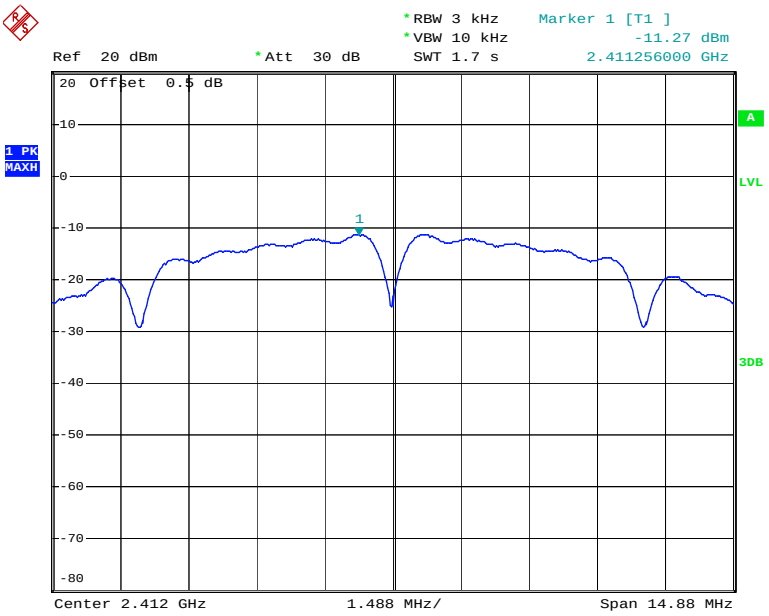
Power Spectral Density, 802.11n ht40 High Channel



Date: 13.FEB.2018 13:26:07

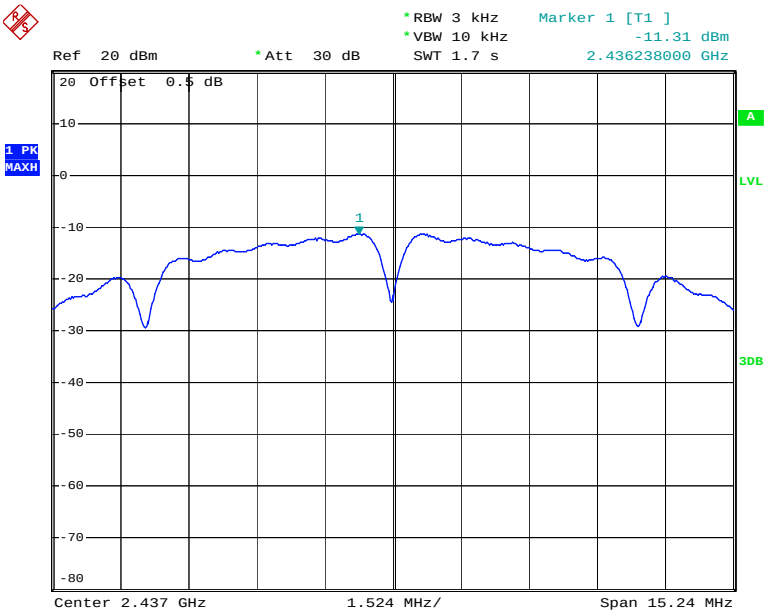
Chain 1

Power Spectral Density, 802.11b Low Channel



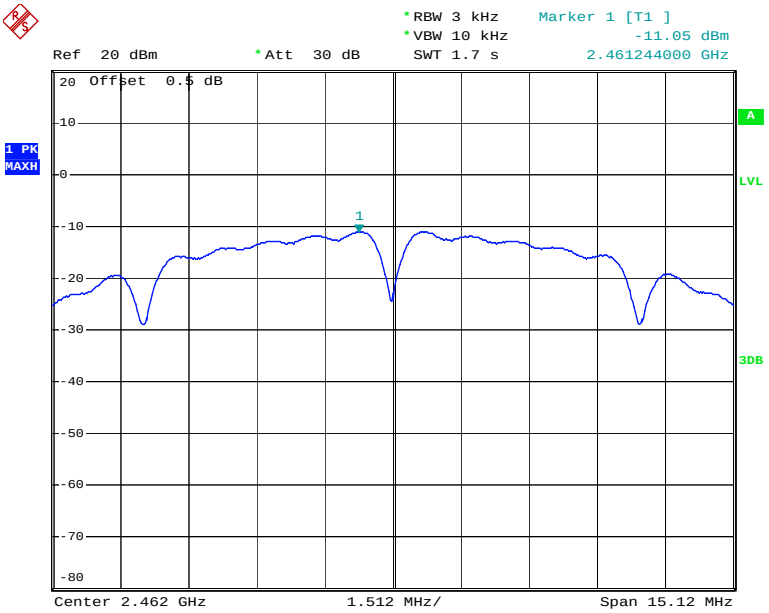
Date: 13.FEB.2018 11:11:16

Power Spectral Density, 802.11b Middle Channel



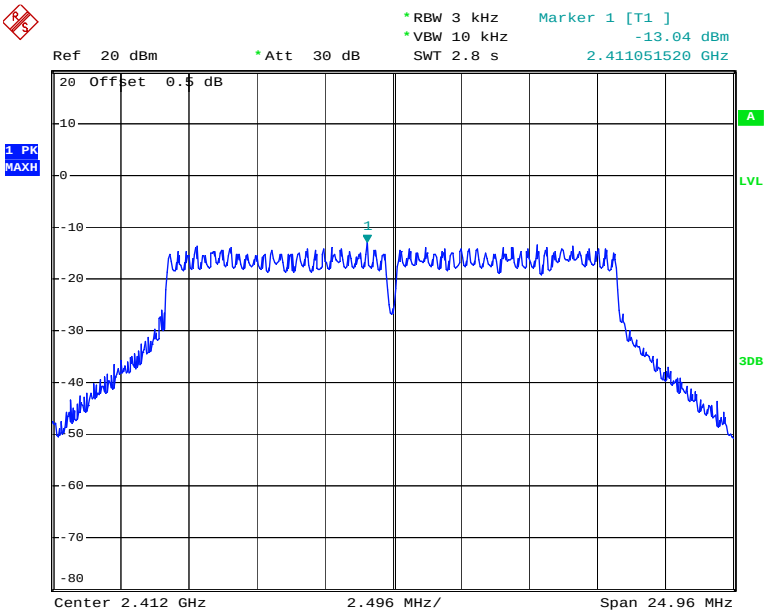
Date: 13.FEB.2018 11:15:15

Power Spectral Density, 802.11b High Channel



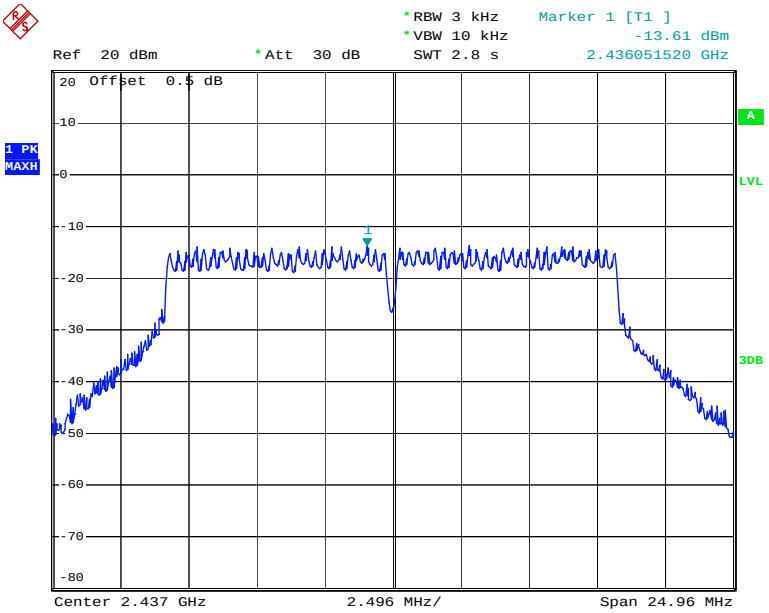
Date: 13.FEB.2018 11:17:59

Power Spectral Density, 802.11g Low Channel



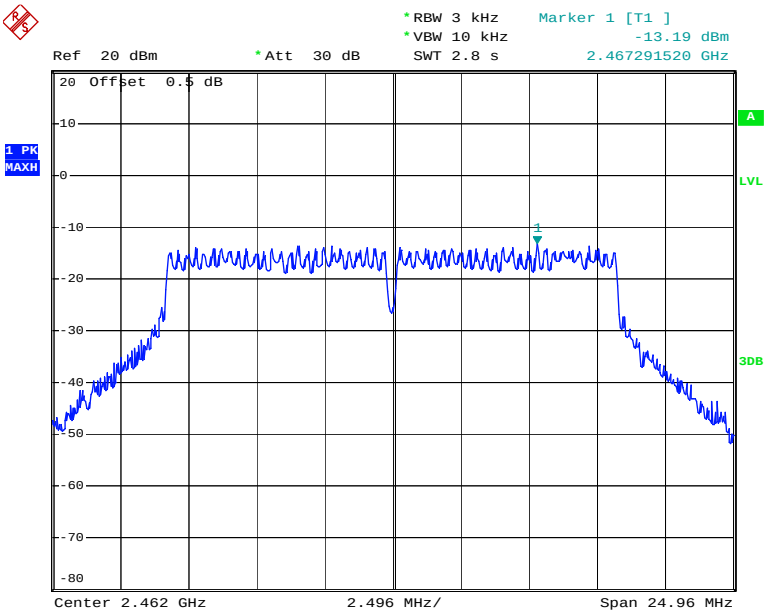
Date: 13.FEB.2018 11:30:26

Power Spectral Density, 802.11g Middle Channel



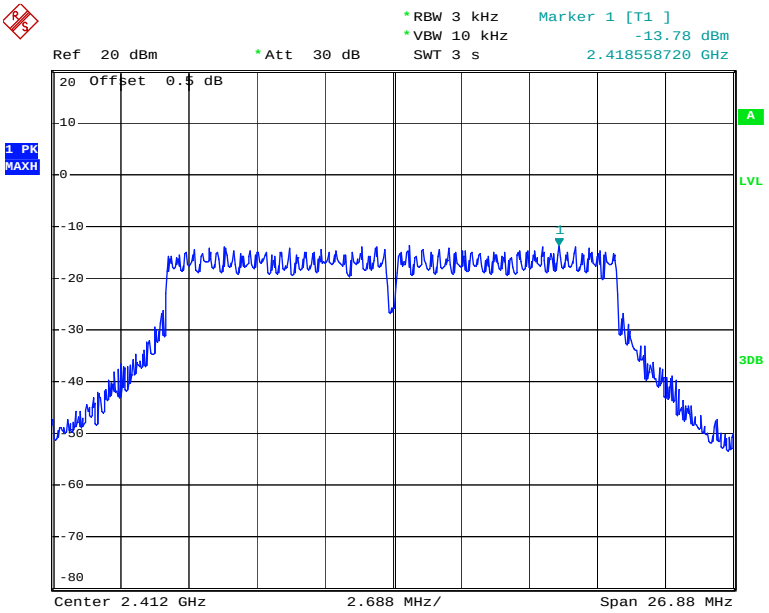
Date: 13.FEB.2018 11:27:21

Power Spectral Density, 802.11g High Channel



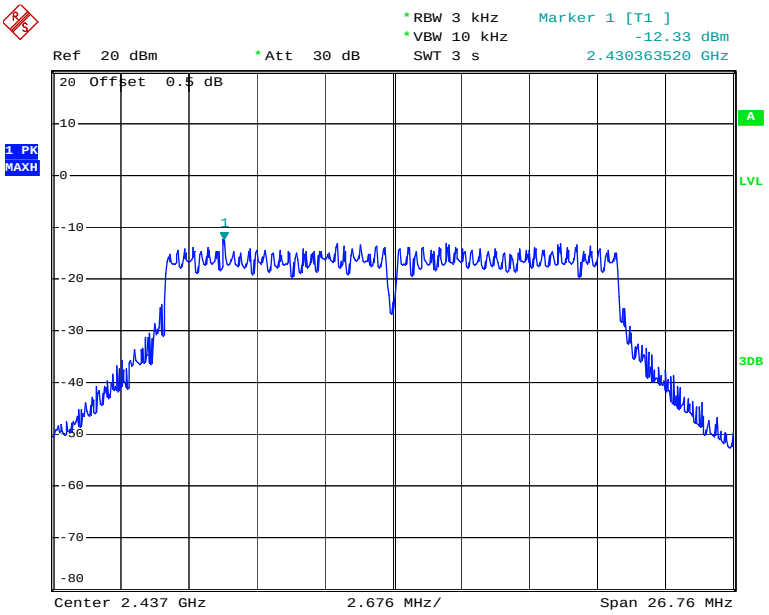
Date: 13.FEB.2018 11:23:41

Power Spectral Density, 802.11n ht20 Low Channel



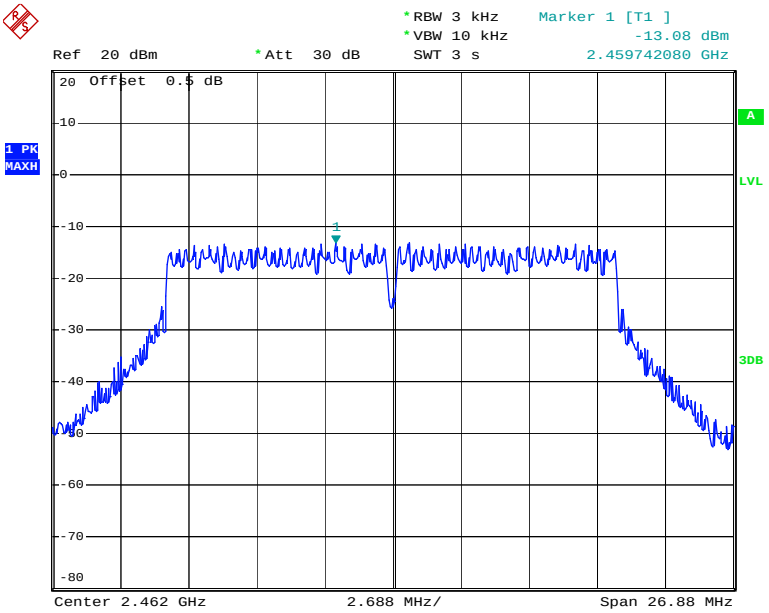
Date: 13.FEB.2018 10:57:18

Power Spectral Density, 802.11n ht20 Middle Channel



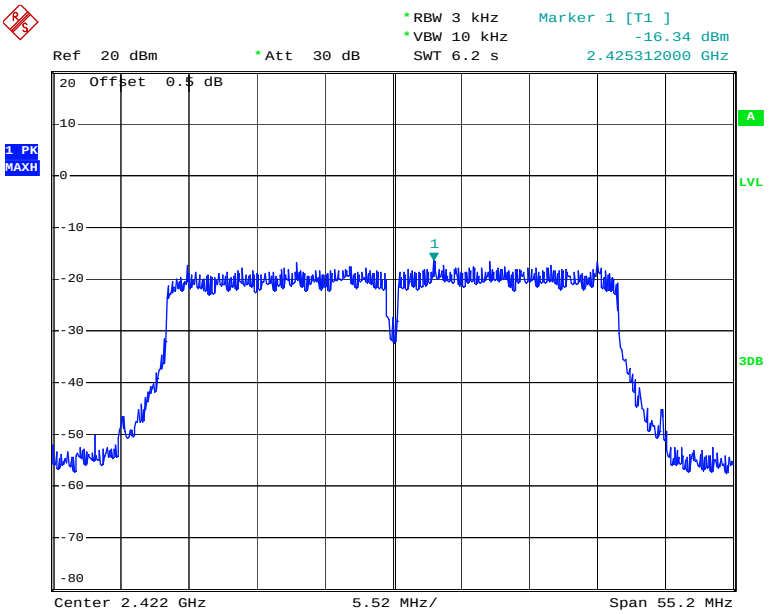
Date: 13.FEB.2018 11:01:13

Power Spectral Density, 802.11n ht20 High Channel



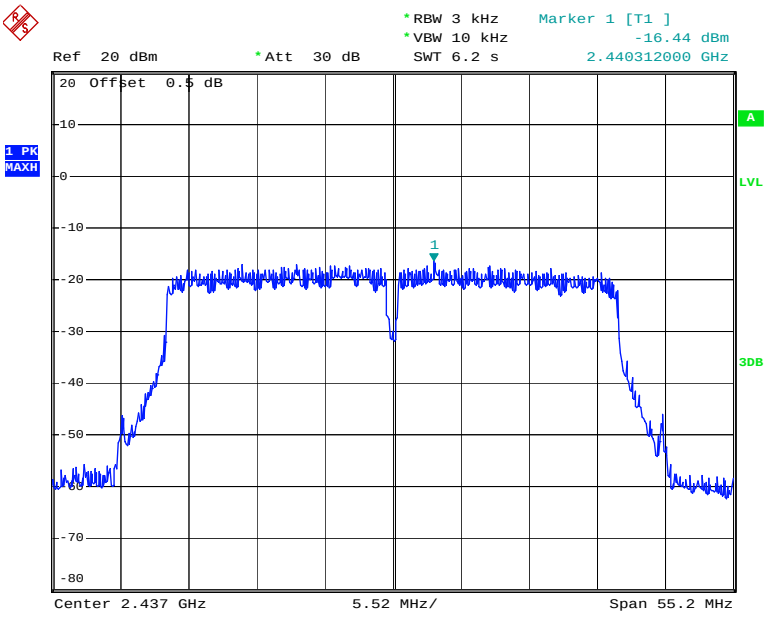
Date: 13.FEB.2018 11:04:45

Power Spectral Density, 802.11n ht40 Low Channel



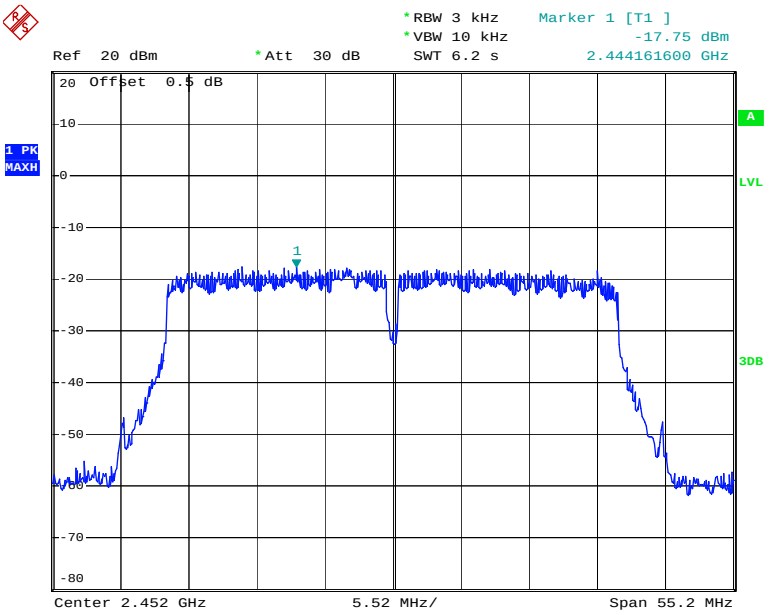
Date: 13.FEB.2018 10:41:44

Power Spectral Density, 802.11n ht40 Middle Channel



Date: 13.FEB.2018 13:28:22

Power Spectral Density, 802.11n ht40 High Channel



Date: 13.FEB.2018 13:30:54

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