



TESTING LABORATORY
CERTIFICATE #4820.01



FCC PART 15.247

TEST REPORT

For

SZ DJI TECHNOLOGY CO., LTD

14th floor, West Wing, Skyworth Semiconductor Design Building NO.18 Gaoxin South 4th Ave,
Nanshan, Shenzhen, Guangdong, China

FCC ID: SS3-RMS11902

Report Type: Original Report	Product Name: RoboMaster S1
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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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FUNVAL

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	RoboMaster S1
EUT Model:	RMS1
Operation Frequency:	2412-2462 MHz(802.11b/g/n20) 2422-2452MHz(802.11n40)
Maximum Output Power (Conducted):	23.41 dBm
Modulation Type:	DSSS, OFDM
Rated Input Voltage:	DC 10.8V from battery
External Dimension:	320mm(L)* 240mm(W)* 270mm(H)
Serial Number:	190215001
EUT Received Date:	2019-02-08

Objective

This report is prepared on behalf of *SZ DJI TECHNOLOGY CO., 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, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15B JAB submissions with FCC ID: SS3-RMS11902.
FCC Part 15E NII submissions with FCC ID: SS3-RMS11902.

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 558074 D01 15.247 Meas Guidance v05r01.

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: 4.55 dB,200M~1GHz: 5.92 dB,1G~6GHz: 4.98 dB, 6G~18GHz: 5.89 dB,18G~26.5G:5.47 dB,26.5G~40G:5.63 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1°C
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 lab has been recognized as the FCC accredited lab 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 lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

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	/	/

EUT Exercise Software

The software "Certification.exe" was used for testing, which was provided by manufacturer. 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 and MIMO in all modes, per pretest, MIMO mode was the worst mode and reported for 802.11n modes.

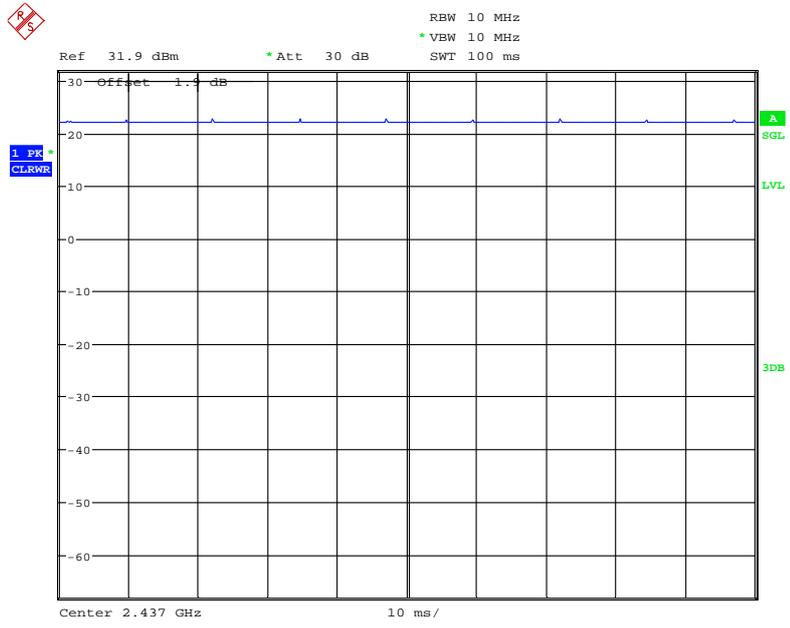
The maximum power with maximum duty cycle was configured as bellow setting, which was provided by manufacturer. Per pretest the conducted output power, the power in difference power level, all test items performed at Low, Middle and High Channel, radiation bandedge test and output power were tested with additional channels according to the pretest output power test results.

Mode	Frequency (MHz)	Data rate	Power level Setting
802.11b	2412	1 Mbps	2
	2417	1 Mbps	4
	2422~2447	1 Mbps	6
	2452	1 Mbps	5
	2457	1 Mbps	5
	2462	1 Mbps	4
802.11g	2412	6 Mbps	2
	2417	6 Mbps	4
	2422~2447	6 Mbps	6
	2452	6 Mbps	4
	2457	6 Mbps	4
	2462	6 Mbps	4
802.11n ht20	2412	MCS8	2
	2417	MCS8	4
	2422~2447	MCS8	6
	2452	MCS8	4
	2457	MCS8	4
	2462	MCS8	4
802.11n ht40	2422	MCS8	2
	2427	MCS8	3
	2432	MCS8	5
	2437	MCS8	6
	2442	MCS8	6
	2447	MCS8	4
	2452	MCS8	2

The maximum duty cycle as following table:

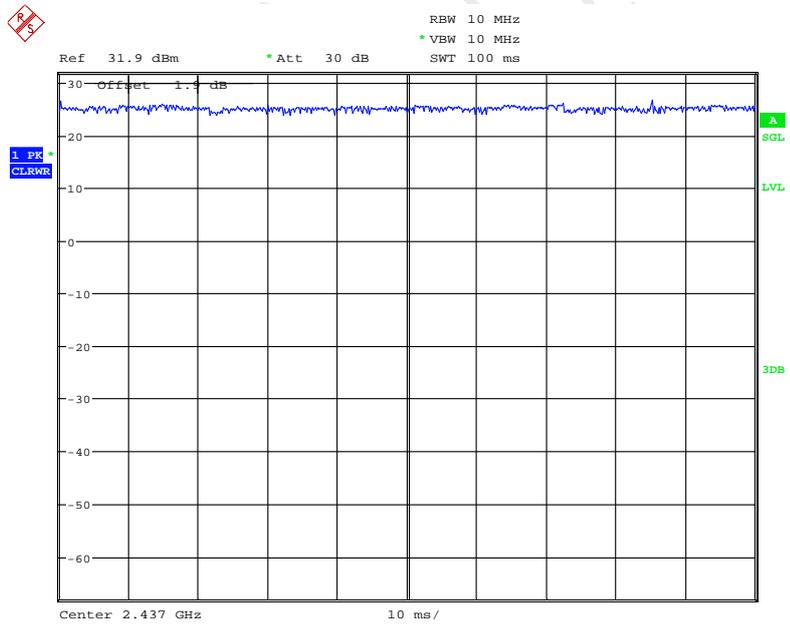
Test mode	T _{on} (ms)	T _{on+off} (ms)	Duty Cycle (%)
802.11b	100	100	100
802.11g	100	100	100
802.11n ht20	100	100	100
802.11n ht40	0.517	0.557	92.82

802.11b



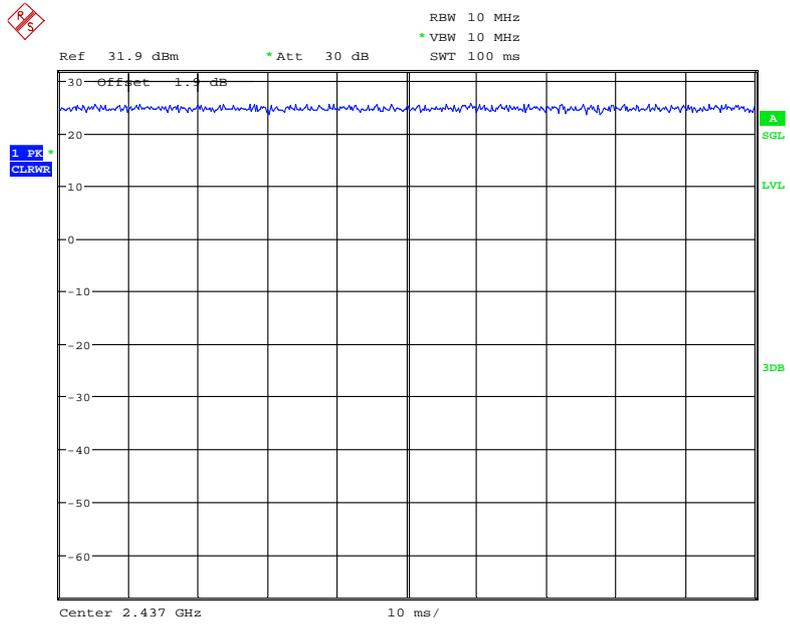
Date: 19.FEB.2019 10:31:00

802.11g



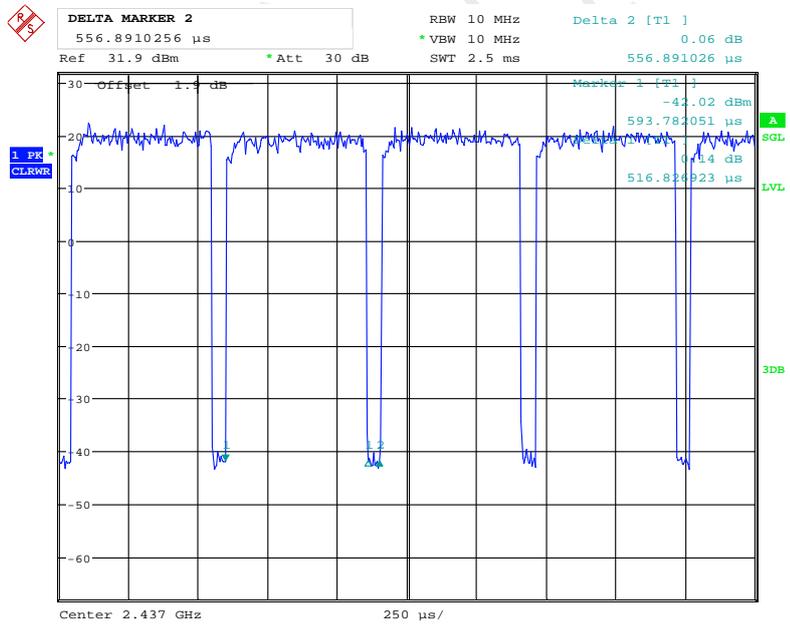
Date: 19.FEB.2019 10:31:33

802.11n ht20



Date: 19.FEB.2019 10:30:42

802.11n ht40



Date: 19.FEB.2019 10:28:34

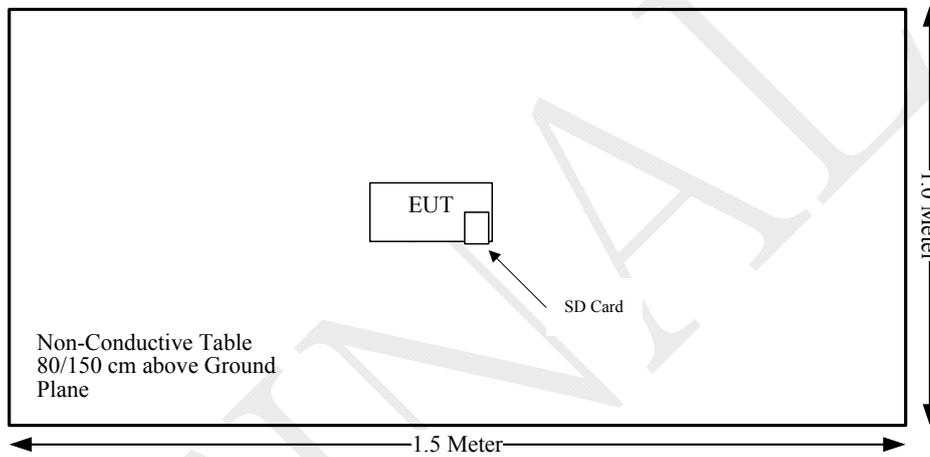
Equipment Modifications

No modification was made to the EUT.

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Kingston	SD Card	4G	/

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Not Applicable*
§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

Note:

Not Applicable*: The EUT was powered by battery.

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

Applicable Standard

According to subpart 15.247(i) and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’s guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculation formula:

Prediction of power density at the distance of the applicable MPE limit

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

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

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

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

Calculated Data:

Mode	Frequency (MHz)	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm²)	MPE Limit (mW/cm²)
		(dBi)	(numeric)	(dBm)	(mW)			
WLAN	2412-2462	4.5	2.82	24	251.19	20.00	0.14	1.0
WLAN	5150-5250	4	2.51	25	316.23	20.00	0.16	1.0
WLAN	5725-5850	4	2.51	25	316.23	20.00	0.16	1.0

Note 1: the Max. Target Power including Tolerance was declared by manufacturer.

Note 2: The WLAN 2.4 GHz and 5 GHz can’t transmit simultaneously

Result: Compliance, The device meets MPE requirement for Devices Used by the General Public (Uncontrolled Environment) at distance ≥20 cm.

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 two external antenna permanently attached to the unit. fulfill the requirement of this section. Please refer to the EUT photos.

Antenna Type	input impedance (Ohm)	Antenna Gain /Frequency Range
PCB	50	4.5 dBi/2.4~2.5GHz 4.0 dBi/5.15~5.85GHz

Result: Compliance.

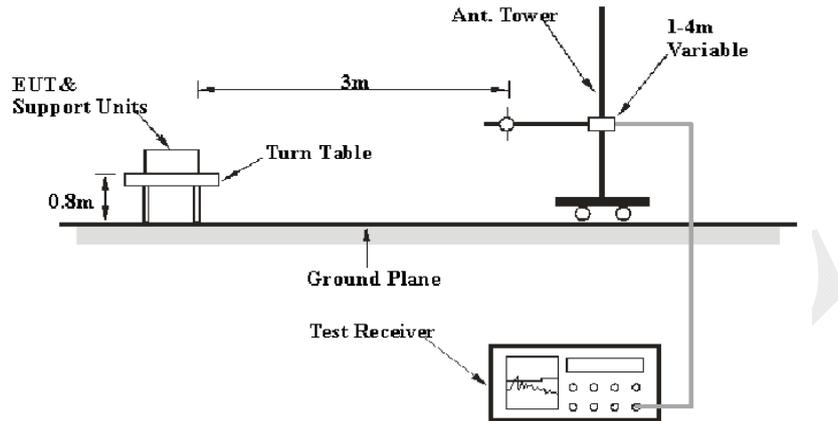
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

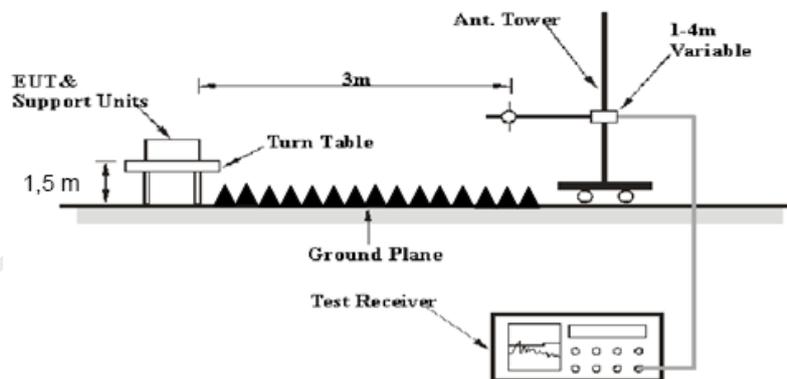
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission Below 1GHz tests were performed in the 3 meters chamber A, above 1GHz tests were performed in the 3 meters chamber B, 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:

Measurement	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

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

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

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

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2018-12-10	2019-12-10
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2018-05-06	2019-05-06
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-01-04	2020-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2018-06-27	2019-06-27
MITEQ	Amplifier	AFS42-00101800- 25-S-42	2001271	2018-09-05	2019-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2018-06-27	2019-06-27
E-Microwave	Band-stop Filters	OBSF-2400-2483.5- S	OE01601525	2018-06-16	2019-06-16
Micro-tronics	High Pass Filter	HPM50111	S/N-G217	2018-06-16	2019-06-16

* **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:	22.6~24°C
Relative Humidity:	51~55 %
ATM Pressure:	100.1kPa

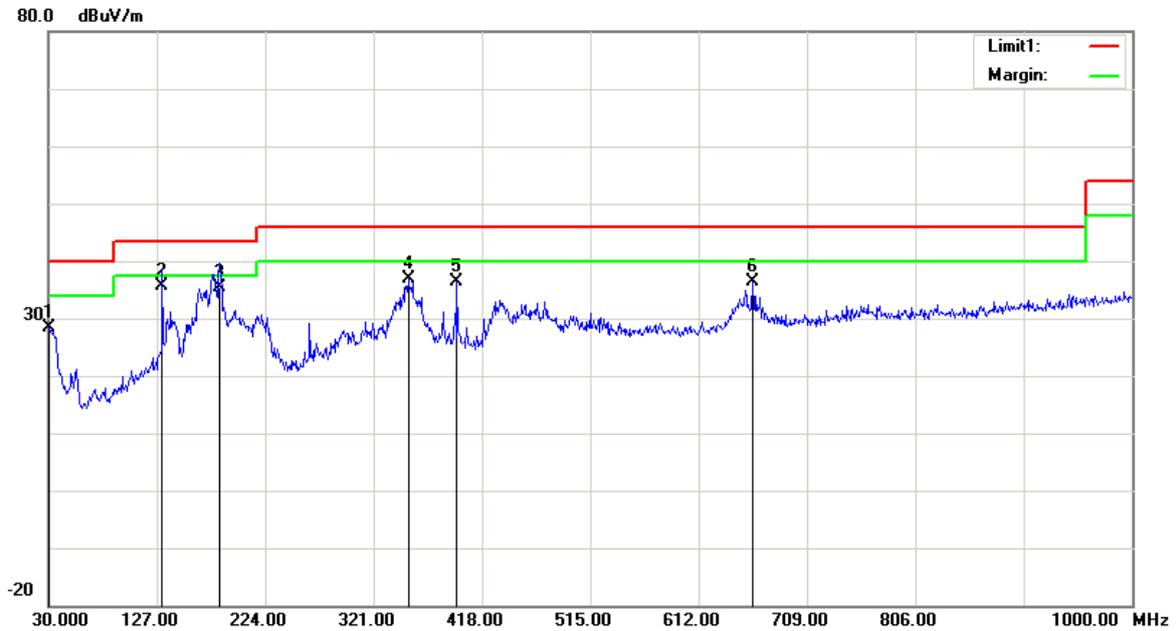
* The testing was performed by Kami Zhou, Tyler Pan on 2019-02-22.

Test Result: Compliance, please Refer to the following data

Test Mode: Transmitting

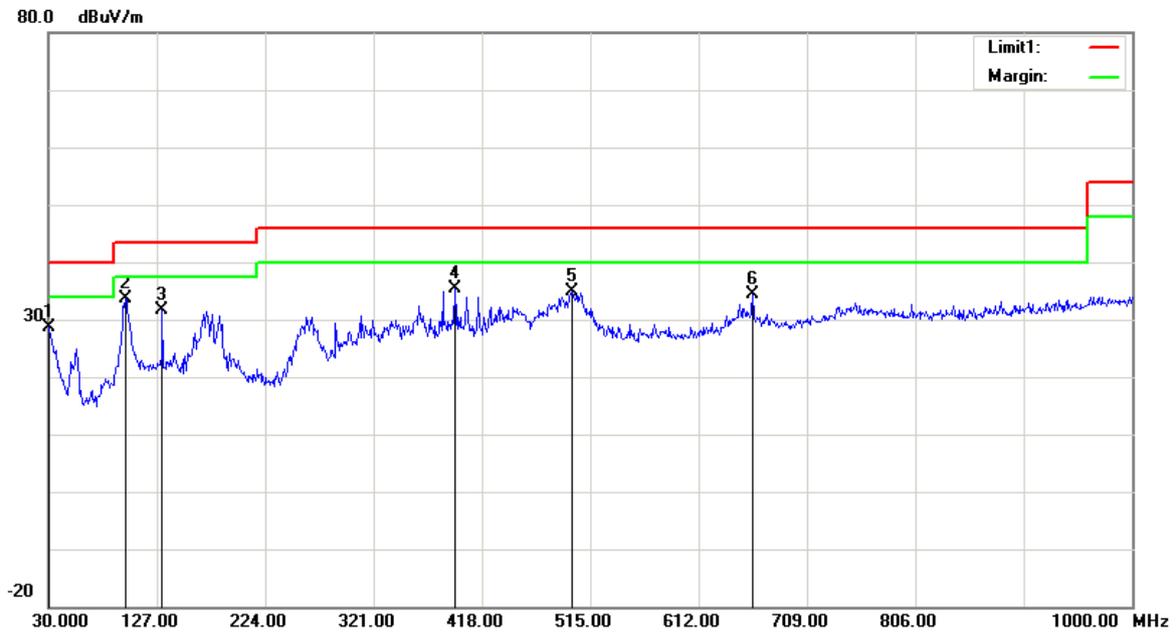
1) 30MHz-1GHz(802.11b mode middle channel was the worst)

Horizontal:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.9700	27.42	peak	0.91	28.33	40.00	11.67
131.8500	40.55	QP	-4.89	35.66	43.50	7.84
183.2600	42.71	QP	-7.35	35.36	43.50	8.14
352.0400	39.87	peak	-2.99	36.88	46.00	9.12
395.6900	38.50	peak	-2.07	36.43	46.00	9.57
660.5000	34.26	peak	2.15	36.41	46.00	9.59

Vertical:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.9700	27.80	peak	0.91	28.71	40.00	11.29
98.8700	42.90	peak	-9.20	33.70	43.50	9.80
131.8500	36.47	peak	-4.89	31.58	43.50	11.92
393.7500	37.51	peak	-2.14	35.37	46.00	10.63
498.5100	35.07	peak	-0.31	34.76	46.00	11.24
660.5000	32.31	peak	2.15	34.46	46.00	11.54

**2) 1-25GHz:
802.11b Mode:**

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2412.00	73.74	PK	H	28.12	1.81	0.00	103.67	N/A	N/A
2412.00	69.51	AV	H	28.12	1.81	0.00	99.44	N/A	N/A
2412.00	78.80	PK	V	28.12	1.81	0.00	108.73	N/A	N/A
2412.00	74.86	AV	V	28.12	1.81	0.00	104.79	N/A	N/A
2390.00	27.68	PK	V	28.08	1.80	0.00	57.56	74.00	16.44
2390.00	15.02	AV	V	28.08	1.80	0.00	44.90	54.00	9.10
4824.00	47.09	PK	V	32.95	3.19	37.20	46.03	74.00	27.97
4824.00	34.12	AV	V	32.95	3.19	37.20	33.06	54.00	20.94
7236.00	45.90	PK	V	35.81	4.77	37.27	49.21	74.00	24.79
7236.00	32.52	AV	V	35.81	4.77	37.27	35.83	54.00	18.17
Additional Channel: 2417 MHz									
2417.00	82.28	PK	V	28.13	1.81	0.00	112.22	N/A	N/A
2417.00	78.64	AV	V	28.13	1.81	0.00	108.58	N/A	N/A
2390.00	25.50	PK	V	28.08	1.80	0.00	55.38	74.00	18.62
2390.00	13.81	AV	V	28.08	1.80	0.00	43.69	54.00	10.31
Additional Channel: 2422 MHz									
2422.00	84.74	PK	V	28.14	1.81	0.00	114.69	N/A	N/A
2422.00	80.23	AV	V	28.14	1.81	0.00	110.18	N/A	N/A
2390.00	26.77	PK	V	28.08	1.80	0.00	56.65	74.00	17.35
2390.00	13.45	AV	V	28.08	1.80	0.00	43.33	54.00	10.67
Middle Channel: 2437 MHz									
2437.00	79.23	PK	H	28.17	1.82	0.00	109.22	N/A	N/A
2437.00	75.28	AV	H	28.17	1.82	0.00	105.27	N/A	N/A
2437.00	84.72	PK	V	28.17	1.82	0.00	114.71	N/A	N/A
2437.00	80.45	AV	V	28.17	1.82	0.00	110.44	N/A	N/A
4874.00	47.84	PK	V	33.05	3.26	37.21	46.94	74.00	27.06
4874.00	34.02	AV	V	33.05	3.26	37.21	33.12	54.00	20.88
7311.00	35.98	PK	V	36.01	4.64	37.36	39.27	74.00	34.73
7311.00	32.45	AV	V	36.01	4.64	37.36	35.74	54.00	18.26
Additional Channel: 2447 MHz									
2447.00	84.26	PK	V	28.19	1.82	0.00	114.27	N/A	N/A
2447.00	80.29	AV	V	28.19	1.82	0.00	110.30	N/A	N/A
2483.50	26.11	PK	V	28.27	1.84	0.00	56.22	74.00	17.78
2483.50	13.32	AV	V	28.27	1.84	0.00	43.43	54.00	10.57
Additional Channel: 2452 MHz									
2452.00	82.83	PK	V	28.20	1.83	0.00	112.86	N/A	N/A
2452.00	78.58	AV	V	28.20	1.83	0.00	108.61	N/A	N/A
2483.50	26.75	PK	V	28.27	1.84	0.00	56.86	74.00	17.14
2483.50	13.48	AV	V	28.27	1.84	0.00	43.59	54.00	10.41

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)					
Additional Channel: 2457 MHz									
2457.00	82.71	PK	V	28.21	1.83	0.00	112.75	N/A	N/A
2457.00	78.48	AV	V	28.21	1.83	0.00	108.52	N/A	N/A
2483.50	26.38	PK	V	28.27	1.84	0.00	56.49	74.00	17.51
2483.50	13.52	AV	V	28.27	1.84	0.00	43.63	54.00	10.37
High Channel: 2462 MHz									
2462.00	74.91	PK	H	28.22	1.83	0.00	104.96	N/A	N/A
2462.00	70.84	AV	H	28.22	1.83	0.00	100.89	N/A	N/A
2462.00	79.99	PK	V	28.22	1.83	0.00	110.04	N/A	N/A
2462.00	74.56	AV	V	28.22	1.83	0.00	104.61	N/A	N/A
2483.50	26.65	PK	V	28.27	1.84	0.00	56.76	74.00	17.24
2483.50	13.74	AV	V	28.27	1.84	0.00	43.85	54.00	10.15
4924.00	47.56	PK	V	33.15	3.27	37.22	46.76	74.00	27.24
4924.00	34.28	AV	V	33.15	3.27	37.22	33.48	54.00	20.52
7386.00	45.33	PK	V	36.20	4.51	37.46	48.58	74.00	25.42
7386.00	32.46	AV	V	36.20	4.51	37.46	35.71	54.00	18.29

802.11g Mode:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2412.00	74.92	PK	H	28.12	1.81	0.00	104.85	N/A	N/A
2412.00	64.87	AV	H	28.12	1.81	0.00	94.80	N/A	N/A
2412.00	79.69	PK	V	28.12	1.81	0.00	109.62	N/A	N/A
2412.00	69.67	AV	V	28.12	1.81	0.00	99.60	N/A	N/A
2390.00	25.28	PK	V	28.08	1.80	0.00	55.16	74.00	18.84
2390.00	14.86	AV	V	28.08	1.80	0.00	44.74	54.00	9.26
4824.00	46.68	PK	V	32.95	3.19	37.20	45.62	74.00	28.38
4824.00	33.17	AV	V	32.95	3.19	37.20	32.11	54.00	21.89
7236.00	46.38	PK	V	35.81	4.77	37.27	49.69	74.00	24.31
7236.00	33.52	AV	V	35.81	4.77	37.27	36.83	54.00	17.17
Additional Channel: 2417 MHz									
2417.00	84.02	PK	V	28.13	1.81	0.00	113.96	N/A	N/A
2417.00	73.89	AV	V	28.13	1.81	0.00	103.83	N/A	N/A
2390.00	33.36	PK	V	28.08	1.80	0.00	63.24	74.00	10.76
2390.00	17.28	AV	V	28.08	1.80	0.00	47.16	54.00	6.84
Additional Channel: 2422 MHz									
2422.00	87.99	PK	V	28.14	1.81	0.00	117.94	N/A	N/A
2422.00	77.56	AV	V	28.14	1.81	0.00	107.51	N/A	N/A
2390.00	38.77	PK	V	28.08	1.80	0.00	68.65	74.00	5.35
2390.00	19.50	AV	V	28.08	1.80	0.00	49.38	54.00	4.62

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)					
Middle Channel: 2437 MHz									
2437.00	82.46	PK	H	28.17	1.82	0.00	112.45	N/A	N/A
2437.00	72.81	AV	H	28.17	1.82	0.00	102.80	N/A	N/A
2437.00	87.68	PK	V	28.17	1.82	0.00	117.67	N/A	N/A
2437.00	77.84	AV	V	28.17	1.82	0.00	107.83	N/A	N/A
4874.00	46.40	PK	V	33.05	3.26	37.21	45.50	74.00	28.50
4874.00	33.84	AV	V	33.05	3.26	37.21	32.94	54.00	21.06
7311.00	52.27	PK	V	36.01	4.64	37.36	55.56	74.00	18.44
7311.00	34.21	AV	V	36.01	4.64	37.36	37.50	54.00	16.50
Additional Channel: 2447 MHz									
2447.00	87.22	PK	V	28.19	1.82	0.00	117.23	N/A	N/A
2447.00	75.32	AV	V	28.19	1.82	0.00	105.33	N/A	N/A
2483.50	29.32	PK	V	28.27	1.84	0.00	59.43	74.00	14.57
2483.50	15.32	AV	V	28.27	1.84	0.00	45.43	54.00	8.57
Additional Channel: 2452 MHz									
2452.00	85.54	PK	V	28.20	1.83	0.00	115.57	N/A	N/A
2452.00	73.73	AV	V	28.20	1.83	0.00	103.76	N/A	N/A
2483.50	29.12	PK	V	28.27	1.84	0.00	59.23	74.00	14.77
2483.50	15.24	AV	V	28.27	1.84	0.00	45.35	54.00	8.65
Additional Channel: 2457 MHz									
2457.00	85.87	PK	V	28.21	1.83	0.00	115.91	N/A	N/A
2457.00	73.77	AV	V	28.21	1.83	0.00	103.81	N/A	N/A
2483.50	29.31	PK	V	28.27	1.84	0.00	59.42	74.00	14.58
2483.50	16.48	AV	V	28.27	1.84	0.00	46.59	54.00	7.41
High Channel: 2462 MHz									
2462.00	78.18	PK	H	28.22	1.83	0.00	108.23	N/A	N/A
2462.00	68.34	AV	H	28.22	1.83	0.00	98.39	N/A	N/A
2462.00	83.08	PK	V	28.22	1.83	0.00	113.13	N/A	N/A
2462.00	72.23	AV	V	28.22	1.83	0.00	102.28	N/A	N/A
2483.50	31.84	PK	V	28.27	1.84	0.00	61.95	74.00	12.05
2483.50	18.15	AV	V	28.27	1.84	0.00	48.26	54.00	5.74
4924.00	47.14	PK	V	33.15	3.27	37.22	46.34	74.00	27.66
4924.00	33.56	AV	V	33.15	3.27	37.22	32.76	54.00	21.24
7386.00	46.97	PK	V	36.20	4.51	37.46	50.22	74.00	23.78
7386.00	32.00	AV	V	36.20	4.51	37.46	35.25	54.00	18.75

802.11n ht20 Mode:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2412.00	77.43	PK	H	28.12	1.81	0.00	107.36	N/A	N/A
2412.00	66.74	AV	H	28.12	1.81	0.00	96.67	N/A	N/A
2412.00	80.36	PK	V	28.12	1.81	0.00	110.29	N/A	N/A
2412.00	69.52	AV	V	28.12	1.81	0.00	99.45	N/A	N/A
2390.00	28.02	PK	V	28.08	1.80	0.00	57.90	74.00	16.10
2390.00	14.75	AV	V	28.08	1.80	0.00	44.63	54.00	9.37
4824.00	46.88	PK	V	32.95	3.19	37.20	45.82	74.00	28.18
4824.00	33.57	AV	V	32.95	3.19	37.20	32.51	54.00	21.49
7236.00	46.12	PK	V	35.81	4.77	37.27	49.43	74.00	24.57
7236.00	32.76	AV	V	35.81	4.77	37.27	36.07	54.00	17.93
Additional Channel: 2417 MHz									
2417.00	83.03	PK	V	28.13	1.81	0.00	112.97	N/A	N/A
2417.00	72.48	AV	V	28.13	1.81	0.00	102.42	N/A	N/A
2390.00	32.26	PK	V	28.08	1.80	0.00	62.14	74.00	11.86
2390.00	16.32	AV	V	28.08	1.80	0.00	46.20	54.00	7.80
Additional Channel: 2422 MHz									
2422.00	86.46	PK	V	28.14	1.81	0.00	116.41	N/A	N/A
2422.00	74.02	AV	V	28.14	1.81	0.00	103.97	N/A	N/A
2390.00	34.00	PK	V	28.08	1.80	0.00	63.88	74.00	10.12
2390.00	17.72	AV	V	28.08	1.80	0.00	47.60	54.00	6.40
Middle Channel: 2437 MHz									
2437.00	84.23	PK	H	28.17	1.82	0.00	114.22	N/A	N/A
2437.00	73.65	AV	H	28.17	1.82	0.00	103.64	N/A	N/A
2437.00	87.50	PK	V	28.17	1.82	0.00	117.49	N/A	N/A
2437.00	76.38	AV	V	28.17	1.82	0.00	106.37	N/A	N/A
4874.00	46.64	PK	V	33.05	3.26	37.21	45.74	74.00	28.26
4874.00	33.17	AV	V	33.05	3.26	37.21	32.27	54.00	21.73
7311.00	50.47	PK	V	36.01	4.64	37.36	53.76	74.00	20.24
7311.00	34.54	AV	V	36.01	4.64	37.36	37.83	54.00	16.17
Additional Channel: 2447 MHz									
2447.00	87.25	PK	V	28.19	1.82	0.00	117.26	N/A	N/A
2447.00	75.21	AV	V	28.19	1.82	0.00	105.22	N/A	N/A
2483.50	28.32	PK	V	28.27	1.84	0.00	58.43	74.00	15.57
2483.50	16.02	AV	V	28.27	1.84	0.00	46.13	54.00	7.87
Additional Channel: 2452 MHz									
2452.00	83.80	PK	V	28.20	1.83	0.00	113.83	N/A	N/A
2452.00	73.05	AV	V	28.20	1.83	0.00	103.08	N/A	N/A
2483.50	27.66	PK	V	28.27	1.84	0.00	57.77	74.00	16.23
2483.50	16.02	AV	V	28.27	1.84	0.00	46.13	54.00	7.87
Additional Channel: 2457 MHz									
2457.00	83.97	PK	V	28.21	1.83	0.00	114.01	N/A	N/A
2457.00	73.39	AV	V	28.21	1.83	0.00	103.43	N/A	N/A
2483.50	30.28	PK	V	28.27	1.84	0.00	60.39	74.00	13.61
2483.50	16.29	AV	V	28.27	1.84	0.00	46.40	54.00	7.60

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)					
High Channel: 2462 MHz									
2462.00	79.64	PK	H	28.22	1.83	0.00	109.69	N/A	N/A
2462.00	68.57	AV	H	28.22	1.83	0.00	98.62	N/A	N/A
2462.00	82.58	PK	V	28.22	1.83	0.00	112.63	N/A	N/A
2462.00	72.15	AV	V	28.22	1.83	0.00	102.20	N/A	N/A
2483.50	32.61	PK	V	28.27	1.84	0.00	62.72	74.00	11.28
2483.50	18.45	AV	V	28.27	1.84	0.00	48.56	54.00	5.44
4924.00	46.89	PK	V	33.15	3.27	37.22	46.09	74.00	27.91
4924.00	33.54	AV	V	33.15	3.27	37.22	32.74	54.00	21.26
7386.00	45.27	PK	V	36.20	4.51	37.46	48.52	74.00	25.48
7386.00	32.40	AV	V	36.20	4.51	37.46	35.65	54.00	18.35

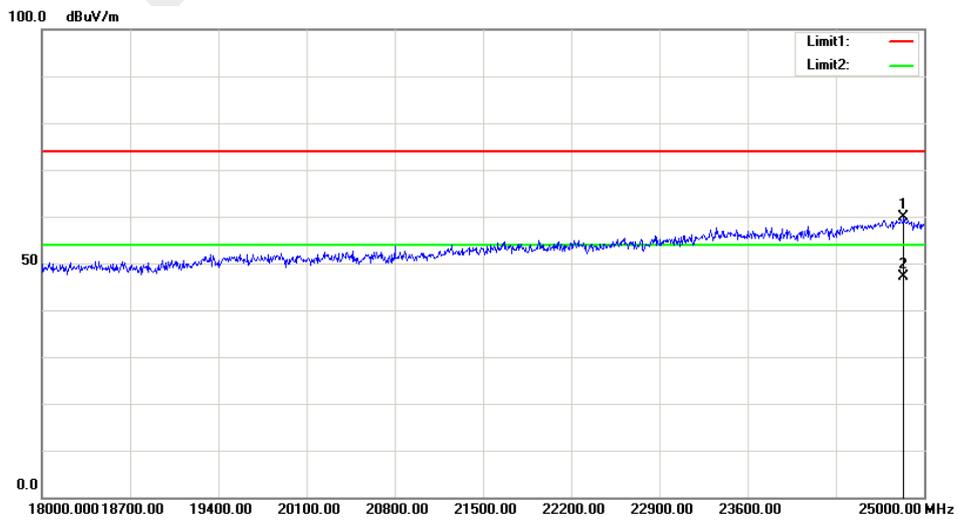
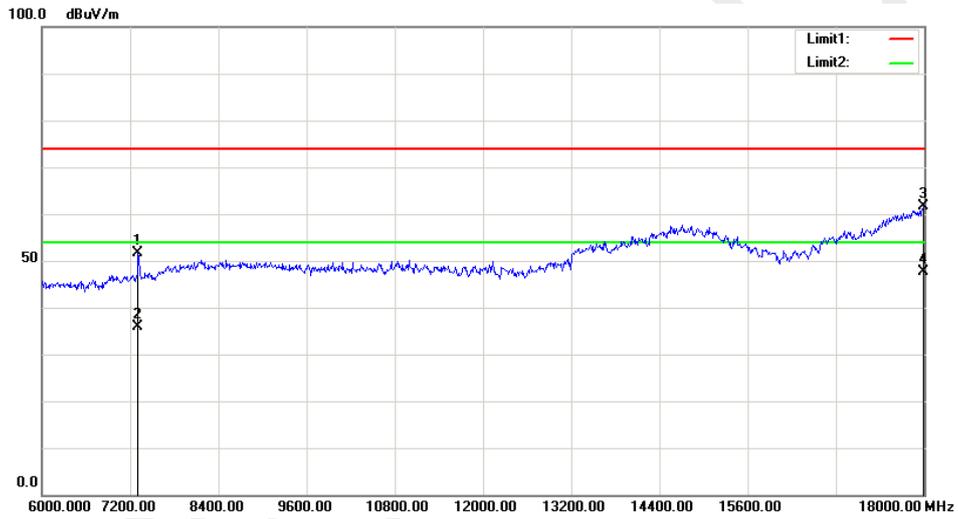
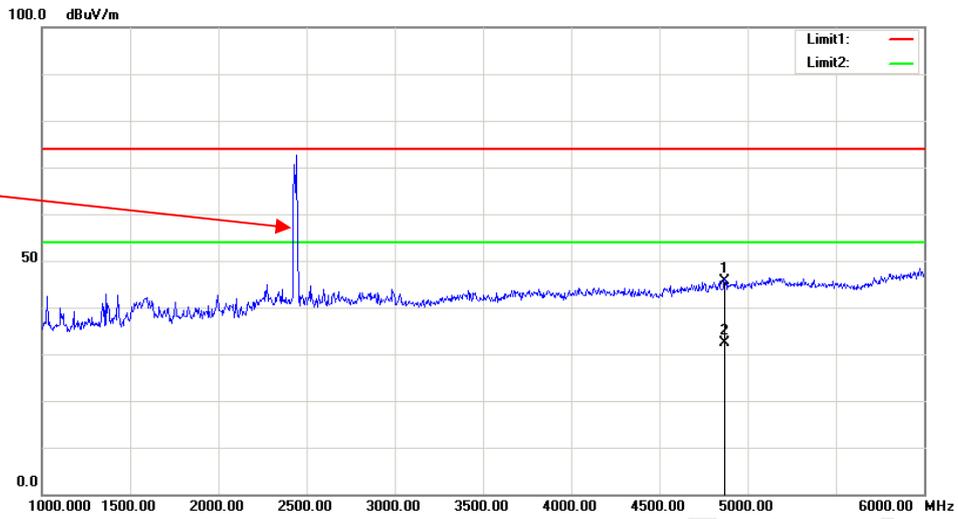
802.11n ht40 Mode:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2422 MHz									
2422.00	72.16	PK	H	28.14	1.81	0.00	102.11	N/A	N/A
2422.00	62.22	AV	H	28.14	1.81	0.00	92.17	N/A	N/A
2422.00	79.22	PK	V	28.14	1.81	0.00	109.17	N/A	N/A
2422.00	69.46	AV	V	28.14	1.81	0.00	99.41	N/A	N/A
2390.00	25.96	PK	V	28.08	1.80	0.00	55.84	74.00	18.16
2390.00	13.81	AV	V	28.08	1.80	0.00	43.69	54.00	10.31
4844.00	46.59	PK	V	32.99	3.22	37.20	45.60	74.00	28.40
4844.00	33.25	AV	V	32.99	3.22	37.20	32.26	54.00	21.74
7266.00	45.78	PK	V	35.89	4.72	37.31	49.08	74.00	24.92
7266.00	32.50	AV	V	35.89	4.72	37.31	35.80	54.00	18.20
Additional Channel: 2427 MHz									
2427.00	80.42	PK	V	28.15	1.81	0.00	110.38	N/A	N/A
2427.00	70.34	AV	V	28.15	1.81	0.00	100.30	N/A	N/A
2390.00	25.45	PK	V	28.08	1.80	0.00	55.33	74.00	18.67
2390.00	13.78	AV	V	28.08	1.80	0.00	43.66	54.00	10.34
Additional Channel: 2432 MHz									
2432.00	83.69	PK	V	28.16	1.82	0.00	113.67	N/A	N/A
2432.00	73.40	AV	V	28.16	1.82	0.00	103.38	N/A	N/A
2390.00	25.11	PK	V	28.08	1.80	0.00	54.99	74.00	19.01
2390.00	15.74	AV	V	28.08	1.80	0.00	45.62	54.00	8.38
Middle Channel: 2437 MHz									
2437.00	78.47	PK	H	28.17	1.82	0.00	108.46	N/A	N/A
2437.00	68.35	AV	H	28.17	1.82	0.00	98.34	N/A	N/A
2437.00	85.68	PK	V	28.17	1.82	0.00	115.67	N/A	N/A
2437.00	75.40	AV	V	28.17	1.82	0.00	105.39	N/A	N/A
4874.00	46.69	PK	V	33.05	3.26	37.21	45.79	74.00	28.21
4874.00	33.54	AV	V	33.05	3.26	37.21	32.64	54.00	21.36
7311.00	52.32	PK	V	36.01	4.64	37.36	55.61	74.00	18.39
7311.00	34.56	AV	V	36.01	4.64	37.36	37.85	54.00	16.15

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
	Reading (dB μ V)	Detector	Polar (H/V)	Factor (dB/m)					
Additional Channel: 2442 MHz									
2442.00	87.31	PK	V	28.18	1.82	0.00	117.31	N/A	N/A
2442.00	76.84	AV	V	28.18	1.82	0.00	106.84	N/A	N/A
2483.50	33.25	PK	V	28.27	1.84	0.00	63.36	74.00	10.64
2483.50	19.96	AV	V	28.27	1.84	0.00	50.07	54.00	3.93
Additional Channel: 2447 MHz									
2447.00	85.19	PK	V	28.19	1.82	0.00	115.20	N/A	N/A
2447.00	73.61	AV	V	28.19	1.82	0.00	103.62	N/A	N/A
2483.50	28.04	PK	V	28.27	1.84	0.00	58.15	74.00	15.85
2483.50	16.43	AV	V	28.27	1.84	0.00	46.54	54.00	7.46
High Channel: 2452 MHz									
2452.00	72.37	PK	H	28.20	1.83	0.00	102.40	N/A	N/A
2452.00	62.45	AV	H	28.20	1.83	0.00	92.48	N/A	N/A
2452.00	79.17	PK	V	28.20	1.83	0.00	109.20	N/A	N/A
2452.00	68.03	AV	V	28.20	1.83	0.00	98.06	N/A	N/A
2483.50	26.17	PK	V	28.27	1.84	0.00	56.28	74.00	17.72
2483.50	15.43	AV	V	28.27	1.84	0.00	45.54	54.00	8.46
4904.00	46.91	PK	V	33.11	3.30	37.21	46.11	74.00	27.89
4904.00	33.73	AV	V	33.11	3.30	37.21	32.93	54.00	21.07
7356.00	45.67	PK	V	36.13	4.56	37.42	48.94	74.00	25.06
7356.00	32.35	AV	V	36.13	4.56	37.42	35.62	54.00	18.38

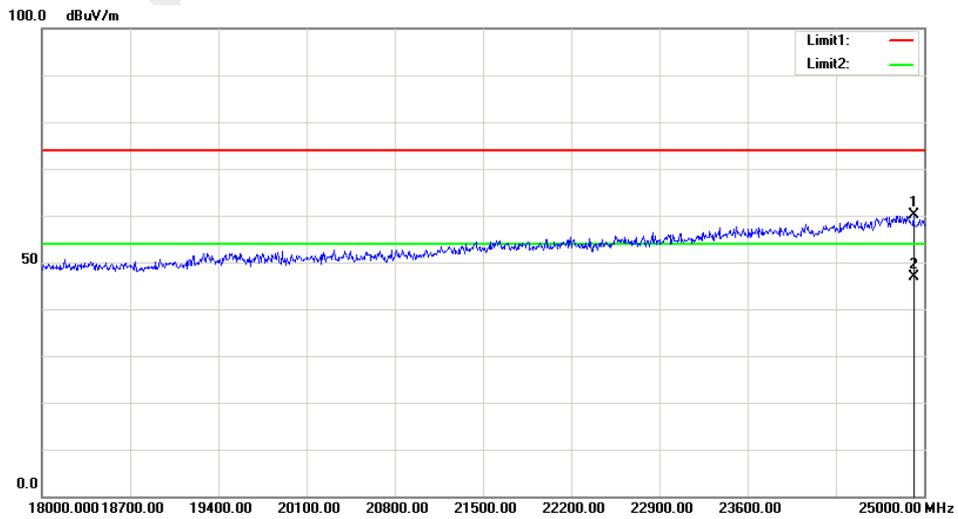
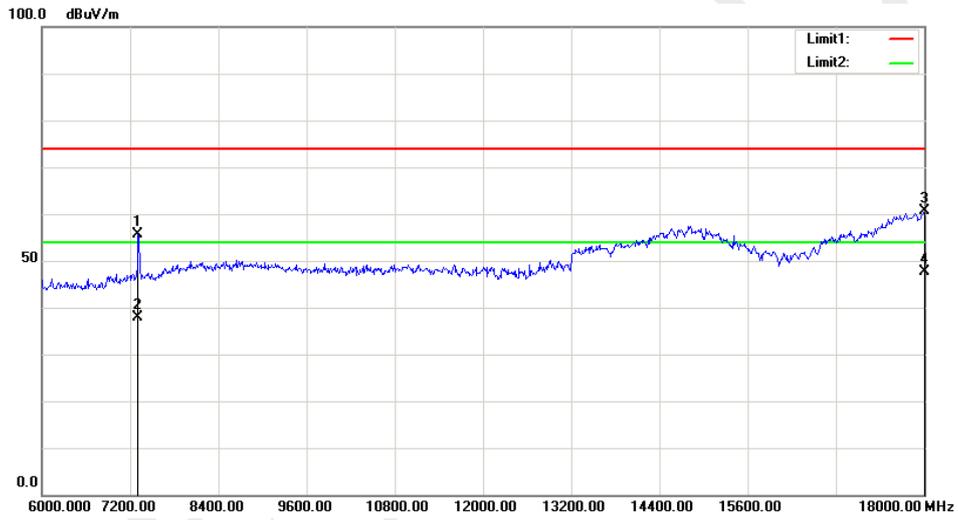
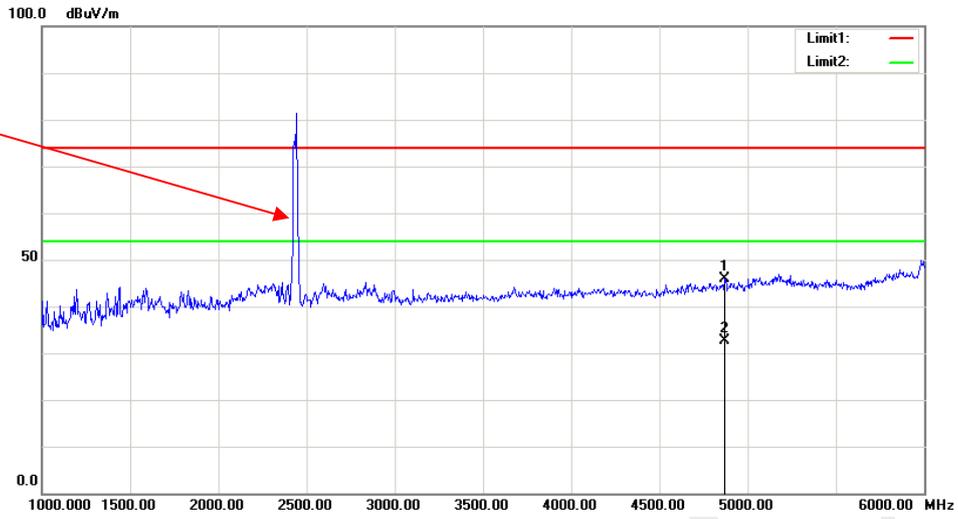
Test plots(802.11n ht40 mode middle channel was the worst)
Horizontal:

Fundamental
Test with Band
Rejection Filter



Vertical:

Fundamental
Test with Band
Rejection Filter



FCC §15.247(a) (2)–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

- Set RBW = 100 kHz.
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- 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	FSU 26	200256	2019-01-04	2020-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A

* **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:	24.4 °C
Relative Humidity:	62 %
ATM Pressure:	100.6 kPa

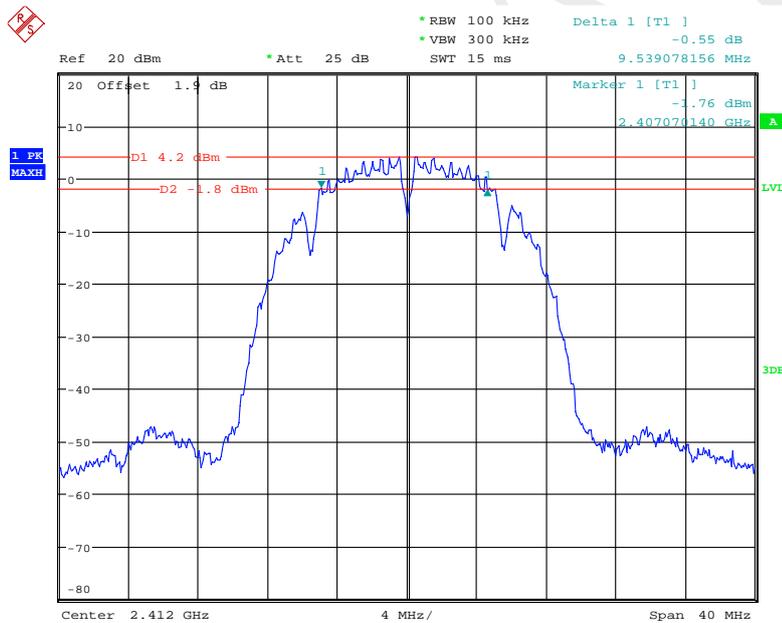
* The testing was performed by Elena Lei on 2019-02-19.

Test Mode: Transmitting

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

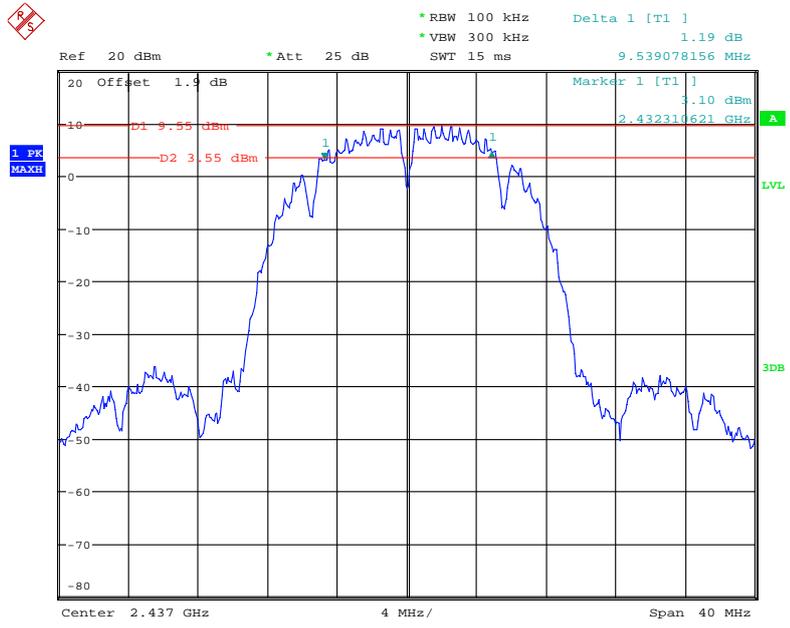
Test mode	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	9.539	≥ 0.5
	Middle	2437	9.539	≥ 0.5
	High	2462	9.940	≥ 0.5
802.11g	Low	2412	15.872	≥ 0.5
	Middle	2437	15.792	≥ 0.5
	High	2462	16.273	≥ 0.5
802.11n ht20	Low	2412	16.673	≥ 0.5
	Middle	2437	16.273	≥ 0.5
	High	2462	17.234	≥ 0.5
802.11n ht20	Low	2422	35.591	≥ 0.5
	Middle	2437	34.950	≥ 0.5
	High	2452	35.110	≥ 0.5

802.11b Low Channel



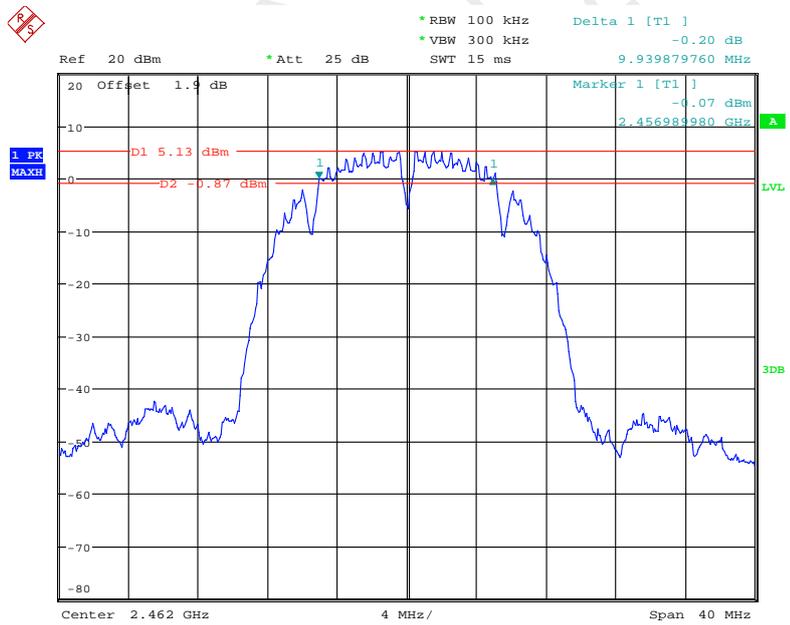
Date: 19.FEB.2019 08:36:04

802.11b Middle Channel



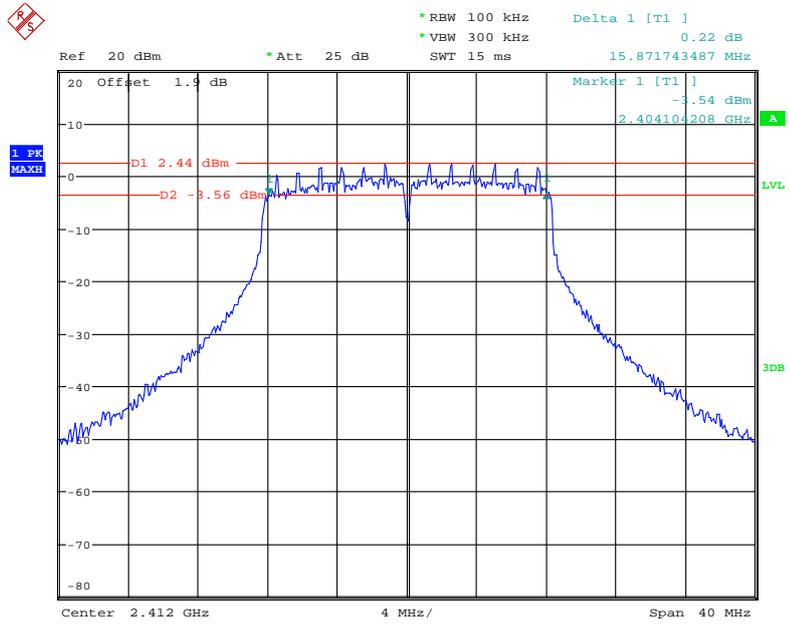
Date: 19.FEB.2019 08:39:32

802.11b High Channel



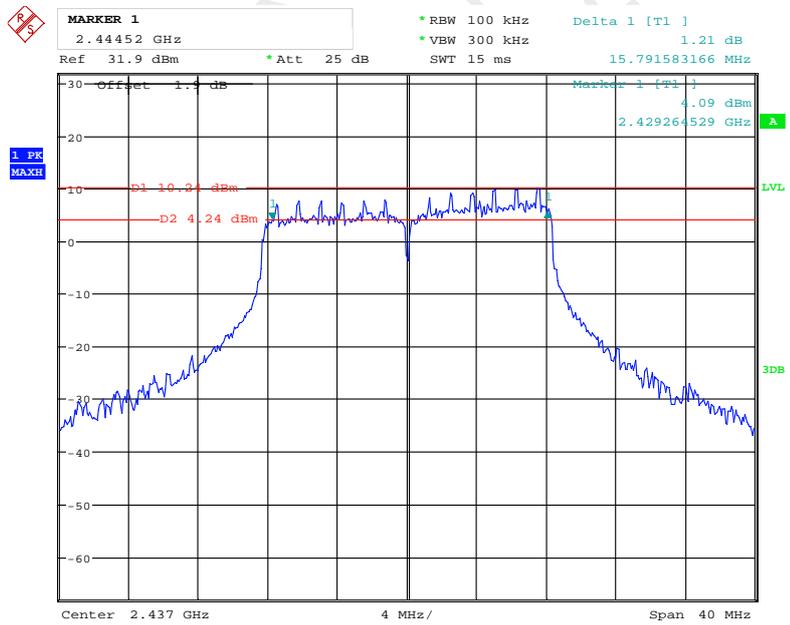
Date: 19.FEB.2019 08:42:04

802.11g Low Channel



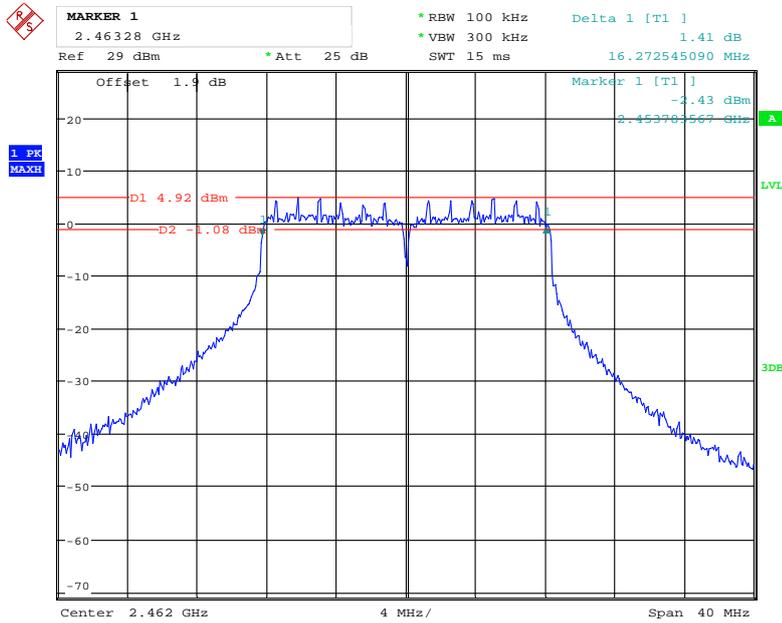
Date: 19.FEB.2019 08:45:55

802.11g Middle Channel



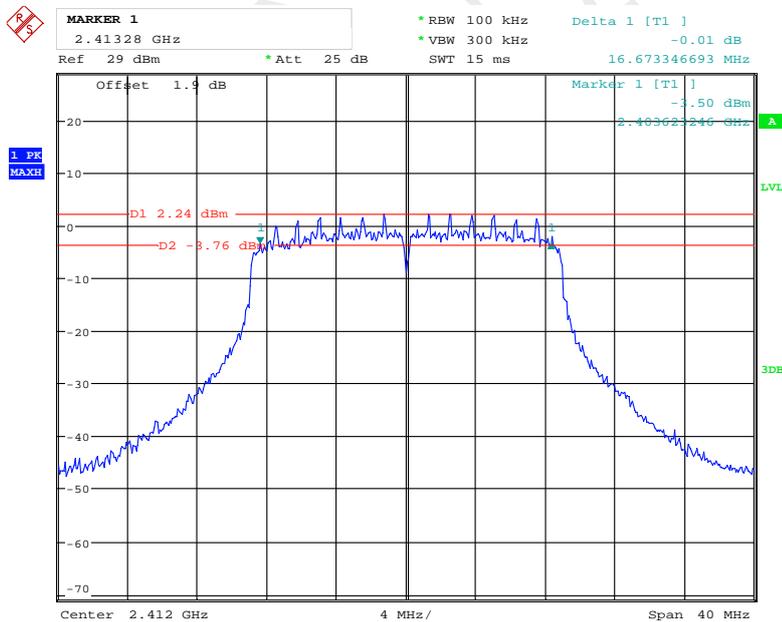
Date: 19.FEB.2019 08:49:02

802.11g High Channel



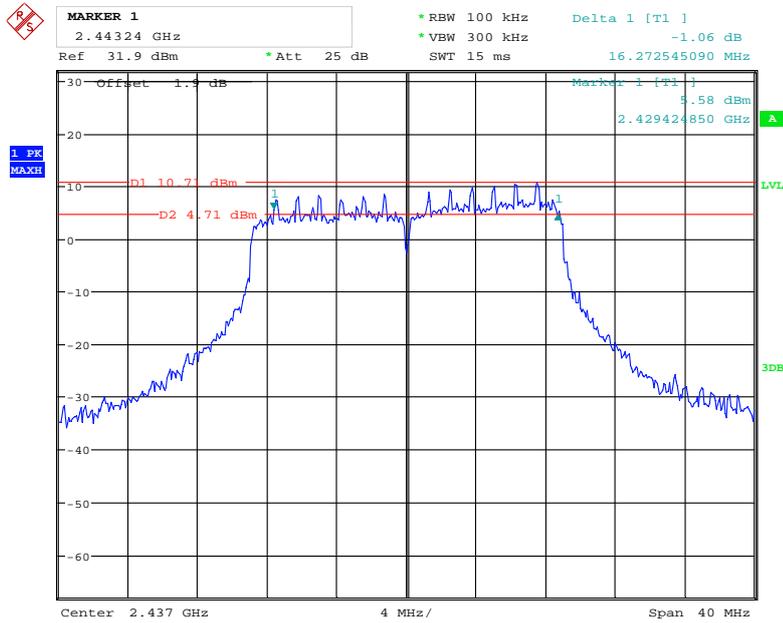
Date: 19.FEB.2019 08:51:26

802.11n ht20 Low Channel



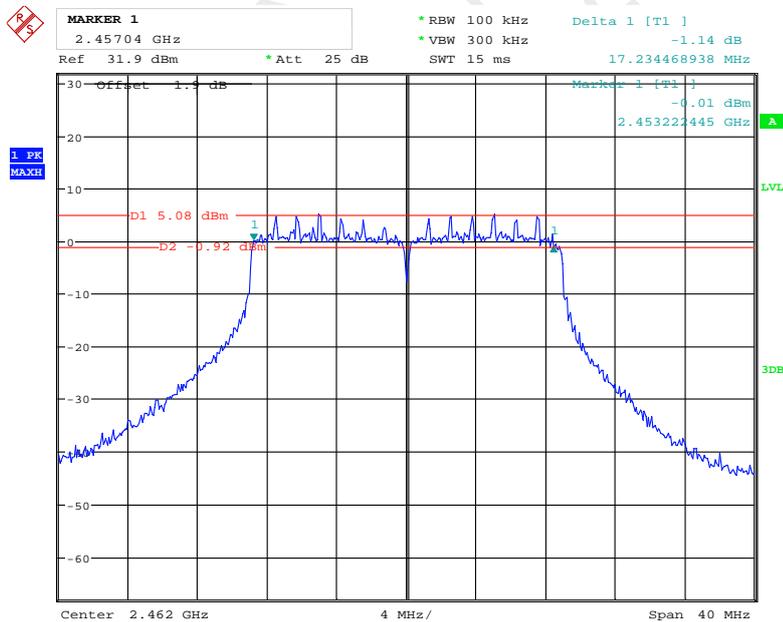
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802.11n ht20 Middle Channel



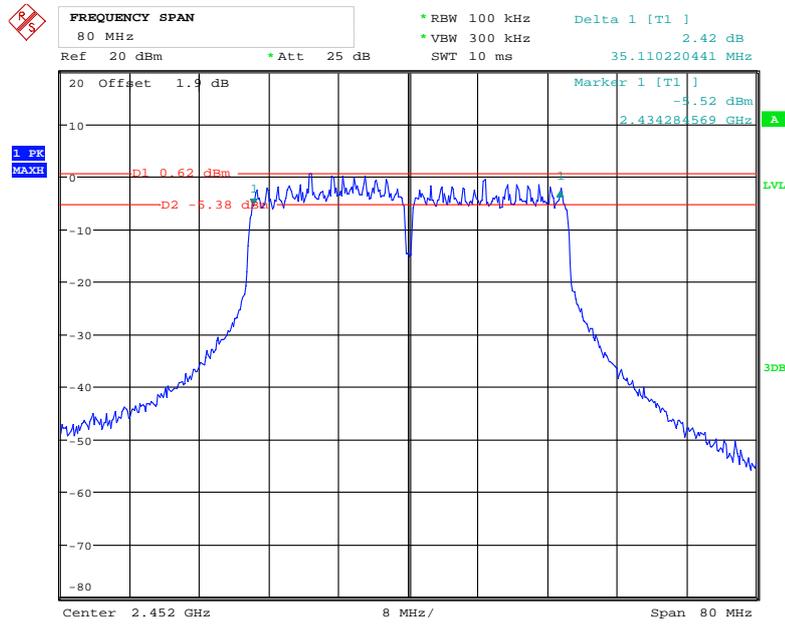
Date: 19.FEB.2019 08:57:30

802.11n ht20 High Channel



Date: 19.FEB.2019 09:04:37

802.11n ht40 High Channel



Date: 19.FEB.2019 09:16:50

FEMV

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 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	USB Wideband Power Sensor	U2022XA	MY5417006	2018-12-10	2019-12-10
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A

* **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:	24.4 °C
Relative Humidity:	62 %
ATM Pressure:	100.6 kPa

* The testing was performed by Elena Lei on 2019-02-19.

Test Mode: Transmitting

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

Test mode	Frequency (MHz)	Max Conducted Average Output Power (dBm)			Limit (dBm)
		Chain 0	Chain 1	Total	
802.11b	2412	14.40	14.05	17.24	30
	2417	17.34	17.30	20.33	30
	2422	19.75	19.73	22.75	30
	2437	19.71	19.92	22.83	30
	2447	19.74	19.58	22.67	30
	2452	18.68	18.74	21.72	30
	2457	18.77	18.84	21.82	30
802.11g	2412	13.74	13.83	16.80	30
	2417	17.41	17.33	20.38	30
	2422	19.58	19.81	22.71	30
	2437	20.34	20.46	23.41	30
	2447	20.15	20.24	23.21	30
	2452	17.33	17.76	20.56	30
	2457	17.19	17.57	20.39	30
802.11n ht20	2412	13.61	13.14	16.39	30
	2417	17.13	17.27	20.21	30
	2422	20.12	19.93	23.04	30
	2437	20.13	20.37	23.26	30
	2447	20.11	20.12	23.13	30
	2452	17.27	17.71	20.51	30
	2457	17.14	17.61	20.39	30
802.11n ht40	2422	12.48	12.51	15.51	30
	2427	15.06	15.19	18.14	30
	2432	18.87	18.81	21.85	30
	2437	20.29	20.13	23.22	30
	2442	19.83	19.68	22.77	30
	2447	16.37	16.15	19.27	30
	2452	12.77	13.18	15.99	30

Note:

The duty cycle was calculated into the reading already.

The maximum antenna gain is 4.5dBi in 2.4 GHz band. The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices:

$$\text{Array Gain} = 0 \text{ dB (i.e., no array gain) for } N_{\text{ANT}} \leq 4;$$

So:

$$\text{Directional gain} = G_{\text{ANT}} + \text{Array Gain} = 4.5 \text{ dBi} < 6\text{dBi}$$

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	FSU 26	200256	2019-01-04	2020-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A

* **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:	24.5 °C
Relative Humidity:	67 %
ATM Pressure:	100.4 kPa

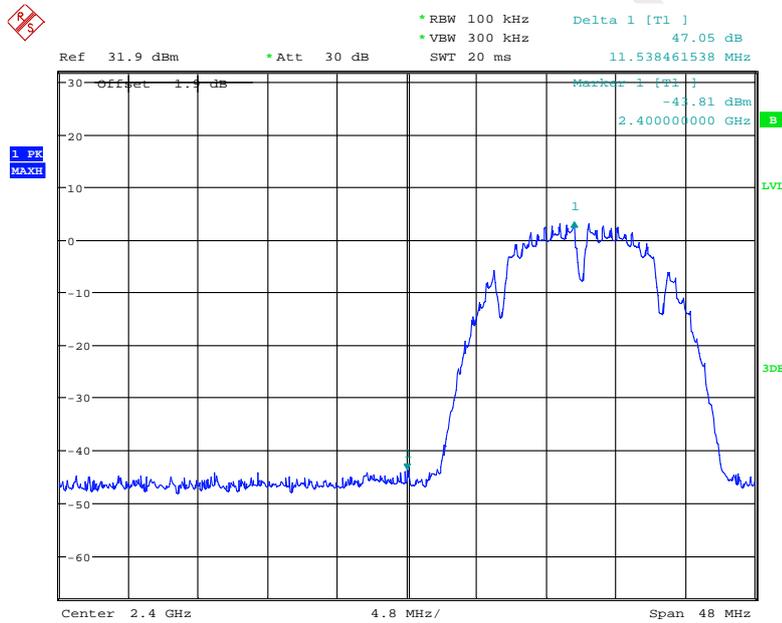
* The testing was performed by Elena Lei on 2019-02-21.

Test mode: Transmitting

Test Result: Compliance. All emission outside the frequency band is under 30 dB below the desired power, Please refer to following plots.

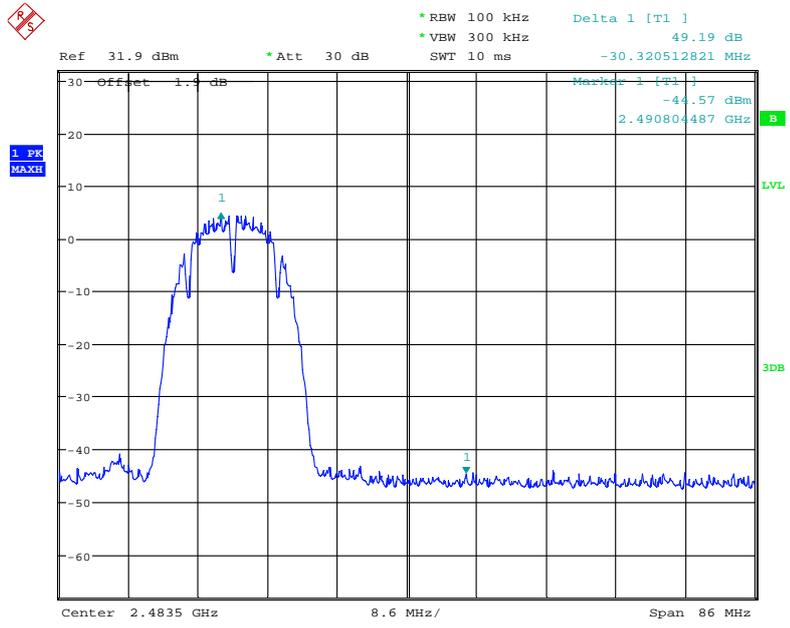
Chain 0:

802.11b: Band Edge, Left Side



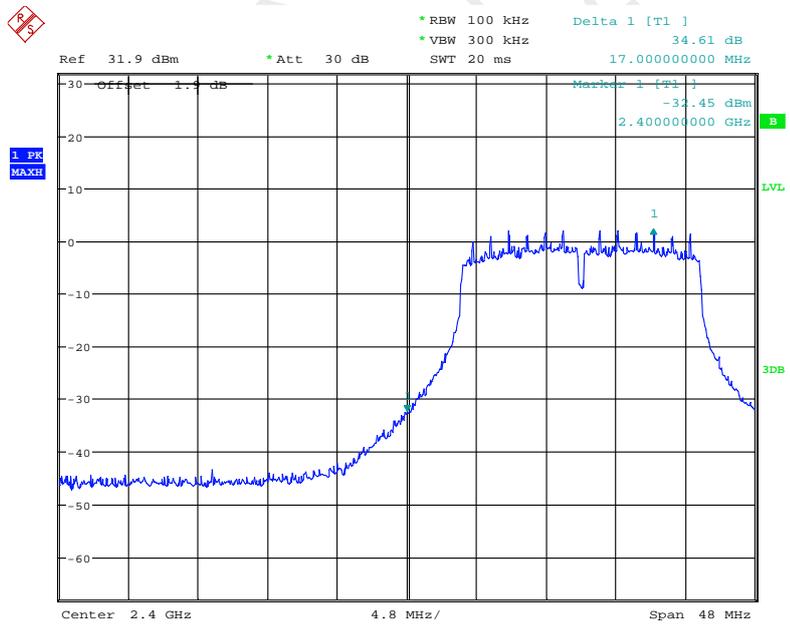
Date: 21.FEB.2019 15:56:42

802.11b: Band Edge, Right Side



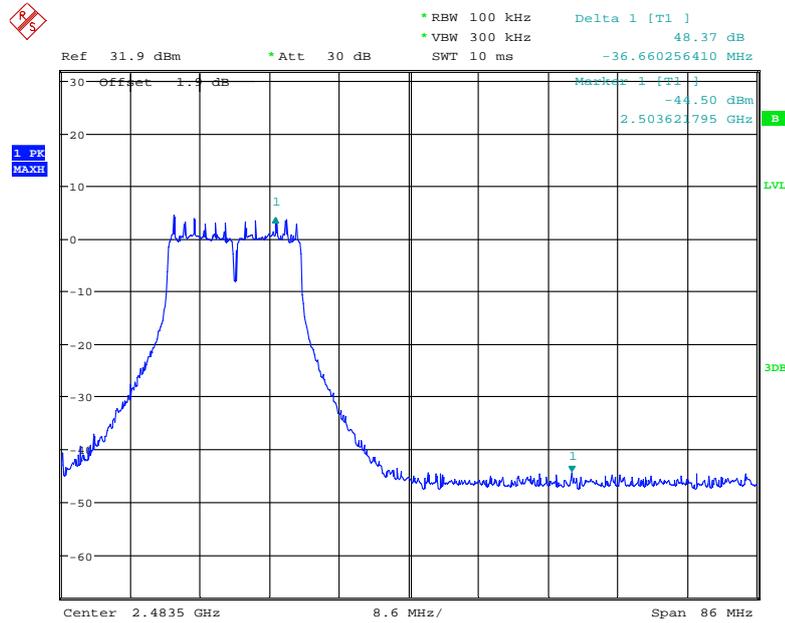
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802.11g: Band Edge, Left Side



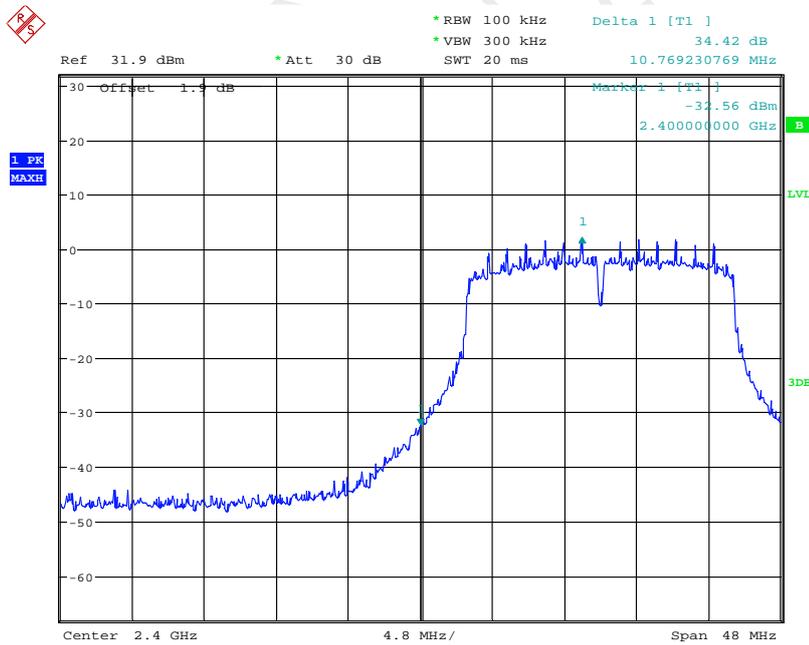
Date: 21.FEB.2019 15:54:46

802.11g: Band Edge, Right Side



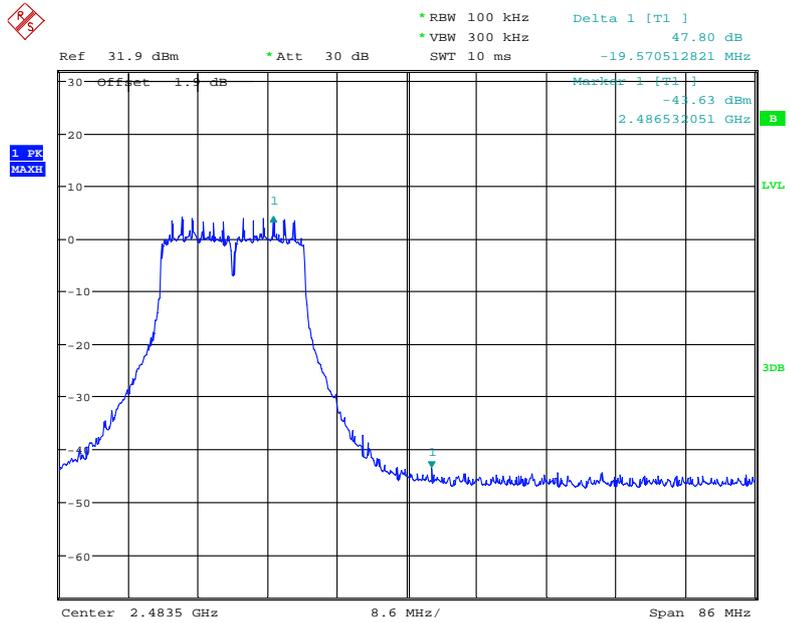
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802.11n ht20 Band Edge, Left Side



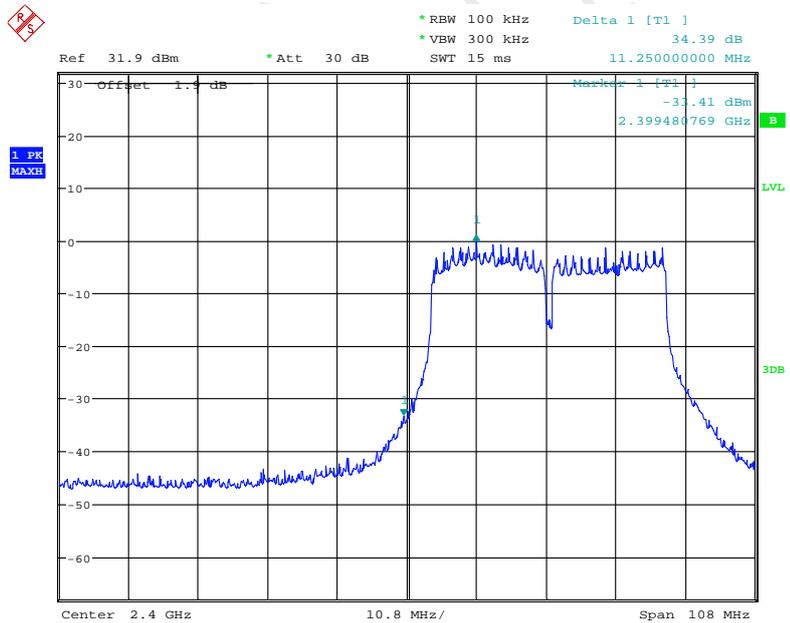
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802.11n ht20 Band Edge, Right Side



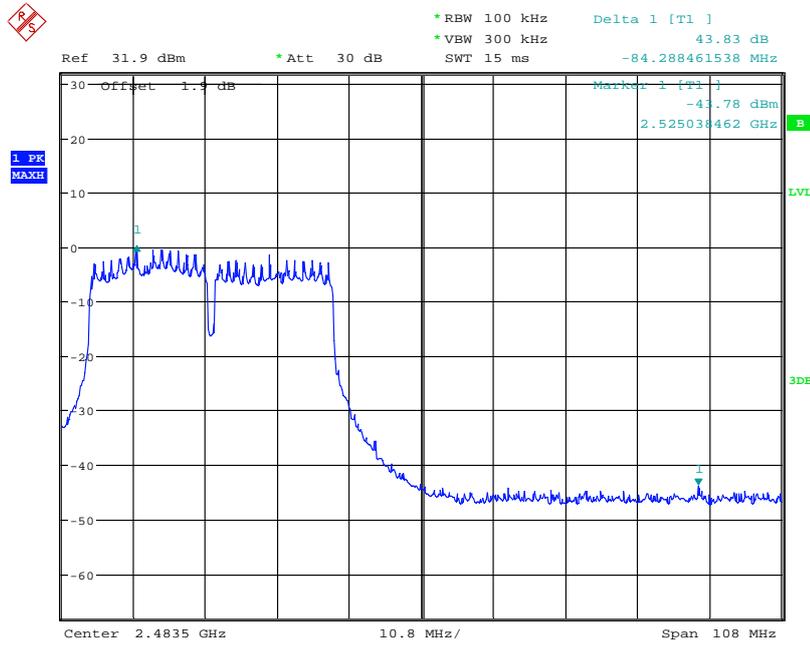
Date: 21.FEB.2019 15:52:20

802.11n ht40 Band Edge, Left Side



Date: 21.FEB.2019 15:47:59

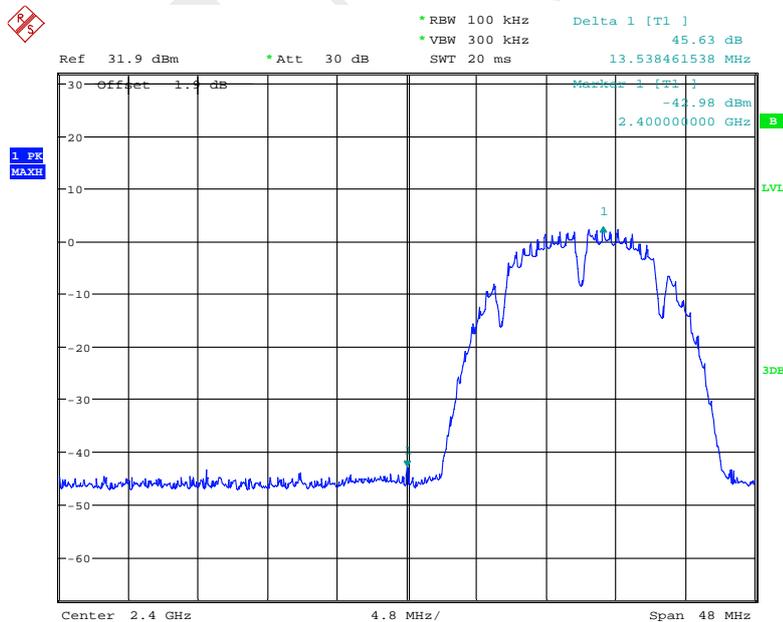
802.11n ht40 Band Edge, Right Side



Date: 21.FEB.2019 15:48:35

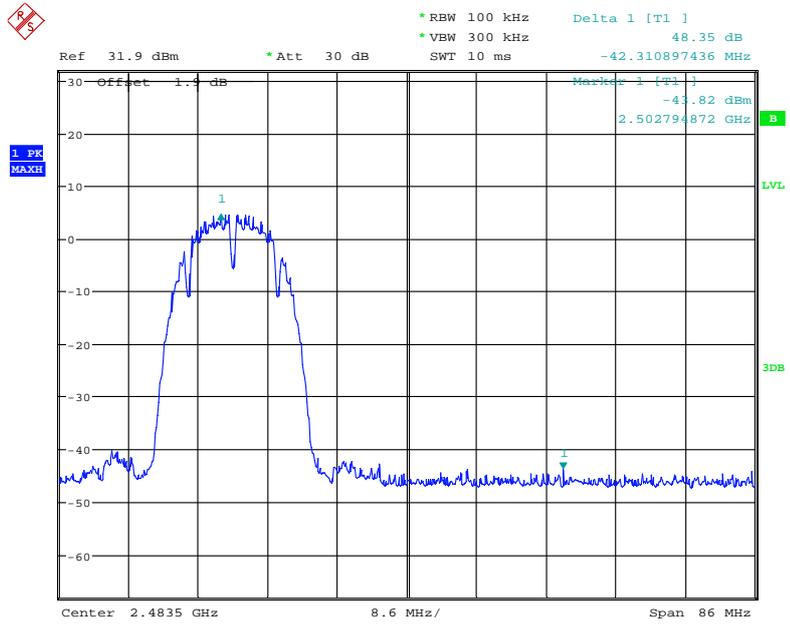
Chain 1:

802.11b: Band Edge, Left Side



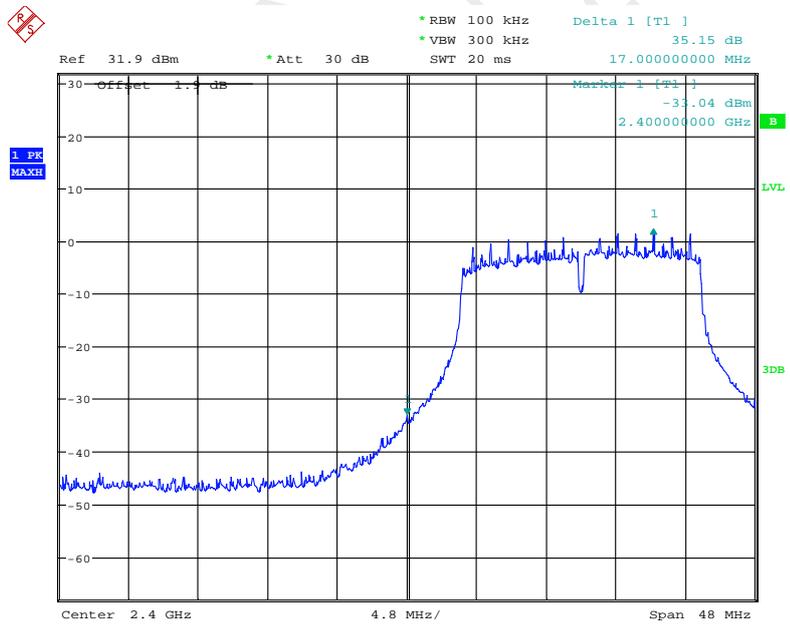
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802.11b: Band Edge, Right Side



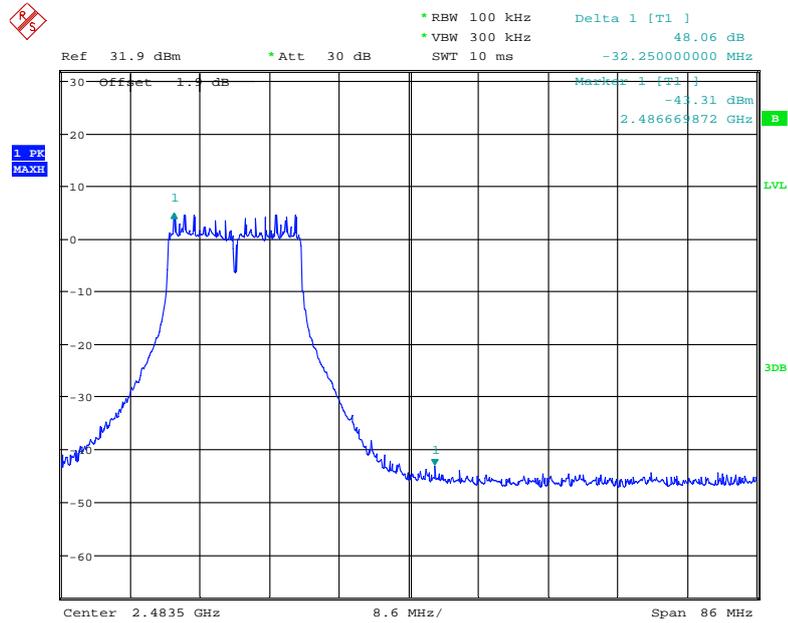
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802.11g: Band Edge, Left Side



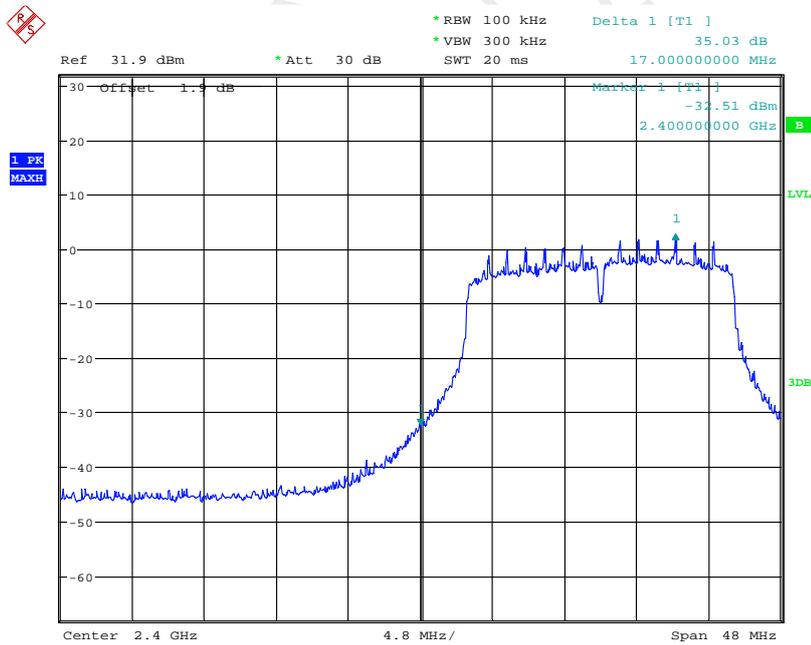
Date: 21.FEB.2019 15:42:19

802.11g: Band Edge, Right Side



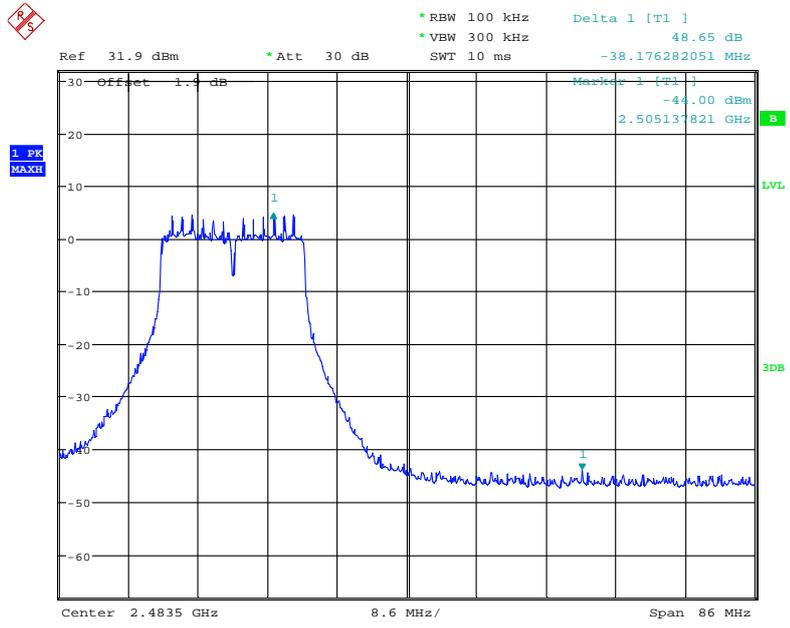
Date: 21.FEB.2019 15:40:50

802.11n ht20 Band Edge, Left Side



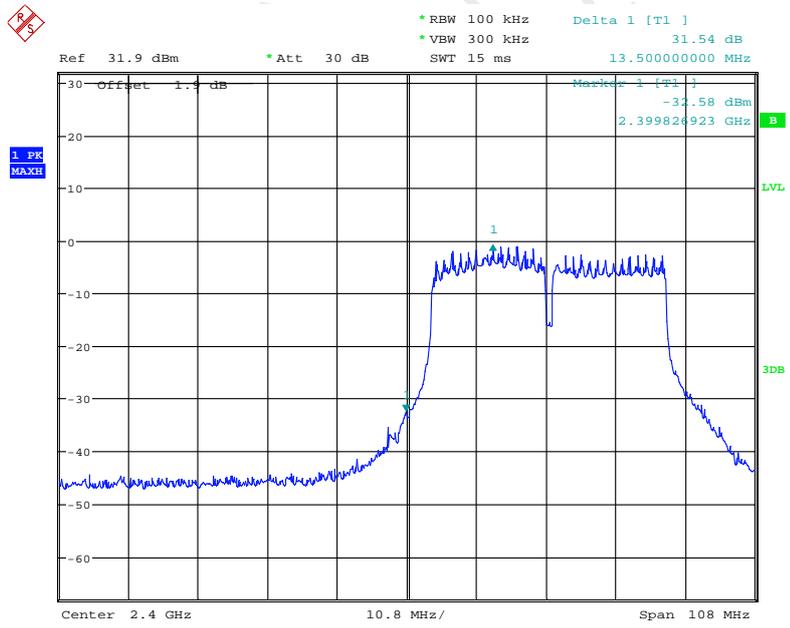
Date: 21.FEB.2019 15:36:58

802.11n ht20 Band Edge, Right Side



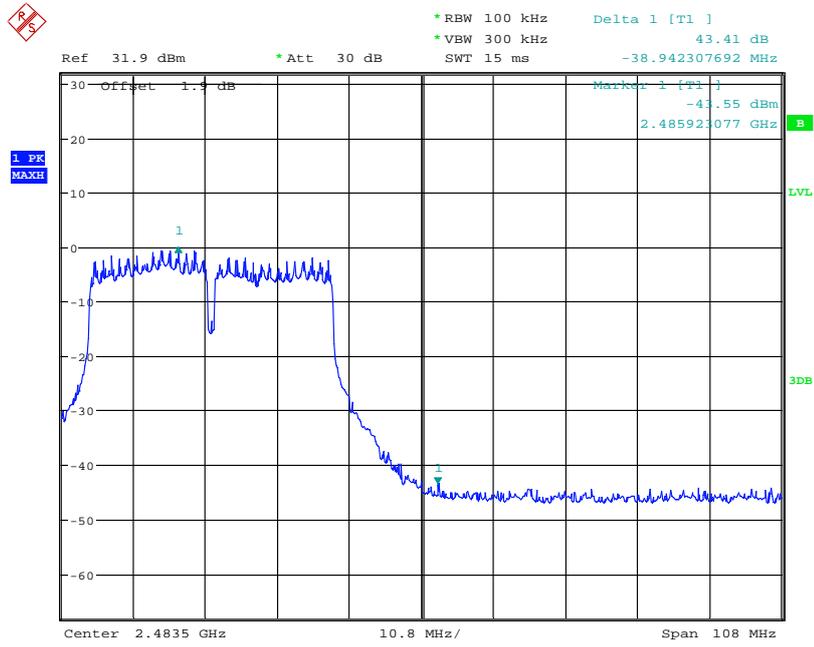
Date: 21.FEB.2019 15:40:06

802.11n ht40 Band Edge, Left Side



Date: 21.FEB.2019 15:46:50

802.11n ht40 Band Edge, Right Side



Date: 21.FEB.2019 15:45:51

FEMV

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	FSU 26	200256	2019-01-04	2020-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A

* **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:	24.5 °C
Relative Humidity:	67 %
ATM Pressure:	100.4 kPa

* The testing was performed by Elena Lei on 2019-02-21.

Test Result: Compliance

Test Mode: Transmitting

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

Test mode	Frequency (MHz)	Power Spectral Density (dBm/3kHz)			Limit (dBm/3kHz)
		Chain 0	Chain 1	Total	
802.11b	2412	-17.51	-18.20	-14.83	≤6.5
	2437	-11.20	-11.78	-8.47	≤6.5
	2462	-16.32	-16.75	-13.52	≤6.5
802.11g	2412	-20.07	-21.05	-17.52	≤6.5
	2437	-12.30	-13.48	-9.84	≤6.5
	2462	-17.70	-17.85	-14.76	≤6.5
802.11n ht20	2412	-20.49	-20.91	-17.68	≤6.5
	2437	-13.13	-13.47	-10.29	≤6.5
	2462	-17.98	-17.67	-14.81	≤6.5
802.11n ht40	2422	-22.39	-23.25	-19.79	≤6.5
	2437	-14.67	-16.01	-12.28	≤6.5
	2452	-23.20	-22.46	-19.80	≤6.5

Note 1: The maximum antenna gain is 4.5dBi in 2.4 GHz band. The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices:

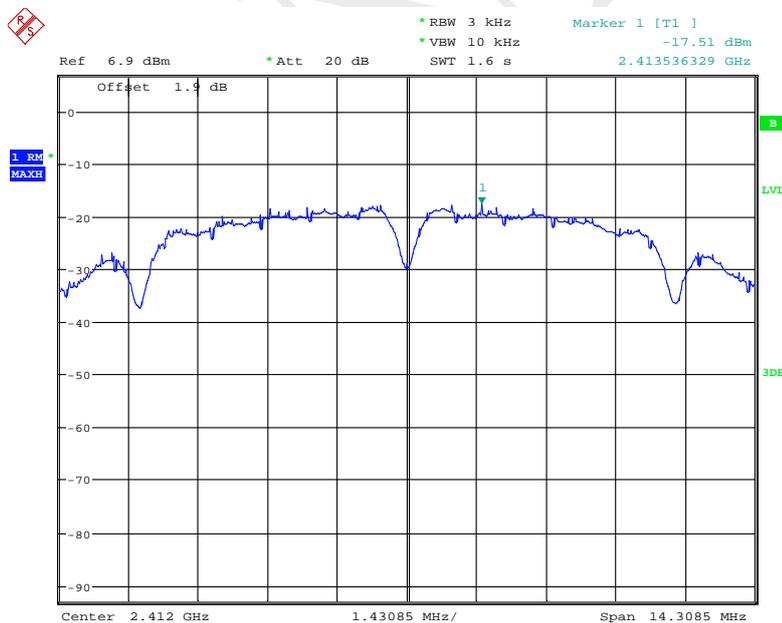
$$\text{Array Gain} = 10 \log(N_{\text{ANT}}/N_{\text{SS}}) \text{ dB.}$$

So:

$$\text{Directional gain} = G_{\text{ANT}} + \text{Array Gain} = 4.5\text{dBi} + 10 * \log(2/1) = 7.5\text{dBi}$$

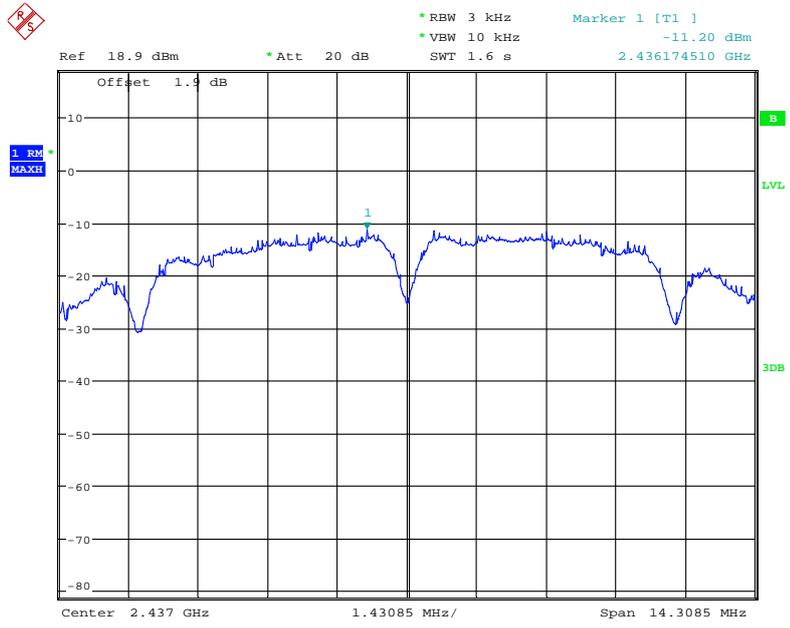
Chain 0:

Power Spectral Density, 802.11b Low Channel



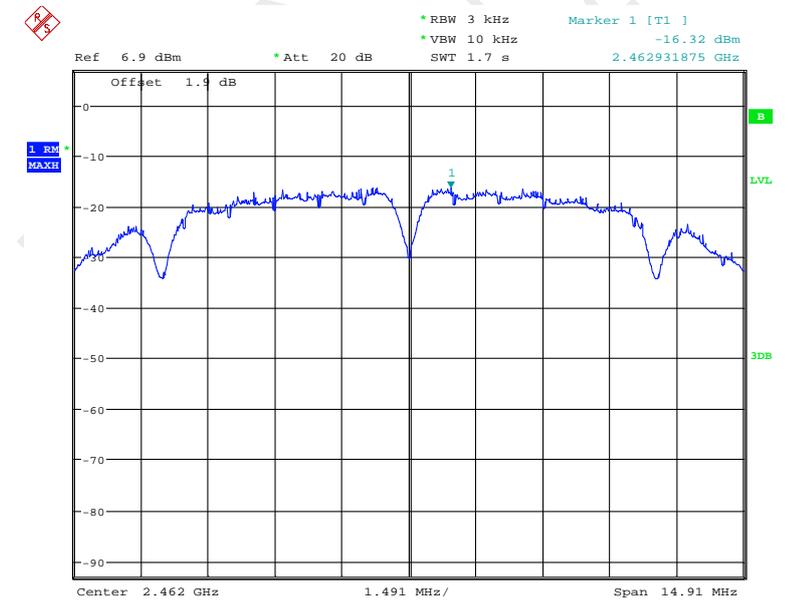
Date: 21.FEB.2019 15:14:22

Power Spectral Density, 802.11b Middle Channel



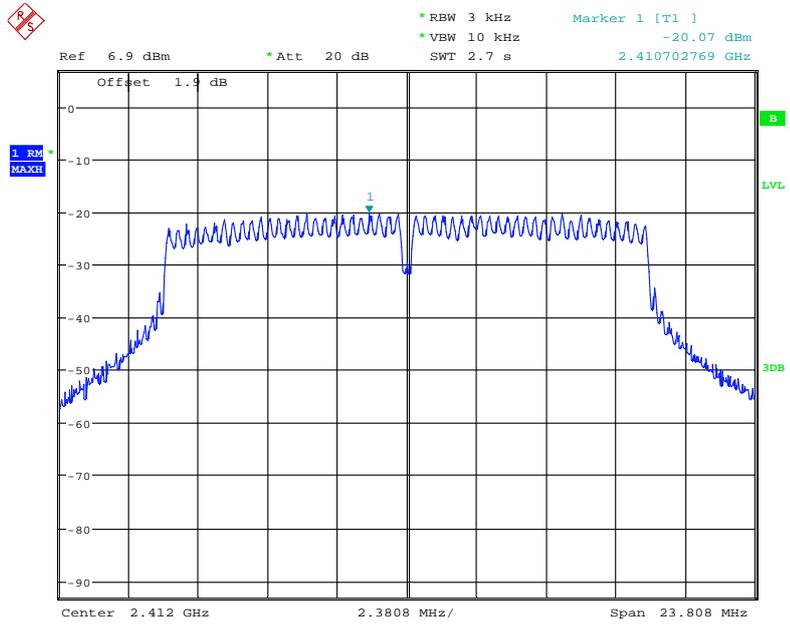
Date: 21.FEB.2019 15:06:01

Power Spectral Density, 802.11b High Channel



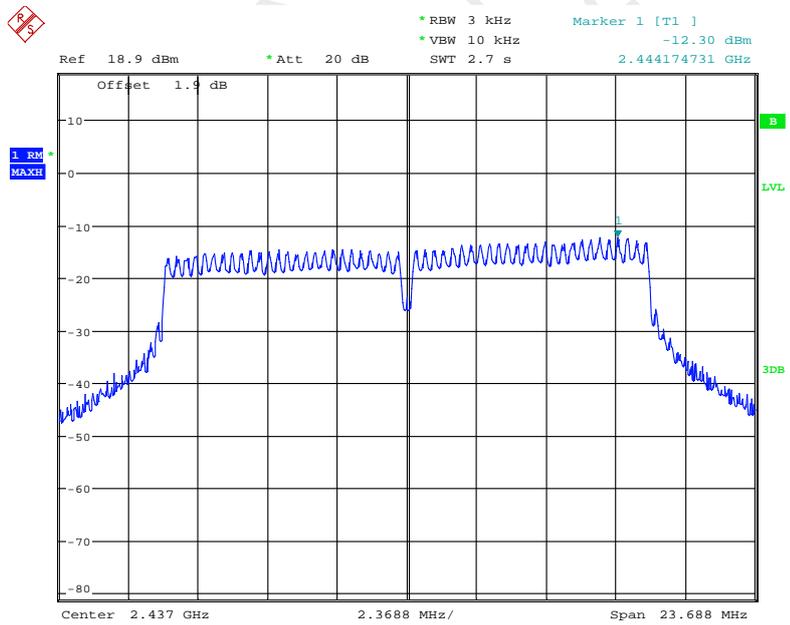
Date: 21.FEB.2019 15:16:05

Power Spectral Density, 802.11g Low Channel



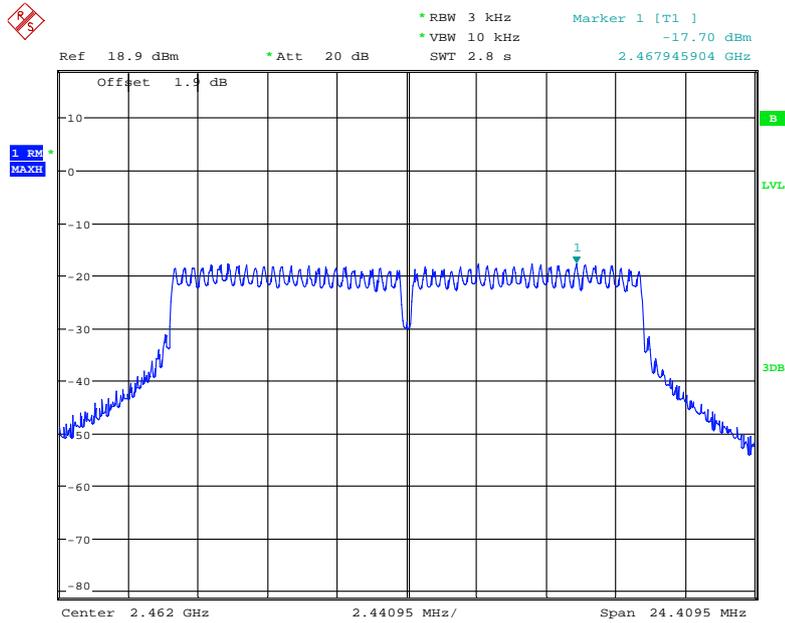
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Power Spectral Density, 802.11g Middle Channel



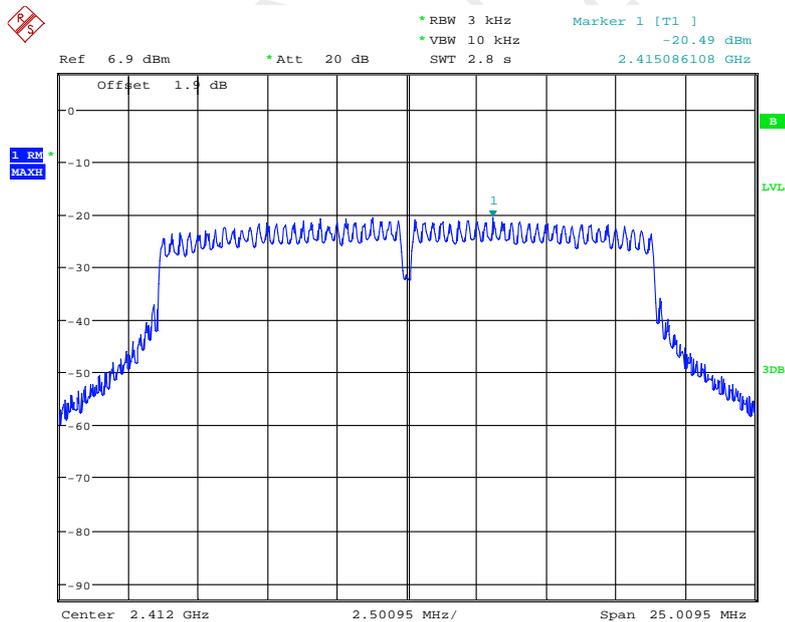
Date: 21.FEB.2019 15:11:22

Power Spectral Density, 802.11g High Channel



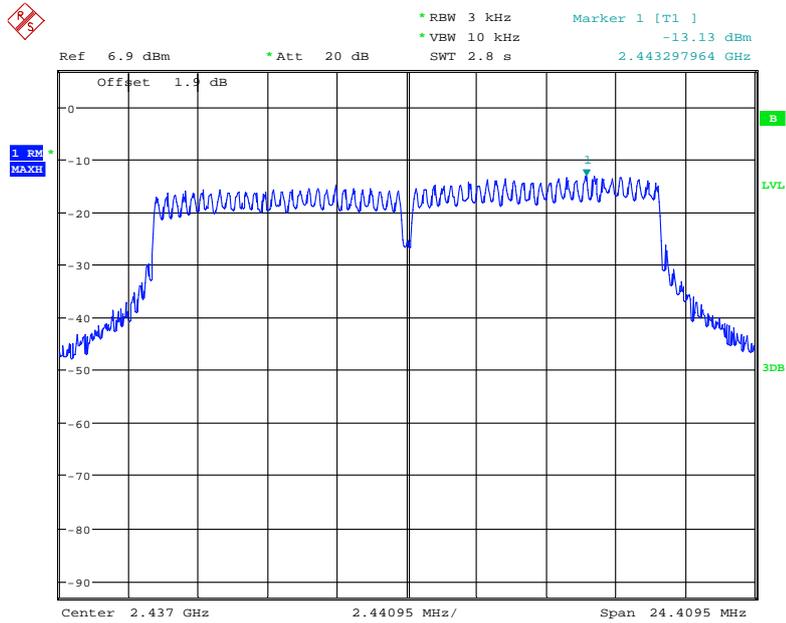
Date: 21.FEB.2019 15:07:34

Power Spectral Density, 802.11n ht20 Low Channel



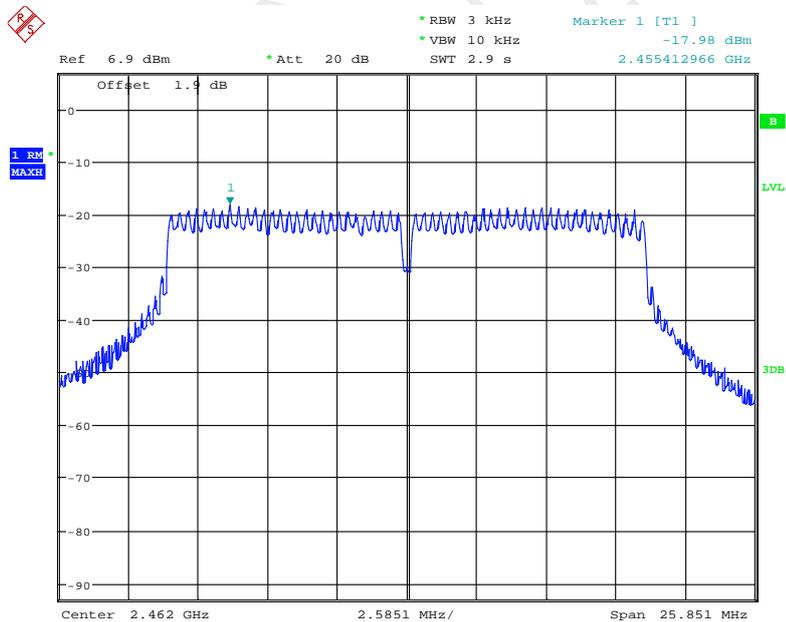
Date: 21.FEB.2019 15:16:53

Power Spectral Density, 802.11n ht20 Middle Channel



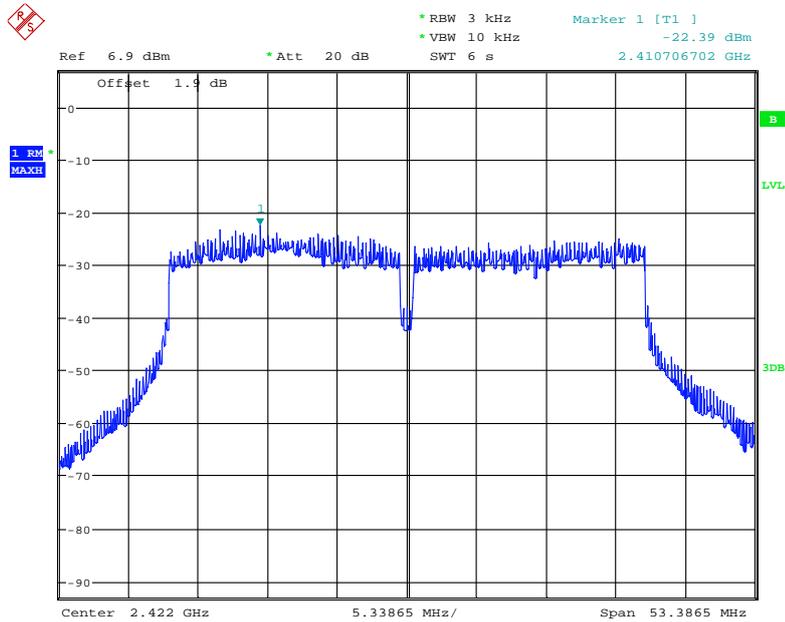
Date: 21.FEB.2019 15:17:32

Power Spectral Density, 802.11n ht20 High Channel



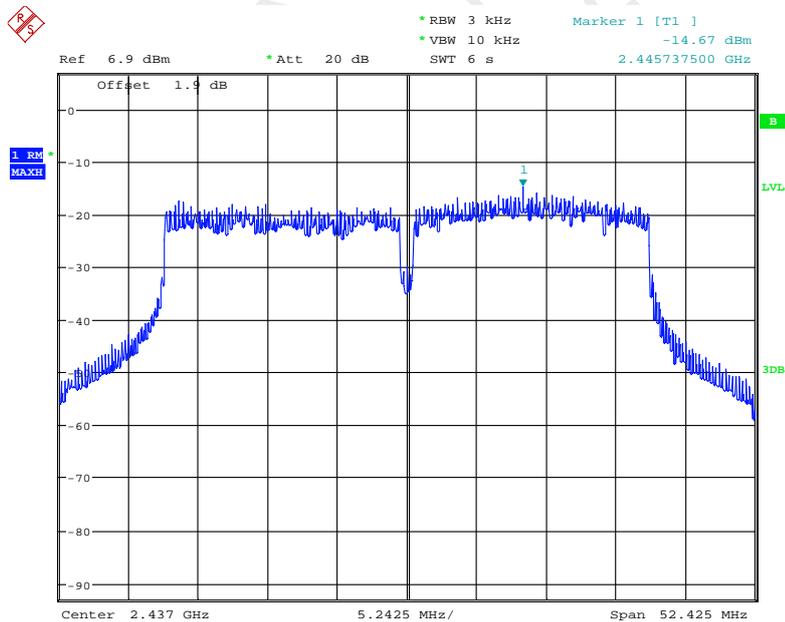
Date: 21.FEB.2019 15:18:08

Power Spectral Density, 802.11n ht40 Low Channel



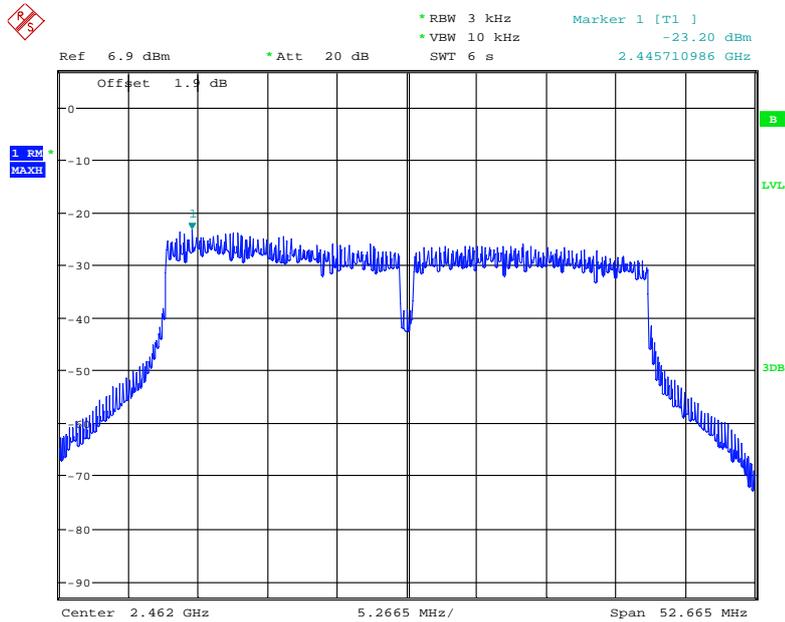
Date: 21.FEB.2019 15:19:07

Power Spectral Density, 802.11n ht40 Middle Channel



Date: 21.FEB.2019 15:19:46

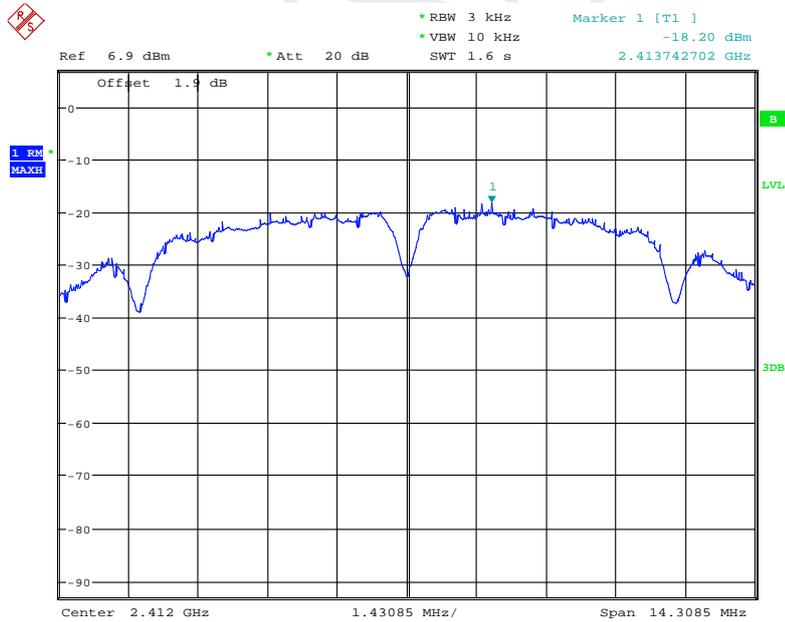
Power Spectral Density, 802.11n ht40 High Channel



Date: 21.FEB.2019 15:20:33

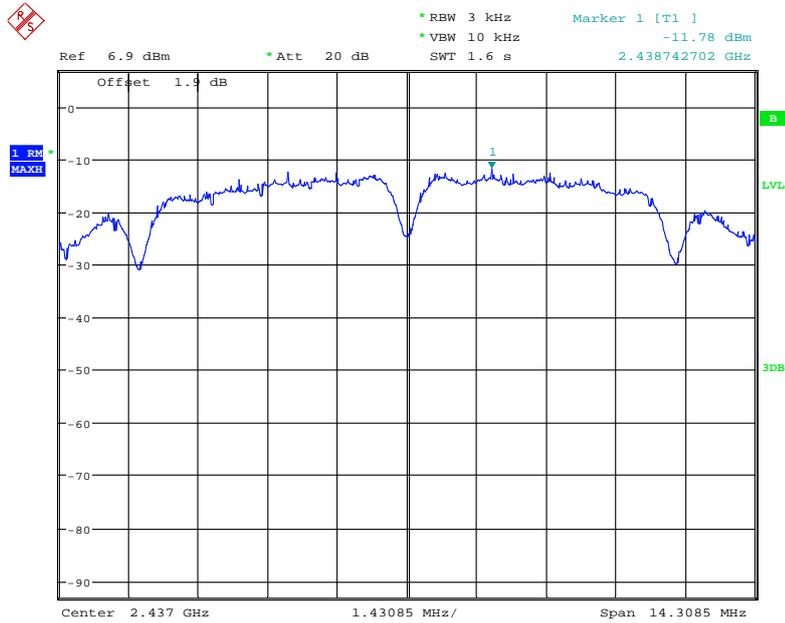
Chain 1:

Power Spectral Density, 802.11b Low Channel



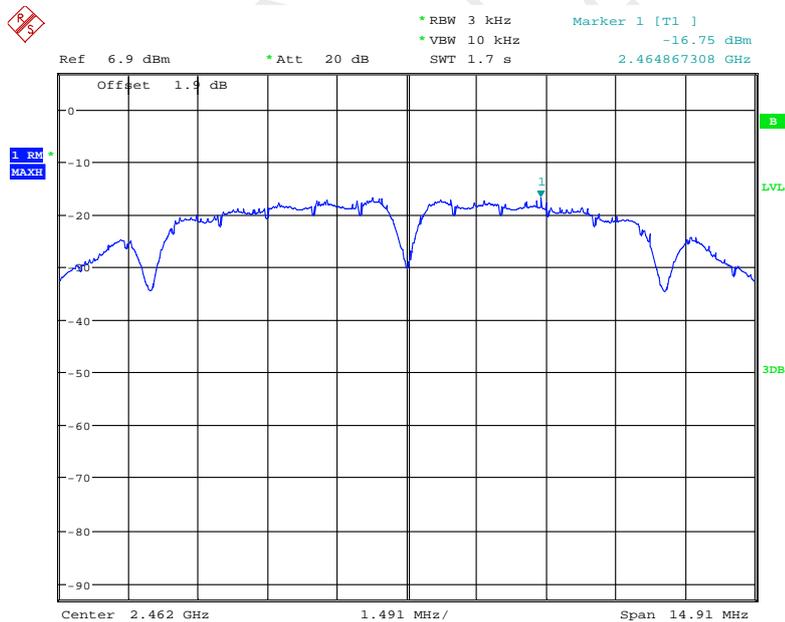
Date: 21.FEB.2019 15:24:28

Power Spectral Density, 802.11b Middle Channel



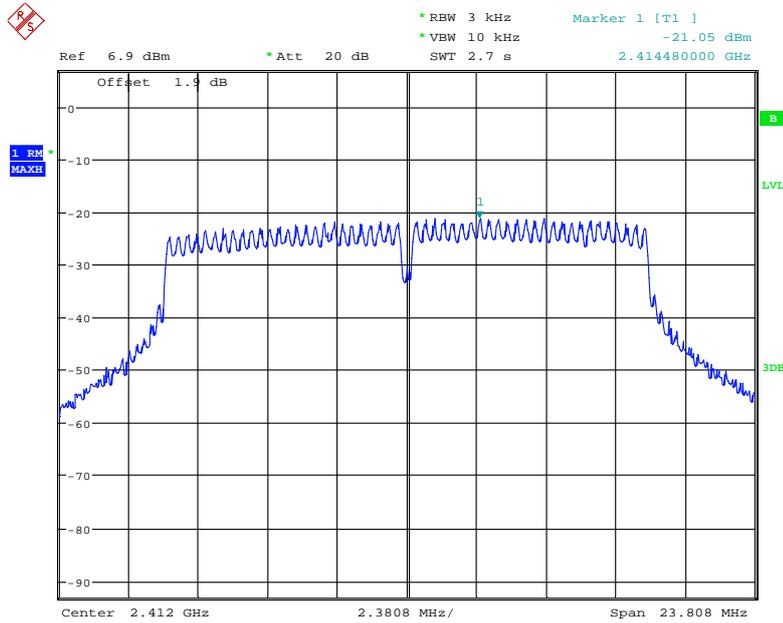
Date: 21.FEB.2019 15:24:55

Power Spectral Density, 802.11b High Channel



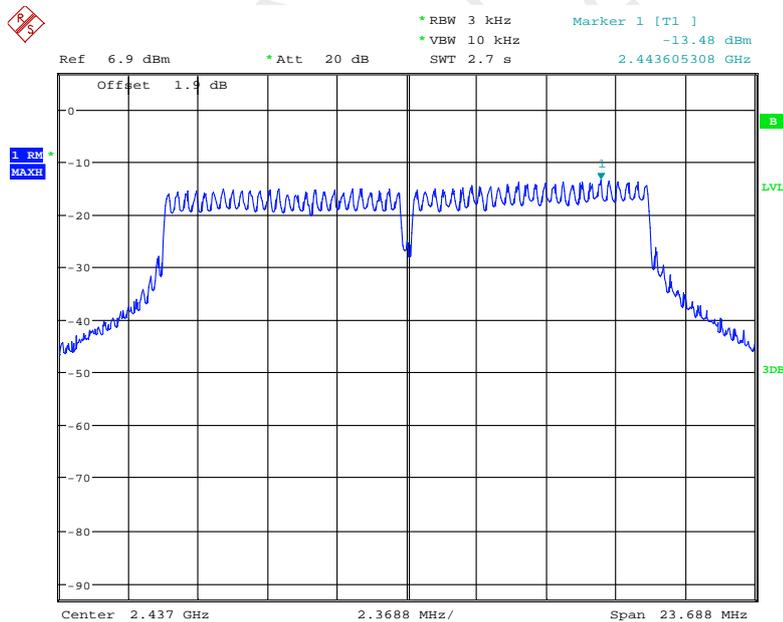
Date: 21.FEB.2019 15:25:22

Power Spectral Density, 802.11g Low Channel



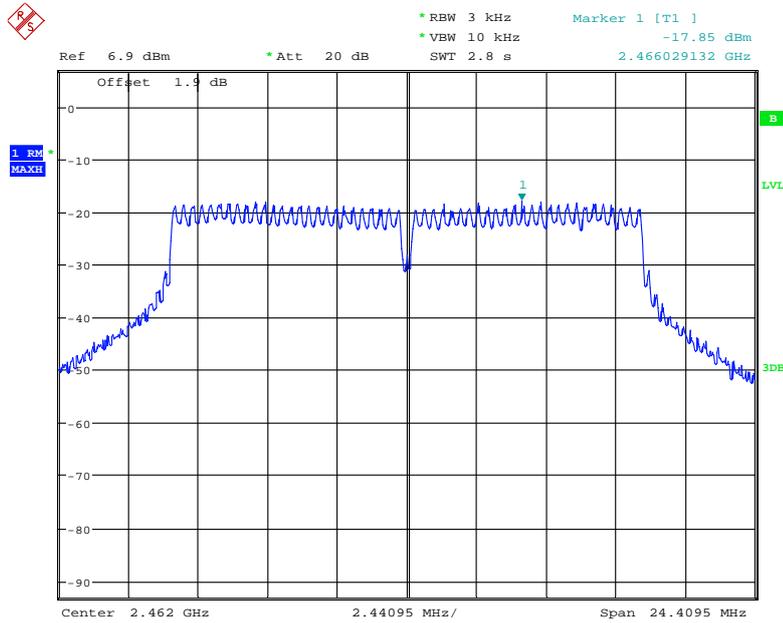
Date: 21.FEB.2019 15:26:48

Power Spectral Density, 802.11g Middle Channel



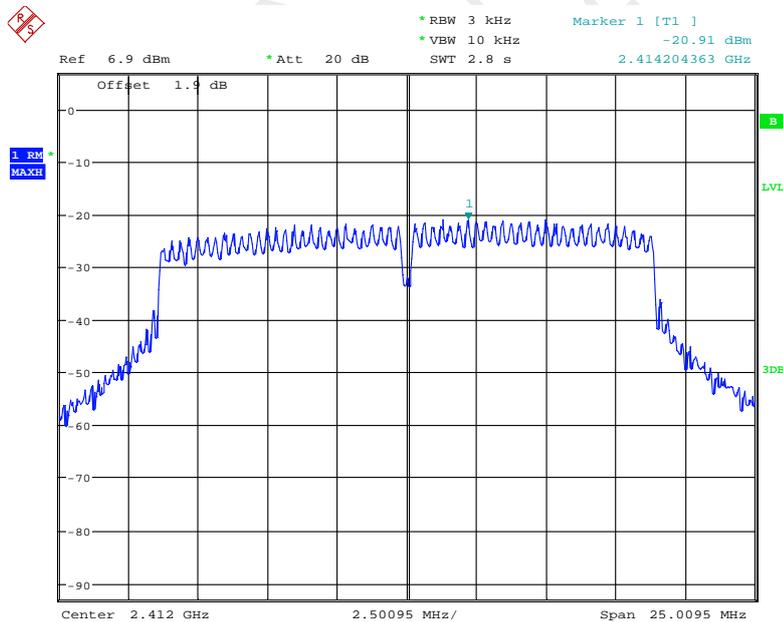
Date: 21.FEB.2019 15:26:23

Power Spectral Density, 802.11g High Channel



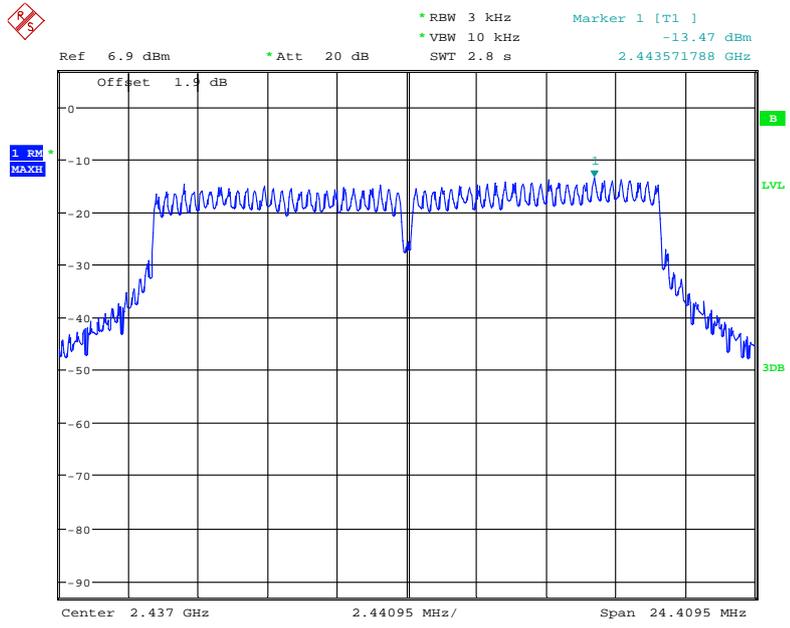
Date: 21.FEB.2019 15:25:55

Power Spectral Density, 802.11n ht20 Low Channel



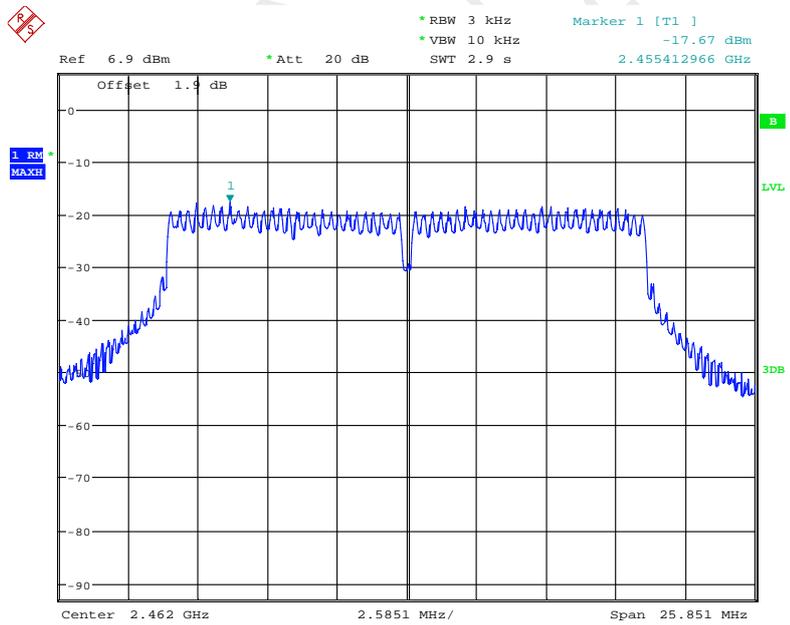
Date: 21.FEB.2019 15:27:20

Power Spectral Density, 802.11n ht20 Middle Channel



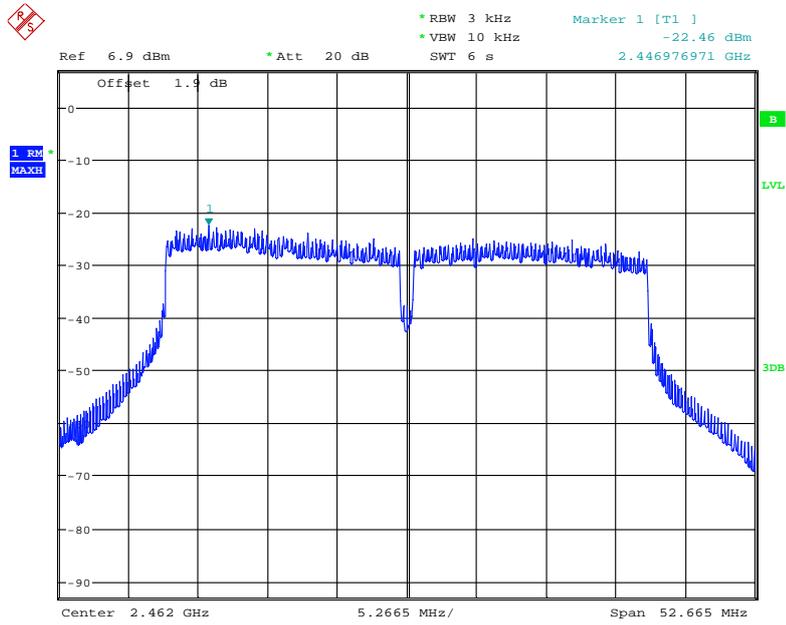
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Power Spectral Density, 802.11n ht20 High Channel



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Power Spectral Density, 802.11n ht40 High Channel



Date: 21.FEB.2019 15:22:29

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

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