FCC PART 15.247
RSS-GEN, ISSUE 4, NOVEMBER 2014
RSS-247, ISSUE 2, FEBRUARY 2017

TEST REPORT

For

Shenzhen RYZE Tech Co.,Ltd.

10th Floor,West Wing,Skyworth Semiconductor Design Building,NO.18 Gaoxin South 4th Ave,Nanshan District,Shenzhen,China

FCC ID: 2AOOE-WM0041801
IC: 23508-WM0041801

Report Type:	**Product Name:**
Original Report	TELLO

Report Number:	RDG171229004-00
Report Date:	2018-01-19
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:	TELLO
EUT Model:	TLW004
FCC ID:	2AOOE-WM0041801
IC:	23508-WM0041801
Rated Input Voltage:	DC3.8V from battery or DC 5V from USB port
External Dimension:	Length (177.16mm)*Width (170.37mm)*High (42.07mm)
Serial Number:	171229004
EUT Received Date:	2017.12.29

Objective

This report is prepared on behalf of ***Shenzhen RYZE Tech Co.,Ltd.*** in accordance with Part 2, Subpart J, Part 15, Subparts A, and C of the Federal Communications Commission's rules and RSS-247, Issue 2, February 2017, RSS-Gen Issue 4, November 2014 of the Innovation, Science and Economic Development Canada.

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, 15.247 rules and RSS-247, Issue 2, February 2017, RSS-Gen Issue 4, November 2014 of the Innovation, Science and Economic Development Canada.

Related Submittal(s)/Grant(s)

N/A

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices. And KDB 558074 D01 DTS Meas Guidance v04, RSS-247, Issue 2, February 2017, RSS-Gen Issue 4, November 2014 of the Innovation, Science and Economic Development Canada.

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 testing mode, which was provided by manufacturer.

The device supports 802.11b/g/n ht20 in 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 802.11n ht20 modes were test with channel 1,6,11.

The device have two antenna used for 802.11 transmission, but the system only configured one antenna for using(1T1R) Judge by good performance.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.

EUT Exercise Software

The software “RfCertification004” was used for testing, which was provided by manufacturer. The maximum power was configured as below table, that provided by the manufacturer:

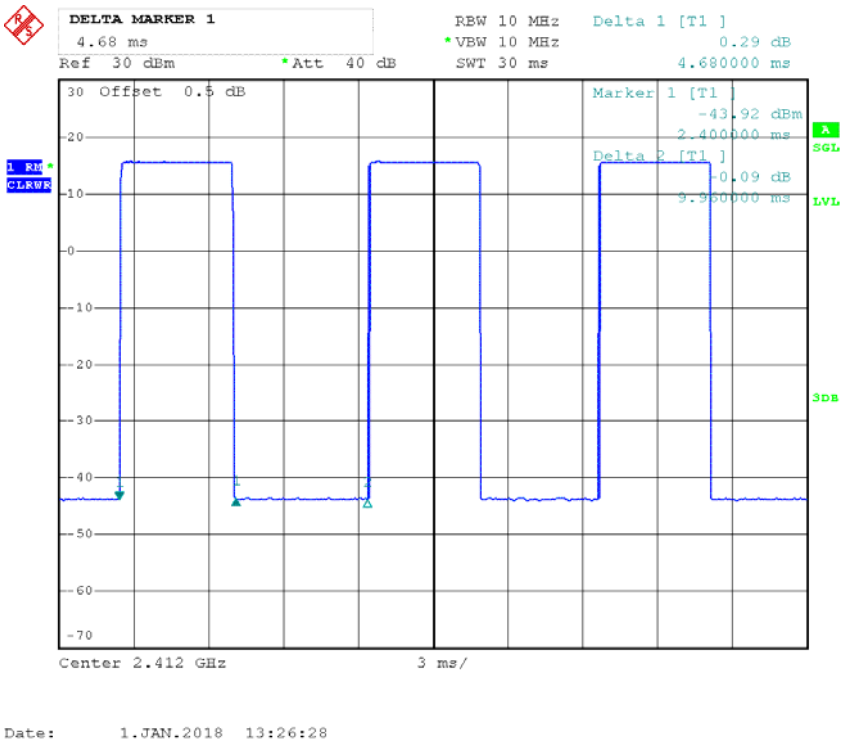
Software and version			RfCertification004		
Mode	Channel	Frequency (MHz)	Data Rate	Power Level	
				Chain 0	Chain 1
802.11 b	Low	2412	1 Mbps	16	16
	Middle	2437	1 Mbps	16	16
	High	2462	1 Mbps	16	14
802.11 g	Low	2412	6 Mbps	16	14
	Middle	2437	6 Mbps	16	16
	High	2462	6 Mbps	16	9
802.11n ht20	Low	2412	MCS0	13	15
	Middle	2437	MCS0	16	16
	High	2462	MCS0	16	8

Addiation channel 2457 MHz for 802.11g and 802.11 ht20 power test and radiation bandedge test at chain 1 was performed for proving compliance, the power level was set to16 for 802.11g and 16 for 802.11n ht20.

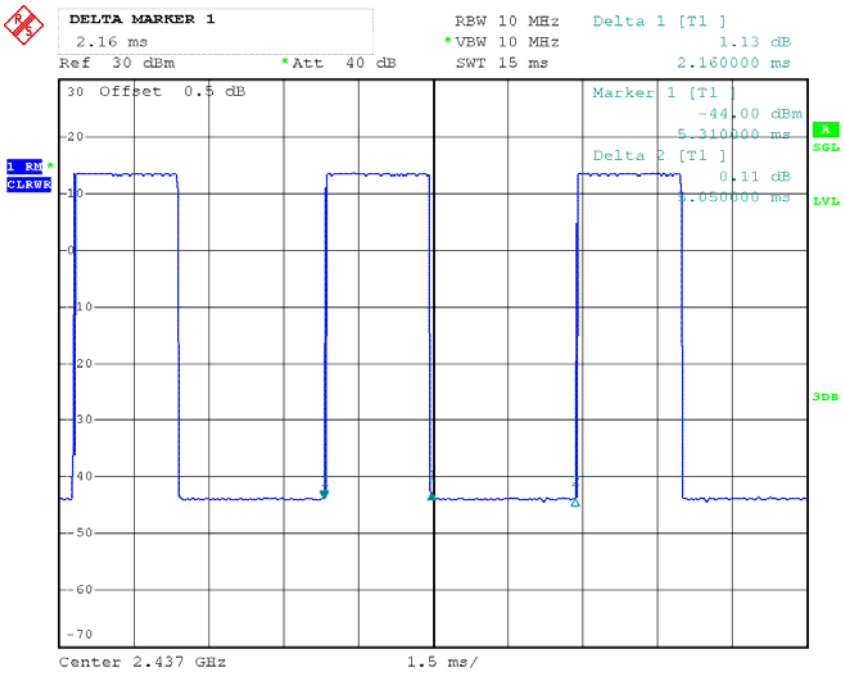
The maximum duty cycle as following table:

Test mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle (%)
802.11b	4.68	9.96	46.99
802.11g	2.16	5.05	42.77
802.11n ht20	2.04	4.84	42.15

802.11b



802.11g



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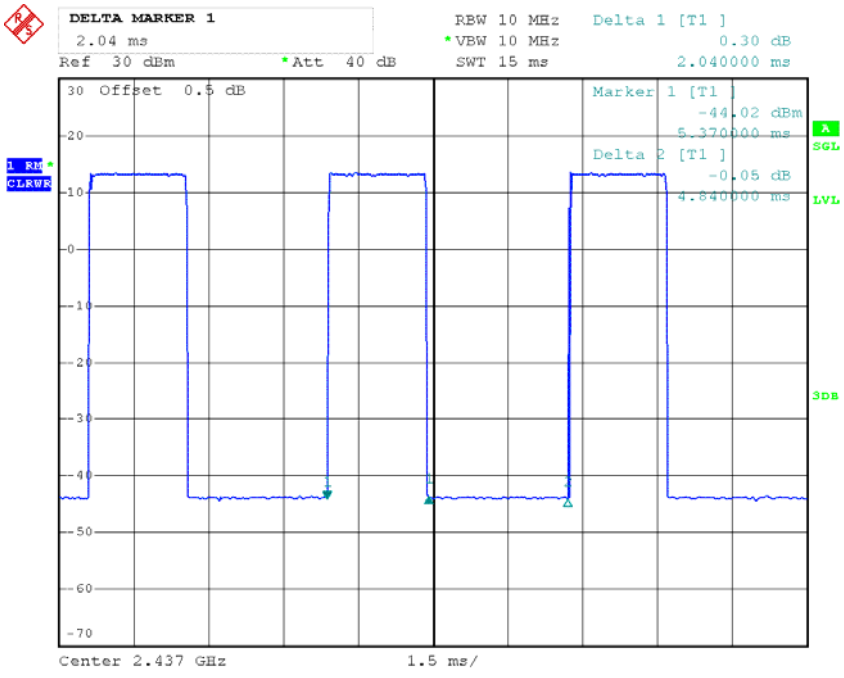
802.11n ht20



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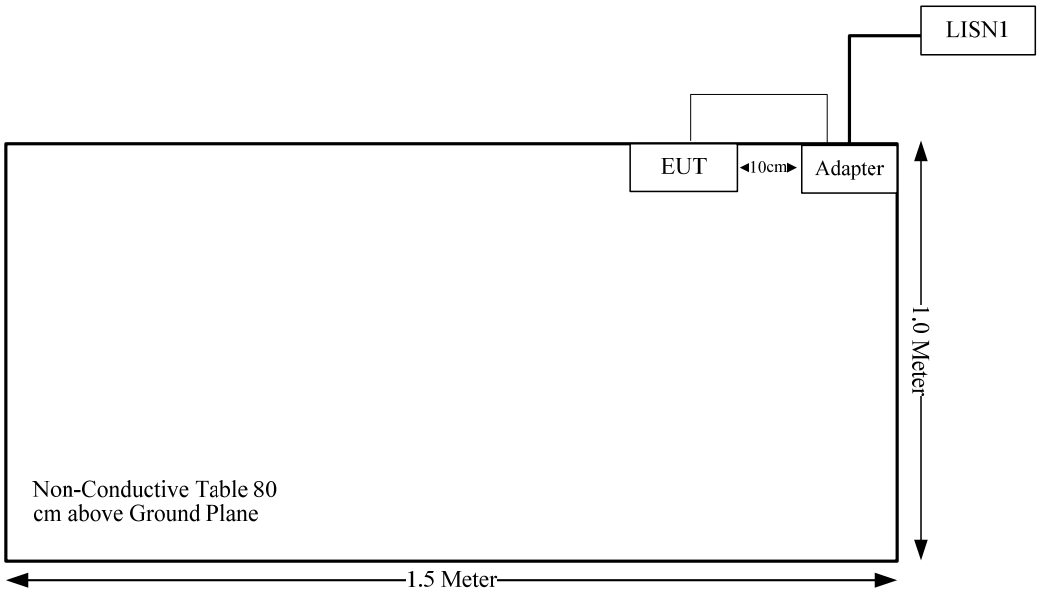
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
maxwest	adapter	Olbco 4N LTE	N/A

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB Cable	Yes	No	0.8	USB Port of adapter	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	Maximum Permissable Exposure (MPE)	Compliance
RSS-102 § 2.5.2	Exemption Limits For Routine Evaluation-RF Exposure Evaluation	Compliance
FCC§15.203 RSS-GEN§8.3	Antenna Requirement	Compliance
§15.207 (a) RSS-Gen §8.8	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d) RSS-247 §5.5 RSS-Gen §8.10	Spurious Emissions	Compliance
§15.247 (a)(2) RSS-247 §5.2 a)	6 dB Emission Bandwidth And 99% Occupied Bandwidth	Compliance
§15.247(b)(3) RSS-247 §5.4 d)	Maximum conducted output power	Compliance
§15.247(d) RSS-247 §5.5	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247 (e) RSS-247 §5.2 b)	Power Spectral Density	Compliance

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

Applicable Standard

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

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

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	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/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

Frequency Range (MHz)	**Antenna Gain**		**Maximum Power Including Tolerance**		**Evaluation Distance (cm)**	**Power Density (mW/cm^2)**	**MPE Limit (mW/cm^2)**
	(dBi)	**(numeric)**	**(dBm)**	**(mW)**			
2412-2462	2.96	1.98	24	251.19	20.00	0.10	1.0

Note:
The Maximum Power Including Tolerance was declared by manufacturer.

Result: Compliance, The device meets FCC MPE at 20 cm distance

RSS-102 § 2.5.2 - EXEMPTION LIMITS FOR ROUTINE EVALUATION – RF EXPOSURE EVALUATION

Applicable Standard

According to RSS-102 § (2.5.2):

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

Calculated Data:

The maximum power including tune-up tolerance is 24dBm, the maximum antenna gain is 2.96 dBi, so the maximum e.i.r.p. is 26.96 dBm (0.497W),

Exemption from Routine Evaluation Limit is:
$1.31 \times 10^{-2} f^{0.6834} = 1.31 \times 10^{-2} \times 2412^{0.6834} = 2.68 > 0.497W$

So the device is compliance exemption from Routine Evaluation Limits –RF exposure Evaluation.

Result: Compliance

FCC §15.203 ,RSS-GEN§8.3- ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.
Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

According to RSS-Gen §8.3, The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.
Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level.9 When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

This radio transmitter (identify the device by certification number or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi).

Antenna Information And Connector Construction

The EUT has two internal antenna arrangement, and the maximum antenna gain is 2.96 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

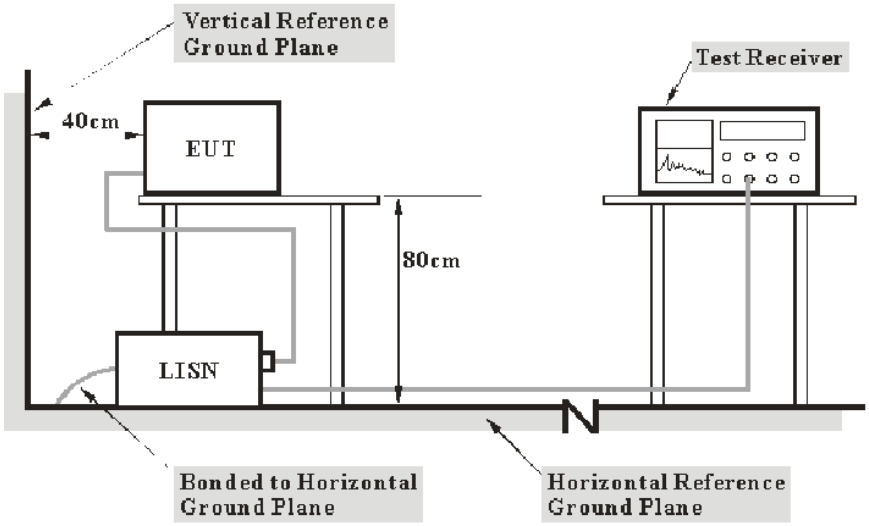
Result: Compliance.

FCC §15.207 (a)& RSS-GEN §8.8– 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 15.207and RSS-247/RSS-Gen limits.

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	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

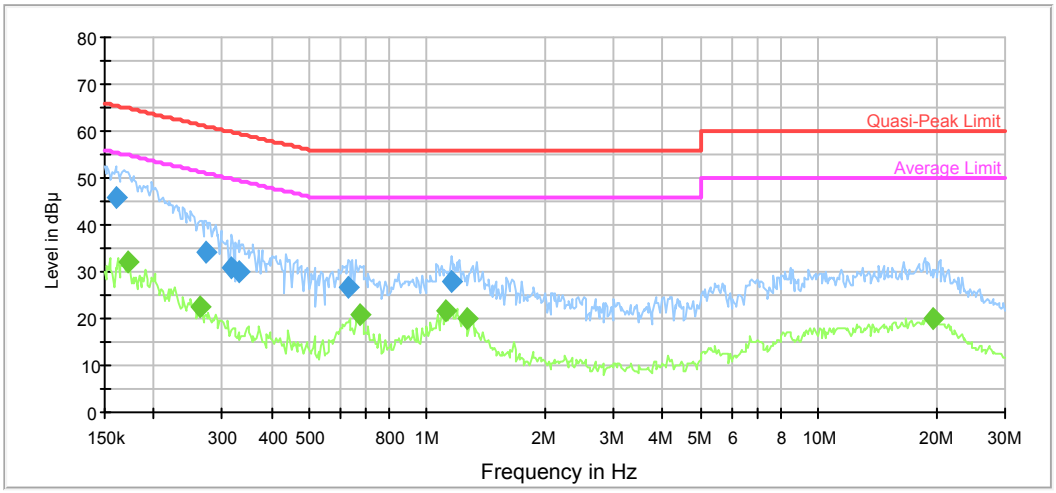
Environmental Conditions

Temperature:	26.1 °C
Relative Humidity:	42 %
ATM Pressure:	100.8 kPa

The testing was performed by Jim Zhang on 2018-01-05.

Test Mode: Transmitting (Chain 1 802.11n ht20 mode middle channel was the worst)

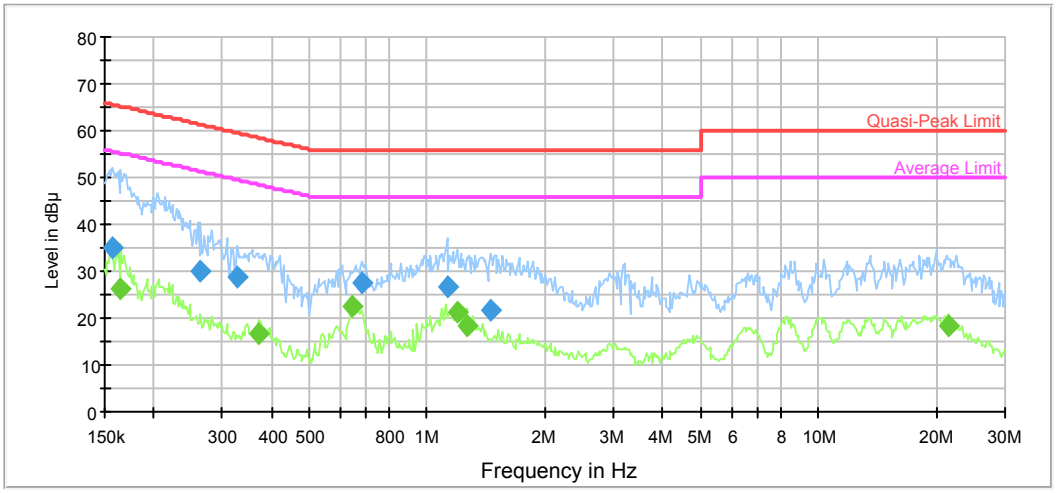
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.159873	45.7	9.000	L1	11.1	19.8	65.5	Compliance
0.272666	34.2	9.000	L1	10.2	26.8	61.0	Compliance
0.317235	31.0	9.000	L1	10.1	28.8	59.8	Compliance
0.330129	30.1	9.000	L1	10.1	29.3	59.4	Compliance
0.629488	26.6	9.000	L1	9.8	29.4	56.0	Compliance
1.153421	27.7	9.000	L1	9.8	28.3	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.171759	31.9	9.000	L1	10.9	23.0	54.9	Compliance
0.262017	22.6	9.000	L1	10.3	28.8	51.4	Compliance
0.670921	21.0	9.000	L1	9.8	25.0	46.0	Compliance
1.117238	21.5	9.000	L1	9.8	24.5	46.0	Compliance
1.259081	20.1	9.000	L1	9.8	25.9	46.0	Compliance
19.519859	20.0	9.000	L1	10.1	30.0	50.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.157346	35.2	9.000	N	11.1	30.4	65.6	Compliance
0.264113	30.1	9.000	N	10.3	31.2	61.3	Compliance
0.327509	28.6	9.000	N	10.1	30.9	59.5	Compliance
0.681699	27.3	9.000	N	9.8	28.7	56.0	Compliance
1.126176	26.5	9.000	N	9.8	29.5	56.0	Compliance
1.453260	21.5	9.000	N	9.7	34.5	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.165051	26.2	9.000	N	11.0	29.0	55.2	Compliance
0.369089	16.9	9.000	N	10.0	31.6	48.5	Compliance
0.644717	22.4	9.000	N	9.8	23.6	46.0	Compliance
1.190776	21.2	9.000	N	9.8	24.8	46.0	Compliance
1.259081	18.4	9.000	N	9.8	27.6	46.0	Compliance
21.478456	18.2	9.000	N	10.0	31.8	50.0	Compliance

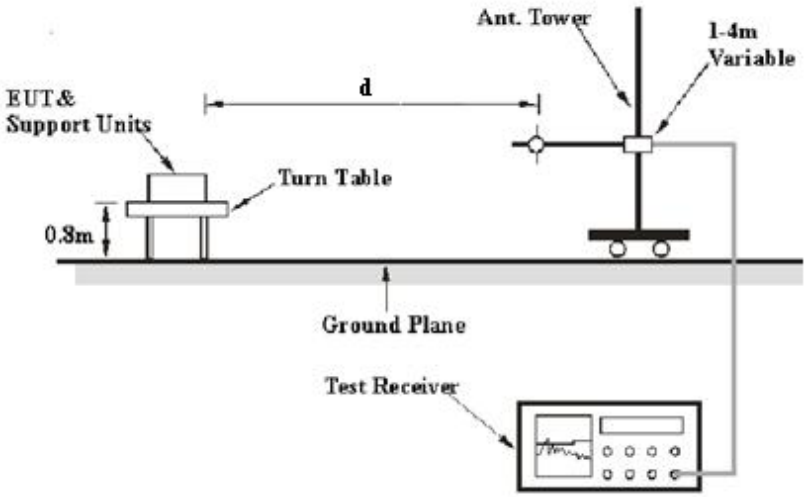
FCC §15.209, §15.205 , §15.247(d) & RSS-247 §5.5&RSS-GEN§8.10- SPURIOUS EMISSIONS

Applicable Standard

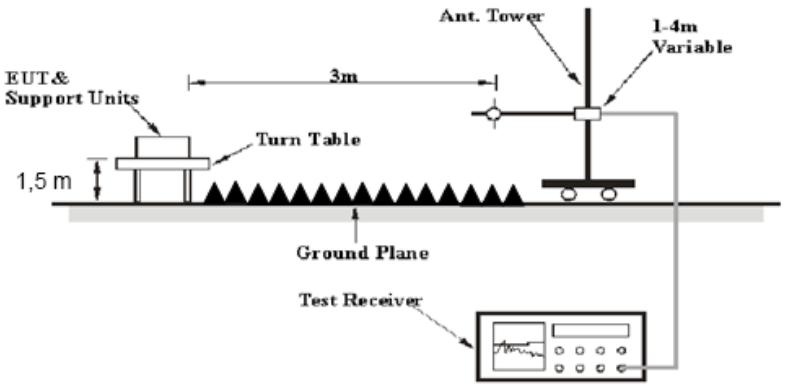
FCC §15.247 (d); §15.209; §15.205; and RSS-247 §5.5, RSS-GEN §8.10

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 10 meters chamber test site for 30MHz to 1GHz, and 3 meters chamber test site for 1GHz to 25GHz, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 and RSS-247 §5.5, RSS-Gen §8.10 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

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:

30-1000MHz:

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
Ave.	>98%	1MHz	10 Hz
	<98%	1MHz	1/T

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.

Emissions under limits 20dB or under the noise floor have not recorded in the report.

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	100035	2017-07-28	2018-07-28
Sunol Sciences	Antenna	JB3	A060611-3	2017-07-21	2019-07-21
HP	Amplifier	8447F	2443A01912	2017-09-05	2018-09-05
N/A	Coaxial Cable	C-NJNJ-50	C-0400-02	2017-09-05	2018-09-05
N/A	Coaxial Cable	C-NJNJ-50	C-0075-02	2017-09-05	2018-09-05
N/A	Coaxial Cable	C-NJNJ-50	C-2200-01	2017-09-05	2018-09-05
Farad	Test Software	EZ-EMC	V1.1.42	N/A	N/A
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
N/A	Coaxial Cable	C-SJSJ-50	C-0800-01	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
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

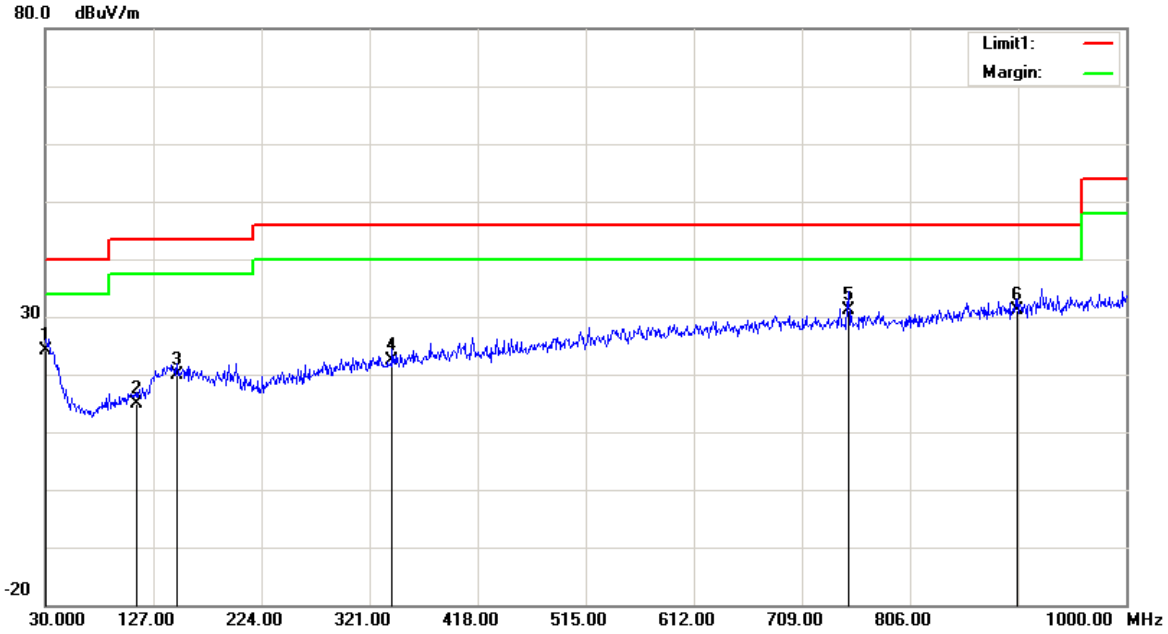
Temperature:	18.6~22.5 °C
Relative Humidity:	38~44 %
ATM Pressure:	101.1~101.5 kPa

The testing was performed by Eeric Xiao and Blake Yang on 2018-01-03 and 2018-01-15.

Test Mode: Transmitting

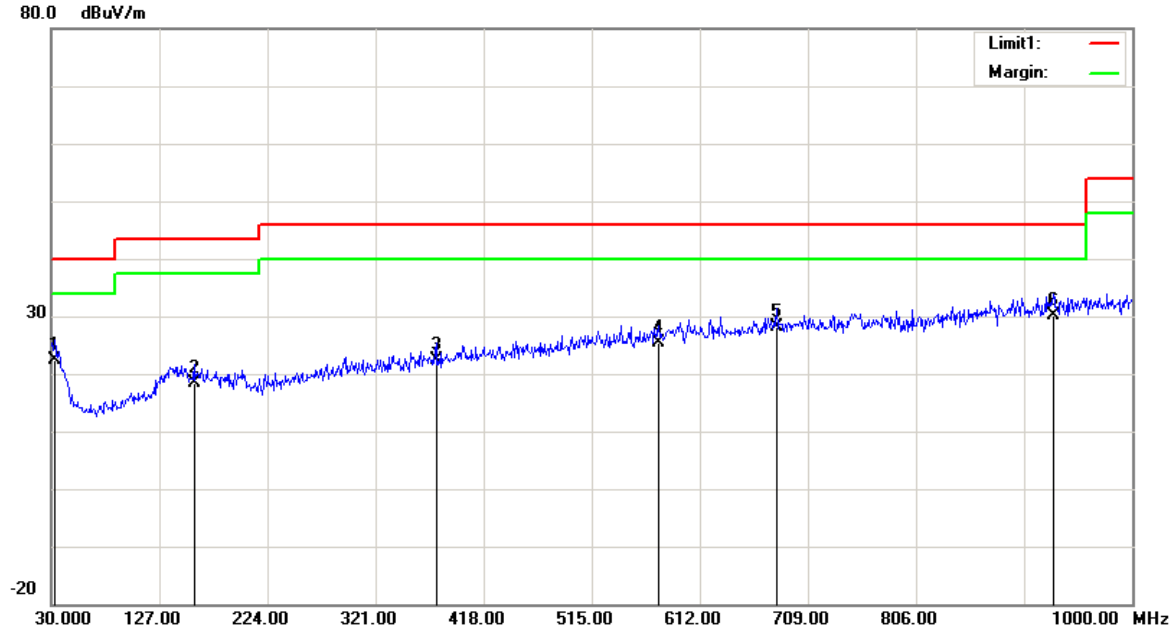
1) 30MHz-1GHz(802.11b mode High channel chain 0 was the worst):

Horizontal:



Frequency (MHz)	Receiver Reading (dBuV)	Measurement	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.9700	26.50	QP	-2.30	24.20	40.00	15.80
112.4500	25.47	QP	-10.67	14.80	43.50	28.70
148.3400	26.46	QP	-6.66	19.80	43.50	23.70
341.3700	25.90	QP	-3.60	22.30	46.00	23.70
750.7100	25.64	QP	5.56	31.20	46.00	14.80
902.0300	23.13	QP	8.07	31.20	46.00	14.80

Vertical:



Frequency (MHz)	Receiver Reading (dBuV)	Measurement	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
32.9100	25.55	QP	-3.25	22.30	40.00	17.70
158.0400	25.19	QP	-6.69	18.50	43.50	25.00
375.3200	25.13	QP	-2.73	22.40	46.00	23.60
575.1400	22.80	QP	2.50	25.30	46.00	20.70
680.8700	23.54	QP	4.66	28.20	46.00	17.80
929.1900	21.68	QP	8.52	30.20	46.00	15.80

2) 1-25GHz:

802.11b Mode

Chain 0:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Measurement	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2412.00	68.89	PK	H	24.84	5.41	0.00	99.14	N/A	N/A
2412.00	64.45	AV	H	24.84	5.41	0.00	94.70	N/A	N/A
2412.00	67.14	PK	V	24.84	5.41	0.00	97.39	N/A	N/A
2412.00	63.23	AV	V	24.84	5.41	0.00	93.48	N/A	N/A
2390.00	29.28	PK	H	24.80	5.36	0.00	59.44	74.00	14.56
2390.00	16.48	AV	H	24.80	5.36	0.00	46.64	54.00	7.36
4824.00	43.56	PK	H	29.75	7.34	27.41	53.24	74.00	20.76
4824.00	32.72	AV	H	29.75	7.34	27.41	42.40	54.00	11.60
7236.00	42.81	PK	H	33.98	9.08	27.22	58.65	74.00	15.35
7236.00	32.10	AV	H	33.98	9.08	27.22	47.94	54.00	6.06
4643.00	39.30	PK	H	29.39	7.29	27.45	48.53	74.00	25.47
4643.00	28.32	AV	H	29.39	7.29	27.45	37.55	54.00	16.45
Middle Channel: 2437 MHz									
2437.00	68.52	PK	H	24.89	5.41	0.00	98.82	N/A	N/A
2437.00	64.21	AV	H	24.89	5.41	0.00	94.51	N/A	N/A
2437.00	66.97	PK	V	24.89	5.41	0.00	97.27	N/A	N/A
2437.00	63.05	AV	V	24.89	5.41	0.00	93.35	N/A	N/A
4874.00	44.05	PK	H	29.85	7.56	27.54	53.92	74.00	20.08
4874.00	33.68	AV	H	29.85	7.56	27.54	43.55	54.00	10.45
7311.00	42.87	PK	H	34.10	9.33	27.28	59.02	74.00	14.98
7311.00	32.46	AV	H	34.10	9.33	27.28	48.61	54.00	5.39
High Channel: 2462 MHz									
2462.00	68.30	PK	H	24.93	5.41	0.00	98.64	N/A	N/A
2462.00	64.21	AV	H	24.93	5.41	0.00	94.55	N/A	N/A
2462.00	67.16	PK	V	24.93	5.41	0.00	97.50	N/A	N/A
2462.00	63.12	AV	V	24.93	5.41	0.00	93.46	N/A	N/A
2483.50	29.47	PK	H	24.97	5.41	0.00	59.85	74.00	14.15
2483.50	17.25	AV	H	24.97	5.41	0.00	47.63	54.00	6.37
4924.00	43.72	PK	H	29.95	7.65	27.51	53.81	74.00	20.19
4924.00	33.15	AV	H	29.95	7.65	27.51	43.24	54.00	10.76
7386.00	42.48	PK	H	34.22	9.08	27.18	58.60	74.00	15.40
7386.00	32.61	AV	H	34.22	9.08	27.18	48.73	54.00	5.27

Chain1:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Measurement	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2412.00	71.62	PK	H	24.84	5.41	0.00	101.87	N/A	N/A
2412.00	67.06	AV	H	24.84	5.41	0.00	97.31	N/A	N/A
2412.00	69.03	PK	V	24.84	5.41	0.00	99.28	N/A	N/A
2412.00	64.86	AV	V	24.84	5.41	0.00	95.11	N/A	N/A
2390.00	32.36	PK	H	24.80	5.36	0.00	62.52	74.00	11.48
2390.00	17.23	AV	H	24.80	5.36	0.00	47.39	54.00	6.61
4824.00	42.68	PK	H	29.75	7.34	27.41	52.36	74.00	21.64
4824.00	31.77	AV	H	29.75	7.34	27.41	41.45	54.00	12.55
7236.00	41.25	PK	H	33.98	9.08	27.22	57.09	74.00	16.91
7236.00	31.32	AV	H	33.98	9.08	27.22	47.16	54.00	6.84
Middle Channel: 2437 MHz									
2437.00	71.80	PK	H	24.89	5.41	0.00	102.10	N/A	N/A
2437.00	67.11	AV	H	24.89	5.41	0.00	97.41	N/A	N/A
2437.00	69.39	PK	V	24.89	5.41	0.00	99.69	N/A	N/A
2437.00	65.04	AV	V	24.89	5.41	0.00	95.34	N/A	N/A
4874.00	43.07	PK	H	29.85	7.56	27.54	52.94	74.00	21.06
4874.00	32.86	AV	H	29.85	7.56	27.54	42.73	54.00	11.27
7311.00	41.93	PK	H	34.10	9.33	27.28	58.08	74.00	15.92
7311.00	31.55	AV	H	34.10	9.33	27.28	47.70	54.00	6.30
High Channel: 2462 MHz									
2462.00	70.44	PK	H	24.93	5.41	0.00	100.78	N/A	N/A
2462.00	65.94	AV	H	24.93	5.41	0.00	96.28	N/A	N/A
2462.00	68.14	PK	V	24.93	5.41	0.00	98.48	N/A	N/A
2462.00	63.75	AV	V	24.93	5.41	0.00	94.09	N/A	N/A
2483.50	33.82	PK	H	24.97	5.41	0.00	64.20	74.00	9.80
2483.50	22.75	AV	H	24.97	5.41	0.00	53.13	54.00	0.87
4924.00	42.86	PK	H	29.95	7.65	27.51	52.95	74.00	21.05
4924.00	31.94	AV	H	29.95	7.65	27.51	42.03	54.00	11.97
7386.00	41.57	PK	H	34.22	9.08	27.18	57.69	74.00	16.31
7386.00	31.12	AV	H	34.22	9.08	27.18	47.24	54.00	6.76

802.11g Mode
Chain 0:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Measurement	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2412.00	71.20	PK	H	24.84	5.41	0.00	101.45	N/A	N/A
2412.00	60.23	AV	H	24.84	5.41	0.00	90.48	N/A	N/A
2412.00	70.77	PK	V	24.84	5.41	0.00	101.02	N/A	N/A
2412.00	59.46	AV	V	24.84	5.41	0.00	89.71	N/A	N/A
2390.00	42.37	PK	H	24.80	5.36	0.00	72.53	74.00	1.47
2390.00	23.44	AV	H	24.80	5.36	0.00	53.60	54.00	0.40
4824.00	42.13	PK	H	29.75	7.34	27.41	51.81	74.00	22.19
4824.00	31.25	AV	H	29.75	7.34	27.41	40.93	54.00	13.07
7236.00	40.86	PK	H	33.98	9.08	27.22	56.70	74.00	17.30
7236.00	30.94	AV	H	33.98	9.08	27.22	46.78	54.00	7.22
Middle Channel: 2437 MHz									
2437.00	70.94	PK	H	24.89	5.41	0.00	101.24	N/A	N/A
2437.00	58.86	AV	H	24.89	5.41	0.00	89.16	N/A	N/A
2437.00	69.90	PK	V	24.89	5.41	0.00	100.20	N/A	N/A
2437.00	58.64	AV	V	24.89	5.41	0.00	88.94	N/A	N/A
4874.00	42.38	PK	H	29.85	7.56	27.54	52.25	74.00	21.75
4874.00	32.14	AV	H	29.85	7.56	27.54	42.01	54.00	11.99
7311.00	41.18	PK	H	34.10	9.33	27.28	57.33	74.00	16.67
7311.00	30.87	AV	H	34.10	9.33	27.28	47.02	54.00	6.98
High Channel: 2462 MHz									
2462.00	69.18	PK	H	24.93	5.41	0.00	99.52	N/A	N/A
2462.00	58.09	AV	H	24.93	5.41	0.00	88.43	N/A	N/A
2462.00	67.75	PK	V	24.93	5.41	0.00	98.09	N/A	N/A
2462.00	56.31	AV	V	24.93	5.41	0.00	86.65	N/A	N/A
2483.50	39.71	PK	H	24.97	5.41	0.00	70.09	74.00	3.91
2483.50	21.51	AV	H	24.97	5.41	0.00	51.89	54.00	2.11
4924.00	42.26	PK	H	29.95	7.65	27.51	52.35	74.00	21.65
4924.00	31.58	AV	H	29.95	7.65	27.51	41.67	54.00	12.33
7386.00	41.67	PK	H	34.22	9.08	27.18	57.79	74.00	16.21
7386.00	31.02	AV	H	34.22	9.08	27.18	47.14	54.00	6.86

Chain1:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Measurement	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2412.00	70.45	PK	H	24.84	5.41	0.00	100.70	N/A	N/A
2412.00	57.62	AV	H	24.84	5.41	0.00	87.87	N/A	N/A
2412.00	69.47	PK	V	24.84	5.41	0.00	99.72	N/A	N/A
2412.00	56.43	AV	V	24.84	5.41	0.00	86.68	N/A	N/A
2390.00	43.01	PK	H	24.80	5.36	0.00	73.17	74.00	0.83
2390.00	22.61	AV	H	24.80	5.36	0.00	52.77	54.00	1.23
4824.00	42.48	PK	H	29.75	7.34	27.41	52.16	74.00	21.84
4824.00	31.69	AV	H	29.75	7.34	27.41	41.37	54.00	12.63
7236.00	40.87	PK	H	33.98	9.08	27.22	56.71	74.00	17.29
7236.00	30.45	AV	H	33.98	9.08	27.22	46.29	54.00	7.71
Middle Channel: 2437 MHz									
2437.00	71.37	PK	H	24.89	5.41	0.00	101.67	N/A	N/A
2437.00	59.61	AV	H	24.89	5.41	0.00	89.91	N/A	N/A
2437.00	69.51	PK	V	24.89	5.41	0.00	99.81	N/A	N/A
2437.00	57.71	AV	V	24.89	5.41	0.00	88.01	N/A	N/A
4874.00	42.35	PK	H	29.85	7.56	27.54	52.22	74.00	21.78
4874.00	32.01	AV	H	29.85	7.56	27.54	41.88	54.00	12.12
7311.00	41.34	PK	H	34.10	9.33	27.28	57.49	74.00	16.51
7311.00	31.28	AV	H	34.10	9.33	27.28	47.43	54.00	6.57
High Channel: 2462 MHz									
2462.00	68.14	PK	H	24.93	5.41	0.00	98.48	N/A	N/A
2462.00	56.36	AV	H	24.93	5.41	0.00	86.70	N/A	N/A
2462.00	65.94	PK	V	24.93	5.41	0.00	96.28	N/A	N/A
2462.00	54.15	AV	V	24.93	5.41	0.00	84.49	N/A	N/A
2483.50	43.32	PK	H	24.97	5.41	0.00	73.70	74.00	0.30
2483.50	23.25	AV	H	24.97	5.41	0.00	53.63	54.00	0.37
4924.00	42.05	PK	H	29.95	7.65	27.51	52.14	74.00	21.86
4924.00	31.65	AV	H	29.95	7.65	27.51	41.74	54.00	12.26
7386.00	41.06	PK	H	34.22	9.08	27.18	57.18	74.00	16.82
7386.00	30.83	AV	H	34.22	9.08	27.18	46.95	54.00	7.05
Additional Channel: 2457 MHz									
2457.00	70.25	PK	H	24.92	5.41	0.00	100.58	N/A	N/A
2457.00	59.24	AV	H	24.92	5.41	0.00	89.57	N/A	N/A
2483.50	36.25	PK	H	24.97	5.41	0.00	66.63	74.00	7.37
2483.50	17.85	AV	H	24.97	5.41	0.00	48.23	54.00	5.77

802.11n ht20 Mode:

Chain 0:

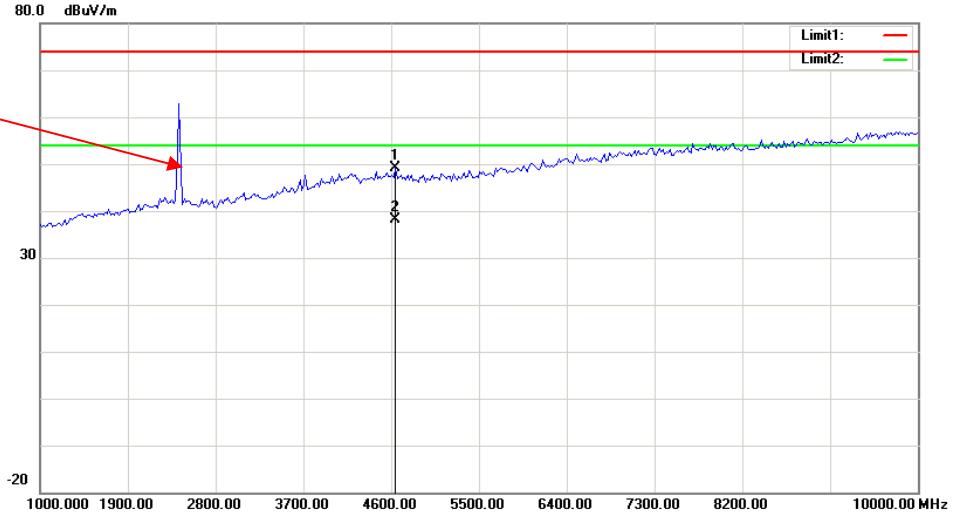
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Measurement	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2412.00	68.03	PK	H	24.84	5.41	0.00	98.28	N/A	N/A
2412.00	57.23	AV	H	24.84	5.41	0.00	87.48	N/A	N/A
2412.00	67.51	PK	V	24.84	5.41	0.00	97.76	N/A	N/A
2412.00	56.82	AV	V	24.84	5.41	0.00	87.07	N/A	N/A
2390.00	42.85	PK	H	24.80	5.36	0.00	73.01	74.00	0.99
2390.00	23.49	AV	H	24.80	5.36	0.00	53.65	54.00	0.35
4824.00	42.67	PK	H	29.75	7.34	27.41	52.35	74.00	21.65
4824.00	32.14	AV	H	29.75	7.34	27.41	41.82	54.00	12.18
7236.00	41.43	PK	H	33.98	9.08	27.22	57.27	74.00	16.73
7236.00	31.26	AV	H	33.98	9.08	27.22	47.10	54.00	6.90
Middle Channel: 2437 MHz									
2437.00	69.80	PK	H	24.89	5.41	0.00	100.10	N/A	N/A
2437.00	59.86	AV	H	24.89	5.41	0.00	90.16	N/A	N/A
2437.00	68.73	PK	V	24.89	5.41	0.00	99.03	N/A	N/A
2437.00	58.65	AV	V	24.89	5.41	0.00	88.95	N/A	N/A
4874.00	42.37	PK	H	29.85	7.56	27.54	52.24	74.00	21.76
4874.00	31.87	AV	H	29.85	7.56	27.54	41.74	54.00	12.26
7311.00	41.53	PK	H	34.10	9.33	27.28	57.68	74.00	16.32
7311.00	31.25	AV	H	34.10	9.33	27.28	47.40	54.00	6.60
High Channel: 2462 MHz									
2462.00	68.59	PK	H	24.93	5.41	0.00	98.93	N/A	N/A
2462.00	58.61	AV	H	24.93	5.41	0.00	88.95	N/A	N/A
2462.00	67.88	PK	V	24.93	5.41	0.00	98.22	N/A	N/A
2462.00	57.84	AV	V	24.93	5.41	0.00	88.18	N/A	N/A
2483.50	43.41	PK	H	24.97	5.41	0.00	73.79	74.00	0.21
2483.50	23.36	AV	H	24.97	5.41	0.00	53.74	54.00	0.26
4924.00	42.53	PK	H	29.95	7.65	27.51	52.62	74.00	21.38
4924.00	31.88	AV	H	29.95	7.65	27.51	41.97	54.00	12.03
7386.00	41.65	PK	H	34.22	9.08	27.18	57.77	74.00	16.23
7386.00	31.02	AV	H	34.22	9.08	27.18	47.14	54.00	6.86

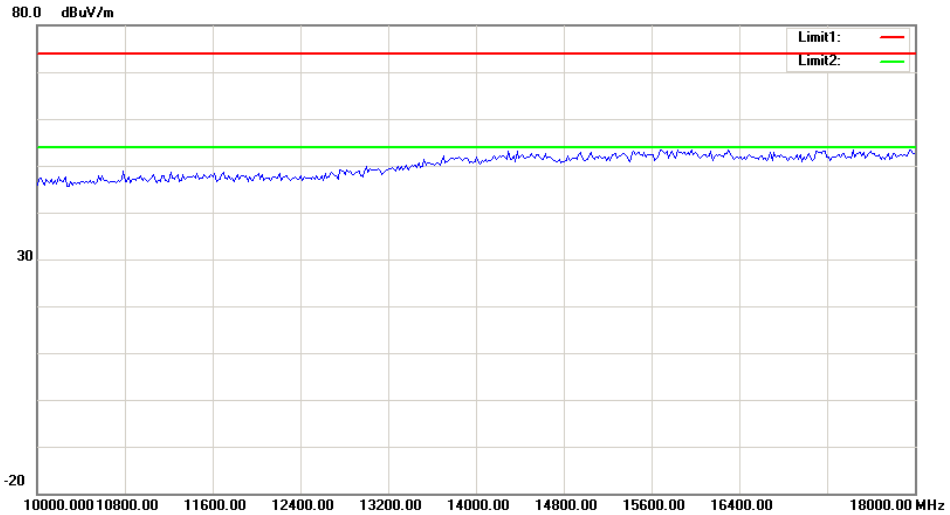
Chain 1:

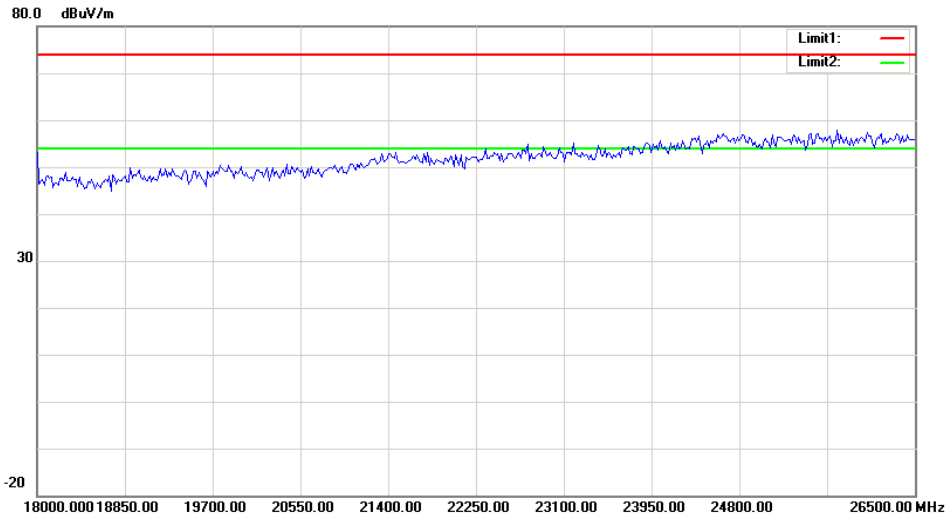
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Measurement	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2412.00	71.12	PK	H	24.84	5.41	0.00	101.37	N/A	N/A
2412.00	60.36	AV	H	24.84	5.41	0.00	90.61	N/A	N/A
2412.00	69.21	PK	V	24.84	5.41	0.00	99.46	N/A	N/A
2412.00	59.05	AV	V	24.84	5.41	0.00	89.30	N/A	N/A
2390.00	42.89	PK	H	24.80	5.36	0.00	73.05	74.00	0.95
2390.00	23.49	AV	H	24.80	5.36	0.00	53.65	54.00	0.35
4824.00	42.86	PK	H	29.75	7.34	27.41	52.54	74.00	21.46
4824.00	32.31	AV	H	29.75	7.34	27.41	41.99	54.00	12.01
7236.00	41.53	PK	H	33.98	9.08	27.22	57.37	74.00	16.63
7236.00	31.18	AV	H	33.98	9.08	27.22	47.02	54.00	6.98
Middle Channel: 2437 MHz									
2437.00	72.46	PK	H	24.89	5.41	0.00	102.76	N/A	N/A
2437.00	62.26	AV	H	24.89	5.41	0.00	92.56	N/A	N/A
2437.00	69.17	PK	V	24.89	5.41	0.00	99.47	N/A	N/A
2437.00	58.97	AV	V	24.89	5.41	0.00	89.27	N/A	N/A
4874.00	42.73	PK	H	29.85	7.56	27.54	52.60	74.00	21.40
4874.00	31.94	AV	H	29.85	7.56	27.54	41.81	54.00	12.19
7311.00	41.05	PK	H	34.10	9.33	27.28	57.20	74.00	16.80
7311.00	30.67	AV	H	34.10	9.33	27.28	46.82	54.00	7.18
High Channel: 2462 MHz									
2462.00	66.80	PK	H	24.93	5.41	0.00	97.14	N/A	N/A
2462.00	56.20	AV	H	24.93	5.41	0.00	86.54	N/A	N/A
2462.00	64.13	PK	V	24.93	5.41	0.00	94.47	N/A	N/A
2462.00	54.05	AV	V	24.93	5.41	0.00	84.39	N/A	N/A
2483.50	43.24	PK	H	24.97	5.41	0.00	73.62	74.00	0.38
2483.50	23.35	AV	H	24.97	5.41	0.00	53.73	54.00	0.27
4924.00	43.13	PK	H	29.95	7.65	27.51	53.22	74.00	20.78
4924.00	32.87	AV	H	29.95	7.65	27.51	42.96	54.00	11.04
7386.00	42.05	PK	H	34.22	9.08	27.18	58.17	74.00	15.83
7386.00	31.46	AV	H	34.22	9.08	27.18	47.58	54.00	6.42
Additional Channel: 2457 MHz									
2457.00	72.01	PK	H	24.92	5.41	0.00	102.34	N/A	N/A
2457.00	62.08	AV	H	24.92	5.41	0.00	92.41	N/A	N/A
2483.50	35.84	PK	H	24.97	5.41	0.00	66.22	74.00	7.78
2483.50	17.48	AV	H	24.97	5.41	0.00	47.86	54.00	6.14

Test plots(802.11b mode High channel chain 0 was the worst)
Horizontal:

Fundamental Test with Band Rejection Filter

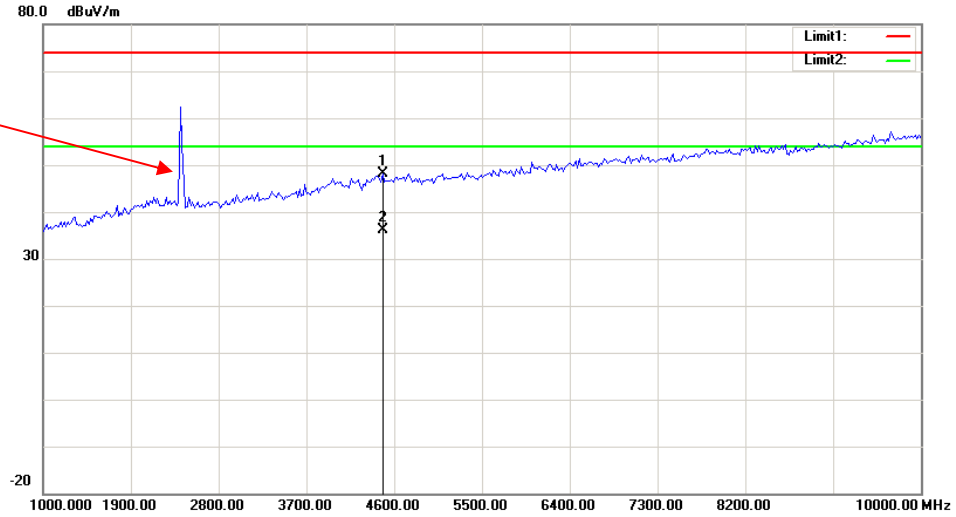


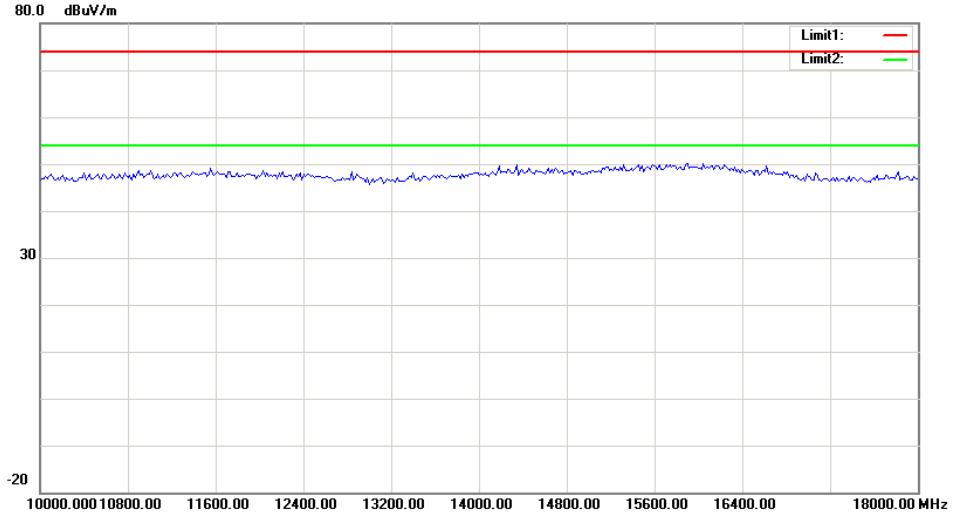


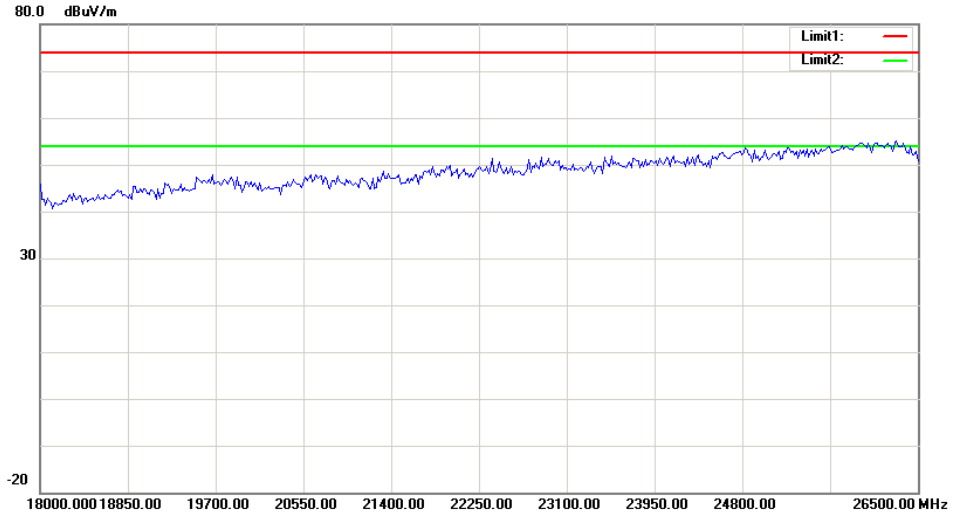


Vertical:

Fundamental Test with Band Rejection Filter







FCC §15.247(a) (2)& RSS-247 §5.2 a) &RSS-247 §5.2 a) &RSS-GEN§6.6 –6 dB EMISSION BANDWIDTH AND 99% OCCUPIED 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 kH

According to RSS-247 §5.2 a)

The minimum 6 dB bandwidth shall be 500 kHz.

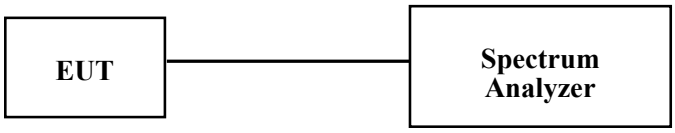
According to RSS-Gen §6.6

The emission bandwidth (x dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated x dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth.

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

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.
h) Measure the 99% bandwidth use OBW test function.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESPI	100120	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:	24.1 °C
Relative Humidity:	42 %
ATM Pressure:	100.9 kPa

The testing was performed by Swin Lv on 2018-01-01.

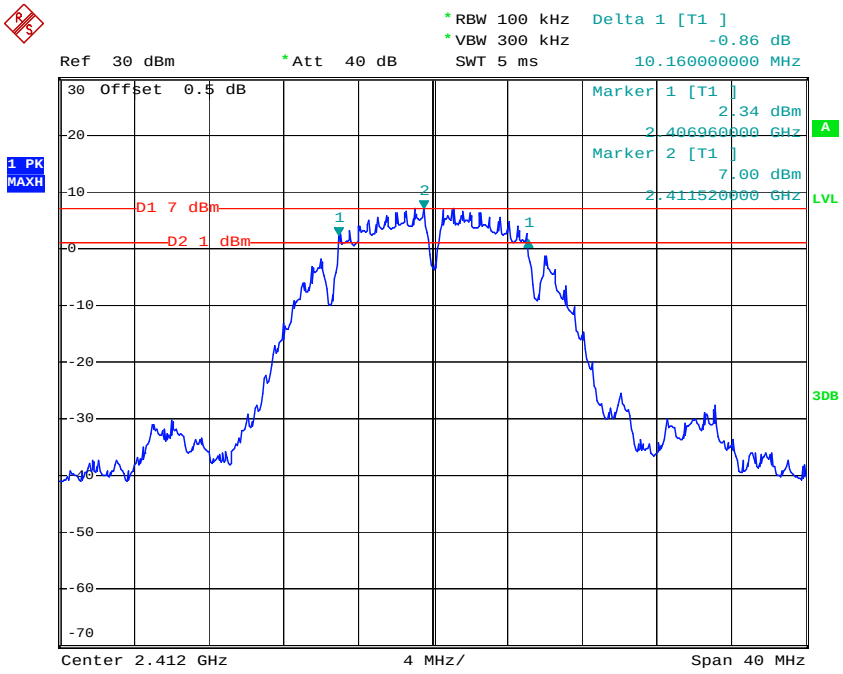
Test Mode: Transmitting

Test Result: Compliant. Test only performed at chain 0, please refer to the following table and plots.

Test mode	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	10.16	13.68	≥0.5
	Middle	2437	10.08	13.84	≥0.5
	High	2462	10.16	13.84	≥0.5
802.11g	Low	2412	16.48	17.52	≥0.5
	Middle	2437	16.40	17.84	≥0.5
	High	2462	16.40	18.08	≥0.5
802.11n ht20	Low	2412	17.68	18.24	≥0.5
	Middle	2437	17.68	18.64	≥0.5
	High	2462	17.68	18.80	≥0.5

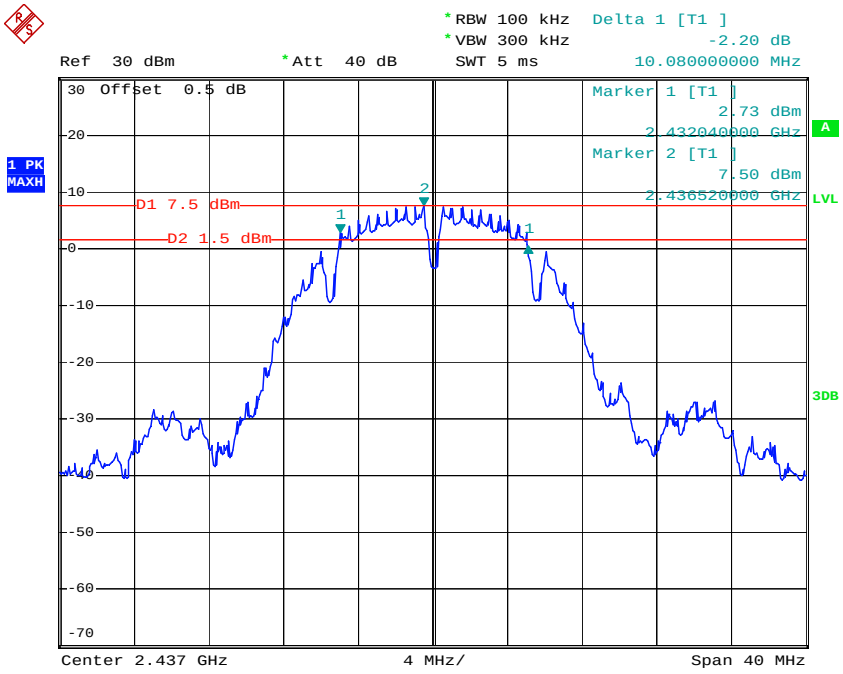
6dB bandwidth:

802.11b Low Channel



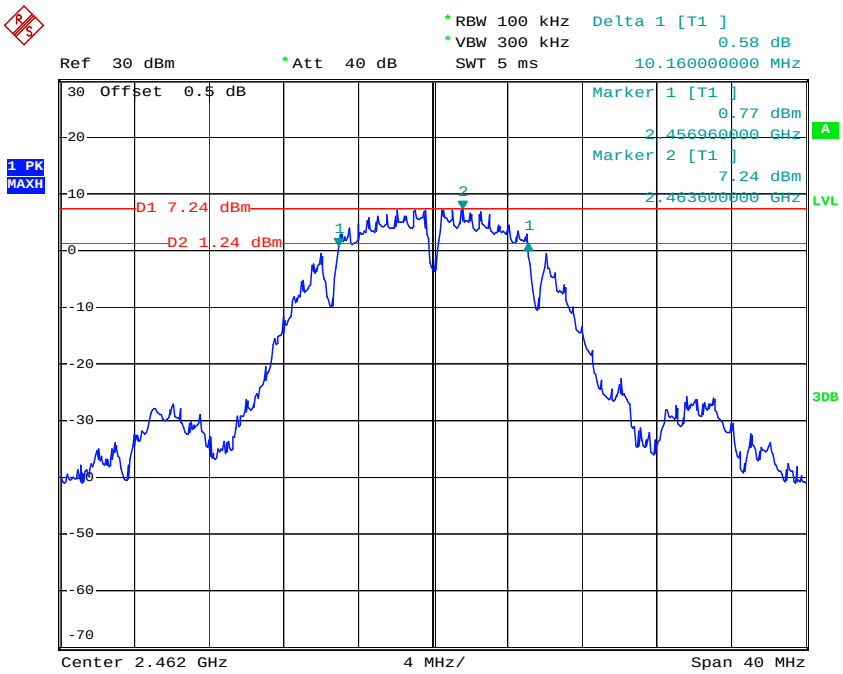
Date: 1.JAN.2018 11:24:46

802.11b Middle Channel



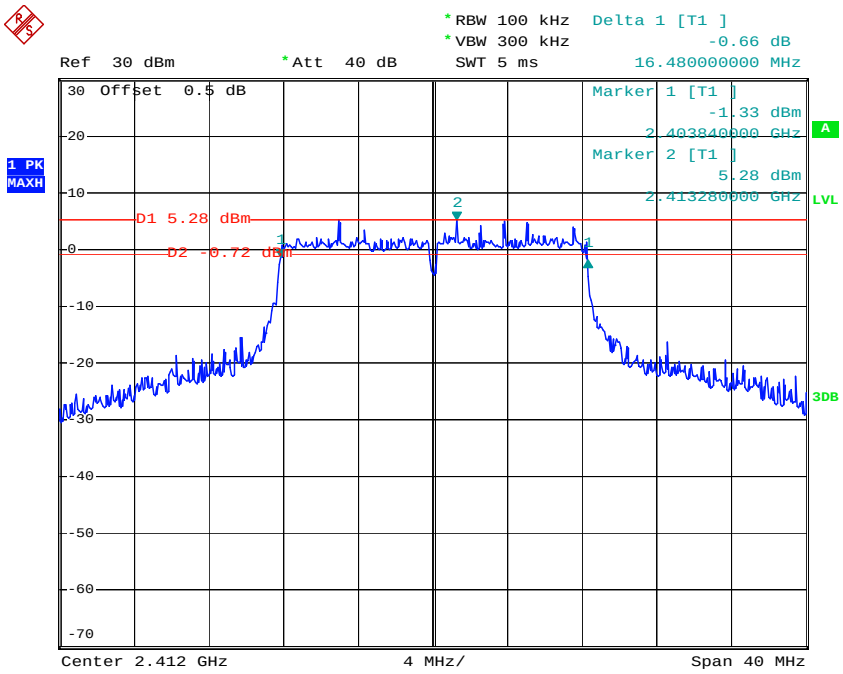
Date: 1.JAN.2018 11:15:30

802.11b High Channel



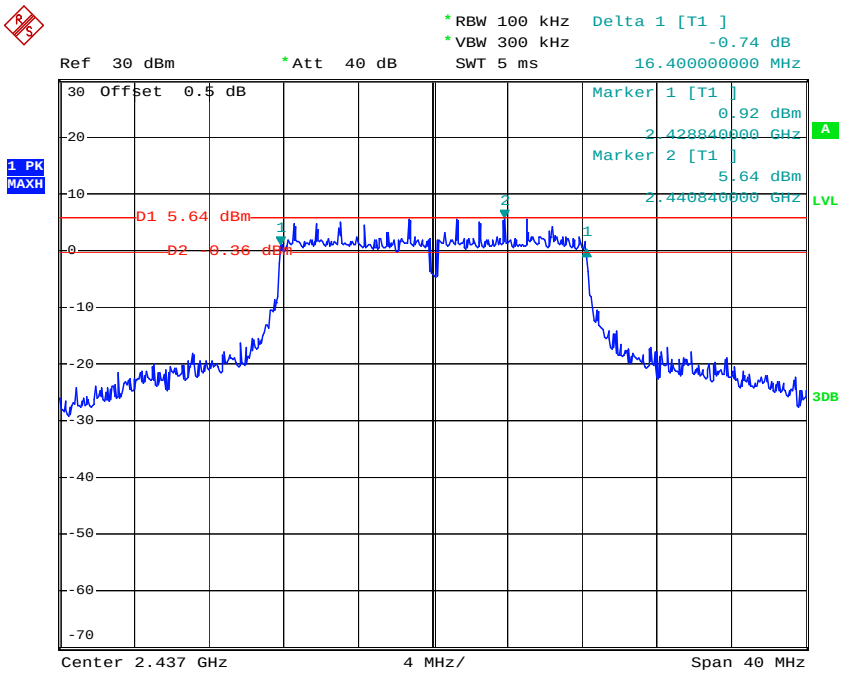
Date: 1.JAN.2018 11:16:51

802.11g Low Channel



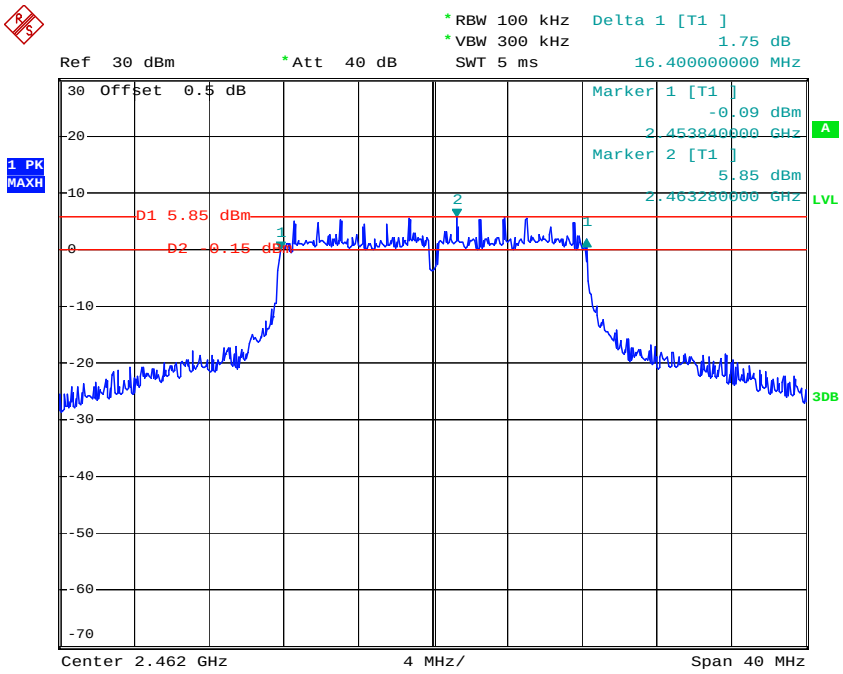
Date: 1.JAN.2018 11:23:08

802.11g Middle Channel



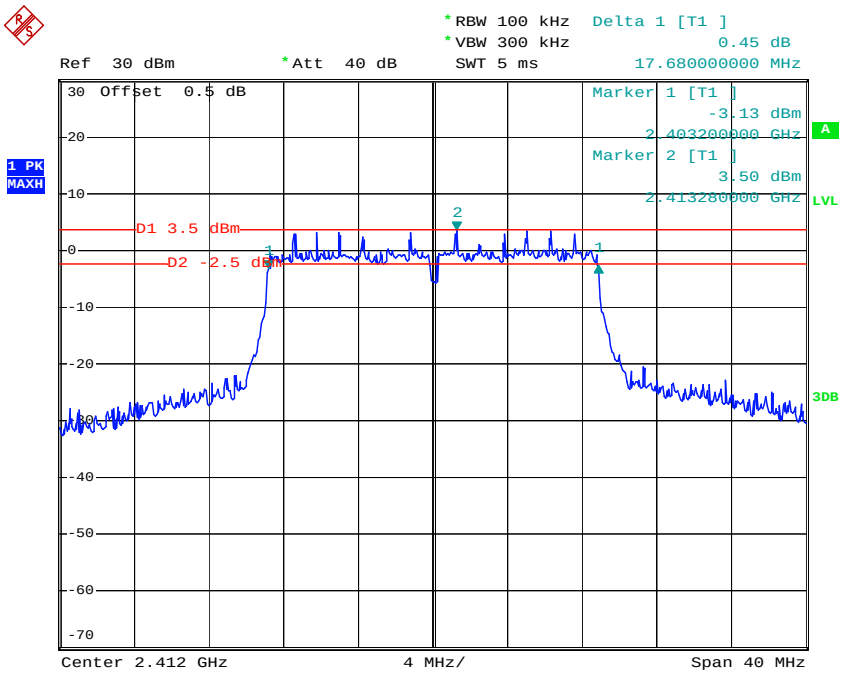
Date: 1.JAN.2018 11:20:49

802.11g High Channel



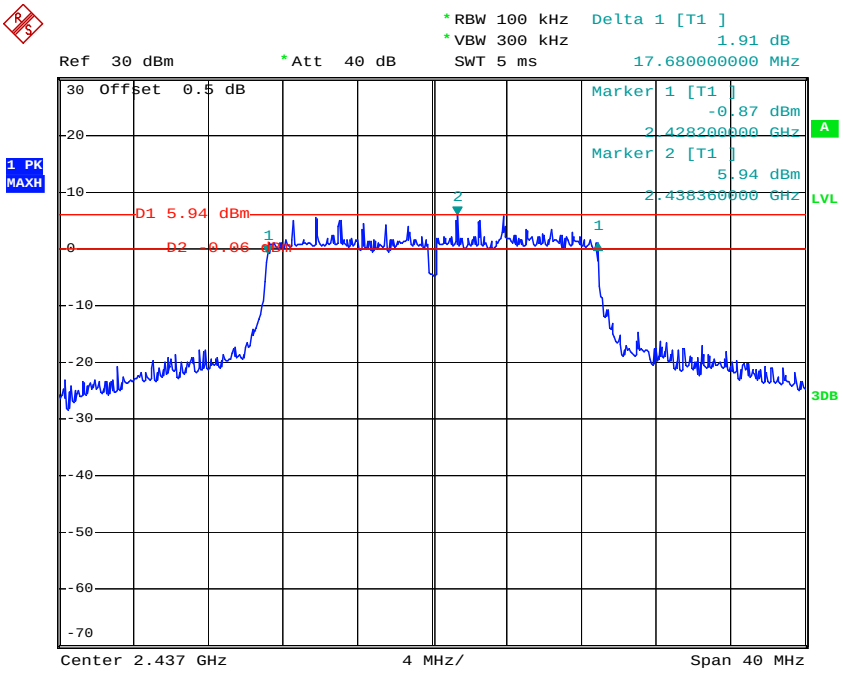
Date: 1.JAN.2018 11:18:47

802.11n ht20 Low Channel



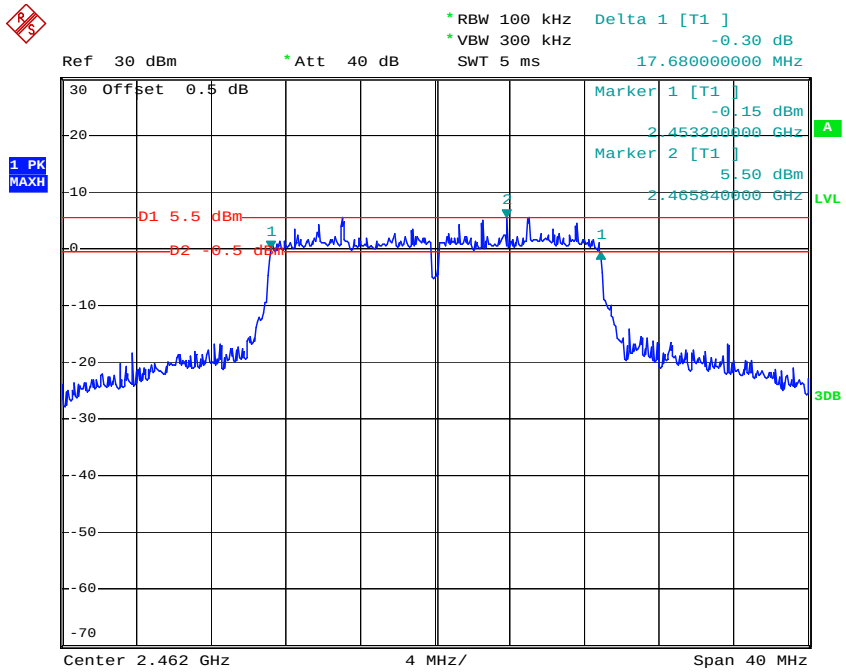
Date: 1.JAN.2018 11:31:38

802.11n ht20 Middle Channel



Date: 1.JAN.2018 11:33:55

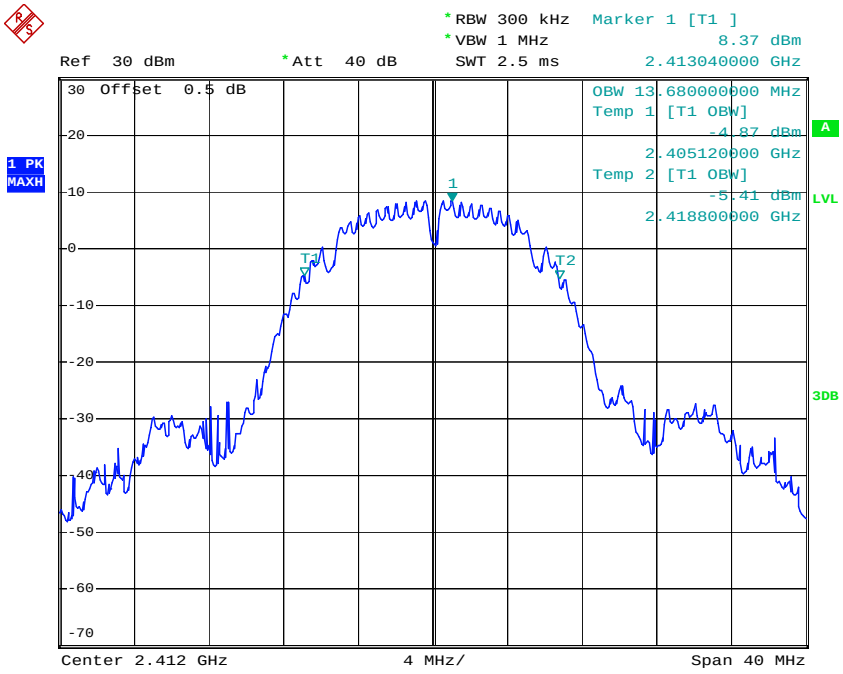
802.11n ht20 High Channel



Date: 1.JAN.2018 11:35:41

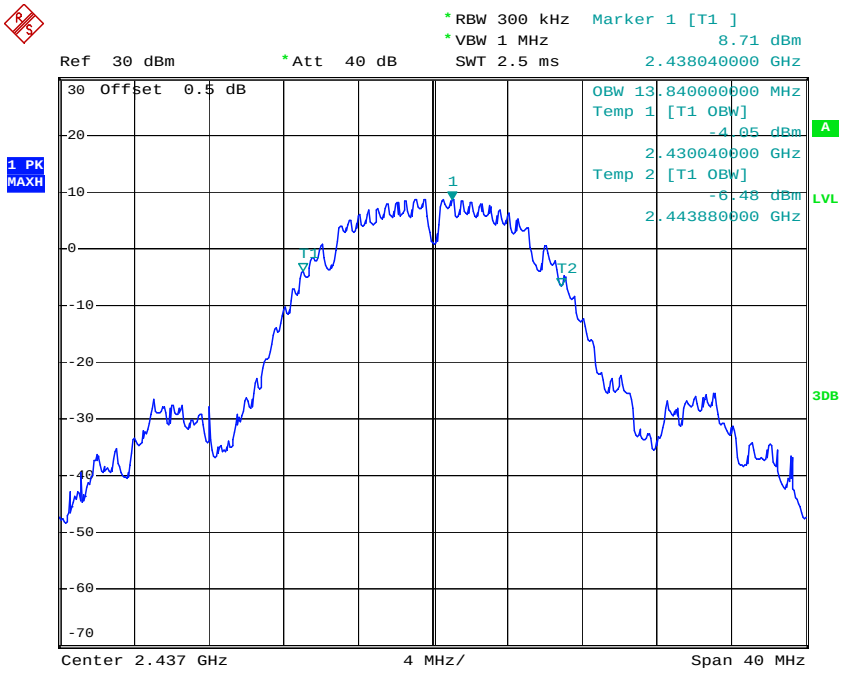
99% Occupied bandwidth:

802.11b Low Channel



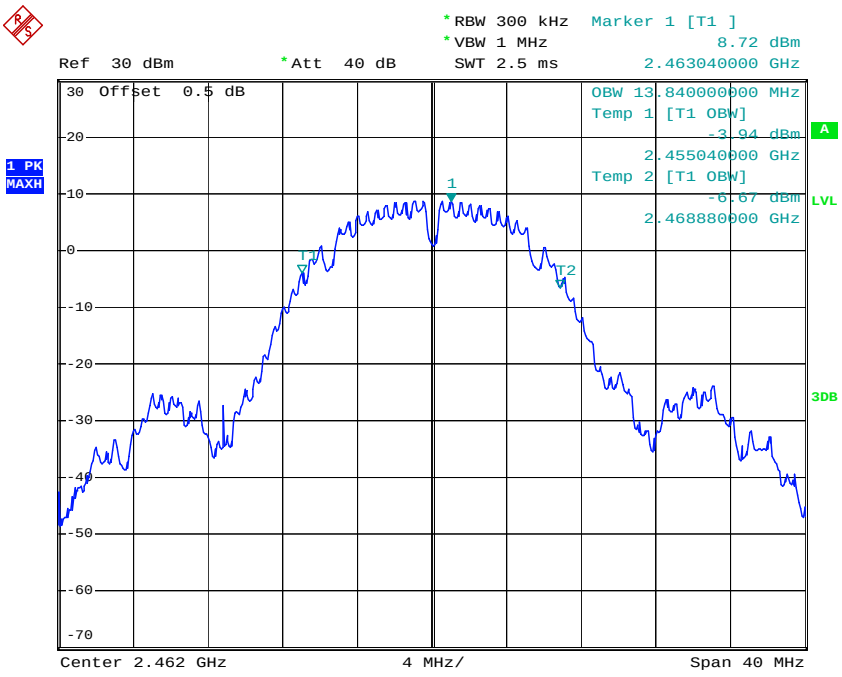
Date: 1.JAN.2018 11:25:00

802.11b Middle Channel



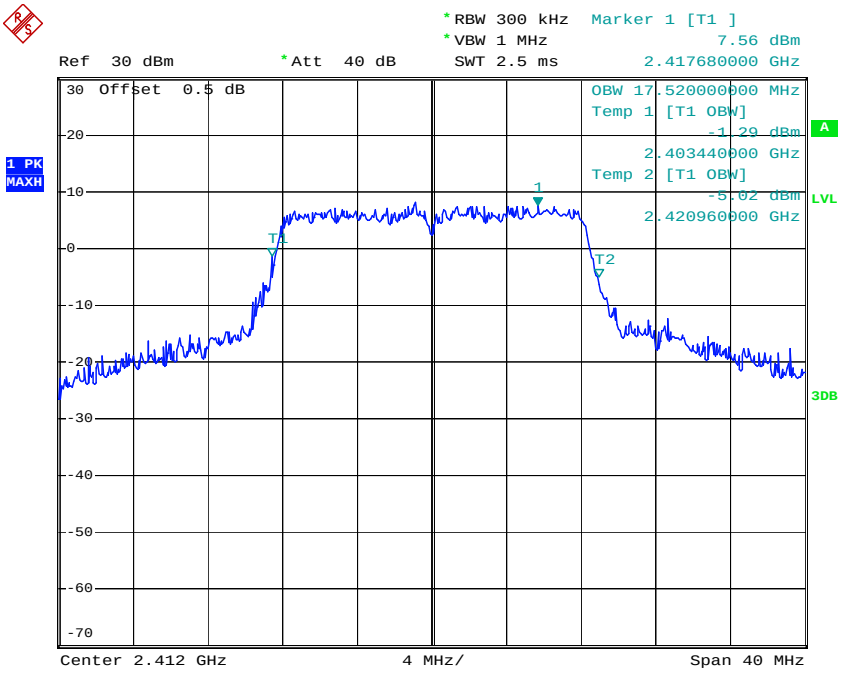
Date: 1.JAN.2018 11:15:42

802.11b High Channel



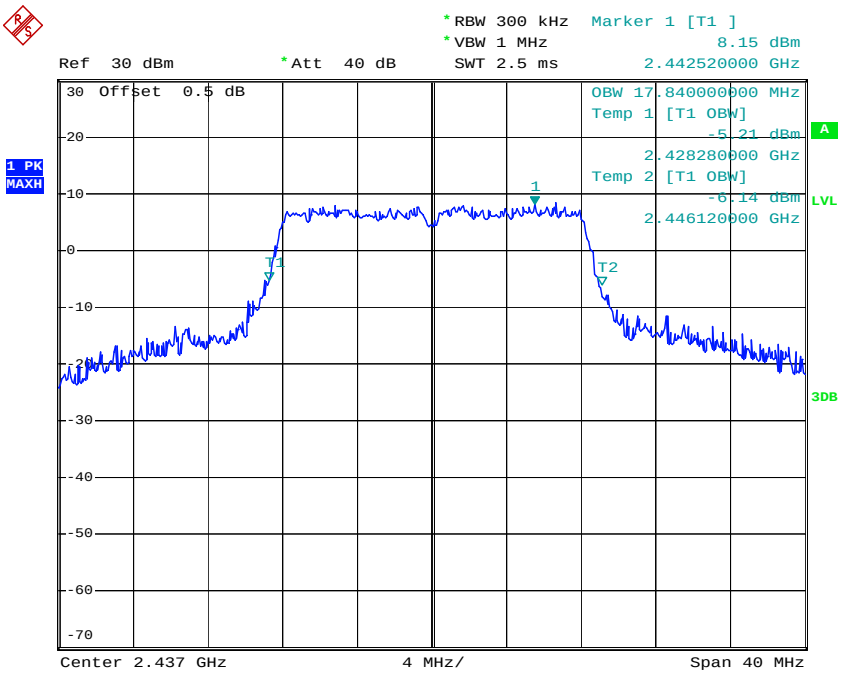
Date: 1.JAN.2018 11:17:04

802.11g Low Channel



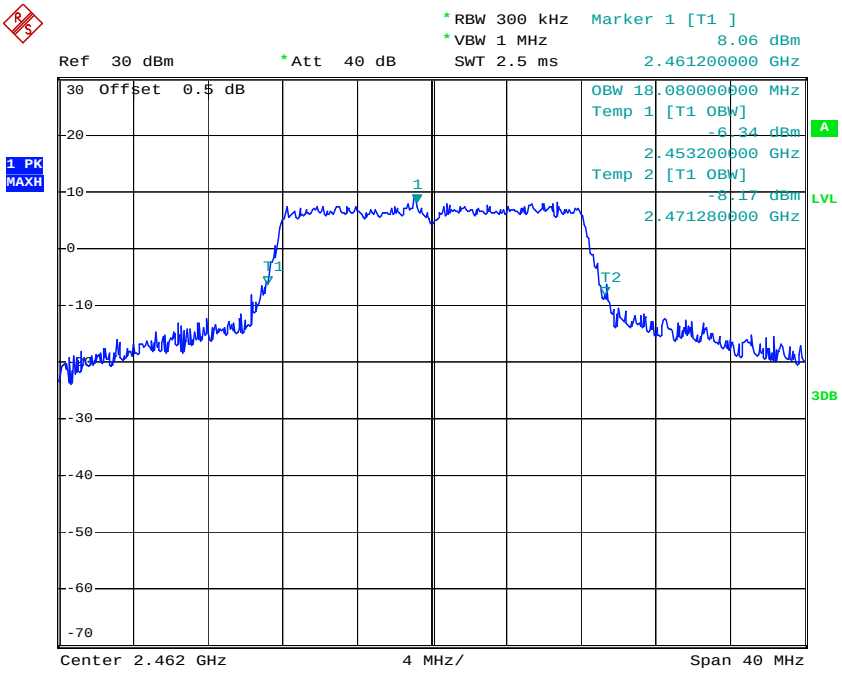
Date: 1.JAN.2018 11:23:21

802.11g Middle Channel



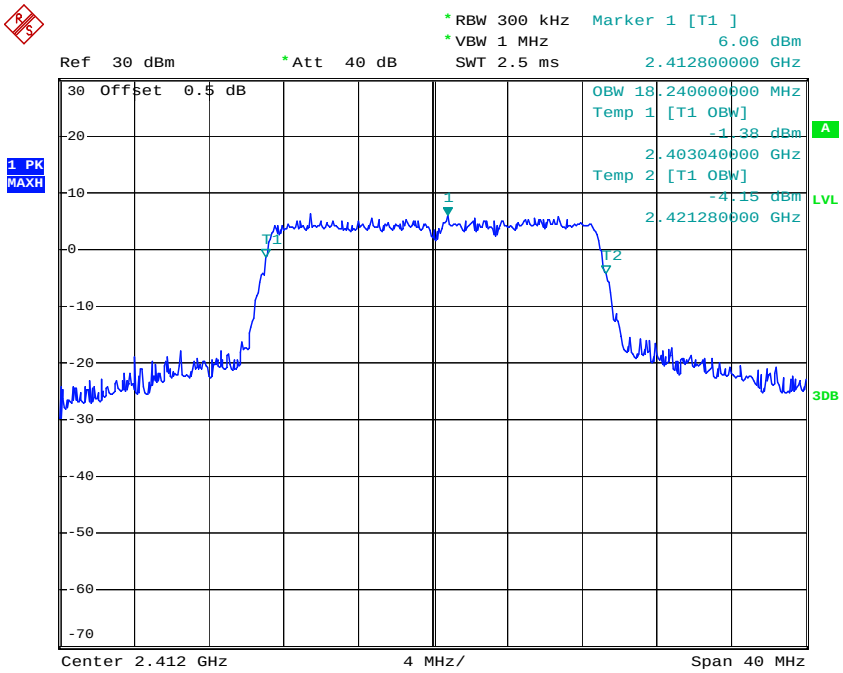
Date: 1.JAN.2018 11:21:03

802.11g High Channel



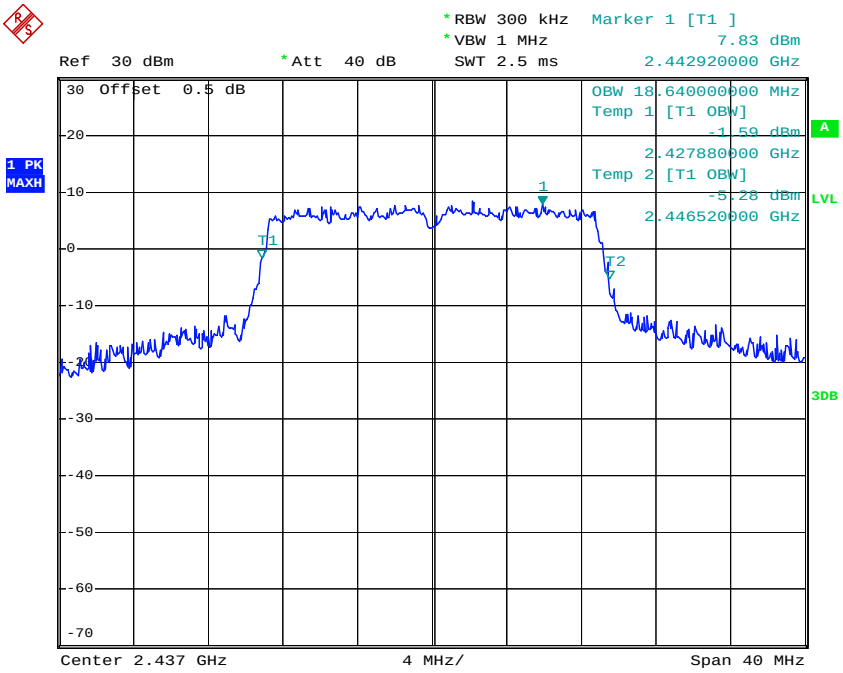
Date: 1.JAN.2018 11:19:02

802.11n ht20 Low Channel



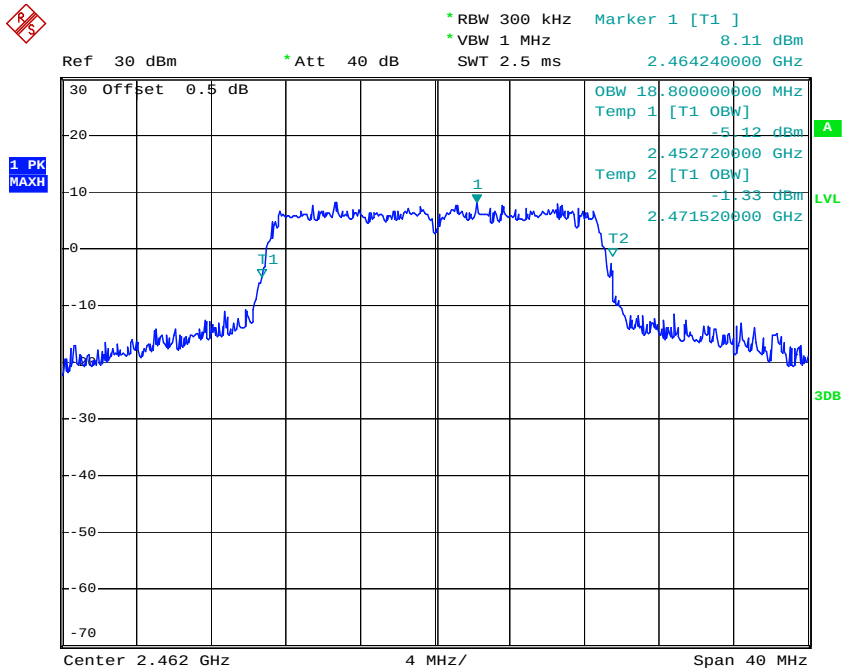
Date: 1.JAN.2018 11:31:53

802.11n ht20 Middle Channel



Date: 1.JAN.2018 11:34:08

802.11n ht20 High Channel



FCC §15.247(b) (3)&RSS-247 §5.4 d) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

According to RSS-247§5.4 d) For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(e), the e.i.r.p. shall not exceed 4 W.
As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signalling 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 transmitting at a reduced power level. If multiple modes of operation are implemented, 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.

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:	24.1 °C
Relative Humidity:	42 %
ATM Pressure:	100.9 kPa

The testing was performed by Swin Lv on 2018-01-01.

Test Mode: Transmitting

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

Test mode	Channel	Frequency (MHz)	Max Peak Conducted Output Power (dBm)		Max Conducted Average Output Power (dBm)		Limit (dBm)
			Chain 0	Chain 1	Chain 0	Chain 1	
802.11b	Low	2412	19.29	19.39	16.71	16.61	30
	Middle	2437	19.36	19.48	16.81	16.92	30
	High	2462	19.72	18.31	17.24	15.69	30
802.11g	Low	2412	23.64	22.59	16.23	15.56	30
	Middle	2437	23.63	23.59	16.82	16.53	30
	High	2462	23.6	18.88	16.83	10.63	30
802.11n ht20	Low	2412	21.94	23.57	15.17	16.56	30
	Middle	2437	23.59	23.65	16.47	16.57	30
	High	2462	23.63	17.17	16.91	9.68	30

Test mode	Channel	Frequency (MHz)	Additional Conducted Power test at Chain 1 (dBm)		Limit (dBm)
			Peak	Average	
802.11g	additional	2457	23.59	16.67	30
802.11n ht20	additional	2457	23.65	16.84	30

FCC§15.247(d)&RSS-247 §5.5 – 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)).

According to RSS-247 §5.5:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

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	EMI Test Receiver	ESPI	100120	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:	24.1 °C
Relative Humidity:	42 %
ATM Pressure:	100.9 kPa

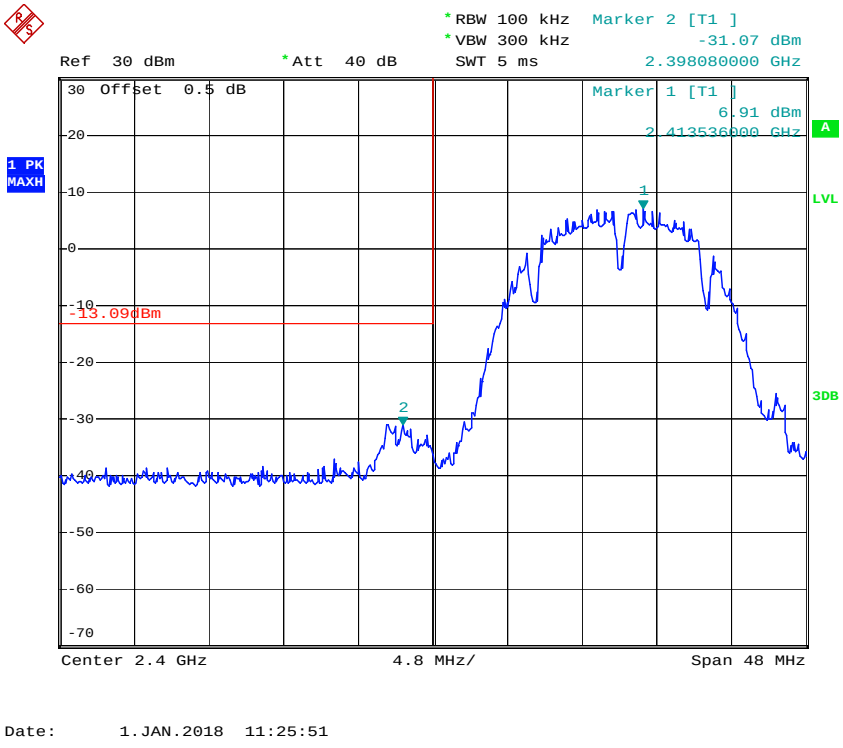
The testing was performed by Swin Lv on 2018-01-01.

Test mode: Transmitting

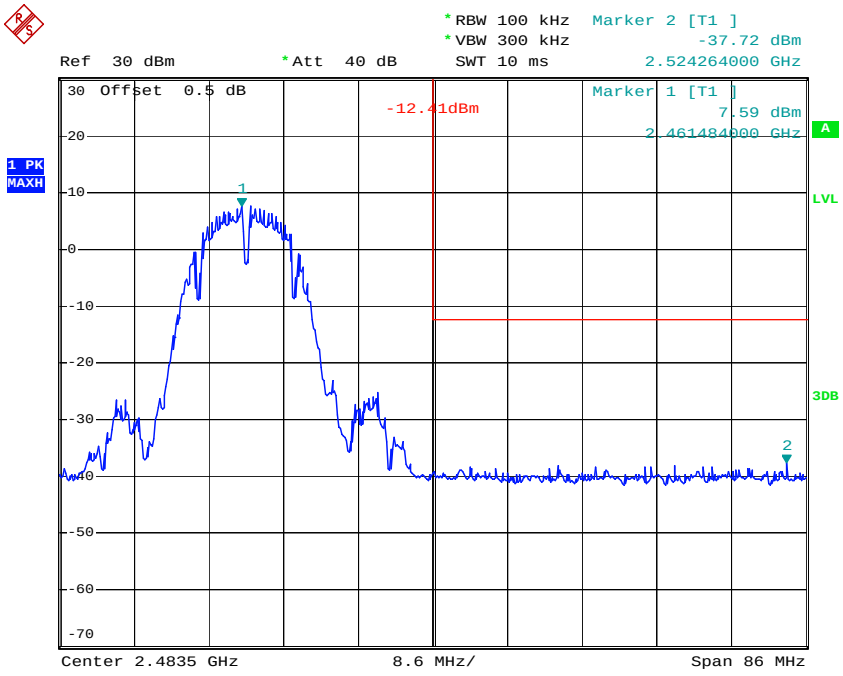
Test Result: Compliant. Please refer to following plots.

Chain0:

802.11b: Band Edge, Left Side

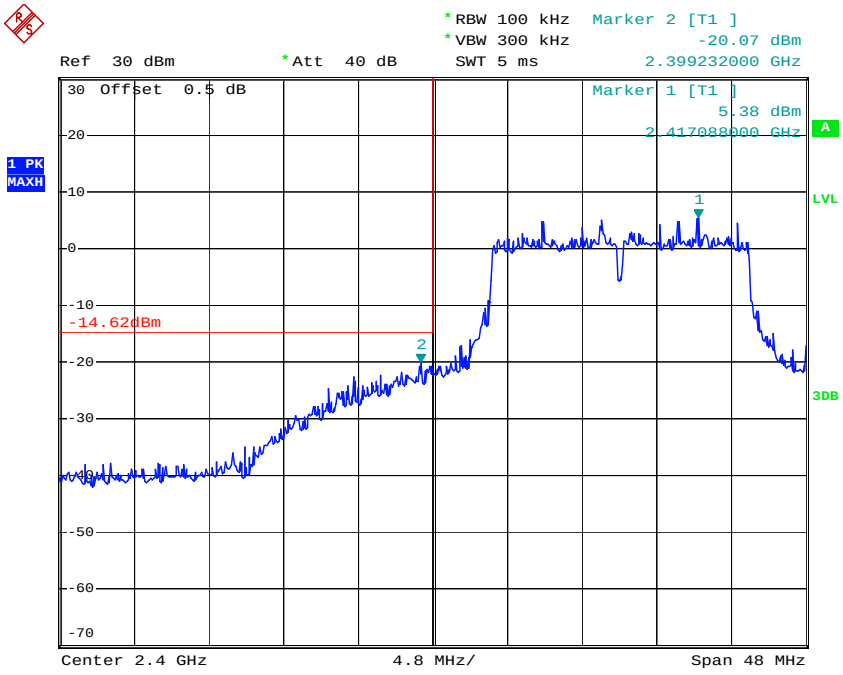


802.11b: Band Edge, Right Side



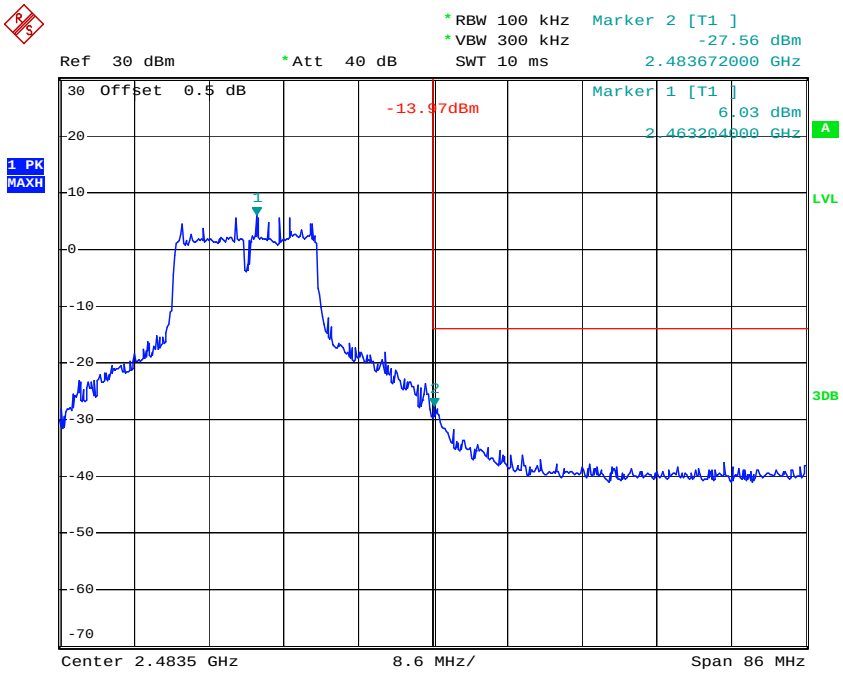
Date: 1.JAN.2018 11:17:53

802.11g: Band Edge, Left Side



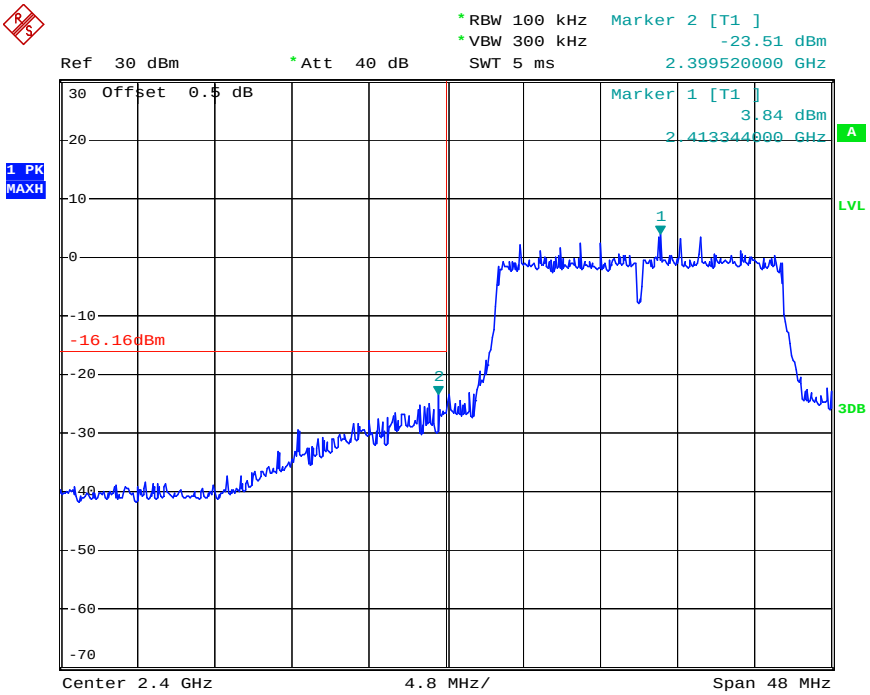
Date: 1.JAN.2018 11:24:17

802.11g: Band Edge, Right Side



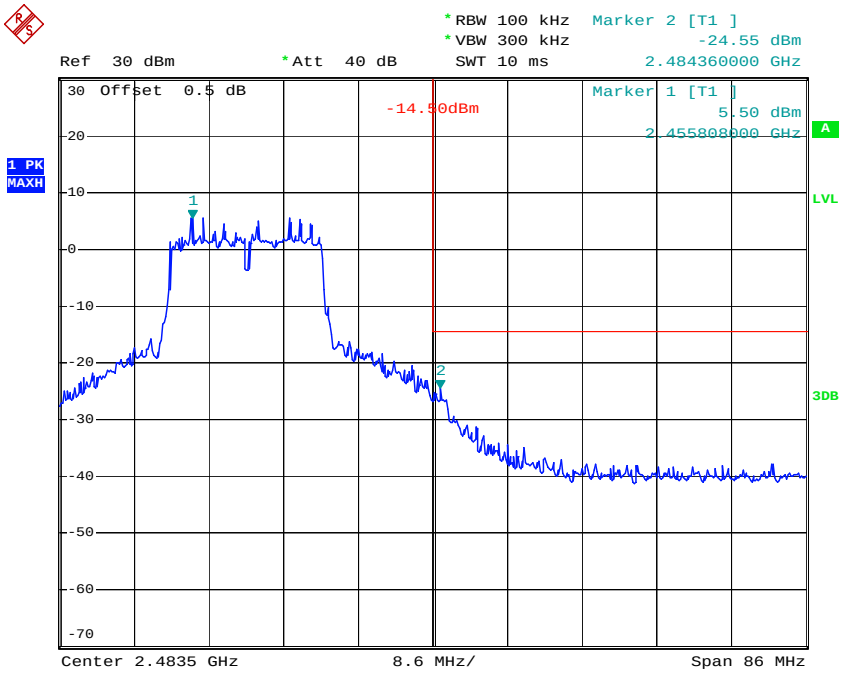
Date: 1.JAN.2018 11:20:02

802.11n ht20 Band Edge, Left Side



Date: 1.JAN.2018 11:32:51

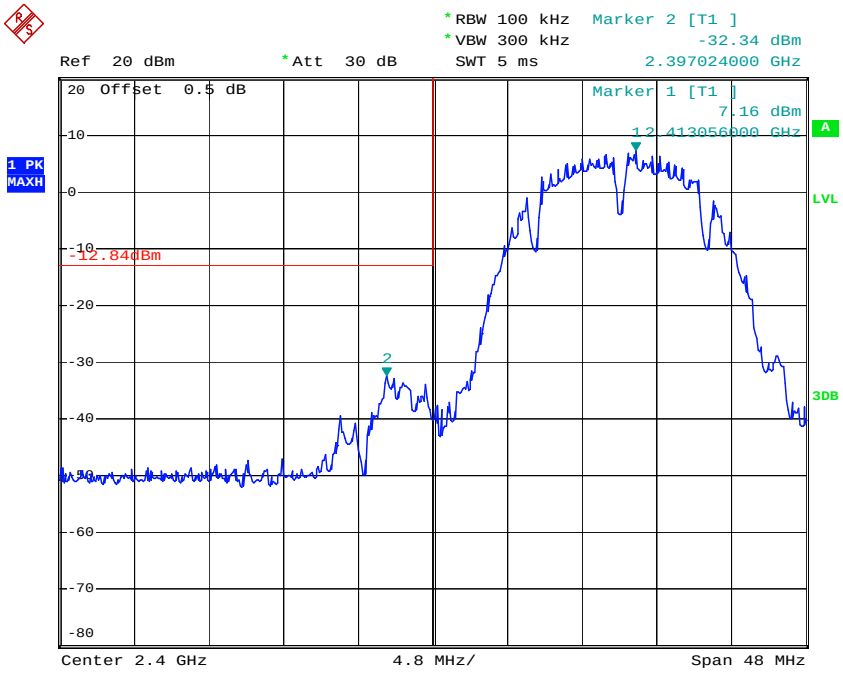
802.11n ht20 Band Edge, Right Side



Date: 1.JAN.2018 11:36:53

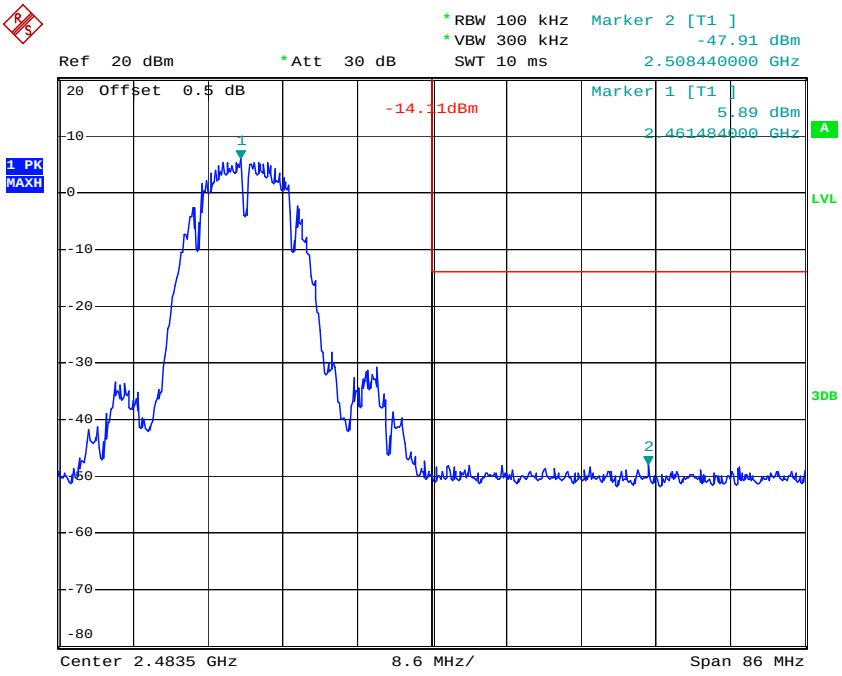
Chain1:

802.11b: Band Edge, Left Side



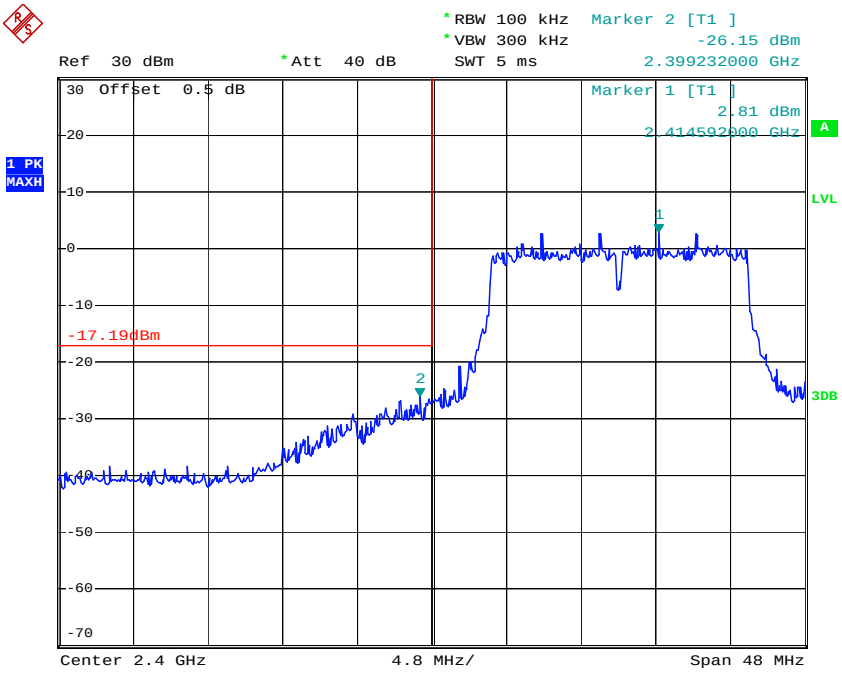
Date: 1.JAN.2018 10:38:08

802.11b: Band Edge, Right Side



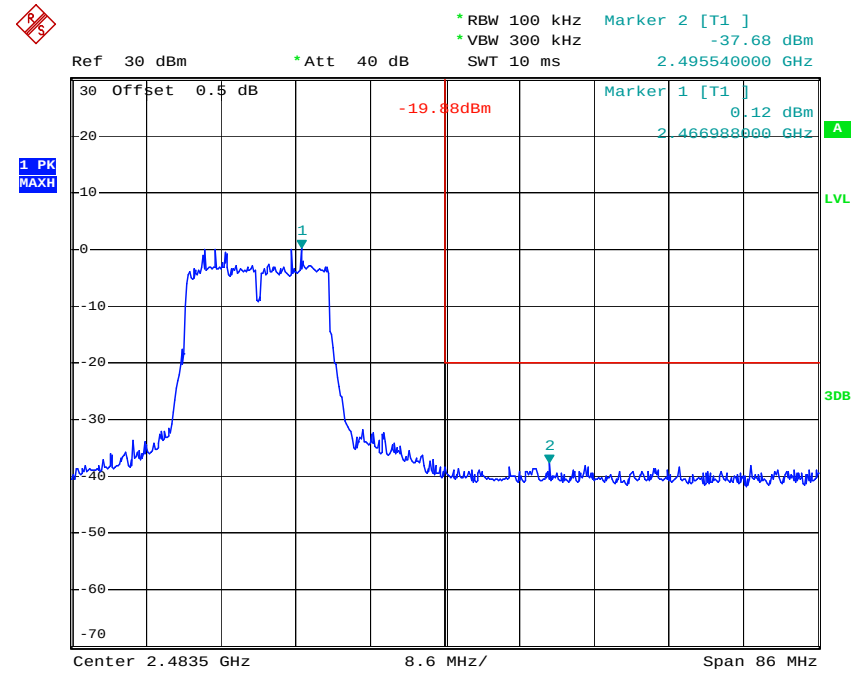
Date: 1.JAN.2018 10:41:32

802.11g: Band Edge, Left Side



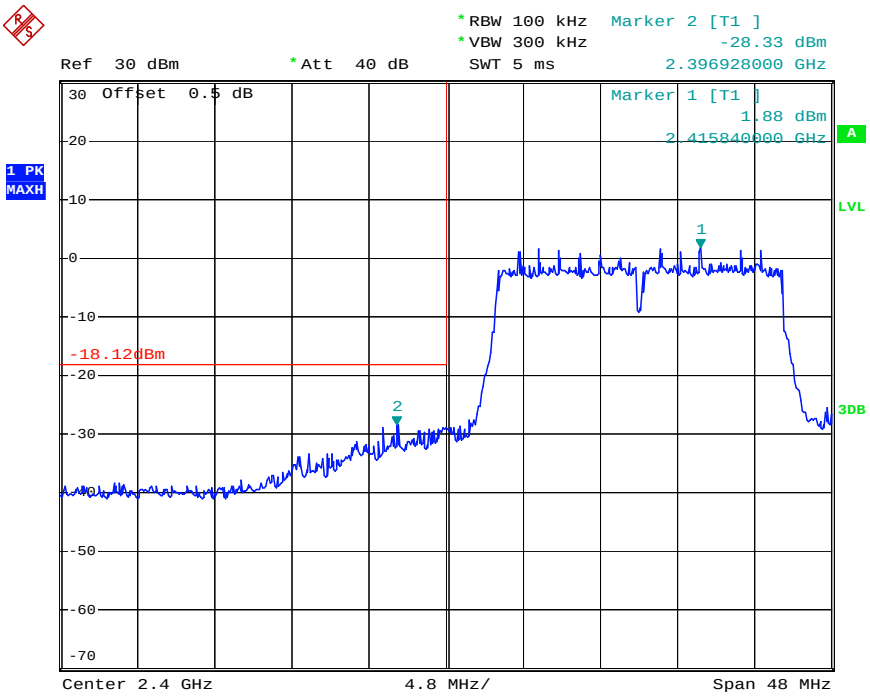
Date: 1.JAN.2018 10:45:57

802.11g: Band Edge, Right Side



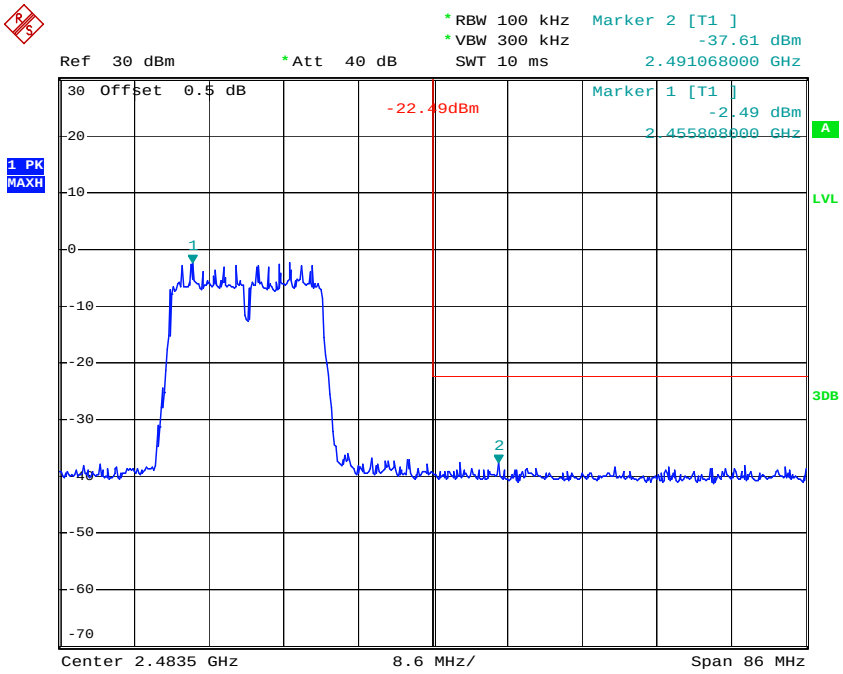
Date: 1.JAN.2018 10:50:56

802.11n ht20 Band Edge, Left Side



Date: 1.JAN.2018 10:55:08

802.11n ht20 Band Edge, Right Side



Date: 1.JAN.2018 10:57:42

FCC §15.247(e) &RSS-247 §5.2 b)- POWER SPECTRAL DENSITY

Applicable Standard

According to FCC§15.247(e):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.

According to RSS-247 §5.2 b):

b) The transmitter power spectral density conducted from the transmitter 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 section 5.4(d), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).

Test Procedure

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3×RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESPI	100120	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:	24.1 °C
Relative Humidity:	42 %
ATM Pressure:	100.9 kPa

The testing was performed by Swin Lv on 2018-01-01.

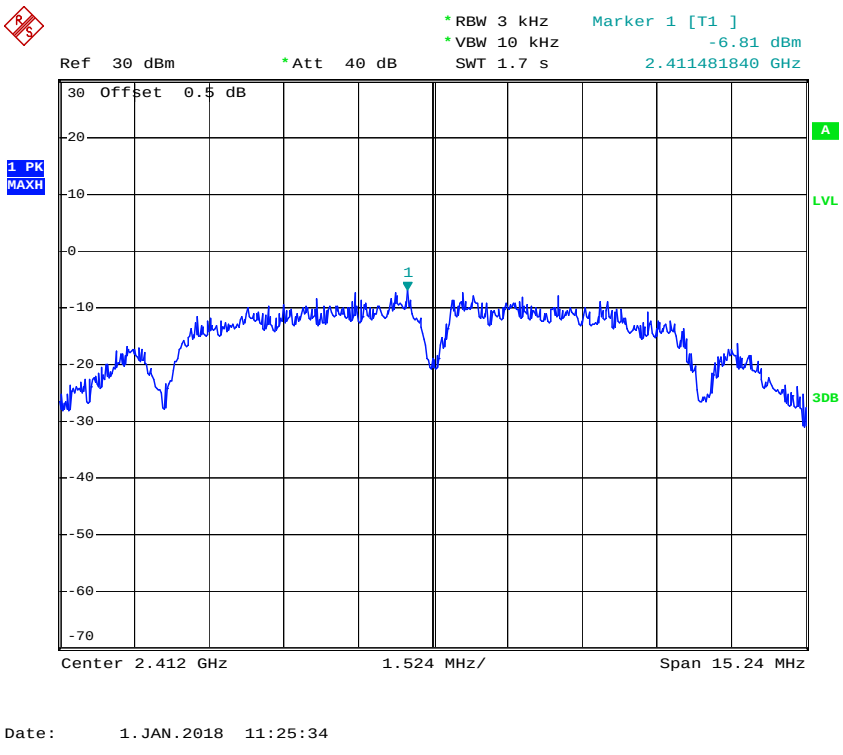
Test Mode: Transmitting

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

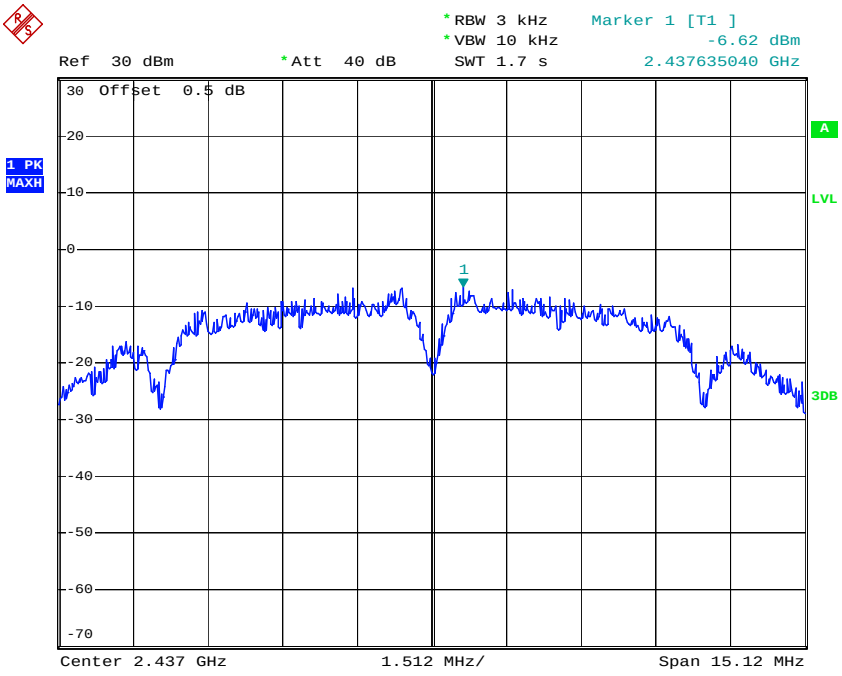
Test mode	Channel	Frequency (MHz)	PSD (dBm/3kHz)		Limit (dBm/3kHz)
			Chain 0	Chain 1	
802.11b	Low	2412	-6.81	-7.63	≤8
	Middle	2437	-6.62	-7.41	≤8
	High	2462	-6.74	-8.55	≤8
802.11g	Low	2412	-10.64	-11.43	≤8
	Middle	2437	-9.13	-8.55	≤8
	High	2462	-9.98	-15.78	≤8
802.11n ht20	Low	2412	-10.75	-12.33	≤8
	Middle	2437	-9.19	-9.42	≤8
	High	2462	-9.07	-17.71	≤8

Chain 0:

Power Spectral Density, 802.11b Low Channel

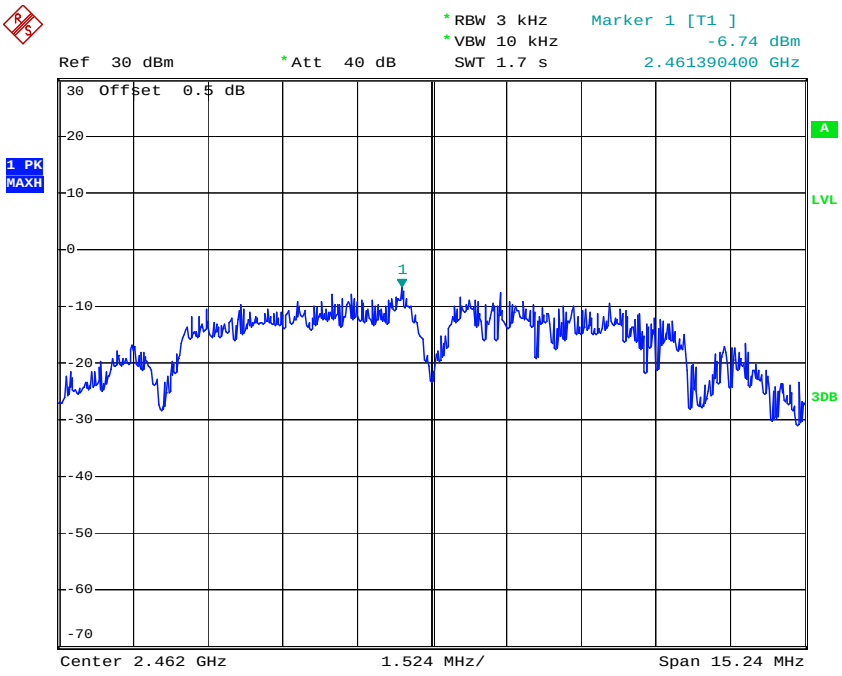


Power Spectral Density, 802.11b Middle Channel



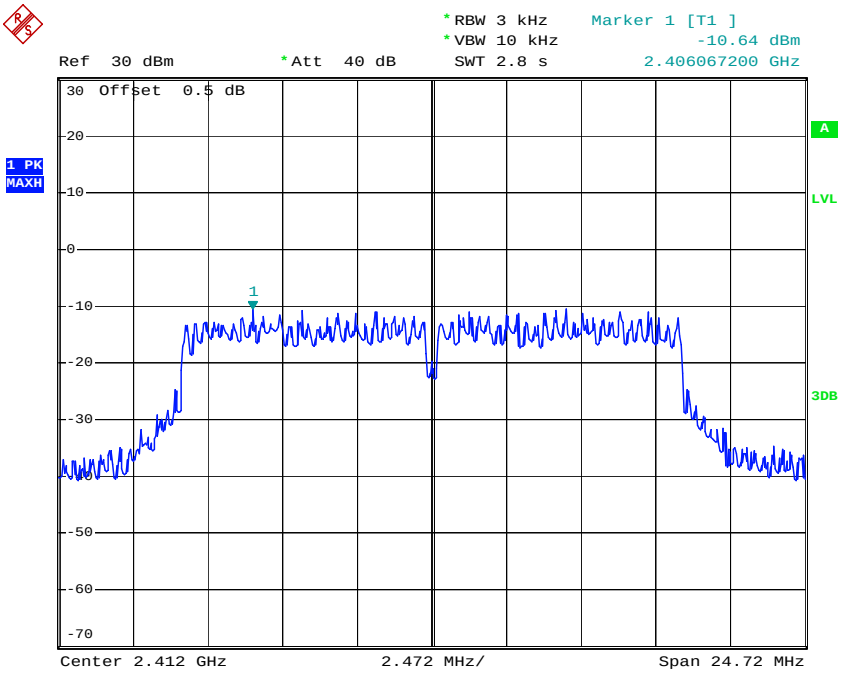
Date: 1.JAN.2018 11:16:16

Power Spectral Density, 802.11b High Channel



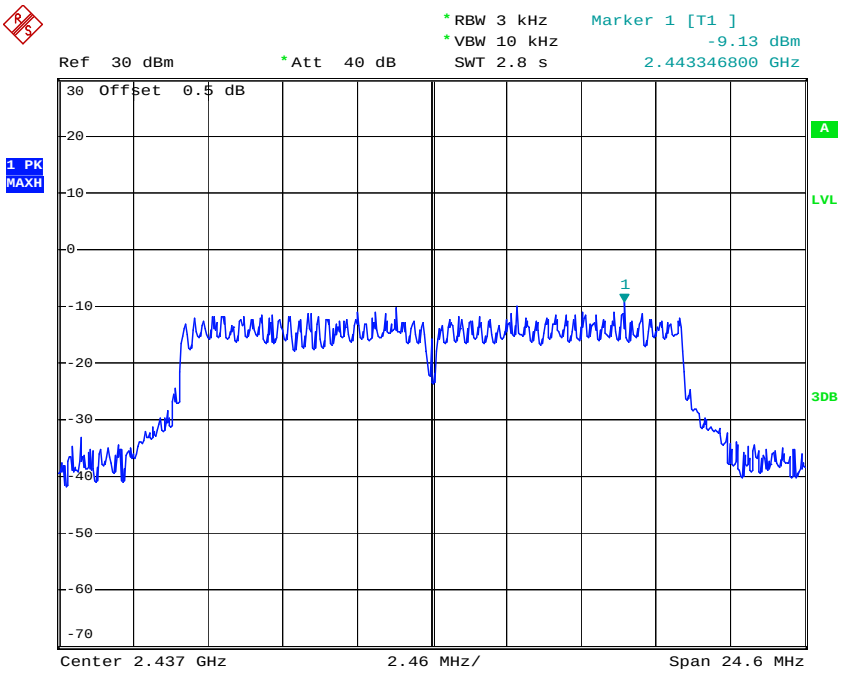
Date: 1.JAN.2018 11:17:35

Power Spectral Density, 802.11g Low Channel



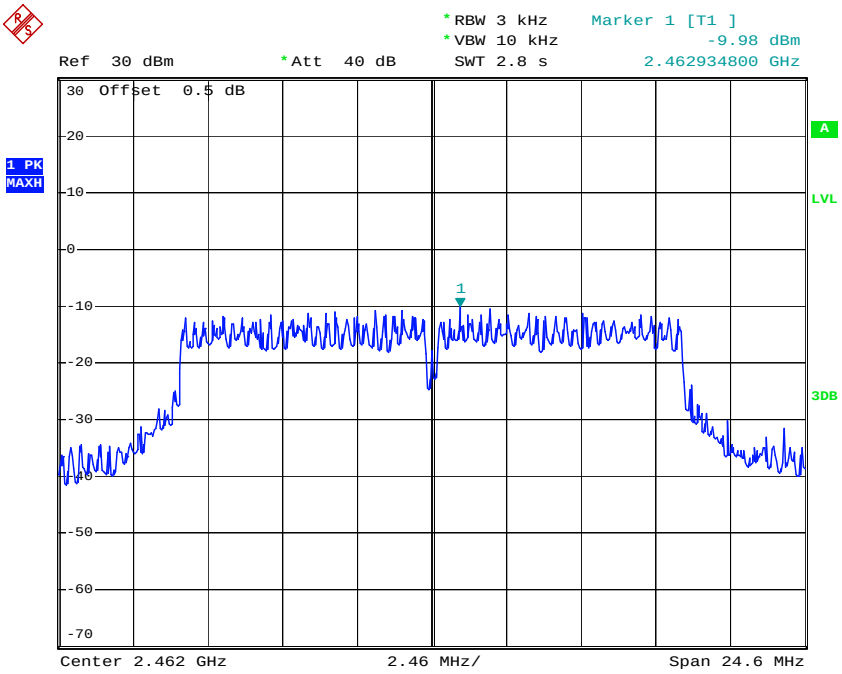
Date: 1.JAN.2018 11:23:58

Power Spectral Density, 802.11g Middle Channel



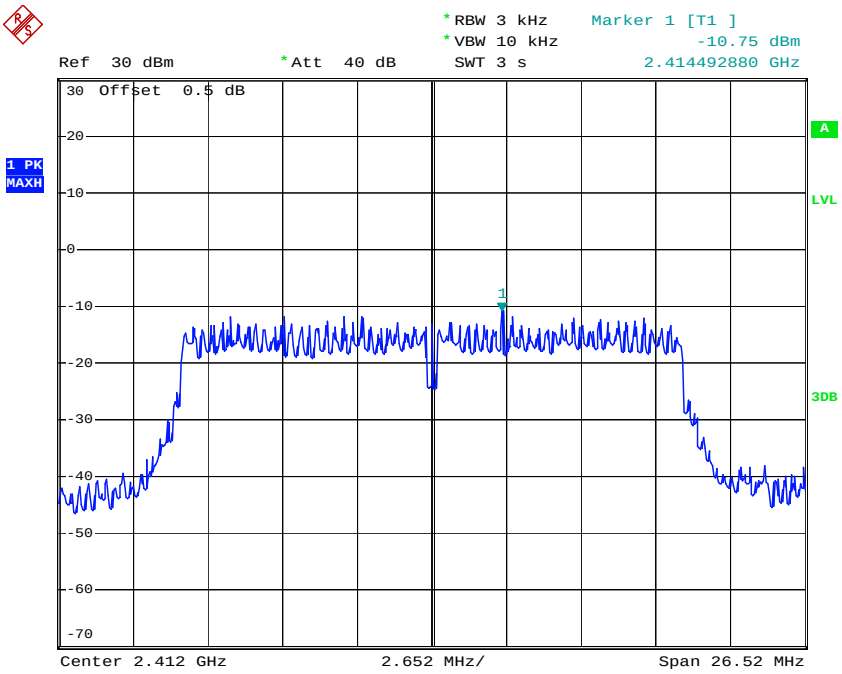
Date: 1.JAN.2018 11:21:40

Power Spectral Density, 802.11g High Channel



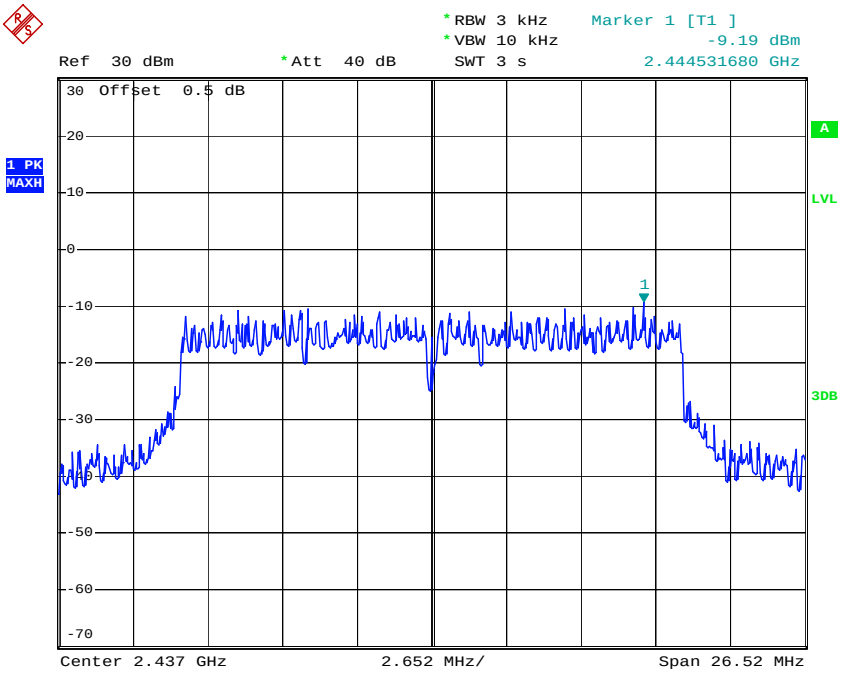
Date: 1.JAN.2018 11:19:32

Power Spectral Density, 802.11n ht20 Low Channel



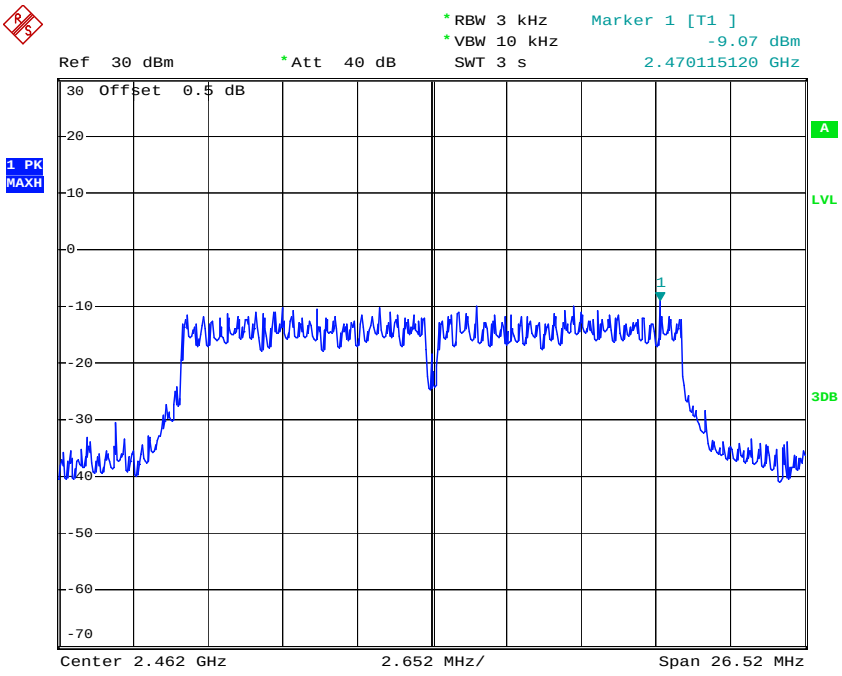
Date: 1.JAN.2018 11:32:34

Power Spectral Density, 802.11n ht20 Middle Channel



Date: 1.JAN.2018 11:34:39

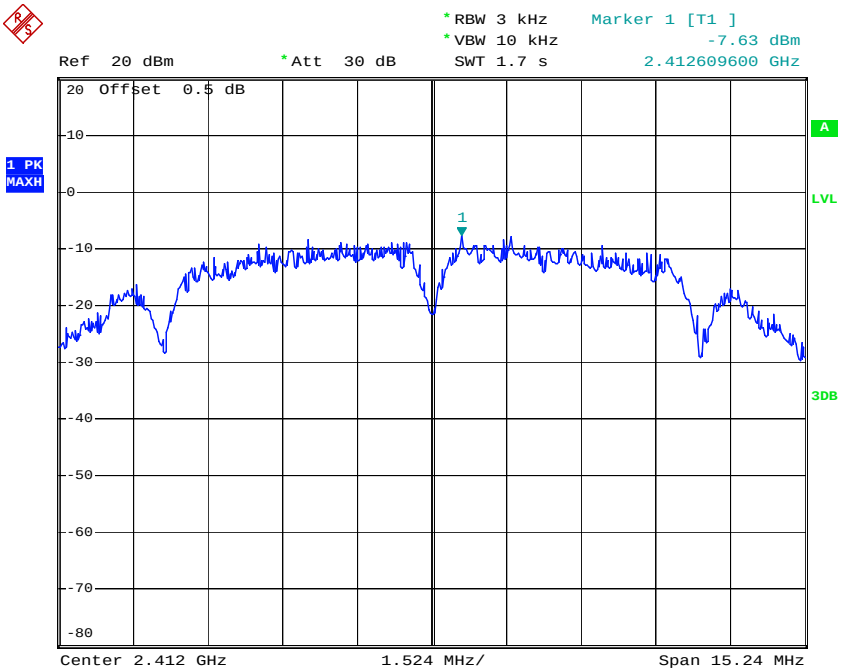
Power Spectral Density, 802.11n ht20 High Channel



Date: 1.JAN.2018 11:36:29

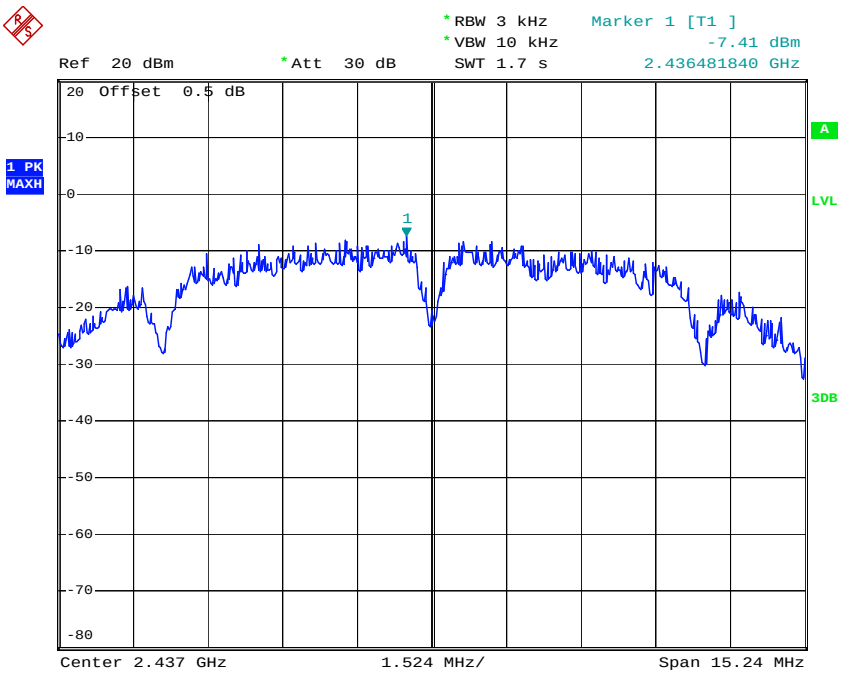
Chain1:

Power Spectral Density, 802.11b Low Channel



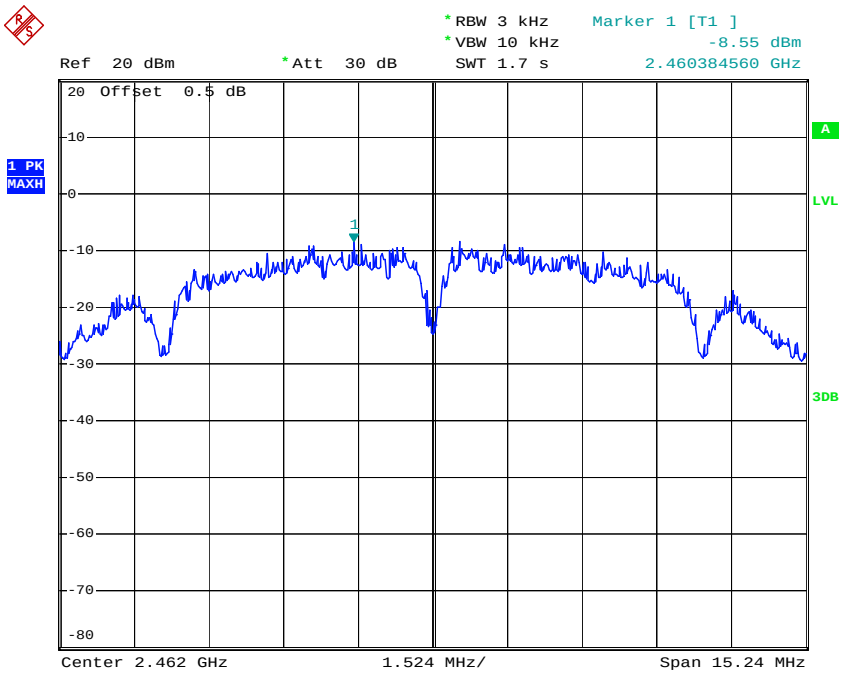
Date: 1.JAN.2018 10:37:49

Power Spectral Density, 802.11b Middle Channel



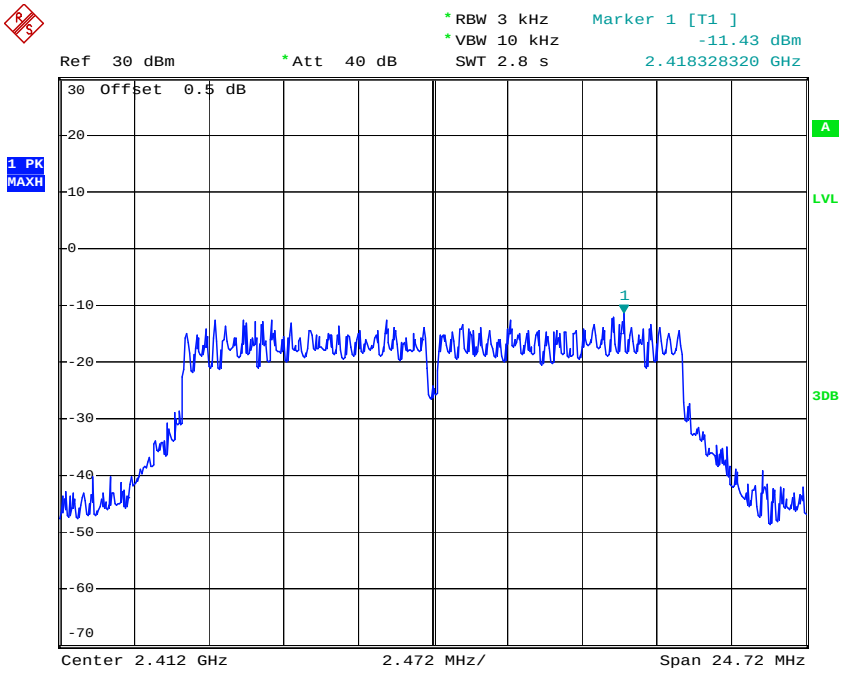
Date: 1.JAN.2018 10:39:42

Power Spectral Density, 802.11b High Channel



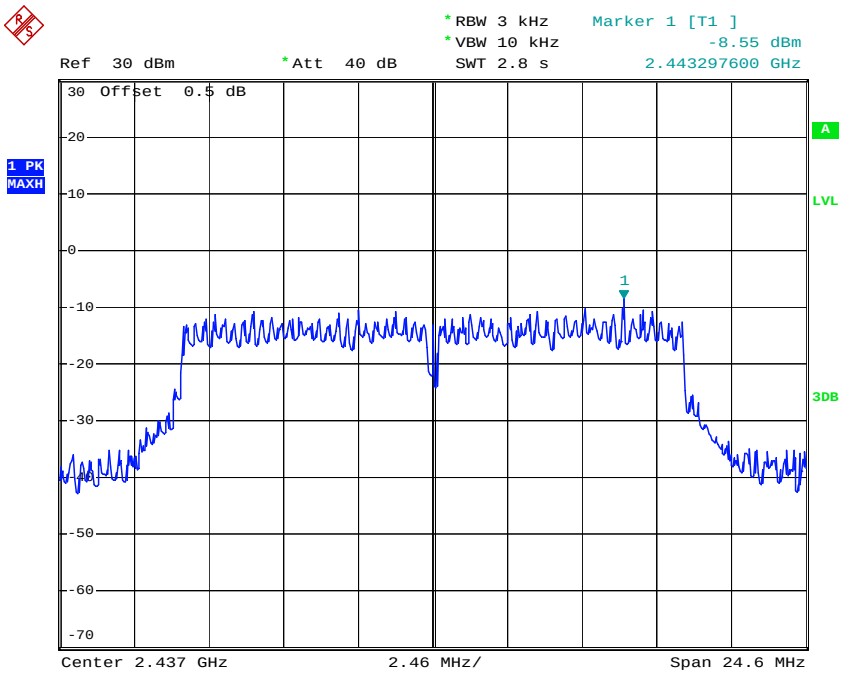
Date: 1.JAN.2018 10:41:15

Power Spectral Density, 802.11g Low Channel



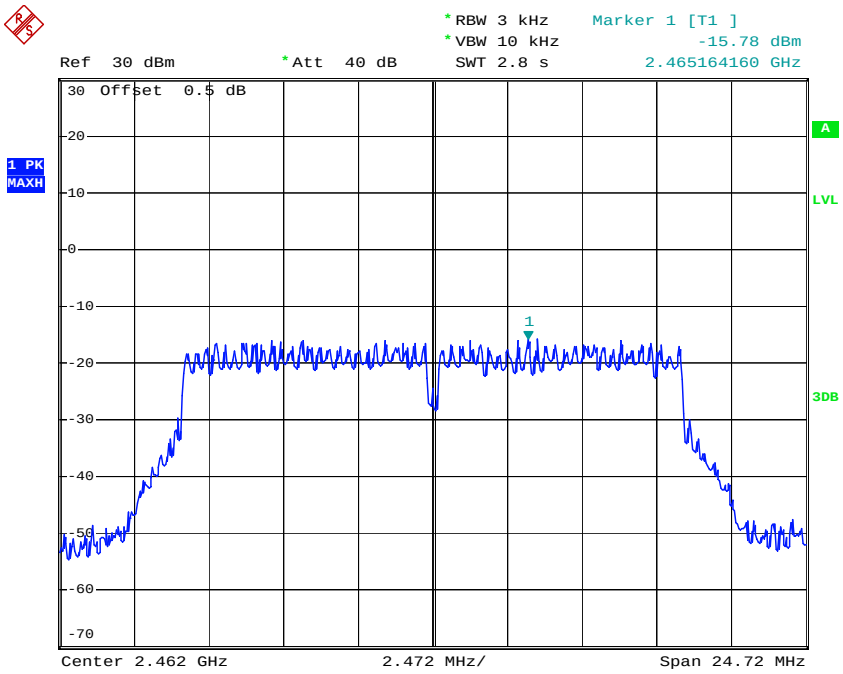
Date: 1.JAN.2018 10:45:39

Power Spectral Density, 802.11g Middle Channel



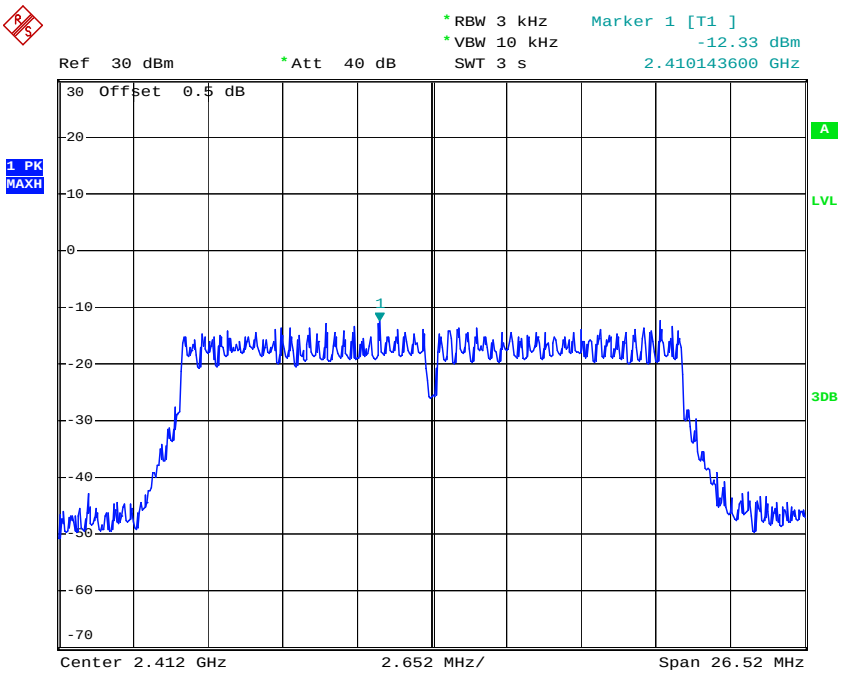
Date: 1.JAN.2018 10:48:42

Power Spectral Density, 802.11g High Channel



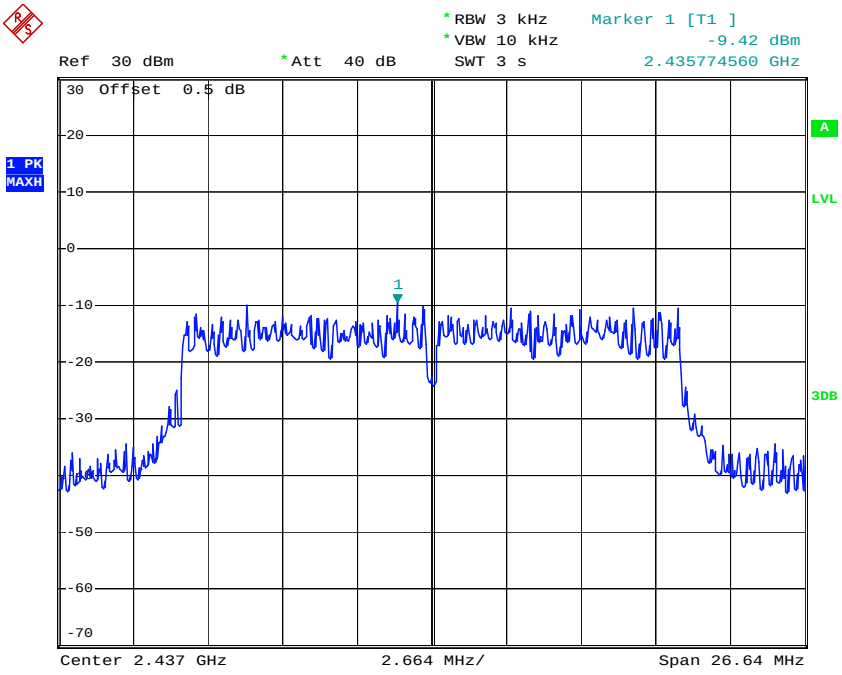
Date: 1.JAN.2018 10:50:38

Power Spectral Density, 802.11n ht20 Low Channel



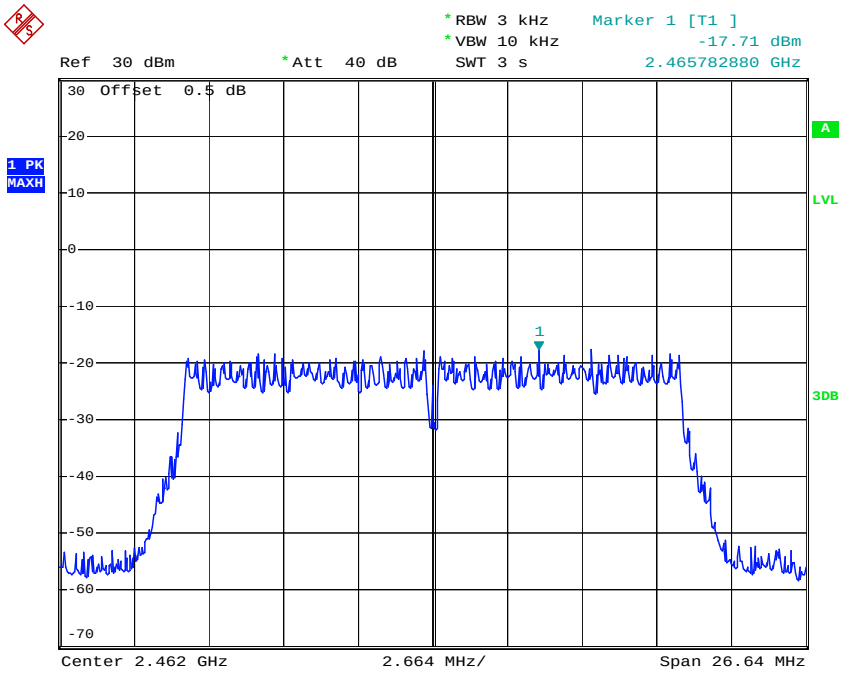
Date: 1.JAN.2018 10:54:33

Power Spectral Density, 802.11n ht20 Middle Channel



Date: 1.JAN.2018 10:52:41

Power Spectral Density, 802.11n ht20 High Channel



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