

FCC PART 15.247

TEST REPORT

For

Hobbico Inc

2904 Research Road, Champaign, Illinois, United States

FCC ID: IYFZ1020

Report Type: Original Report	Product Type: Droneview 1080P Wi-Fi Camera
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Hobbico Inc* 's product, model number: *TACZ1020 (FCC ID: IYFZ1020)* (the "EUT") in this report was a *Droneview 1080P Wi-Fi Camera*, which was measured approximately: 9.5 cm (L) x3.5 cm (W) x 3.0 cm (H), rated input voltage: DC 5 V from CAN port.

All measurement and test data in this report was gathered from production sample serial number: 160620004 (Assigned by BACL, Dongguan). The EUT was received on 2016-06-22.

Objective

This report is prepared on behalf of *Hobbico Inc* . in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communications Commission's rules

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

Related Submittal(s)/Grant(s)

No Related Grant(s).

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

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

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 Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communications Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 06, 2015.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in testing mode, which was provided by manufacturer. For 2.4GHz band, 11 channels are provided to testing:

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 tested with channel 1, 6 and 11. For 802.11n ht40 mode, test with channel 3,6 and 9.

The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations.

Equipment Modifications

No modification was made to the EUT tested.

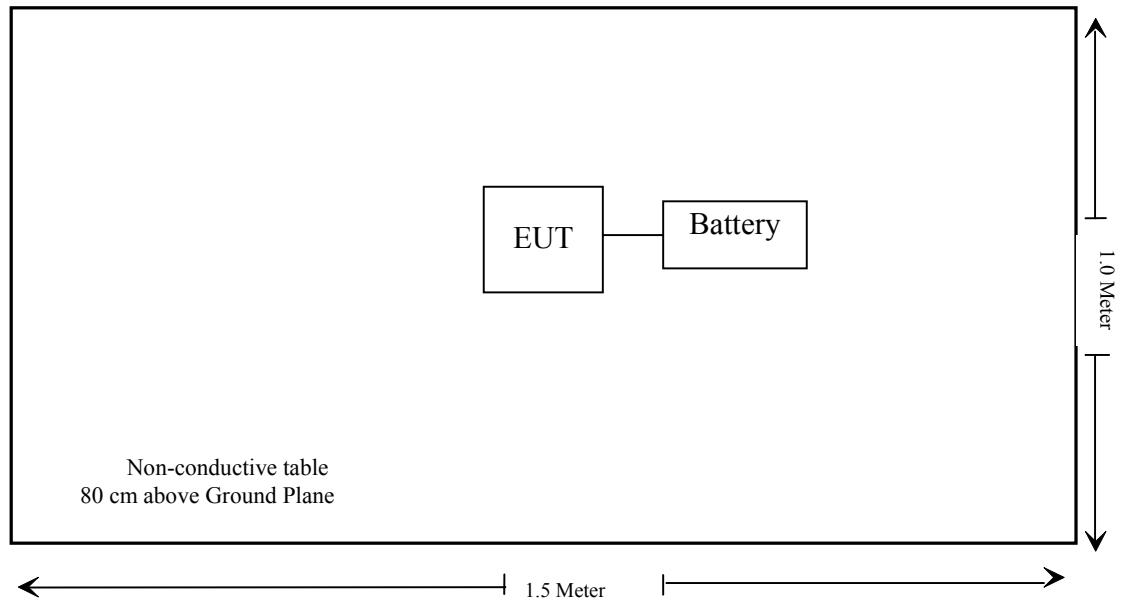
EUT Exercise Software

Hyper terminal command was used in test, which was provided by manufacturer, the worst condition (maximum power with 100% duty cycle) was setting by command as following table:

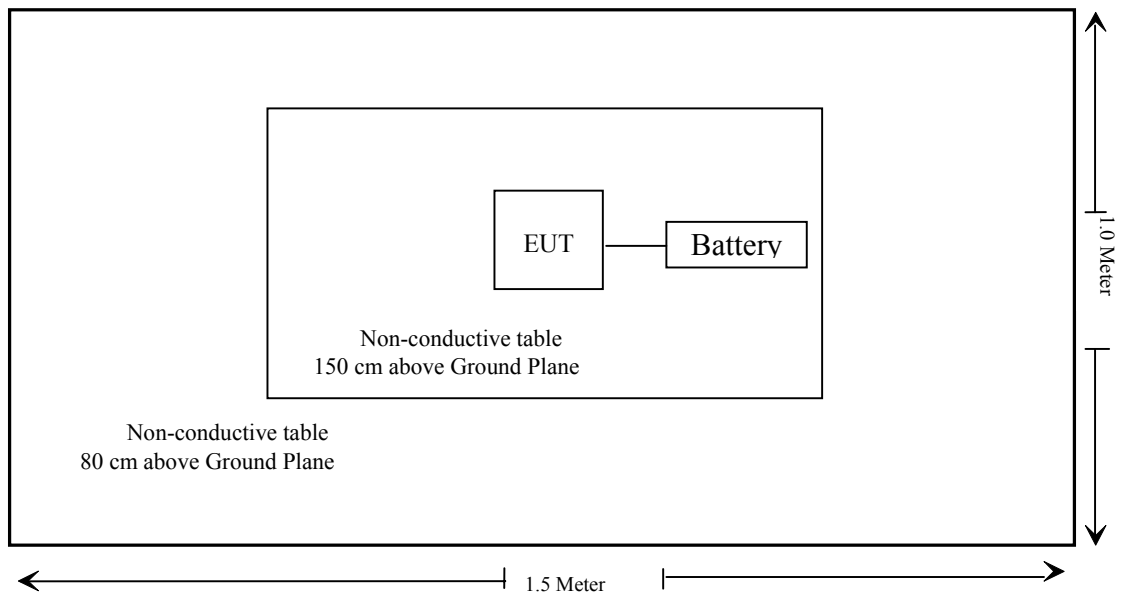
Test Mode	Test Software Version	Engineer Mode		
802.11b	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	1Mbps	1Mbps	1Mbps
	Power Level Setting	0	0	0
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	0	0	0
802.11n ht20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	0	0	0
802.11n ht40	Test Frequency	2422MHz	2437MHz	2452MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	0	0	0

Block Diagram of Test Setup

Below 1 GHz:



Above 1 GHz:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	MPE	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Not Applicable
§15.247(d)	Spurious Emissions at Antenna Port	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum conducted output power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

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

Applicable Standard

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

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

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

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

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

Calculated Formulary:

Predication of MPE limit at a given distance

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

Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
2412-2462	2.50	1.78	22	158.49	20.00	0.0561	1.00

Note: The tune-up conducted out power is 20dBm+/-2dB.which declared by the manufacturer.

Result: The device meet FCC MPE at 20 cm distance

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

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

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

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

Antenna Connector Construction

The EUT has one integrated antenna arrangement, which was permanently attached and the antenna gain is 2.5 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

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

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cispr} of Table 2, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} of Table 2, then:

- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

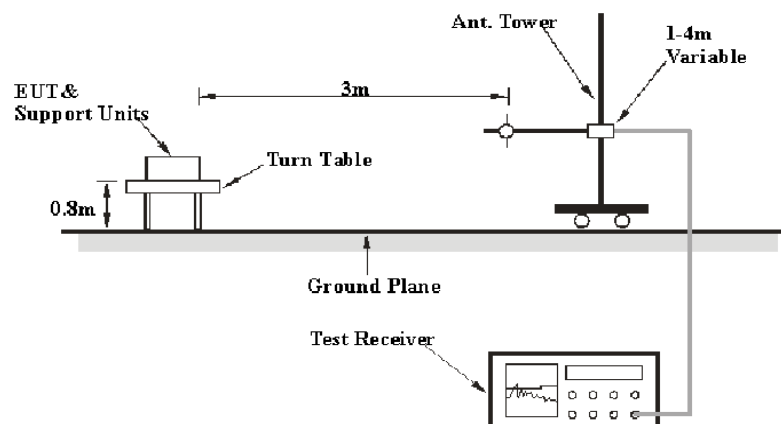
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 10m at Bay Area Compliance Laboratories Corp. (Dongguan) is: 30M~200MHz: 4.55 dB for Horizontal, 4.57 dB for Vertical; 200M~1GHz: 4.66 dB for Horizontal, 4.56 dB for Vertical; measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is: 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~18GHz: 5.23 dB

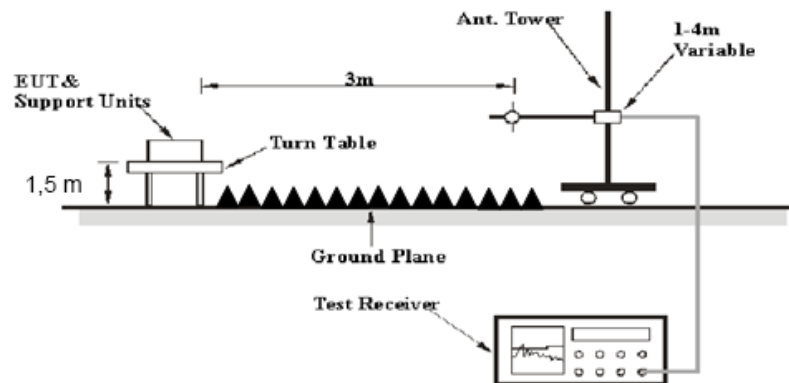
Table 2 – Values of U_{cispr}

Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1GHz:



Above 1GHz:

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

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	AV

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 Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

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

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	2015-08-03	2016-08-02
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2015-09-01	2016-09-01
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
ETS-Lindgren	Horn Antenna	3115	9808-5557	2015-09-06	2018-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2016-02-19	2017-02-19
R&S	Spectrum Analyzer	FSEM	DE23437	2015-11-23	2016-11-22
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
N/A	Coaxial Cable	14m	N/A	2016-05-06	2017-05-06
N/A	Coaxial Cable	8m	N/A	2016-05-06	2017-05-06
Quinstar	Amplifier	QLW- 18405536-JO	15964001001	2015-09-06	2016-09-06

* **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 Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Section 15.205, 15.209 and 15.247, with the worst margin reading of:

1.04 dB at 4824 MHz in the Horizontal polarization for 802.11b Mode

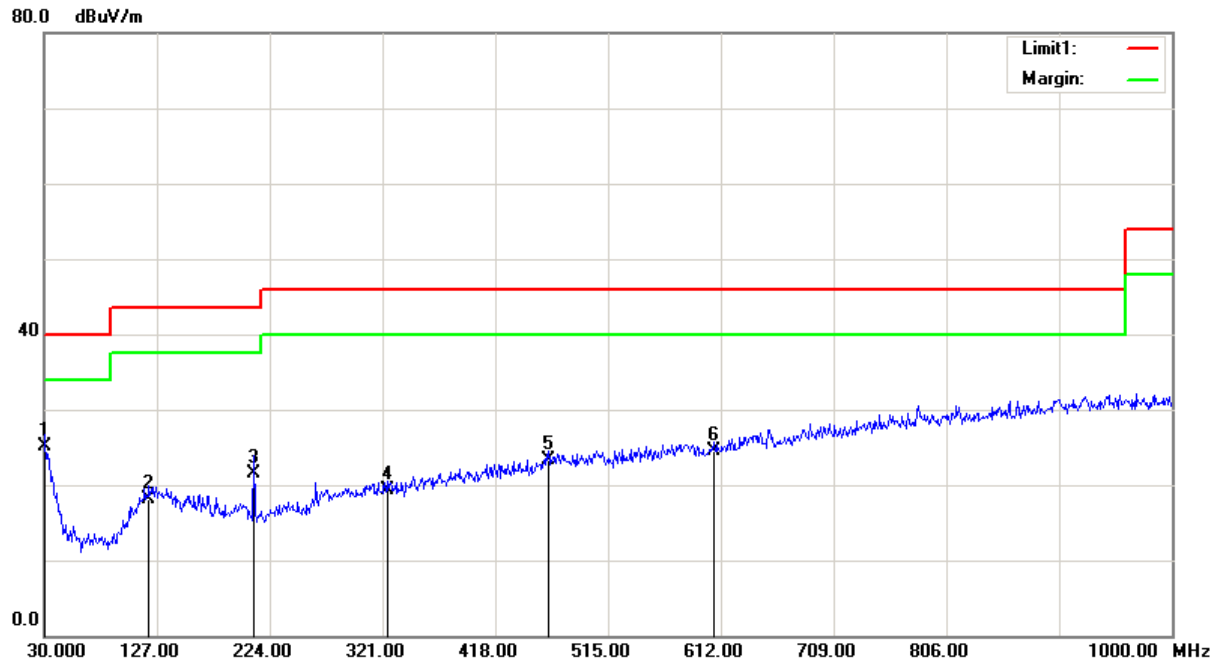
Test Data

Environmental Conditions

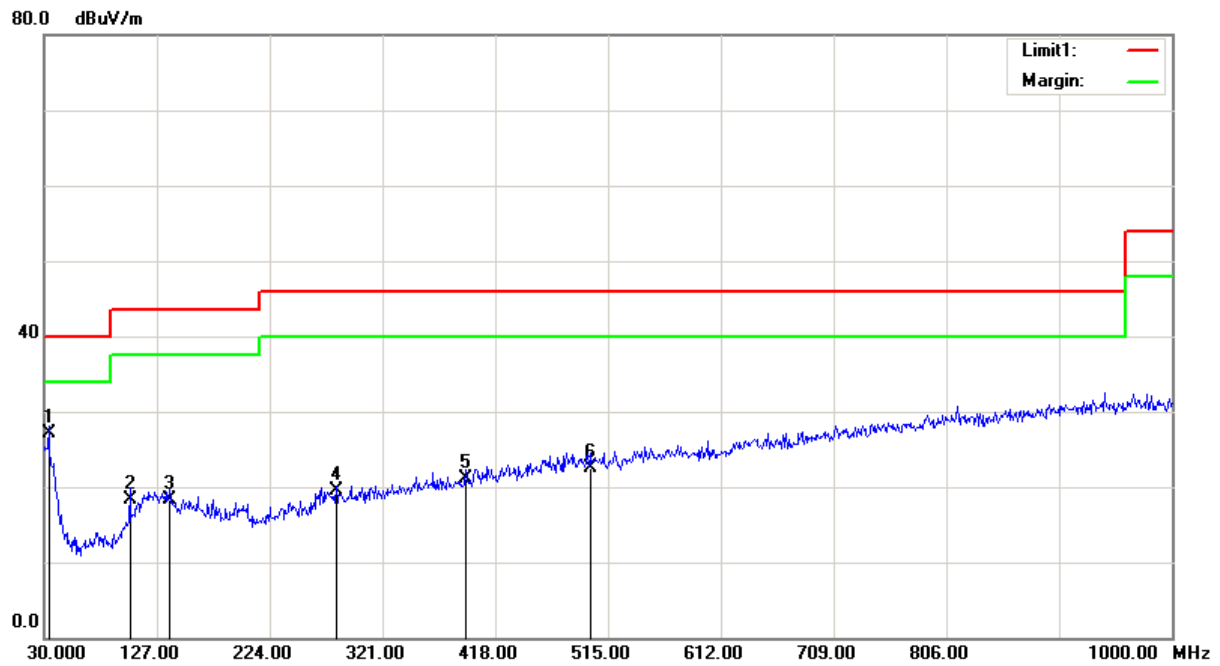
Temperature:	28.1 °C
Relative Humidity:	46%
ATM Pressure:	100.3kPa

The testing was performed by Rocky Xiao on 2016-07-06.

Test Mode: Transmitting

1) Below 1GHz:*Test mode: Transmitting***Horizontal:**

Frequency (MHz)	Receiver Reading (dBuV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.0000	24.15	QP	0.95	25.10	40.00	14.90
120.2100	23.91	QP	-5.71	18.20	43.50	25.30
210.4200	30.61	QP	-9.01	21.60	43.50	21.90
324.8800	24.69	QP	-5.39	19.30	46.00	26.70
463.5900	25.28	QP	-1.88	23.40	46.00	22.60
606.1800	25.18	QP	-0.68	24.50	46.00	21.50

Vertical:

Frequency (MHz)	Receiver Reading (dBuV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
33.8800	29.07	QP	-1.97	27.10	40.00	12.90
103.7200	26.90	QP	-8.60	18.30	43.50	25.20
137.6700	24.81	QP	-6.41	18.40	43.50	25.10
281.2300	25.53	QP	-5.93	19.60	46.00	26.40
392.7800	25.05	QP	-3.85	21.20	46.00	24.80
499.4800	24.02	QP	-1.52	22.50	46.00	23.50

2) Above 1GHz:

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 (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	66.86	PK	H	25.67	3.68	0.00	96.21	N/A	N/A
2412	63.72	AV	H	25.67	3.68	0.00	93.07	N/A	N/A
2412	74.1	PK	V	25.67	3.68	0.00	103.45	N/A	N/A
2412	71.01	AV	V	25.67	3.68	0.00	100.36	N/A	N/A
2390	29.74	PK	H	25.61	3.63	0.00	58.98	74.00	15.02
2390	19.84	AV	H	25.61	3.63	0.00	49.08	54.00	4.92
4824	50.24	PK	H	30.64	5.03	27.41	58.50	74.00	15.50
4824	44.7	AV	H	30.64	5.03	27.41	52.96	54.00	1.04
7236	36.23	PK	H	34.17	6.65	25.90	51.15	74.00	22.85
7236	30.65	AV	H	34.17	6.65	25.90	45.57	54.00	8.43
3222	43.78	PK	H	27.91	6.18	27.35	50.52	74.00	23.48
3222	38.94	AV	H	27.91	6.18	27.35	45.68	54.00	8.32
Middle Channel: 2437 MHz									
2437	66.91	PK	H	25.74	3.75	0.00	96.40	N/A	N/A
2437	63.67	AV	H	25.74	3.75	0.00	93.16	N/A	N/A
2437	74.18	PK	V	25.74	3.75	0.00	103.67	N/A	N/A
2437	71.13	AV	V	25.74	3.75	0.00	100.62	N/A	N/A
4874	48.69	PK	H	30.77	5.14	27.42	57.18	74.00	16.82
4874	44.32	AV	H	30.77	5.14	27.42	52.81	54.00	1.19
7311	34.68	PK	H	34.35	6.74	25.88	49.89	74.00	24.11
7311	28.74	AV	H	34.35	6.74	25.88	43.95	54.00	10.05
3251	48.36	PK	H	28.00	6.29	27.33	55.32	74.00	18.68
3251	43.27	AV	H	28.00	6.29	27.33	50.23	54.00	3.77
3120	36.54	PK	H	27.58	6.90	27.43	43.59	74.00	30.41
3120	24.21	AV	H	27.58	6.90	27.43	31.26	54.00	22.74
High Channel: 2462 MHz									
2462	66.98	PK	H	25.80	3.75	0.00	96.53	N/A	N/A
2462	63.65	AV	H	25.80	3.75	0.00	93.20	N/A	N/A
2462	74.22	PK	V	25.80	3.75	0.00	103.77	N/A	N/A
2462	71.21	AV	V	25.80	3.75	0.00	100.76	N/A	N/A
2483.5	25.86	PK	H	25.86	3.67	0.00	55.39	74.00	18.61
2483.5	14.32	AV	H	25.86	3.67	0.00	43.85	54.00	10.15
4924	46.63	PK	H	30.90	5.34	27.43	55.44	74.00	18.56
4924	44.1	AV	H	30.90	5.34	27.43	52.91	54.00	1.09
7386	32.31	PK	H	34.53	6.83	25.86	47.81	74.00	26.19
7386	26.64	AV	H	34.53	6.83	25.86	42.14	54.00	11.86
3280	50.68	PK	H	28.10	5.61	27.30	57.09	74.00	16.91
3280	45.17	AV	H	28.10	5.61	27.30	51.58	54.00	2.42

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 (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	67.8	PK	H	25.67	3.68	0.00	97.15	N/A	N/A
2412	58.52	AV	H	25.67	3.68	0.00	87.87	N/A	N/A
2412	75.43	PK	V	25.67	3.68	0.00	104.78	N/A	N/A
2412	65.58	AV	V	25.67	3.68	0.00	94.93	N/A	N/A
2390	28.73	PK	H	25.61	3.63	0.00	57.97	74.00	16.03
2390	14.44	AV	H	25.61	3.63	0.00	43.68	54.00	10.32
4824	48.21	PK	H	30.64	5.03	27.41	56.47	74.00	17.53
4824	35.1	AV	H	30.64	5.03	27.41	43.36	54.00	10.64
7236	35.55	PK	H	34.17	6.65	25.90	50.47	74.00	23.53
7236	23.17	AV	H	34.17	6.65	25.90	38.09	54.00	15.91
3222	46.26	PK	H	27.91	6.18	27.35	53.00	74.00	21.00
3222	42.12	AV	H	27.91	6.18	27.35	48.86	54.00	5.14
Middle Channel: 2437 MHz									
2437	67.95	PK	H	25.74	3.75	0.00	97.44	N/A	N/A
2437	58.7	AV	H	25.74	3.75	0.00	88.19	N/A	N/A
2437	75.55	PK	V	25.74	3.75	0.00	105.04	N/A	N/A
2437	65.88	AV	V	25.74	3.75	0.00	95.37	N/A	N/A
4874	48.44	PK	H	30.77	5.14	27.42	56.93	74.00	17.07
4874	35.34	AV	H	30.77	5.14	27.42	43.83	54.00	10.17
7311	35.83	PK	H	34.35	6.74	25.88	51.04	74.00	22.96
7311	23.41	AV	H	34.35	6.74	25.88	38.62	54.00	15.38
3251	46.38	PK	H	28.00	6.29	27.33	53.34	74.00	20.66
3251	41.11	AV	H	28.00	6.29	27.33	48.07	54.00	5.93
3120	36.59	PK	H	27.58	6.90	27.43	43.64	74.00	30.36
3120	34.2	AV	H	27.58	6.90	27.43	41.25	54.00	12.75
High Channel: 2462 MHz									
2462	67.98	PK	H	25.80	3.75	0.00	97.53	N/A	N/A
2462	58.61	AV	H	25.80	3.75	0.00	88.16	N/A	N/A
2462	75.61	PK	V	25.80	3.75	0.00	105.16	N/A	N/A
2462	66.03	AV	V	25.80	3.75	0.00	95.58	N/A	N/A
2483.5	34.41	PK	H	25.86	3.67	0.00	63.94	74.00	10.06
2483.5	17.13	AV	H	25.86	3.67	0.00	46.66	54.00	7.34
4924	48.66	PK	H	30.90	5.34	27.43	57.47	74.00	16.53
4924	35.66	AV	H	30.90	5.34	27.43	44.47	54.00	9.53
7386	36.05	PK	H	34.53	6.83	25.86	51.55	74.00	22.45
7386	23.71	AV	H	34.53	6.83	25.86	39.21	54.00	14.79
3280	46.62	PK	H	28.10	5.61	27.30	53.03	74.00	20.97
3280	42.52	AV	H	28.10	5.61	27.30	48.93	54.00	5.07

802.11 n 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 (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	68.49	PK	H	25.67	3.68	0.00	97.84	N/A	N/A
2412	57.81	AV	H	25.67	3.68	0.00	87.16	N/A	N/A
2412	75.81	PK	V	25.67	3.68	0.00	105.16	N/A	N/A
2412	65.29	AV	V	25.67	3.68	0.00	94.64	N/A	N/A
2390	33.37	PK	V	25.61	3.63	0.00	62.61	74.00	11.39
2390	15.19	AV	V	25.61	3.63	0.00	44.43	54.00	9.57
4824	48.97	PK	V	30.64	5.03	27.41	57.23	74.00	16.77
4824	35.87	AV	V	30.64	5.03	27.41	44.13	54.00	9.87
7236	36.35	PK	V	34.17	6.65	25.90	51.27	74.00	22.73
7236	23.93	AV	V	34.17	6.65	25.90	38.85	54.00	15.15
3222	46.7	PK	V	27.91	6.18	27.35	53.44	74.00	20.56
3222	40.31	AV	V	27.91	6.18	27.35	47.05	54.00	6.95
Middle Channel: 2437 MHz									
2437	68.59	PK	H	25.74	3.75	0.00	98.08	N/A	N/A
2437	57.86	AV	H	25.74	3.75	0.00	87.35	N/A	N/A
2437	75.91	PK	V	25.74	3.75	0.00	105.40	N/A	N/A
2437	65.58	AV	V	25.74	3.75	0.00	95.07	N/A	N/A
4874	49.25	PK	V	30.77	5.14	27.42	57.74	74.00	16.26
4874	36.1	AV	V	30.77	5.14	27.42	44.59	54.00	9.41
7311	36.58	PK	V	34.35	6.74	25.88	51.79	74.00	22.21
7311	24.11	AV	V	34.35	6.74	25.88	39.32	54.00	14.68
3251	46.84	PK	V	28.00	6.29	27.33	53.80	74.00	20.20
3251	42.45	AV	V	28.00	6.29	27.33	49.41	54.00	4.59
3120	39.23	PK	V	27.58	6.90	27.43	46.28	74.00	27.72
3120	26.56	AV	V	27.58	6.90	27.43	33.61	54.00	20.39
High Channel: 2462 MHz									
2462	68.37	PK	H	25.80	3.75	0.00	97.92	N/A	N/A
2462	57.69	AV	H	25.80	3.75	0.00	87.24	N/A	N/A
2462	75.99	PK	V	25.80	3.75	0.00	105.54	N/A	N/A
2462	65.74	AV	V	25.80	3.75	0.00	95.29	N/A	N/A
2483.5	39.45	PK	V	25.86	3.67	0.00	68.98	74.00	5.02
2483.5	18.28	AV	V	25.86	3.67	0.00	47.81	54.00	6.19
4924	49.48	PK	V	30.90	5.34	27.43	58.29	74.00	15.71
4924	36.39	AV	V	30.90	5.34	27.43	45.20	54.00	8.80
7386	36.88	PK	V	34.53	6.83	25.86	52.38	74.00	21.62
7386	24.37	AV	V	34.53	6.83	25.86	39.87	54.00	14.13
3280	47.01	PK	V	28.10	5.61	27.30	53.42	74.00	20.58
3280	42.85	AV	V	28.10	5.61	27.30	49.26	54.00	4.74

802.11 n 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 (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2422 MHz									
2422	65.67	PK	H	25.70	3.71	0.00	95.08	N/A	N/A
2422	55.31	AV	H	25.70	3.71	0.00	84.72	N/A	N/A
2422	73.02	PK	V	25.70	3.71	0.00	102.43	N/A	N/A
2422	61.88	AV	V	25.70	3.71	0.00	91.29	N/A	N/A
2400	34.91	PK	H	25.64	3.65	0.00	64.20	74.00	9.80
2400	20.92	AV	H	25.64	3.65	0.00	50.21	54.00	3.79
4844	47.94	PK	H	30.69	4.99	27.42	56.20	74.00	17.80
4844	34.88	AV	H	30.69	4.99	27.42	43.14	54.00	10.86
7266	35.27	PK	H	34.24	6.68	25.89	50.30	74.00	23.70
7266	22.93	AV	H	34.24	6.68	25.89	37.96	54.00	16.04
3222	46.01	PK	H	27.91	6.18	27.35	52.75	74.00	21.25
3222	41.71	AV	H	27.91	6.18	27.35	48.45	54.00	5.55
Middle Channel: 2437 MHz									
2437	65.76	PK	H	25.74	3.75	0.00	95.25	N/A	N/A
2437	55.41	AV	H	25.74	3.75	0.00	84.90	N/A	N/A
2437	73.18	PK	V	25.74	3.75	0.00	102.67	N/A	N/A
2437	61.62	AV	V	25.74	3.75	0.00	91.11	N/A	N/A
4874	48.33	PK	H	30.77	5.14	27.42	56.82	74.00	17.18
4874	35.27	AV	H	30.77	5.14	27.42	43.76	54.00	10.24
7311	35.69	PK	H	34.35	6.74	25.88	50.90	74.00	23.10
7311	23.35	AV	H	34.35	6.74	25.88	38.56	54.00	15.44
3251	46.43	PK	H	28.00	6.29	27.33	53.39	74.00	20.61
3251	43.07	AV	H	28.00	6.29	27.33	50.03	54.00	3.97
3120	35.68	PK	H	27.58	6.90	27.43	42.73	74.00	31.27
3120	23.21	AV	H	27.58	6.90	27.43	30.26	54.00	23.74
High Channel: 2452MHz									
2452	65.58	PK	H	25.78	3.78	0.00	95.14	N/A	N/A
2452	55.23	AV	H	25.78	3.78	0.00	84.79	N/A	N/A
2452	73.24	PK	V	25.78	3.78	0.00	102.80	N/A	N/A
2452	61.26	AV	V	25.78	3.78	0.00	90.82	N/A	N/A
2483.5	36.61	PK	H	25.86	3.67	0.00	66.14	74.00	7.86
2483.5	19.42	AV	H	25.86	3.67	0.00	48.95	54.00	5.05
4904	48.48	PK	H	30.85	5.31	27.43	57.21	74.00	16.79
4904	35.38	AV	H	30.85	5.31	27.43	44.11	54.00	9.89
7356	35.86	PK	H	34.45	6.79	25.87	51.23	74.00	22.77
7356	23.47	AV	H	34.45	6.79	25.87	38.84	54.00	15.16
3280	46.62	PK	H	28.10	5.61	27.30	53.03	74.00	20.97
3280	41.29	AV	H	28.10	5.61	27.30	47.70	54.00	6.30

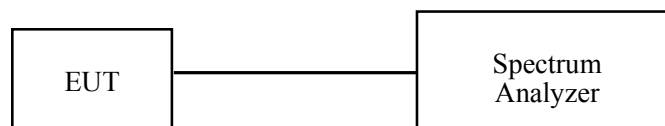
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

- 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	FSP 38	100478	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

* **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:	28.1°C
Relative Humidity:	46%
ATM Pressure:	100.3 kPa

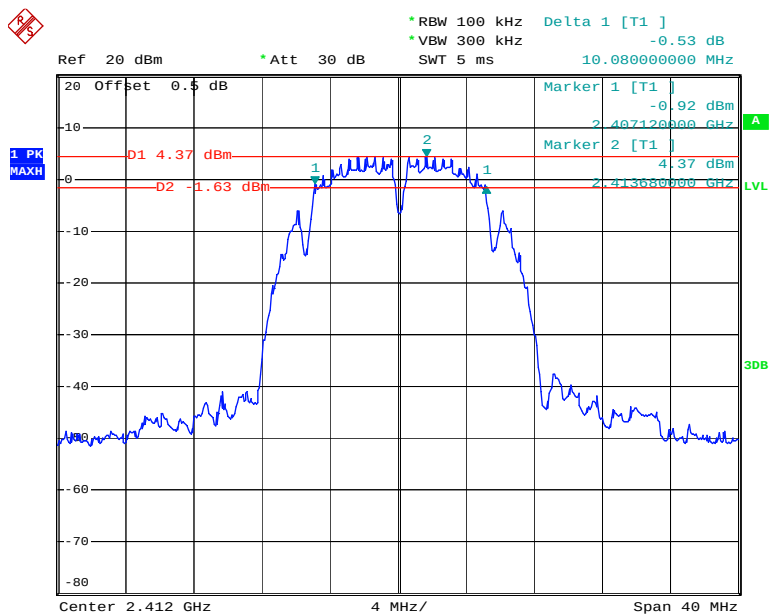
* The testing was performed by Rocky Xiao on 2016-07-06.

Test Mode: Transmitting

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

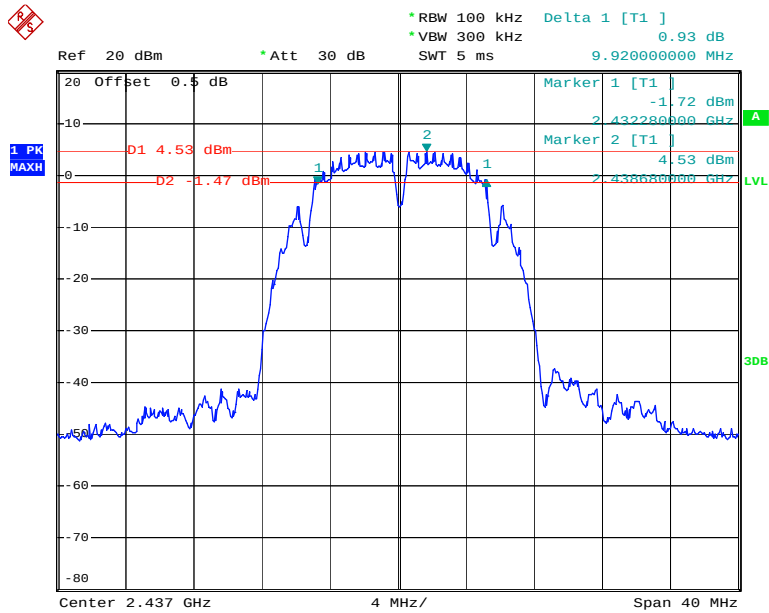
Test mode	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	10.08	≥ 0.5
	Middle	2437	9.92	≥ 0.5
	High	2462	10.08	≥ 0.5
802.11g	Low	2412	16.48	≥ 0.5
	Middle	2437	16.48	≥ 0.5
	High	2462	16.48	≥ 0.5
802.11n20	Low	2412	17.44	≥ 0.5
	Middle	2437	17.52	≥ 0.5
	High	2462	17.36	≥ 0.5
802.11n40	Low	2422	36.48	≥ 0.5
	Middle	2437	36.48	≥ 0.5
	High	2452	36.48	≥ 0.5

802.11b Low Channel



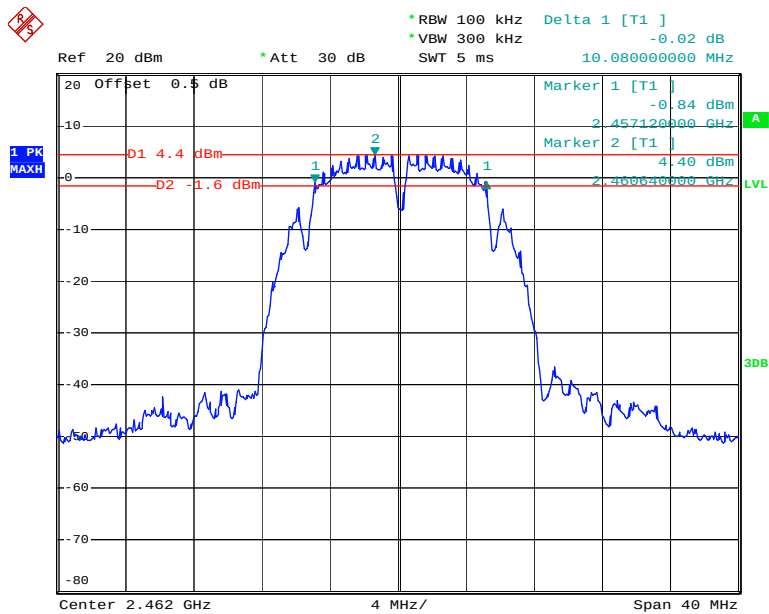
Date: 6.JUL.2016 13:30:38

802.11b Middle Channel



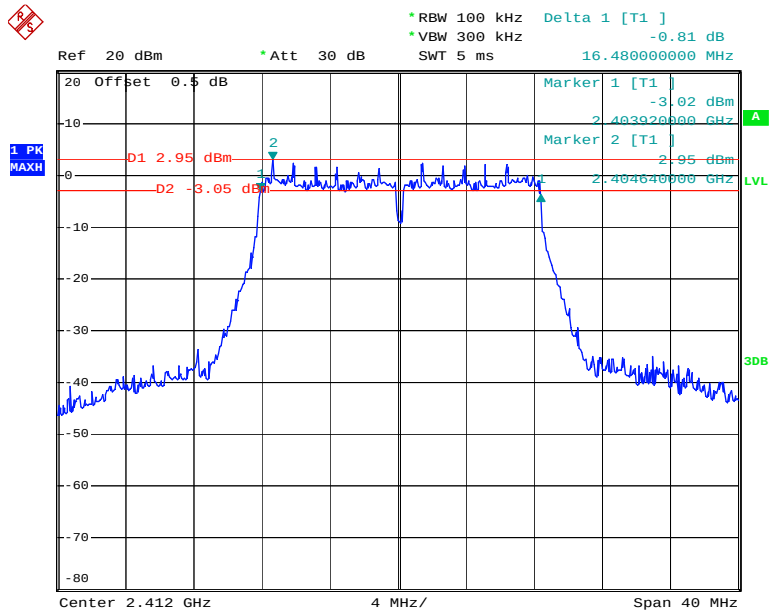
Date: 6.JUL.2016 13:33:05

802.11b High Channel



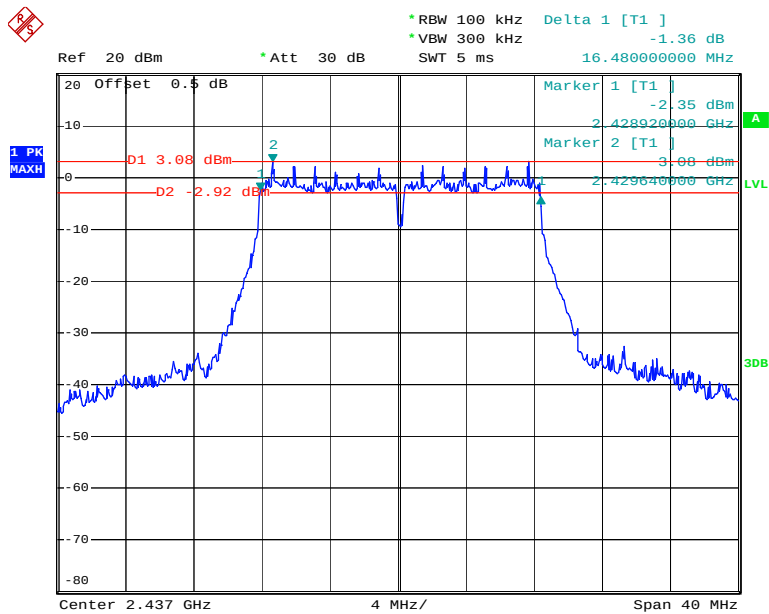
Date: 6.JUL.2016 13:35:16

802.11g Low Channel



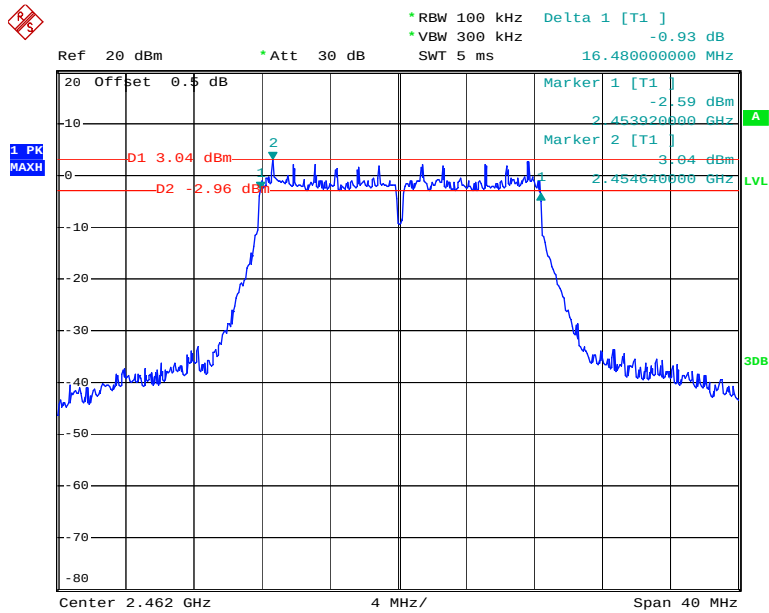
Date: 6.JUL.2016 13:39:52

802.11g Middle Channel



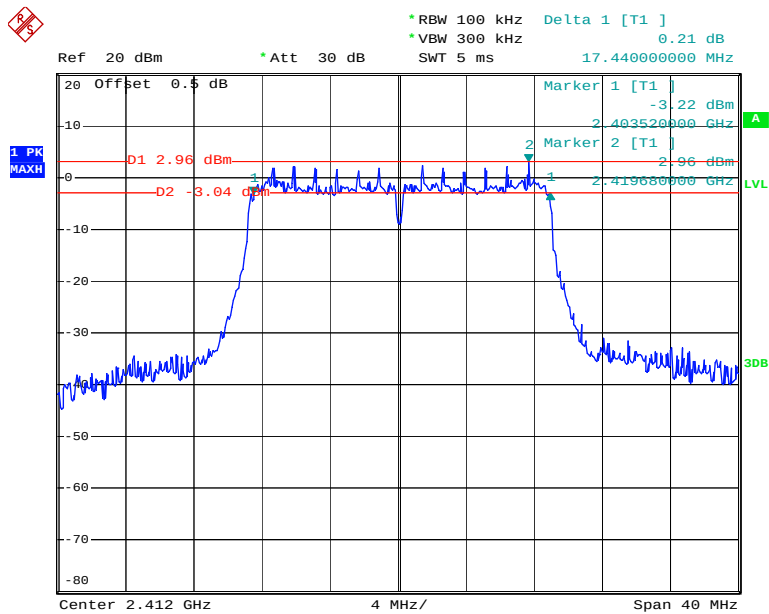
Date: 6.JUL.2016 13:42:25

802.11g High Channel



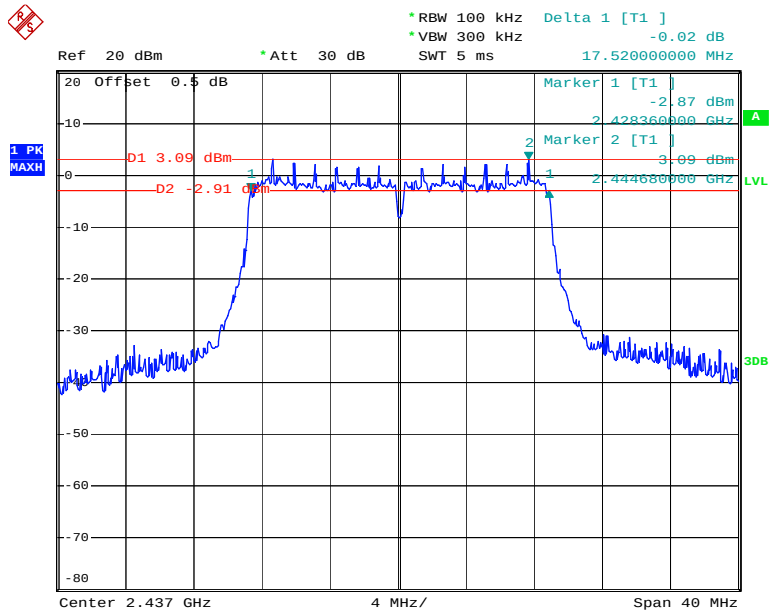
Date: 6.JUL.2016 13:44:43

802.11n ht20 Low Channel



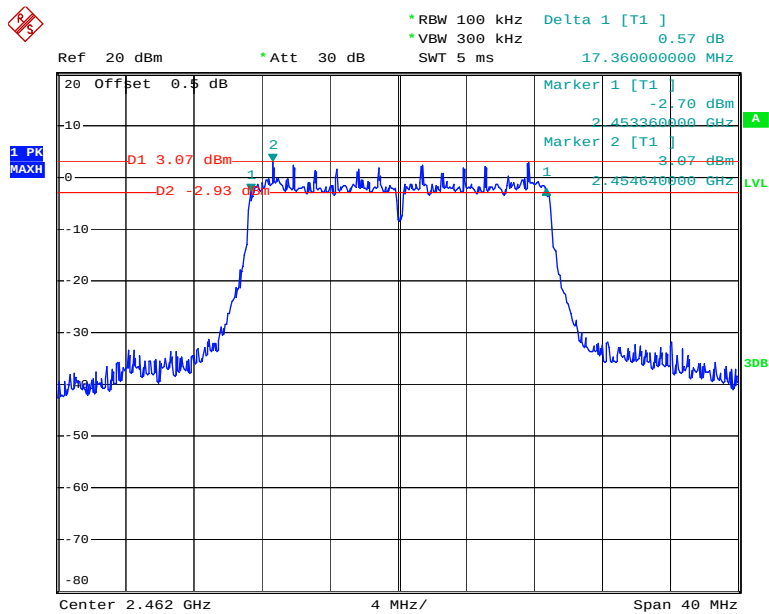
Date: 6.JUL.2016 13:47:33

802.11n ht20 Middle Channel



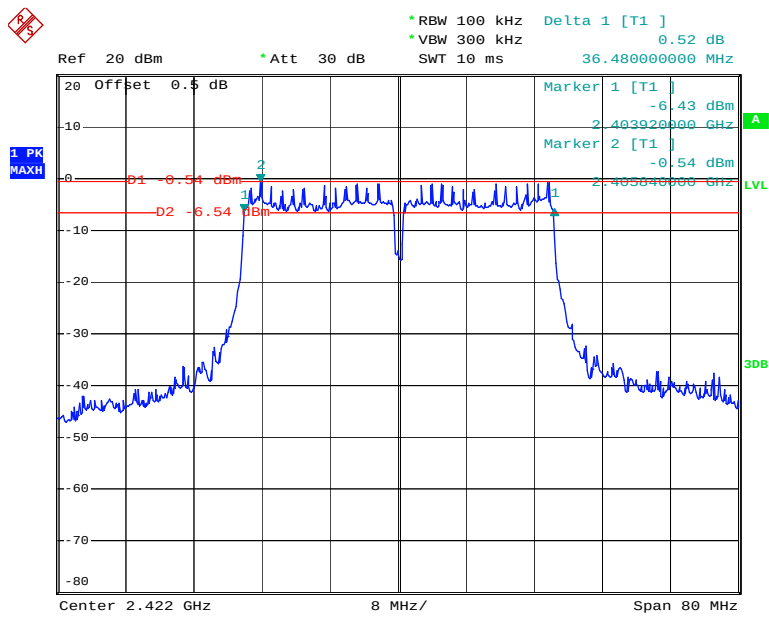
Date: 6.JUL.2016 13:50:09

802.11n ht20 High Channel



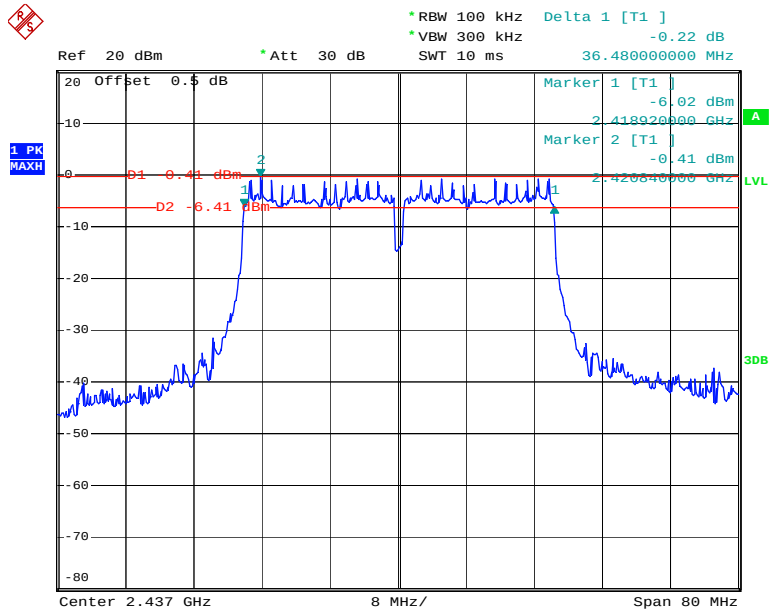
Date: 6.JUL.2016 13:52:30

802.11n ht40 Low Channel



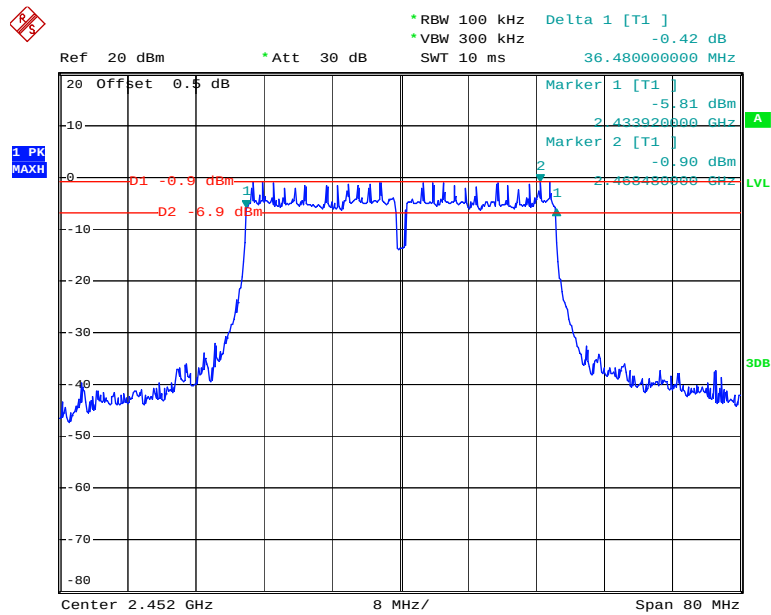
Date: 6.JUL.2016 13:55:17

802.11n ht40 Middle Channel



Date: 6.JUL.2016 13:58:17

802.11n ht40 High Channel



Date: 6.JUL.2016 14:00:38

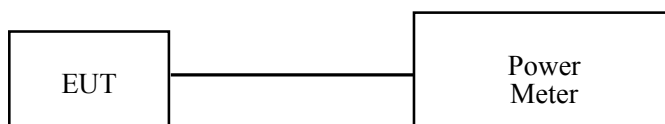
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

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

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to 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	2015-11-03	2016-11-03
Agilent	Wideband Power Sensor	N1921A	MY54170013	2015-11-03	2016-11-03
Agilent	P-Series Power Meter	N1912A	MY5000448	2015-11-03	2016-11-03
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

* **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:	28.1°C
Relative Humidity:	46 %
ATM Pressure:	100.3 kPa

* The testing was performed by Rocky Xiao on 2016-07-06.

Test Mode: Transmitting

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

Test mode	Channel	Frequency	Max Peak Conducted Output Power	Limit
		(MHz)	(dBm)	(dBm)
802.11b	Low	2412	18.31	30
	Middle	2437	18.41	30
	High	2462	18.3	30
802.11g	Low	2412	20.61	30
	Middle	2437	20.78	30
	High	2462	20.73	30
802.11n20	Low	2412	20.72	30
	Middle	2437	20.88	30
	High	2462	20.8	30
802.11n40	Low	2422	21.55	30
	Middle	2437	21.65	30
	High	2452	21.68	30

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

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

* **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

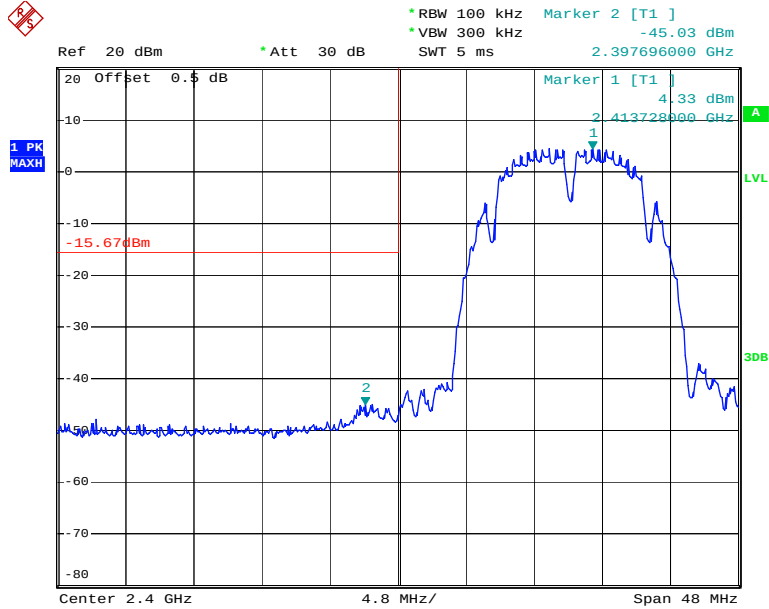
Environmental Conditions

Temperature:	28.1°C
Relative Humidity:	46%
ATM Pressure:	100.3 kPa

* The testing was performed by Rocky Xiao on 2016-07-06.
Test mode: Transmitting

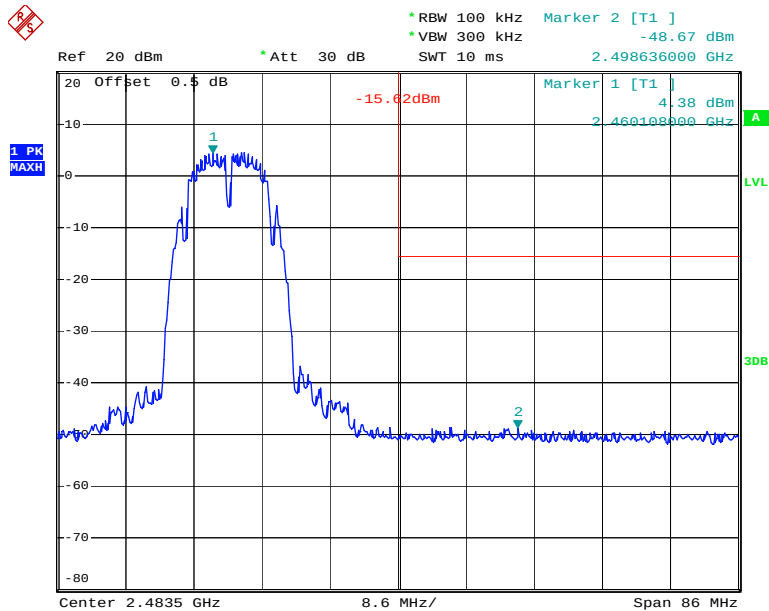
Test Result: Compliant. Please refer to following plots.

802.11b: Band Edge, Left Side



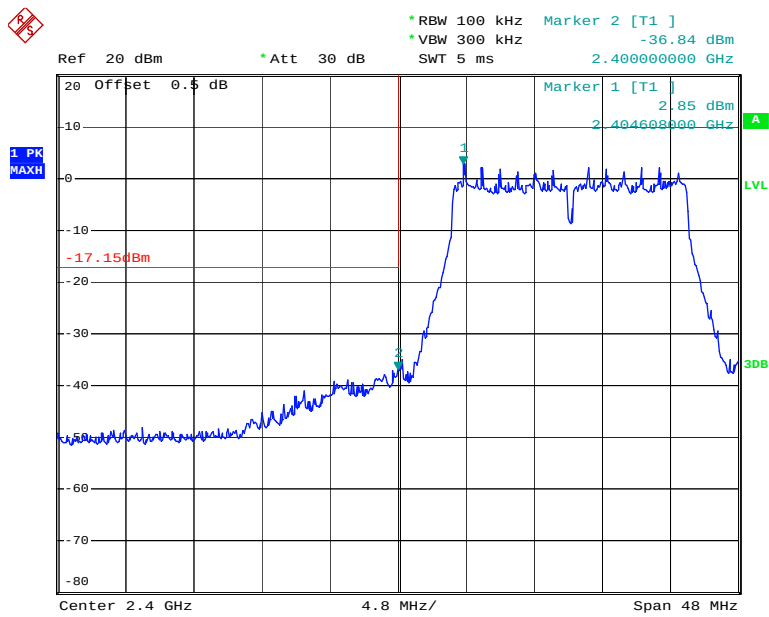
Date: 6.JUL.2016 13:32:23

802.11b: Band Edge, Right Side



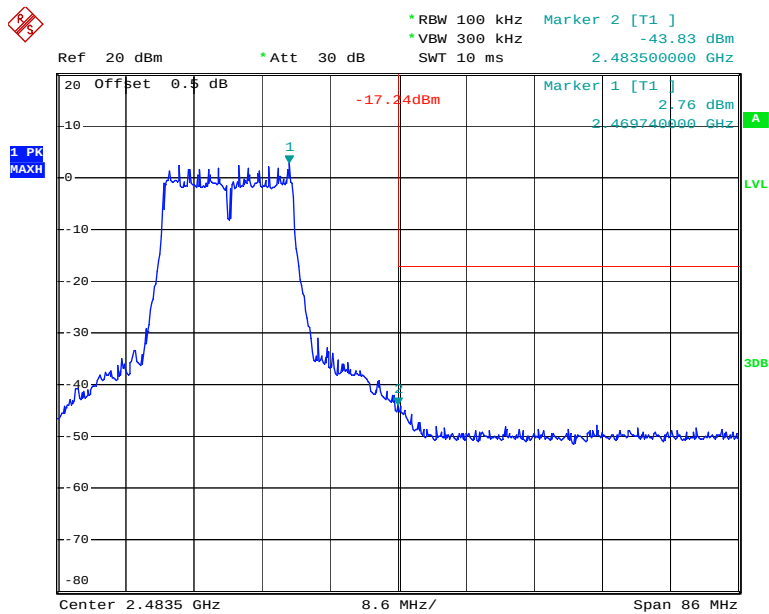
Date: 6.JUL.2016 13:36:54

802.11g: Band Edge, Left Side



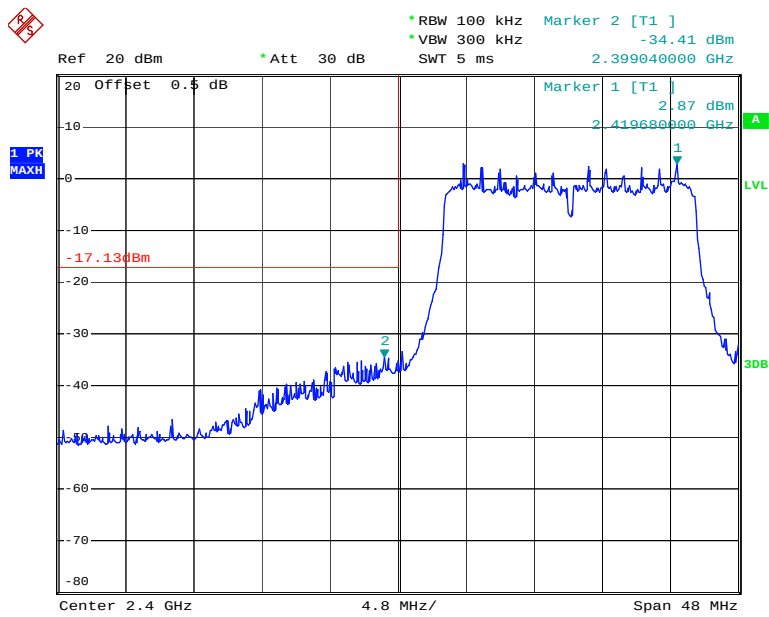
Date: 6.JUL.2016 13:41:41

802.11g: Band Edge, Right Side



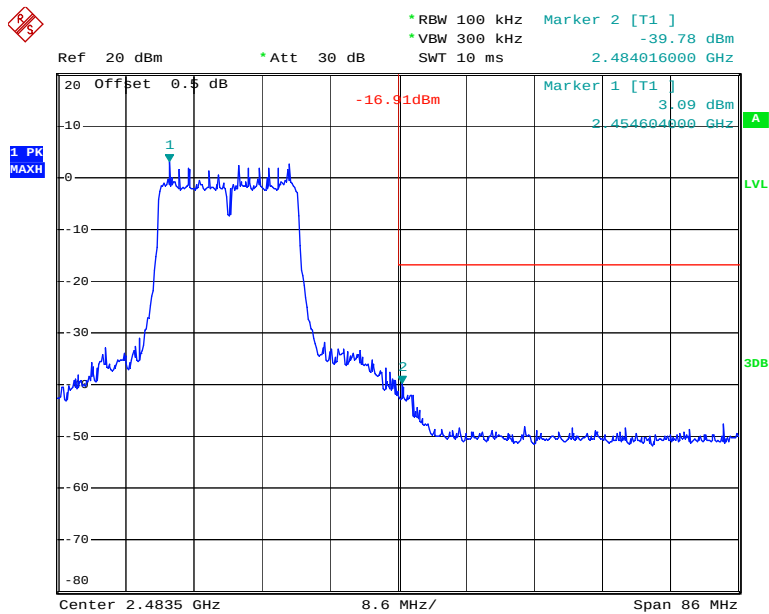
Date: 6.JUL.2016 13:46:40

802.11n ht20 Band Edge, Left Side



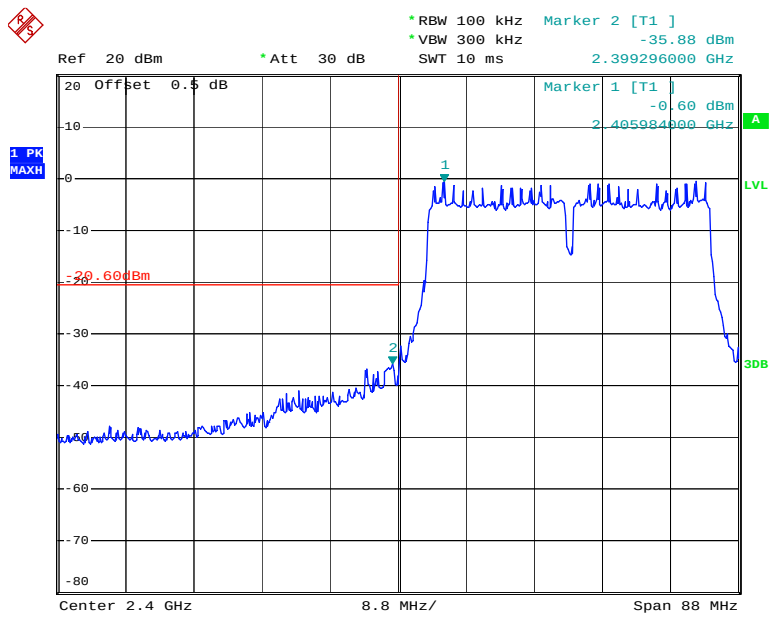
Date: 6.JUL.2016 13:49:25

802.11n ht20 Band Edge, Right Side



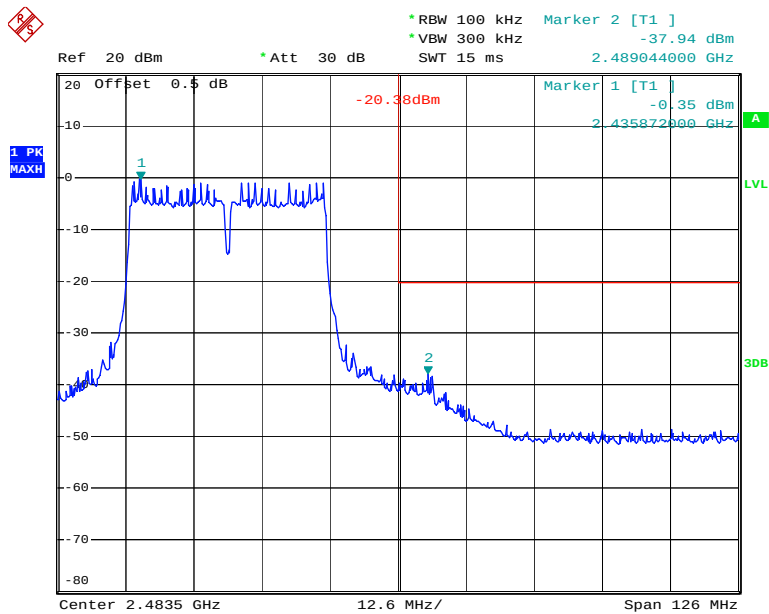
Date: 6.JUL.2016 13:54:18

802.11n ht40 Band Edge, Left Side



Date: 6.JUL.2016 13:57:22

802.11n ht20 Band Edge, Right Side



Date: 6.JUL.2016 14:02:34

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

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq 3 \times \text{RBW}$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.
- 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	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

* **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:	28.1°C
Relative Humidity:	46 %
ATM Pressure:	100.3 kPa

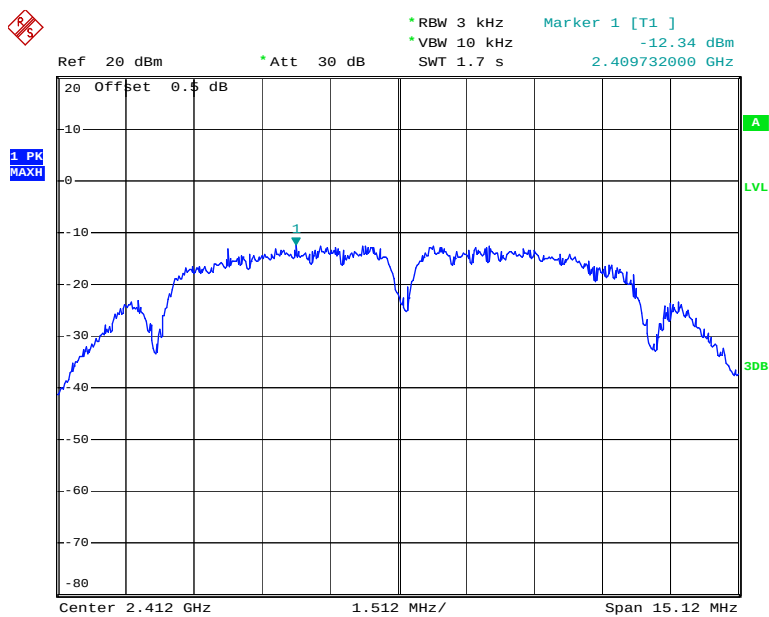
* The testing was performed by Rocky Xiao on 2016-07-06.

Test Mode: Transmitting

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

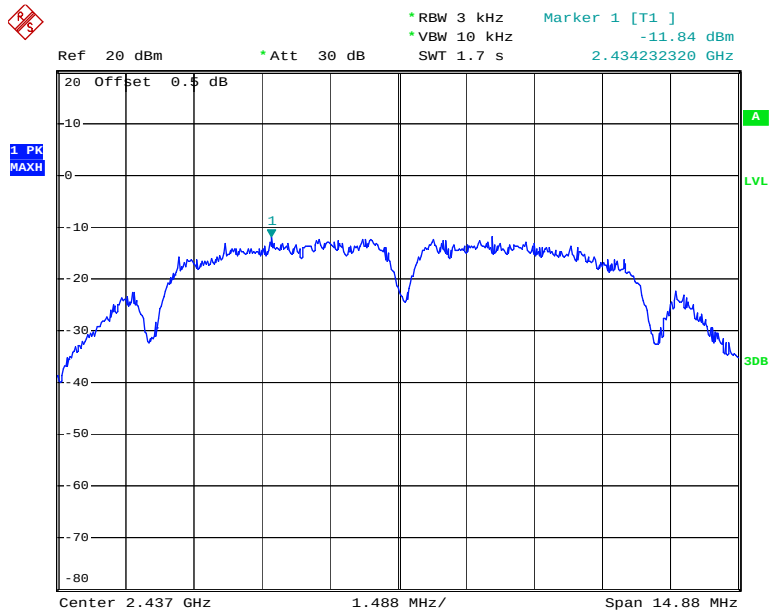
Test mode	Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	Low	2412	-12.34	≤ 8
	Middle	2437	-11.84	≤ 8
	High	2462	-11.88	≤ 8
802.11g	Low	2412	-14.4	≤ 8
	Middle	2437	-12.67	≤ 8
	High	2462	-14.16	≤ 8
802.11n20	Low	2412	-13.68	≤ 8
	Middle	2437	-12.84	≤ 8
	High	2462	-13.62	≤ 8
802.11n40	Low	2422	-16.35	≤ 8
	Middle	2437	-14.35	≤ 8
	High	2452	-16.19	≤ 8

Power Spectral Density, 802.11b Low Channel



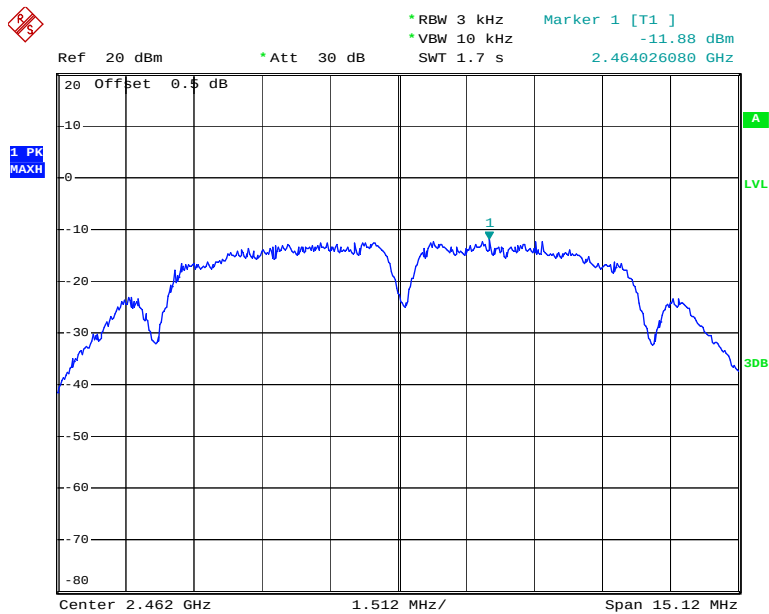
Date: 6.JUL.2016 13:31:53

Power Spectral Density, 802.11b Middle Channel



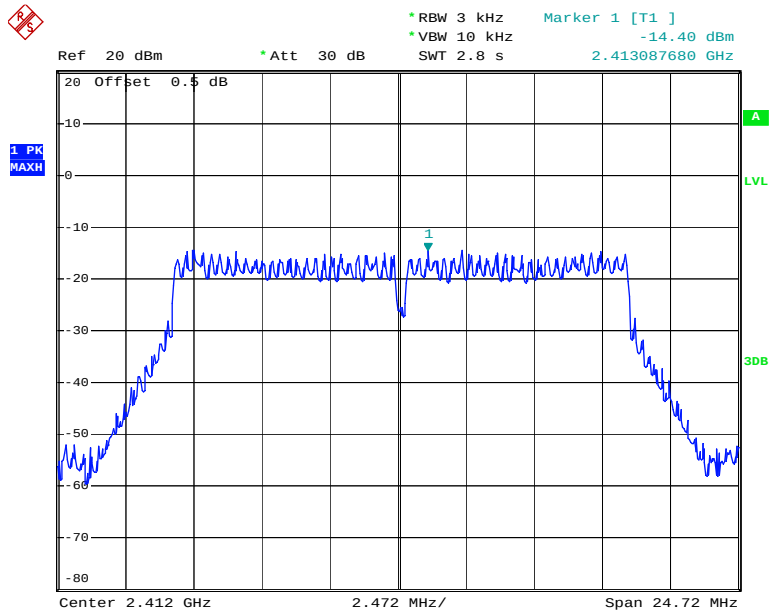
Date: 6.JUL.2016 13:34:26

Power Spectral Density, 802.11b High Channel



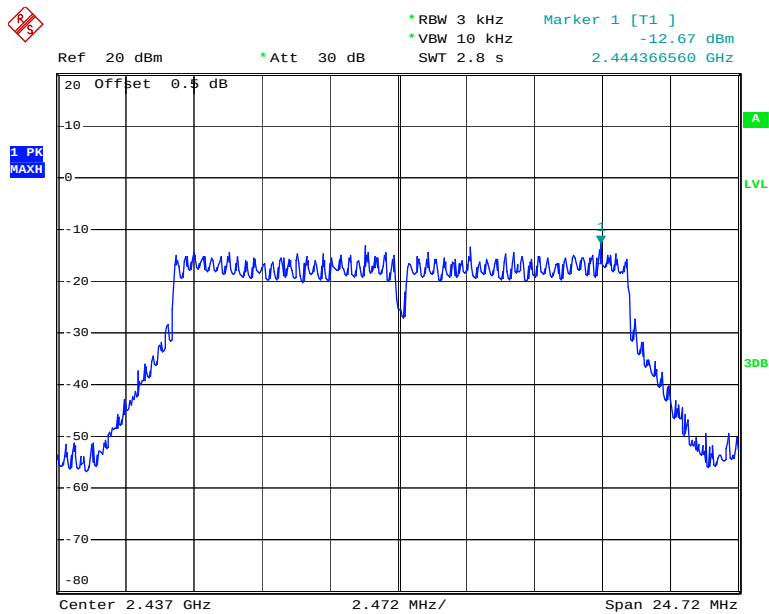
Date: 6.JUL.2016 13:36:36

Power Spectral Density, 802.11g Low Channel



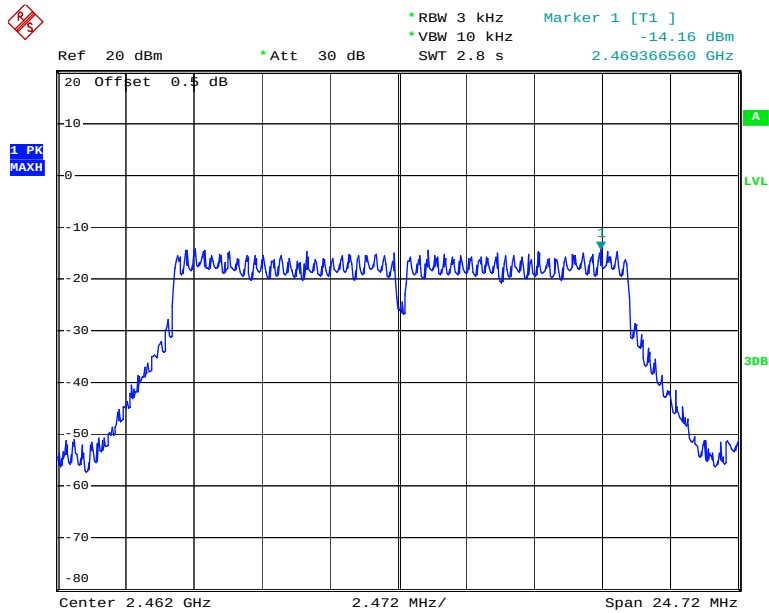
Date: 6.JUL.2016 13:41:16

Power Spectral Density, 802.11g Middle Channel



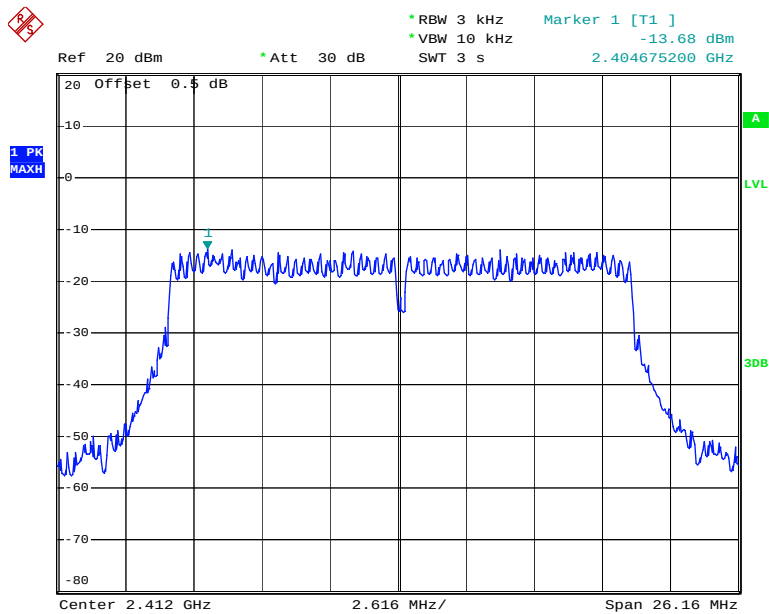
Date: 6.JUL.2016 13:43:51

Power Spectral Density, 802.11g High Channel



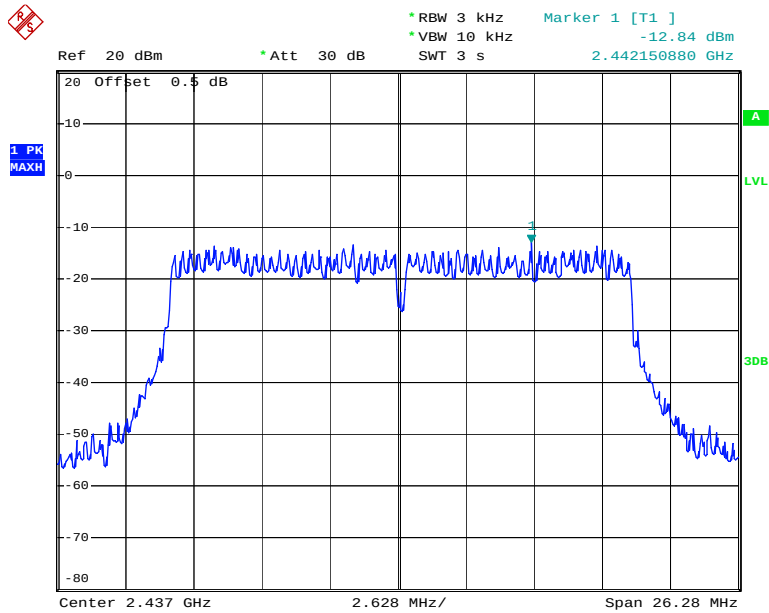
Date: 6.JUL.2016 13:46:11

Power Spectral Density, 802.11n ht20 Low Channel



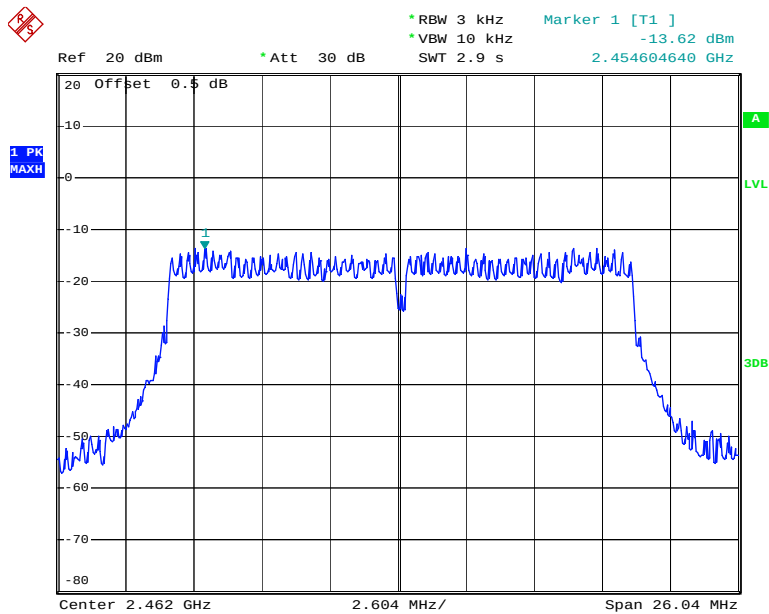
Date: 6.JUL.2016 13:49:08

Power Spectral Density, 802.11n ht20 Middle Channel



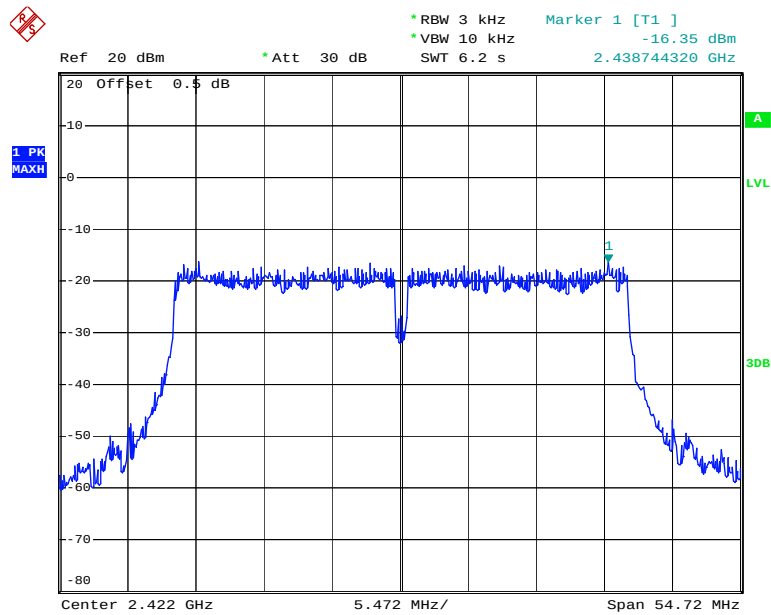
Date: 6.JUL.2016 13:51:36

Power Spectral Density, 802.11n ht20 High Channel



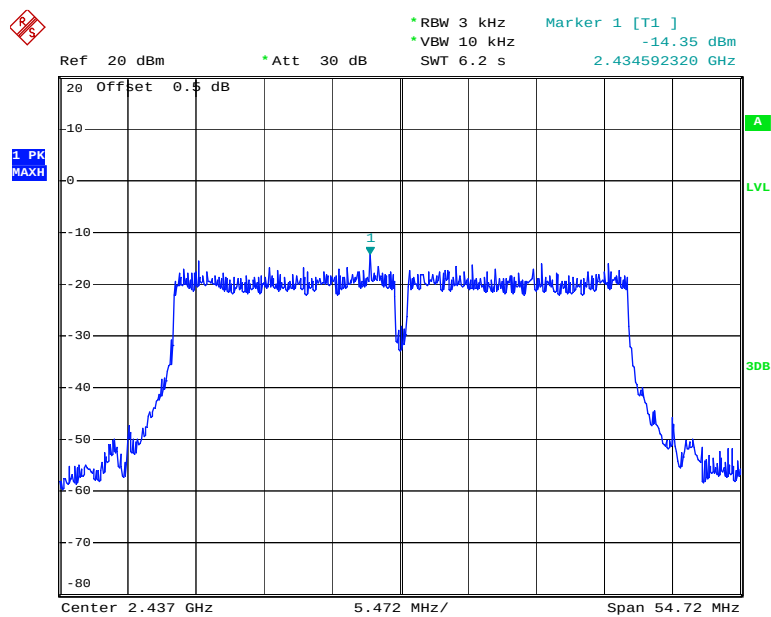
Date: 6.JUL.2016 13:53:59

Power Spectral Density, 802.11n ht40 Low Channel



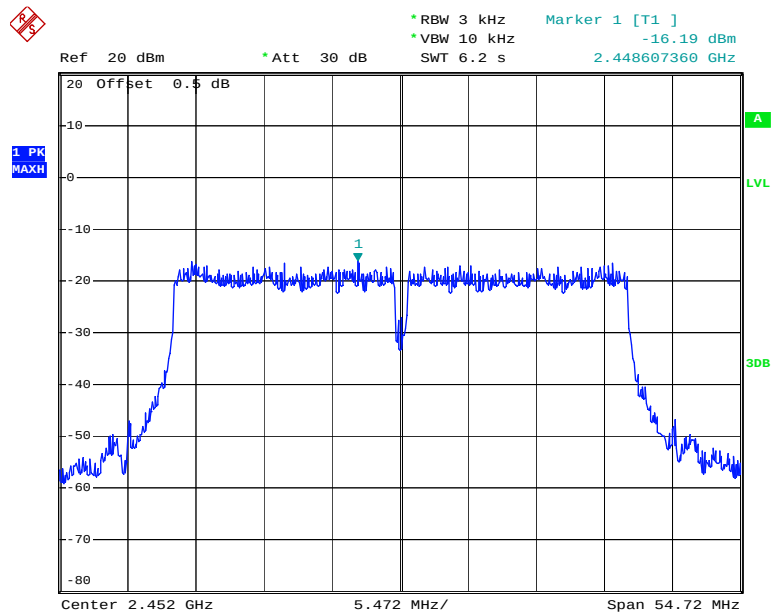
Date: 6.JUL.2016 13:56:57

Power Spectral Density, 802.11n ht40 Middle Channel



Date: 6.JUL.2016 13:59:55

Power Spectral Density, 802.11n ht40 High Channel



Date: 6.JUL.2016 14:02:15

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