

FCC PART 15.247

TEST REPORT

For

Shenzhen Rapoo Technology Co., Ltd.

22, Jinxiu Road East, Pingshan District, Shenzhen, China

FCC ID: PP2UG3300

Report Type: Original Report	Product Type: Vision Gimbal
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Report Number:	RDG150331007-00
Report Date:	2015-04-11
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FINAL

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Shenzhen Rapoo Technology Co., Ltd.*'s product, model number: *UG3300(FCC ID: PP2UG3300)* (or the "EUT") in this report was a *Vision Gimbal*, which was measured approximately: 11.0 cm (L) x 9.0 cm (W) x 11.0 cm (H), rated input voltage: DC 12.0V from aircraft System.

** All measurement and test data in this report was gathered from production sample serial number: 150331007 (Assigned by applicant). The EUT was received on 2015-04-03.*

Objective

This report is prepared on behalf of *Shenzhen Rapoo Technology Co., Ltd.* 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, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

N/A

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

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 facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

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. 11 channels employed by the system:

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 modes were tested with Channel 1, 6 and 11.

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

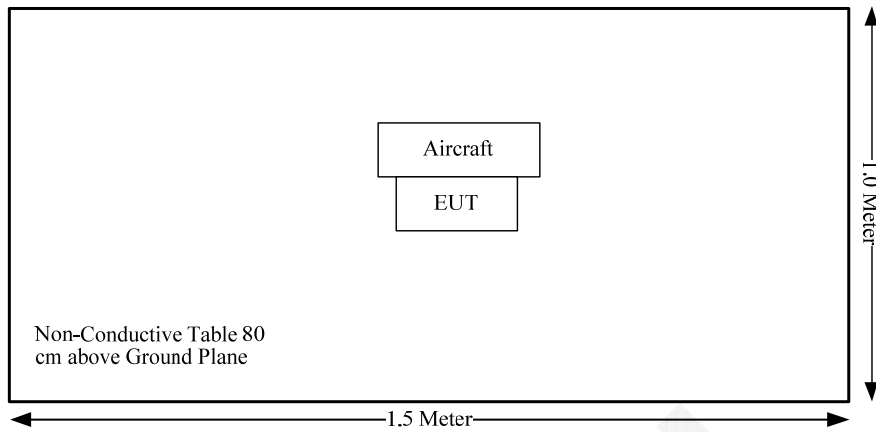
The worst condition (maximum power with 100% duty cycle) was setting by the software as following table:

Software and version			SmartTools 20110519		
Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Power Level	
				Chain 0	Chain 1
802.11 b	Low	2412	1	42	42
	Middle	2437	1	40	40
	High	2462	1	38	38
802.11 g	Low	2412	6	35	35
	Middle	2437	6	33	33
	High	2462	6	30	30

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Rapoo	Aircraft	UA3500	150331003

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	Maximum Permissible Exposure	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

Not Applicable*: the device was powered by DC from system in the operation mode.

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/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)			
2437	3.4	2.19	23.1	204.17	20.00	0.08891	1.0

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 two internal antennas arrangement and the antenna gains are 3.4 dBi, which 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_{cisp} 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_{cisp} of Table 2, then:

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

Based on CISPR 16-4-2-2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:

30M~200MHz: 5.0 dB

200M~1GHz: 6.2 dB

1G~6GHz: 4.45 dB

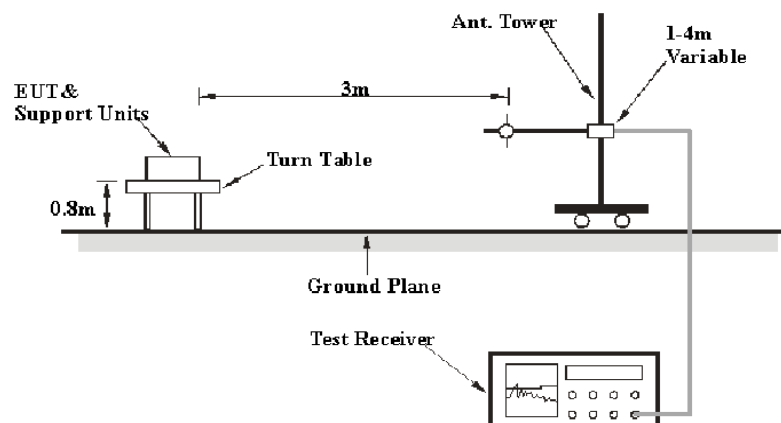
6G~18GHz: 5.23 dB

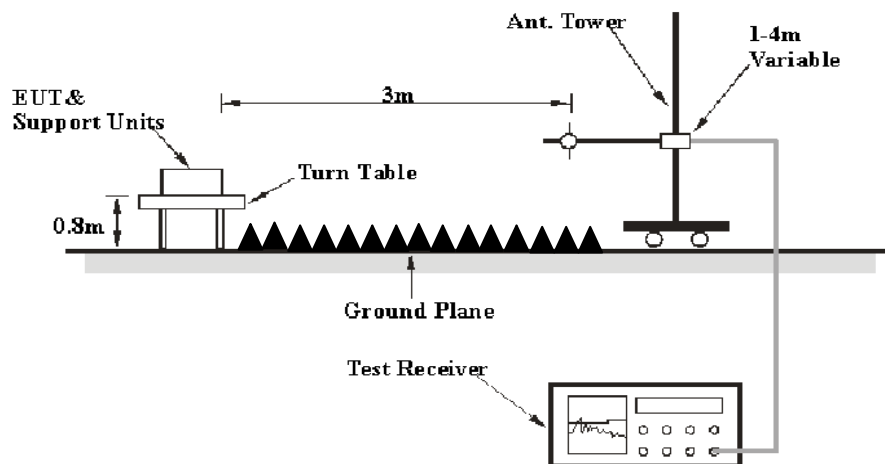
Table 2 – Values of U_{cisp}

Measurement	U_{cisp}
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 C63.4-2009. 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	/	Ave.

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	2014-05-09	2015-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01
Agilent	Spectrum Analyzer	E4440A	SG43360054	2014-12-04	2015-12-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2015-02-19	2016-02-19
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2014-09-06	2015-09-06

* **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:

2.44 dB at 7236MHz in the Vertical polarization for 802.11 b Mode

Test Data

Environmental Conditions

Temperature:	21.6°C
Relative Humidity:	58 %
ATM Pressure:	101.4 kPa

* The testing was performed by Allen Qiao on 2015-04-11.

Test Mode: Transmitting

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	71.83	PK	H	25.67	3.68	0.00	101.18	N/A	N/A
2412	66.69	AV	H	25.67	3.68	0.00	96.04	N/A	N/A
2412	79.66	PK	V	25.67	3.68	0.00	109.01	N/A	N/A
2412	74.46	AV	V	25.67	3.68	0.00	103.81	N/A	N/A
2390	35.36	PK	V	25.61	3.63	0.00	64.60	74.00	9.40
2390	17	AV	V	25.61	3.63	0.00	46.24	54.00	7.76
4824	44.98	PK	V	30.64	5.03	27.41	53.24	74.00	20.76
4824	40.48	AV	V	30.64	5.03	27.41	48.74	54.00	5.26
7236	43.36	PK	V	34.17	6.65	25.90	58.28	74.00	15.72
7236	36.64	AV	V	34.17	6.65	25.90	51.56	54.00	2.44 *
9648	34.25	PK	V	36.06	8.55	27.46	51.40	74.00	22.60
9648	26.47	AV	V	36.06	8.55	27.46	43.62	54.00	10.38
5613	34.28	PK	V	32.12	5.61	26.76	45.25	74.00	28.75
5613	21.31	AV	V	32.12	5.61	26.76	32.28	54.00	21.72
260.86	29.2	QP	V	12.92	1.95	21.50	22.57	46.00	23.43
Middle Channel: 2437 MHz									
2437	71.68	PK	H	25.74	3.75	0.00	101.17	N/A	N/A
2437	66.37	AV	H	25.74	3.75	0.00	95.86	N/A	N/A
2437	79.43	PK	V	25.74	3.75	0.00	108.92	N/A	N/A
2437	73.38	AV	V	25.74	3.75	0.00	102.87	N/A	N/A
4874	45.15	PK	V	30.77	5.14	27.42	53.64	74.00	20.36
4874	41.73	AV	V	30.77	5.14	27.42	50.22	54.00	3.78 *
7311	44.26	PK	V	34.35	6.74	25.88	59.47	74.00	14.53
7311	35.22	AV	V	34.35	6.74	25.88	50.43	54.00	3.57 *
9748	33.39	PK	V	36.30	8.61	27.24	51.06	74.00	22.94
9748	25.32	AV	V	36.30	8.61	27.24	42.99	54.00	11.01
3947	36.36	PK	V	29.78	4.83	27.25	43.72	74.00	30.28
3947	22.48	AV	V	29.78	4.83	27.25	29.84	54.00	24.16
5613	34.51	PK	V	32.12	5.61	26.76	45.48	74.00	28.52
5613	21.27	AV	V	32.12	5.61	26.76	32.24	54.00	21.76
526.64	33.32	QP	V	18.34	2.79	22.09	32.36	46.00	13.64
260.86	29.3	QP	V	12.92	1.95	21.50	22.67	46.00	23.33
High Channel: 2462 MHz									
2462	71.12	PK	H	25.80	3.75	0.00	100.67	N/A	N/A
2462	66.07	AV	H	25.80	3.75	0.00	95.62	N/A	N/A
2462	78.56	PK	V	25.80	3.75	0.00	108.11	N/A	N/A
2462	72.11	AV	V	25.80	3.75	0.00	101.66	N/A	N/A
2483.5	38.69	PK	V	25.86	3.67	0.00	68.22	74.00	5.78
2483.5	16.23	AV	V	25.86	3.67	0.00	45.76	54.00	8.24
4924	45.63	PK	V	30.90	5.34	27.43	54.44	74.00	19.56
4924	41.41	AV	V	30.90	5.34	27.43	50.22	54.00	3.78 *
7386	43.02	PK	V	34.53	6.83	25.86	58.52	74.00	15.48
7386	34.25	AV	V	34.53	6.83	25.86	49.75	54.00	4.25 *
9848	33.14	PK	V	36.54	8.66	26.94	51.40	74.00	22.60
9848	25.12	AV	V	36.54	8.66	26.94	43.38	54.00	10.62
5613	33.47	PK	V	32.12	5.61	26.76	44.44	74.00	29.56
5613	20.83	AV	V	32.12	5.61	26.76	31.80	54.00	22.20
260.86	28.9	QP	V	12.92	1.95	21.50	22.27	46.00	23.73

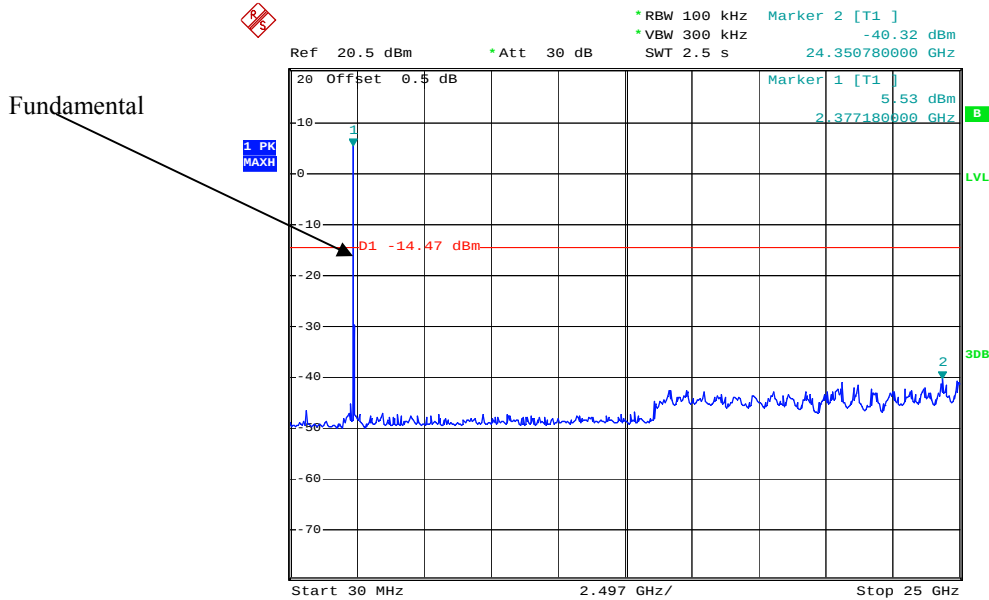
*Within measurement uncertainty!

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	74.39	PK	H	25.67	3.68	0.00	103.74	N/A	N/A
2412	63.37	AV	H	25.67	3.68	0.00	92.72	N/A	N/A
2412	76.09	PK	V	25.67	3.68	0.00	105.44	N/A	N/A
2412	65.51	AV	V	25.67	3.68	0.00	94.86	N/A	N/A
2390	28.64	PK	V	25.61	3.63	0.00	57.88	74.00	16.12
2390	16.34	AV	V	25.61	3.63	0.00	45.58	54.00	8.42
4824	40.68	PK	H	30.64	5.03	27.41	48.94	74.00	25.06
4824	26.33	AV	H	30.64	5.03	27.41	34.59	54.00	19.41
7236	39.64	PK	H	34.17	6.65	25.90	54.56	74.00	19.44
7236	24.22	AV	H	34.17	6.65	25.90	39.14	54.00	14.86
9648	31.05	PK	H	36.06	8.55	27.46	48.20	74.00	25.80
9648	19.25	AV	H	36.06	8.55	27.46	36.40	54.00	17.60
5613	33.68	PK	H	32.12	5.61	26.76	44.65	74.00	29.35
5613	30.27	AV	H	32.12	5.61	26.76	41.24	54.00	12.76
260.86	28.8	QP	V	12.92	1.95	21.50	22.17	46.00	23.83
Middle Channel: 2437 MHz									
2437	73.48	PK	H	25.74	3.75	0.00	102.97	N/A	N/A
2437	62.38	AV	H	25.74	3.75	0.00	91.87	N/A	N/A
2437	75.36	PK	V	25.74	3.75	0.00	104.85	N/A	N/A
2437	65.14	AV	V	25.74	3.75	0.00	94.63	N/A	N/A
4874	41	PK	H	30.77	5.14	27.42	49.49	74.00	24.51
4874	26.81	AV	H	30.77	5.14	27.42	35.30	54.00	18.70
7311	40.03	PK	H	34.35	6.74	25.88	55.24	74.00	18.76
7311	24.12	AV	H	34.35	6.74	25.88	39.33	54.00	14.67
9748	30.64	PK	H	36.30	8.61	27.24	48.31	74.00	25.69
9748	18.85	AV	H	36.30	8.61	27.24	36.52	54.00	17.48
3947	33.27	PK	H	29.78	4.83	27.25	40.63	74.00	33.37
3947	29.94	AV	H	29.78	4.83	27.25	37.30	54.00	16.70
5613	34.21	PK	H	32.12	5.61	26.76	45.18	74.00	28.82
5613	21.15	AV	H	32.12	5.61	26.76	32.12	54.00	21.88
526.64	33.32	QP	V	18.34	2.79	22.09	32.36	46.00	13.64
260.86	29.4	QP	V	12.92	1.95	21.50	22.77	46.00	23.23
High Channel: 2462 MHz									
2462	73.34	PK	H	25.80	3.75	0.00	102.89	N/A	N/A
2462	52.14	AV	H	25.80	3.75	0.00	81.69	N/A	N/A
2462	75.36	PK	V	25.80	3.75	0.00	104.91	N/A	N/A
2462	65.28	AV	V	25.80	3.75	0.00	94.83	N/A	N/A
2483.5	32.65	PK	V	25.86	3.67	0.00	62.18	74.00	11.82
2483.5	16.23	AV	V	25.86	3.67	0.00	45.76	54.00	8.24
4924	40.12	PK	V	30.90	5.34	27.43	48.93	74.00	25.07
4924	26.89	AV	V	30.90	5.34	27.43	35.70	54.00	18.30
7386	41.33	PK	V	34.53	6.83	25.86	56.83	74.00	17.17
7386	24.36	AV	V	34.53	6.83	25.86	39.86	54.00	14.14
9848	30.39	PK	V	36.54	8.66	26.94	48.65	74.00	25.35
9848	18.58	AV	V	36.54	8.66	26.94	36.84	54.00	17.16
5613	32.98	PK	V	32.12	5.61	26.76	43.95	74.00	30.05
5613	29.7	AV	V	32.12	5.61	26.76	40.67	54.00	13.33
260.86	29	QP	V	12.92	1.95	21.50	22.37	46.00	23.63

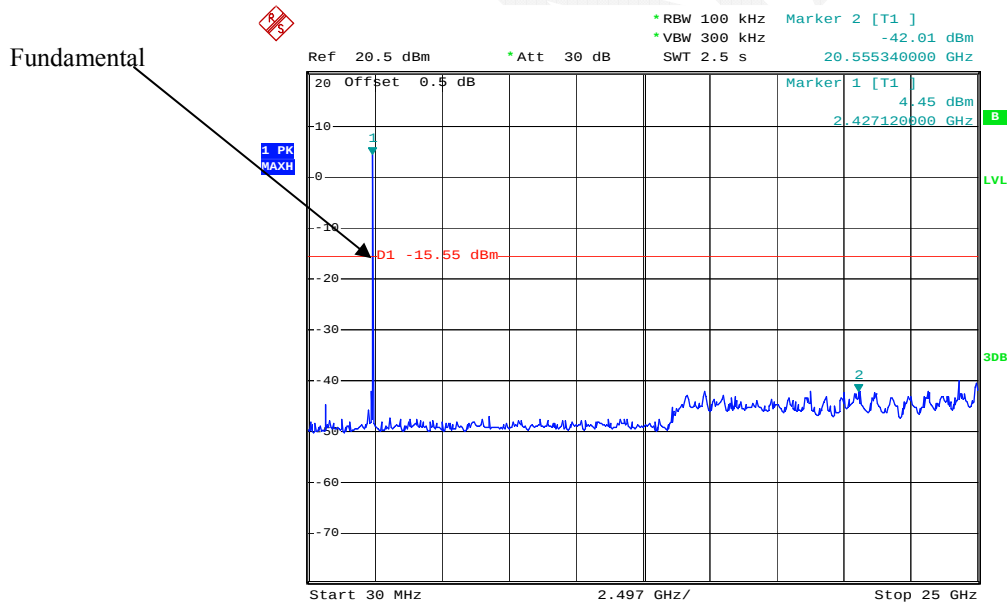
Conducted Spurious Emissions at Antenna Port

Chain 0 802.11b Low Channel



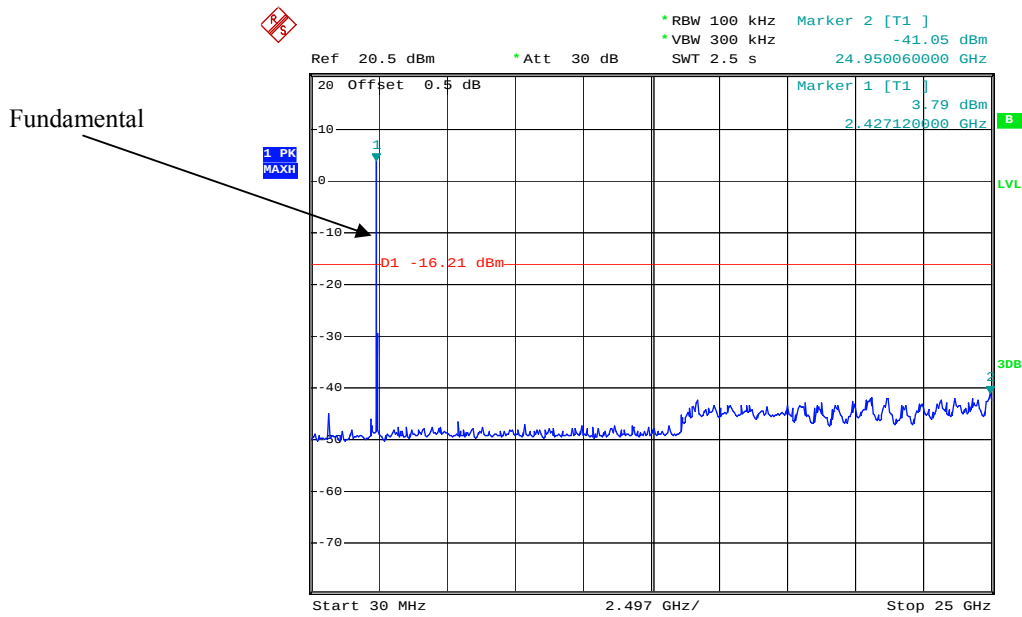
Date: 11.APR.2015 09:25:09

Chain 0 802.11b Middle Channel



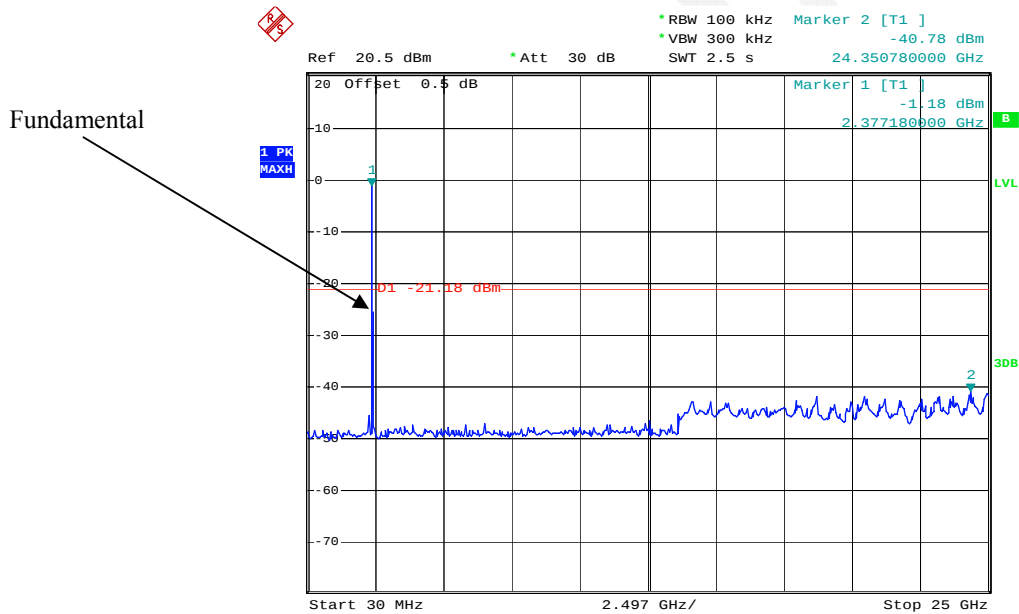
Date: 11.APR.2015 09:27:05

Chain 0 802.11b High Channel

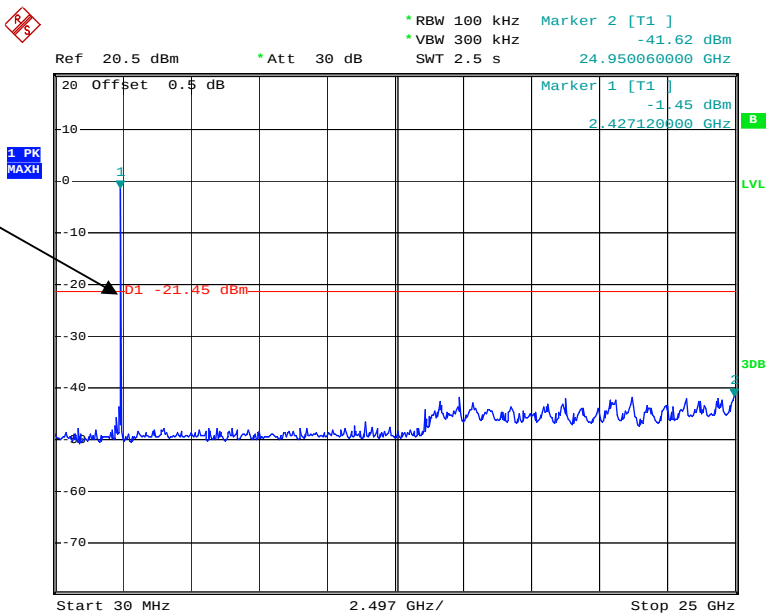


Date: 11.APR.2015 09:29:08

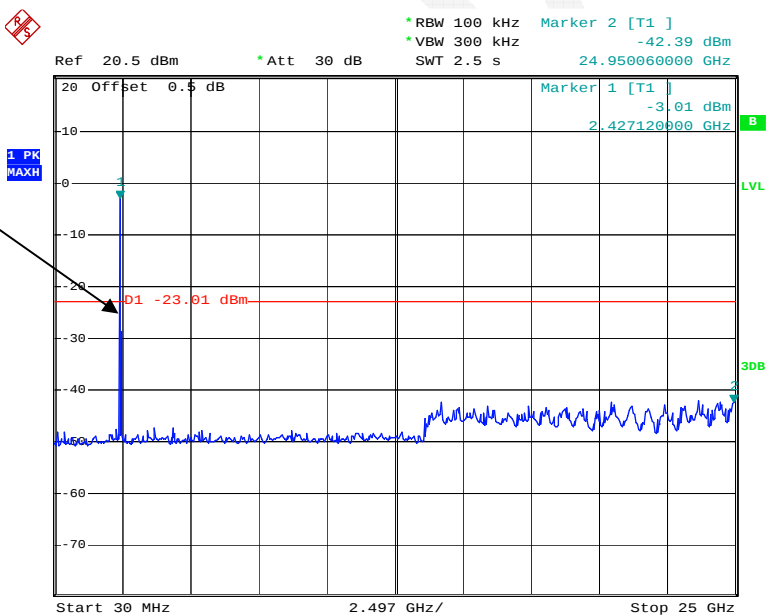
Chain 0 802.11g Low Channel



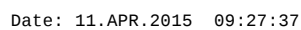
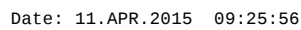
Date: 11.APR.2015 09:33:35



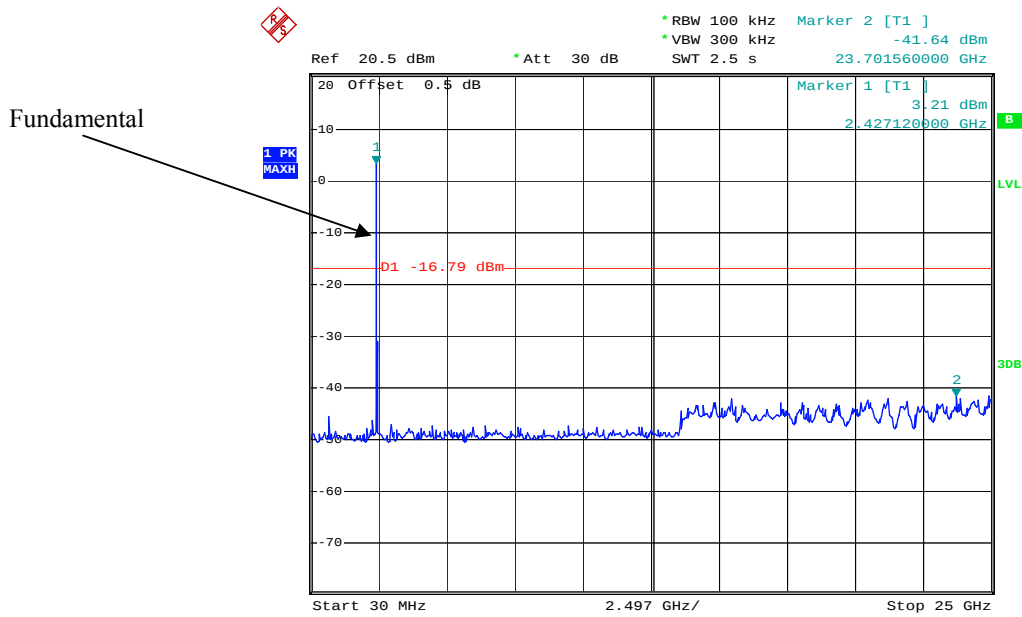
Chain 0 802.11g High Channel



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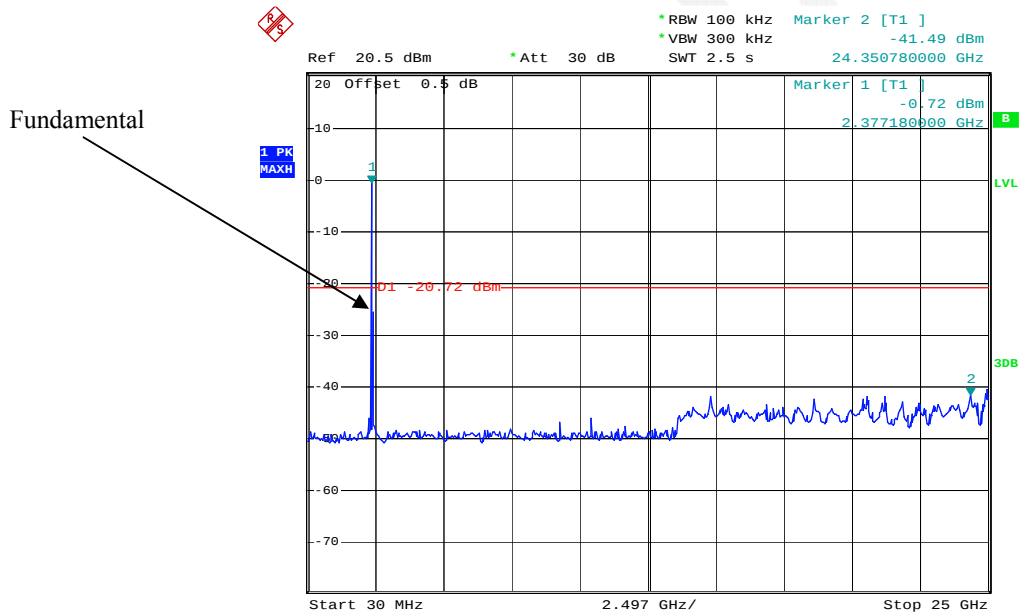


Chain 1 802.11b High Channel



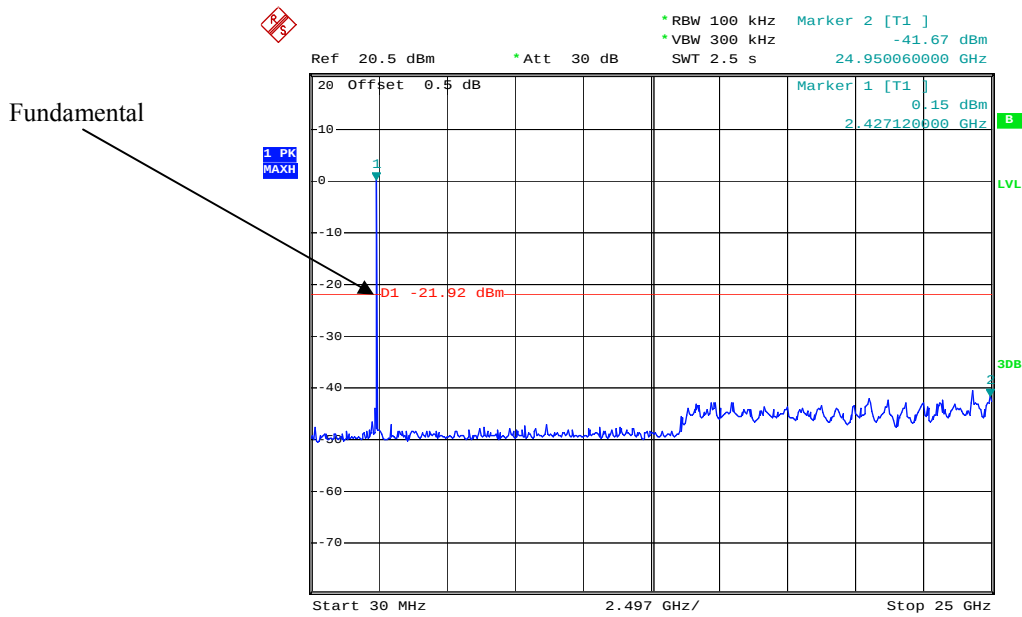
Date: 11.APR.2015 09:31:13

Chain 1 802.11g Low Channel



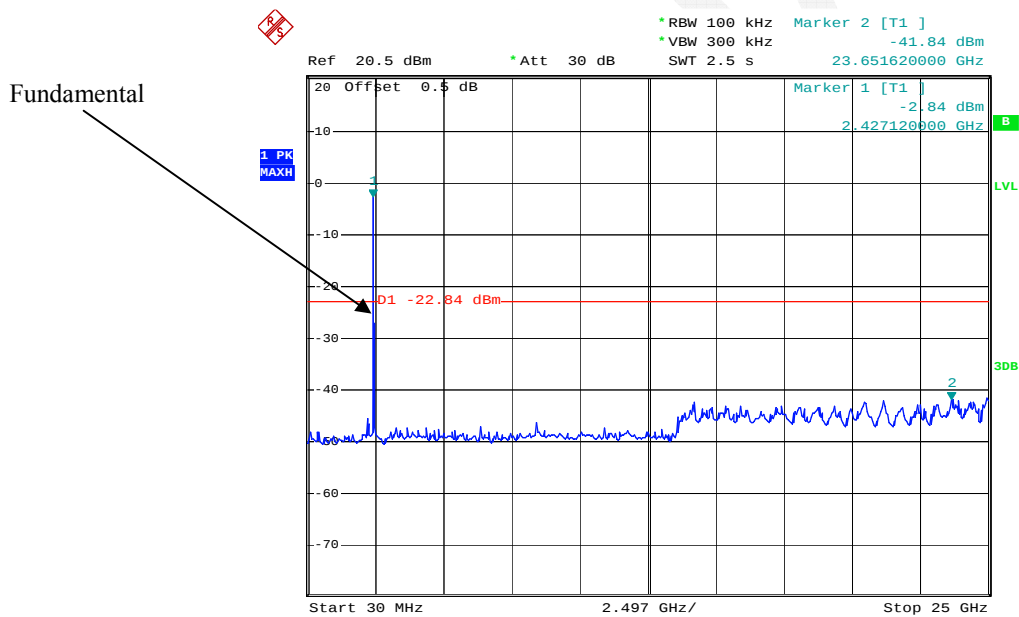
Date: 11.APR.2015 09:33:53

Chain 1 802.11g Middle Channel



Date: 11.APR.2015 09:35:10

Chain 1 802.11g High Channel



Date: 11.APR.2015 09:37:03

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

According to KDB 558074 D01 DTS Meas Guidance v03r02 clause8.1 Option 1:

- 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	FSEM	DE31388	2014-05-09	2015-05-09

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

Test Data

Environmental Conditions

Temperature:	21.8 °C
Relative Humidity:	57 %
ATM Pressure:	101.4 kPa

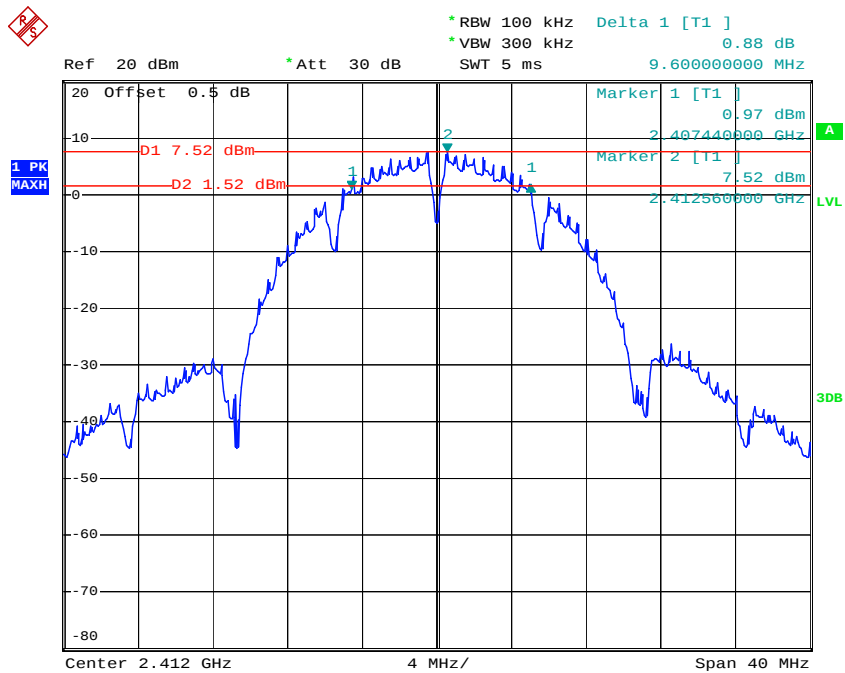
The testing was performed by Allen Qiao on 2015-04-09.

Test Mode: Transmitting

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

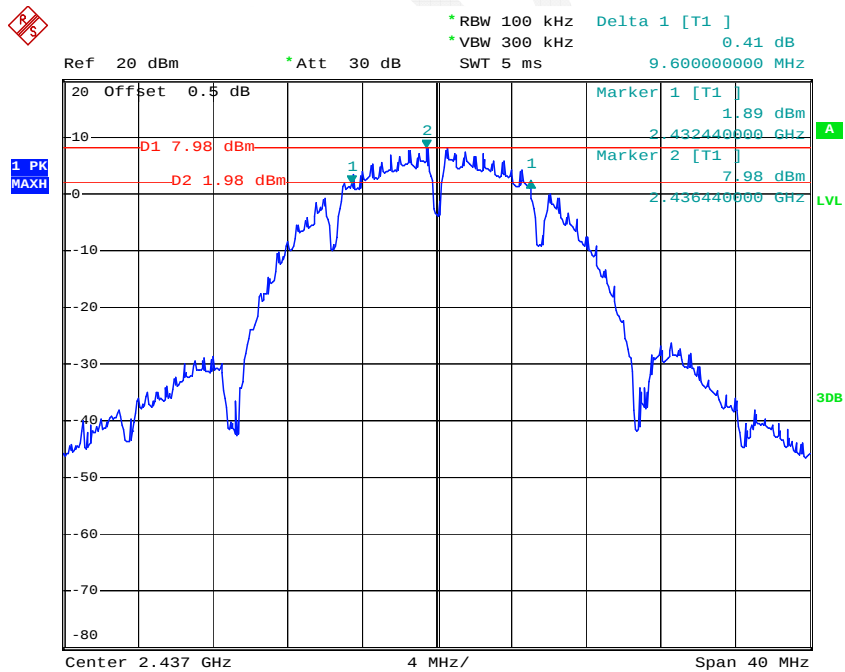
Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Limit (MHz)
			Chain 0	Chain 1	
802.11 b	Low	2412	9.60	10.08	0.5
	Middle	2437	9.60	10.00	0.5
	High	2462	9.68	9.20	0.5
802.11 g	Low	2412	16.40	16.40	0.5
	Middle	2437	16.40	16.40	0.5
	High	2462	16.48	16.48	0.5

Chain 0 802.11b Low Channel



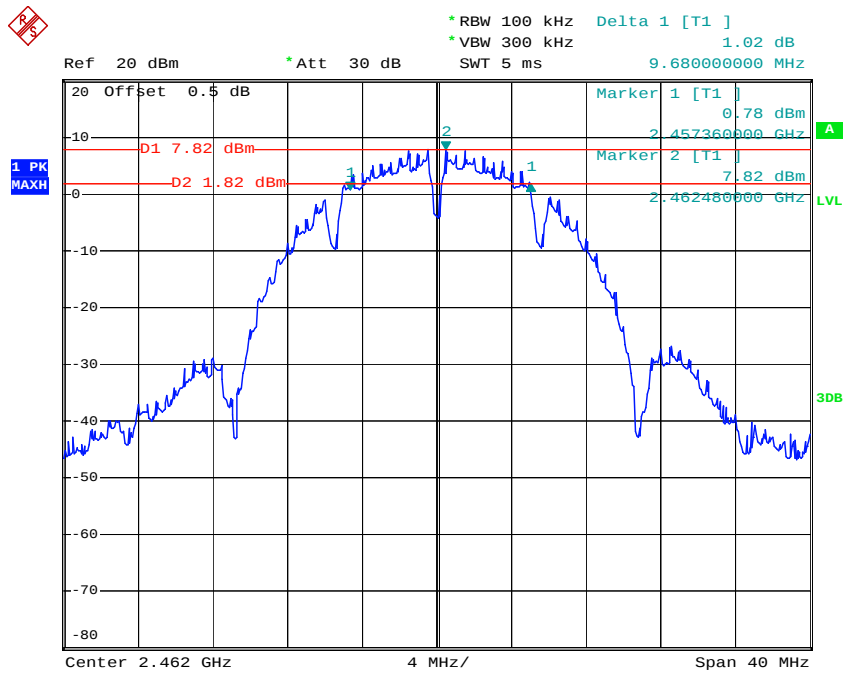
Date: 9.APR.2015 22:29:35

Chain 0 802.11b Middle Channel



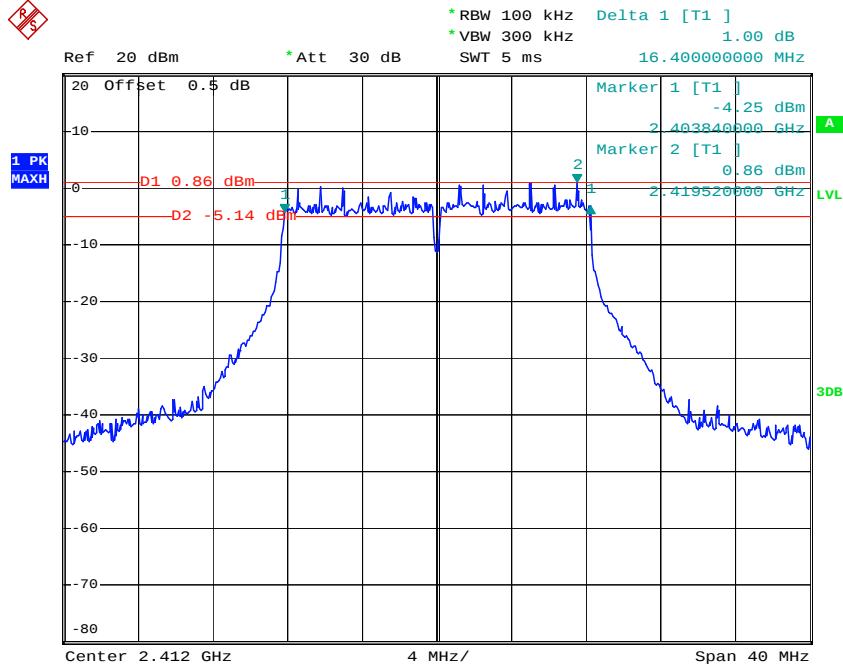
Date: 9.APR.2015 22:30:56

Chain 0 802.11b High Channel



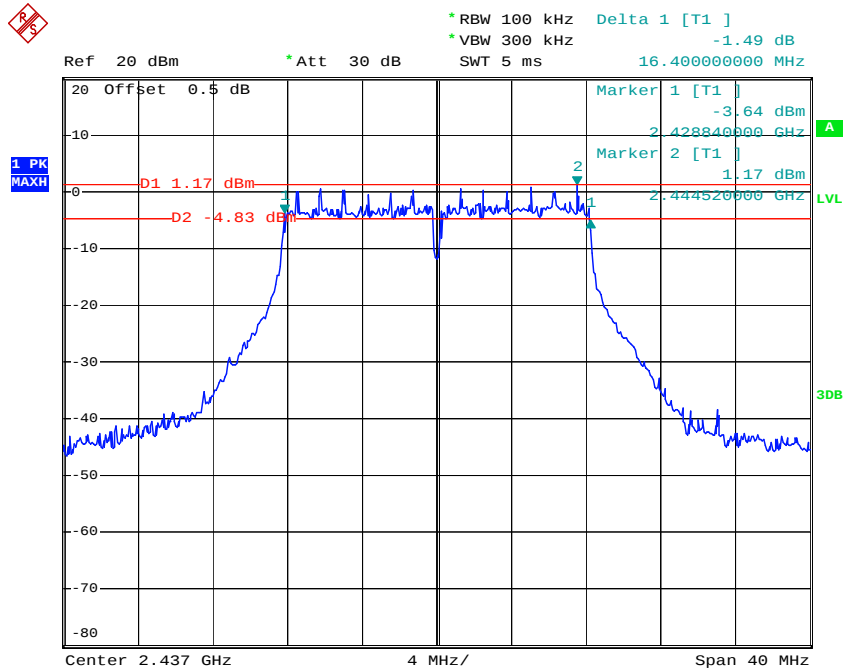
Date: 9.APR.2015 22:32:56

Chain 0 802.11g Low Channel



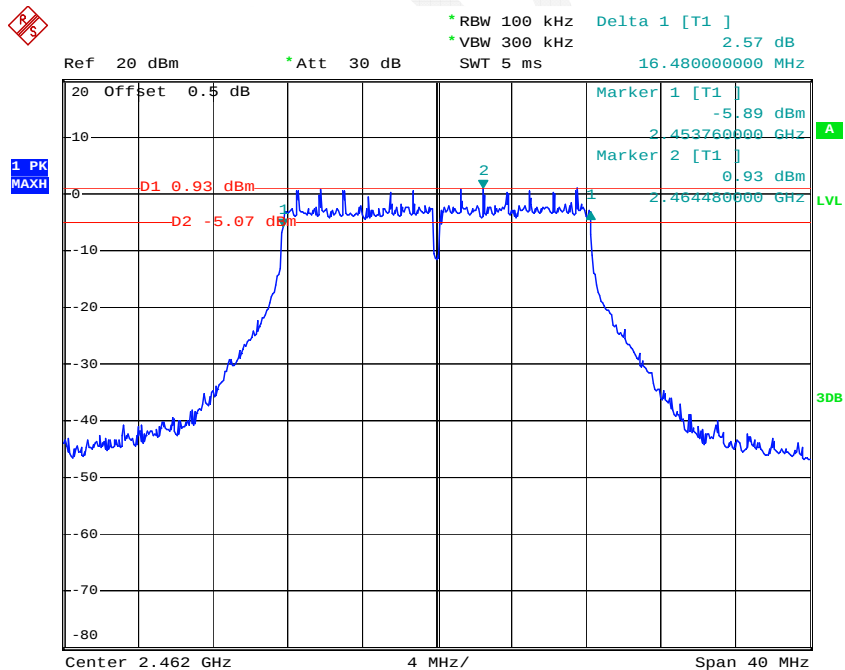
Date: 9.APR.2015 22:35:41

Chain 0 802.11g Middle Channel



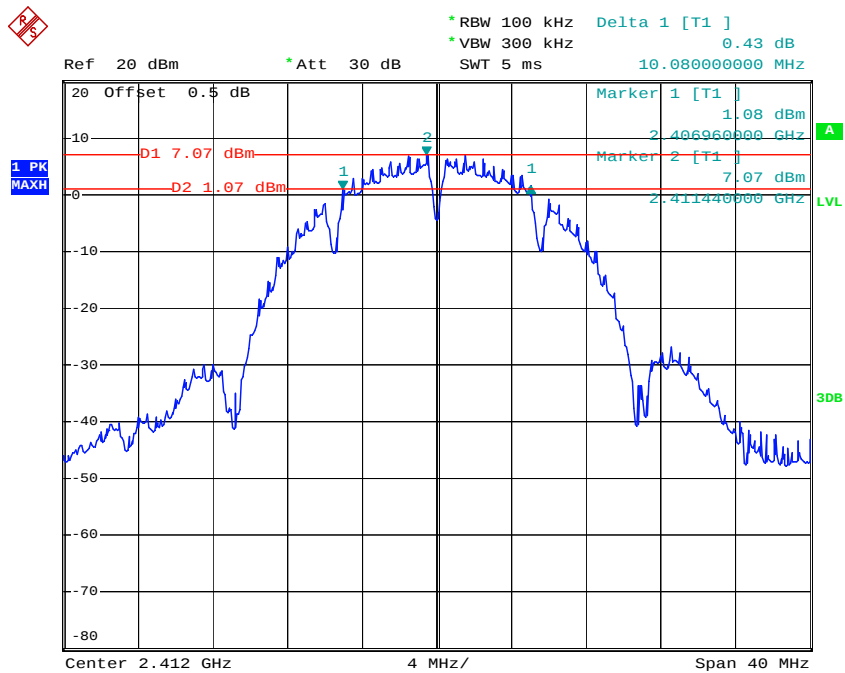
Date: 9.APR.2015 22:38:30

Chain 0 802.11g High Channel



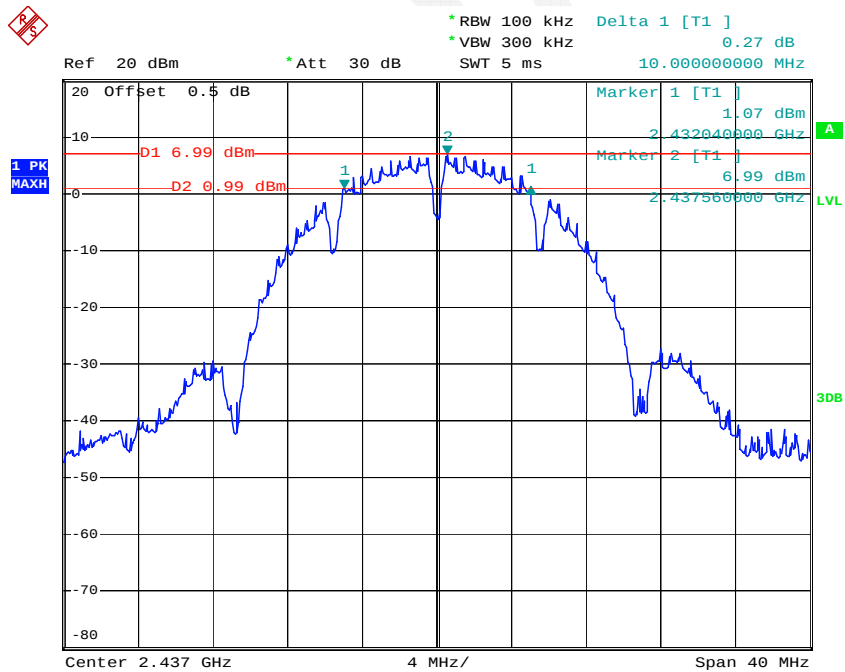
Date: 9.APR.2015 22:40:21

Chain 1 802.11b Low Channel



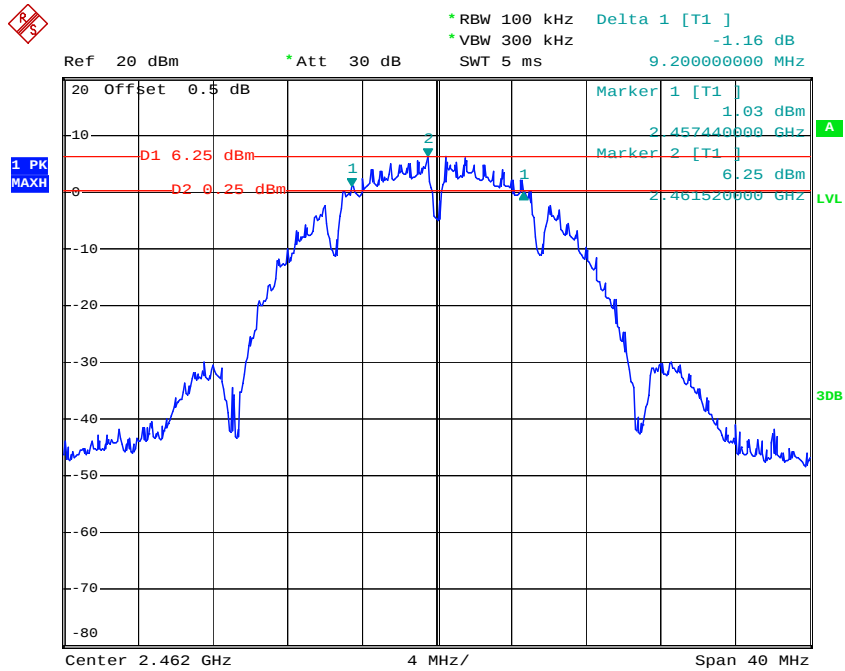
Date: 9.APR.2015 22:13:13

Chain 1 802.11b Middle Channel



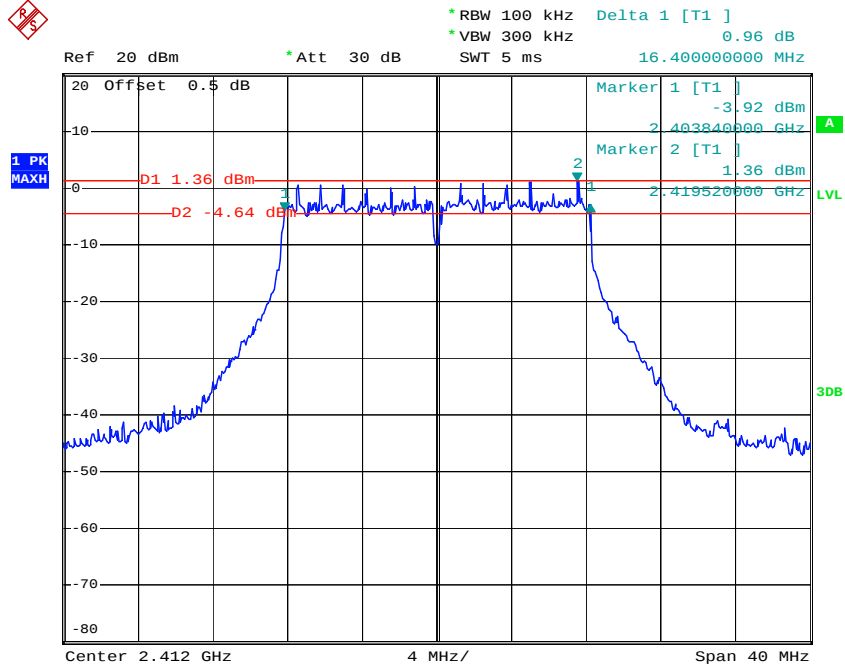
Date: 9.APR.2015 22:15:51

Chain 1 802.11b High Channel



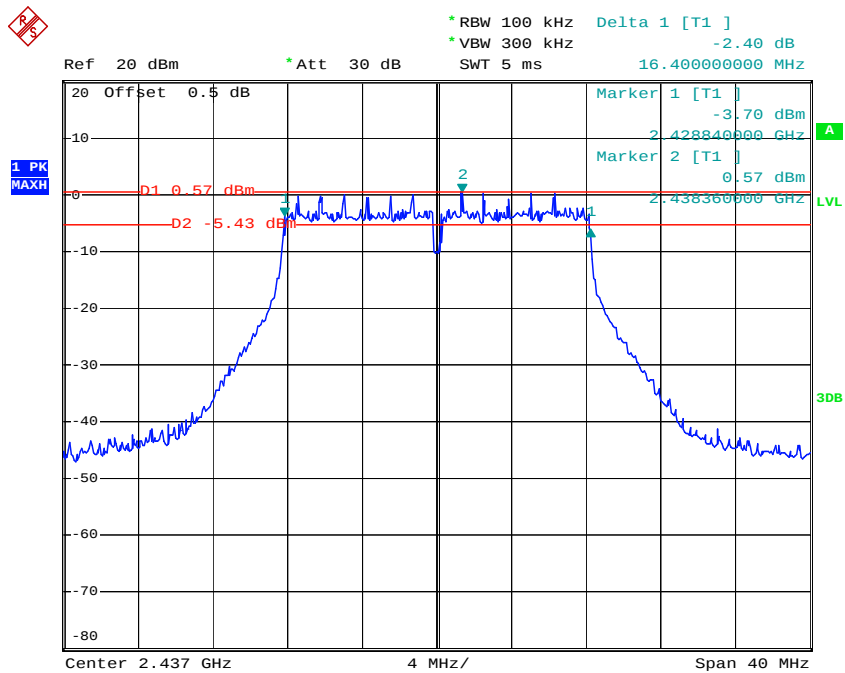
Date: 9.APR.2015 22:17:43

Chain 1 802.11g Low Channel



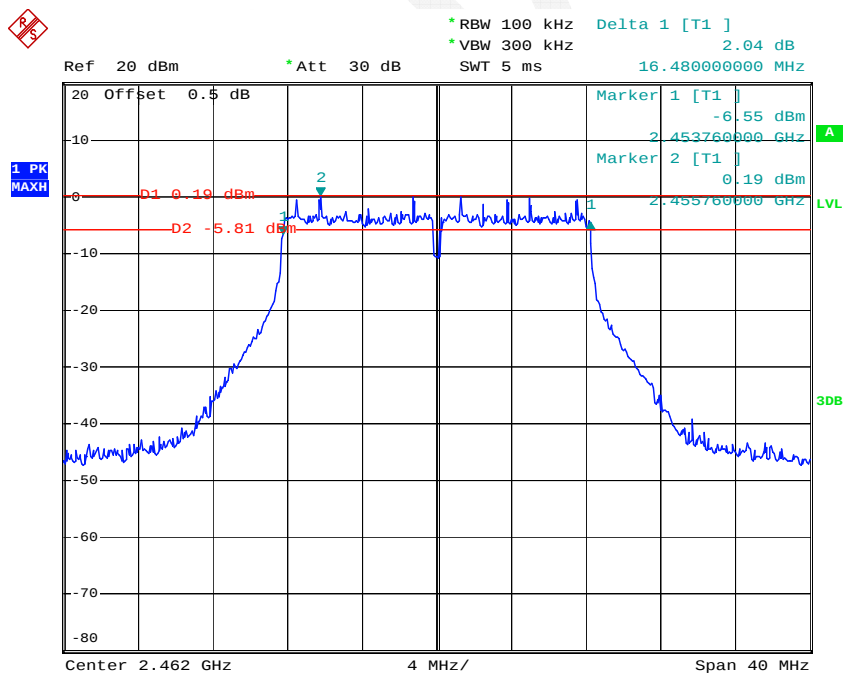
Date: 9.APR.2015 22:20:25

Chain 1 802.11g Middle Channel



Date: 9. APR. 2015 22:22:34

Chain 1 802.11g High Channel



Date: 9. APR. 2015 22:24:38

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

According to KDB 558074 D01 DTS Meas Guidance v03r02

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	2014-11-03	2015-11-03
Agilent	Wideband Power Sensor	N1921A	MY54170013	2014-11-03	2015-11-03
Agilent	P-Series Power Meter	N1912A	MY5000448	2014-11-03	2015-11-03
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09

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

Test Data

Environmental Conditions

Temperature:	21.3 °C
Relative Humidity:	56 %
ATM Pressure:	101.6 kPa

The testing was performed by Allen Qiao on 2015-04-09

Test Mode: Transmitting

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

Mode	Channel	Frequency (MHz)	maximum conducted Peak output power (dBm)			Limit (dBm)
			Chain 0	Chain 1	Total	
802.11 b	Low	2412	20.14	19.83	23.00	30
	Middle	2437	20.34	19.68	23.03	30
	High	2462	20.13	18.76	22.51	30
802.11 g	Low	2412	19.97	20.11	23.05	30
	Middle	2437	20.20	19.98	23.10	30
	High	2462	20.55	19.23	22.95	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	FSEM	DE31388	2014-05-09	2015-05-09

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

Test Data

Environmental Conditions

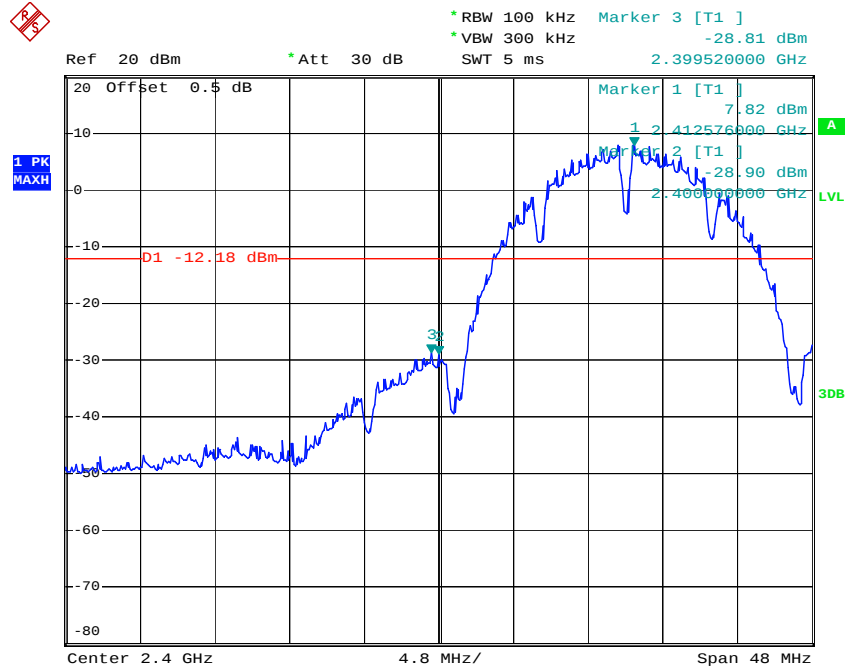
Temperature:	22 °C
Relative Humidity:	59 %
ATM Pressure:	101.4 kPa

The testing was performed by Allen Qiao on 2015-04-09

Test mode: Transmitting

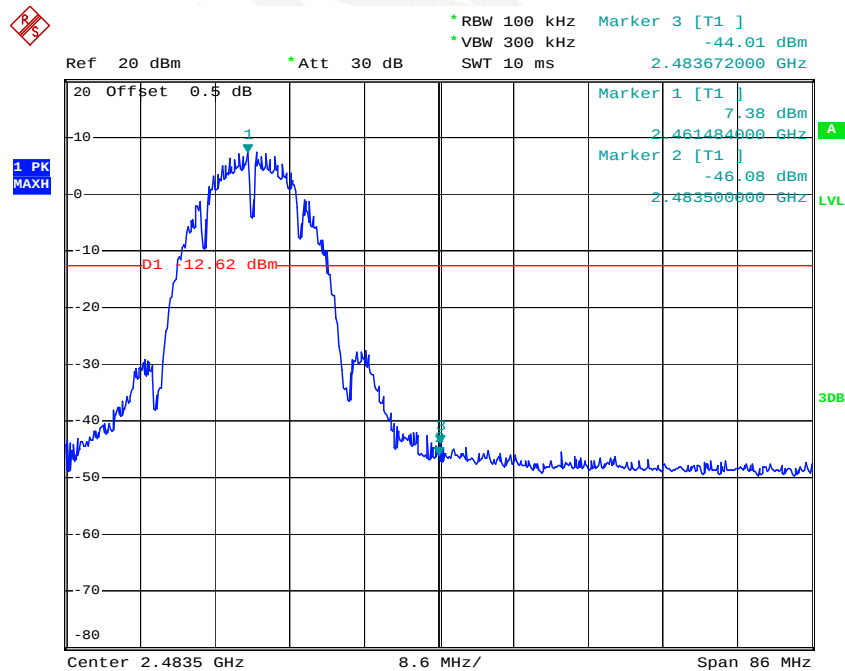
Test Result: Compliant. Please refer to following plots.

Chain 0 802.11b: Band Edge, Left Side



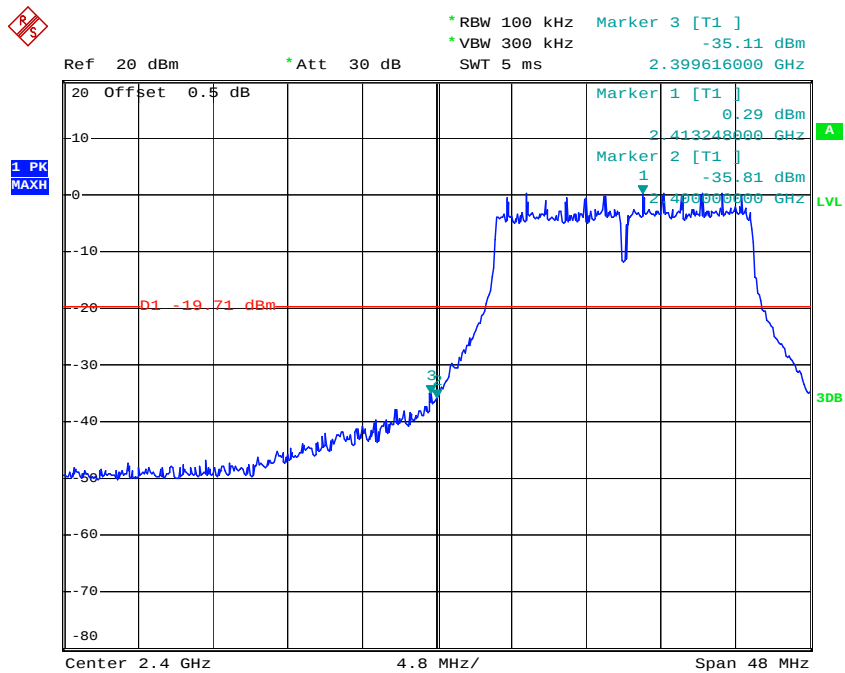
Date: 9.APR.2015 22:29:02

Chain 0 802.11b: Band Edge, Right Side



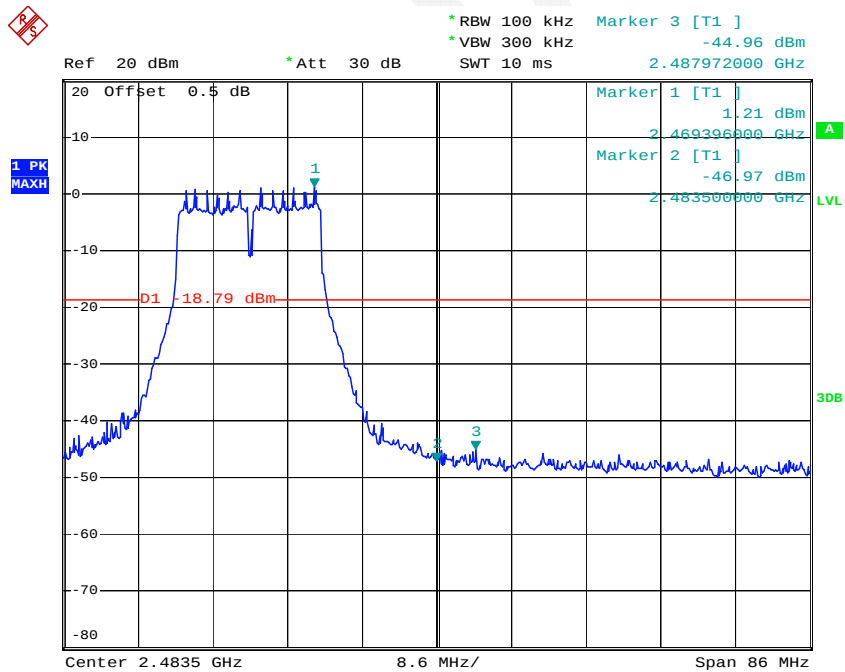
Date: 9.APR.2015 22:34:25

Chain 0 802.11g: Band Edge, Left Side



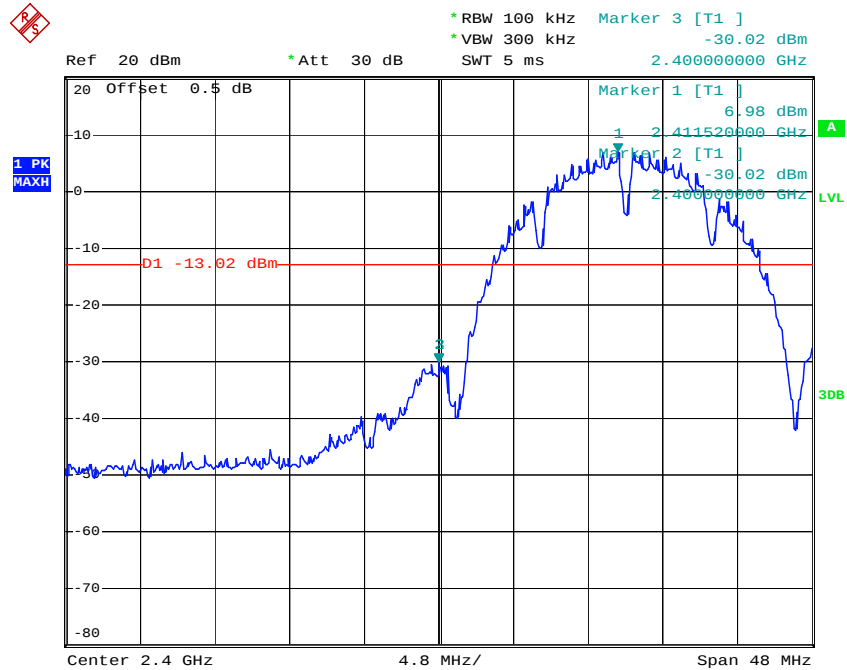
Date: 9.APR.2015 22:37:12

Chain 0 802.11g: Band Edge, Right Side



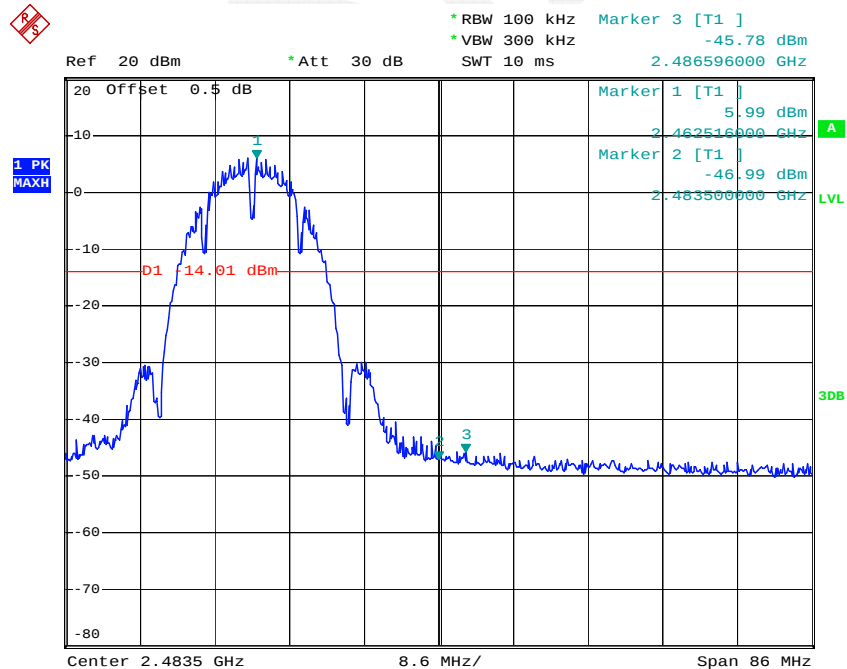
Date: 9.APR.2015 22:41:51

Chain 1 802.11b: Band Edge, Left Side



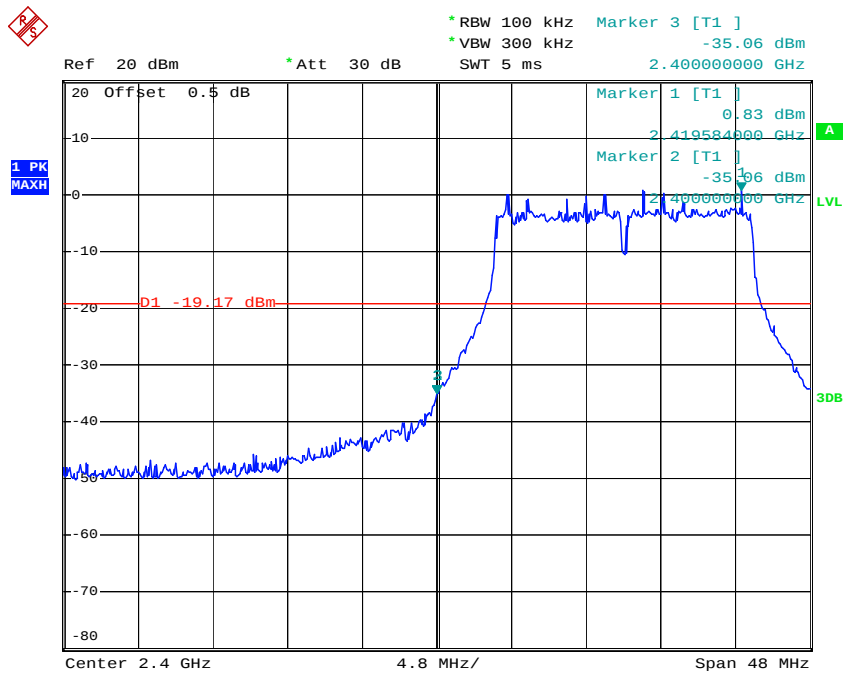
Date: 9.APR.2015 22:14:54

Chain 1 802.11b: Band Edge, Right Side



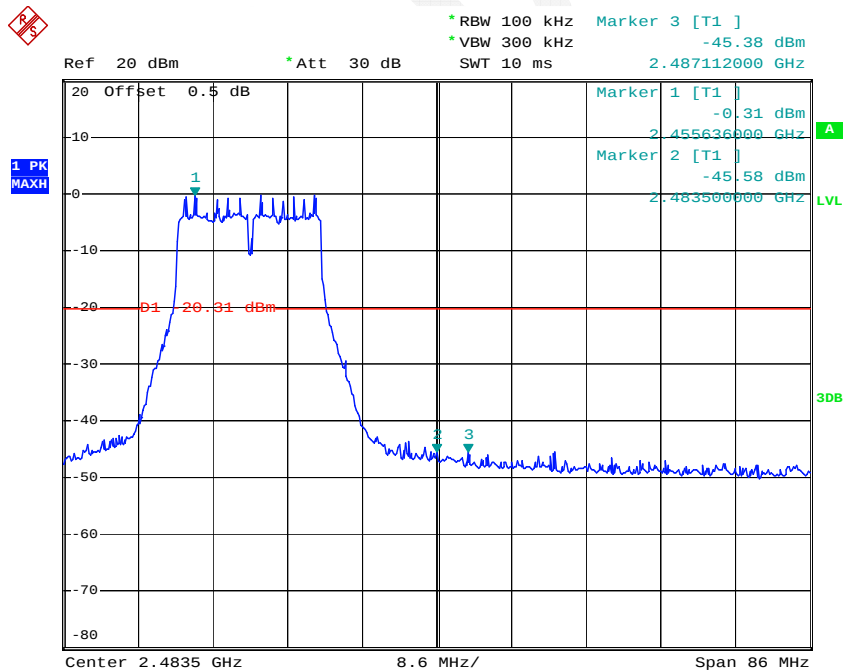
Date: 9.APR.2015 22:19:14

Chain 1 802.11g: Band Edge, Left Side



Date: 9.APR.2015 22:21:46

Chain 1 802.11g: Band Edge, Right Side



Date: 9.APR.2015 22:26:13

FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

According to KDB 558074 D01 DTS Meas Guidance v03r02 clause10.2:

- 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	FSEM	DE31388	2014-05-09	2015-05-09

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

Test Data

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	59 %
ATM Pressure:	101.4 kPa

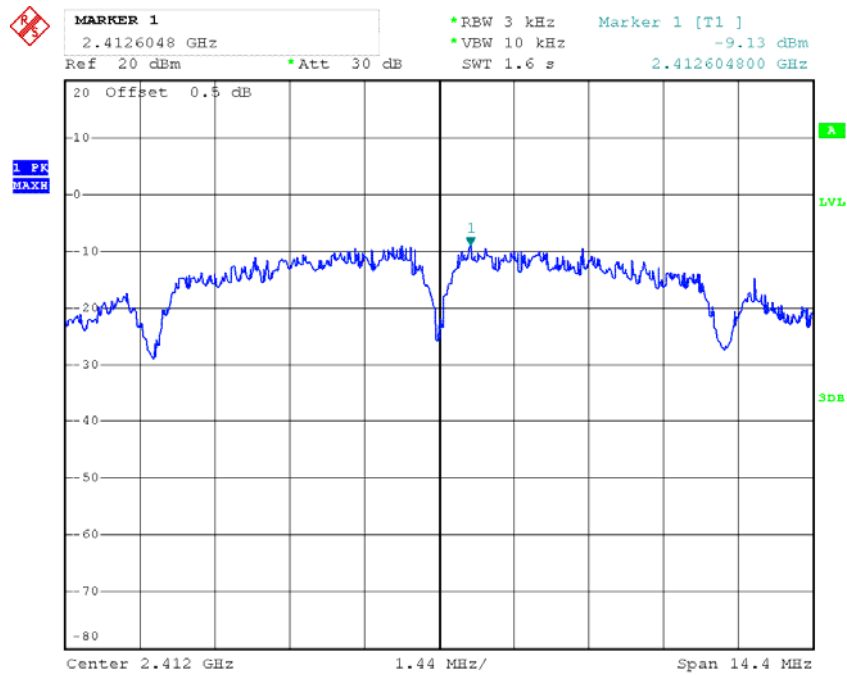
The testing was performed by Allen Qiao on 2015-04-09

Test Mode: Transmitting

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

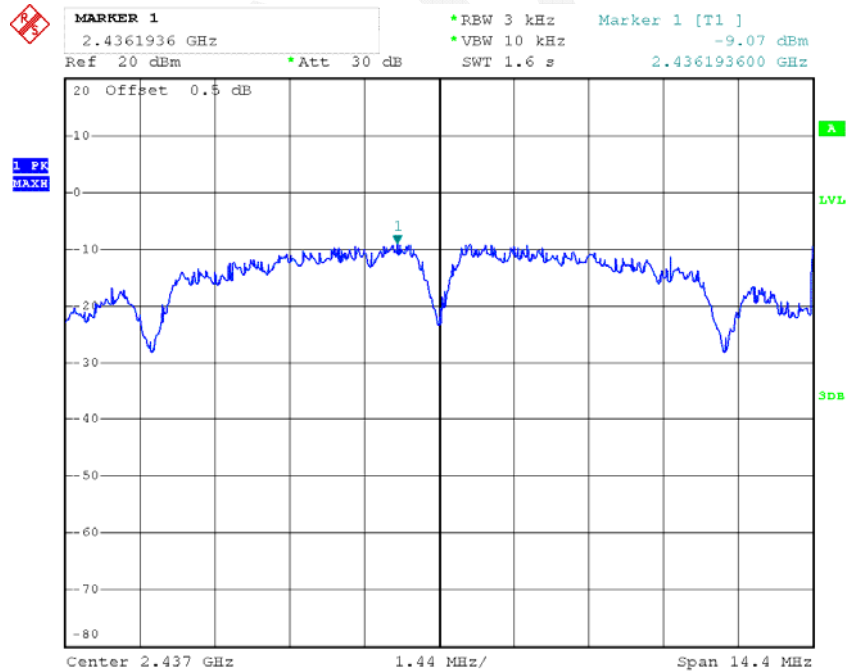
Mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)			Limit (dBm/3kHz)
			Chain 0	Chain 1	Total	
802.11 b	Low	2412	-9.13	-7.28	-5.10	8
	Middle	2437	-9.07	-9.04	-6.04	8
	High	2462	-8.45	-10.32	-6.27	8
802.11 g	Low	2412	-16.04	-16.3	-13.16	8
	Middle	2437	-16.31	-15.86	-13.07	8
	High	2462	-15.62	-16.49	-13.02	8

Chain 0 Power Spectral Density, 802.11b Low Channel



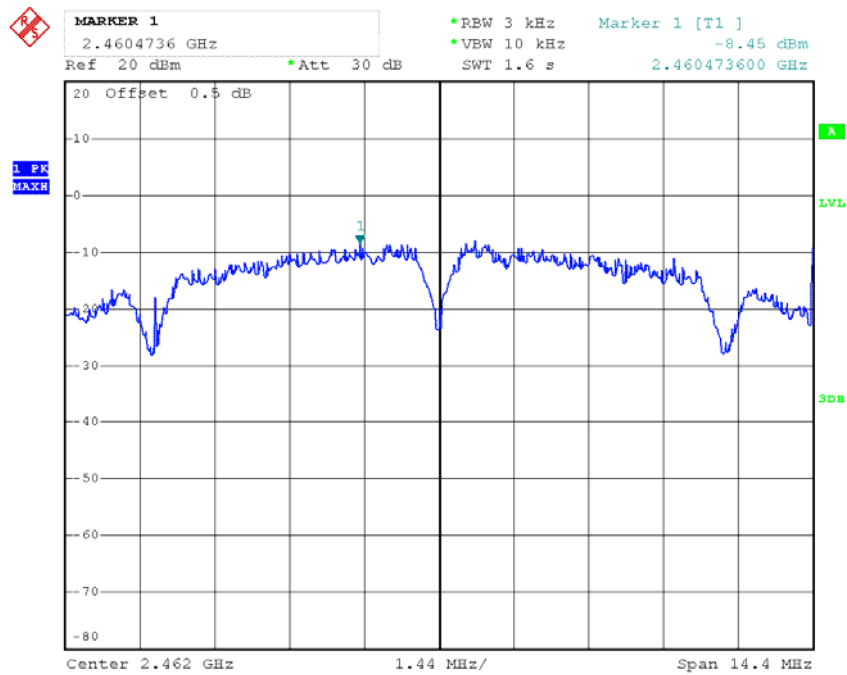
Date: 9.APR.2015 22:48:33

Chain 0 Power Spectral Density, 802.11b Middle Channel



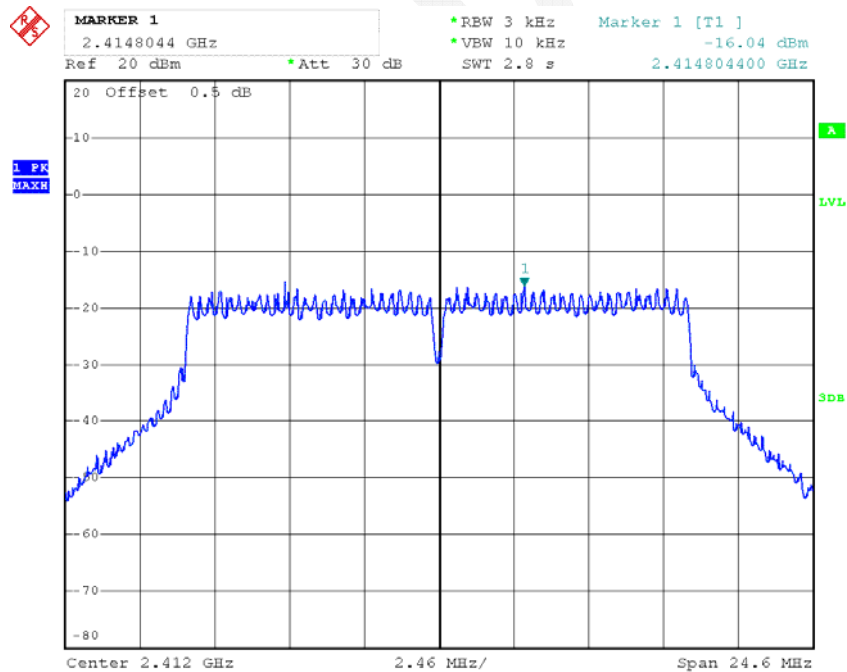
Date: 9.APR.2015 22:52:15

Chain 0 Power Spectral Density, 802.11b High Channel



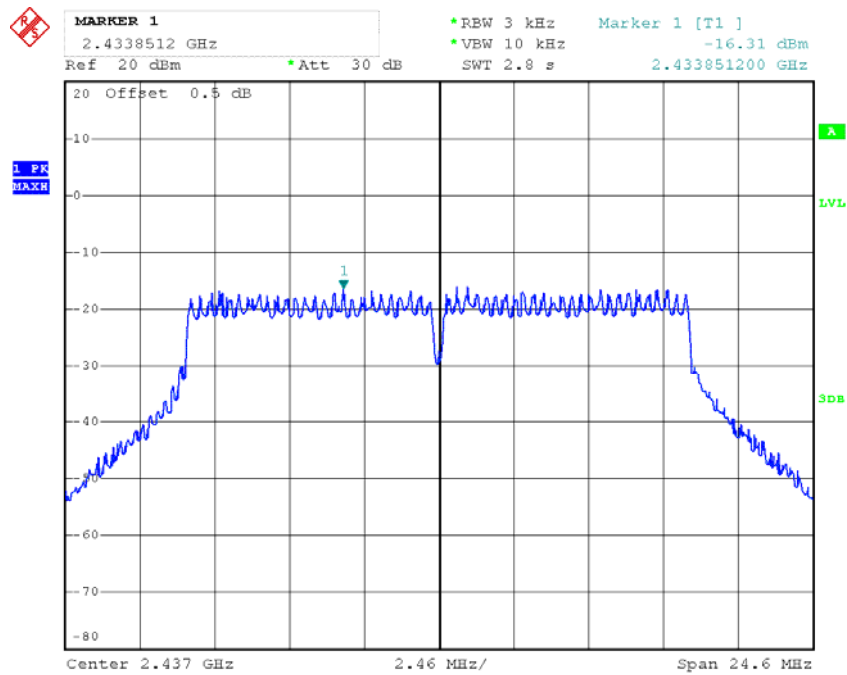
Date: 9.APR.2015 22:53:40

Chain 0 Power Spectral Density, 802.11g Low Channel



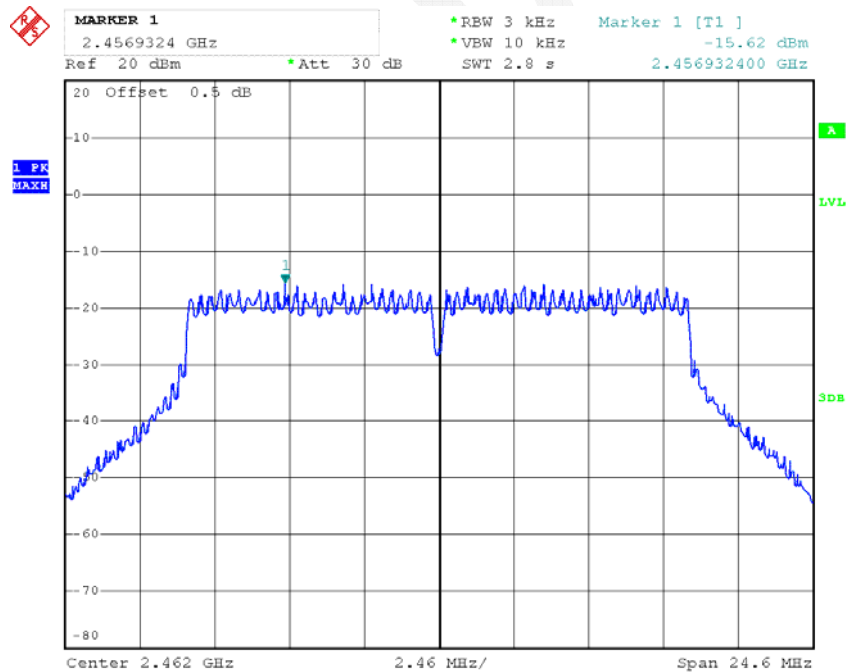
Date: 9.APR.2015 22:56:08

Chain 0 Power Spectral Density, 802.11g Middle Channel



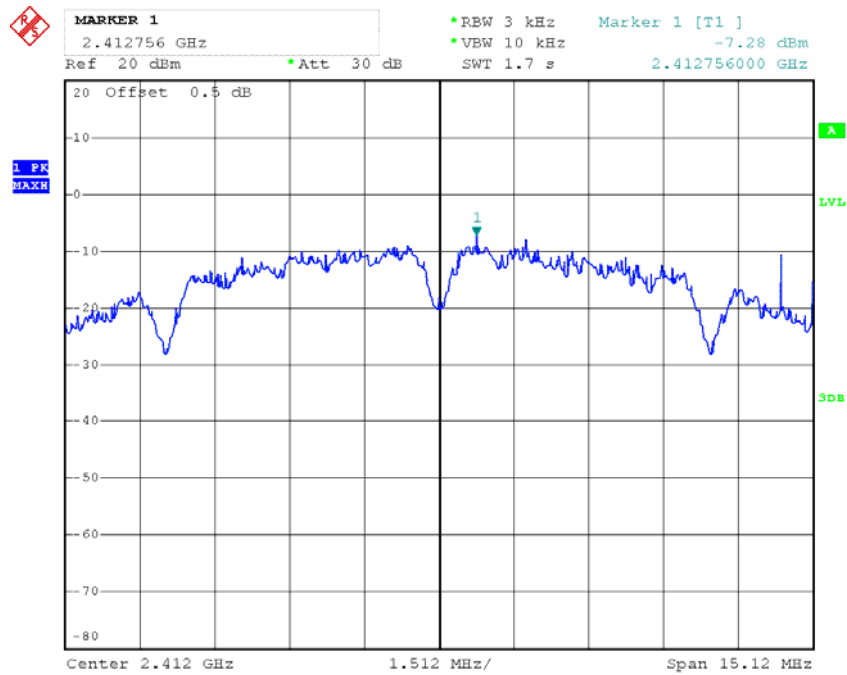
Date: 9.APR.2015 22:56:55

Chain 0 Power Spectral Density, 802.11g High Channel



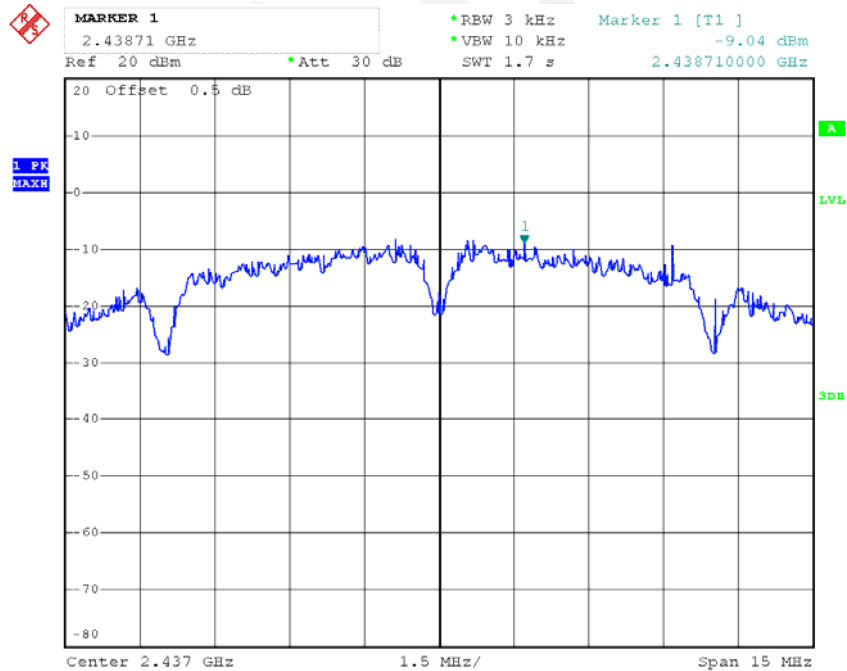
Date: 9.APR.2015 22:57:32

Chain 1 Power Spectral Density, 802.11b Low Channel



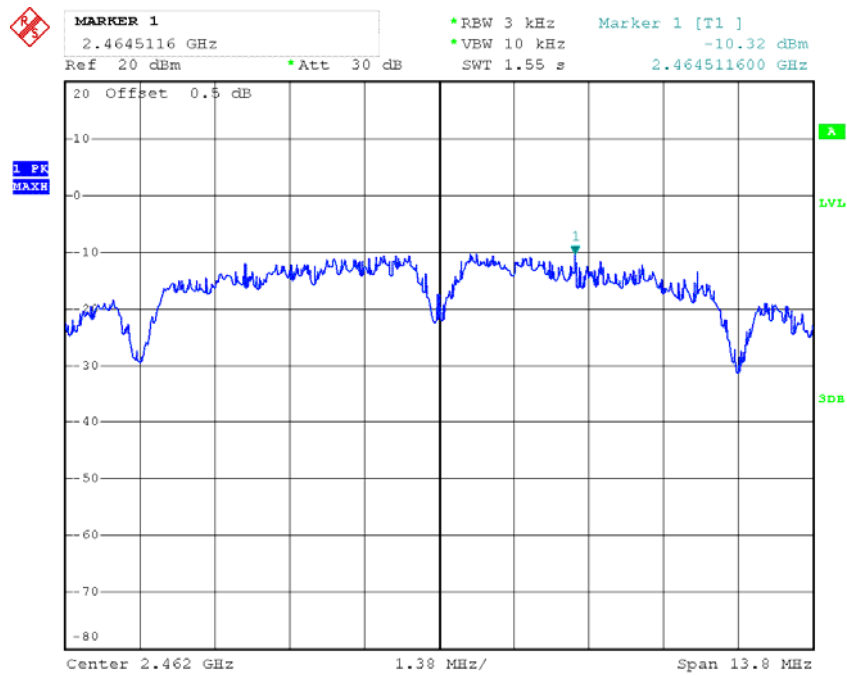
Date: 9.APR.2015 23:00:20

Chain 1 Power Spectral Density, 802.11b Middle Channel



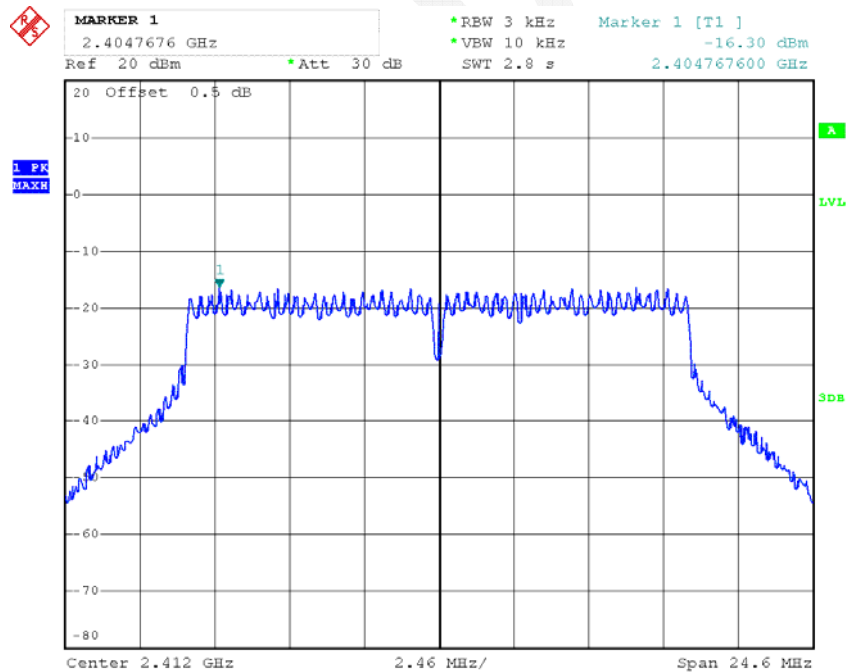
Date: 9.APR.2015 23:01:15

Chain 1 Power Spectral Density, 802.11b High Channel



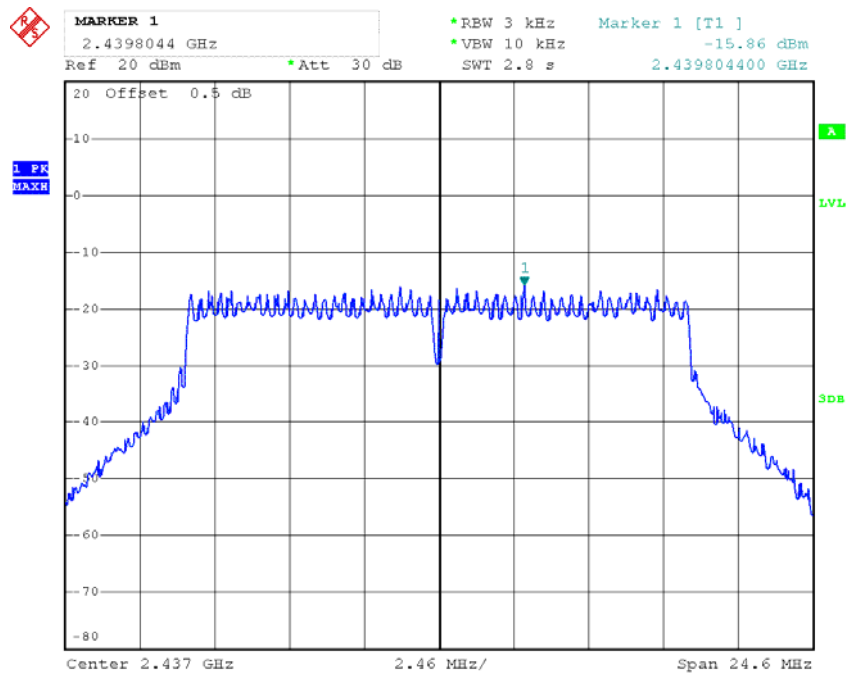
Date: 9.APR.2015 23:02:11

Chain 1 Power Spectral Density, 802.11g Low Channel



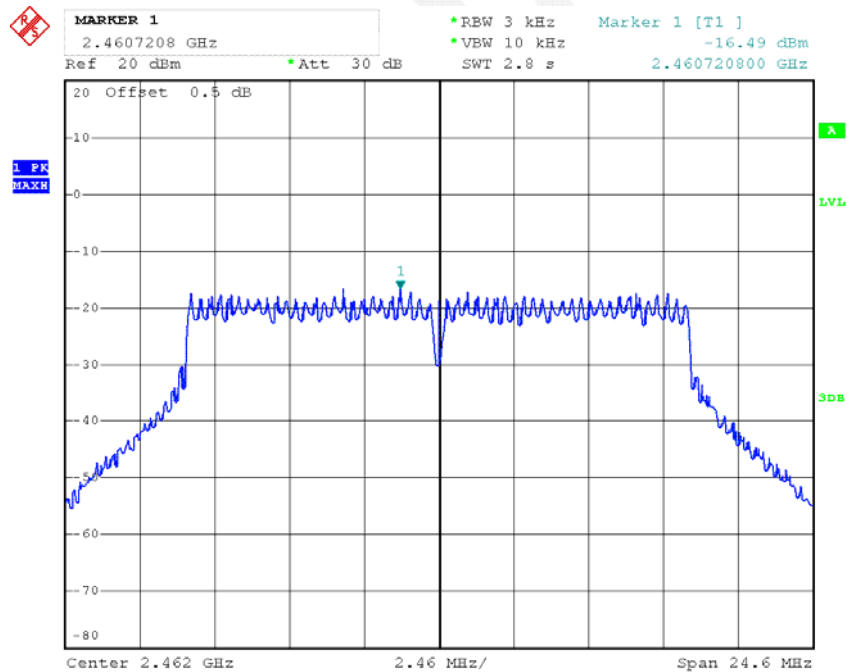
Date: 9.APR.2015 23:03:11

Chain 1 Power Spectral Density, 802.11g Middle Channel



Date: 9.APR.2015 23:03:40

Chain 1 Power Spectral Density, 802.11g High Channel



Date: 9.APR.2015 23:04:09

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