



# FCC PART 15.247

## TEST REPORT

For

### SHENZHEN TENDA TECHNOLOGY CO., LTD.

Tenda Industrial Park, No 34-1, Shilong Rd., Shiyan Town, Bao'an District, Shenzhen, China

**FCC ID: V7TF456**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Wireless N450 Home Router
<b>Test Engineer:</b> Ares Liu	<i>Ares Liu</i>
<b>Report Number:</b> R2DG131212002-00	
<b>Report Date:</b> 2013-12-30	
<b>Reviewed By:</b> Ivan Cao RF Leader	<i>Ivan Cao</i>
<b>Test Laboratory:</b>	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 <a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a>

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *SHENZHEN TENDA TECHNOLOGY CO., LTD.*'s product, model number: *F456 (FCC ID: V7TF456)* (the "EUT") in this report was a *Wireless N450 Home Router*, which was measured approximately: 19.0 cm (L) x 12.5 cm (W) x 7.0 cm (H), input voltage: DC 9V from adapter.

#### Adapter Information:

MODEL: TEA09U-09100

INPUT: AC100-240V 50/60Hz, 0.3A

OUTPUT: DC 9V, 1.0A

Manufacturer: SHENZHEN HEWEISHUN NETWORK TECHNOLOGY CO., LTD.

\* *All measurement and test data in this report was gathered from production sample serial number: 131212002 (Assigned by BA CL.Dongguan). The EUT was received on 2013-12-12.*

### Objective

This report was prepared on behalf of *SHENZHEN TENDA 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)

No related submittal(s).

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, 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). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## 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 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

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.

Additionally, Bay Area Compliance Laboratories Corp. (Dongguan) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 500069-0).



The current scope of accreditations can be found at <http://ts.nist.gov/standards/scopes/5000690.htm>

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing in testing mode, which was provided by manufacturer. For 2.4G 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 802.11n20 modes were tested with Channel 1, 6 and 11.  
 For 802.11n40 mode were tested 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.

For 802.11b and 802.11g, the EUT can transmit with chain 0, chain 1 or chain 2, therefore investigated worst case to representative chain 0 in test report.

### EUT Exercise Software

The software “MTool\_2.0.0.3” was used for testing, which was provided by manufacturer.

Test Mode	Test Software Version	MTool 2.0.0.3		
802.11b	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	1Mbps	1Mbps	1Mbps
	Power Level Setting	52	52	52
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	40	40	40
802.11n ht20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	42	42	42
802.11n ht40	Test Frequency	2422MHz	2437MHz	2452MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	42	42	42

**Equipment Modifications**

No modification was made to the EUT.

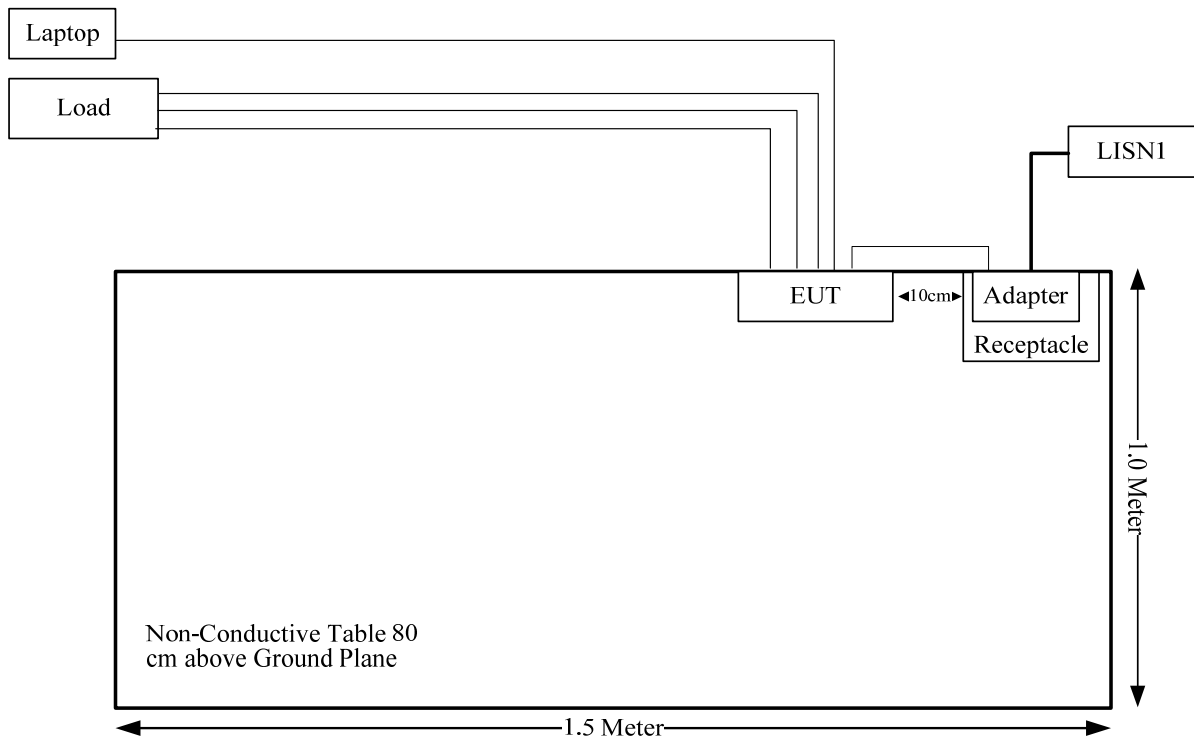
**Support Equipment List and Details**

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1017
/	Load	/	/

**External Cable**

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45 Cable*3	yes	yes	10	EUT	Load
RJ45 Cable	yes	yes	10	EUT	Laptop

**Block Diagram of Test Setup**



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
§15.247 (i), §1.1310, §2.1091	Maximum Permissible exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§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 Peak 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 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 <sup>2</sup> )	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f <sup>2</sup> )	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/cm<sup>2</sup>);

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

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

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

### Calculated Data:

Mode	Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
		(dBi)	(numeric)	(dBm)	(mW)			
802.11b	2412	3.5	2.24	17.76	59.77	20	0.027	1.0
802.11g	2462	3.5	2.24	21.02	126.39	20	0.056	1.0
802.11n20	2462	3.5	2.24	21.69	147.57	20	0.066	1.0
802.11n40	2437	3.5	2.24	21.10	128.82	20	0.057	1.0

**Result:** The device meet FCC MPE at 20 cm distance

## **FCC §15.203 - ANTENNA REQUIREMENT**

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### **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 have three internal antennas, which were permanently attached to the EUT, and all of them maximum gain is 3.5 dBi, please refer to the internal photos.

**Result:** Compliance.

**FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS**

**Applicable Standard**

FCC§15.207

**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 1, 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 1, then:

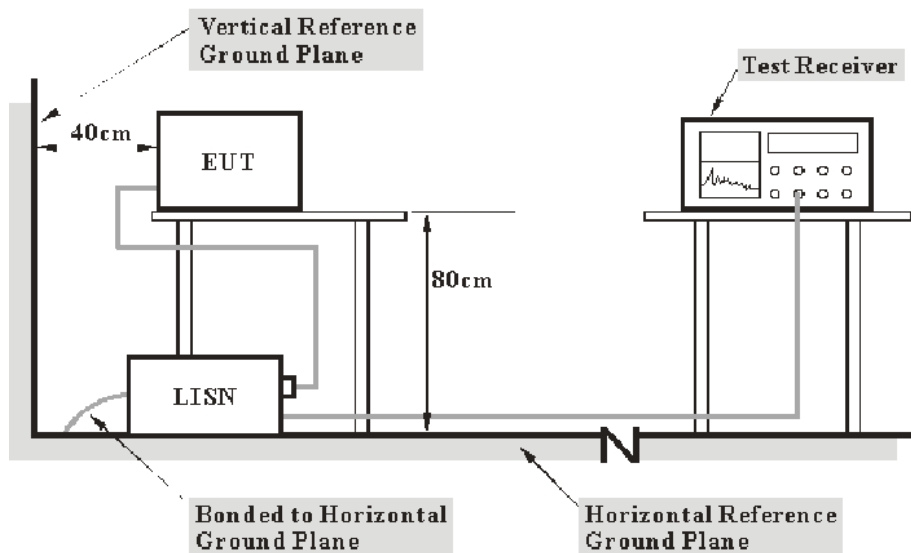
- compliance is deemed to occur if no measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit.

Based on CISPR 16-4-2:2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.46 dB (150 kHz to 30 MHz).

Table 1 – Values of  $U_{cispr}$

Measurement	$U_{cispr}$
Conducted disturbance at mains port using AMN (150 kHz to 30 MHz)	3.4 dB

**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 C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter of EUT was connected to a 120 VAC/60 Hz 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 of EUT was connected to the outlet of the first LISN and the other support equipments were connected to the outlet of the second 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 maximum 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	ESCS 30	830245/006	2013-11-20	2014-11-19
R&S	Two-line V-network	ENV216	3560.6550.12	2013-2-18	2014-2-17
R&S	L.I.S.N	ESH3-Z5	100113	N/A	N/A

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, 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 Part 15.207, with the worst margin reading of:

**8.31dB at 0.560 MHz** in the **Line** conducted mode

### Test Data

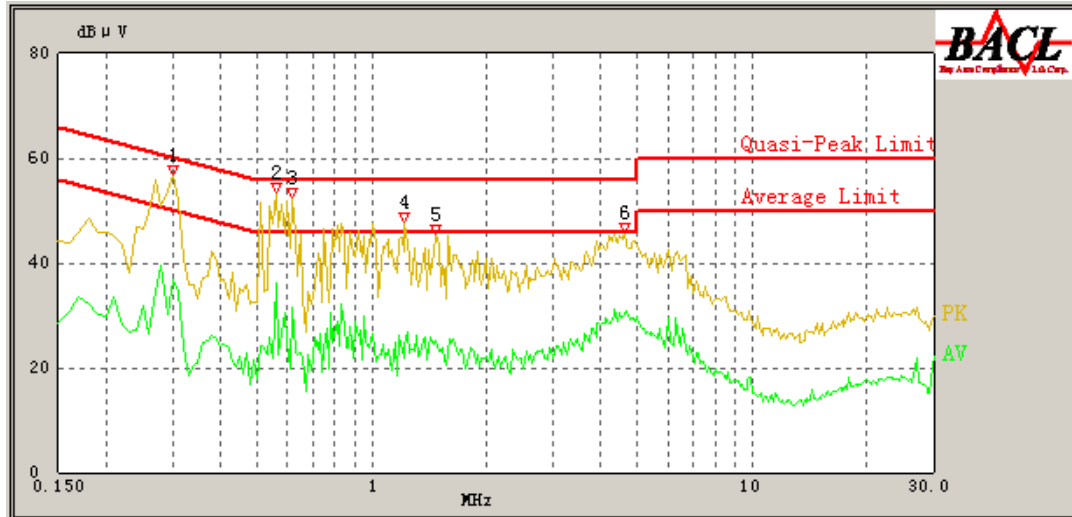
#### Environmental Conditions

<b>Temperature:</b>	20 °C
<b>Relative Humidity:</b>	36 %
<b>ATM Pressure:</b>	101.8 kPa

*The testing was performed by Ares Liu on 2013-12-25.*

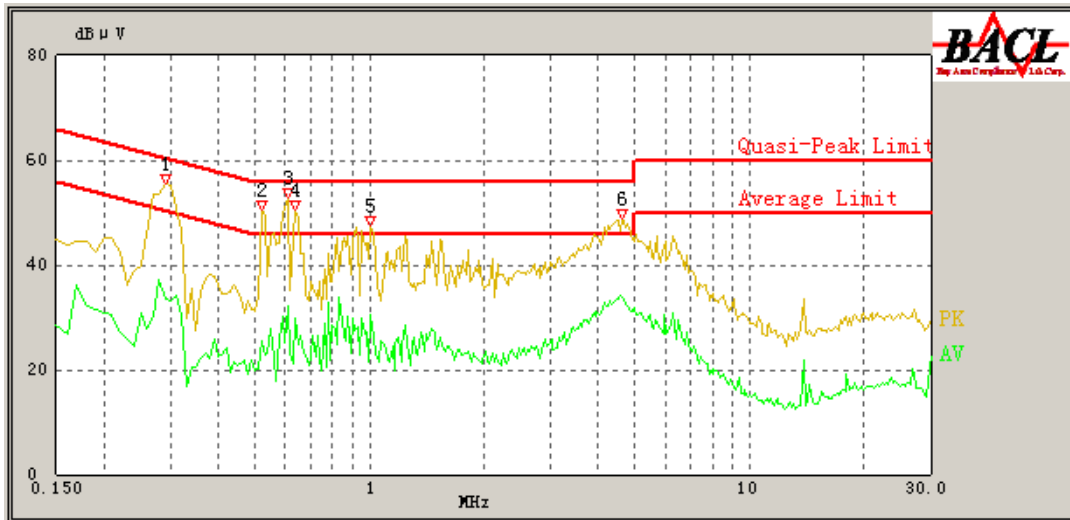
Test Mode: Transmitting

120 V, 60 Hz, Line:



Frequency (MHz)	Cord. Reading (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/AV/QP)
0.300	52.46	9.69	61.71	9.25	QP
0.300	36.89	9.69	51.71	14.82	AV
0.560	47.69	9.66	56.00	8.31	QP
0.560	36.27	9.66	46.00	9.73	AV
0.620	46.38	9.67	56.00	9.62	QP
0.620	31.42	9.67	46.00	14.58	AV
1.220	38.72	9.68	56.00	17.28	QP
1.220	24.43	9.68	46.00	21.57	AV
1.470	33.41	9.68	56.00	22.59	QP
1.470	25.17	9.68	46.00	20.83	AV
4.630	40.63	9.71	56.00	15.37	QP
4.630	30.30	9.71	46.00	15.70	AV

**120 V, 60 Hz, Neutral:**



Frequency (MHz)	Cord. Reading (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/AV/QP)
0.290	50.15	9.68	62.00	11.85	QP
0.290	33.56	9.68	52.00	18.44	AV
0.520	45.58	9.67	56.00	10.42	QP
0.520	25.38	9.67	46.00	20.62	AV
0.610	45.76	9.67	56.00	10.24	QP
0.610	32.18	9.67	46.00	13.82	AV
0.640	42.75	9.67	56.00	13.25	QP
0.640	29.90	9.67	46.00	16.10	AV
1.010	36.20	9.69	56.00	19.80	QP
1.000	30.41	9.69	46.00	15.59	AV
4.600	43.34	9.74	56.00	12.66	QP
4.600	33.94	9.74	46.00	12.06	AV

**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 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:

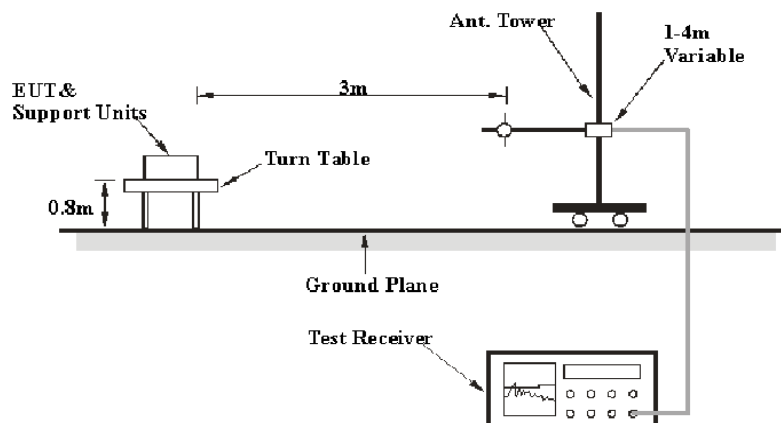
- 30M~200MHz: 5.0 dB
- 200M~1GHz: 6.2 dB
- 1G~6GHz: 4.45 dB
- 6G~18GHz: 5.23 dB

Table 2 – Values of  $U_{cispr}$

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

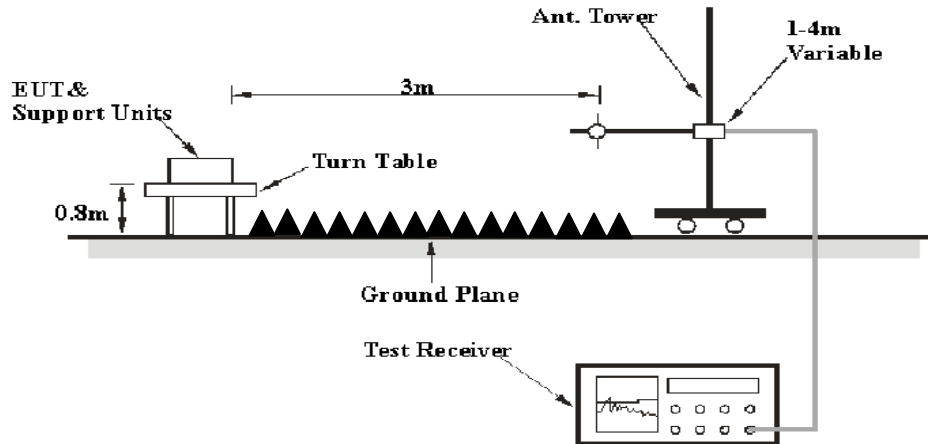
**EUT Setup**

**Below 1GHz:**





**Above 1GHz:**



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2003. 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.

The adapter of EUT was connected to a 120 VAC/60 Hz power source

**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
30MHz – 1000 MHz	120 kHz	300 kHz	120kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

**Test Procedure**

For the radiated emissions test, the adapter of EUT was connected to the first AC floor outlet and the other support equipments were connected to the second AC floor outlet.

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	2013-5-6	2014-5-5
Sunol Sciences	Antenna	JB3	A060611-1	2011-9-6	2014-9-5
HP	AMPLIFIER	8447E	2434A02181	N/A	N/A
R&S	Spectrum analyzer	FSEM	DE31388	2013-5-7	2014-5-6
ETS LINDGREN	horn antenna	3115	000 527 35	2012-9-6	2015-9-5
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	N/A	N/A
R&S	Spectrum Analyzer	FSP 38	100478	2013-6-16	2014-6-15
Ducommun Technologies	horn antenna	ARH-4223-02	1007726-01 1304	2013-6-16	2014-6-15
Quinstar	Amplifier	QLW- 18405536-JO	15964001001	N/A	N/A

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, 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:

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

## Test Data

### Environmental Conditions

<b>Temperature:</b>	18.8 °C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101.3 kPa

*The testing was performed by Ares Liu on 2013-12-18.*

Test Mode: Transmitting  
802.11b Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	FCC 15.247	
	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)
Low Channel: 2412 MHz									
2412	74.48	PK	H	25.67	4.42	0.00	104.57	N/A	N/A
2412	68.16	AV	H	25.67	4.42	0.00	98.25	N/A	N/A
2412	66.96	PK	V	25.67	4.42	0.00	97.05	N/A	N/A
2412	60.33	AV	V	25.67	4.42	0.00	90.42	N/A	N/A
2390	30.35	PK	H	25.61	4.39	0.00	60.35	74.00	13.65
2390	17.2	AV	H	25.61	4.39	0.00	47.20	54.00	6.80
4824	48.49	PK	H	30.64	6.03	27.26	57.90	74.00	16.10
4824	44.34	AV	H	30.64	6.03	27.26	53.75	54.00	0.25*
7236	34.63	PK	H	34.17	7.47	26.36	49.91	74.00	24.09
7236	22.02	AV	H	34.17	7.47	26.36	37.30	54.00	16.70
9648	34.55	PK	H	36.06	8.81	26.06	53.36	74.00	20.64
9648	26.88	AV	H	36.06	8.81	26.06	45.69	54.00	8.31
2819	31.24	PK	H	26.73	5.55	27.37	36.15	74.00	37.85
2819	17.53	AV	H	26.73	5.55	27.37	22.44	54.00	31.56
609.36	32.3	QP	H	19.44	3.03	22.27	32.50	46.00	13.50
Middle Channel: 2437 MHz									
2437	75.08	PK	H	25.74	4.41	0.00	105.23	N/A	N/A
2437	72.72	AV	H	25.74	4.41	0.00	102.87	N/A	N/A
2437	67.59	PK	V	25.74	4.41	0.00	97.74	N/A	N/A
2437	61.52	AV	V	25.74	4.41	0.00	91.67	N/A	N/A
4874	46.76	PK	H	30.77	6.09	27.26	56.36	74.00	17.64
4874	44.05	AV	H	30.77	6.09	27.26	53.65	54.00	0.35*
7311	35.13	PK	H	34.35	7.51	26.51	50.48	74.00	23.52
7311	23.08	AV	H	34.35	7.51	26.51	38.43	54.00	15.57
9748	34.37	PK	H	36.30	8.83	25.68	53.82	74.00	20.18
9748	26.42	AV	H	36.30	8.83	25.68	45.87	54.00	8.13
2819	31.58	PK	H	26.73	5.55	27.37	36.49	74.00	37.51
2819	17.62	AV	H	26.73	5.55	27.37	22.53	54.00	31.47
3815	32.61	PK	H	29.49	5.18	27.41	39.87	74.00	34.13
3815	18.95	AV	H	29.49	5.18	27.41	26.21	54.00	27.79
609.36	31.9	QP	H	19.44	3.03	22.27	32.10	46.00	13.90
High Channel: 2462 MHz									
2462	74.31	PK	H	25.80	4.43	0.00	104.54	N/A	N/A
2462	69.86	AV	H	25.80	4.43	0.00	100.09	N/A	N/A
2462	68.02	PK	V	25.80	4.43	0.00	98.25	N/A	N/A
2462	62.33	AV	V	25.80	4.43	0.00	92.56	N/A	N/A
2483.5	28.81	PK	H	25.86	4.49	0.00	59.16	74.00	14.84
2483.5	15.79	AV	H	25.86	4.49	0.00	46.14	54.00	7.86
4924	46.28	PK	H	30.90	5.97	27.27	55.88	74.00	18.12
4924	42.91	AV	H	30.90	5.97	27.27	52.51	54.00	1.49*
7386	34.2	PK	H	34.53	7.55	26.66	49.62	74.00	24.38
7386	23.51	AV	H	34.53	7.55	26.66	38.93	54.00	15.07
9848	34.19	PK	H	36.54	8.85	25.49	54.09	74.00	19.91
9848	26.84	AV	H	36.54	8.85	25.49	46.74	54.00	7.26
2819	31.85	PK	H	26.73	5.55	27.37	36.76	74.00	37.24
2819	17.68	AV	H	26.73	5.55	27.37	22.59	54.00	31.41
609.36	32.2	QP	H	19.44	3.03	22.27	32.40	46.00	13.60

\*Within measurement uncertainty!

802.11g Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	FCC 15.247	
	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)
Low Channel: 2412 MHz									
2412	77.27	PK	H	25.67	4.42	0.00	107.36	N/A	N/A
2412	63.55	AV	H	25.67	4.42	0.00	93.64	N/A	N/A
2412	69.83	PK	V	25.67	4.42	0.00	99.92	N/A	N/A
2412	55.61	AV	V	25.67	4.42	0.00	85.70	N/A	N/A
2390	35.64	PK	H	25.61	4.39	0.00	65.64	74.00	8.36
2390	19.71	AV	H	25.61	4.39	0.00	49.71	54.00	4.29*
4824	48.8	PK	H	30.64	6.03	27.26	58.21	74.00	15.79
4824	32.43	AV	H	30.64	6.03	27.26	41.84	54.00	12.16
7236	32.59	PK	H	34.17	7.47	26.36	47.87	74.00	26.13
7236	21.57	AV	H	34.17	7.47	26.36	36.85	54.00	17.15
9648	33.64	PK	H	36.06	8.81	26.06	52.45	74.00	21.55
9648	23.87	AV	H	36.06	8.81	26.06	42.68	54.00	11.32
2819	30.24	PK	H	26.73	5.55	27.37	35.15	74.00	38.85
2819	17.53	AV	H	26.73	5.55	27.37	22.44	54.00	31.56
609.36	32.3	QP	H	19.44	3.03	22.27	32.50	46.00	13.50
Middle Channel: 2437 MHz									
2437	77.32	PK	H	25.74	4.41	27.17	80.30	N/A	N/A
2437	63.61	AV	H	25.74	4.41	27.17	66.59	N/A	N/A
2437	69.9	PK	V	25.74	4.41	27.17	72.88	N/A	N/A
2437	55.71	AV	V	25.74	4.41	27.17	58.69	N/A	N/A
4874	48.81	PK	H	30.77	6.09	27.26	58.41	74.00	15.59
4874	32.52	AV	H	30.77	6.09	27.26	42.12	54.00	11.88
7311	32.68	PK	H	34.35	7.51	26.51	48.03	74.00	25.97
7311	21.59	AV	H	34.35	7.51	26.51	36.94	54.00	17.06
9748	33.66	PK	H	36.30	8.83	25.68	53.11	74.00	20.89
9748	23.95	AV	H	36.30	8.83	25.68	43.40	54.00	10.60
2819	30.26	PK	H	26.73	5.55	27.37	35.17	74.00	38.83
2819	17.62	AV	H	26.73	5.55	27.37	22.53	54.00	31.47
3815	32.64	PK	H	29.49	5.18	27.41	39.90	74.00	34.10
3815	18.75	AV	H	29.49	5.18	27.41	26.01	54.00	27.99
609.36	31.5	QP	H	19.44	3.03	22.27	31.70	46.00	14.30
High Channel: 2462 MHz									
2462	79.04	PK	H	25.80	4.43	0.00	109.27	N/A	N/A
2462	63.99	AV	H	25.80	4.43	0.00	94.22	N/A	N/A
2462	71.83	PK	V	25.80	4.43	0.00	102.06	N/A	N/A
2462	54.28	AV	V	25.80	4.43	0.00	84.51	N/A	N/A
2483.5	37.96	PK	H	25.86	4.49	0.00	68.31	74.00	5.69
2483.5	19.51	AV	H	25.86	4.49	0.00	49.86	54.00	4.14*
4924	48.67	PK	H	30.90	5.97	27.27	58.27	74.00	15.73
4924	32.37	AV	H	30.90	5.97	27.27	41.97	54.00	12.03
7386	32.54	PK	H	34.53	7.55	26.66	47.96	74.00	26.04
7386	21.43	AV	H	34.53	7.55	26.66	36.85	54.00	17.15
9848	33.5	PK	H	36.54	8.85	25.49	53.40	74.00	20.60
9848	23.78	AV	H	36.54	8.85	25.49	43.68	54.00	10.32
2819	30.25	PK	H	26.73	5.55	27.37	35.16	74.00	38.84
2819	17.56	AV	H	26.73	5.55	27.37	22.47	54.00	31.53
609.36	31.6	QP	H	19.44	3.03	22.27	31.80	46.00	14.20

\*Within measurement uncertainty!

802.11 n20 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	FCC 15.247	
	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)
Low Channel: 2412 MHz									
2412	73.56	PK	H	25.67	4.42	0.00	103.65	N/A	N/A
2412	56.73	AV	H	25.67	4.42	0.00	86.82	N/A	N/A
2412	66.03	PK	V	25.67	4.42	0.00	96.12	N/A	N/A
2412	49.41	AV	V	25.67	4.42	0.00	79.50	N/A	N/A
2390	37.22	PK	H	25.61	4.39	0.00	67.22	74.00	6.78
2390	17.18	AV	H	25.61	4.39	0.00	47.18	54.00	6.82
4824	40.55	PK	H	30.64	6.03	27.26	49.96	74.00	24.04
4824	25.2	AV	H	30.64	6.03	27.26	34.61	54.00	19.39
7236	32.89	PK	H	34.17	7.47	26.36	48.17	74.00	25.83
7236	20.11	AV	H	34.17	7.47	26.36	35.39	54.00	18.61
9648	33.64	PK	H	36.06	8.81	26.06	52.45	74.00	21.55
9648	23.57	AV	H	36.06	8.81	26.06	42.38	54.00	11.62
2819	31.83	PK	H	26.73	5.55	27.37	36.74	74.00	37.26
2819	17.61	AV	H	26.73	5.55	27.37	22.52	54.00	31.48
609.36	31.5	QP	H	19.44	3.03	22.27	31.70	46.00	14.30
Middle Channel: 2437 MHz									
2437	73.61	PK	H	25.74	4.41	27.17	76.59	N/A	N/A
2437	56.78	AV	H	25.74	4.41	27.17	59.76	N/A	N/A
2437	66.04	PK	V	25.74	4.41	27.17	69.02	N/A	N/A
2437	49.48	AV	V	25.74	4.41	27.17	52.46	N/A	N/A
4874	40.56	PK	H	30.77	6.09	27.26	50.16	74.00	23.84
4874	25.29	AV	H	30.77	6.09	27.26	34.89	54.00	19.11
7311	32.9	PK	H	34.35	7.51	26.51	48.25	74.00	25.75
7311	20.18	AV	H	34.35	7.51	26.51	35.53	54.00	18.47
9748	33.71	PK	H	36.30	8.83	25.68	53.16	74.00	20.84
9748	23.64	AV	H	36.30	8.83	25.68	43.09	54.00	10.91
2819	31.88	PK	H	26.73	5.55	27.37	36.79	74.00	37.21
2819	17.71	AV	H	26.73	5.55	27.37	22.62	54.00	31.38
3815	32.47	PK	H	29.49	5.18	27.41	39.73	74.00	34.27
3815	18.74	AV	H	29.49	5.18	27.41	26.00	54.00	28.00
609.36	31.6	QP	H	19.44	3.03	22.27	31.80	46.00	14.20
High Channel: 2462 MHz									
2462	73.5	PK	H	25.80	4.43	0.00	103.73	N/A	N/A
2462	56.65	AV	H	25.80	4.43	0.00	86.88	N/A	N/A
2462	66.01	PK	V	25.80	4.43	0.00	96.24	N/A	N/A
2462	49.4	AV	V	25.80	4.43	0.00	79.63	N/A	N/A
2483.5	37.14	PK	H	25.86	4.49	0.00	67.49	74.00	6.51
2483.5	17.11	AV	H	25.86	4.49	0.00	47.46	54.00	6.54
4924	40.5	PK	H	30.90	5.97	27.27	50.10	74.00	23.90
4924	25.11	AV	H	30.90	5.97	27.27	34.71	54.00	19.29
7386	32.8	PK	H	34.53	7.55	26.66	48.22	74.00	25.78
7386	20.04	AV	H	34.53	7.55	26.66	35.46	54.00	18.54
9848	33.63	PK	H	36.54	8.85	25.49	53.53	74.00	20.47
9848	23.49	AV	H	36.54	8.85	25.49	43.39	54.00	10.61
2819	31.73	PK	H	26.73	5.55	27.37	36.64	74.00	37.36
2819	17.55	AV	H	26.73	5.55	27.37	22.46	54.00	31.54
609.36	31.4	QP	H	19.44	3.03	22.27	31.60	46.00	14.40

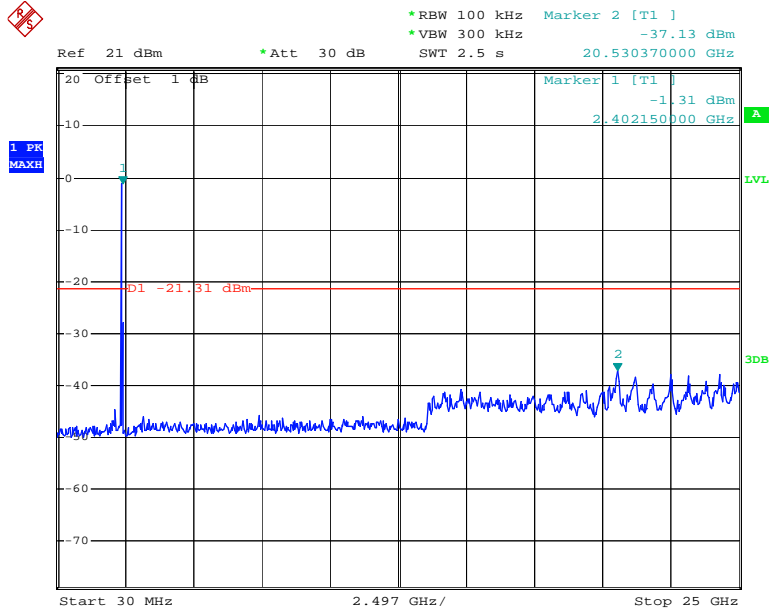
802.11 n40 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	FCC 15.247	
	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)
Low Channel: 2422 MHz									
2422	70.2	PK	H	25.70	4.41	0.00	100.31	N/A	N/A
2422	50.43	AV	H	25.70	4.41	0.00	80.54	N/A	N/A
2422	62.73	PK	V	25.70	4.41	0.00	92.84	N/A	N/A
2422	42.57	AV	V	25.70	4.41	0.00	72.68	N/A	N/A
2390	39.01	PK	H	25.61	4.39	0.00	69.01	74.00	4.99
2390	19.14	AV	H	25.61	4.39	0.00	49.14	54.00	4.86
4844	38.9	PK	H	30.69	6.08	27.26	48.41	74.00	25.59
4844	23.37	AV	H	30.69	6.08	27.26	32.88	54.00	21.12
7266	32.84	PK	H	34.24	7.48	26.42	48.14	74.00	25.86
7266	19.62	AV	H	34.24	7.48	26.42	34.92	54.00	19.08
9688	32.94	PK	H	36.15	8.82	25.91	52.00	74.00	22.00
9688	22.83	AV	H	36.15	8.82	25.91	41.89	54.00	12.11
2819	30.75	PK	H	26.73	5.55	27.37	35.66	74.00	38.34
2819	17.72	AV	H	26.73	5.55	27.37	22.63	54.00	31.37
609.36	31.9	QP	H	19.44	3.03	22.27	32.10	46.00	13.90
Middle Channel: 2437 MHz									
2437	70.21	PK	H	25.74	4.41	27.17	73.19	N/A	N/A
2437	50.5	AV	H	25.74	4.41	27.17	53.48	N/A	N/A
2437	62.98	PK	V	25.74	4.41	27.17	65.96	N/A	N/A
2437	42.6	AV	V	25.74	4.41	27.17	45.58	N/A	N/A
4874	38.91	PK	H	30.77	6.09	27.26	48.51	74.00	25.49
4874	23.52	AV	H	30.77	6.09	27.26	33.12	54.00	20.88
7311	32.84	PK	H	34.35	7.51	26.51	48.19	74.00	25.81
7311	19.92	AV	H	34.35	7.51	26.51	35.27	54.00	18.73
9748	32.96	PK	H	36.30	8.83	25.68	52.41	74.00	21.59
9748	22.99	AV	H	36.30	8.83	25.68	42.44	54.00	11.56
2819	30.77	PK	H	26.73	5.55	27.37	35.68	74.00	38.32
2819	17.85	AV	H	26.73	5.55	27.37	22.76	54.00	31.24
3815	32.48	PK	H	29.49	5.18	27.41	39.74	74.00	34.26
3815	18.62	AV	H	29.49	5.18	27.41	25.88	54.00	28.12
609.36	31.8	QP	H	19.44	3.03	22.27	32.00	46.00	14.00
High Channel: 2452 MHz									
2452	71.5	PK	H	25.78	4.41	0.00	101.69	N/A	N/A
2452	50.67	AV	H	25.78	4.41	0.00	80.86	N/A	N/A
2452	63.85	PK	V	25.78	4.41	0.00	94.04	N/A	N/A
2452	42.38	AV	V	25.78	4.41	0.00	72.57	N/A	N/A
2483.5	31.13	PK	H	25.86	4.49	0.00	61.48	74.00	12.52
2483.5	16.71	AV	H	25.86	4.49	0.00	47.06	54.00	6.94
4904	38.89	PK	H	30.85	6.06	27.27	48.53	74.00	25.47
4904	23.3	AV	H	30.85	6.06	27.27	32.94	54.00	21.06
7356	32.68	PK	H	34.45	7.53	26.60	48.06	74.00	25.94
7356	19.5	AV	H	34.45	7.53	26.60	34.88	54.00	19.12
9808	32.87	PK	H	36.44	8.84	25.48	52.67	74.00	21.33
9808	22.8	AV	H	36.44	8.84	25.48	42.60	54.00	11.40
2819	30.53	PK	H	26.73	5.55	27.37	35.44	74.00	38.56
2819	17.29	AV	H	26.73	5.55	27.37	22.20	54.00	31.80
609.36	31.5	QP	H	19.44	3.03	22.27	31.70	46.00	14.30

\*Within measurement uncertainty!

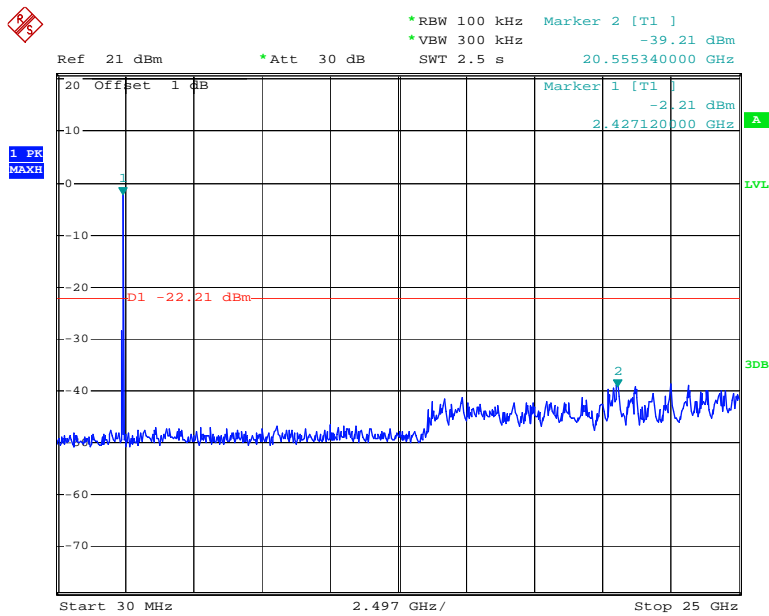
### Conducted Spurious Emissions at Antenna Port

#### 802.11b Low Channel



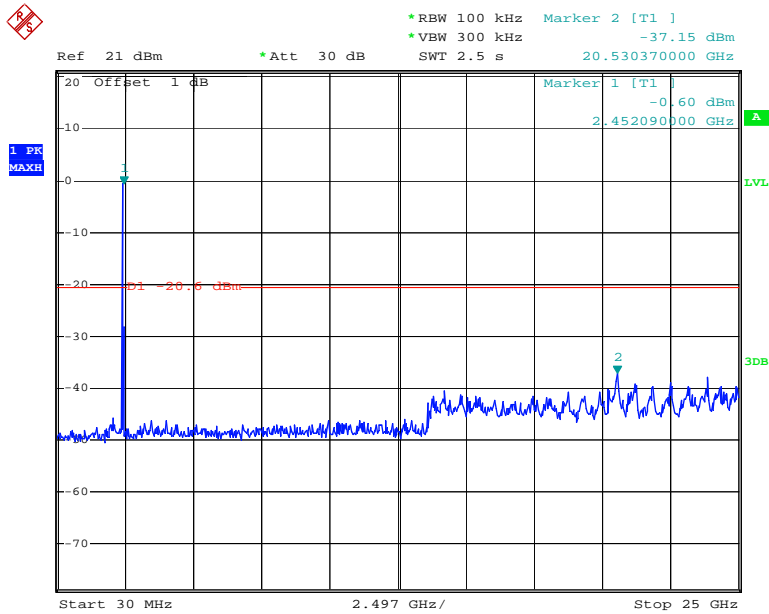
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#### 802.11b Middle Channel



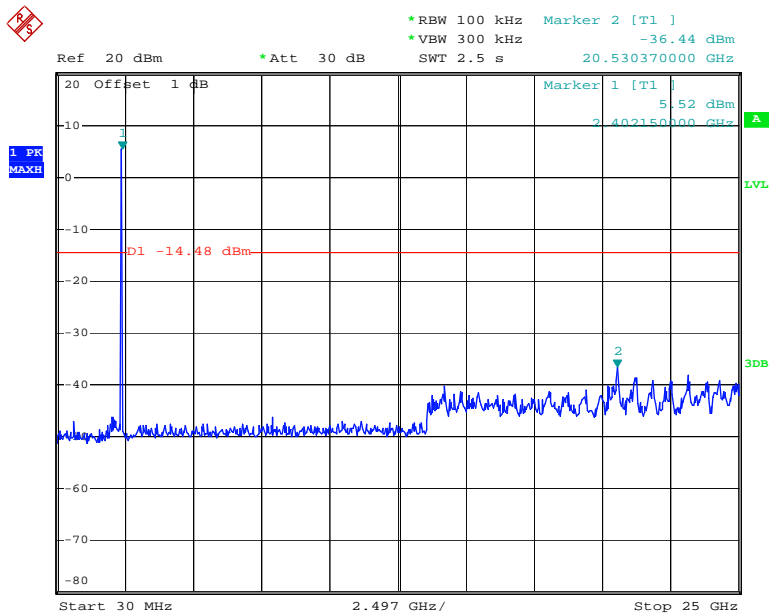
Date: 18.DEC.2013 11:18:47

### 802.11b High Channel



Date: 18.DEC.2013 11:21:12

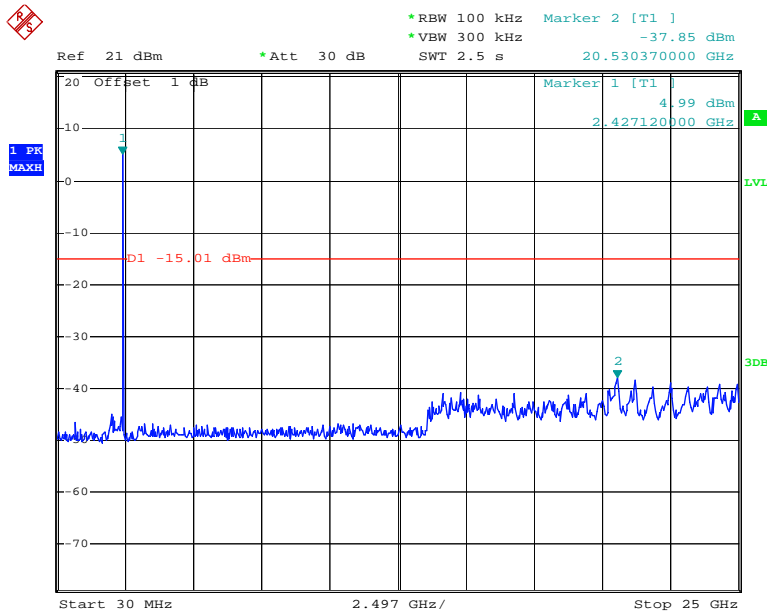
### 802.11g Low Channel



Date: 18.DEC.2013 11:01:13

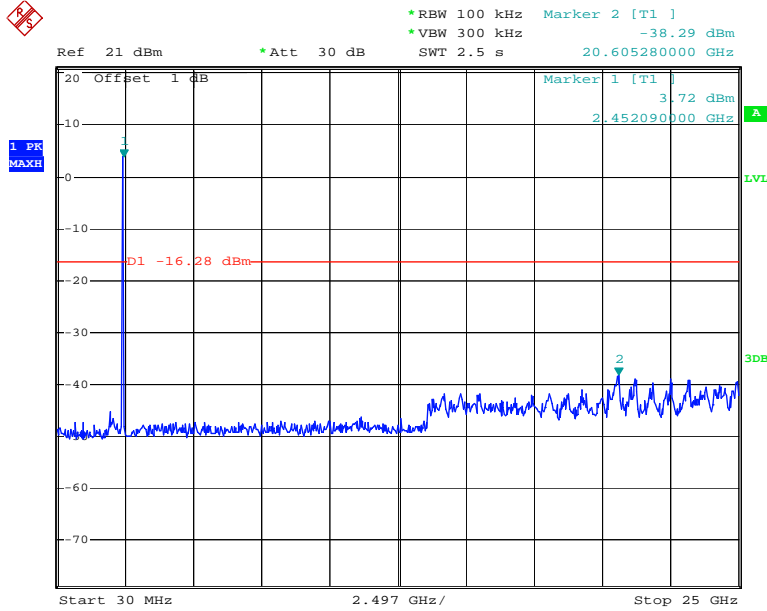


### 802.11g Middle Channel



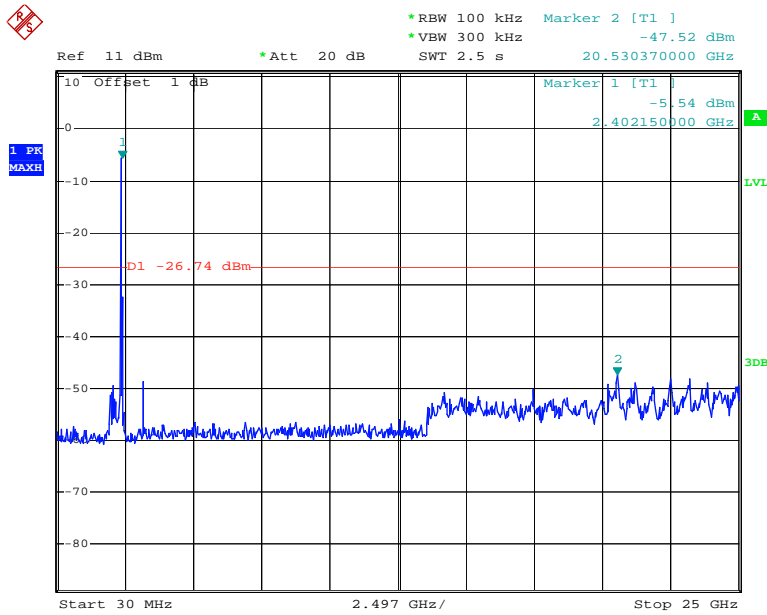
Date: 18.DEC.2013 11:03:43

### 802.11g High Channel



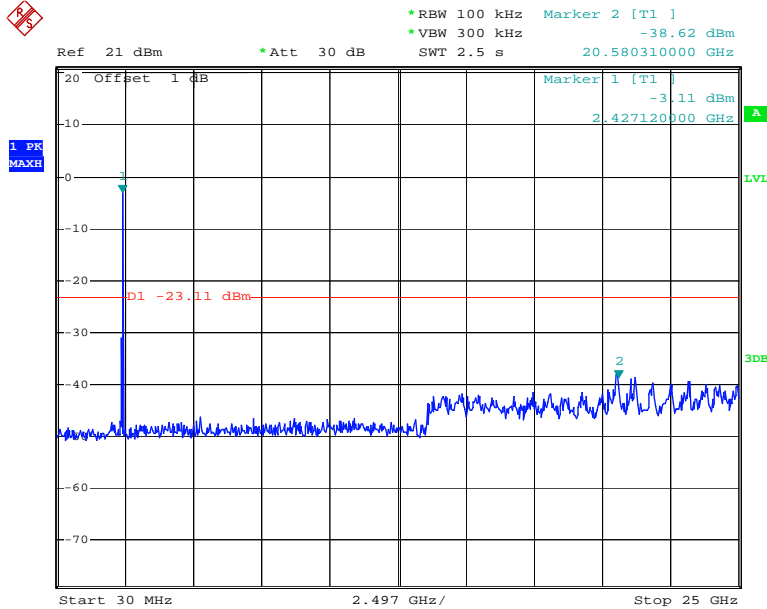
Date: 18.DEC.2013 11:05:20

### Chain0: 802.11n20 Low Channel



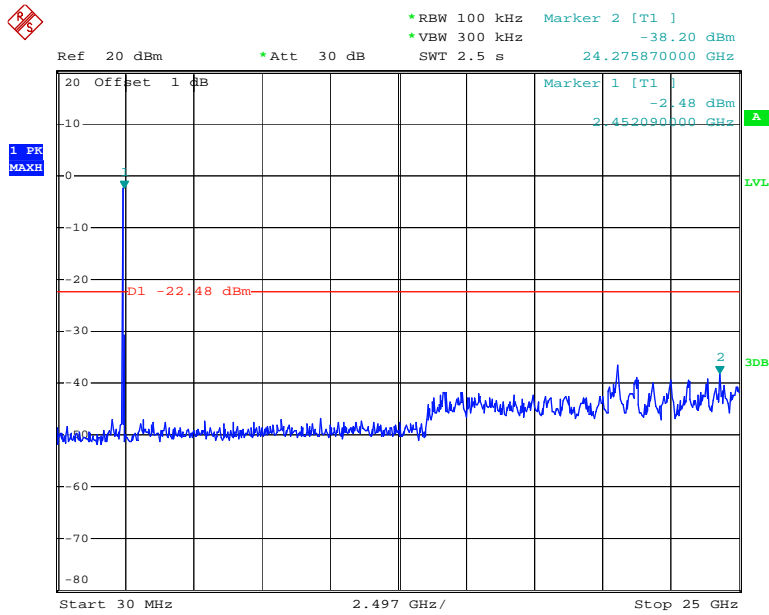
Date: 18.DEC.2013 11:27:07

### Chain0: 802.11n20 Middle Channel



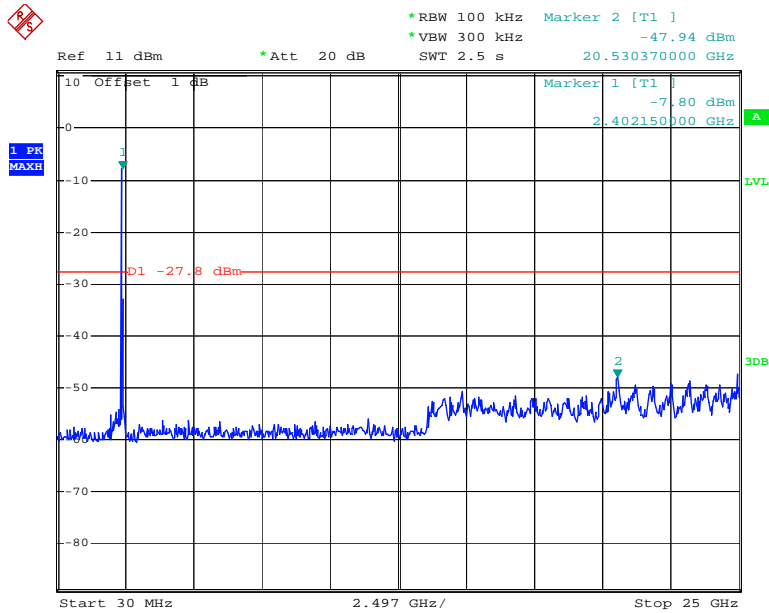
Date: 18.DEC.2013 11:41:47

### Chain0: 802.11n20 High Channel



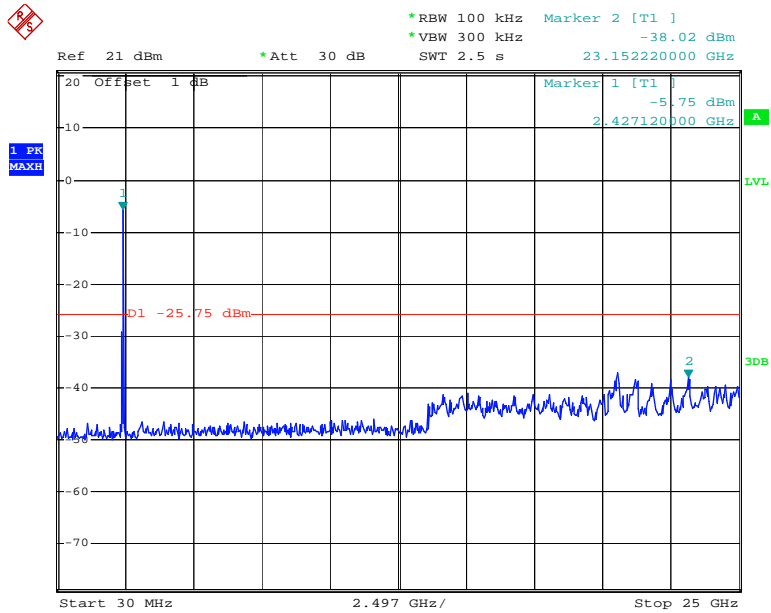
Date: 18.DEC.2013 11:49:49

### Chain1: 802.11n20 Low Channel



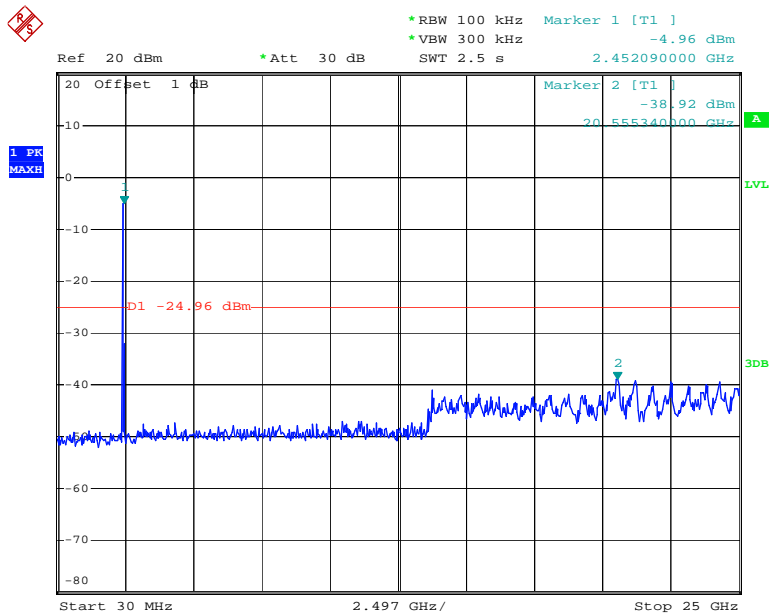
Date: 18.DEC.2013 11:27:56

**Chain1: 802.11n20 Middle Channel**



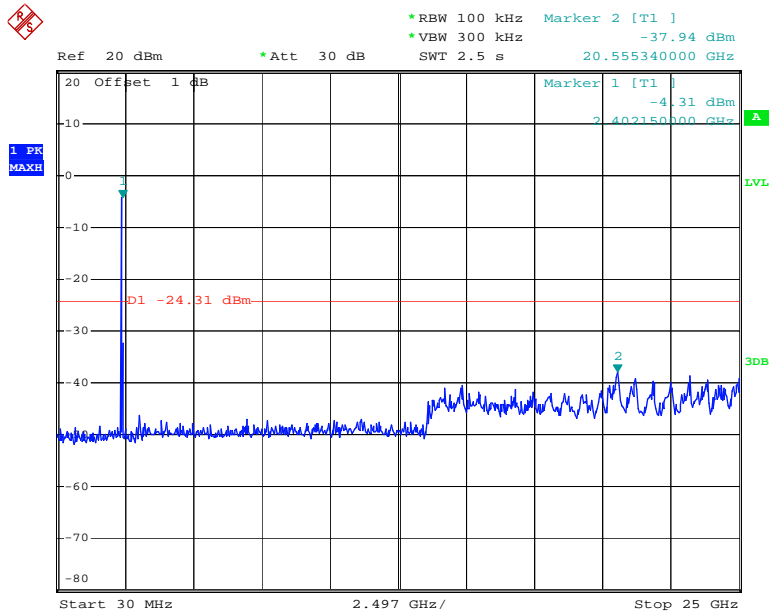
Date: 18.DEC.2013 11:44:06

**Chain1: 802.11n20 High Channel**



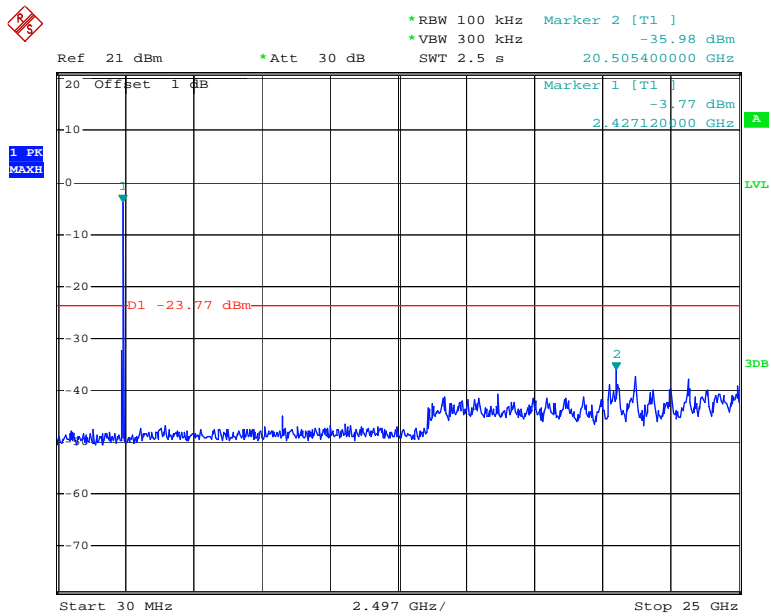
Date: 18.DEC.2013 11:51:34

### Chain2: 802.11n20 Low Channel



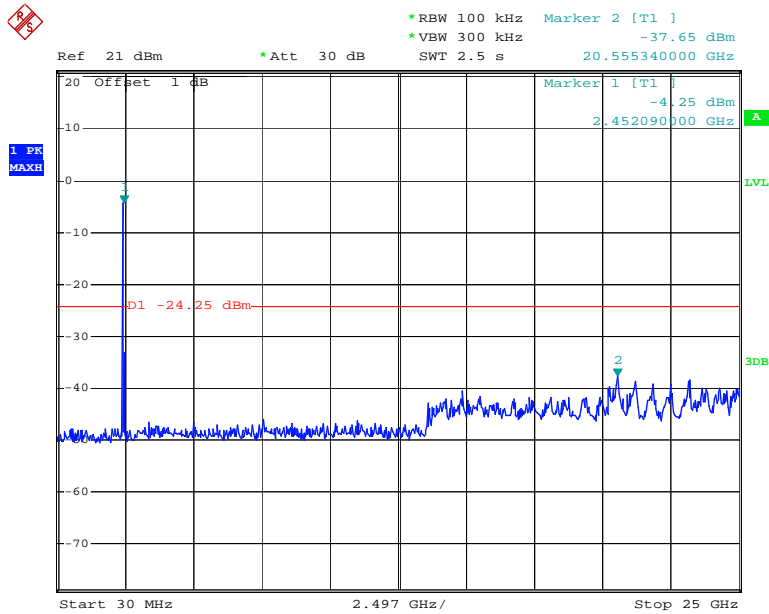
Date: 18.DEC.2013 11:31:57

### Chain2: 802.11n20 Middle Channel



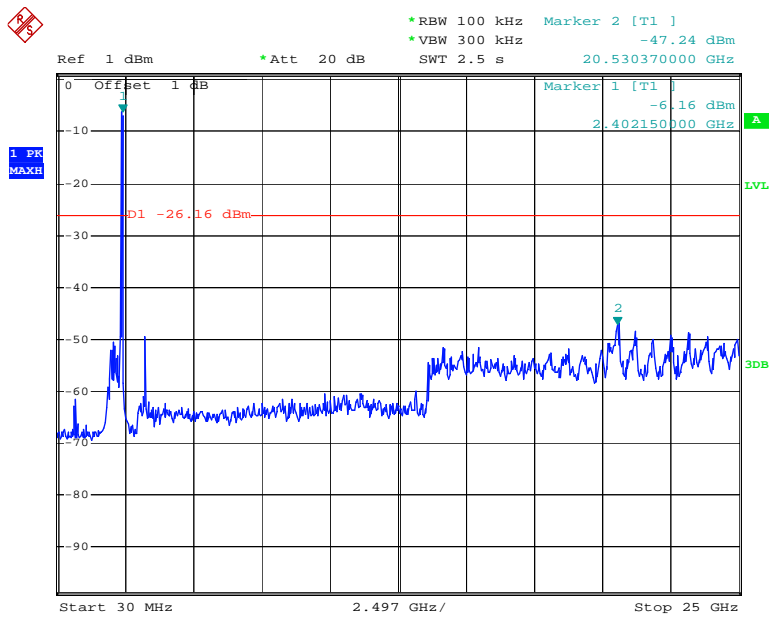
Date: 18.DEC.2013 11:44:59

### Chain2: 802.11n20 High Channel



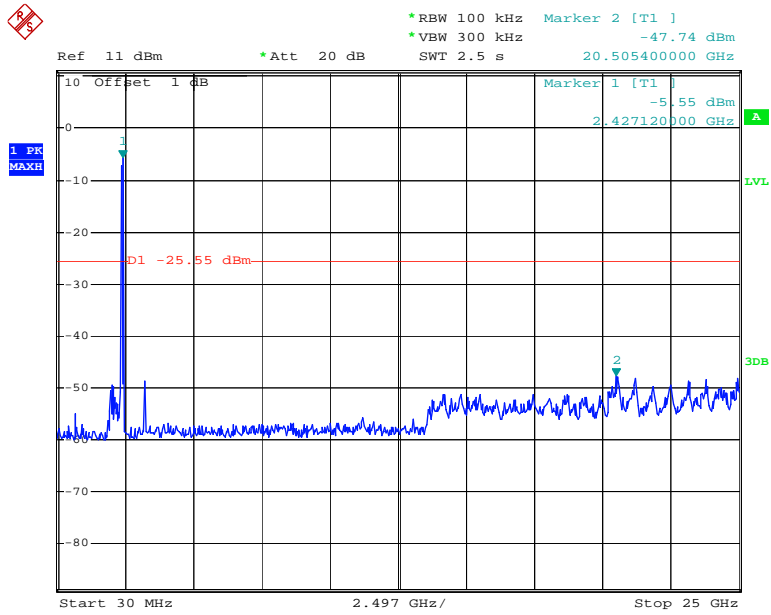
Date: 18.DEC.2013 11:53:13

### Chain0: 802.11n40 Low Channel



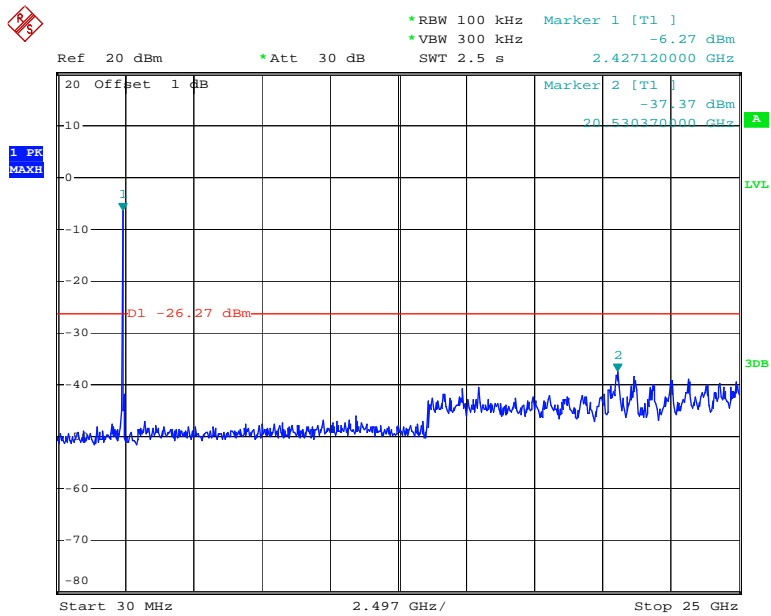
Date: 18.DEC.2013 12:59:35

### Chain0: 802.11n40 Middle Channel



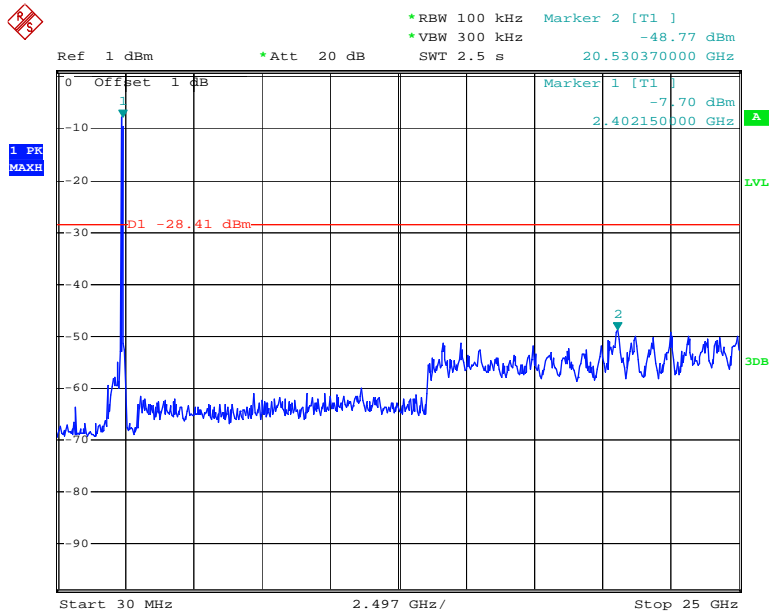
Date: 18.DEC.2013 13:05:59

### Chain0: 802.11n40 High Channel



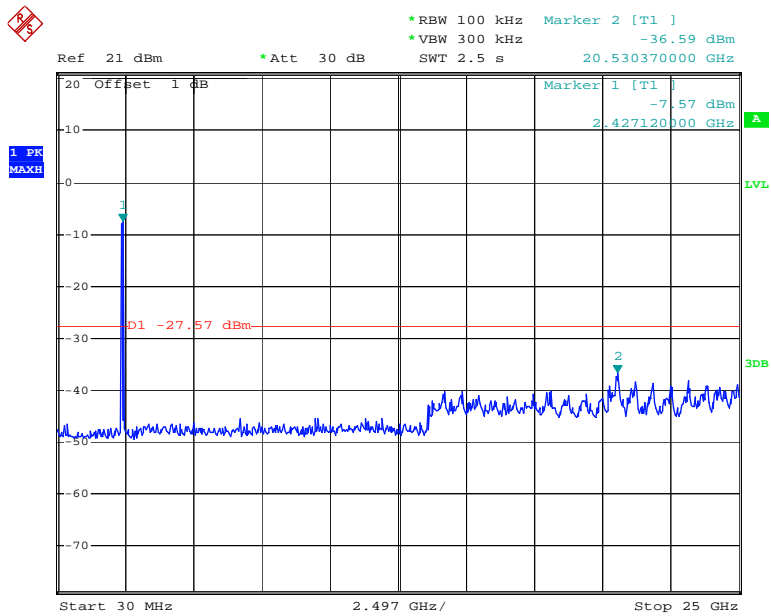
Date: 18.DEC.2013 13:25:20

**Chain1: 802.11n40 Low Channel**



Date: 18.DEC.2013 13:00:17

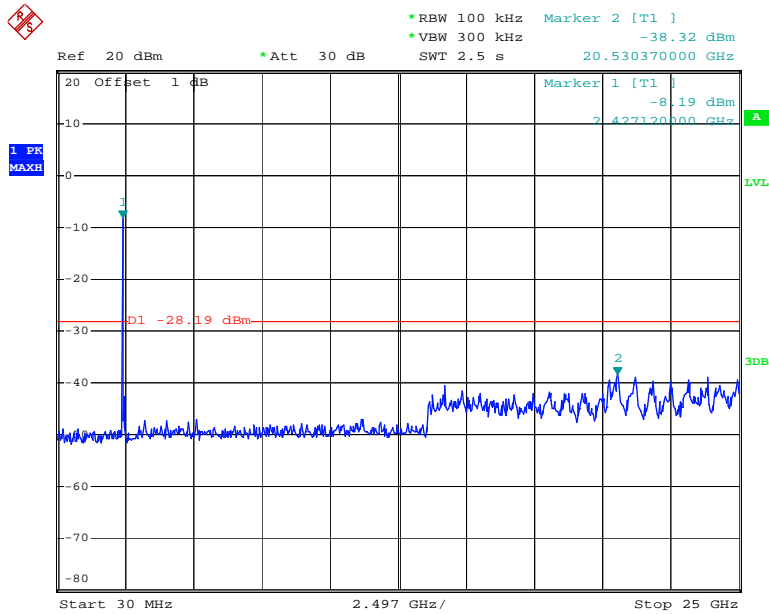
**Chain1: 802.11n40 Middle Channel**



Date: 18.DEC.2013 13:14:27

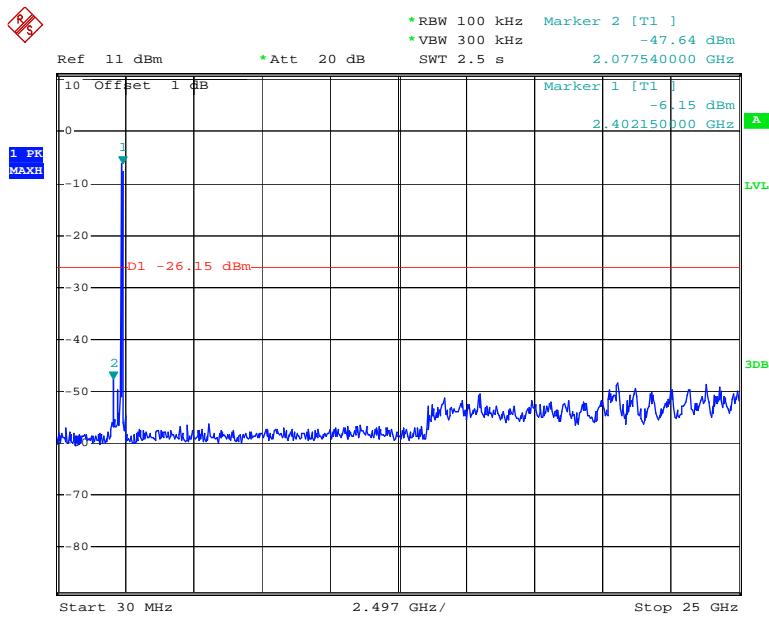


### Chain1: 802.11n40 High Channel



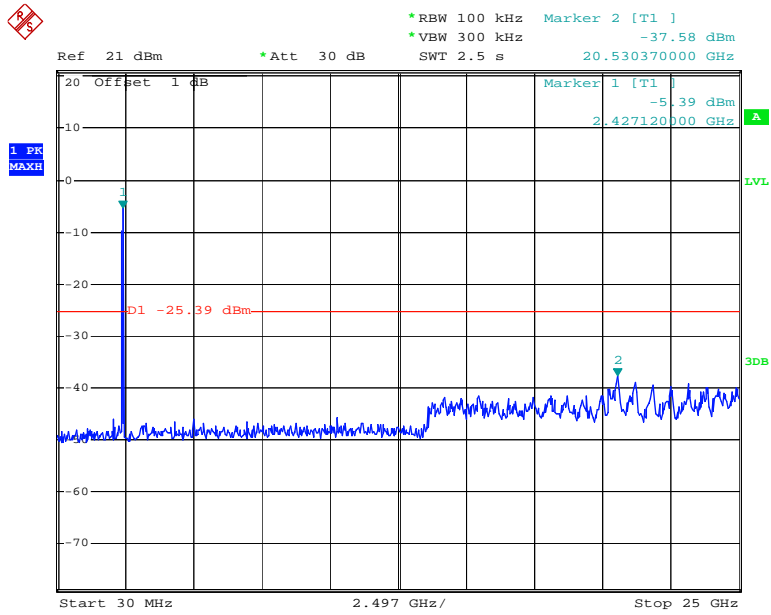
Date: 18.DEC.2013 13:26:16

### Chain2: 802.11n40 Low Channel



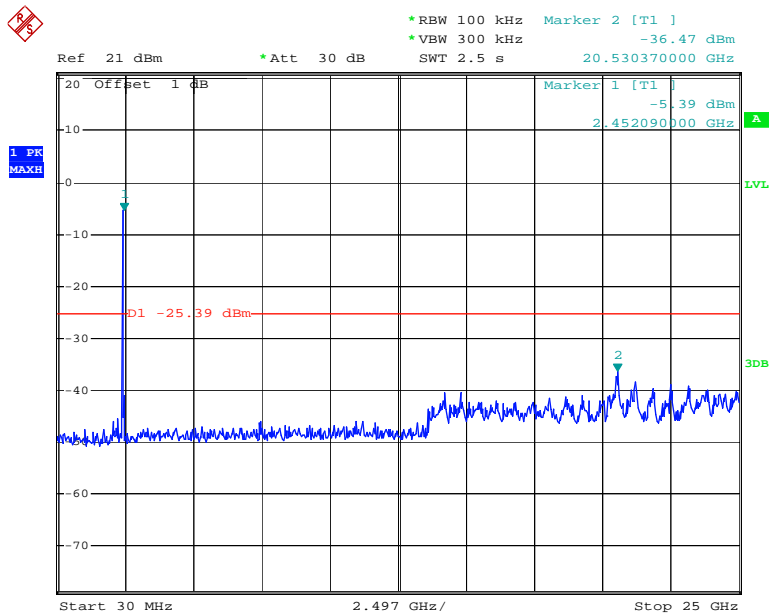
Date: 18.DEC.2013 13:04:22

### Chain2: 802.11n40 Middle Channel



Date: 18.DEC.2013 13:15:45

### Chain2: 802.11n40 High Channel



Date: 18.DEC.2013 13:32:55

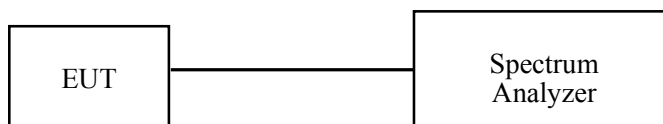
## FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

### 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

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 it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum analyzer	FSP 38	100478	2013-6-16	2014-6-15

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

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	20.9 °C
<b>Relative Humidity:</b>	42 %
<b>ATM Pressure:</b>	101.3 kPa

*The testing was performed by Ares Liu on 2013-12-18.*

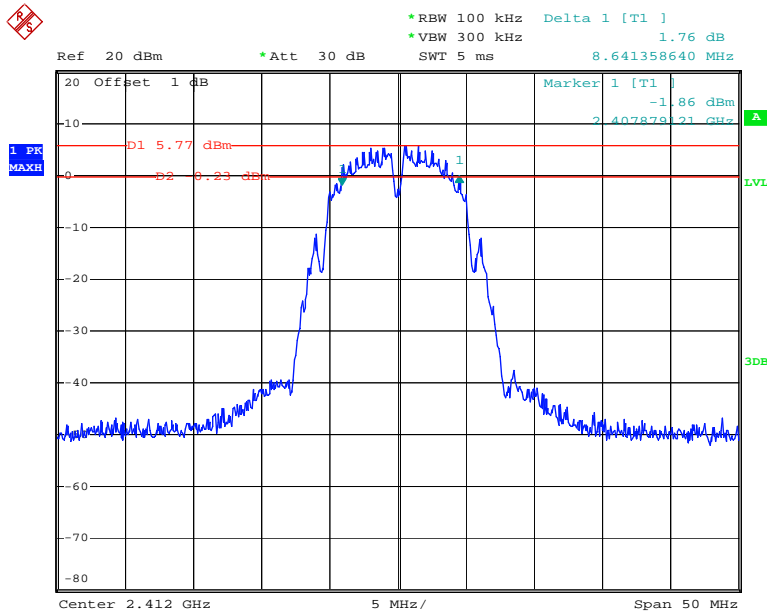
*Test Mode: Transmitting*

**Test Result:** Pass.

Please refer to the following tables and plots.

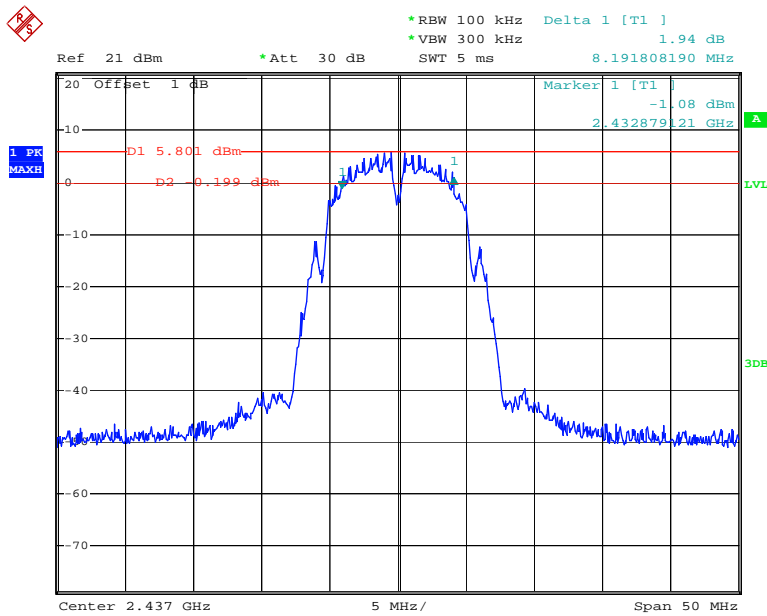
Test Mode	Channel	Frequency	6 dB Bandwidth (MHz)			Limit
		(MHz)	Chain0	Chain1	Chain2	(kHz)
802.11b	Low	2412	8.64	/	/	>500
	Middle	2437	8.19	/	/	>500
	High	2462	8.19	/	/	>500
802.11g	Low	2412	16.58	/	/	>500
	Middle	2437	16.48	/	/	>500
	High	2462	16.53	/	/	>500
802.11n20	Low	2412	17.78	17.68	17.78	>500
	Middle	2437	17.73	17.73	17.68	>500
	High	2462	17.73	17.63	17.73	>500
802.11n40	Low	2422	36.46	36.46	36.46	>500
	Middle	2437	36.26	35.96	35.96	>500
	High	2452	36.26	36.56	36.56	>500

### 802.11b Low Channel



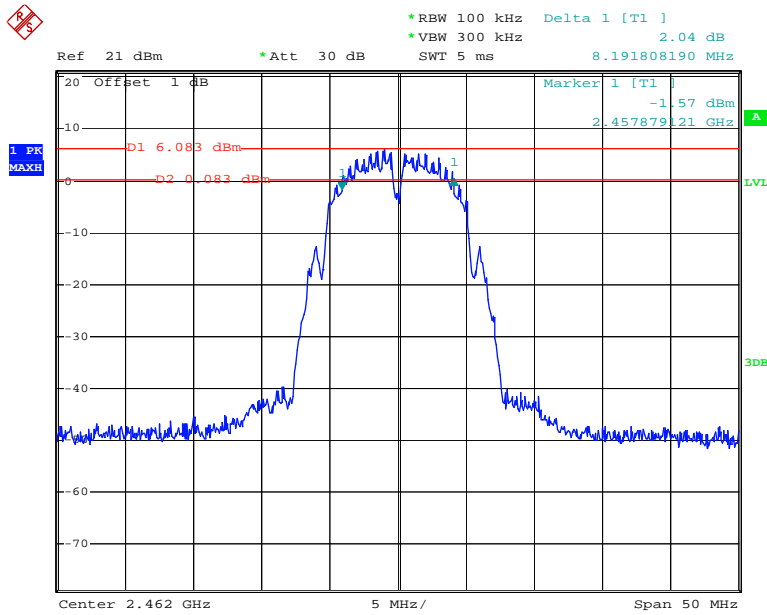
Date: 18.DEC.2013 10:58:31

### 802.11b Middle Channel



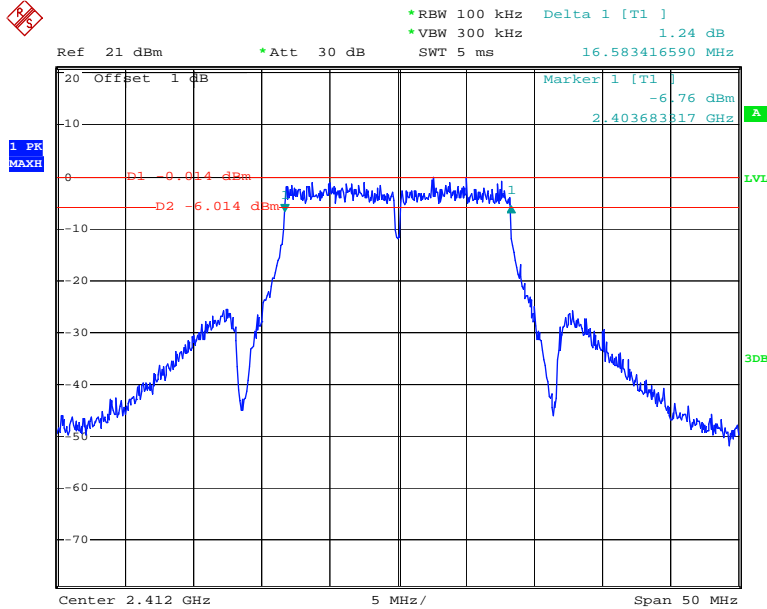
Date: 18.DEC.2013 11:02:32

### 802.11b High Channel



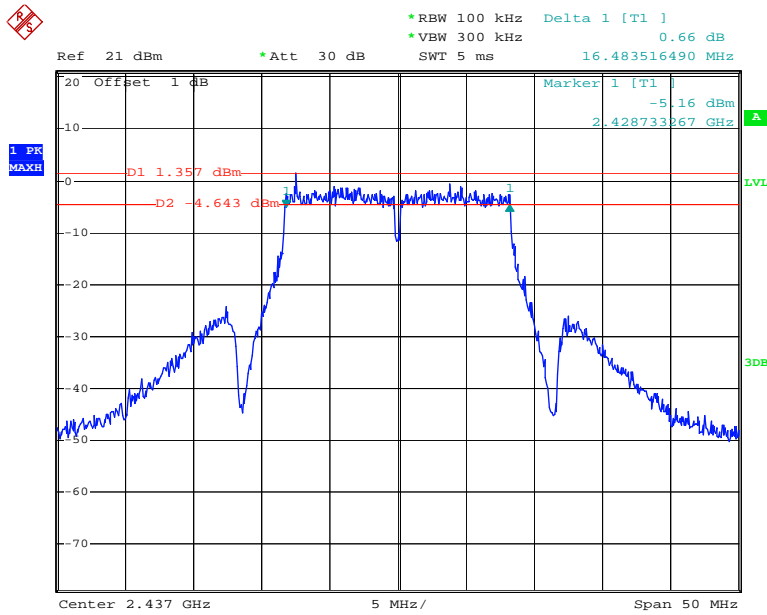
Date: 18.DEC.2013 11:04:06

### 802.11g Low Channel



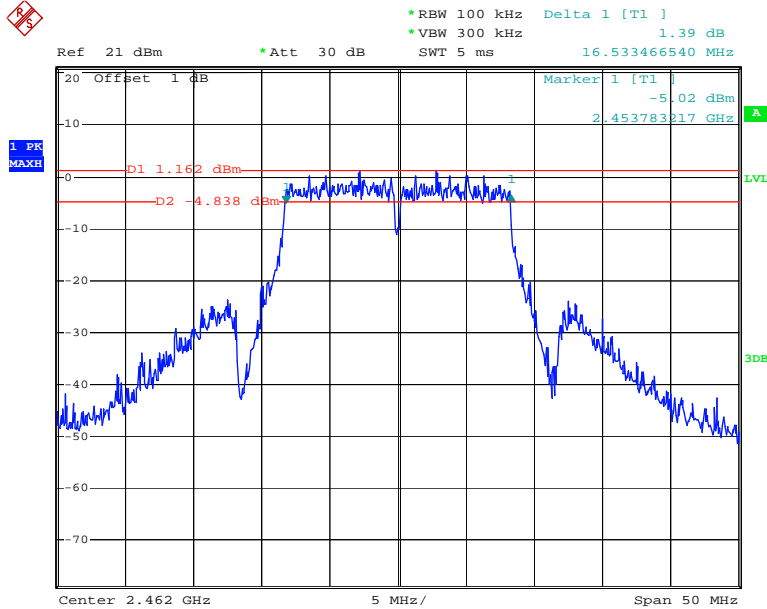
Date: 18.DEC.2013 11:06:20

### 802.11g Middle Channel



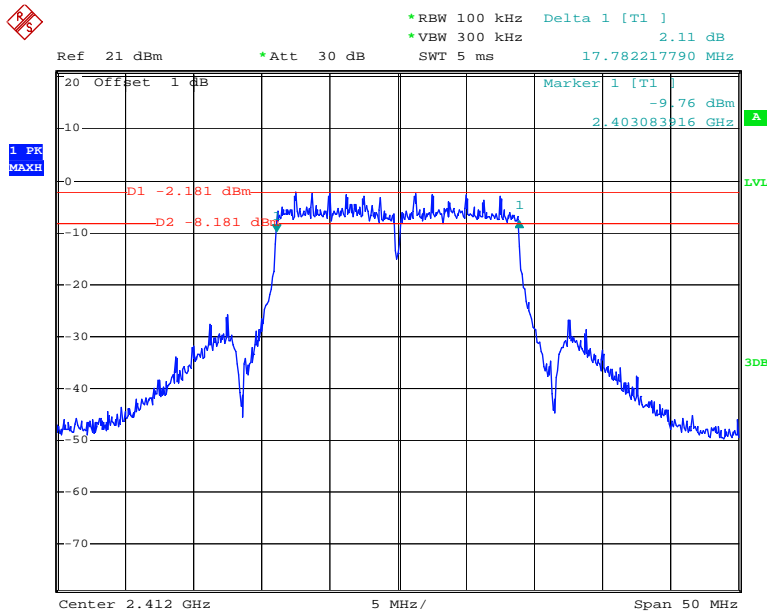
Date: 18.DEC.2013 11:17:41

### 802.11g High Channel



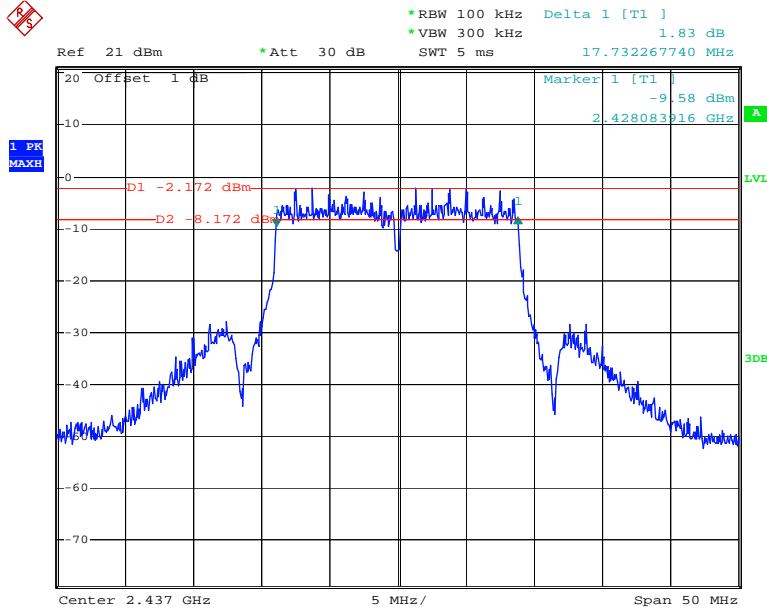
Date: 18.DEC.2013 11:19:24

### Chain0: 802.11n20 Low Channel



Date: 18.DEC.2013 11:25:22

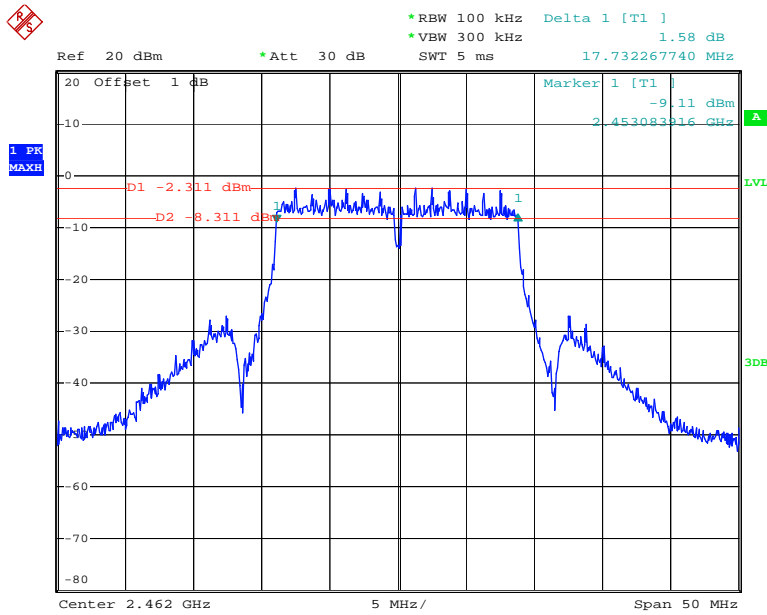
### Chain0: 802.11n20 Middle Channel



Date: 18.DEC.2013 11:40:41

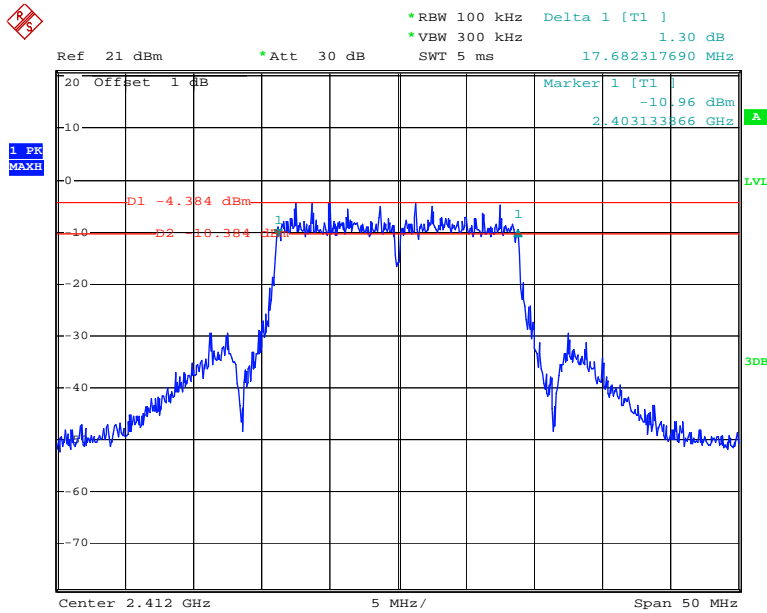


### Chain0: 802.11n20 High Channel



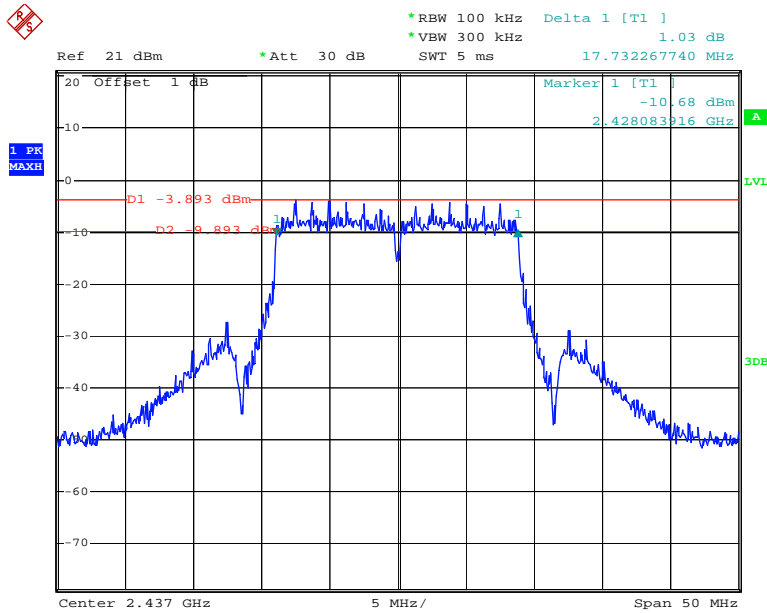
Date: 18.DEC.2013 11:48:32

### Chain1: 802.11n20 Low Channel



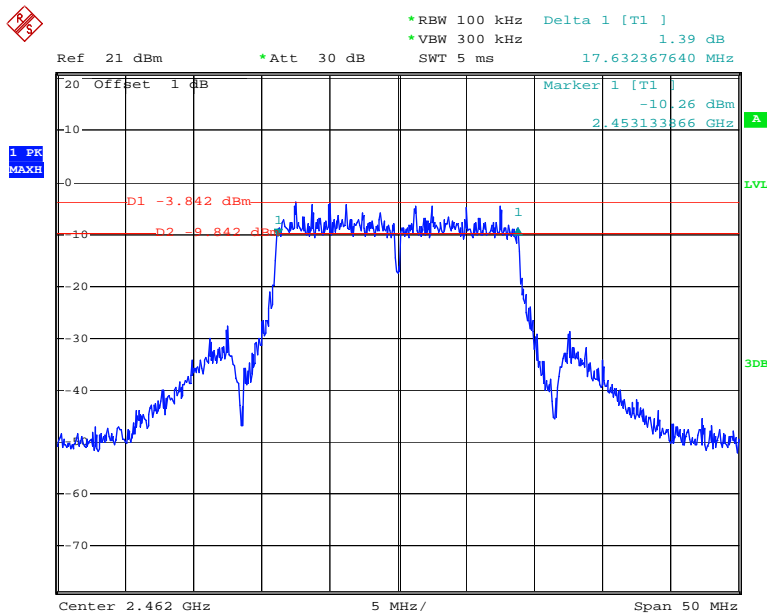
Date: 18.DEC.2013 11:28:35

### Chain1: 802.11n20 Middle Channel



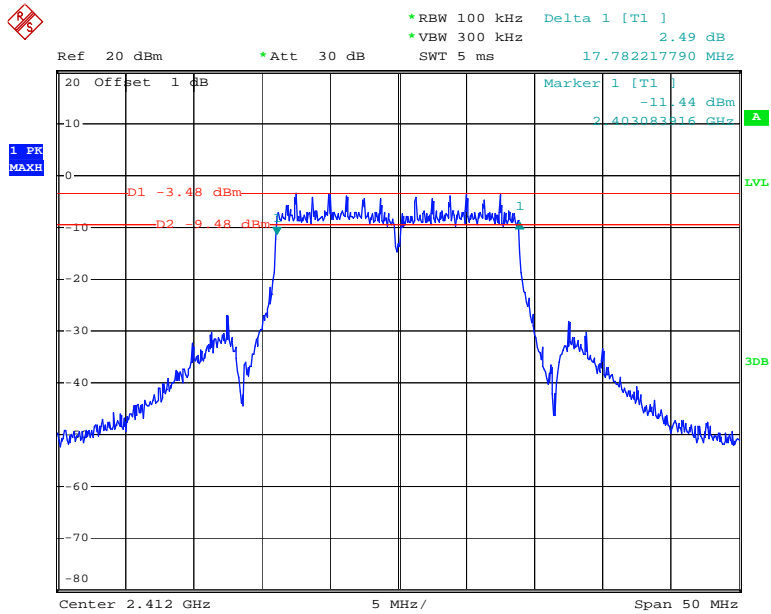
Date: 18.DEC.2013 11:42:24

### Chain1: 802.11n20 High Channel



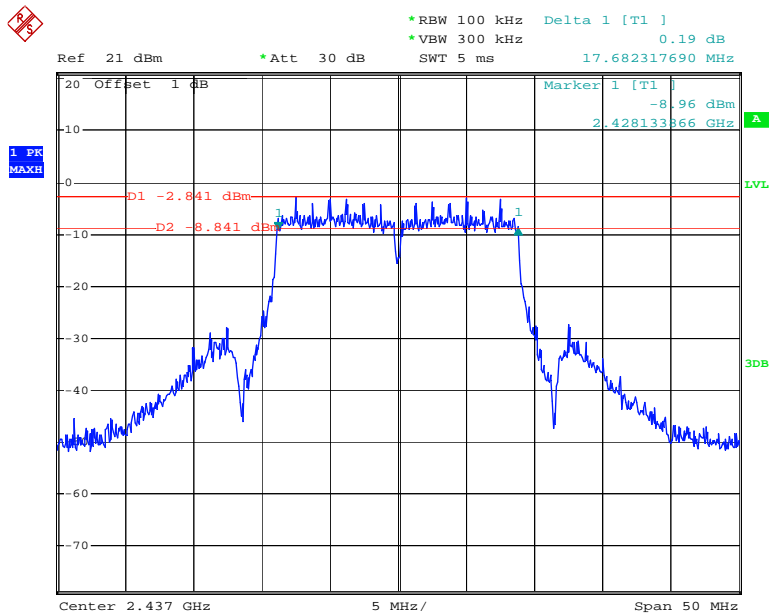
Date: 18.DEC.2013 11:51:52

### Chain2: 802.11n20 Low Channel



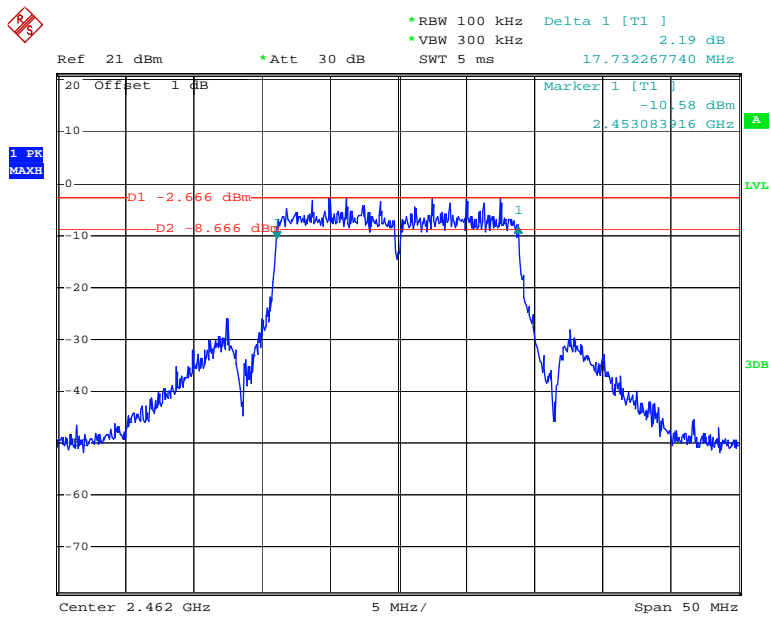
Date: 18.DEC.2013 11:30:36

### Chain2: 802.11n20 Middle Channel



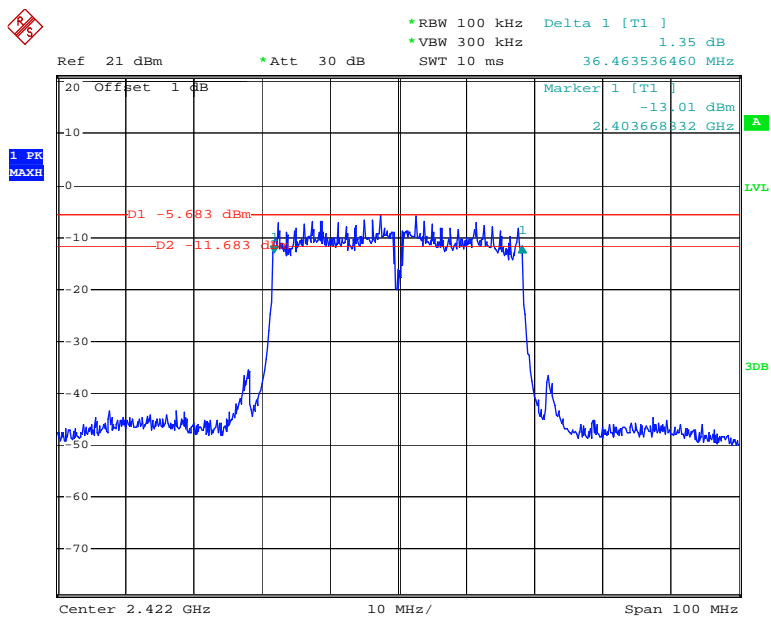
Date: 18.DEC.2013 11:45:20

### Chain2: 802.11n20 High Channel



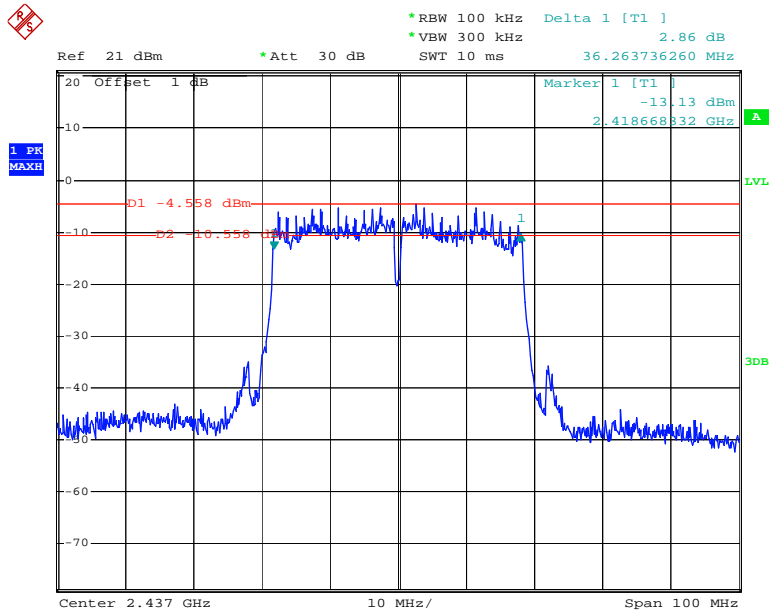
Date: 18.DEC.2013 11:56:37

### Chain0: 802.11n40 Low Channel



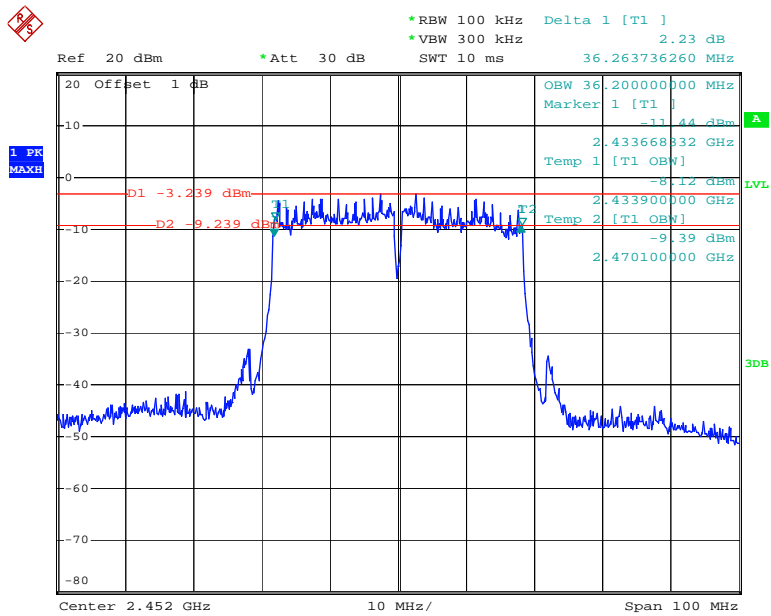
Date: 18.DEC.2013 13:33:45

**Chain0: 802.11n40 Middle Channel**



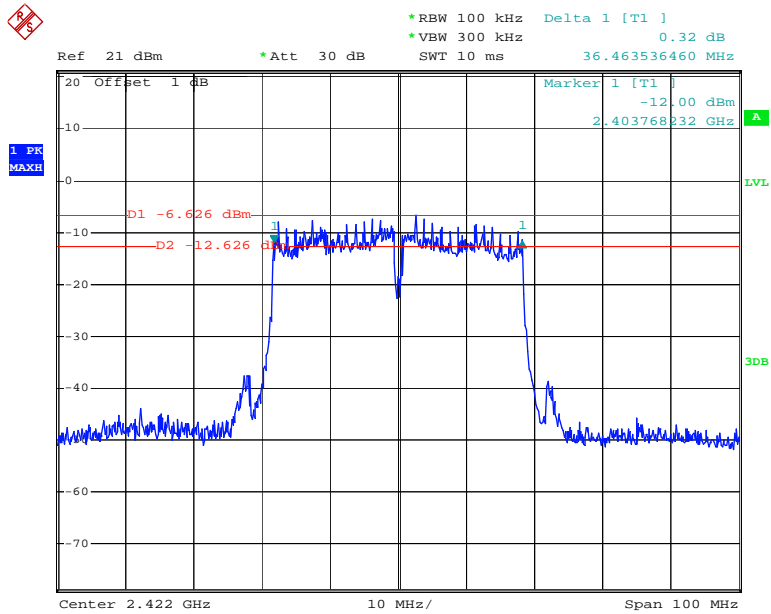
Date: 18.DEC.2013 13:06:22

**Chain0: 802.11n40 High Channel**



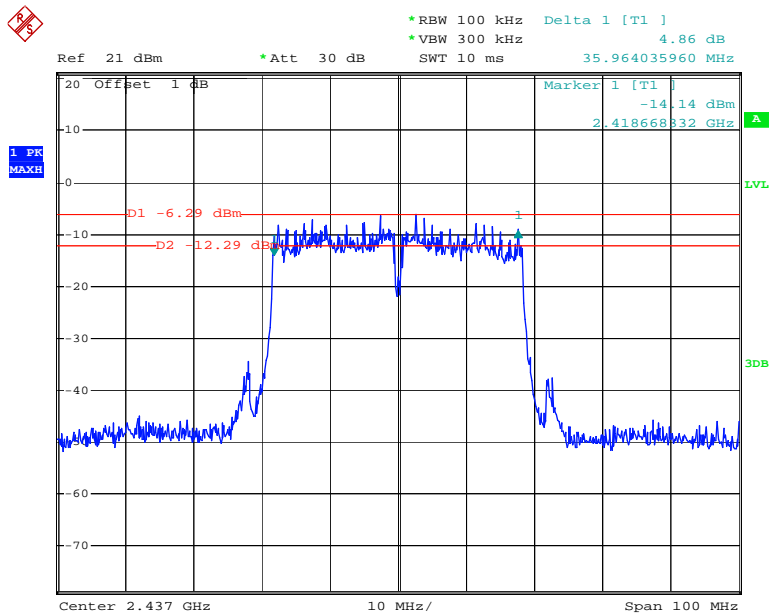
Date: 18.DEC.2013 13:22:44

**Chain1: 802.11n40 Low Channel**



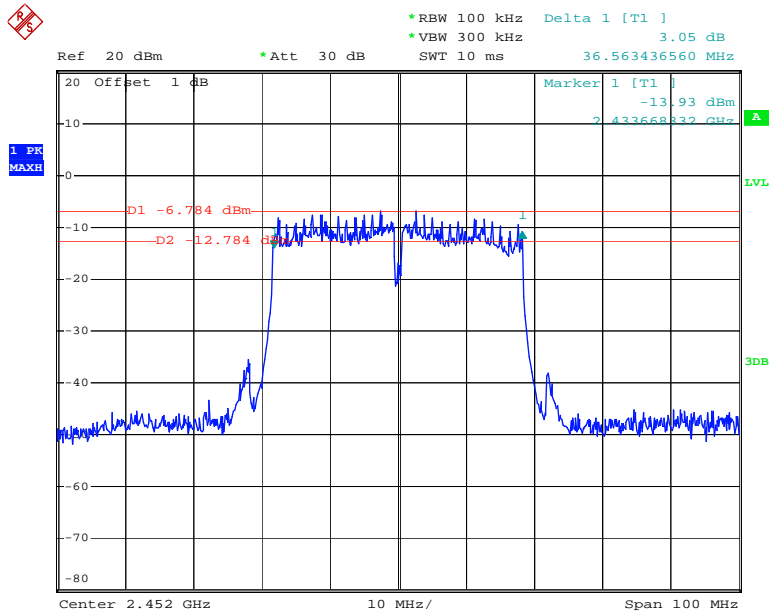
Date: 18.DEC.2013 13:00:46

**Chain1: 802.11n40 Middle Channel**



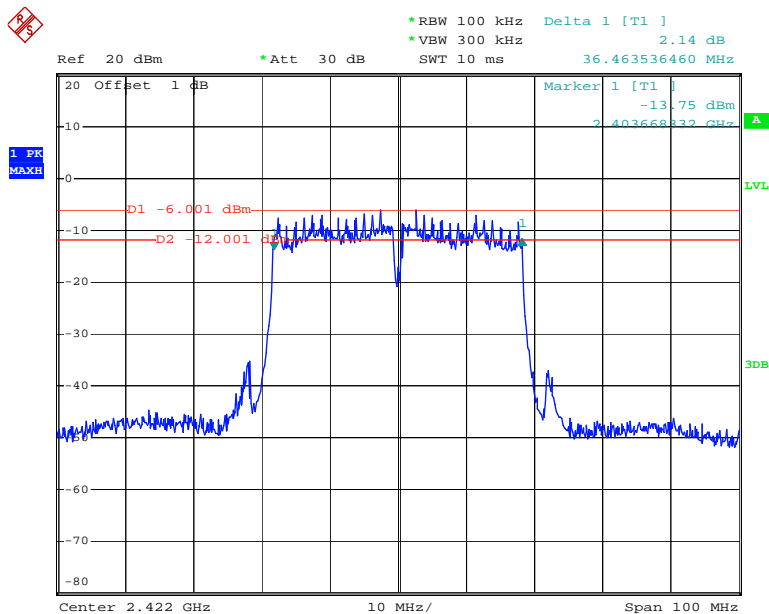
Date: 18.DEC.2013 13:08:05

### Chain1: 802.11n40 High Channel



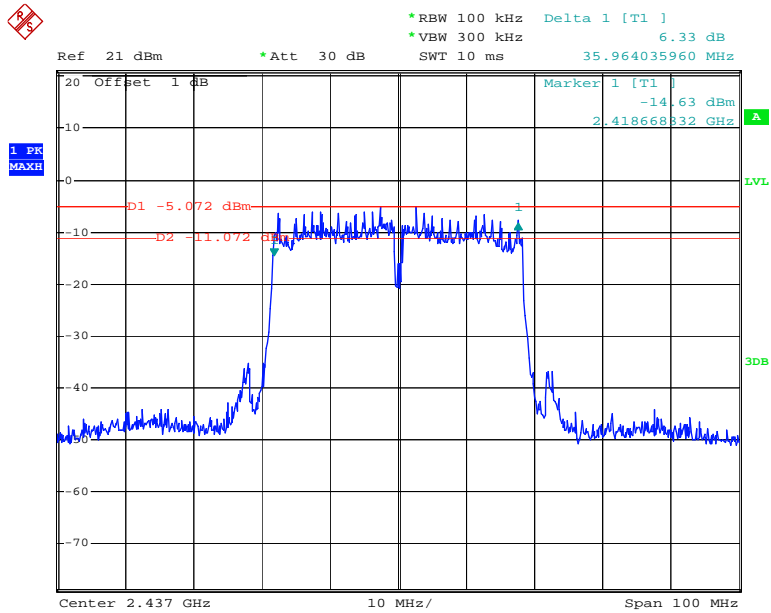
Date: 18.DEC.2013 13:30:05

### Chain2: 802.11n40 Low Channel



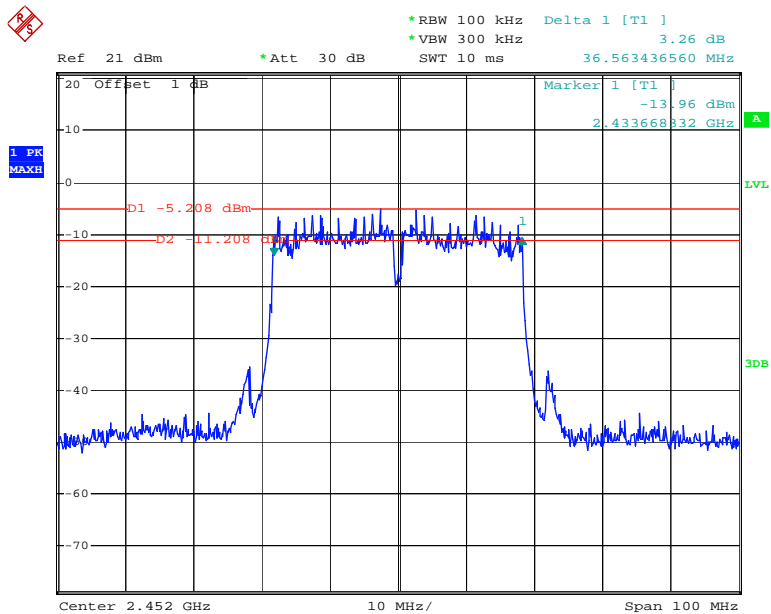
Date: 18.DEC.2013 13:02:35

**Chain2: 802.11n40 Middle Channel**



Date: 18.DEC.2013 13:16:22

**Chain2: 802.11n40 High Channel**



Date: 18.DEC.2013 13:31:09



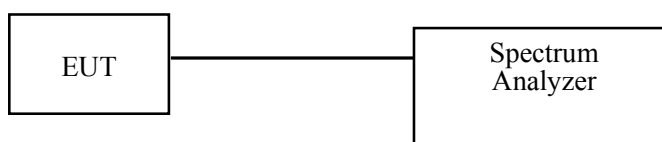
## **FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER**

### **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. According to KDB 558074 D01 DTS Meas Guidance v03r01, 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 a spectrum Analyzer.
3. Add a correction factor to the display.



### **Test Equipment List and Details**

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
R&S	Spectrum analyzer	FSP 38	100478	2013-6-16	2014-6-15

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

**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	20.9 °C
<b>Relative Humidity:</b>	42 %
<b>ATM Pressure:</b>	101.3 kPa

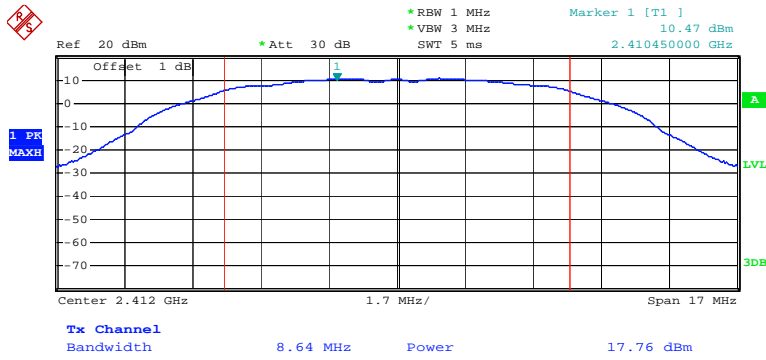
*The testing was performed by Ares Liu on 2013-12-18.*

*Test Mode: Transmitting*

Test Mode	Channel	Frequency (MHz)	Conducted Output Power (dBm)				Limit (dBm)	Result
			Chain0	Chain1	Chain2	Total		
802.11b	Low	2412	17.76	/	/	17.76	30	PASS
	Middle	2437	17.70	/	/	17.70	30	PASS
	High	2462	17.64	/	/	17.64	30	PASS
802.11g	Low	2412	20.95	/	/	20.95	30	PASS
	Middle	2437	20.72	/	/	20.72	30	PASS
	High	2462	21.02	/	/	21.02	30	PASS
802.11n20	Low	2412	17.36	15.38	16.09	21.13	30	PASS
	Middle	2437	17.42	15.63	16.51	21.35	30	PASS
	High	2462	17.55	15.78	17.23	21.69	30	PASS
802.11n40	Low	2422	17.28	15.01	15.60	20.84	30	PASS
	Middle	2437	17.10	15.31	16.38	21.10	30	PASS
	High	2452	17.08	15.00	16.43	21.03	30	PASS

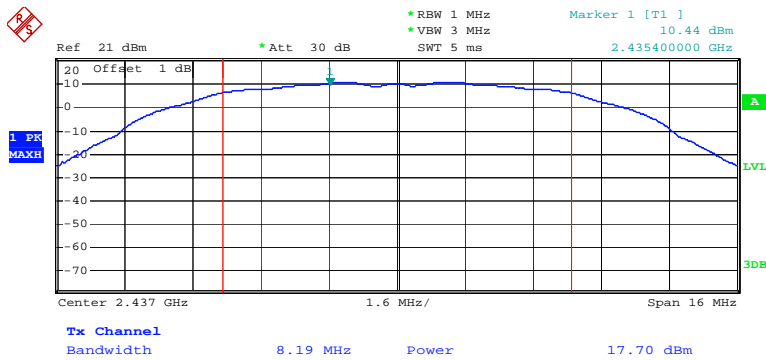
Please refer to the following plots

### 802.11b RF Output Power, Low Channel



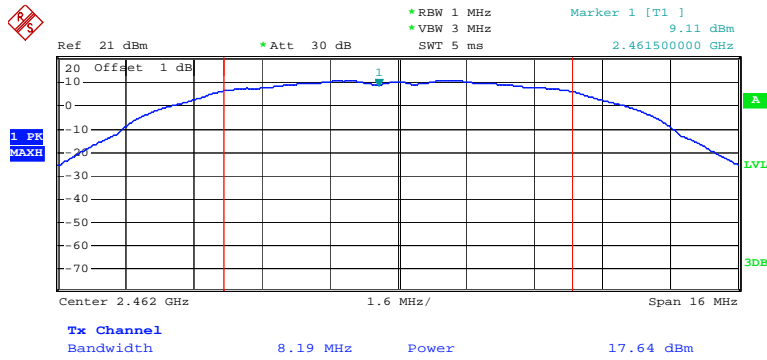
Date: 18.DEC.2013 10:58:48

### 802.11b RF Output Power, Middle Channel



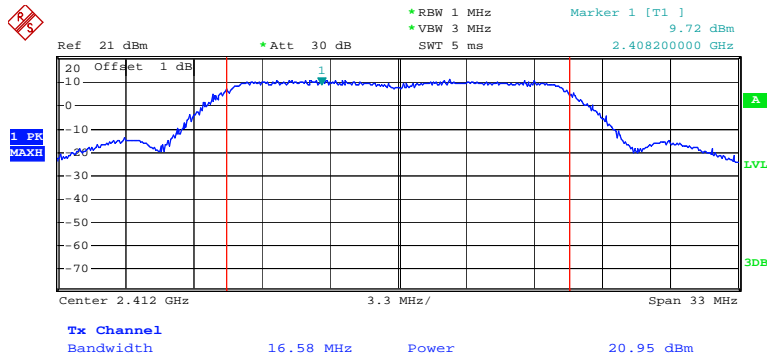
Date: 18.DEC.2013 11:02:47

### 802.11b RF Output Power, High Channel



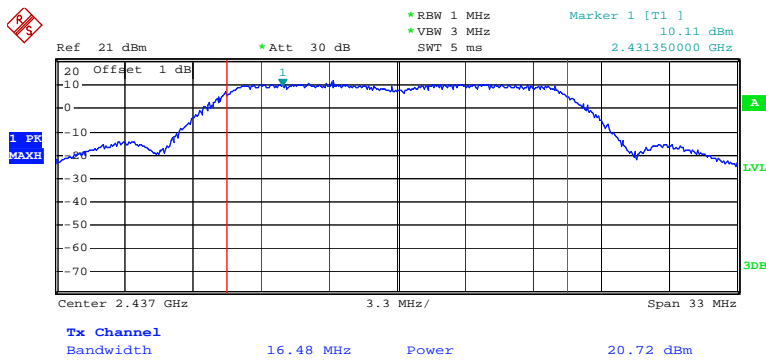
Date: 18.DEC.2013 11:04:22

### 802.11g RF Output Power, Low Channel



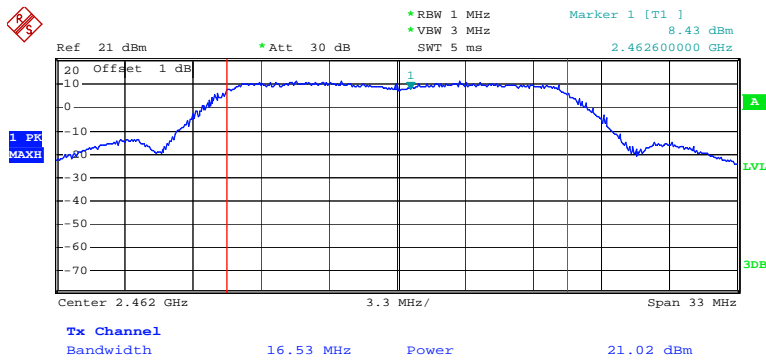
Date: 18.DEC.2013 11:12:38

### 802.11g RF Output Power, Middle Channel



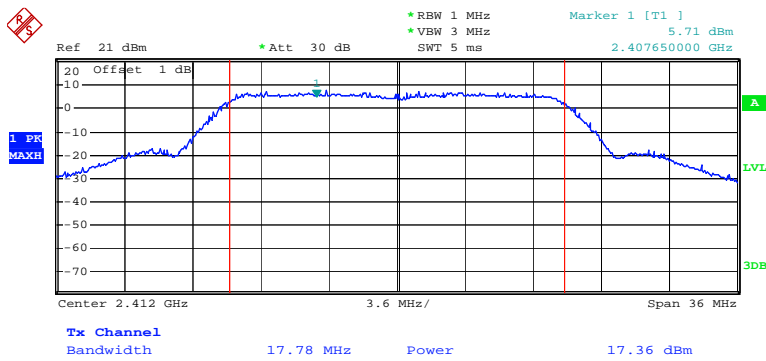
Date: 18.DEC.2013 11:17:55

### 802.11g RF Output Power, High Channel



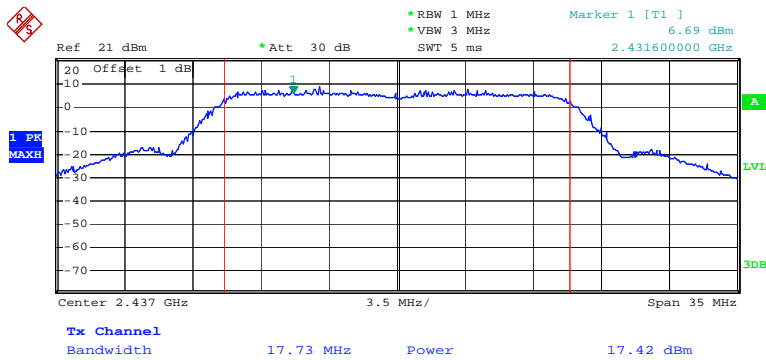
Date: 18.DEC.2013 11:19:40

### Chain0: 802.11n20 RF Output Power, Low Channel



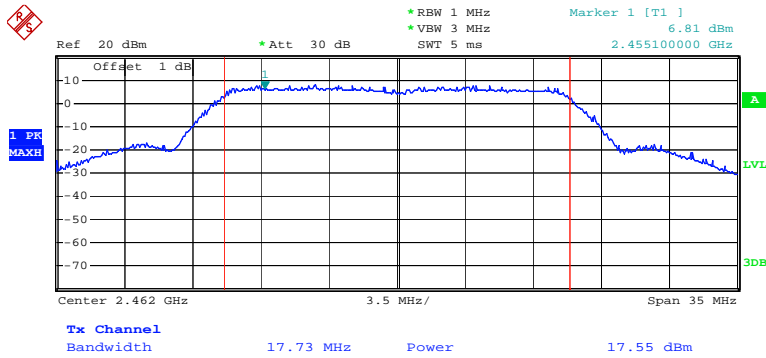
Date: 18.DEC.2013 11:25:45

### Chain0: 802.11n20 RF Output Power, Middle Channel



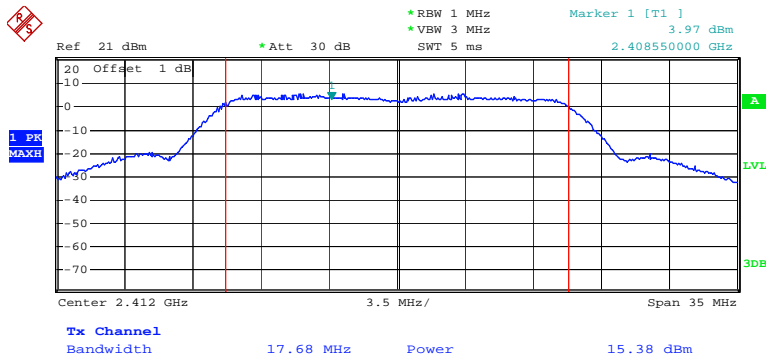
Date: 18.DEC.2013 11:41:00

### Chain0: 802.11n20 RF Output Power, High Channel



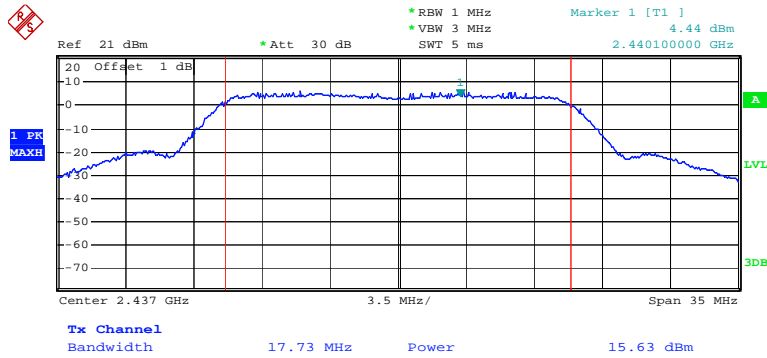
Date: 18.DEC.2013 11:48:52

### Chain1: 802.11n20 RF Output Power, Low Channel



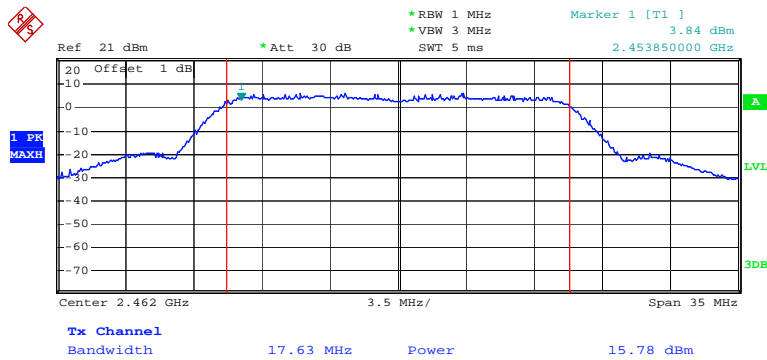
Date: 18.DEC.2013 11:29:01

### Chain1: 802.11n20 RF Output Power, Middle Channel



Date: 18.DEC.2013 11:42:48

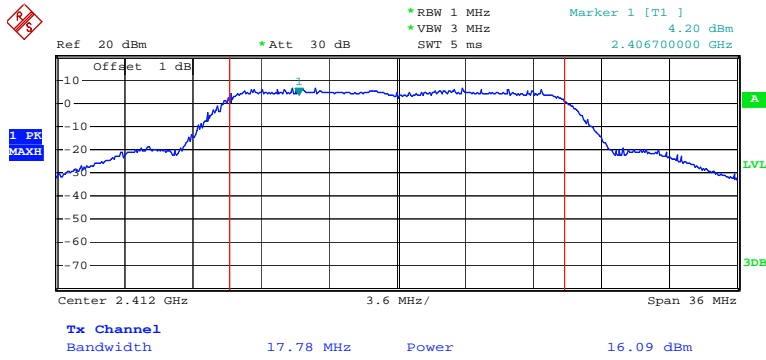
### Chain1: 802.11n20 RF Output Power, High Channel



Date: 18.DEC.2013 11:52:14

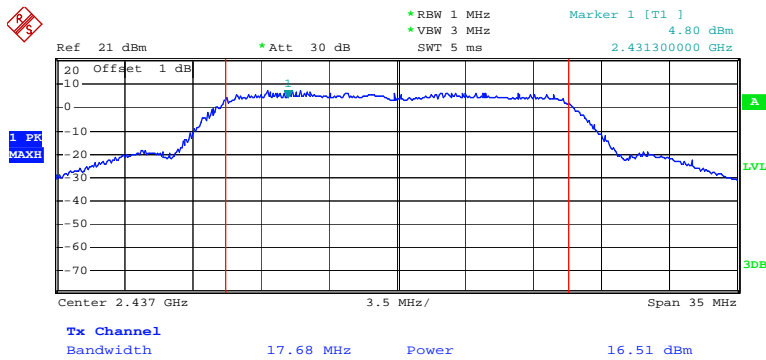


### Chain2: 802.11n20 RF Output Power, Low Channel



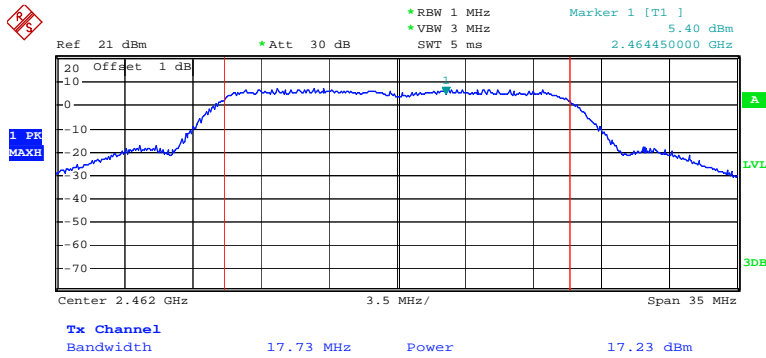
Date: 18.DEC.2013 11:30:58

### Chain2: 802.11n20 RF Output Power, Middle Channel



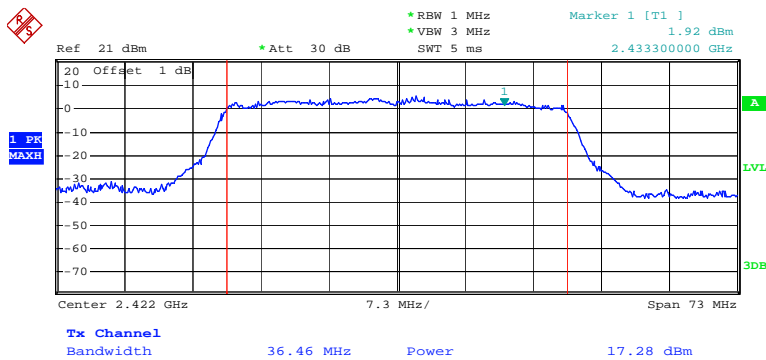
Date: 18.DEC.2013 11:45:39

### Chain2: 802.11n20 RF Output Power, High Channel



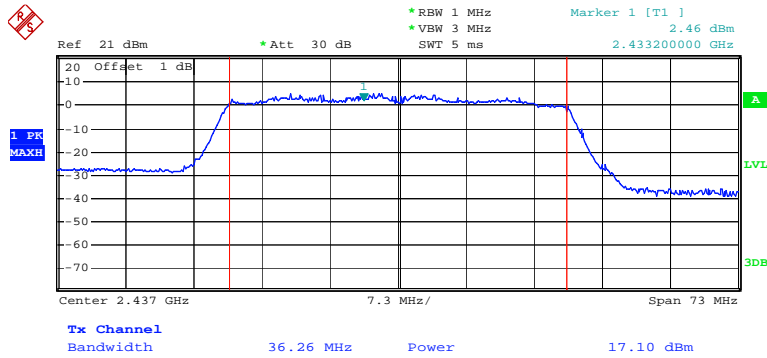
Date: 18.DEC.2013 11:57:03

### Chain0: 802.11n40 RF Output Power, Low Channel



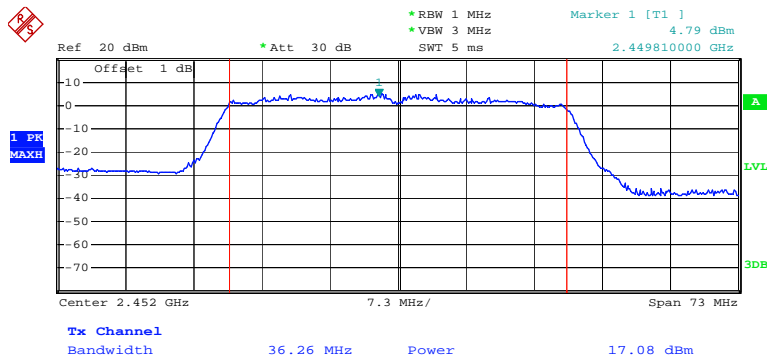
Date: 18.DEC.2013 13:34:17

### Chain0: 802.11n40 RF Output Power, Middle Channel



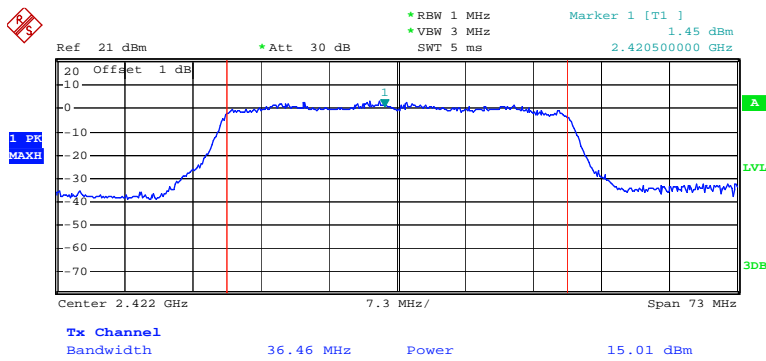
Date: 18.DEC.2013 13:06:45

### Chain0: 802.11n40 RF Output Power, High Channel



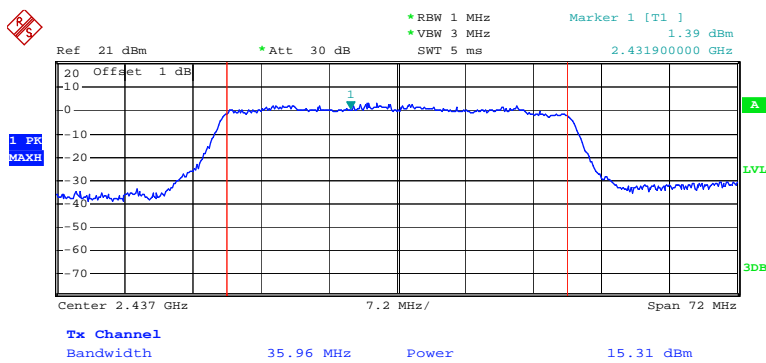
Date: 18.DEC.2013 13:23:47

### Chain1: 802.11n40 RF Output Power, Low Channel



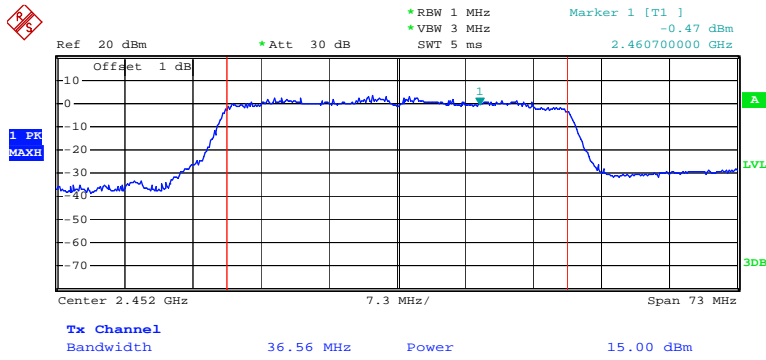
Date: 18.DEC.2013 13:01:16

### Chain1: 802.11n40 RF Output Power, Middle Channel



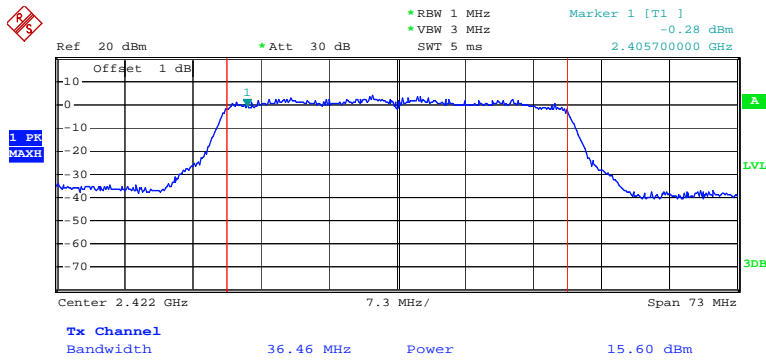
Date: 18.DEC.2013 13:08:29

### Chain1: 802.11n40 RF Output Power, High Channel



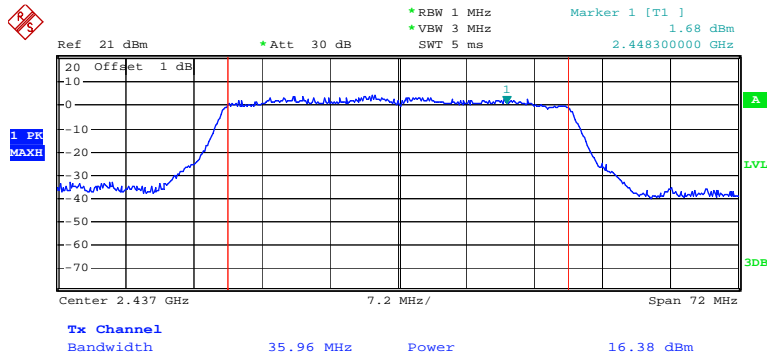
Date: 18.DEC.2013 13:30:26

### Chain2: 802.11n40 RF Output Power, Low Channel



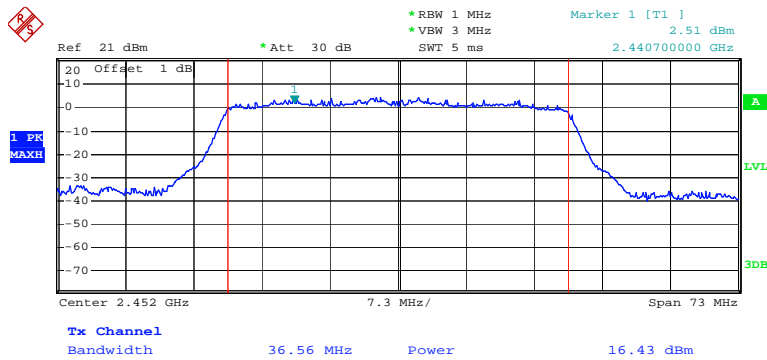
Date: 18.DEC.2013 13:02:55

### Chain2: 802.11n40 RF Output Power, Middle Channel



Date: 18.DEC.2013 13:16:46

### Chain2: 802.11n40 RF Output Power, High Channel



Date: 18.DEC.2013 13:31:34

## **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	2013-6-16	2014-6-15

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

### **Test Data**

#### **Environmental Conditions**

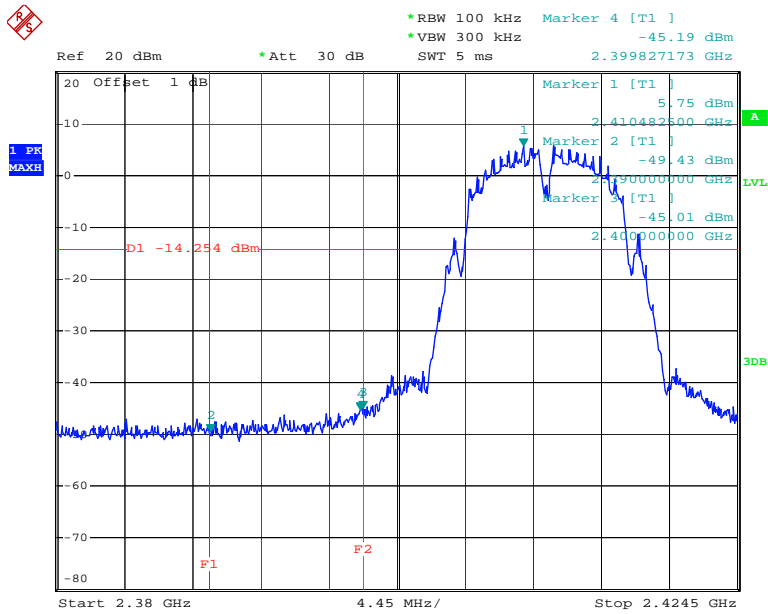
<b>Temperature:</b>	20.9 °C
<b>Relative Humidity:</b>	42 %
<b>ATM Pressure:</b>	101.3 kPa

*The testing was performed by Ares Liu on 2013-12-18.*

#### **Test Result: Compliance**

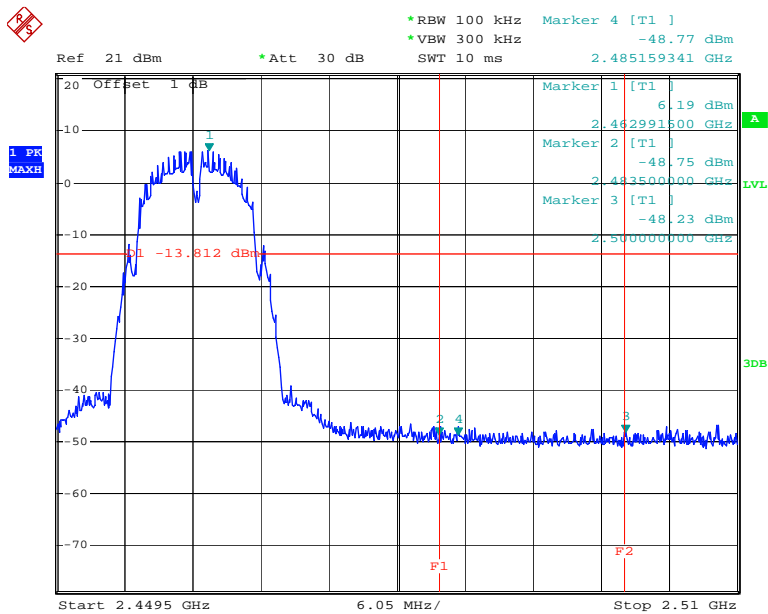
Please refer to following table and plots.

### 802.11b: Band Edge, Left Side



Date: 18.DEC.2013 10:59:09

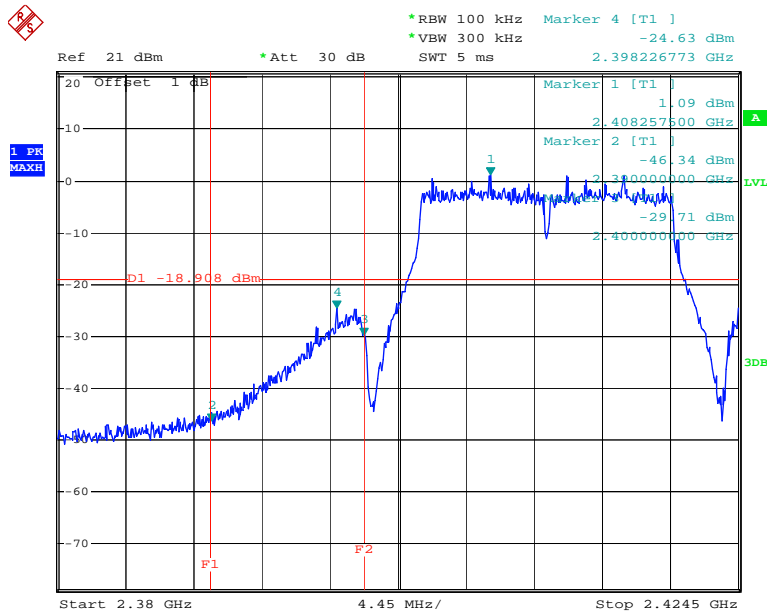
### 802.11b: Band Edge, Right Side



Date: 18.DEC.2013 11:04:42

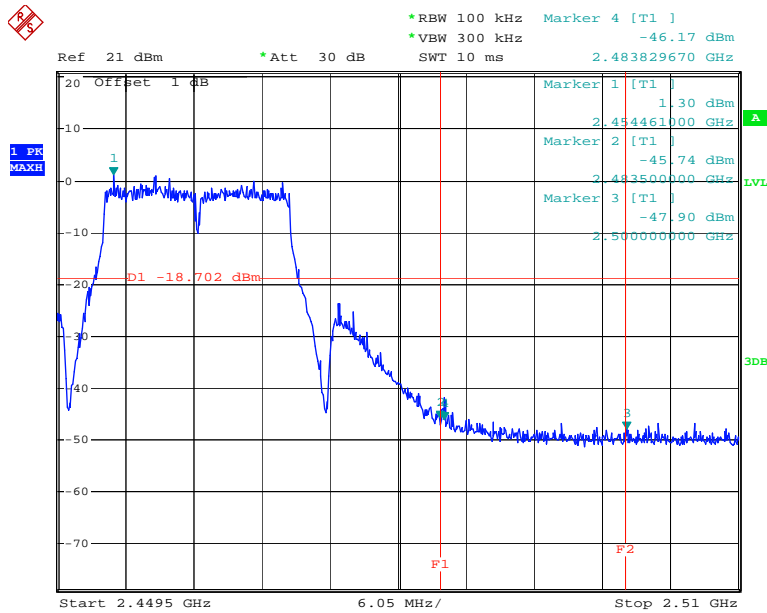


### 802.11g: Band Edge, Left Side



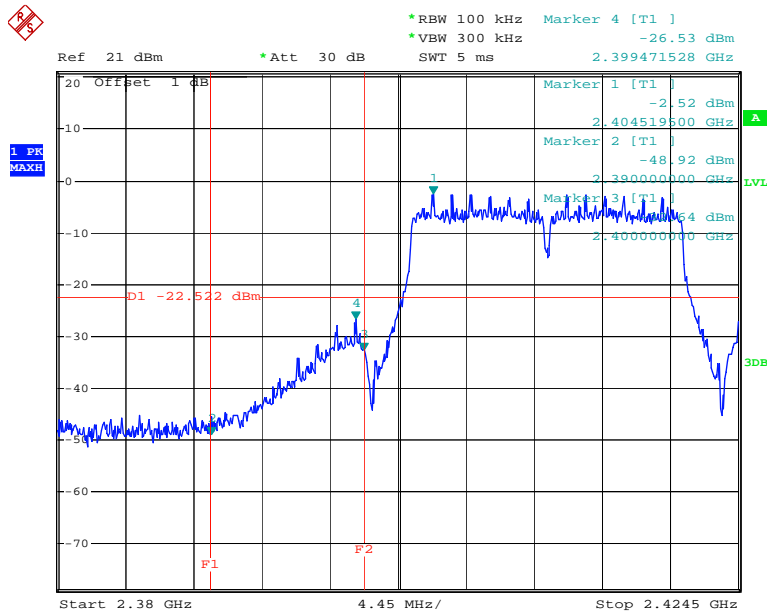
Date: 18.DEC.2013 11:13:03

### 802.11g: Band Edge, Right Side



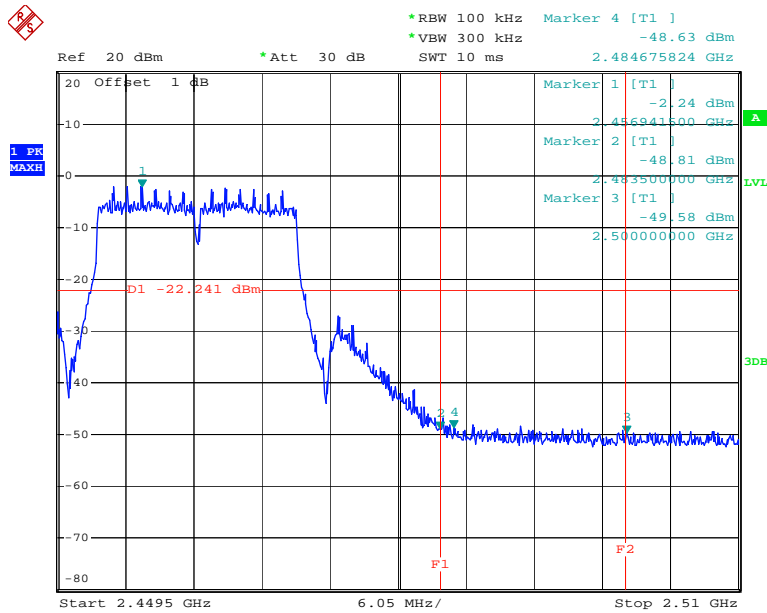
Date: 18.DEC.2013 11:20:06

**Chain0: 802.11n20 Band Edge, Left Side**



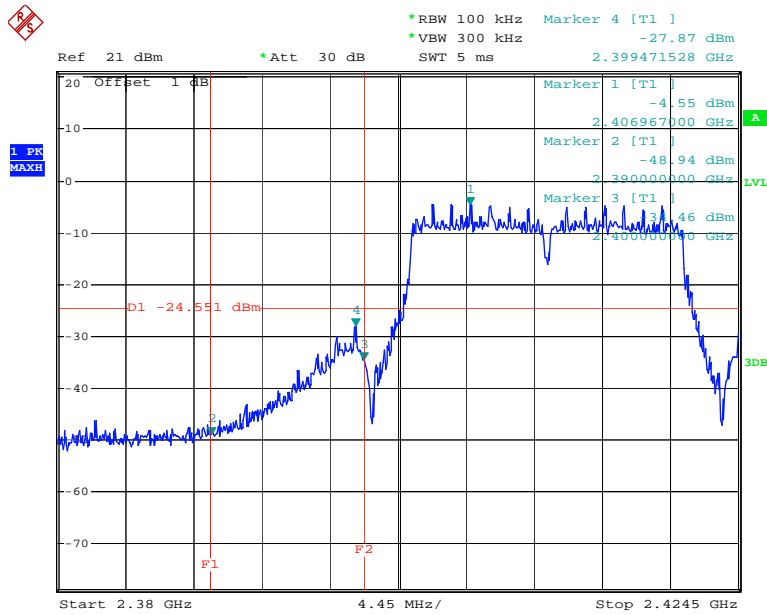
Date: 18.DEC.2013 11:26:12

**Chain0: 802.11n20 Band Edge, Right Side**



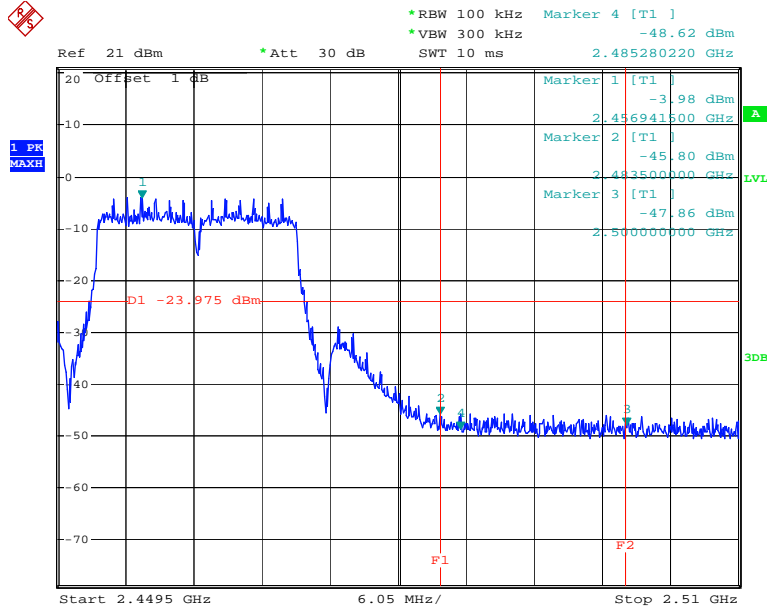
Date: 18.DEC.2013 11:49:18

**Chain1: 802.11n20 Band Edge, Left Side**



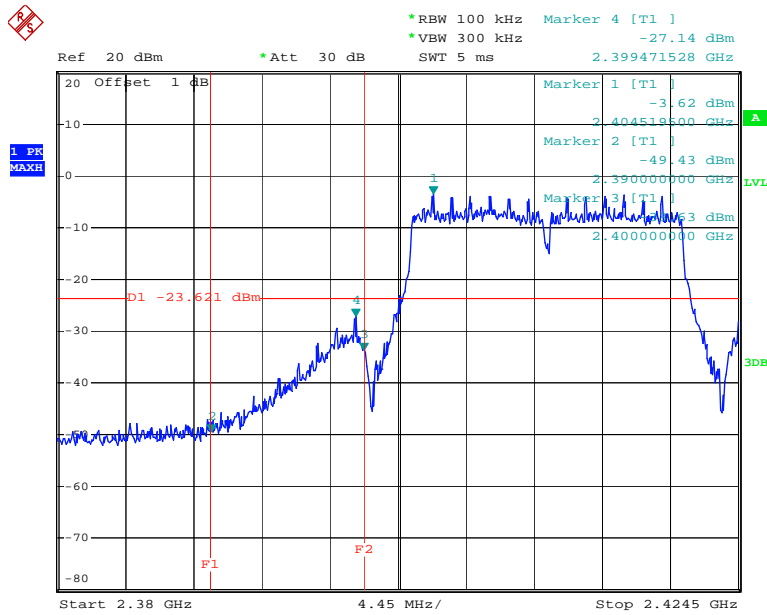
Date: 18.DEC.2013 11:29:27

**Chain1: 802.11n20 Band Edge, Right Side**



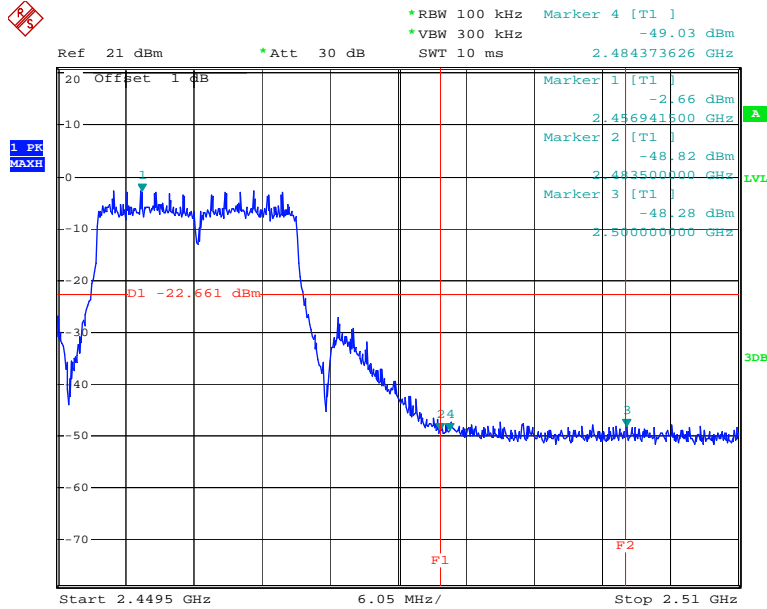
Date: 18.DEC.2013 11:52:40

**Chain2: 802.11n20 Band Edge, Left Side**



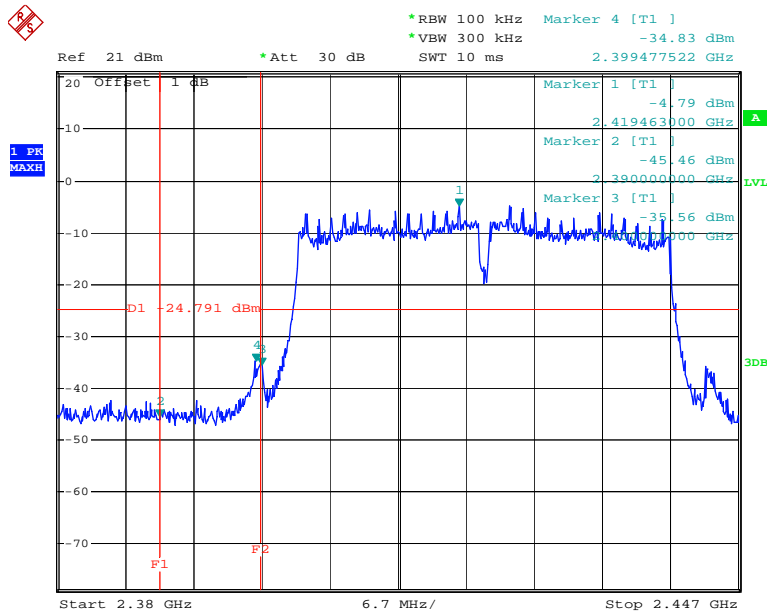
Date: 18.DEC.2013 11:31:24

**Chain2: 802.11n20 Band Edge, Right Side**



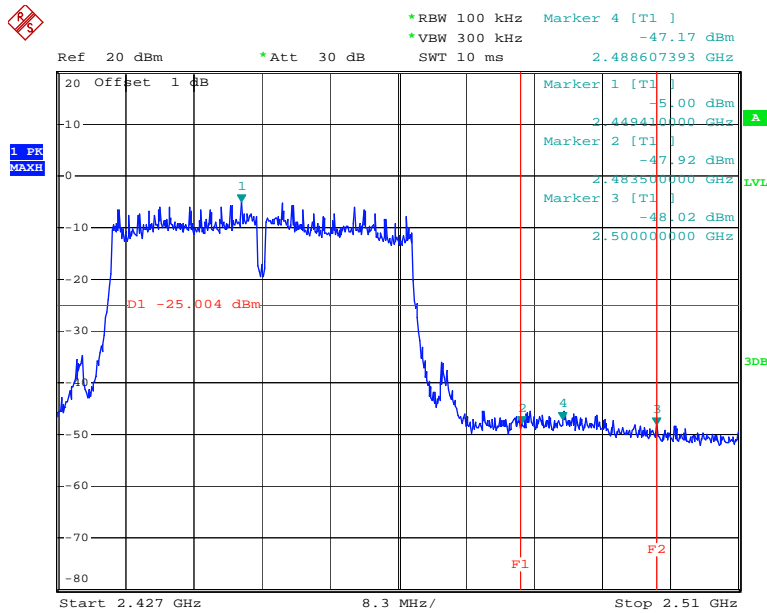
Date: 18.DEC.2013 11:57:29

**Chain0: 802.11n40 Band Edge, Left Side**



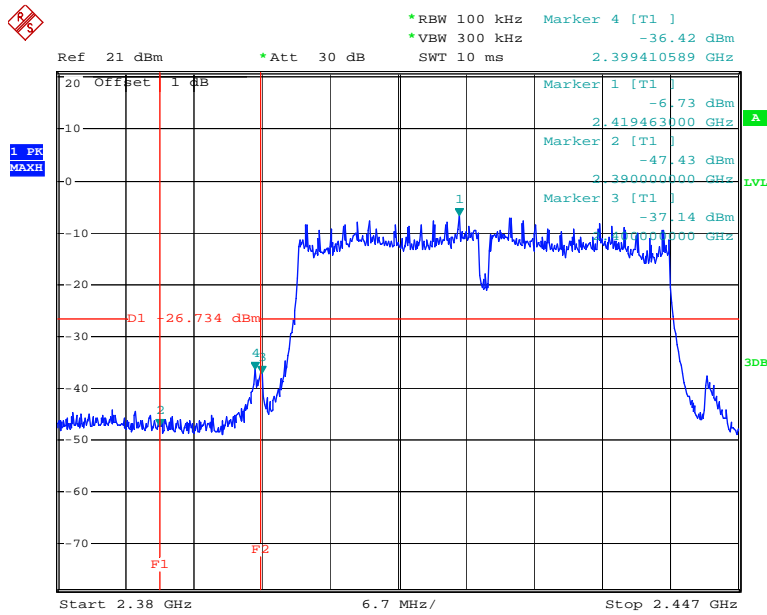
Date: 18.DEC.2013 12:58:31

**Chain0: 802.11n40 Band Edge, Right Side**



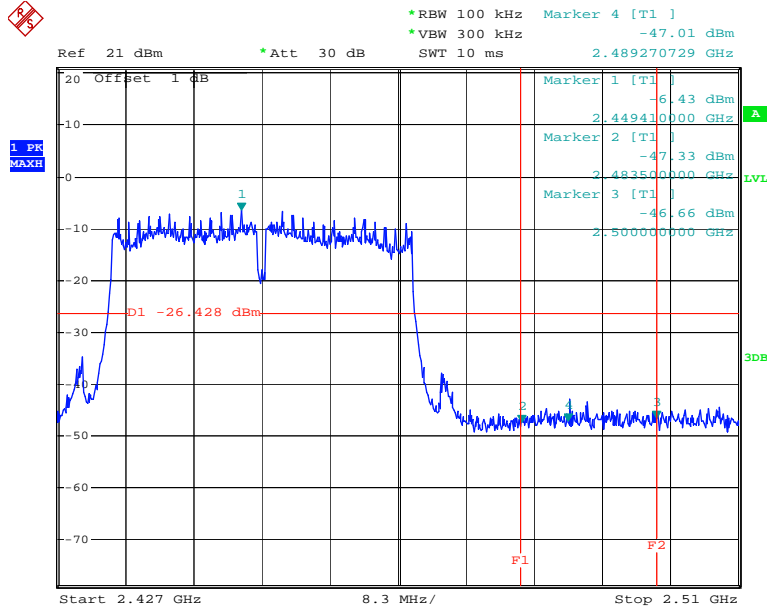
Date: 18.DEC.2013 13:24:26

**Chain1: 802.11n40 Band Edge, Left Side**



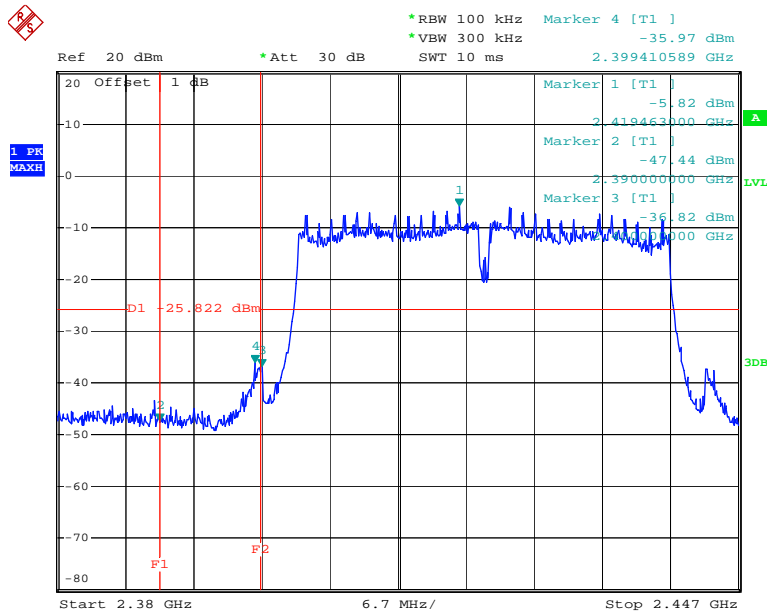
Date: 18.DEC.2013 13:01:55

**Chain1: 802.11n40 Band Edge, Right Side**



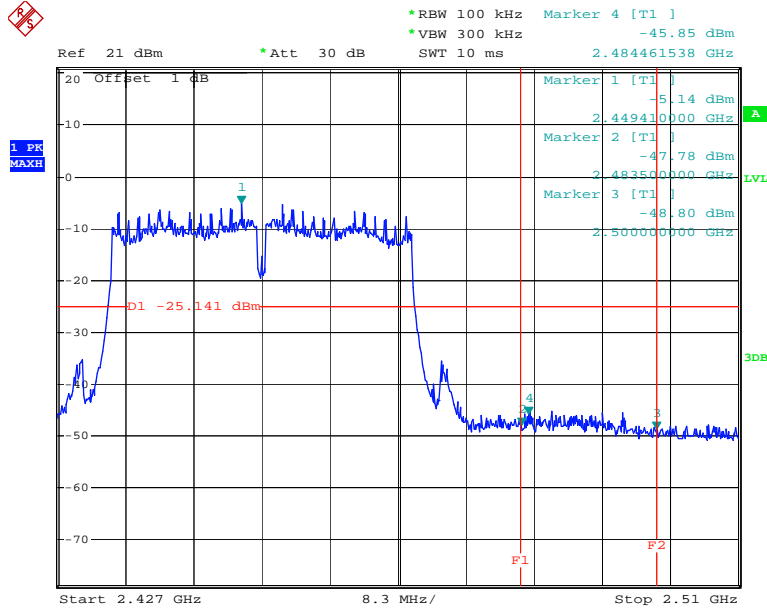
Date: 18.DEC.2013 13:27:33

**Chain2: 802.11n40 Band Edge, Left Side**



Date: 18.DEC.2013 13:03:34

**Chain2: 802.11n40 Band Edge, Right Side**



Date: 18.DEC.2013 13:32:13

## 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

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the RBW = 3 kHz, VBW = 10 kHz, Set the span to 1.5 times the DTS bandwidth.
4. Use the peak marker function to determine the maximum amplitude level.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum analyzer	FSP 38	100478	2013-6-16	2014-6-15

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

### Test Data

#### Environmental Conditions

Temperature:	20.9 °C
Relative Humidity:	42 %
ATM Pressure:	101.3 kPa

*The testing was performed by Ares Liu on 2013-12-18.*



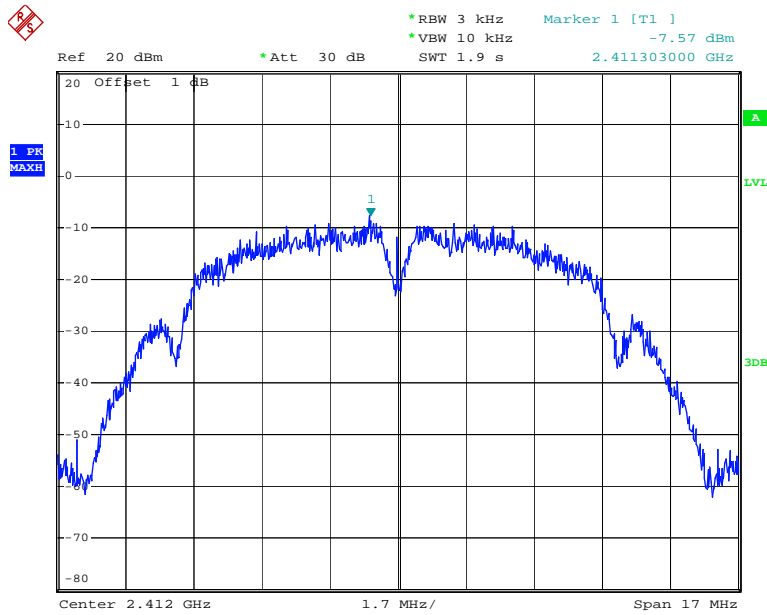
Test Mode: Transmitting

Test Result: Pass

Test Mode	Channel	PSD (dBm/3kHz)				Limit (dBm/3kHz)	Result
		Chain0	Chain1	Chain2	Total		
802.11b	Low	-7.57	/	/	-7.57	8	PASS
	Middle	-8.56	/	/	-8.56	8	PASS
	High	-8.43	/	/	-8.43	8	PASS
802.11g	Low	-12.97	/	/	-12.97	8	PASS
	Middle	-12.26	/	/	-12.26	8	PASS
	High	-13.63	/	/	-13.63	8	PASS
802.11n20	Low	-16.87	-18.56	-18.52	-13.14	8	PASS
	Middle	-16.45	-18.36	-17.02	-12.43	8	PASS
	High	-15.72	-18.15	-16.53	-11.91	8	PASS
802.11n40	Low	-19.73	-22.48	-20.46	-15.97	8	PASS
	Middle	-19.67	-20.28	-19.43	-15.01	8	PASS
	High	-19.51	-20.95	-19.33	-15.10	8	PASS

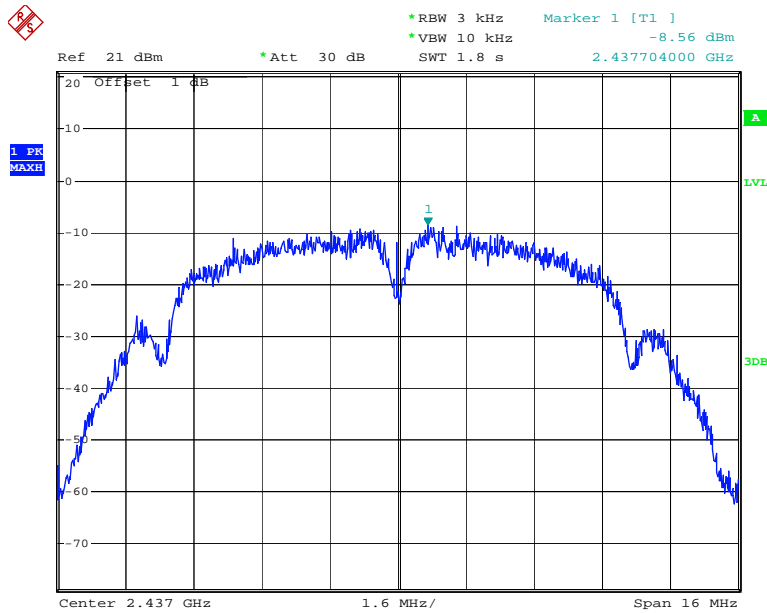
Please refer to the following plots

### Power Spectral Density, 802.11b Low Channel



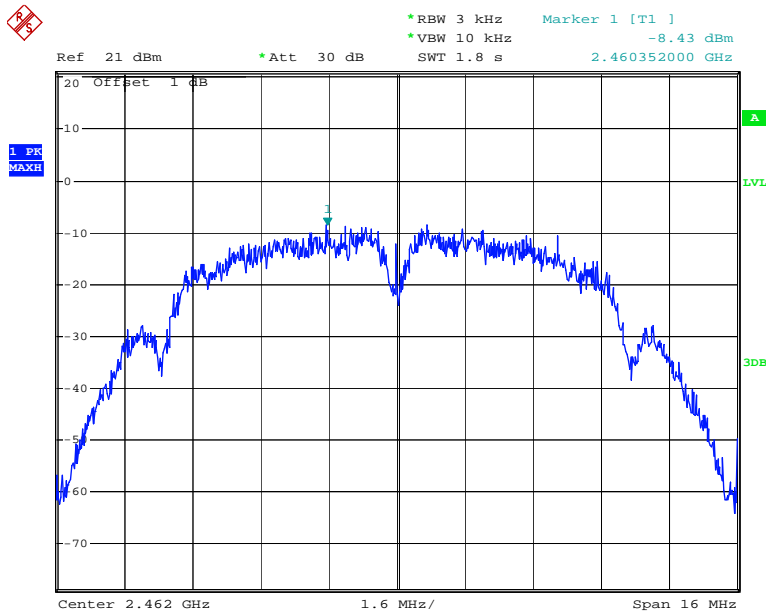
Date: 18.DEC.2013 10:58:57

### Power Spectral Density, 802.11b Middle Channel



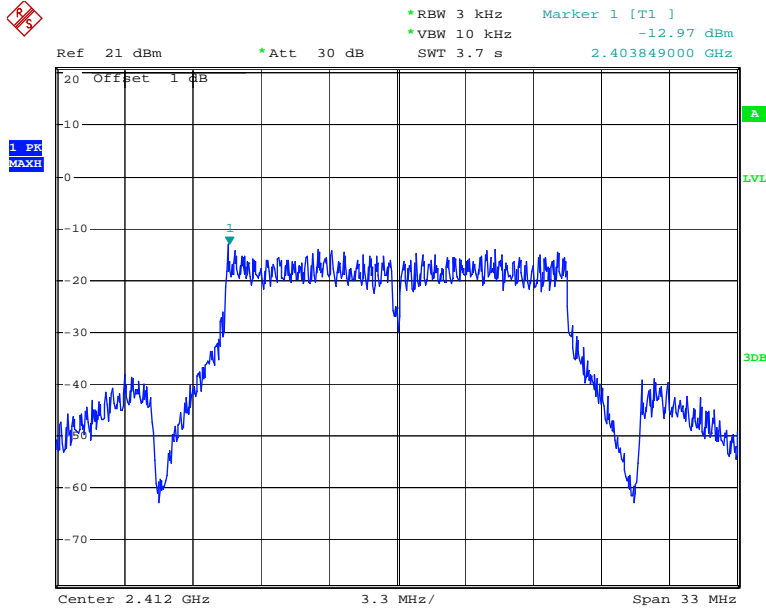
Date: 18.DEC.2013 11:02:56

### Power Spectral Density, 802.11b High Channel



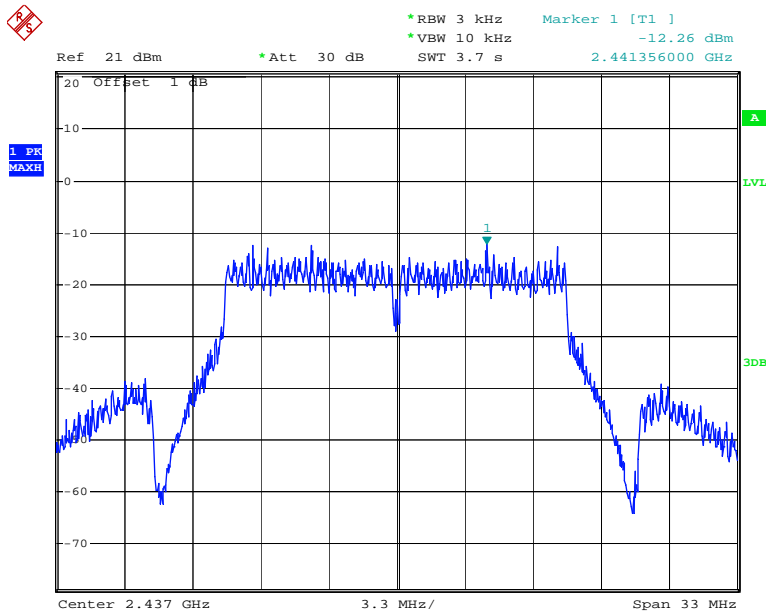
Date: 18.DEC.2013 11:04:30

### Power Spectral Density, 802.11g Low Channel



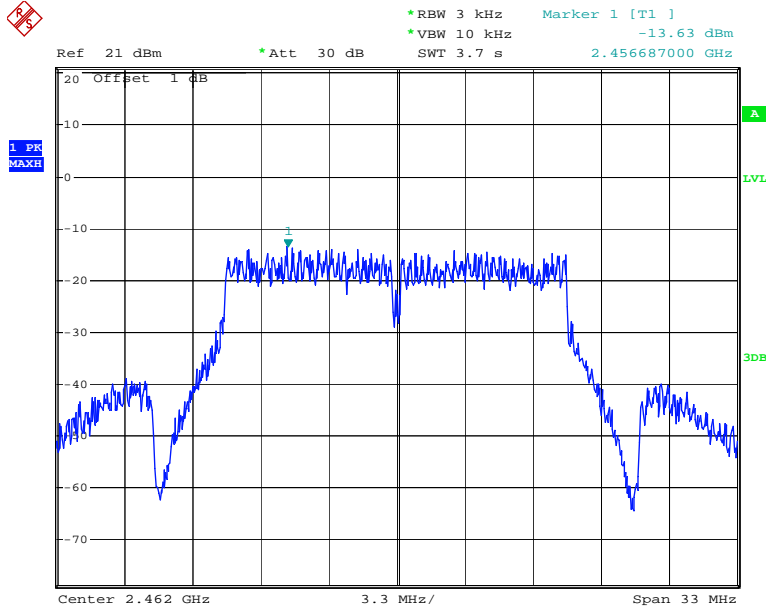
Date: 18.DEC.2013 11:12:51

### Power Spectral Density, 802.11g Middle Channel



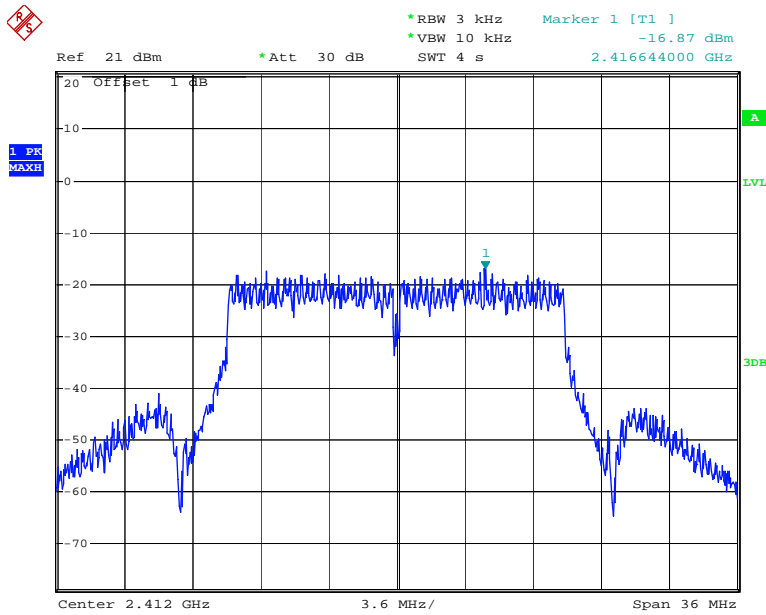
Date: 18.DEC.2013 11:18:09

### Power Spectral Density, 802.11g High Channel



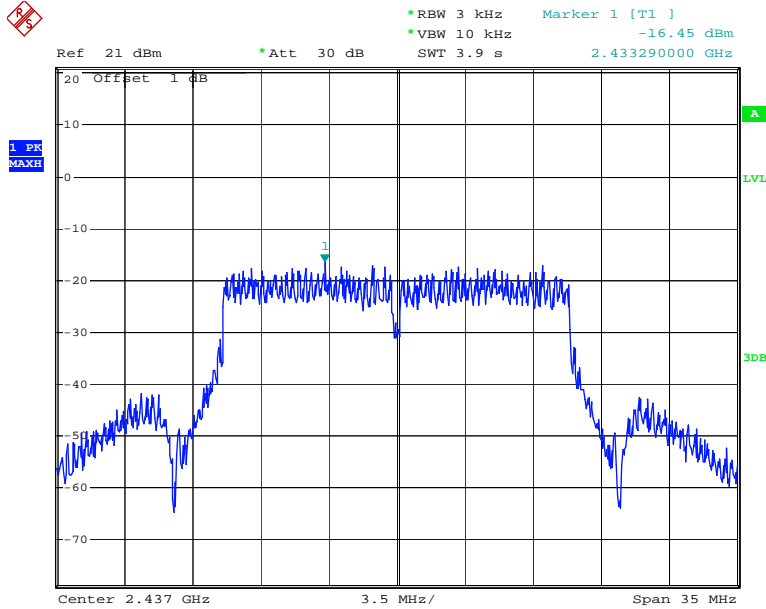
Date: 18.DEC.2013 11:19:53

### Chain0: Power Spectral Density, 802.11n20 Low Channel



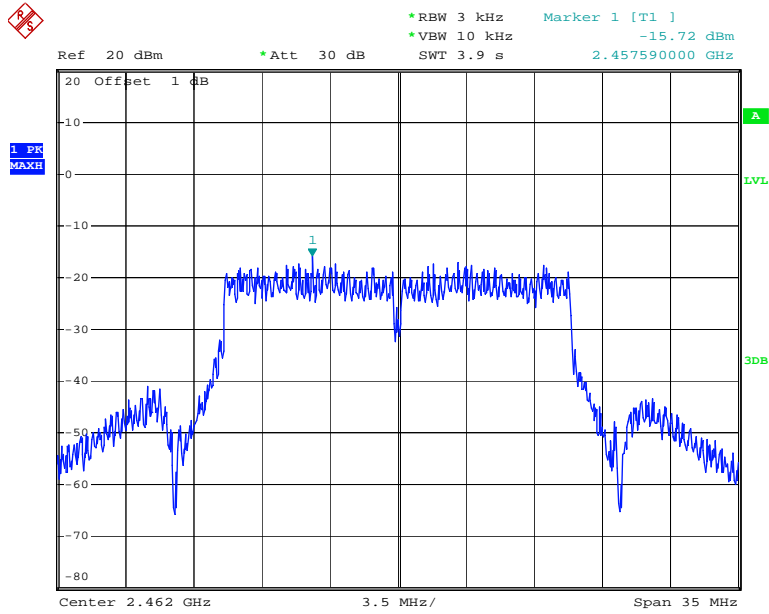
Date: 18.DEC.2013 11:25:59

### Chain0: Power Spectral Density, 802.11n20 Middle Channel



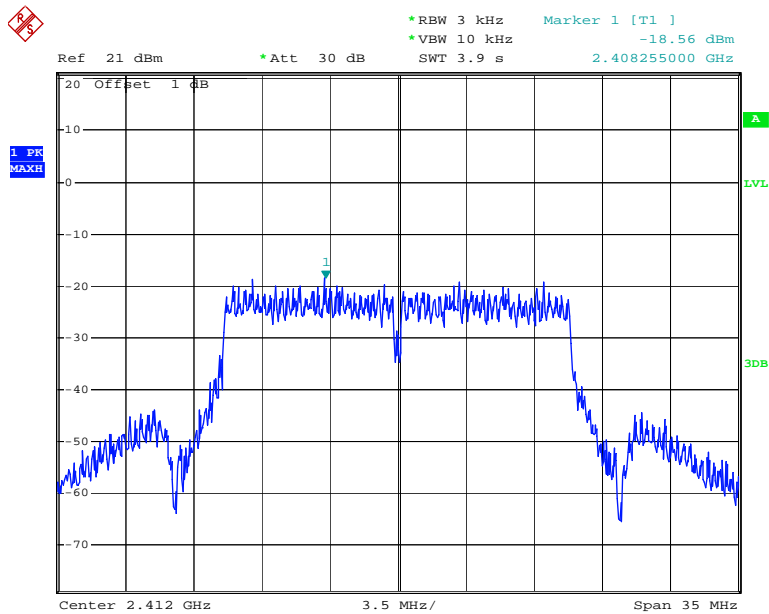
Date: 18.DEC.2013 11:41:14

### Chain0: Power Spectral Density, 802.11n20 High Channel



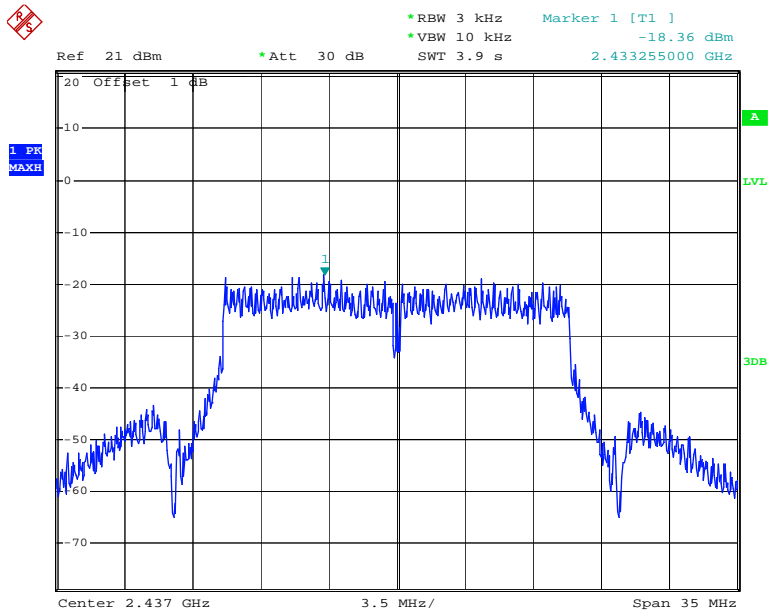
Date: 18.DEC.2013 11:49:06

### Chain1: Power Spectral Density, 802.11n20 Low Channel



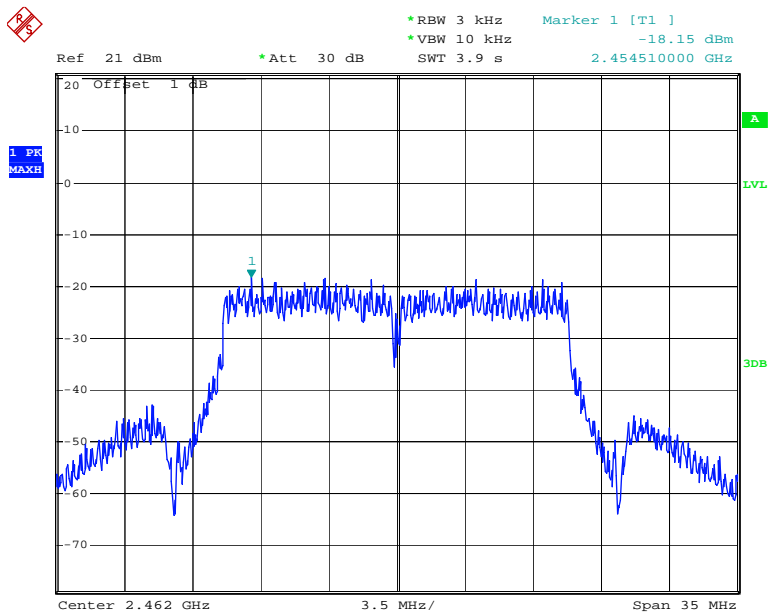
Date: 18.DEC.2013 11:29:15

### Chain1: Power Spectral Density, 802.11n20 Middle Channel



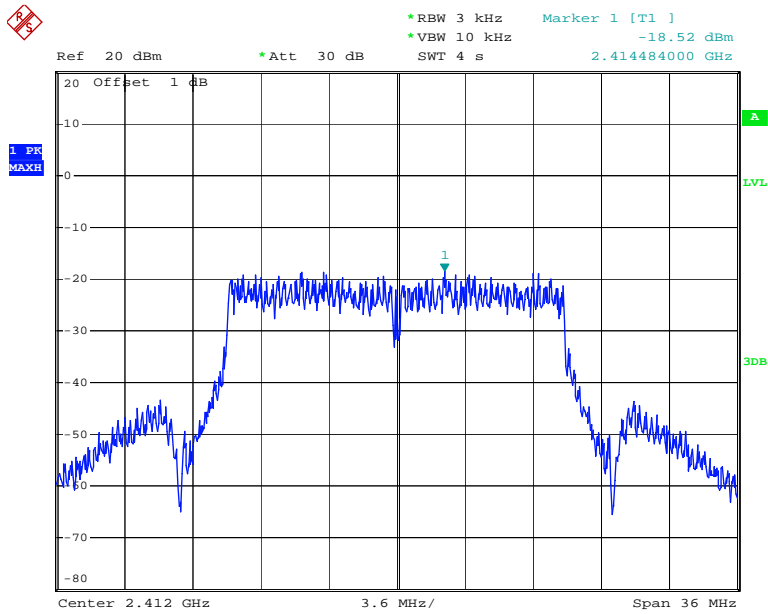
Date: 18.DEC.2013 11:43:01

### Chain1: Power Spectral Density, 802.11n20 High Channel



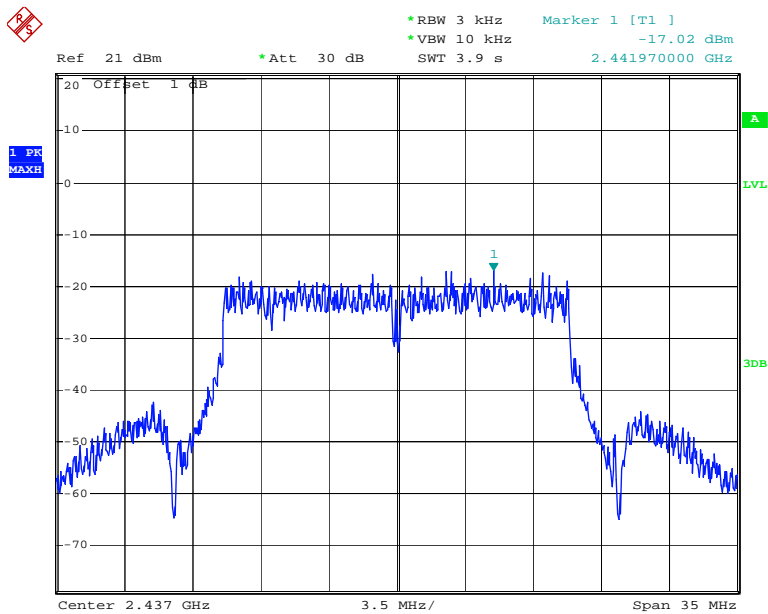
Date: 18.DEC.2013 11:52:28

### Chain2: Power Spectral Density, 802.11n20 Low Channel



Date: 18.DEC.2013 11:31:12

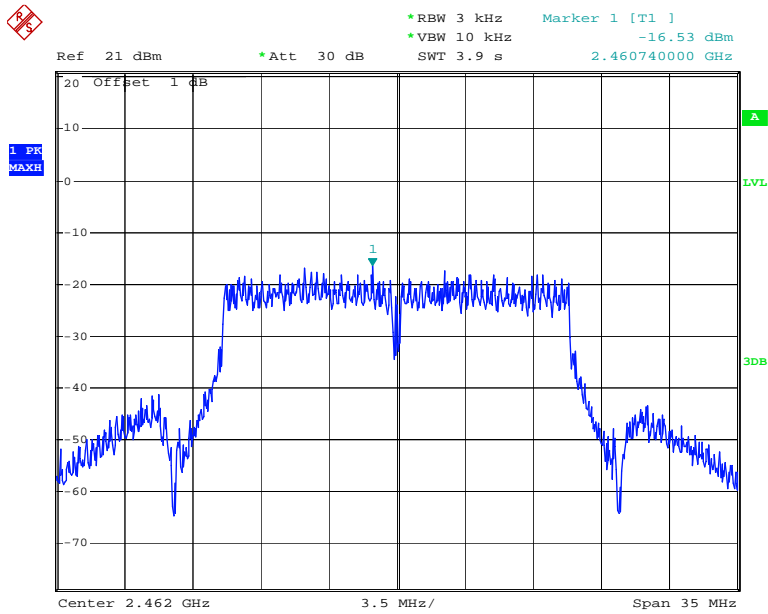
### Chain2: Power Spectral Density, 802.11n20 Middle Channel



Date: 18.DEC.2013 11:45:52

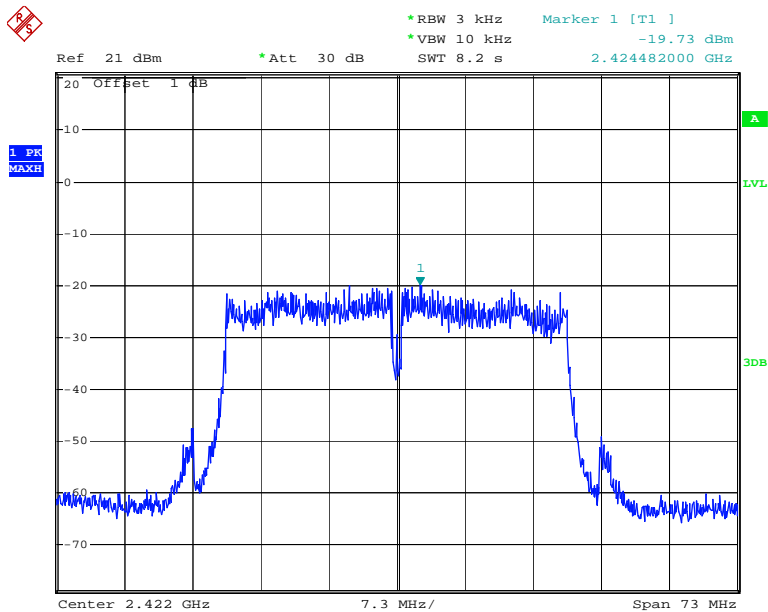


### Chain2: Power Spectral Density, 802.11n20 High Channel



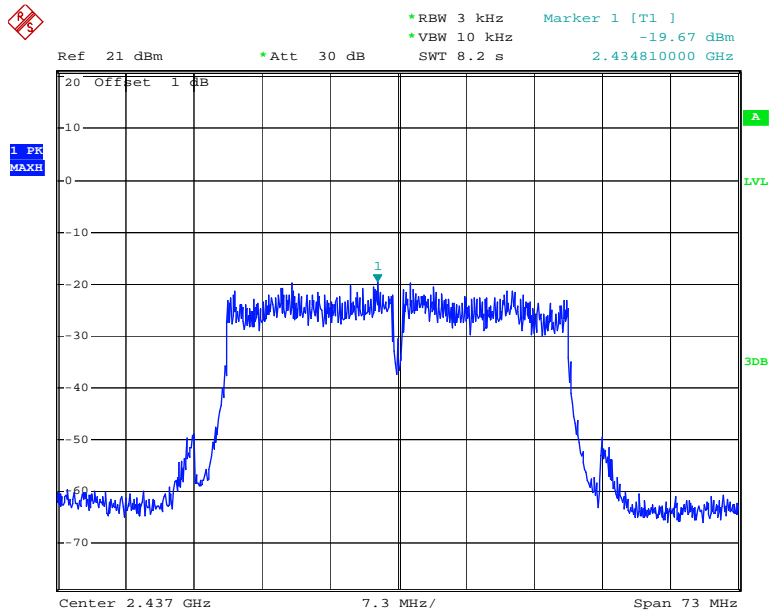
Date: 18.DEC.2013 11:57:16

### Chain0: Power Spectral Density, 802.11n40 Low Channel



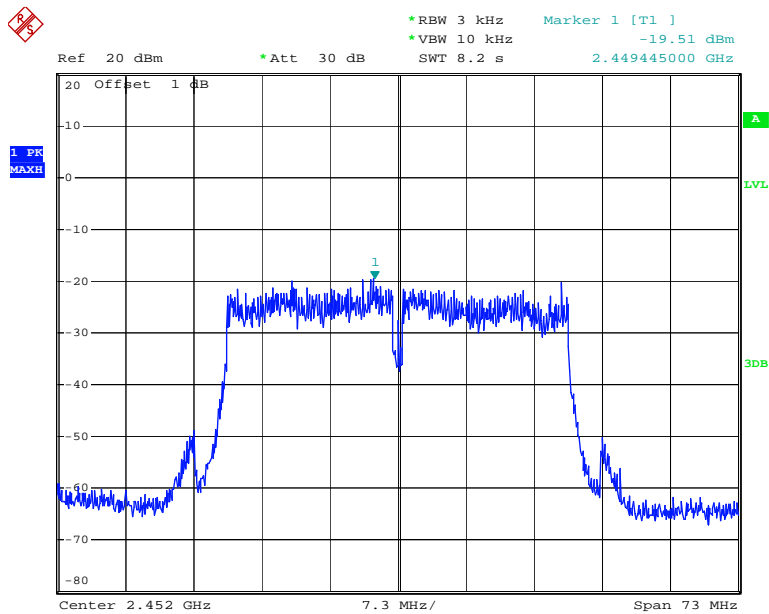
Date: 18.DEC.2013 12:58:19

### Chain0: Power Spectral Density, 802.11n40 Middle Channel



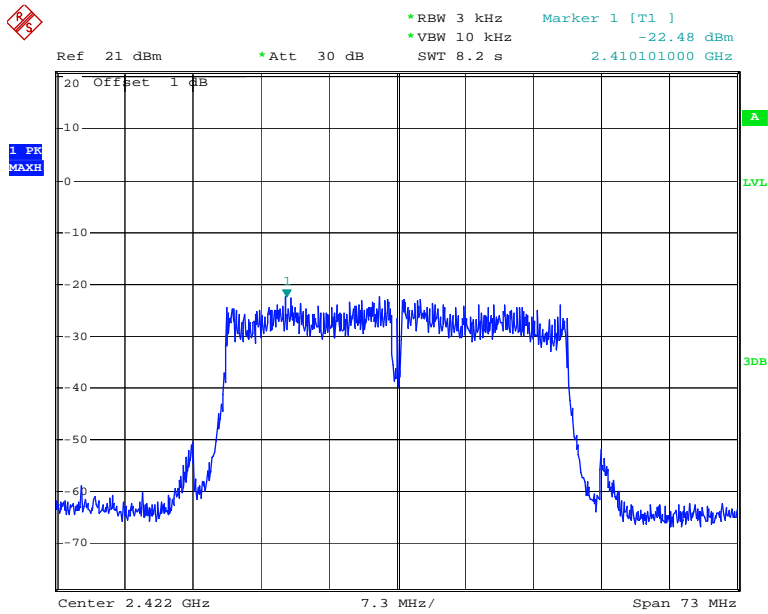
Date: 18.DEC.2013 13:07:11

### Chain0: Power Spectral Density, 802.11n40 High Channel



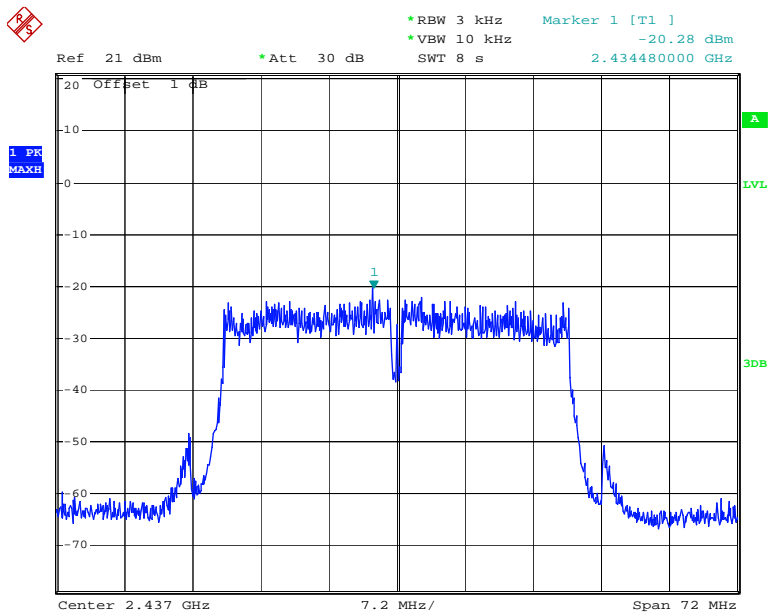
Date: 18.DEC.2013 13:24:14

### Chain1: Power Spectral Density, 802.11n40 Low Channel



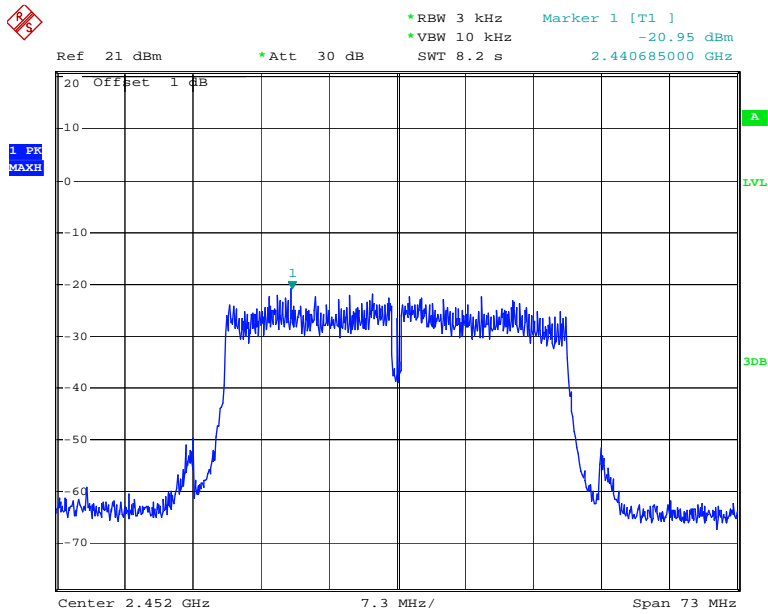
Date: 18.DEC.2013 13:01:42

### Chain1: Power Spectral Density, 802.11n40 Middle Channel



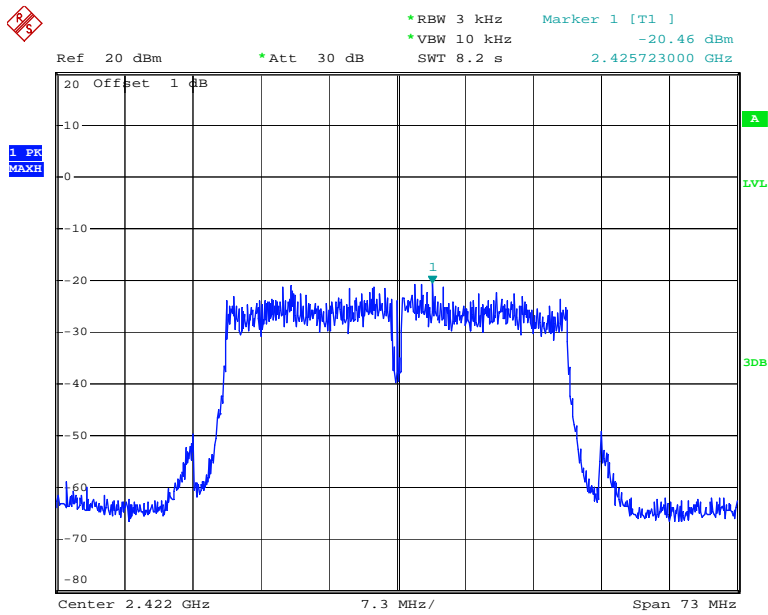
Date: 18.DEC.2013 13:08:55

### Chain1: Power Spectral Density, 802.11n40 High Channel



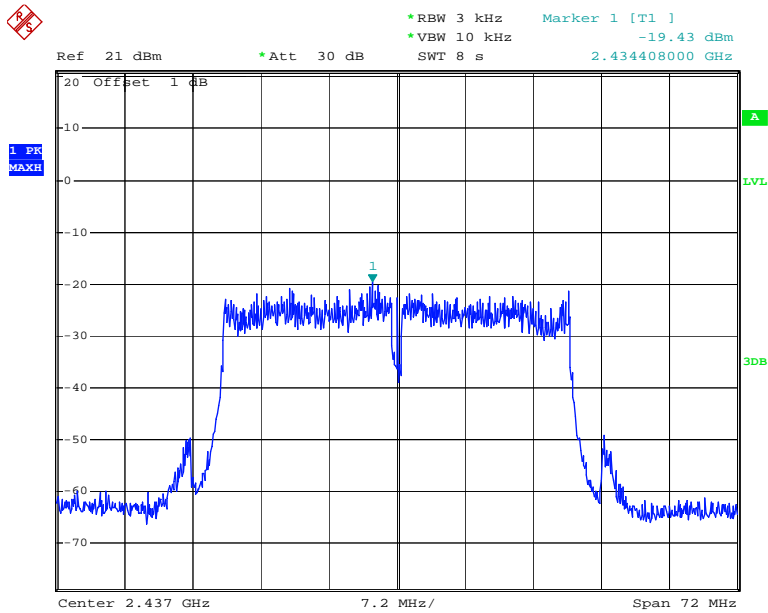
Date: 18.DEC.2013 13:27:21

### Chain2: Power Spectral Density, 802.11n40 Low Channel



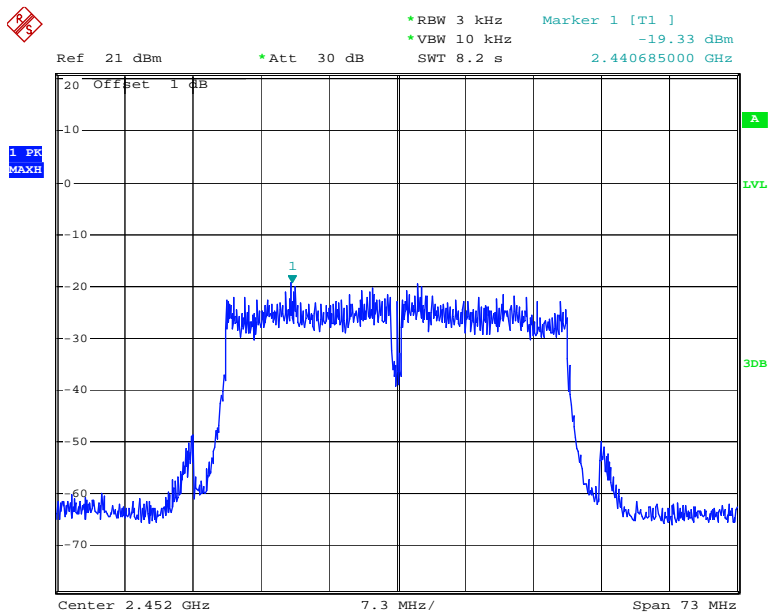
Date: 18.DEC.2013 13:03:21

### Chain2: Power Spectral Density, 802.11n40 Middle Channel



Date: 18.DEC.2013 13:17:12

### Chain2: Power Spectral Density, 802.11n40 High Channel



Date: 18.DEC.2013 13:32:01

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