

## 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: V7TW300DV6**

<b>Report Type:</b> Original Report	<b>Product Type:</b> ADSL Router
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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: *W300D (FCC ID: V7TW300DV6)* (the "EUT") in this report was a *ADSL Router*, which was measured approximately: 17.2 cm (L) x 10.8 cm (W) x 3 cm (H), rated input voltage: DC 9V from adapter.

Adapter Information: HEWEISHUN  
MODEL: TEA09U-09100  
INPUT: AC 100-240V, 50/60Hz, 0.3A  
OUTPUT: DC 9V, 1.0A

*\* All measurement and test data in this report was gathered from production sample serial number: 130813011 (Assigned by BACL, Dongguan). The EUT was received on 2013-08-15.*

### Objective

This report is 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 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)

FCC Part 15B JBP submissions with FCC ID: *V7TW300DV6*.

### 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 transmitting with chain 0 or chain 1, 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. The worst condition (maximum power) was setting by the software as following table:

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	65	65	69
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	56	56	57
802.11n ht20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	6.5Mbps	6.5Mbps	6.5Mbps
	Power Level Setting	36	38	41
802.11n ht40	Test Frequency	2422MHz	2437MHz	2452MHz
	Data Rate	13Mbps	13Mbps	13Mbps
	Power Level Setting	39	39	40

**Equipment Modifications**

No modification was made to the EUT.

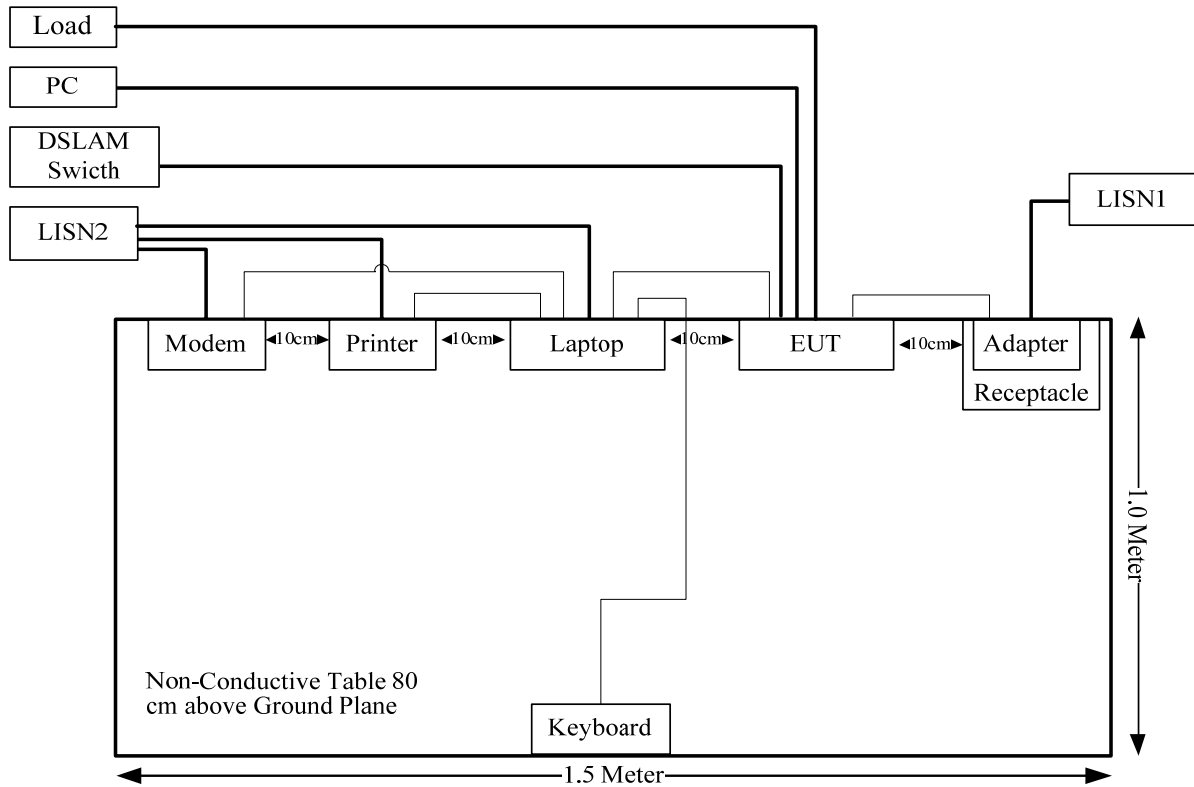
**Support Equipment List and Details**

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1017
HP	Printer	C3941A	JPTVOB2337
DELL	Keyboard	L100	CNORH656658907BL05DC
SAST	Modem	AEM-2100	0293
DELL	PC	GX620	/
Huawei	DSLAM Swicth	MA5615	98MA6444773-001
/	Load	/	/

**External Cable**

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Parallel Cable	yes	no	1.2	Laptop	Printer
Serial Cable	yes	no	1.2	Laptop	Modem
RJ45 Cable	no	no	1.0	EUT	Laptop
RJ45 Cable	no	no	10.0	EUT	PC
RJ45 Cable*2	no	no	10.0	EUT	Load
RJ11 Cable	no	no	10.0	EUT	DSLAM Swicth
Keyboard Cable	yes	no	2.0	Laptop	Keyboard

# Block Diagram of Test Setup





**SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Result
§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 Conducted Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

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

### Applicable Standard

According to 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	5	3.16	15.86	38.55	20	0.024	1.0
802.11g	2412	5	3.16	14.78	30.06	20	0.019	1.0
802.11n20	2437	5	3.16	12.67	18.49	20	0.012	1.0
802.11n40	2437	5	3.16	12.82	19.14	20	0.012	1.0

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

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## **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 two Monopole antennas, which permanently attached to the EUT, and the maximum gain is 5.0 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  $U_{cisp}$  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  $U_{cisp}$  of Table 1, then:

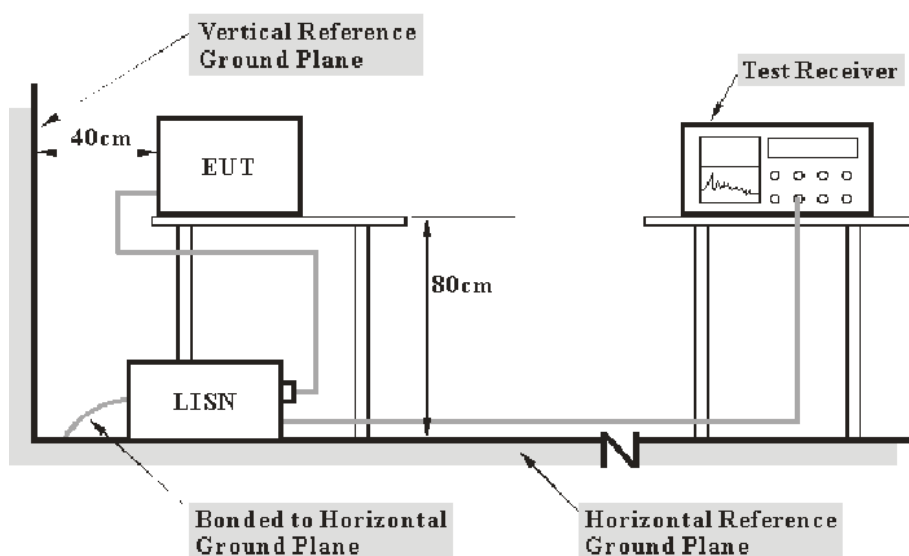
- compliance is deemed to occur if no measured disturbance level, increased by  $(U_{lab} - U_{cisp})$ , exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by  $(U_{lab} - U_{cisp})$ , exceeds the disturbance limit.

Based on CISPR 16-4-2:2011, measurement uncertainty of 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  $U_{cisp}$

Measurement	$U_{cisp}$
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 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 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	2012-11-29	2013-11-28
R&S	L.I.S.N	ESH3-Z5	843331/015	2013-9-17	2014-9-16
R&S	L.I.S.N	ESH3-Z5	100113	2012-11-29	2013-11-28
BACL	Test Software	BACL-EMC	V1.0-2010	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:

**9.18 dB at 1.575 MHz in the Line conducted mode**

**Test Data****Environmental Conditions**

<b>Temperature:</b>	26.5°C
<b>Relative Humidity:</b>	53 %
<b>ATM Pressure:</b>	100.3 kPa

*The testing was performed by Leon Chen on 2013-09-27.*

Test Mode: Transmitting

120 V, 60 Hz, Line:



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

Frequency (MHz)	Cord. Reading (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/AV/QP)
0.780	40.48	9.68	56.00	15.52	QP
0.780	35.59	9.68	46.00	10.41	AV
0.950	37.75	9.69	56.00	18.25	QP
0.950	32.57	9.69	46.00	13.43	AV
1.435	39.64	9.69	56.00	16.36	QP
1.430	34.05	9.69	46.00	11.95	AV
1.600	42.90	9.68	56.00	13.10	QP
1.600	36.35	9.68	46.00	9.65	AV
6.885	33.57	9.75	60.00	26.43	QP
6.895	26.74	9.75	50.00	23.26	AV
20.690	30.31	9.89	60.00	29.69	QP
20.680	21.41	9.89	50.00	28.59	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  $U_{cisp}$  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

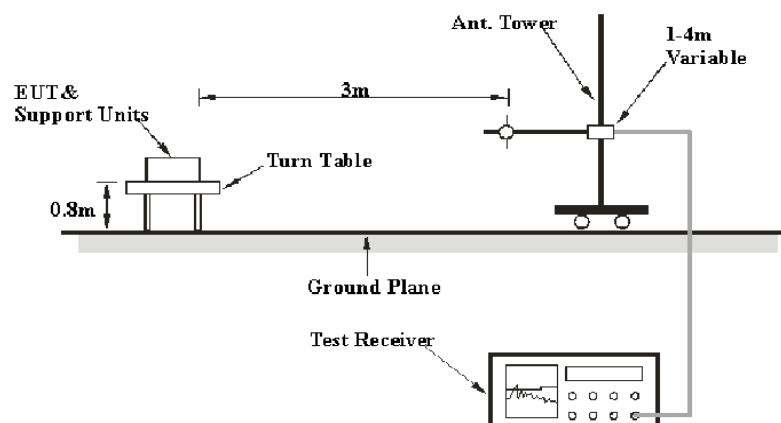
6G~18GHz: 5.23 dB

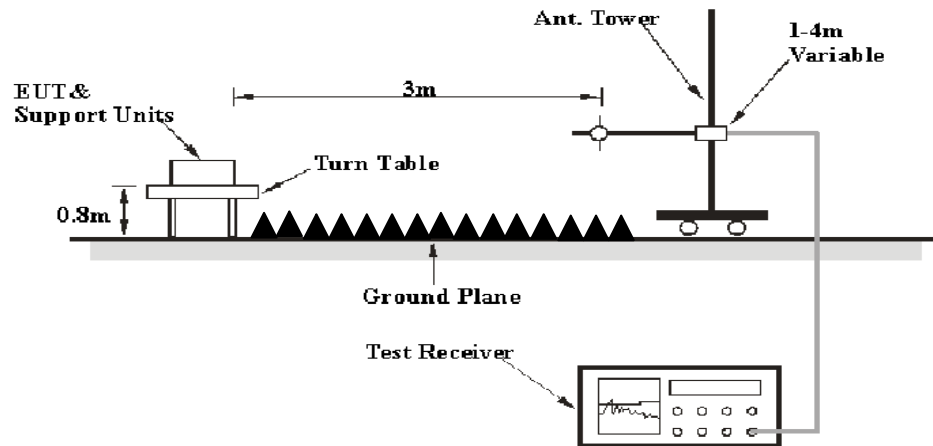
Table 2 – Values of  $U_{cisp}$

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 C63.4-2003. 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 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 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	HP AMPLIFIER	8447E	2434A02181	N/A	N/A
R&S	Spectrum analyzer	FSEM 30	849016/001	2012-12-7	2013-12-6
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
mun Technologies	Horn antenna	ARH-4223-02	1007726-02-1304	2013-6-16	2014-6-15
QUINSTAR	Amplifier	QLW-18045536-J0	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:

**0.90 dB at 3216 MHz in the Vertical polarization for 802.11b Mode**

**Test Data****Environmental Conditions**

<b>Temperature:</b>	26.8 °C
<b>Relative Humidity:</b>	60 %
<b>ATM Pressure:</b>	99.1 kPa

*The testing was performed by Leon Chen on 2013-08-16.*

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)				Limit (dBμV/m)	Margin (dB)
Low Channel: 2412 MHz									
2412	66.63	PK	H	25.67	3.93	0.00	96.23	N/A	N/A
2412	60.51	AV	H	25.67	3.93	0.00	90.11	N/A	N/A
2412	76.72	PK	V	25.67	3.93	0.00	106.32	N/A	N/A
2412	70.48	AV	V	25.67	3.93	0.00	100.08	N/A	N/A
2390	28.48	PK	V	25.61	3.84	0.00	57.93	74.00	16.07
2390	15.44	AV	V	25.61	3.84	0.00	44.89	54.00	9.11
4824	41.15	PK	V	30.64	4.73	27.26	49.26	74.00	24.74
4824	36.16	AV	V	30.64	4.73	27.26	44.27	54.00	9.73
7236	34.82	PK	V	34.17	6.56	26.36	49.19	74.00	24.81
7236	22.51	AV	V	34.17	6.56	26.36	36.88	54.00	17.12
9648	32.44	PK	V	36.06	8.70	26.06	51.14	74.00	22.86
9648	18.25	AV	V	36.06	8.70	26.06	36.95	54.00	17.05
3216	49.42	PK	V	27.89	4.96	27.48	54.79	74.00	19.21
3216	47.73	AV	V	27.89	4.96	27.48	53.10	54.00	0.90 *
500.03	46.2	QP	H	18.10	2.72	22.02	45.00	46.00	1.00 *
Middle Channel: 2437 MHz									
2437	66.74	PK	H	25.74	3.98	0.00	96.46	N/A	N/A
2437	60.67	AV	H	25.74	3.98	0.00	90.39	N/A	N/A
2437	76.86	PK	V	25.74	3.98	0.00	106.58	N/A	N/A
2437	70.66	AV	V	25.74	3.98	0.00	100.38	N/A	N/A
4874	41.31	PK	V	30.77	4.76	27.26	49.58	74.00	24.42
4874	36.21	AV	V	30.77	4.76	27.26	44.48	54.00	9.52
7311	34.87	PK	V	34.35	6.70	26.51	49.41	74.00	24.59
7311	22.56	AV	V	34.35	6.70	26.51	37.10	54.00	16.90
9748	32.47	PK	V	36.30	8.60	25.68	51.69	74.00	22.31
9748	18.3	AV	V	36.30	8.60	25.68	37.52	54.00	16.48
3248.56	47.68	PK	V	28.00	5.28	27.45	53.51	74.00	20.49
3248.56	44.65	AV	V	28.00	5.28	27.45	50.48	54.00	3.52 *
2213	32.52	AV	V	25.15	3.51	27.25	33.93	54.00	20.07
2213	18.29	AV	V	25.15	3.51	27.25	19.70	54.00	34.30
500.05	46.1	QP	H	18.10	2.72	22.02	44.90	46.00	1.10 *
High Channel: 2462 MHz									
2462	68.42	PK	H	25.80	3.93	0.00	98.15	N/A	N/A
2462	62.29	AV	H	25.80	3.93	0.00	92.02	N/A	N/A
2462	78.51	PK	V	25.80	3.93	0.00	108.24	N/A	N/A
2462	72.35	AV	V	25.80	3.93	0.00	102.08	N/A	N/A
2483.5	30.58	PK	V	25.86	3.80	0.00	60.24	74.00	13.76
2483.5	20.63	AV	V	25.86	3.80	0.00	50.29	54.00	3.71*
4924	41.28	PK	V	30.90	4.70	27.27	49.61	74.00	24.39
4924	36.32	AV	V	30.90	4.70	27.27	44.65	54.00	9.35
7386	35	PK	V	34.53	6.84	26.66	49.71	74.00	24.29
7386	22.56	AV	V	34.53	6.84	26.66	37.27	54.00	16.73
9848	32.59	PK	V	36.54	8.49	25.49	52.13	74.00	21.87
9848	18.27	AV	V	36.54	8.49	25.49	37.81	54.00	16.19
3282.46	47.36	PK	V	28.10	4.82	27.41	52.87	74.00	21.13
3282.46	44.45	AV	V	28.10	4.82	27.41	49.96	54.00	4.04*
499.98	46.1	QP	H	18.10	2.72	22.02	44.90	46.00	1.10 *

\*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)				Limit (dBμV/m)	Margin (dB)
Low Channel: 2412 MHz									
2412	66.87	PK	H	25.67	3.93	0.00	96.47	N/A	N/A
2412	54.45	AV	H	25.67	3.93	0.00	84.05	N/A	N/A
2412	76.93	PK	V	25.67	3.93	0.00	106.53	N/A	N/A
2412	64.16	AV	V	25.67	3.93	0.00	93.76	N/A	N/A
2390	39.95	PK	V	25.61	3.84	0.00	69.40	74.00	4.60
2390	21.34	AV	V	25.61	3.84	0.00	50.79	54.00	3.21*
4824	38.61	PK	V	30.64	4.73	27.26	46.72	74.00	27.28
4824	23.66	AV	V	30.64	4.73	27.26	31.77	54.00	22.23
7236	32.83	PK	V	34.17	6.56	26.36	47.20	74.00	26.80
7236	19.35	AV	V	34.17	6.56	26.36	33.72	54.00	20.28
9648	32.26	PK	V	36.06	8.70	26.06	50.96	74.00	23.04
9648	18.27	AV	V	36.06	8.70	26.06	36.97	54.00	17.03
3216	48.96	PK	V	27.89	4.96	27.48	54.33	74.00	19.67
3216	45.32	AV	V	27.89	4.96	27.48	50.69	54.00	3.31*
500.05	45.9	QP	H	18.10	2.72	22.02	44.70	46.00	1.30*
Middle Channel: 2437 MHz									
2437	67.05	PK	H	25.74	3.98	0.00	96.77	N/A	N/A
2437	54.62	AV	H	25.74	3.98	0.00	84.34	N/A	N/A
2437	76.99	PK	V	25.74	3.98	0.00	106.71	N/A	N/A
2437	64.36	AV	V	25.74	3.98	0.00	94.08	N/A	N/A
4874	38.8	PK	V	30.77	4.76	27.26	47.07	74.00	26.93
4874	23.77	AV	V	30.77	4.76	27.26	32.04	54.00	21.96
7311	33.03	PK	V	34.35	6.70	26.51	47.57	74.00	26.43
7311	19.42	AV	V	34.35	6.70	26.51	33.96	54.00	20.04
9748	32.33	PK	V	36.30	8.60	25.68	51.55	74.00	22.45
9748	18.28	AV	V	36.30	8.60	25.68	37.50	54.00	16.50
3248.56	48.53	PK	V	28.00	5.28	27.45	54.36	74.00	19.64
3248.56	44.46	AV	V	28.00	5.28	27.45	50.29	54.00	3.71*
2213	32.16	PK	V	25.15	3.51	27.25	33.57	74.00	40.43
2213	18.19	AV	V	25.15	3.51	27.25	19.60	54.00	34.40
500.02	46.2	QP	H	18.10	2.72	22.02	45.00	46.00	1.00*
High Channel: 2462 MHz									
2462	68.17	PK	H	25.80	3.93	0.00	97.90	N/A	N/A
2462	55.04	AV	H	25.80	3.93	0.00	84.77	N/A	N/A
2462	78.21	PK	V	25.80	3.93	0.00	107.94	N/A	N/A
2462	65.09	AV	V	25.80	3.93	0.00	94.82	N/A	N/A
2483.5	40.69	PK	V	25.86	3.80	0.00	70.35	74.00	3.65*
2483.5	20.87	AV	V	25.86	3.80	0.00	50.53	54.00	3.47*
4924	38.64	PK	V	30.90	4.70	27.27	46.97	74.00	27.03
4924	23.71	AV	V	30.90	4.70	27.27	32.04	54.00	21.96
7386	32.9	PK	V	34.53	6.84	26.66	47.61	74.00	26.39
7386	19.41	AV	V	34.53	6.84	26.66	34.12	54.00	19.88
9848	32.32	PK	V	36.54	8.49	25.49	51.86	74.00	22.14
9848	18.45	AV	V	36.54	8.49	25.49	37.99	54.00	16.01
3282.46	48.76	PK	V	28.10	4.82	27.41	54.27	74.00	19.73
3282.46	45.12	AV	V	28.10	4.82	27.41	50.63	54.00	3.37*
500.05	46.3	QP	H	18.10	2.72	22.02	45.10	46.00	0.90*

\*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)				Limit (dBμV/m)	Margin (dB)
Low Channel: 2412 MHz									
2412	61.37	PK	H	25.67	3.93	0.00	90.97	N/A	N/A
2412	48.63	AV	H	25.67	3.93	0.00	78.23	N/A	N/A
2412	71.26	PK	V	25.67	3.93	0.00	100.86	N/A	N/A
2412	58.71	AV	V	25.67	3.93	0.00	88.31	N/A	N/A
2390	31.39	PK	V	25.61	3.84	0.00	60.84	74.00	13.16
2390	16.01	AV	V	25.61	3.84	0.00	45.46	54.00	8.54
4824	33.07	PK	V	30.64	4.73	27.26	41.18	74.00	32.82
4824	19.56	AV	V	30.64	4.73	27.26	27.67	54.00	26.33
7236	32.2	PK	V	34.17	6.56	26.36	46.57	74.00	27.43
7236	18.31	AV	V	34.17	6.56	26.36	32.68	54.00	21.32
9648	32.45	PK	V	36.06	8.70	26.06	51.15	74.00	22.85
9648	20.29	AV	V	36.06	8.70	26.06	38.99	54.00	15.01
3216	47.92	PK	V	27.89	4.96	27.48	53.29	74.00	20.71
3216	43.73	AV	V	27.89	4.96	27.48	49.10	54.00	4.90 *
499.98	45.9	QP	H	18.10	2.72	22.02	44.70	46.00	1.30*
Middle Channel: 2437 MHz									
2437	61.42	PK	H	25.74	3.98	0.00	91.14	N/A	N/A
2437	48.69	AV	H	25.74	3.98	0.00	78.41	N/A	N/A
2437	71.35	PK	V	25.74	3.98	0.00	101.07	N/A	N/A
2437	58.71	AV	V	25.74	3.98	0.00	88.43	N/A	N/A
4874	33.14	PK	V	30.77	4.76	27.26	41.41	74.00	32.59
4874	19.65	AV	V	30.77	4.76	27.26	27.92	54.00	26.08
7311	32.23	PK	V	34.35	6.70	26.51	46.77	74.00	27.23
7311	18.35	AV	V	34.35	6.70	26.51	32.89	54.00	21.11
9748	32.56	PK	V	36.30	8.60	25.68	51.78	74.00	22.22
9748	20.4	AV	V	36.30	8.60	25.68	39.62	54.00	14.38
3248.56	48.06	PK	V	28.00	5.28	27.45	53.89	74.00	20.11
3248.56	43.86	AV	V	28.00	5.28	27.45	49.69	54.00	4.31*
2213	32.18	PK	V	25.15	3.51	27.25	33.59	74.00	40.41
2213	18.34	AV	V	25.15	3.51	27.25	19.75	54.00	34.25
500.08	46.18	QP	H	18.10	2.72	22.02	44.98	46.00	1.02 *
High Channel: 2462 MHz									
2462	63.24	PK	H	25.80	3.93	0.00	92.97	N/A	N/A
2462	50.19	AV	H	25.80	3.93	0.00	79.92	N/A	N/A
2462	73.32	PK	V	25.80	3.93	0.00	103.05	N/A	N/A
2462	60.32	AV	V	25.80	3.93	0.00	90.05	N/A	N/A
2483.5	37.35	PK	V	25.86	3.80	0.00	67.01	74.00	6.99
2483.5	18.99	AV	V	25.86	3.80	0.00	48.65	54.00	5.35
4924	33.21	PK	V	30.90	4.70	27.27	41.54	74.00	32.46
4924	19.24	AV	V	30.90	4.70	27.27	27.57	54.00	26.43
7386	32.34	PK	V	34.53	6.84	26.66	47.05	74.00	26.95
7386	18.53	AV	V	34.53	6.84	26.66	33.24	54.00	20.76
9848	32.62	PK	V	36.54	8.49	25.49	52.16	74.00	21.84
9848	18.36	AV	V	36.54	8.49	25.49	37.90	54.00	16.10
3282.46	45.86	PK	V	28.10	4.82	27.41	51.37	74.00	22.63
3282.46	43.82	AV	V	28.10	4.82	27.41	49.33	54.00	4.67*
500.07	45.9	QP	H	18.10	2.72	22.02	44.70	46.00	1.30 *

\*Within measurement uncertainty!

## 802.11 n40 Mode

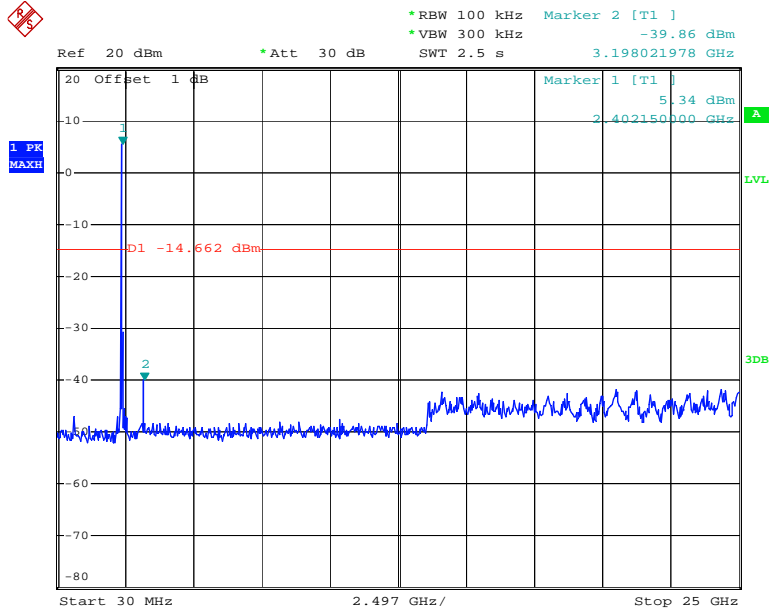
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	FCC 15.247	
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBμV/m)	Margin (dB)
Low Channel: 2422 MHz									
2422	61.47	PK	H	25.70	3.95	0.00	91.12	N/A	N/A
2422	48.76	AV	H	25.70	3.95	0.00	78.41	N/A	N/A
2422	71.35	PK	V	25.70	3.95	0.00	101.00	N/A	N/A
2422	58.75	AV	V	25.70	3.95	0.00	88.40	N/A	N/A
2390	31.45	PK	V	25.61	3.84	0.00	60.90	74.00	13.10
2390	16.19	AV	V	25.61	3.84	0.00	45.64	54.00	8.36
4844	33.17	PK	V	30.69	4.78	27.26	41.38	74.00	32.62
4844	19.74	AV	V	30.69	4.78	27.26	27.95	54.00	26.05
7266	32.27	PK	V	34.24	6.62	26.42	46.71	74.00	27.29
7266	18.43	AV	V	34.24	6.62	26.42	32.87	54.00	21.13
9688	32.6	PK	V	36.15	8.66	25.91	51.50	74.00	22.50
9688	20.3	AV	V	36.15	8.66	25.91	39.20	54.00	14.80
3216	47.97	PK	V	27.89	4.96	27.48	53.34	74.00	20.66
3216	43.77	AV	V	27.89	4.96	27.48	49.14	54.00	4.86 *
500.05	46.2	QP	H	18.10	2.72	22.02	45.00	46.00	1.00*
Middle Channel: 2437 MHz									
2437	61.55	PK	H	25.74	3.98	0.00	91.27	N/A	N/A
2437	48.75	AV	H	25.74	3.98	0.00	78.47	N/A	N/A
2437	71.41	PK	V	25.74	3.98	0.00	101.13	N/A	N/A
2437	58.88	AV	V	25.74	3.98	0.00	88.60	N/A	N/A
4874	33.2	PK	V	30.77	4.76	27.26	41.47	74.00	32.53
4874	19.69	AV	V	30.77	4.76	27.26	27.96	54.00	26.04
7311	32.27	PK	V	34.35	6.70	26.51	46.81	74.00	27.19
7311	18.41	AV	V	34.35	6.70	26.51	32.95	54.00	21.05
9748	32.49	PK	V	36.30	8.60	25.68	51.71	74.00	22.29
9748	20.45	AV	V	36.30	8.60	25.68	39.67	54.00	14.33
3248.56	47.94	PK	V	28.00	5.28	27.45	53.77	74.00	20.23
3248.56	43.75	AV	V	28.00	5.28	27.45	49.58	54.00	4.42 *
2213	32.54	PK	V	25.15	3.51	27.25	33.95	74.00	40.05
2213	18.21	AV	V	25.15	3.51	27.25	19.62	54.00	34.38
500.05	46.01	QP	H	18.10	2.72	22.02	44.81	46.00	1.19*
High Channel: 2452 MHz									
2452	63.32	PK	H	25.78	4.00	0.00	93.09	N/A	N/A
2452	50.31	AV	H	25.78	4.00	0.00	80.08	N/A	N/A
2452	73.41	PK	V	25.78	4.00	0.00	103.18	N/A	N/A
2452	60.35	AV	V	25.78	4.00	0.00	90.12	N/A	N/A
2483.5	37.42	PK	V	25.86	3.80	0.00	67.08	74.00	6.92
2483.5	19.12	AV	V	25.86	3.80	0.00	48.78	54.00	5.22
4904	33.29	PK	V	30.85	4.72	27.27	41.59	74.00	32.41
4904	19.25	AV	V	30.85	4.72	27.27	27.55	54.00	26.45
7356	32.45	PK	V	34.45	6.79	26.60	47.09	74.00	26.91
7356	18.65	AV	V	34.45	6.79	26.60	33.29	54.00	20.71
9808	32.65	PK	V	36.44	8.53	25.48	52.14	74.00	21.86
9808	18.46	AV	V	36.44	8.53	25.48	37.95	54.00	16.05
3282.46	45.93	PK	V	28.10	4.82	27.41	51.44	74.00	22.56
3282.46	43.86	AV	V	28.10	4.82	27.41	49.37	54.00	4.63 *
500.02	46.12	QP	H	18.10	2.72	22.02	44.92	46.00	1.08 *

\*Within measurement uncertainty!



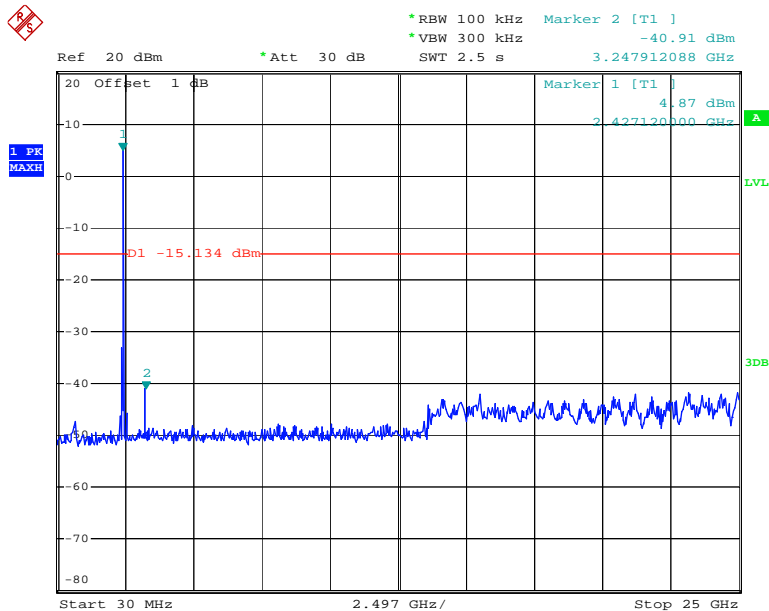
## Conducted Spurious Emissions at Antenna Port

### 802.11b Low Channel



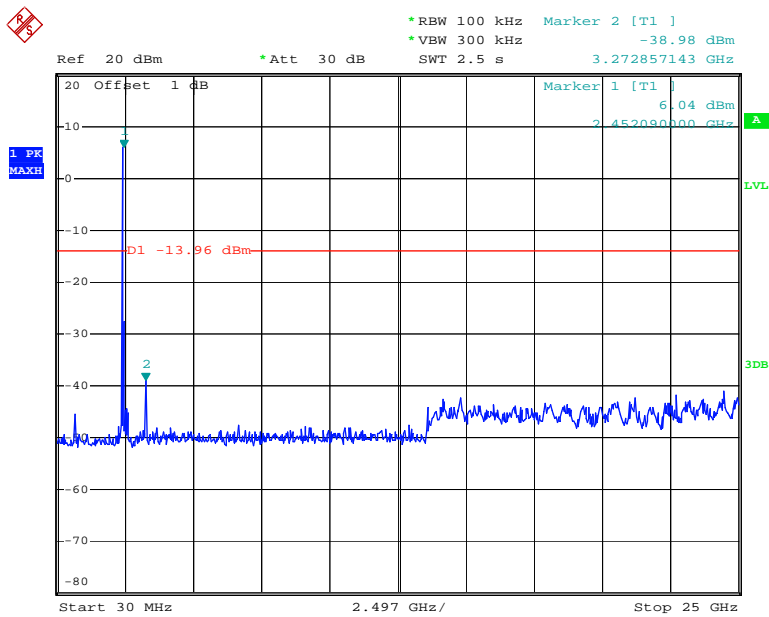
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### 802.11b Middle Channel



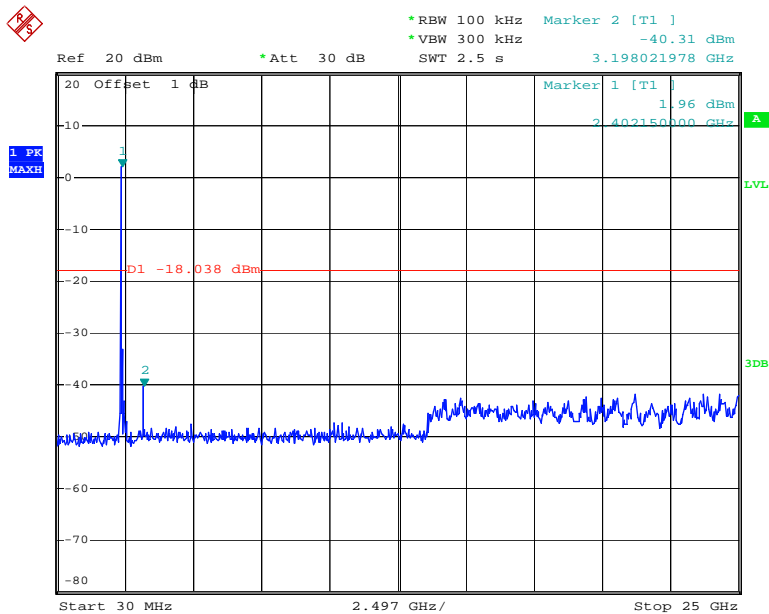
Date: 16.AUG.2013 16:56:41

### 802.11b High Channel



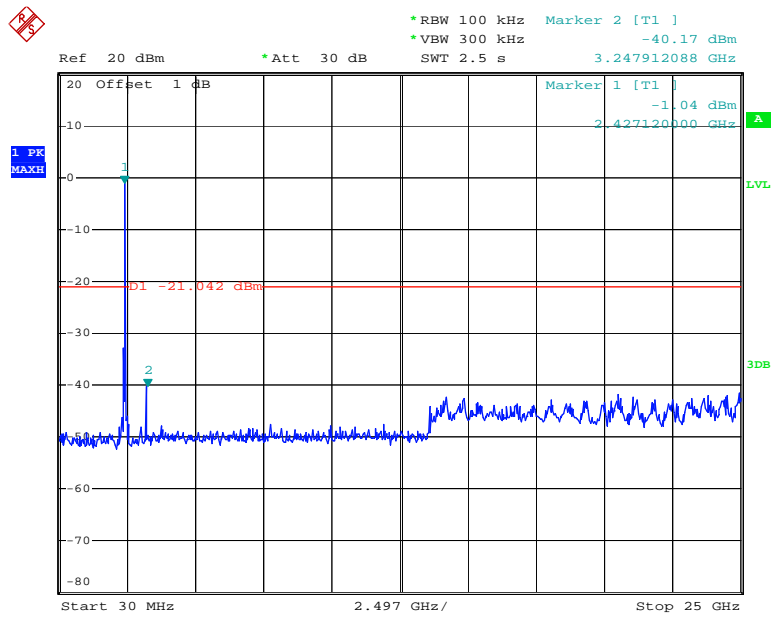
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### 802.11g Low Channel



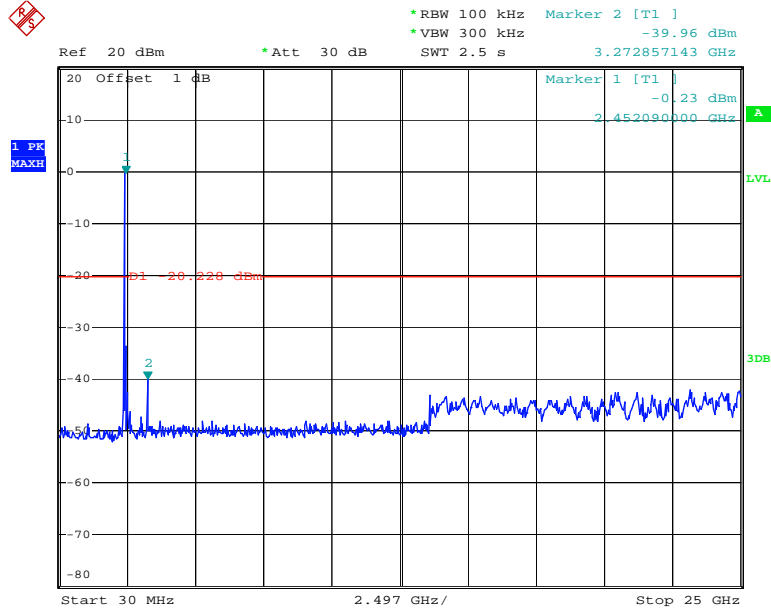
Date: 16.AUG.2013 17:02:22

### 802.11g Middle Channel



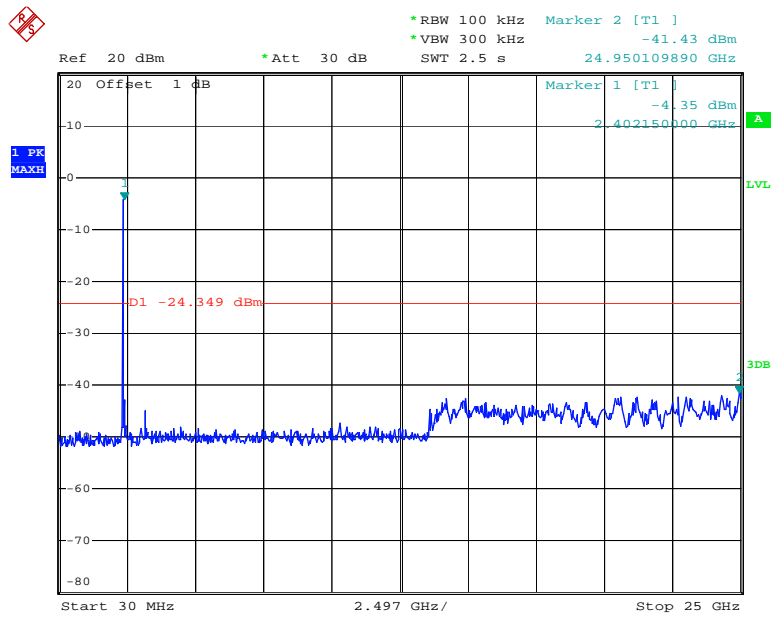
Date: 16.AUG.2013 17:03:54

### 802.11g High Channel



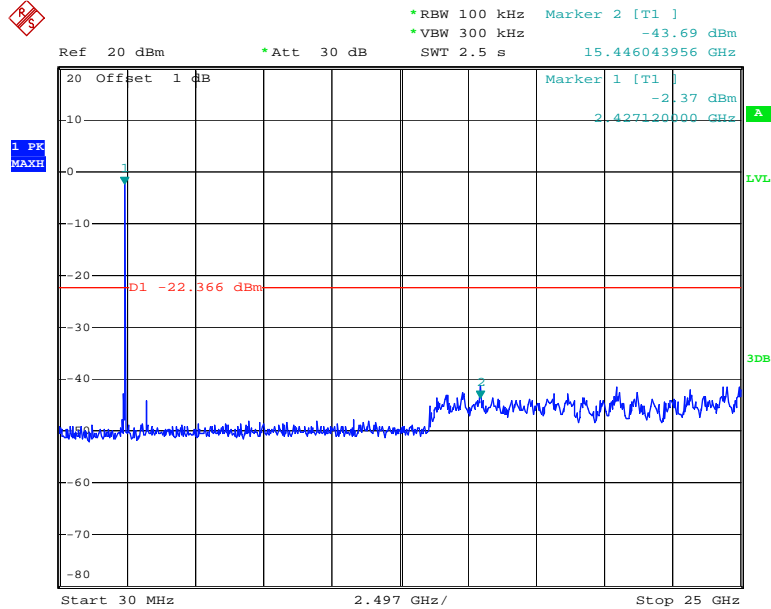
Date: 16.AUG.2013 17:07:15

### Chin 0: 802.11n20 Low Channel



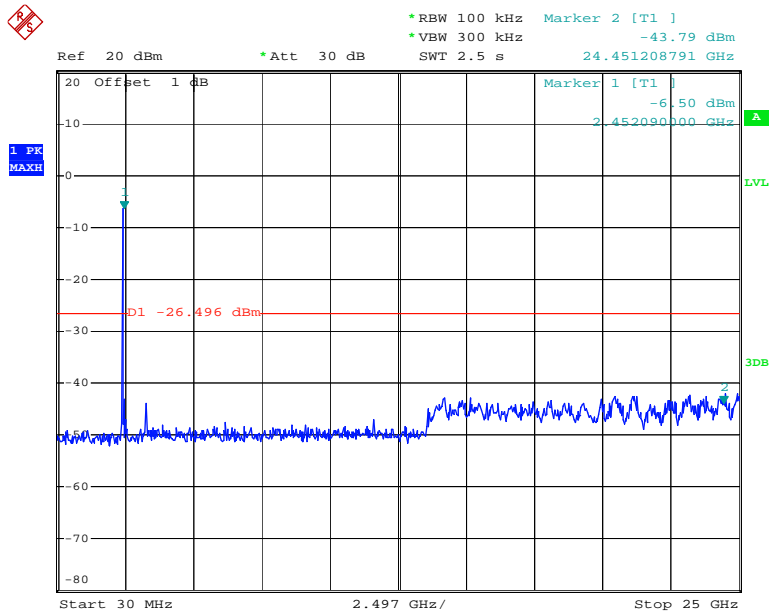
Date: 16.AUG.2013 17:12:57

### Chain 0: 802.11n20 Middle Channel



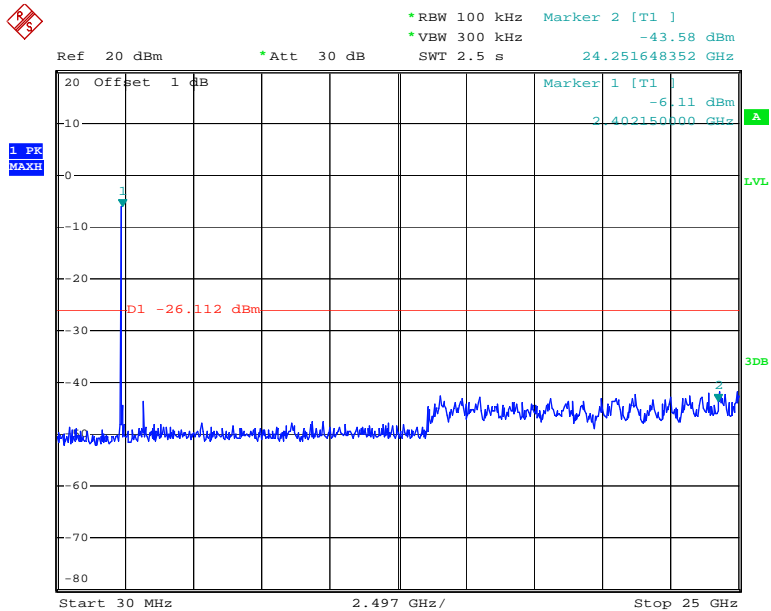
Date: 16.AUG.2013 17:16:44

### Chain 0: 802.11n20 High Channel



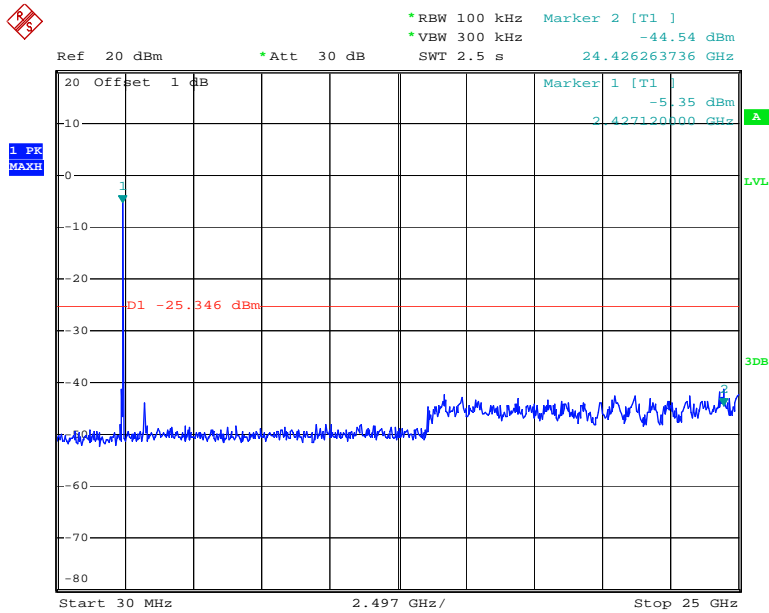
Date: 16.AUG.2013 17:20:20

### Chain 1: 802.11n20 Low Channel



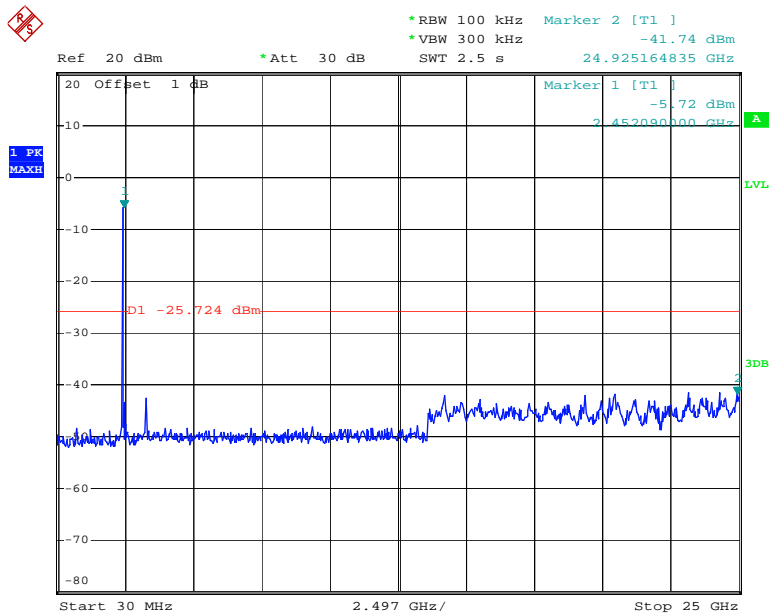
Date: 16.AUG.2013 17:36:25

### Chain 1: 802.11n20 Middle Channel



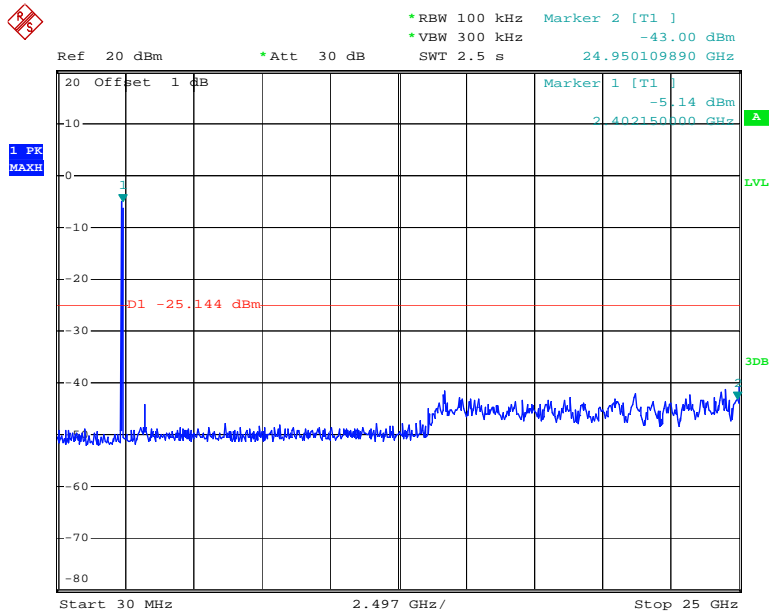
Date: 16.AUG.2013 17:37:48

### Chain 1: 802.11n20 High Channel



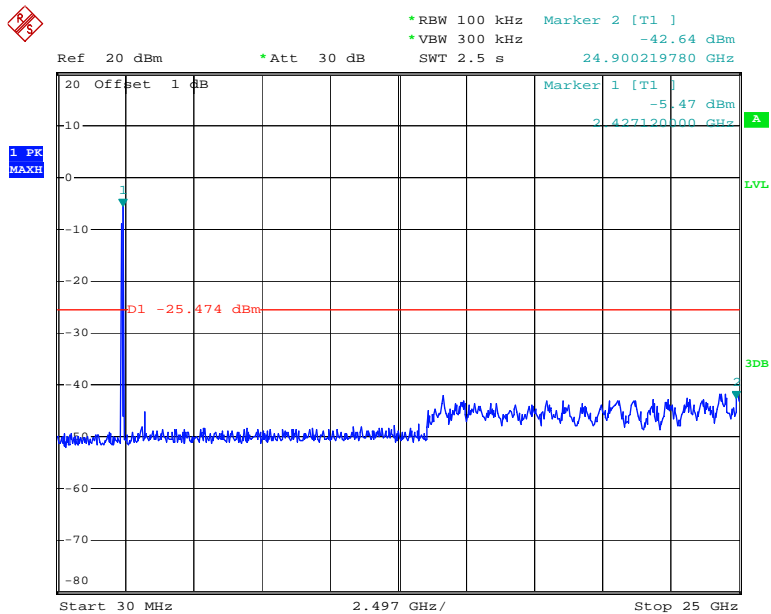
Date: 16.AUG.2013 17:39:33

### Chain 0: 802.11n40 Low Channel



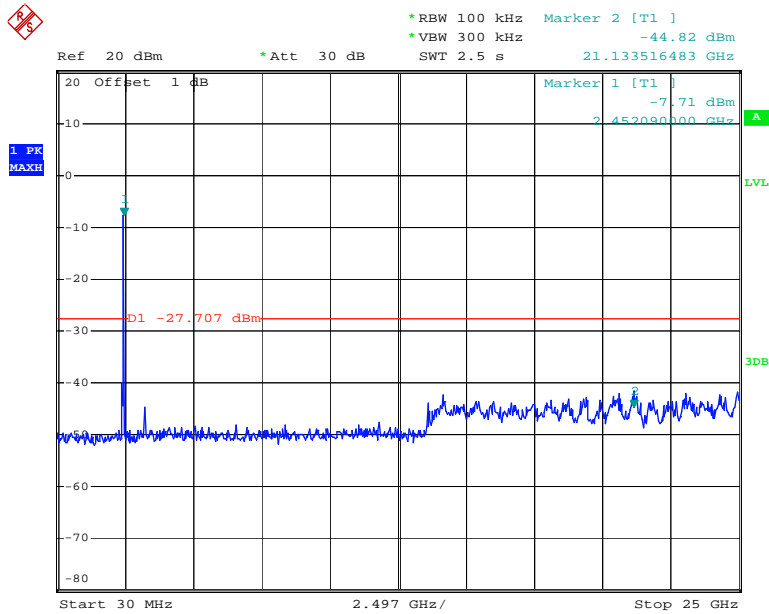
Date: 16.AUG.2013 17:26:10

### Chain 0: 802.11n40 Middle Channel



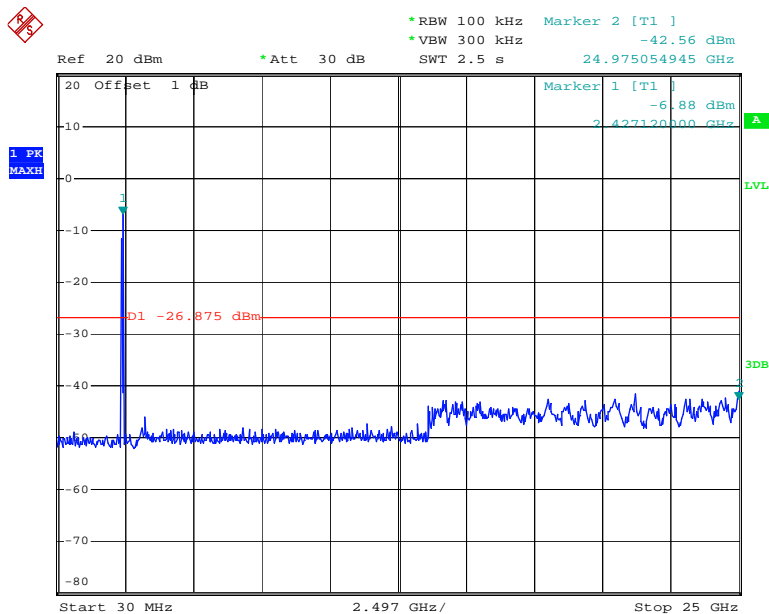
Date: 16.AUG.2013 17:28:41

### Chain 0: 802.11n40 High Channel



Date: 16.AUG.2013 17:32:45

### Chain 1: 802.11n40 Low Channel

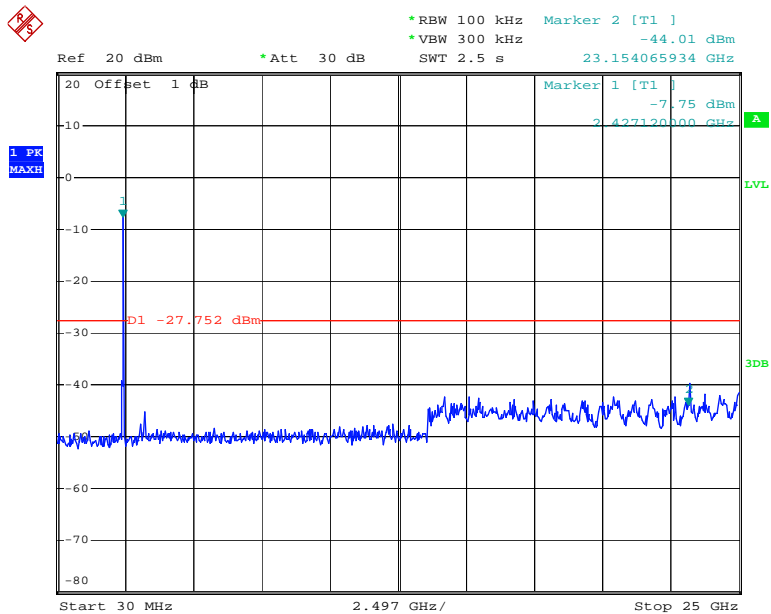


Date: 16.AUG.2013 17:44:11



[illegible]

### Chain 1: 802.11n40 High Channel



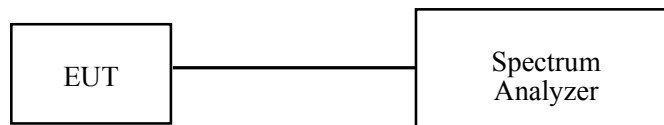
Page 33 of 82

**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**

Temperature:	27.6 °C
Relative Humidity:	58 %
ATM Pressure:	99.1 kPa

*The testing was performed by Leon Chen on 2013-08-16.*

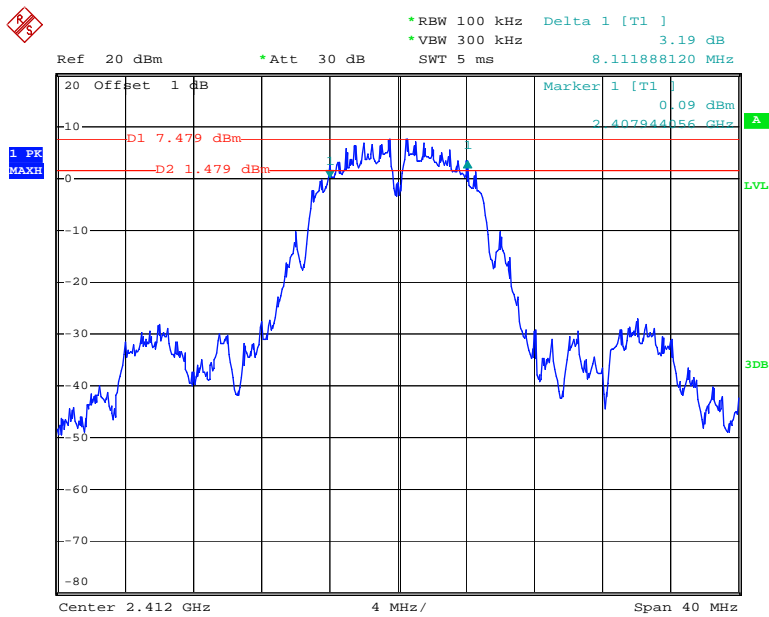
*Test Mode: Transmitting*

**Test Result:** Pass.

Please refer to the following tables and plots.

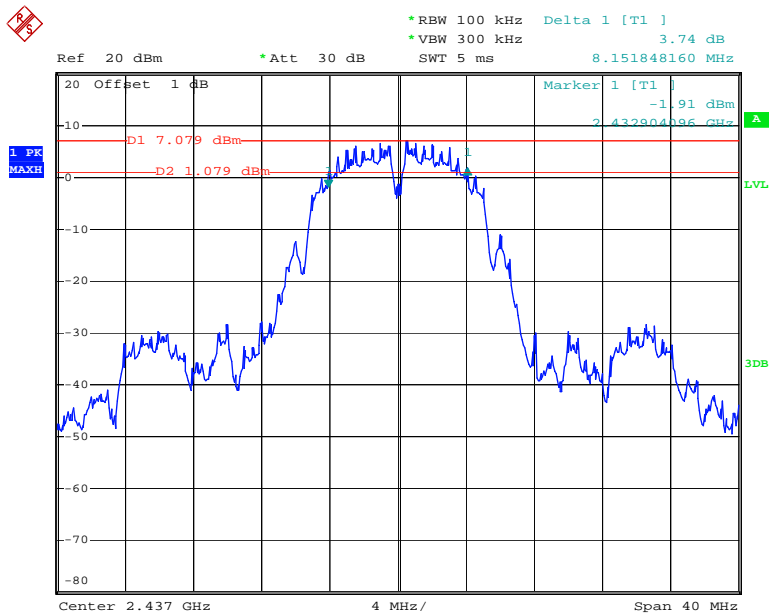
Test Mode	Channel	Frequency	6 dB Bandwidth (MHz)		Limit
		(MHz)	Chain 0	Chain 1	(kHz)
802.11b	Low	2412	8.11	/	>500
	Middle	2437	8.15	/	>500
	High	2462	8.11	/	>500
802.11g	Low	2412	15.10	/	>500
	Middle	2437	15.06	/	>500
	High	2462	15.22	/	>500
802.11n ht20	Low	2412	15.10	14.51	>500
	Middle	2437	15.10	15.14	>500
	High	2462	14.79	15.18	>500
802.11n ht40	Low	2422	35.24	35.24	>500
	Middle	2437	35.64	35.96	>500
	High	2452	36.44	36.44	>500

### 802.11b Low Channel



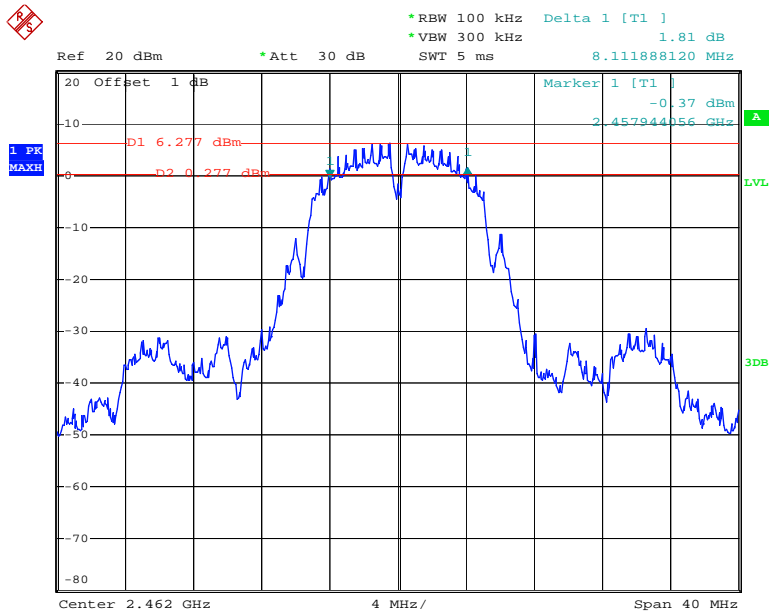
Date: 16.AUG.2013 16:52:41

### 802.11b Middle Channel



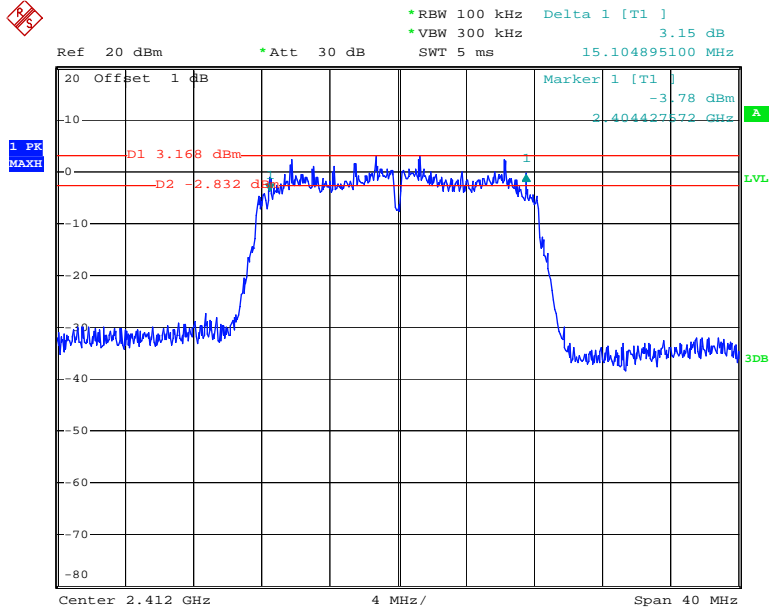
Date: 16.AUG.2013 16:56:00

### 802.11b High Channel



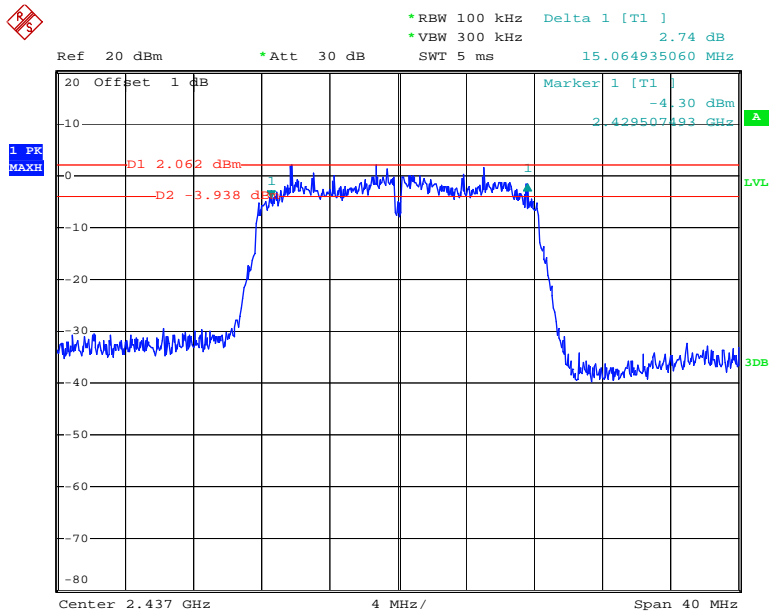
Date: 16.AUG.2013 16:57:20

### 802.11g Low Channel



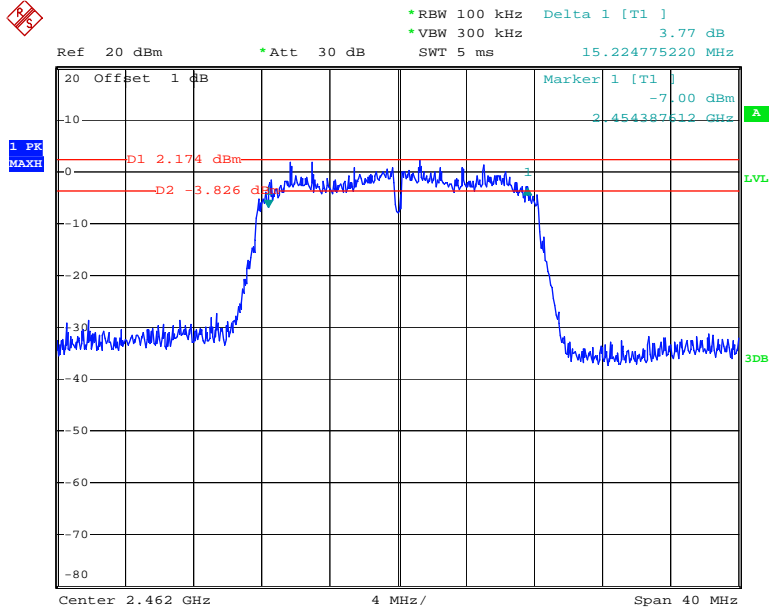
Date: 16.AUG.2013 17:01:40

### 802.11g Middle Channel



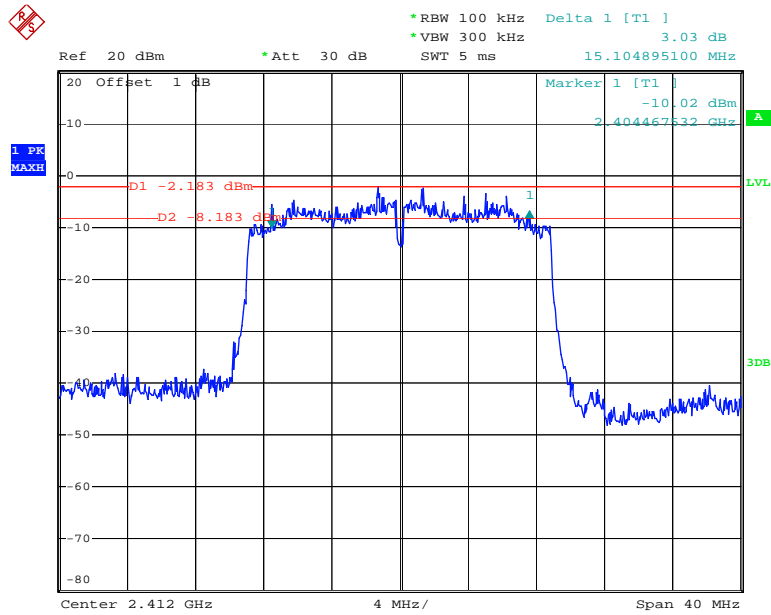
Date: 16.AUG.2013 17:03:12

### 802.11g High Channel



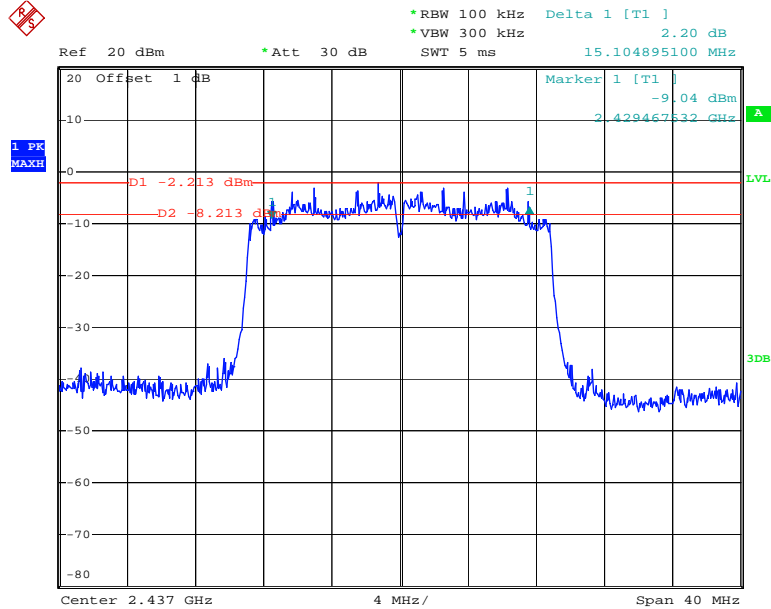
Date: 16.AUG.2013 17:06:32

### Chain 0: 802.11n20 Low Channel



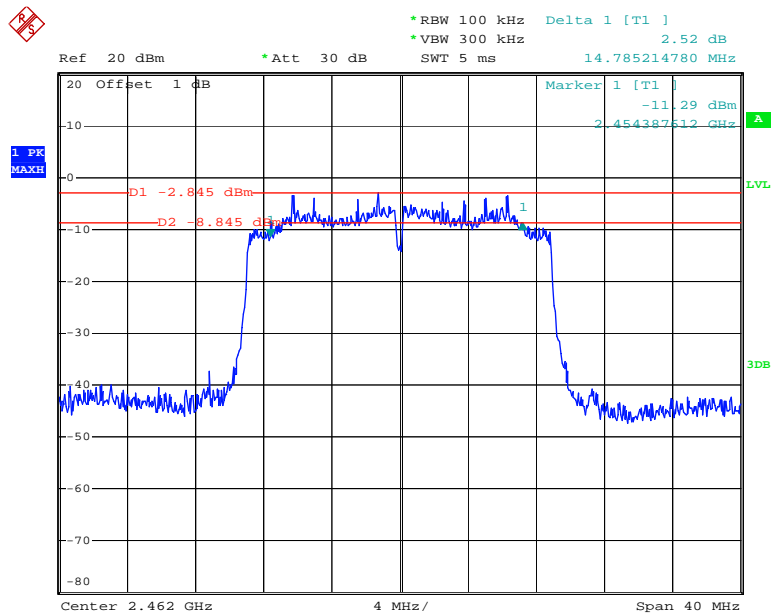
Date: 16.AUG.2013 17:12:14

### Chain 0: 802.11n20 Middle Channel



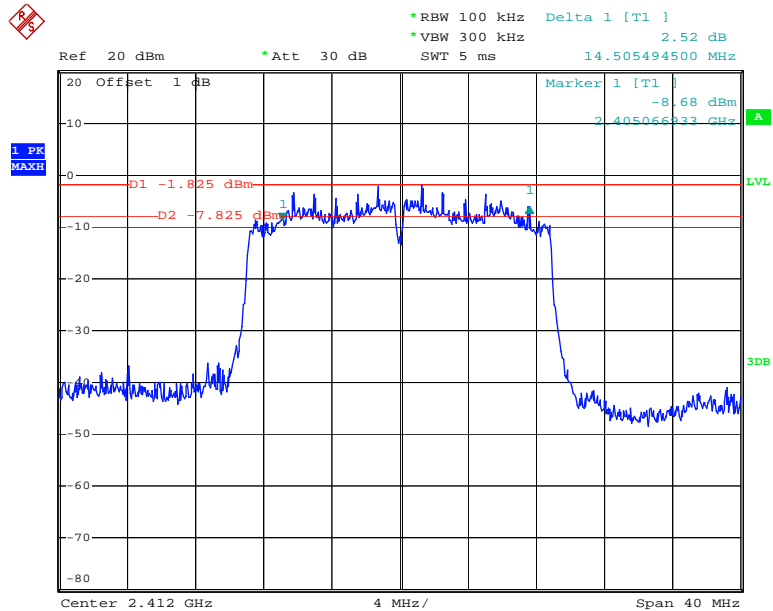
Date: 16.AUG.2013 17:16:02

### Chain 0: 802.11n20 High Channel



Date: 16.AUG.2013 17:19:38

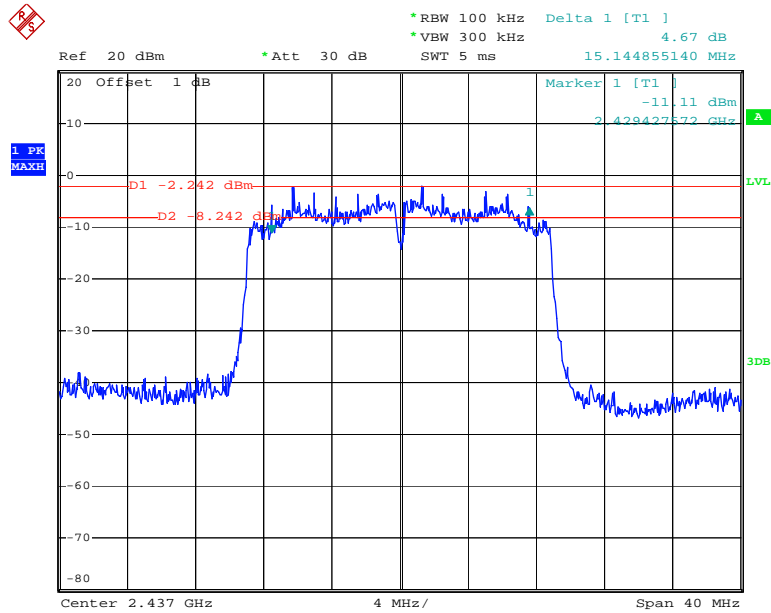
### Chain 1: 802.11n20 Low Channel



Date: 16.AUG.2013 17:35:43

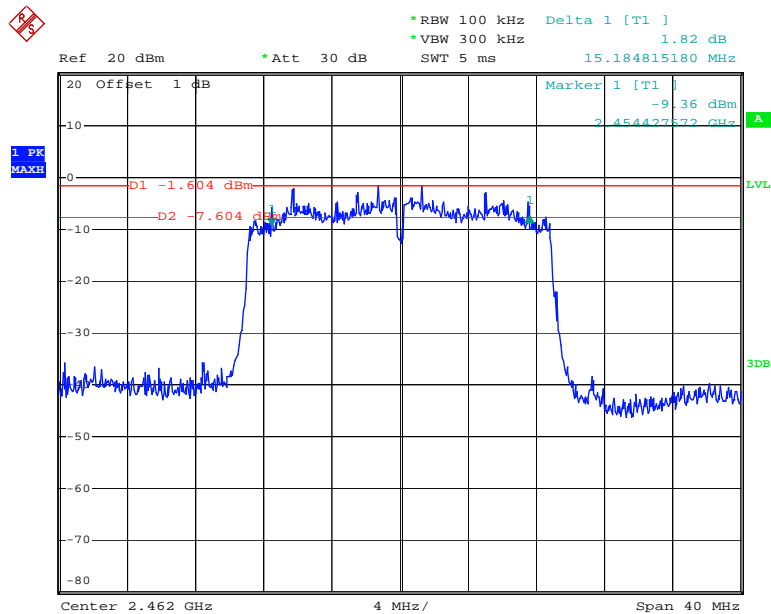


### Chain 1: 802.11n20 Middle Channel



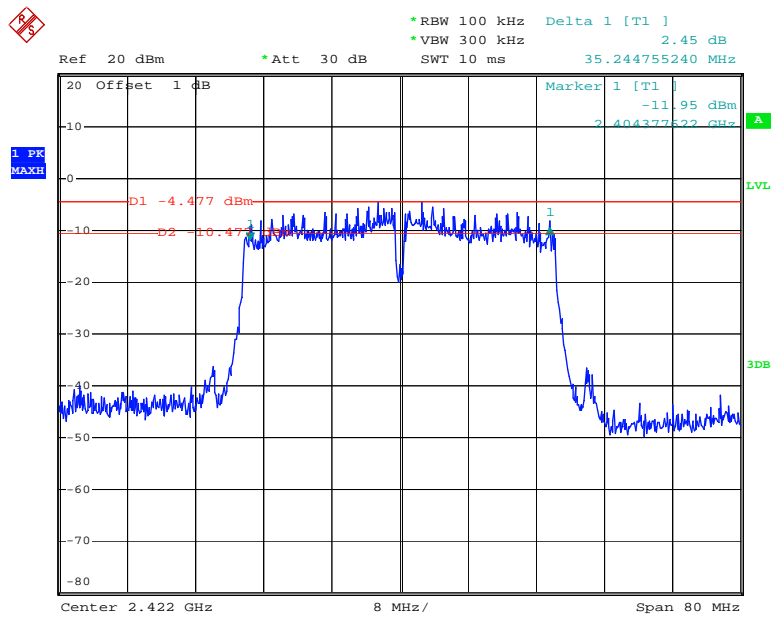
Date: 16.AUG.2013 17:37:06

### Chain 1: 802.11n20 High Channel



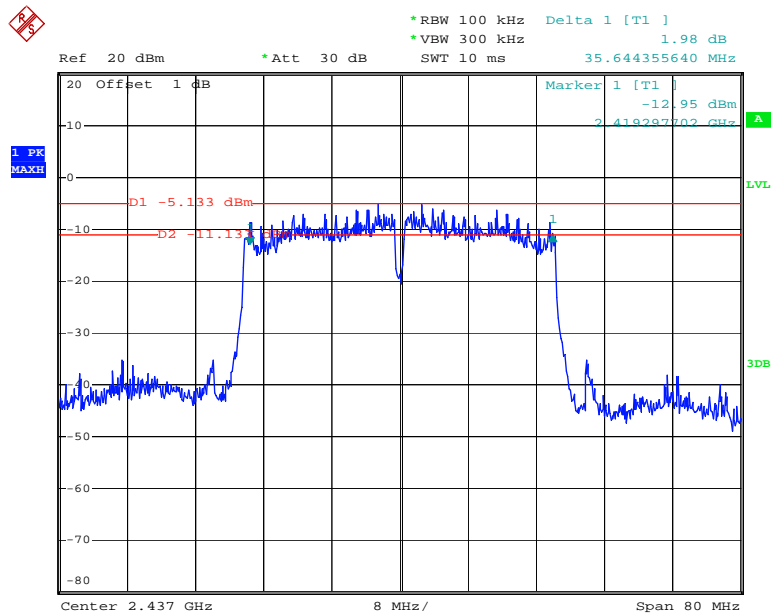
Date: 16.AUG.2013 17:38:27

### Chain 0: 802.11n40 Low Channel



Date: 16.AUG.2013 17:25:17

### Chain 0: 802.11n40 Middle Channel



Date: 16.AUG.2013 17:27:48

\*RBW 100 kHz Delta 1 [T1]  
 \*VVB 300 kHz 1.81 dB  
 \*Att 30 dB  
 SWT 10 ms 36.443556440 MHz

Ref 20 dBm  
 Offset 1 dB

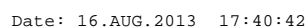
OBW 36.160000000 MHz  
 Marker 1 [T1] -13.33 dBm  
 2.433738862 GHz  
 Temp 1 [T1 OBW] -11.51 dBm  
 2.433920000 GHz  
 Temp 2 [T1 OBW] -12.99 dBm  
 2.470080000 GHz

D1 -6.322 dBm  
 D2 -12.322 dBm

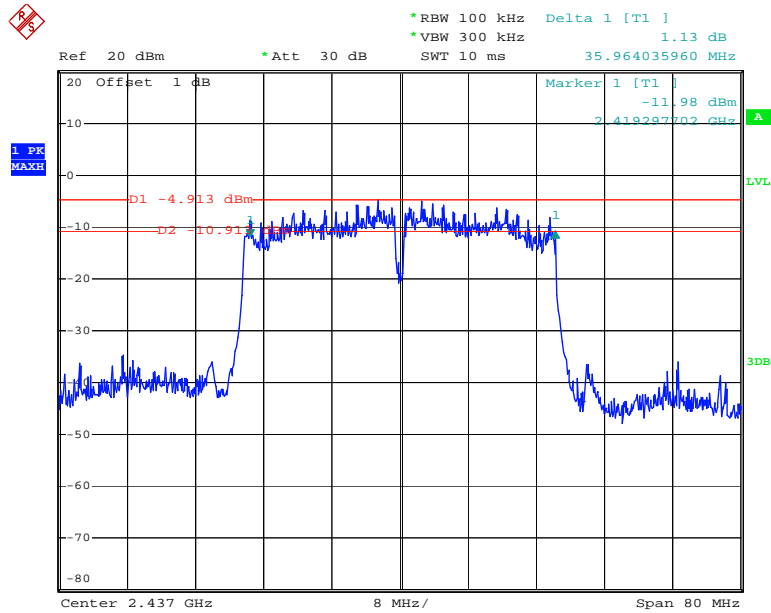
1 PK MAXH

Center 2.452 GHz  
 8 MHz/  
 Span 80 MHz

### Chain 1: 802.11n40 Low Channel

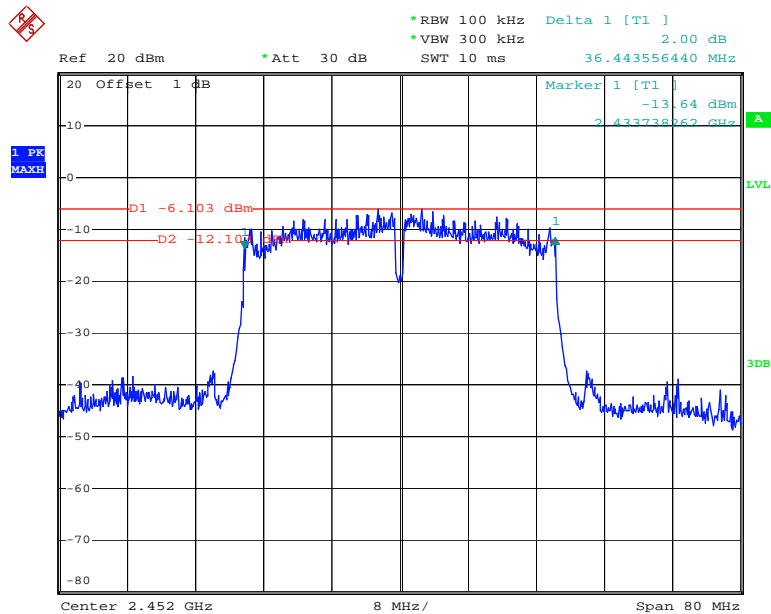


### Chain 1: 802.11n40 Middle Channel



Date: 16.AUG.2013 17:43:01

### Chain 1: 802.11n40 High Channel



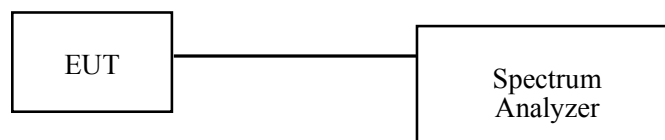
Date: 16.AUG.2013 17:46:02

**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 an EMI Test Receiver.
3. Add a correction factor to the display.

**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>	27.6 °C
<b>Relative Humidity:</b>	58 %
<b>ATM Pressure:</b>	99.1 kPa

*The testing was performed by Leon Chen on 2013-08-16.*

*Test Mode: Transmitting*

Test Mode	Channel	Frequency	Conducted Output Power (dBm)			Limit	Result
		(MHz)	Chain 0	Chain 1	Chain 0+1	(dBm)	
802.11b mode	Low	2412	15.86	/	15.86	30	PASS
	Middle	2437	15.82	/	15.82	30	PASS
	High	2462	15.73	/	15.73	30	PASS
802.11g mode	Low	2412	14.78	/	14.78	30	PASS
	Middle	2437	14.58	/	14.58	30	PASS
	High	2462	14.53	/	14.53	30	PASS
802.11n20 mode	Low	2412	9.66	9.55	12.62	30	PASS
	Middle	2437	9.66	9.66	12.67	30	PASS
	High	2462	9.78	9.54	12.67	30	PASS
802.11n40 mode	Low	2422	9.83	9.55	12.70	30	PASS
	Middle	2437	9.83	9.78	12.82	30	PASS
	High	2452	9.77	9.76	12.78	30	PASS

Please refer to the following plots

Ref 20 dBm \*Att 30 dB \*RBW 100 kHz \*VBW 300 kHz SWT 5 ms Marker 1 [T1 ] 7.19 dBm 2.410520000 GHz

20 Offset 1 dB

1. PK MAXH

OBW 10.120000000 MHz  
Temp 1 [T1 OBW] = -2.63 dBm  
2.406960000 GHz  
Temp 2 [T1 OBW] = -3.73 dBm  
2.417080000 GHz

Center 2.412 GHz 4 MHz/ Span 40 MHz

Date: 16.AUG.2013 16:52:48

Ref 21 dBm \* Att 30 dB \* RBW 300 kHz \* VBW 1 MHz SWT 2.5 ms Marker 1 [T1] -32.01 dBm 2.419590000 GHz

Offset 1 dB

1 RM MAXH

15.86 dBm

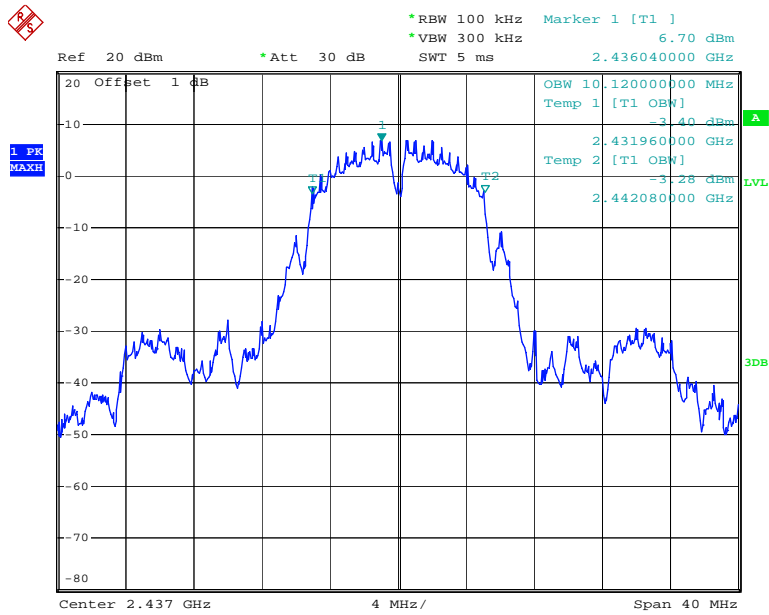
10.12 MHz

Center 2.412 GHz 1.518 MHz/ Span 15.18 MHz

3dB

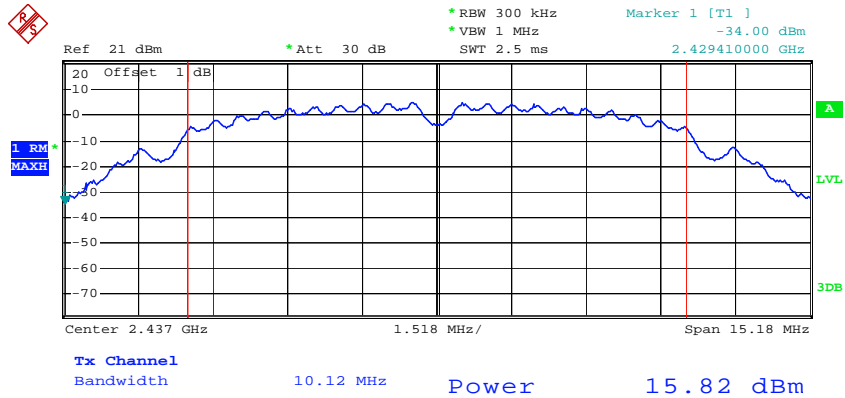
Date: 16.AUG.2013 19:31:30

### 802.11b RF OBW, Middle Channel



Date: 16.AUG.2013 16:56:07

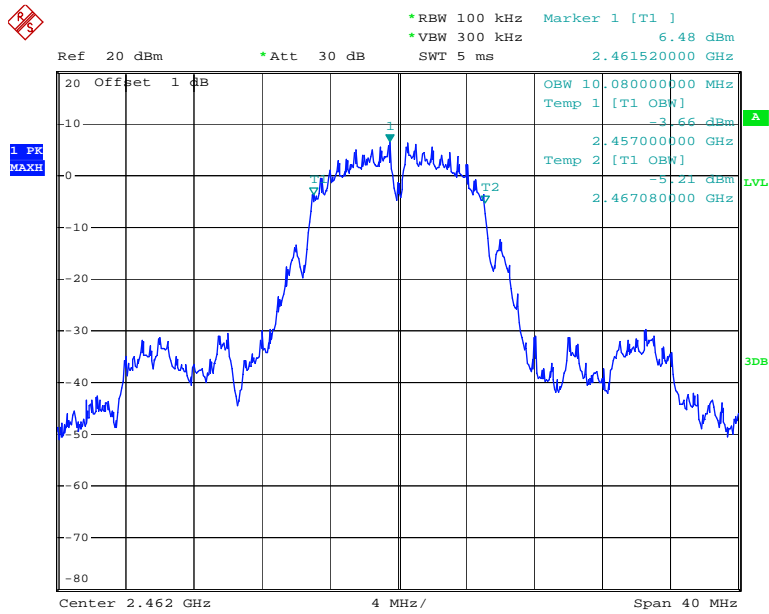
### 802.11b RF Output Power, Middle Channel



Date: 16.AUG.2013 19:33:19

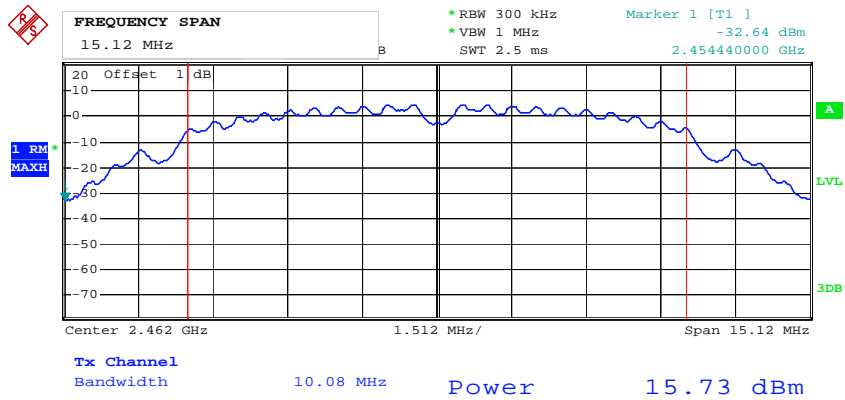


### 802.11b RF OBW, High Channel



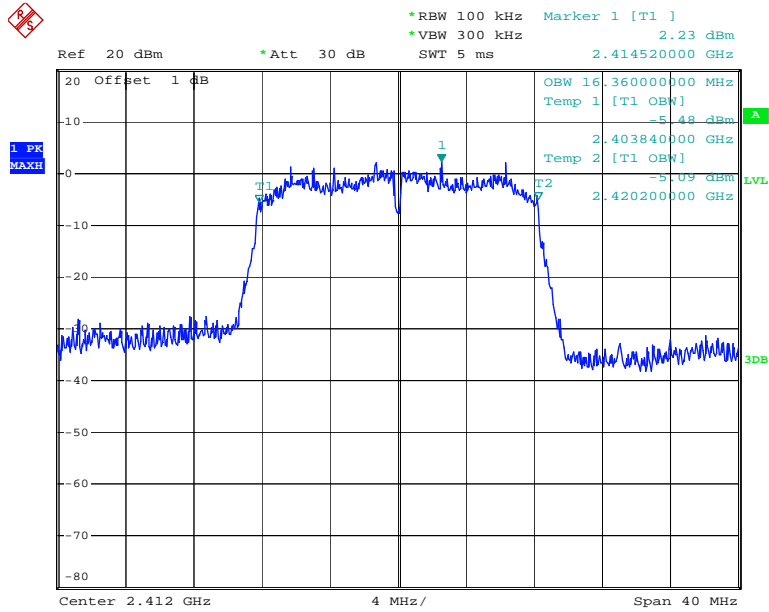
Date: 16.AUG.2013 16:57:27

### 802.11b RF Output Power, High Channel



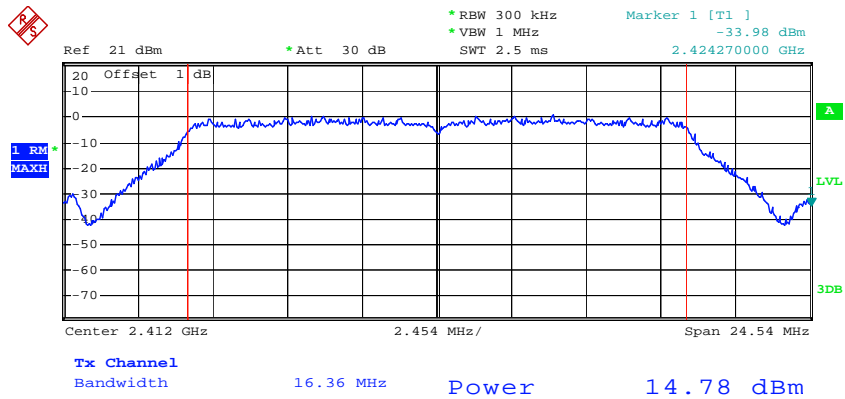
Date: 16.AUG.2013 19:34:23

### 802.11g RF OBW, Low Channel



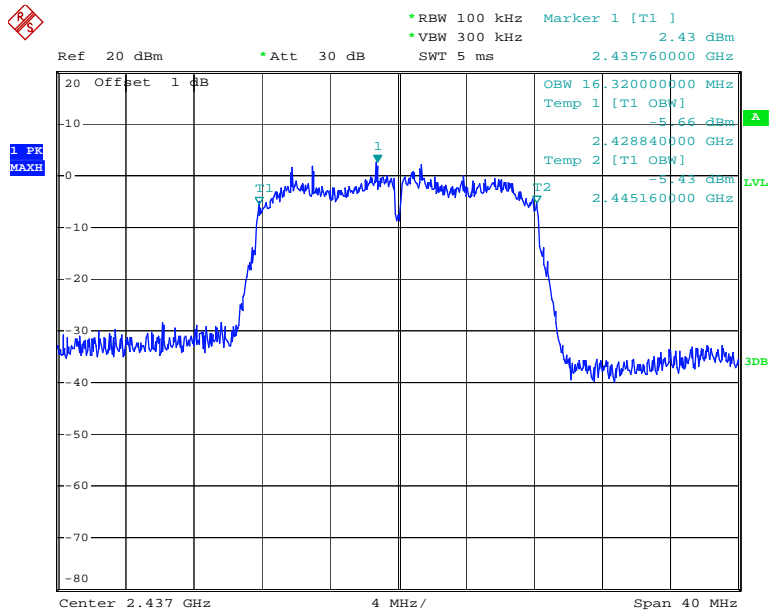
Date: 16.AUG.2013 17:01:47

### 802.11g RF Output Power, Low Channel



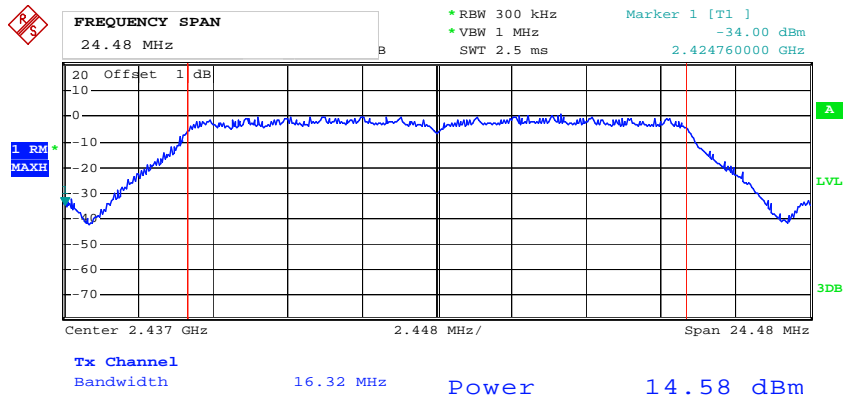
Date: 16.AUG.2013 20:43:42

### 802.11g RF OBW, Middle Channel



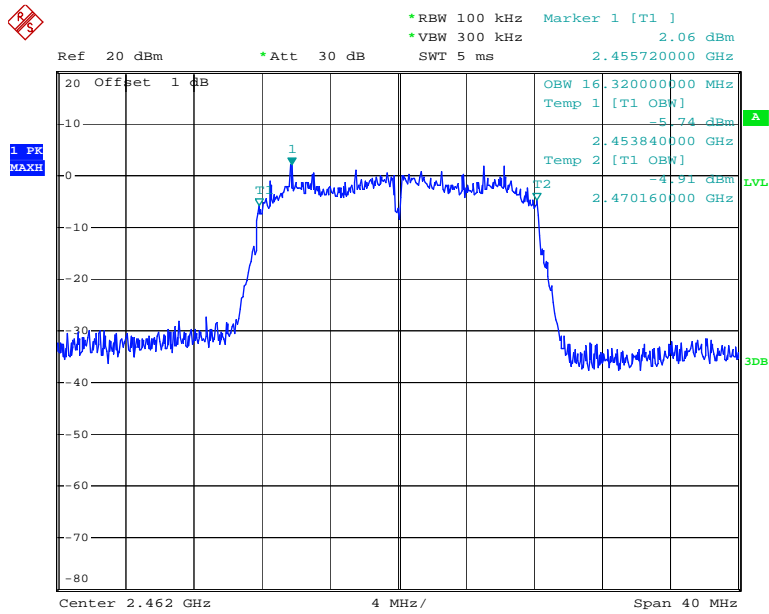
Date: 16.AUG.2013 17:03:19

### 802.11g RF Output Power, Middle Channel



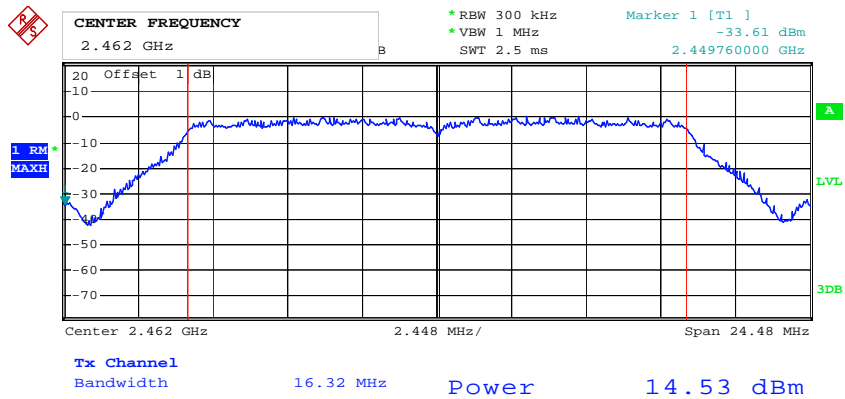
Date: 16.AUG.2013 20:44:57

### 802.11g RF OBW, High Channel



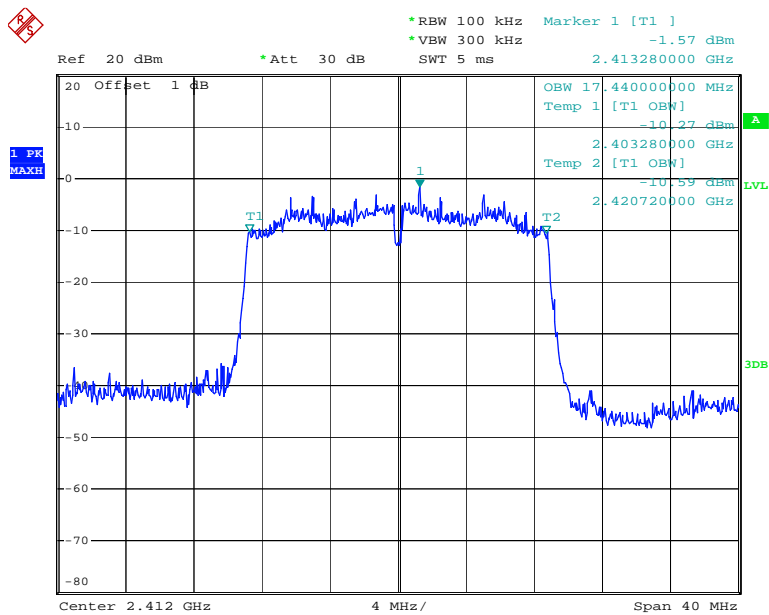
Date: 16.AUG.2013 17:06:39

### 802.11g RF Output Power, High Channel



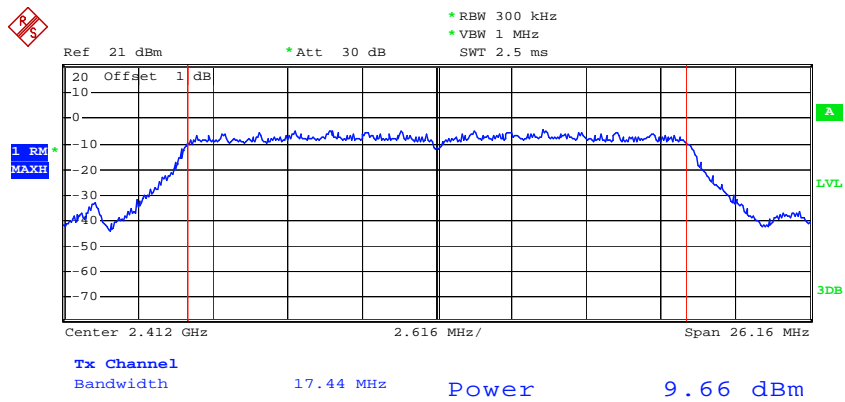
Date: 16.AUG.2013 20:45:54

### Chain 0: 802.11n20 RF OBW, Low Channel



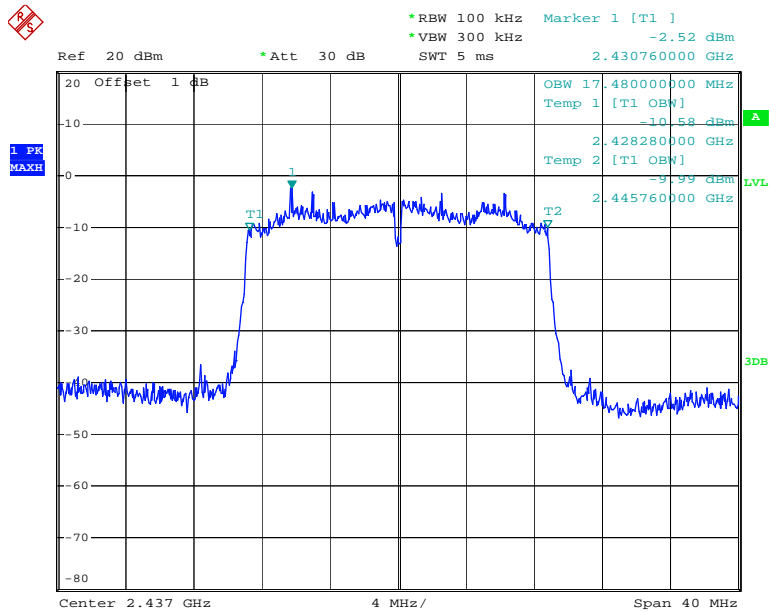
Date: 16.AUG.2013 17:12:21

### Chain 0: 802.11n20 RF Output Power, Low Channel



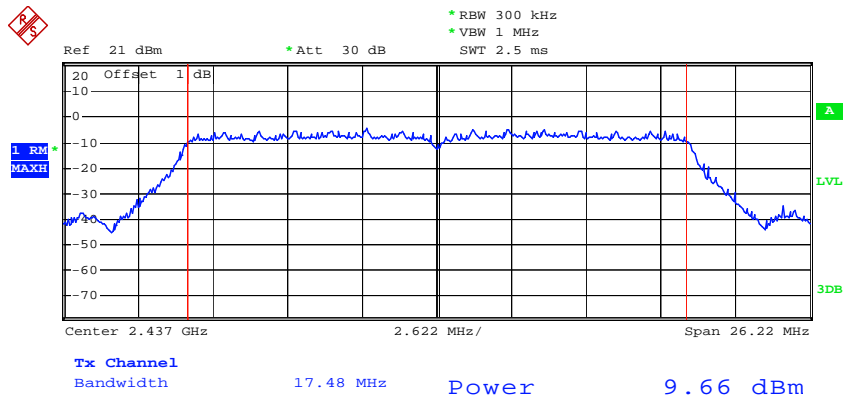
Date: 16.AUG.2013 19:49:39

### Chain 0: 802.11n20 RF OBW, Middle Channel



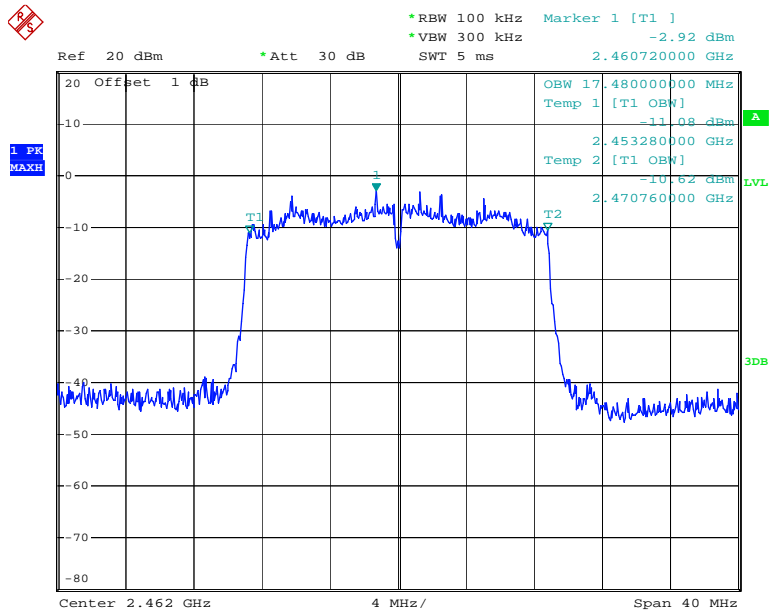
Date: 16.AUG.2013 17:16:09

### Chain 0: 802.11n20 RF Output Power, Middle Channel



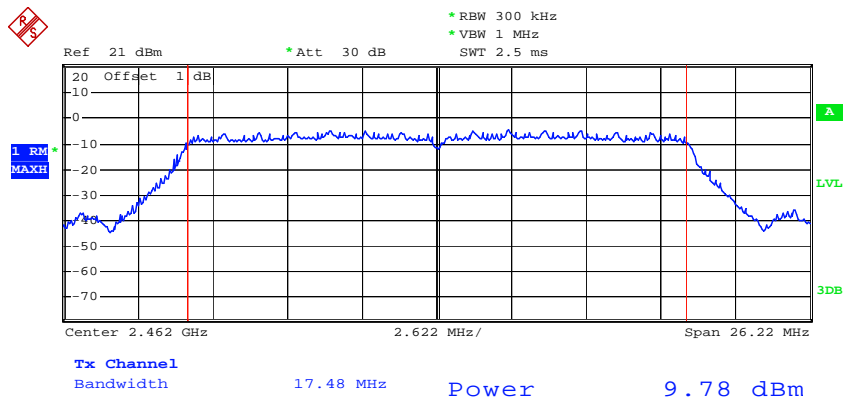
Date: 16.AUG.2013 19:53:34

### Chain 0: 802.11n20 RF OBW, High Channel



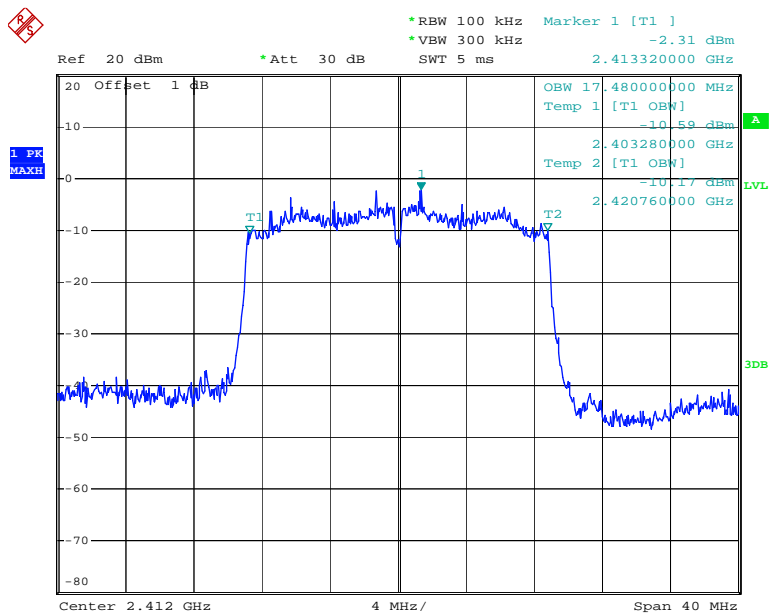
Date: 16.AUG.2013 17:19:45

### Chain 0: 802.11n20 RF Output Power, High Channel



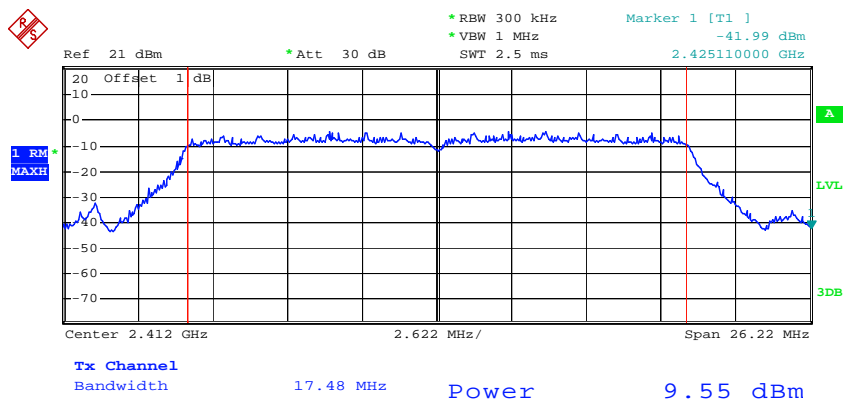
Date: 16.AUG.2013 19:52:06

### Chain 1: 802.11n20 RF OBW, Low Channel



Date: 16.AUG.2013 17:35:50

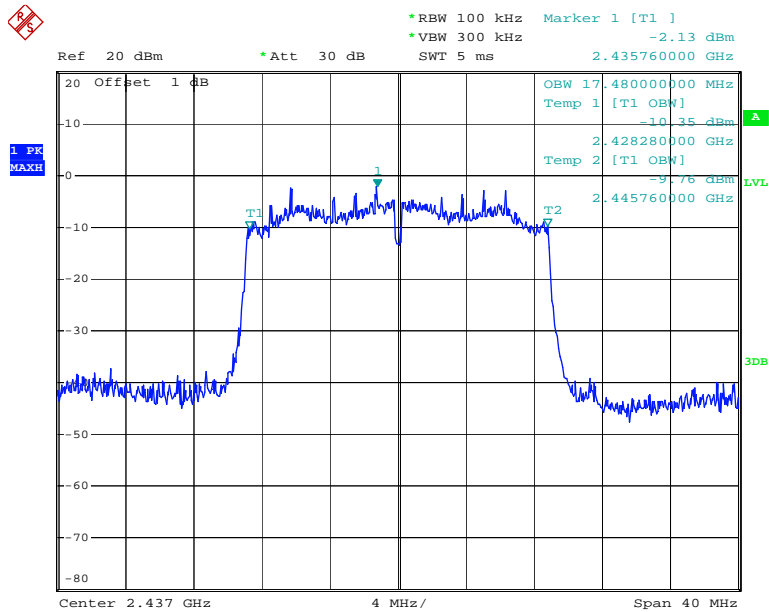
### Chain 1: 802.11n20 RF Output Power, Low Channel



Date: 16.AUG.2013 20:13:36

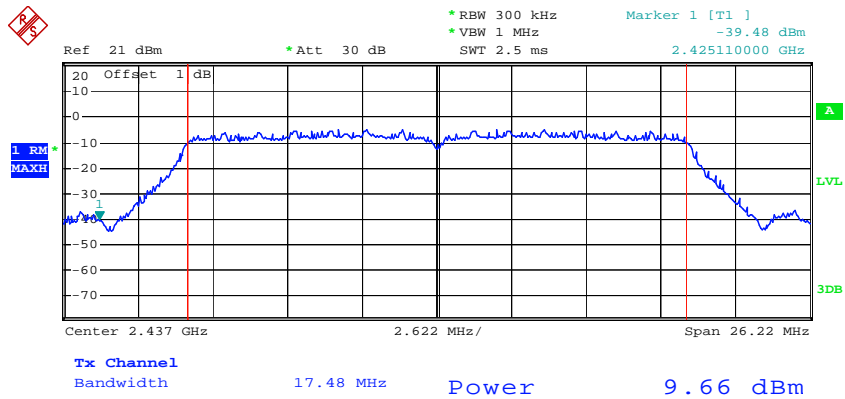


### Chain 1: 802.11n20 RF OBW, Middle Channel



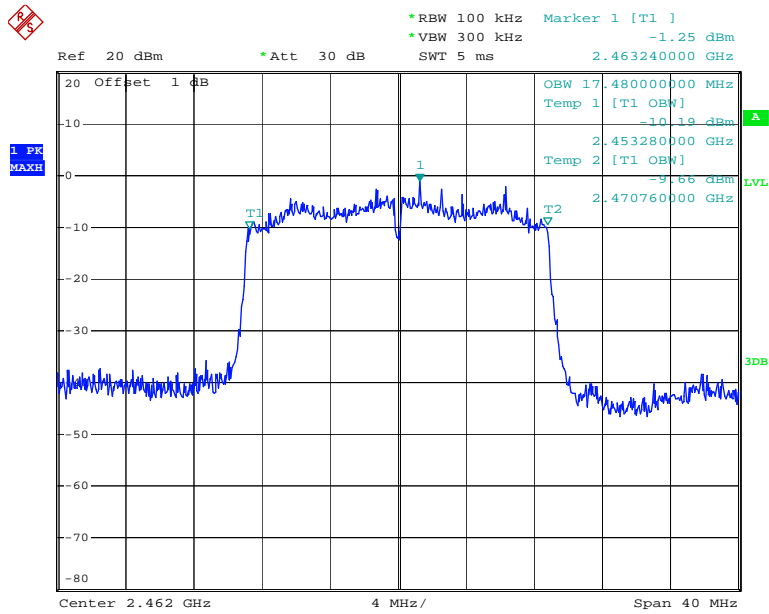
Date: 16.AUG.2013 17:37:13

### Chain 1: 802.11n20 RF Output Power, Middle Channel



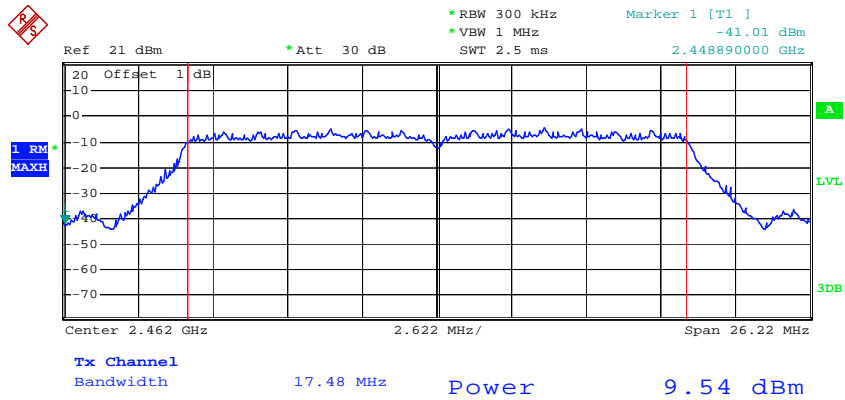
Date: 16.AUG.2013 20:15:14

### Chain 1: 802.11n20 RF OBW, High Channel

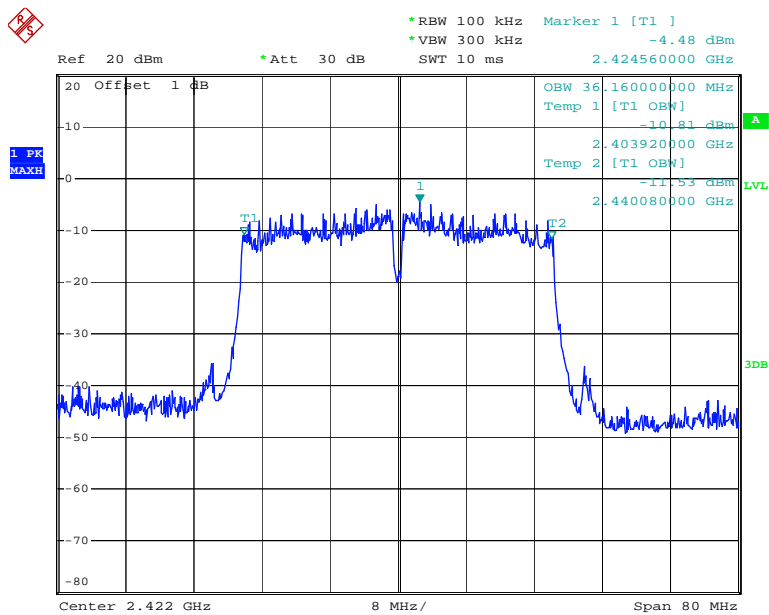


Date: 16.AUG.2013 17:38:34

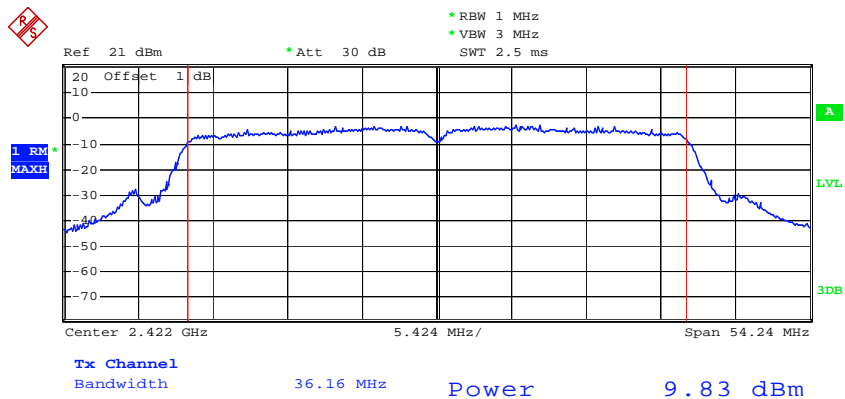
### Chain 1: 802.11n20 RF Output Power, High Channel



Date: 16.AUG.2013 20:16:30

**Chain 0: 802.11n40 RF OBW, Low Channel**

Date: 16.AUG.2013 17:25:24

**Chain 0: 802.11n40 RF Output Power, Low Channel**

Date: 16.AUG.2013 19:56:44

Ref 20 dBm \*Att 30 dB \*RBW 100 kHz \*VBW 300 kHz \*SWT 10 ms

Marker 1 [T1 ] 2.439560000 GHz -5.24 dBm

OBW 36.240000000 MHz  
Temp 1 [T1 OBW] -10.01 dBm  
2.418920000 GHz  
Temp 2 [T1 OBW] -10.98 dBm  
2.455160000 GHz

1 PK MAXH

Center 2.437 GHz 8 MHz/ Span 80 MHz

Date: 16.AUG.2013 17:27:55

\* RBW 1 MHz  
 \* VBW 3 MHz  
 SWT 2.5 ms

FREQUENCY SPAN  
 54.36 MHz

Offset 1 dB

1 RBW  
 MAXH

A

LVL

3DB

Center 2.437 GHz

5.436 MHz/

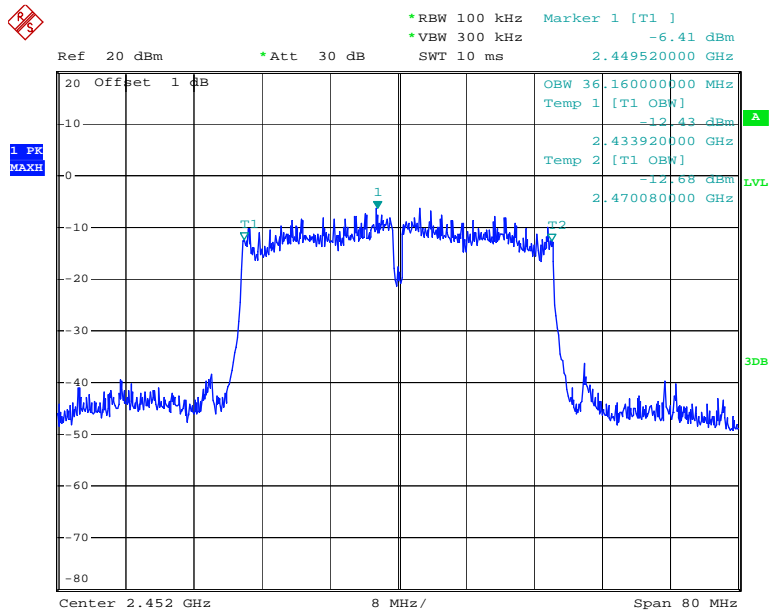
Span 54.36 MHz

Tx Channel  
 Bandwidth 36.24 MHz

Power 9.83 dBm

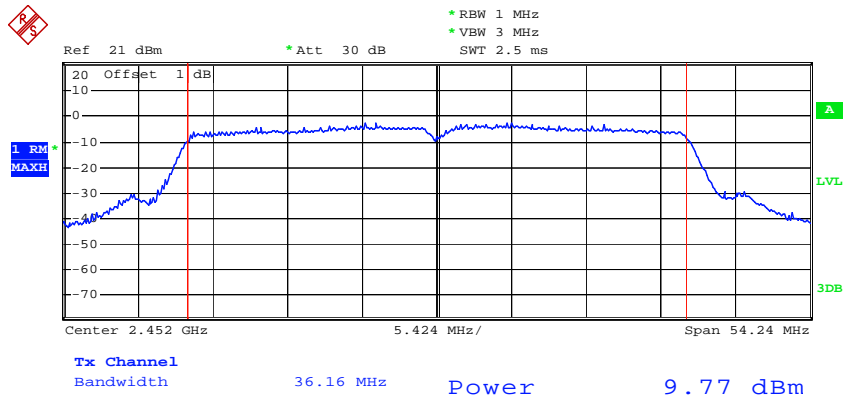
Date: 16.AUG.2013 19:57:59

### Chain 0: 802.11n40 RF OBW, High Channel



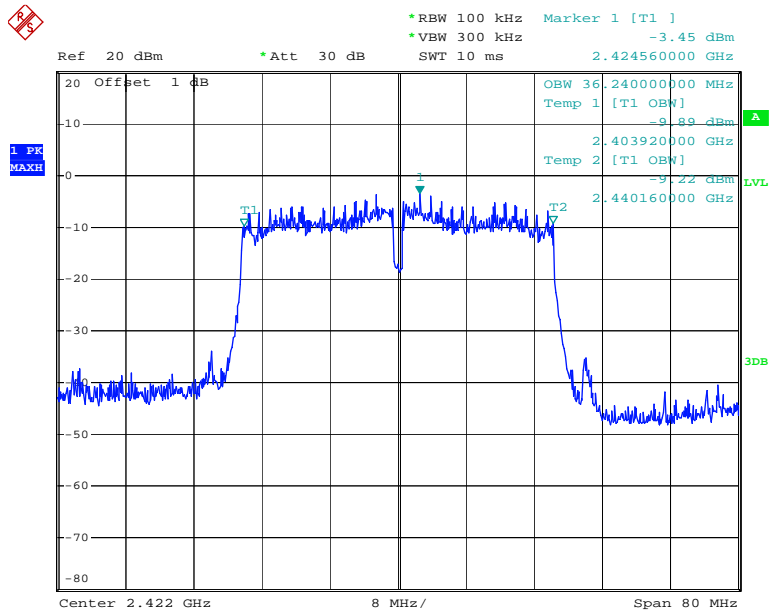
Date: 16.AUG.2013 17:31:36

### Chain 0: 802.11n40 RF Output Power, High Channel



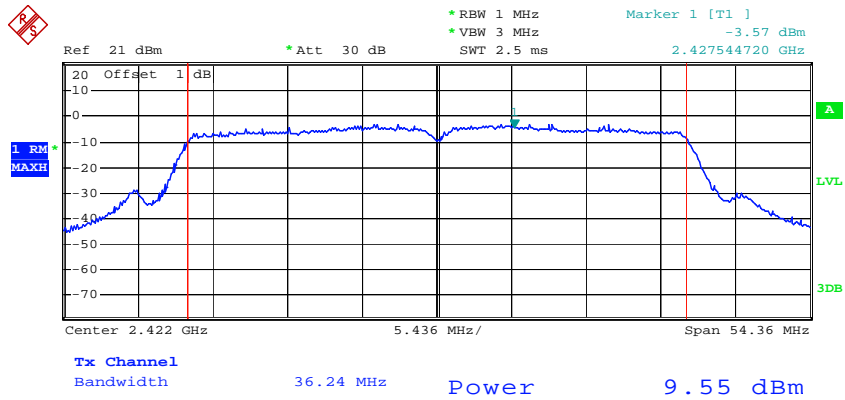
Date: 16.AUG.2013 19:58:51

### Chain 1: 802.11n40 RF OBW, Low Channel



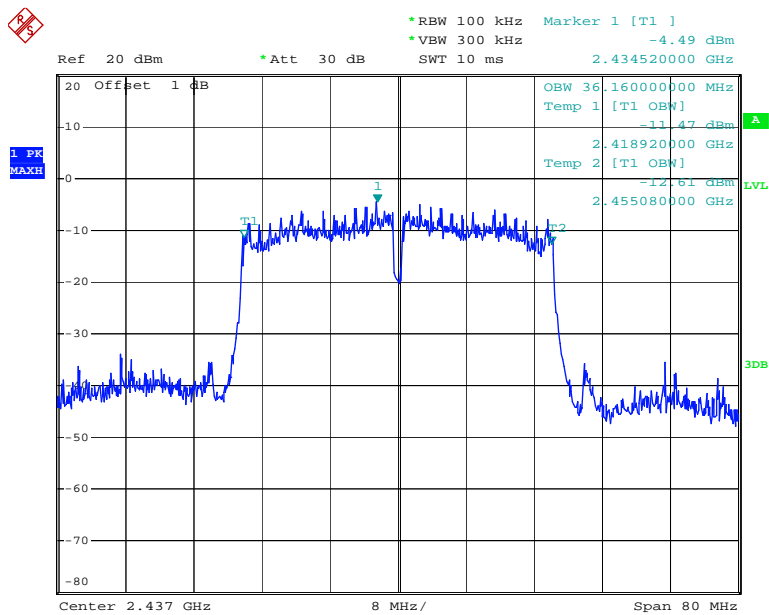
Date: 16.AUG.2013 17:40:49

### Chain 1: 802.11n40 RF Output Power, Low Channel



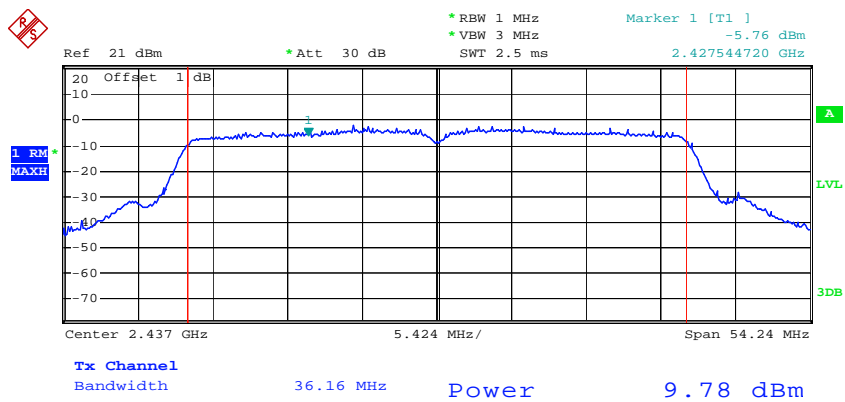
Date: 16.AUG.2013 20:09:10

### Chain 1: 802.11n40 RF OBW, Middle Channel



Date: 16.AUG.2013 17:43:08

### Chain 1: 802.11n40 RF Output Power, Middle Channel



Date: 16.AUG.2013 20:10:48

Ref 20 dBm \* Att 30 dB SWT 10 ms 2.449520000 GHz

Marker 1 [T1] -6.20 dBm 2.449520000 GHz

OBW 36.240000000 MHz Temp 1 [T1 OBW] -12.27 dBm

2.439200000 GHz Temp 2 [T1 OBW] -11.97 dBm

2.470160000 GHz

1 PK MAX

Center 2.452 GHz 8 MHz/ Span 80 MHz

Date: 16.AUG.2013 17:46:09

Ref 21 dBm \* Att 30 dB \* RBW 1 MHz \* VBW 3 MHz \* SWT 2.5 ms

Offset 1 dB

1 RM MAXH

Center 2.452 GHz 5.436 MHz/ Span 54.36 MHz

Tx Channel Bandwidth 36.24 MHz Power 9.76 dBm

Date: 16.AUG.2013 20:07:22



## **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>	27.6° C
<b>Relative Humidity:</b>	58 %
<b>ATM Pressure:</b>	99.1 kPa

*The testing was performed by Leon Chen on 2013-08-16.*

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

Please refer to following table and plots.

1. PK  
MAXH

Ref 20 dBm \* Att 30 dB SWT 5 ms

Marker 4 [T1] 7.86 dBm 2.397916084 GHz  
Marker 2 [T1] -43.25 dBm 2.397916084 GHz  
Marker 3 [T1] -37.63 dBm 2.397916084 GHz

D1 -12.143 dBm

F1 F2

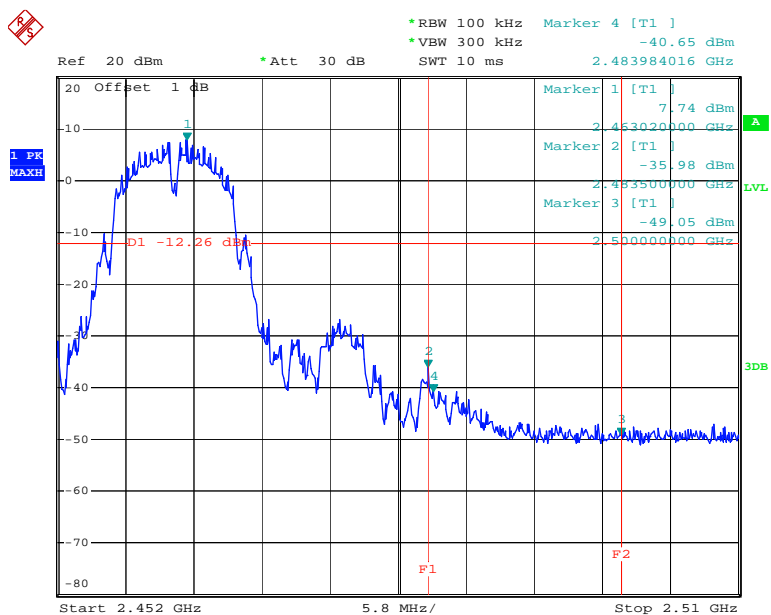
Start 2.38 GHz 4.2 MHz/ Stop 2.422 GHz

A

LVL

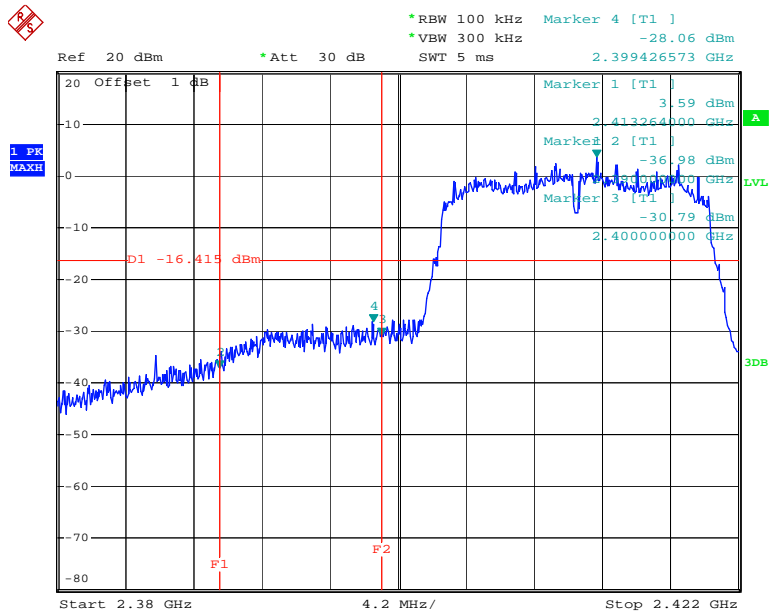
3PB

### 802.11b: Band Edge, Right Side



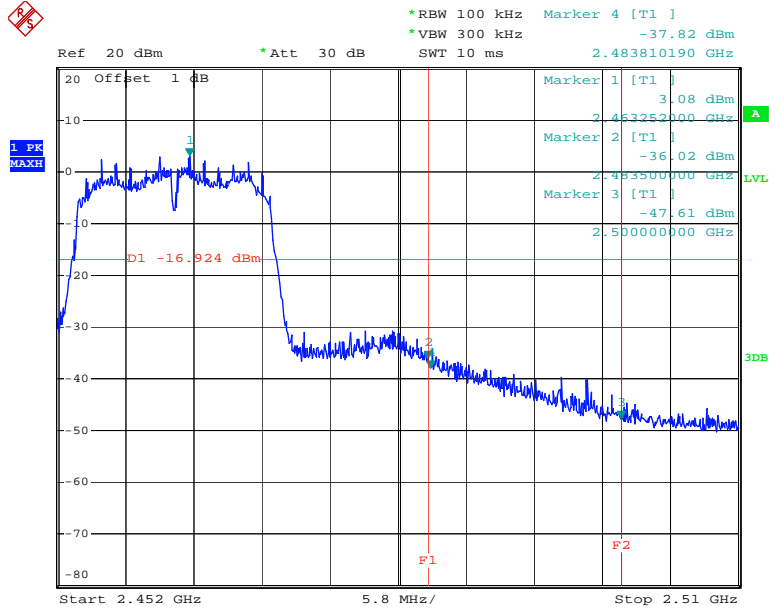
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### 802.11g: Band Edge, Left Side



Date: 16.AUG.2013 17:02:34

### 802.11g: Band Edge, Right Side



Date: 16.AUG.2013 17:07:26

\*RBW 100 kHz    Marker 4 [T1]    -38.12 dBm  
 \*VBW 300 kHz  
 SWT 5 ms    2.391874126 GHz

Ref 20 dBm    \*Att 30 dB

20 Offset 1 dB

Marker 1 [T1]    -2.03 dBm  
 2 413264000 GHz

Marker 2 [T1]    -43.75 dBm  
 1 2.390000000 GHz

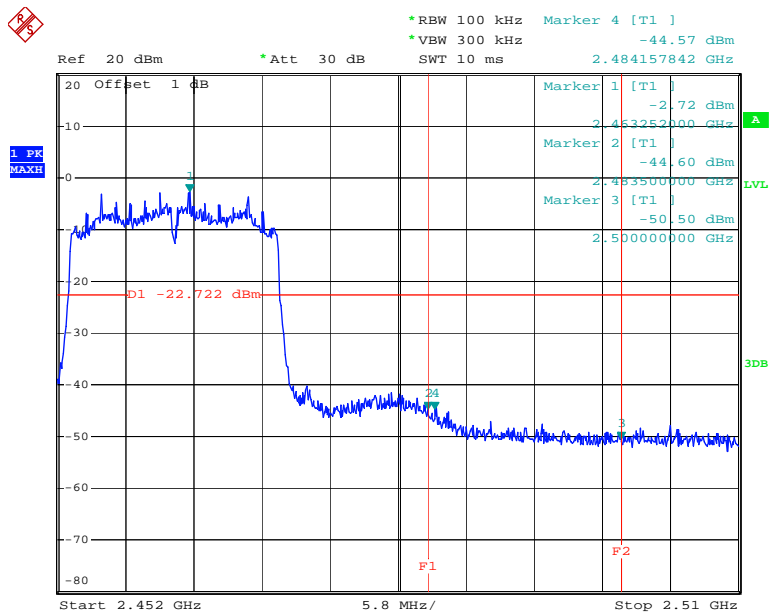
Marker 3 [T1]    -43.75 dBm  
 2.400000000 GHz

D1 -22.027 dBm

F1    F2

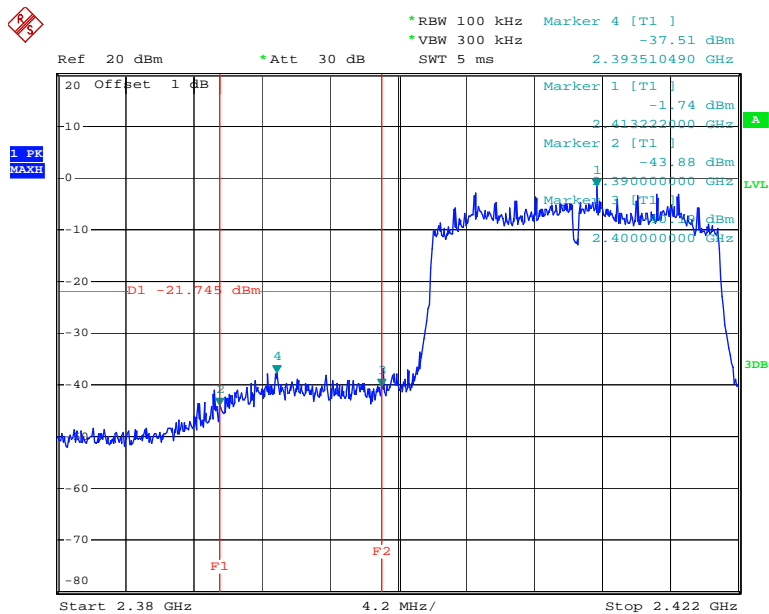
Start 2.38 GHz    4.2 MHz/    Stop 2.422 GHz

### Chain 0: 802.11n20 Band Edge, Right Side



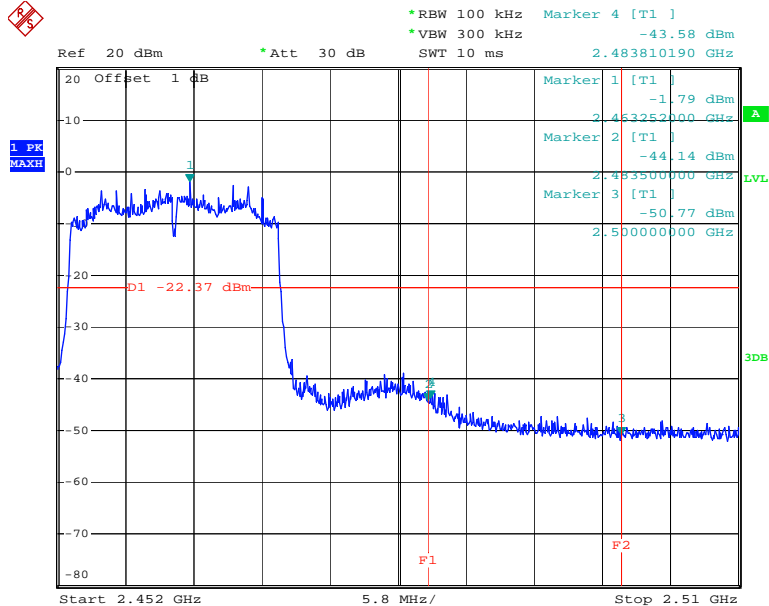
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## Chain 1: 802.11n20 Band Edge, Left Side



Date: 16.AUG.2013 17:36:37

## Chain 1: 802.11n20 Band Edge, Right Side



Date: 16.AUG.2013 17:39:45

\*RBW 100 kHz      Marker 4 [T1]      -37.29 dBm  
 \*VBW 300 kHz  
 SWT 10 ms      2.399758242 GHz

Ref 20 dBm      \*Att 30 dB

20 Offset 1 dB

1 PK MAXH

Marker 1 [T1]      -4.50 dBm  
 2.419556000 GHz

Marker 2 [T1]      -43.80 dBm  
 2.390000000 GHz

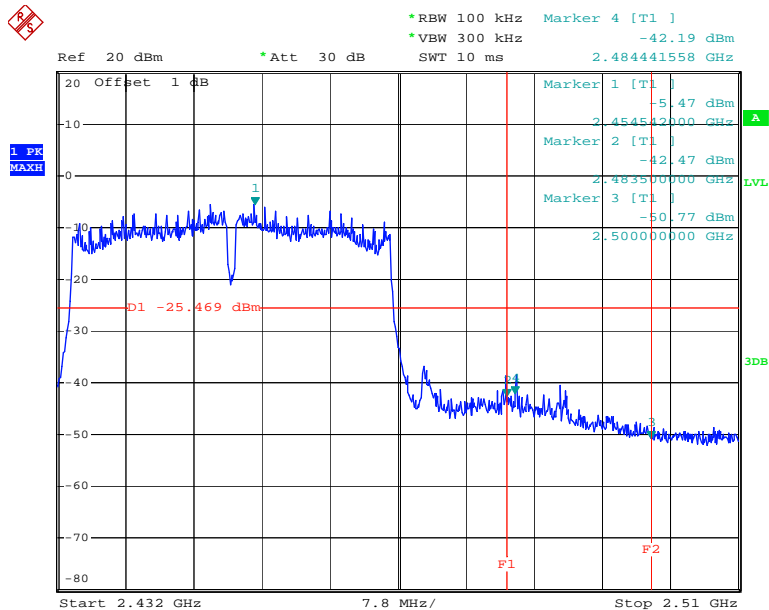
Marker 3 [T1]      -16.10 dBm  
 2.39758242 GHz

D1 -24.501 dBm

F1      F2

Start 2.38 GHz      6.2 MHz/      Stop 2.442 GHz

### Chain 0: 802.11n40 Band Edge, Right Side



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\*RBW 100 kHz  
 \*VBW 300 kHz  
 \*Att 30 dB  
 SWT 10 ms

Ref 20 dBm  
 Marker 4 [T1]  
 -37.39 dBm  
 2.399758242 GHz

1 PK MAXH

20 Offset 1 dB

Marker 1 [T1]  
 -4.49 dBm  
 2.419556000 GHz

Marker 2 [T1]  
 -44.19 dBm  
 2.390000000 GHz

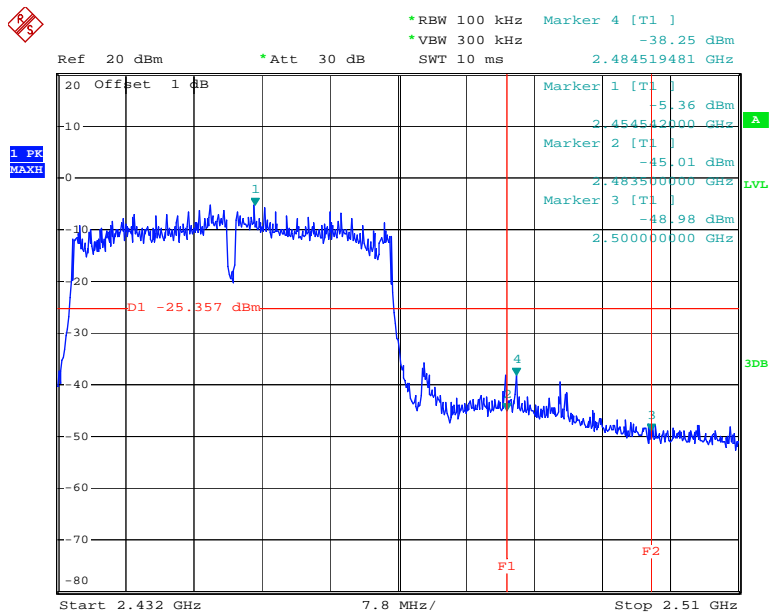
Marker 3 [T1]  
 -37.94 dBm  
 2.390000000 GHz

D1 -24.489 dBm

F1 F2

Start 2.38 GHz  
 6.2 MHz/  
 Stop 2.442 GHz

### Chain 1: 802.11n40 Band Edge, Right Side



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## 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 channel bandwidth.
4. Use the peak marker function to determine the maximum power level in any 3 kHz band segment within the fundamental EBW.

### 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:	27.6° C
Relative Humidity:	58 %
ATM Pressure:	99.1 kPa

*The testing was performed by Leon Chen on 2013-08-16.*

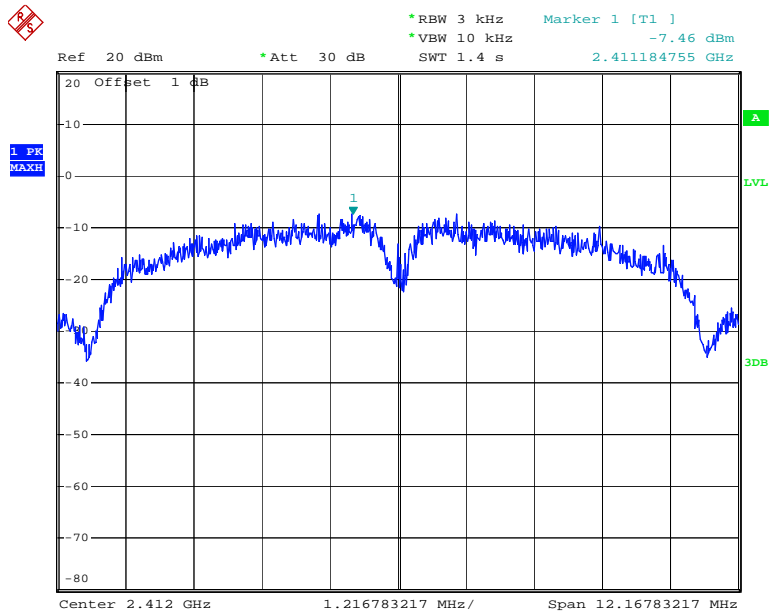


*Test Mode: Transmitting***Test Result: Pass**

Test Mode	Channel	PSD (dBm/3kHz)			Limit (dBm/3kHz)	Result
		Chain 0	Chain 1	Chain 0+1		
802.11b mode	Low	-7.46	/	-7.46	8	PASS
	Middle	-7.33	/	-7.33	8	PASS
	High	-7.18	/	-7.18	8	PASS
802.11g mode	Low	-11.15	/	-11.15	8	PASS
	Middle	-11.56	/	-11.56	8	PASS
	High	-11.92	/	-11.92	8	PASS
802.11n20 mode	Low	-15.73	-16.15	-12.93	8	PASS
	Middle	-16.48	-16.61	-13.53	8	PASS
	High	-17.60	-15.85	-13.63	8	PASS
802.11n40 mode	Low	-19.26	-19.07	-16.16	8	PASS
	Middle	-18.88	-18.90	-15.88	8	PASS
	High	-19.76	-19.57	-16.65	8	PASS

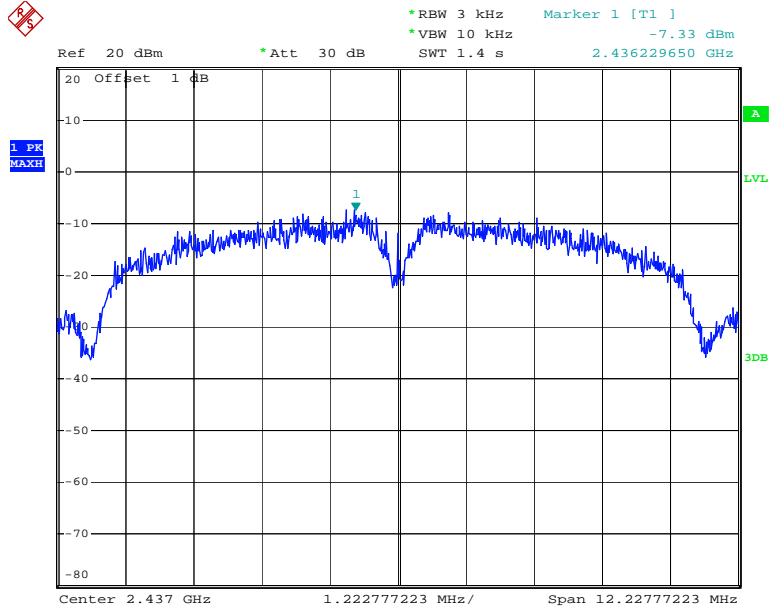
Please refer to the following plots

### Power Spectral Density, 802.11b Low Channel



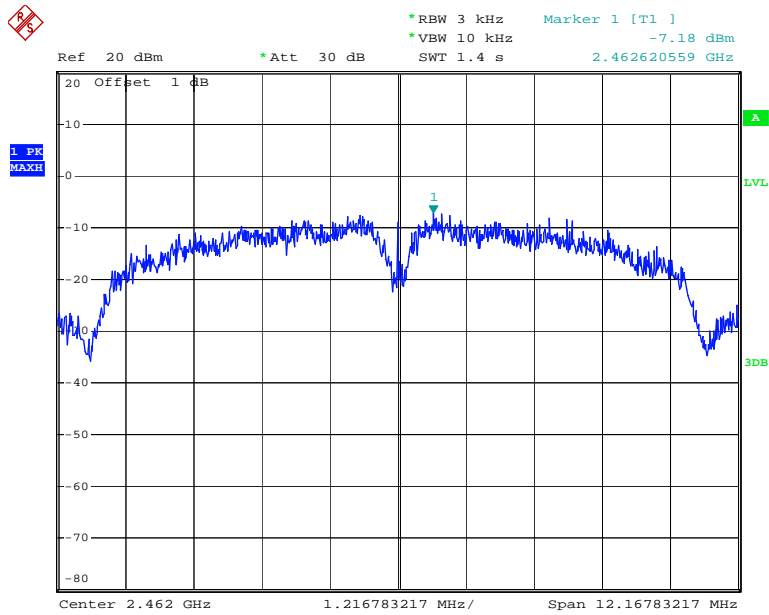
Date: 16.AUG.2013 16:53:09

### Power Spectral Density, 802.11b Middle Channel



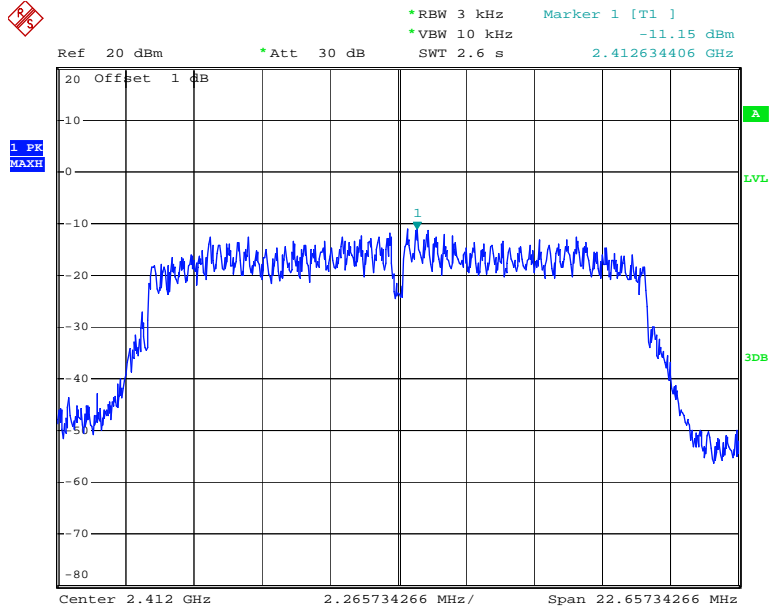
Date: 16.AUG.2013 16:56:28

### Power Spectral Density, 802.11b High Channel



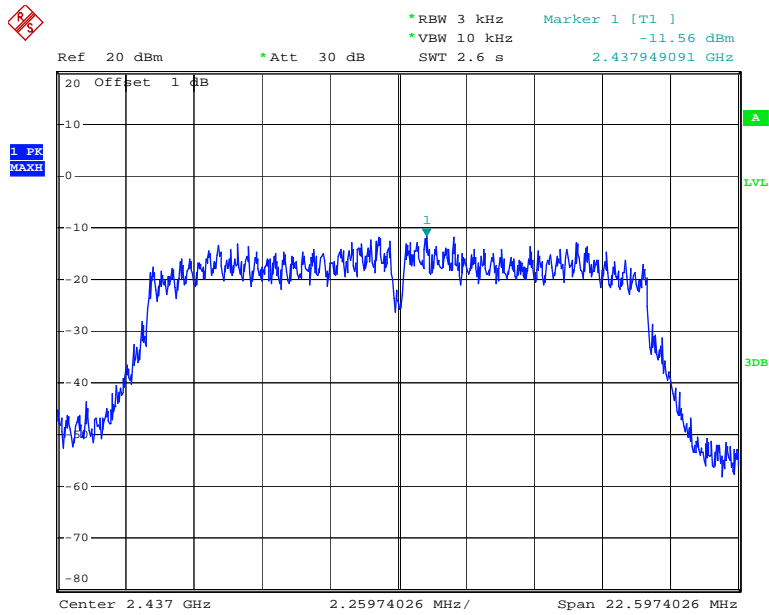
Date: 16.AUG.2013 16:58:08

### Power Spectral Density, 802.11g Low Channel



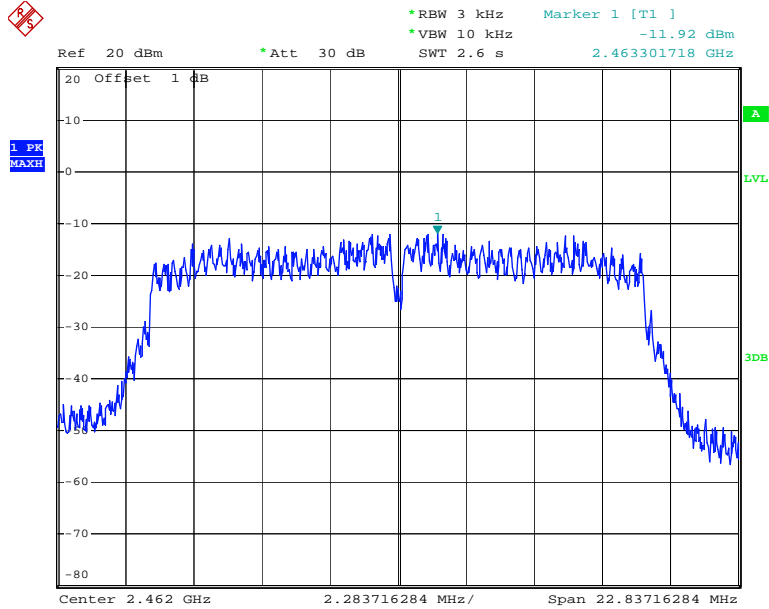
Date: 16.AUG.2013 17:02:09

### Power Spectral Density, 802.11g Middle Channel



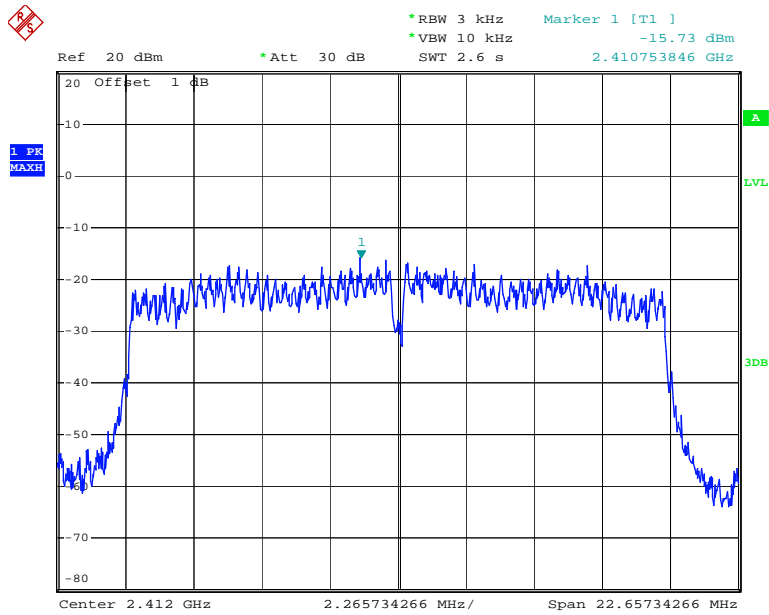
Date: 16.AUG.2013 17:03:42

### Power Spectral Density, 802.11g High Channel



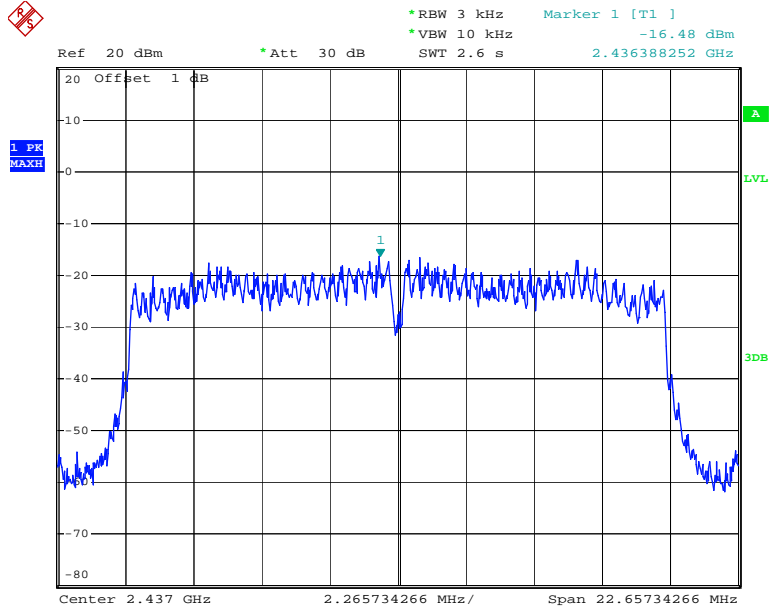
Date: 16.AUG.2013 17:07:02

### Chain 0: Power Spectral Density, 802.11n20 Low Channel



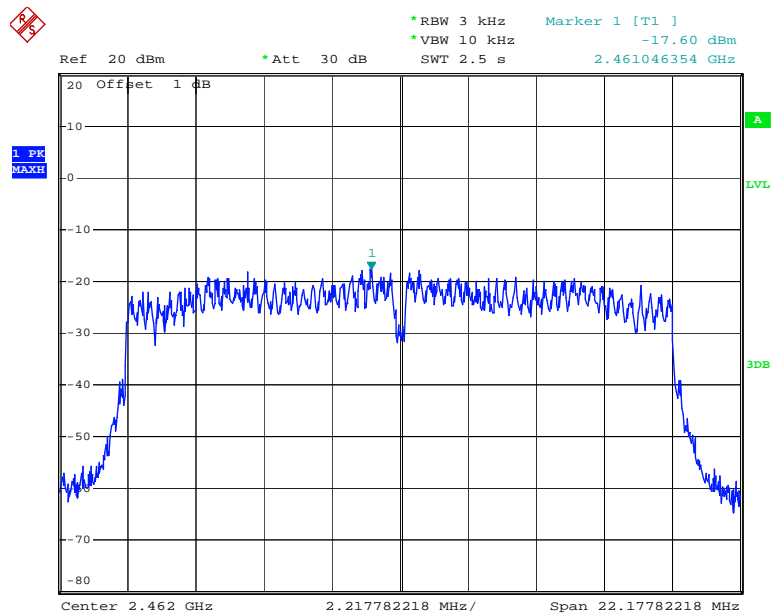
Date: 16.AUG.2013 17:12:44

### Chain 0: Power Spectral Density, 802.11n20 Middle Channel



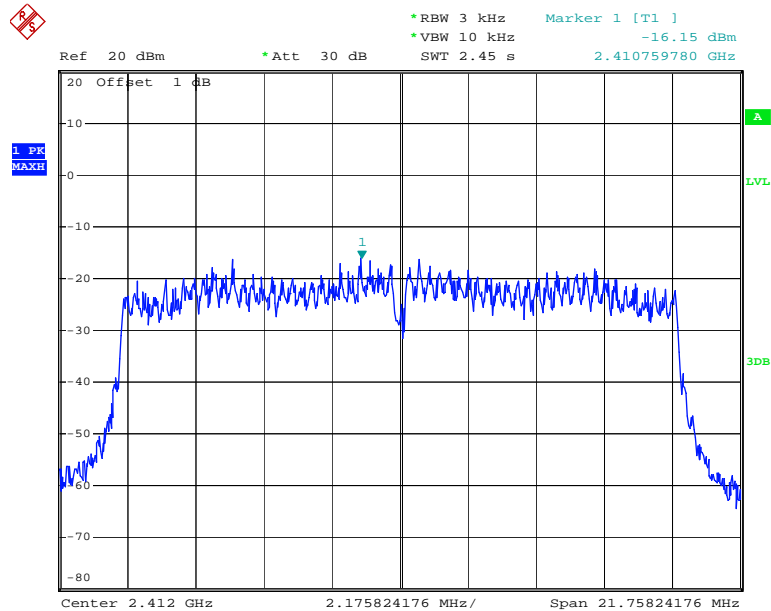
Date: 16.AUG.2013 17:16:32

### Chain 0: Power Spectral Density, 802.11n20 High Channel



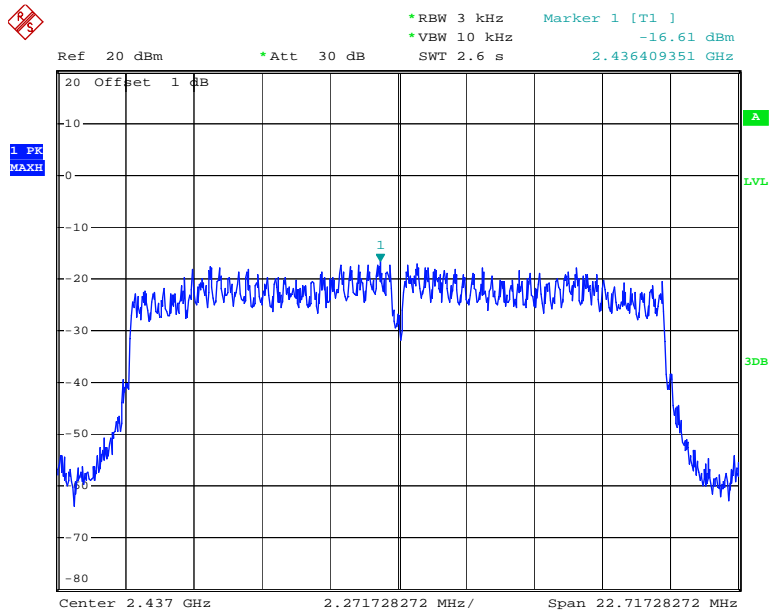
Date: 16.AUG.2013 17:20:07

### Chain 1: Power Spectral Density, 802.11n20 Low Channel



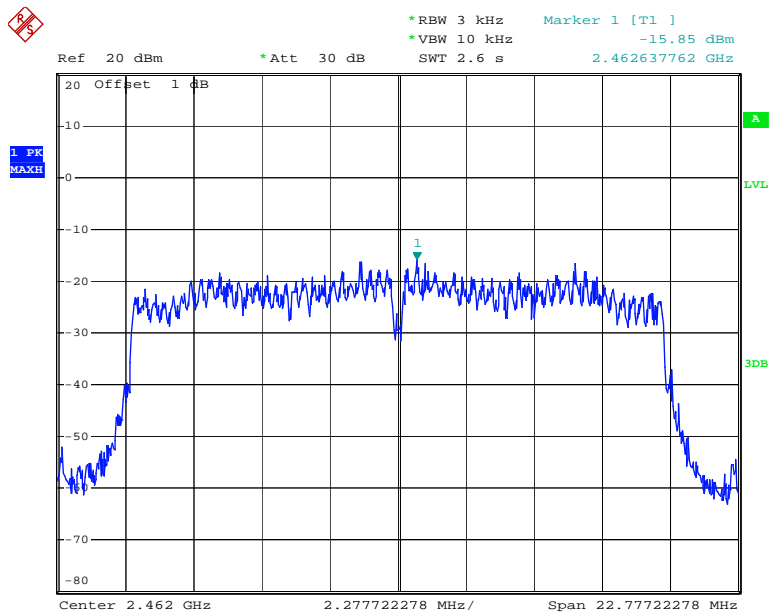
Date: 16.AUG.2013 17:36:12

### Chain 1: Power Spectral Density, 802.11n20 Middle Channel



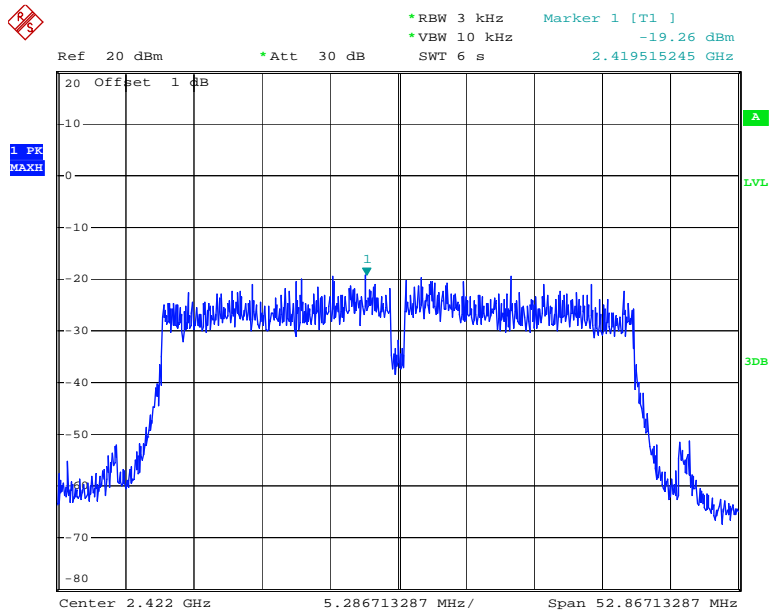
Date: 16.AUG.2013 17:37:36

### Chain 1: Power Spectral Density, 802.11n20 High Channel



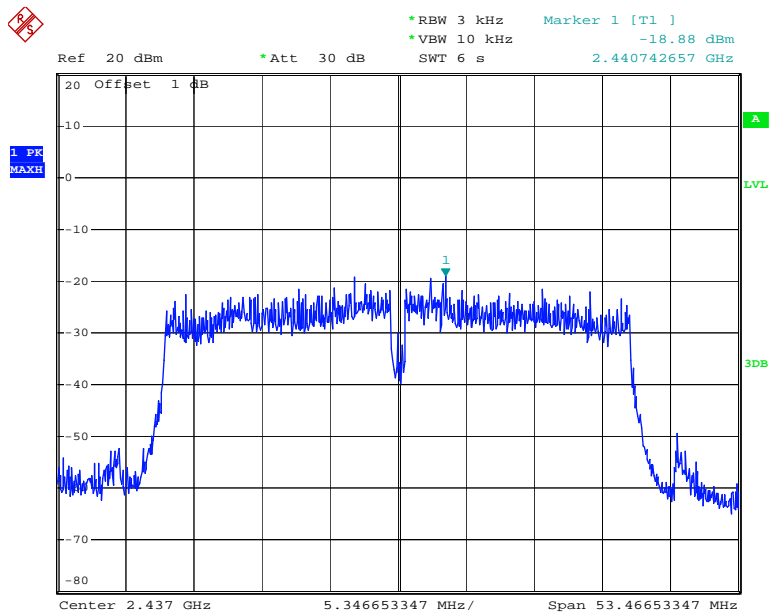
Date: 16.AUG.2013 17:39:20

### Chain 0: Power Spectral Density, 802.11n40 Low Channel



Date: 16.AUG.2013 17:25:57

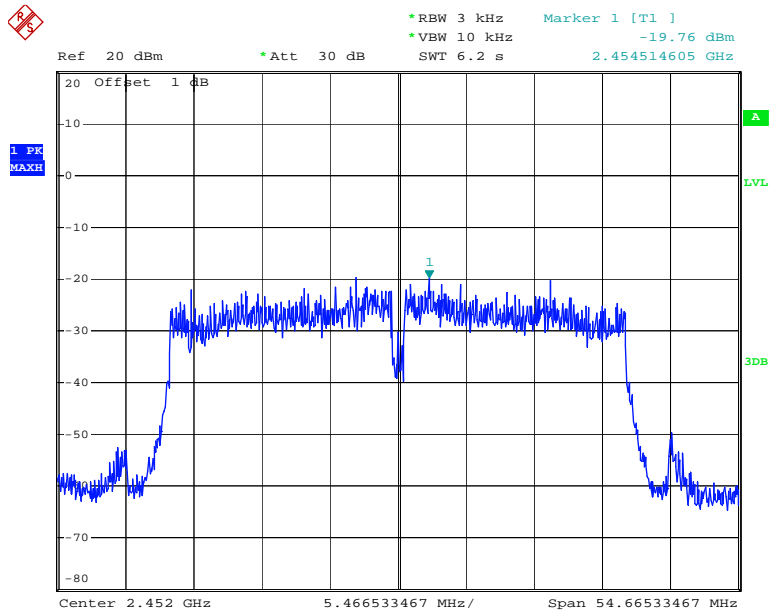
### Chain 0: Power Spectral Density, 802.11n40 Middle Channel



Date: 16.AUG.2013 17:28:28

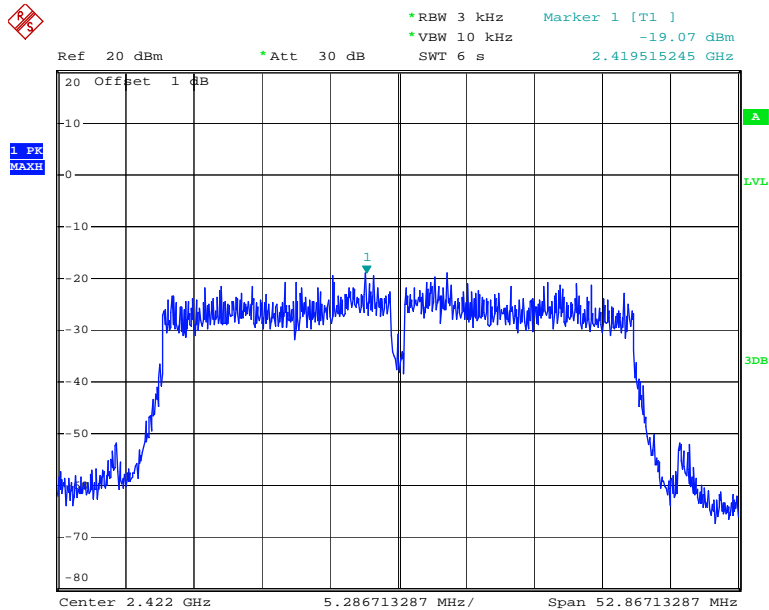


### Chain 0: Power Spectral Density, 802.11n40 High Channel



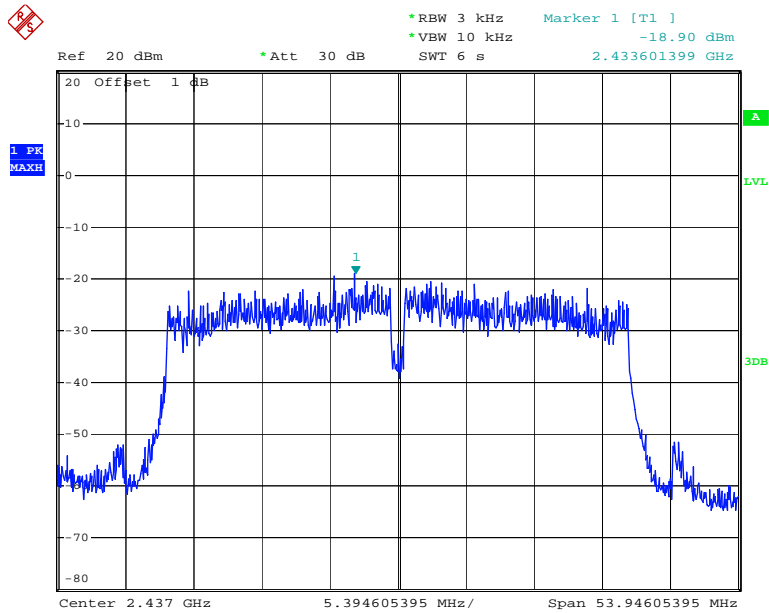
Date: 16.AUG.2013 17:32:32

### Chain 1: Power Spectral Density, 802.11n40 Low Channel



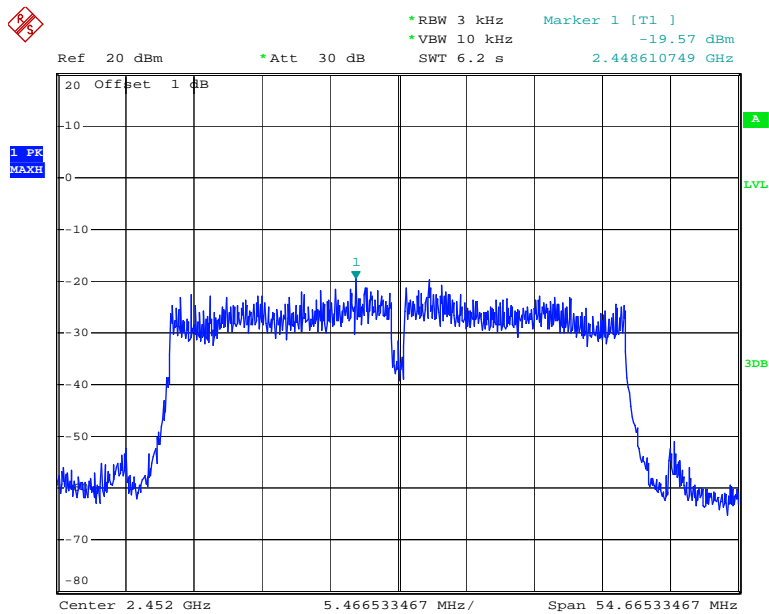
Date: 16.AUG.2013 17:41:47

### Chain 1: Power Spectral Density, 802.11n40 Middle Channel



Date: 16.AUG.2013 17:43:58

### Chain 1: Power Spectral Density, 802.11n40 High Channel



Date: 16.AUG.2013 17:46:53

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