FCC PART 15.247

TEST REPORT

For

Skspruce Technologies Inc.

1732 North 1st St Suite 220，San Jose，CA

FCC ID: 2ACKD-WOA5200

Report Type:	Product Name:
Original Report	Outdoor Access Point

Test Engineer:	Fidel Zhou
Report Number:	RSC140417004
Report Date:	2014-07-25
Reviewed By:	Henry Ding EMC Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, China Tel: 028-65523123, Fax: 028-65525125 www.baclcorp.com

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Skspruce Technologies Inc.*'s product, model number: *WOA5200 (FCC ID: 2ACKD-WOA5200)* (the "EUT") in this report was an Outdoor Access Point, which was measured approximately: 26 cm (L) x 21 cm (W) x 7.5 cm (H), rated input voltage: DC 48 V.

Adapter:
Manufacturer: PoE Injector
Model: PSE801
Input: AC 100--240V 50/60Hz
Output: DC 48--56V

**All measurement and test data in this report was gathered from final production sample, serial number: 8122013122000001 (provided by Applicant). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2014-04-11, and EUT complied with test requirement.*

Objective

This report is prepared on behalf of *Skspruce Technologies Inc.* accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commissions 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 15.407 submissions with FCC ID: 2ACKD-WOA5200.

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. (Chengdu). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

The uncertainty of any RF tests which use conducted method measurement is ±3.17 dB, the uncertainty of any radiation on emissions measurement is:

30M~200MHz: ±4.7 dB;
200M~1GHz: ±6.0 dB;
1G-6GHz:: ±5.13dB;
6G~25GHz: ±5.47dB;

And the uncertainty will not be taken into consideration for all test data recorded in the report.

Test Facility

The test site used by BACL to collect test data is located in the 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, China

Test site at BACL has been fully described in reports submitted to the Federal Communication 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 July 31, 2009. 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.: 560332. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for test in testing mode, which was provided by manufacturer. 11 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	/	/

For 802.11b, 802.11g, and 802.11n HT20 modes were tested with Channel 1, 6 and 11.
For 802.11n HT40 mode 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, PSD across all date rates bandwidths and modulations.

EUT Exercise Software

The software “art2_ver_2_28_6BIN, SecureCRT & SecureCRT_3987” was used for testing, which was provided by manufacturer.

Test Mode	Test Software Version	art2_ver_2_28_6BIN, SecureCRT & SecureCRT_3987		
802.11b	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	CCK 1M	CCK 1M	CCK 1M
	Power Level Setting Antenna 0	15	15	15
	Power Level Setting Antenna 1	15	15	15
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	OFDM 6M	OFDM 6M	OFDM 6M
	Power Level Setting Antenna 0	10	10	10
	Power Level Setting Antenna 1	10	10	10
802.11n HT20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting Antenna 0	7.5	7.5	7.5
	Power Level Setting Antenna 1	7.5	7.5	7.5
802.11n HT40	Test Frequency	2422MHz	2437MHz	2452MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting Antenna 0	6.5	6.5	6.5
	Power Level Setting Antenna 1	6.5	6.5	6.5

Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

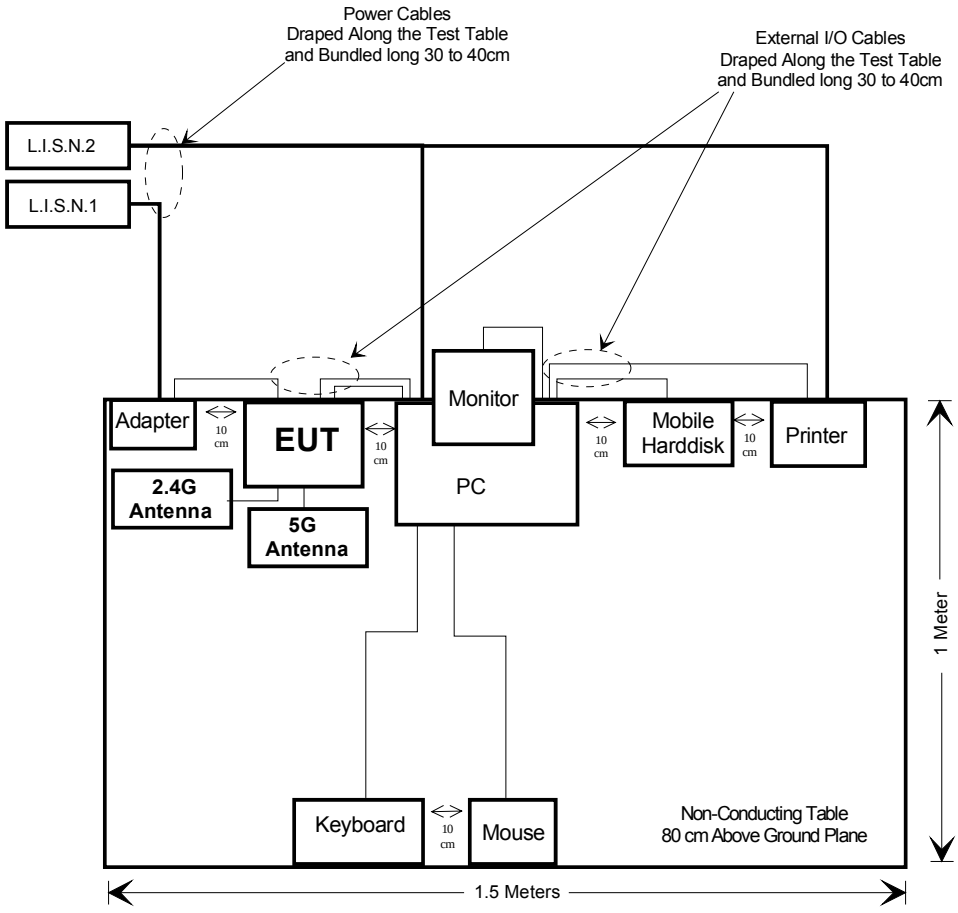
Manufacturer	Description	Model	Serial Number
IBM	PC	8176	99Y7315
DELL	Monitor	SK-8815	9161649
IBM	Keyboard	KM-110X	XBK133000993
Logitech	Mouse	M-U0004	810-001808
TOSHIBA	Mobile Hard Disk	V6700-A500	1297FH0YSRE8
EPSON	Printer	B261A	GXSK285854

External I/O Cable

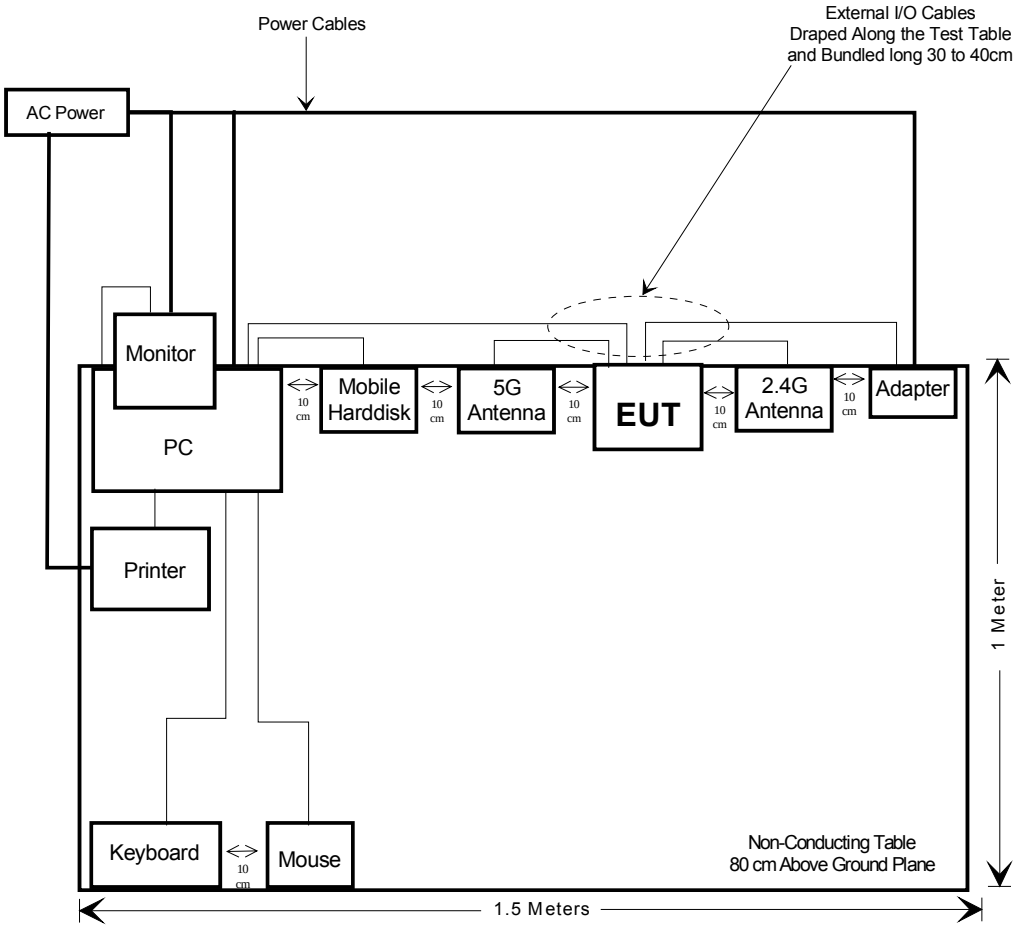
Cable Description	Length (m)	From	To
Shielded VGA cable	1.5	PC	Monitor
Unshielded LAN cable	1.0	PC	EUT
Shielded RS232 cable	2.5	PC	EUT
Shielded Mouse cable	1.5	PC	Mouse
Shielded Keyboard cable	1.5	PC	Keyboard
Shielded RS232 Cable	1.5	PC	Printer
Shielded USB Cable	0.5	PC	Mobile Hard Disk

Block Diagram of Test Setup

For AC Line Conducted Emissions:



For Spurious Emissions:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247(i), §2.1091 & & §1.1307(b)(1)	Maximum Permissible exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	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), §2.1091 & & §1.1307(b)(1)- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

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

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

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	30
30–300	27.5	0.073	0.2	30
300–1500	-	-	f/1500	30
1500–100,000	-	-	1.0	30

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

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

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = PG/4\pi R^2$$

Where:
S = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

DTS Band：

Mode	**Frequency (MHz)**	**Antenna Gain**		**Conducted Power**		**Evaluation Distance (cm)**	**Power Density (mW/cm^2)**	**MPE Limit (mW/cm^2)**
		(dBi)	**(numeric)**	**(dBm)**	**(mW)**			
802.11b	2437	14	25.12	21.99	158.12	35	0.258	1.0
802.11g	2437	14	25.12	22.17	164.82	35	0.269	1.0
802.11n HT20	2412	14	25.12	20.03	100.69	35	0.164	1.0
802.11n HT40	2422	14	25.12	20.58	114.29	35	0.187	1.0

UNII Band：

Mode	Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
802.11a	5825	14.5	28.18	24.09	256.45	35	0.470	1.0
802.11n HT20	5755	14.5	28.18	24.07	255.27	35	0.468	1.0
802.11n HT40	5795	14.5	28.18	23.71	234.96	35	0.430	1.0

According to KDB 447498 D01 General RF exposure guidance v05r02, EUT has 5GHz and 2.4GHz transmitting simultaneously. So the sum of MPE ratio for four antennas is 0.737 which is less than 1.0, So the collocation exposure exclusion applies.

Result: The device meet FCC MPE at 35 cm distance.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

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

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

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

Antenna Connector Construction

The EUT has four directive dual-polarized antennas, which was used a unique type of connector to attach to the EUT, and complied with 15.203. 2.4GHz maximum gain is 14 dBi and 5GHz maximum gain is 14.5 dBi, please refer to the external 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：

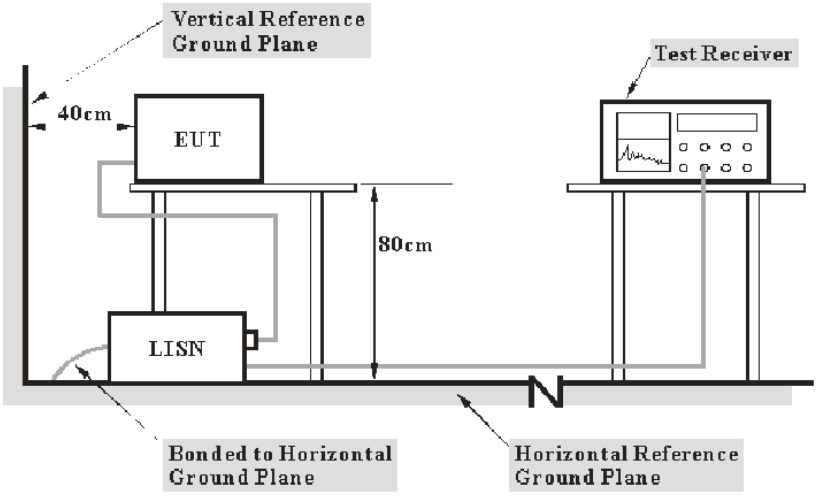
If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
–compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
–non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
If U_{lab} is greater than U_{cispr} of 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. (Chengdu) is ±3.17 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 was according to ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The power cables and 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.

DC 48V was used by the EUT through AC adapter.

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 EUT's 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:

$V_C = V_R + A_C + VDF$

Herein,
V_C: corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN or ISN

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:

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model Number	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2013-08-22	2014-08-21
Rohde & Schwarz	L.I.S.N.	ENV216	3560.6550.06	2013-10-17	2014-10-16
Rohde & Schwarz	L.I.S.N.	ENV216	3560.6550.12	2014-02-08	2015-02-07

*** Statement of Traceability:** BACL (Chengdu) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

7.9 dB at **0.517000 MHz** in the **Neutral** conducted mode.

Test Data

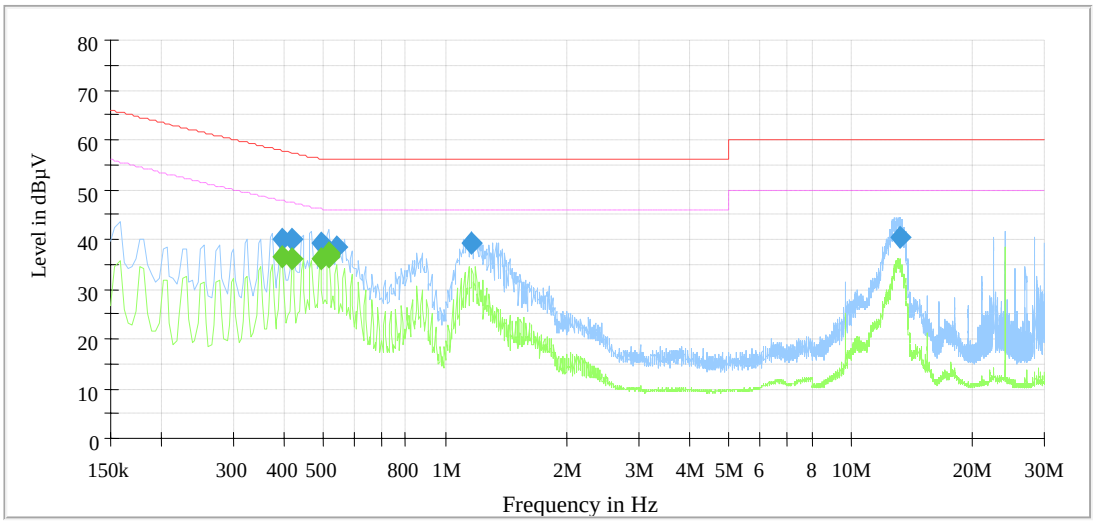
Environmental Conditions

Temperature:	31 °C
Relative Humidity:	46 %
ATM Pressure:	100.0 kPa

The testing was performed by Fidel Zhou on 2014-06-19.

Test Mode: Transmitting

AC 120V/60 Hz, Line



AC Line Conducted Emissions					
Frequency MHz	Corrected Amplitude (dBµV)	Detector (QP/AV)	Phase (Line/Neutral)	Limit dBµV	Margin dB
0.397000	39.9	QP	Line	57.8	17.9
0.421000	39.9	QP	Line	57.3	17.5
0.493000	39.2	QP	Line	56.1	16.9
0.541000	38.5	QP	Line	56.0	17.5
1.165000	39.3	QP	Line	56.0	16.7
13.221000	40.5	QP	Line	60.0	19.5
0.397000	36.6	AV	Line	47.8	11.1
0.421000	36.1	AV	Line	47.3	11.3
0.493000	35.9	AV	Line	46.1	10.2
0.517000	37.4	AV	Line	46.0	8.6
0.517000	36.8	AV	Line	46.0	9.2
0.517000	36.5	AV	Line	46.0	9.5

AC 120V/60 Hz, Neutral

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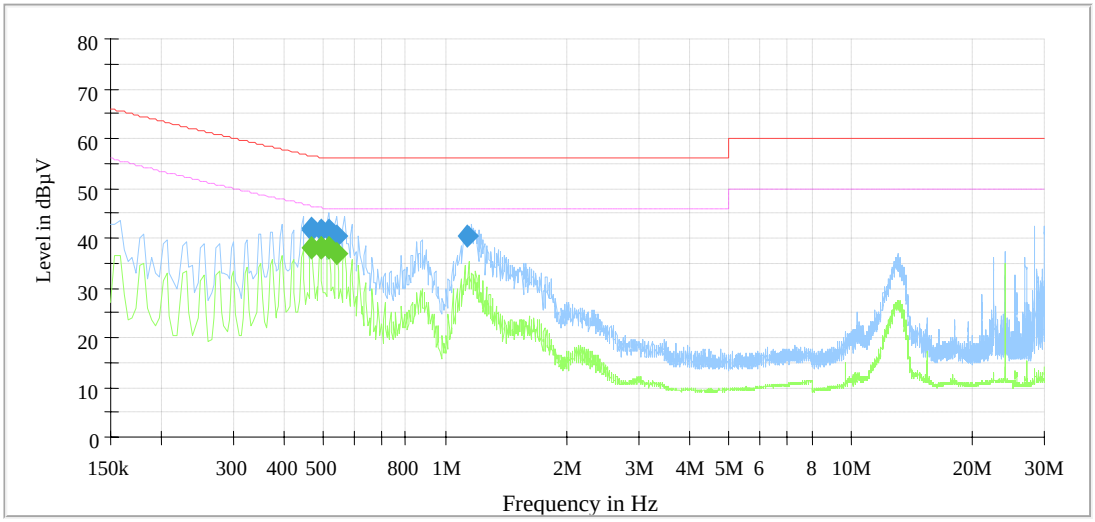


AC Line Conducted Emissions					
Frequency MHz	**Corrected Amplitude (dBµV)**	**Detector (QP/AV)**	**Phase (Line/Neutral)**	**Limit dBµV**	**Margin dB**
0.469000	41.9	QP	Neutral	56.5	14.6
0.469000	41.7	QP	Neutral	56.5	14.8
0.493000	41.6	QP	Neutral	56.1	14.5
0.517000	41.6	QP	Neutral	56.0	14.4
0.541000	40.4	QP	Neutral	56.0	15.6
1.141000	40.2	QP	Neutral	56.0	15.8
0.469000	38.2	AV	Neutral	46.5	8.3
0.493000	38.1	AV	Neutral	46.1	8.0
0.493000	38.0	AV	Neutral	46.1	8.1
0.517000	38.1	AV	Neutral	46.0	7.9
0.530000	38.0	AV	Neutral	46.0	8.0
0.541000	36.8	AV	Neutral	46.0	9.2

Note: EUT transmitting simultaneously with 2.4G and 5G radio frequency and supports intelligent radio frequency management functionalities.

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.

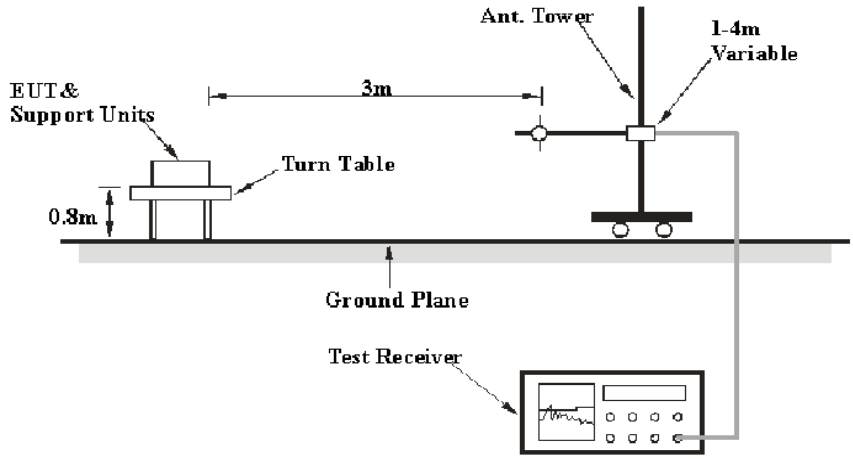
Based on CISPR 16-4-2-2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Chengdu) is:
30M~200MHz: ±4.7 dB ;
200M~1GHz: ±6.0 dB ;
1G-6GHz: ±5.13dB;
6G~25GHz: ±5.47 dB;

Table 2 – Values of U_{cispr}

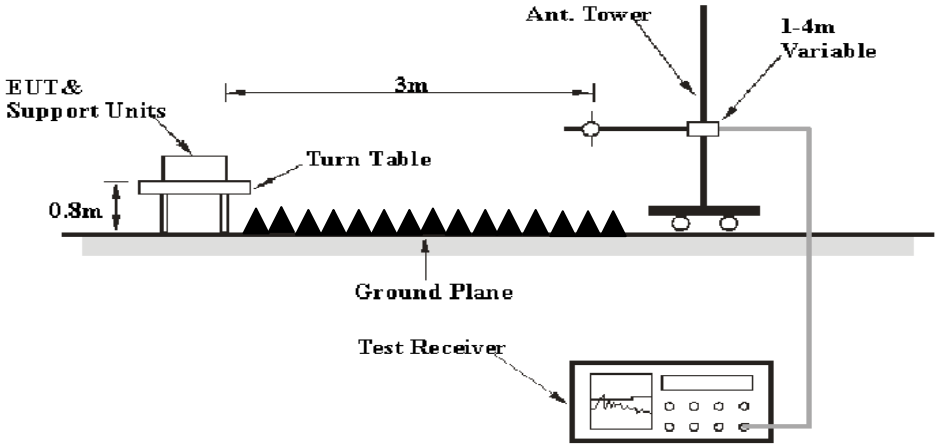
Measurement		U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC)	(30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR)	(1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR)	(6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters Semi-Anechoic Chamber, using the setup in 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.

DC 48V used by the EUT through AC adapter.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

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

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Receiver Reading + Cable loss + Antenna Factor – Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit-Corrected Amplitude

The distance between EUT and receiving antenna is for 1m.

Extrapolation result = Corrected Amplitude-9.54

Margin = Limit- Extrapolation result

Test Equipment List and Details

Manufacturer	Description	Model Number	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2013-07-23	2014-07-22
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2013-08-22	2014-08-21
Sunol Sciences	Broadband Antenna	JB3	A101808	2014-04-10	2015-04-09
Rohde & Schwarz	Spectrum Analyzer	FSL18	100180	2014-06-23	2015-06-22
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2013-10-17	2014-10-16
EM TEST	Horn Antenna	3115	003-6076	2014-04-09	2015-04-08
HP	Amplifier	8449B	3008A00277	2013-10-17	2014-10-16
EMCT	Semi-Anechoic Chamber	966	N/A	2013-03-13	2016-03-12

*** Statement of Traceability:** BACL (Chengdu) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

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

3.51 dB at **11490 MHz** in the **Vertical** polarization

Test Data

Environmental Conditions

Temperature:	30 °C & 28 °C
Relative Humidity:	42 % & 47 %
ATM Pressure:	100.7 kPa & 100.5 kPa

The testing was performed by Fidel Zhou on 2014-07-18 & 2014-07-21.

Test Mode: Transmitting

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation Result (dBμV/m)	FCC 15.247	
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					Limit (dBμV/m)	Margin (dB)
802.11b mode, Low Channel: 2412 MHz										
2412	87.09	PK	H	23.20	2.56	0.00	112.85	-	N/A	N/A
2412	82.95	AV	H	23.20	2.56	0.00	108.71	-	N/A	N/A
2412	91.37	PK	V	23.20	2.56	0.00	117.13	-	N/A	N/A
2412	86.38	AV	V	23.20	2.56	0.00	112.14	-	N/A	N/A
a) 4824	60.52	PK	V	31.40	4.50	26.82	69.60	60.06	74.00	13.94
a) 4824	42.51	AV	V	31.40	4.50	26.82	51.59	42.05	54.00	11.95
a) 7236	53.29	PK	V	35.30	5.15	27.00	66.74	57.20	74.00	16.80
a) 7236	38.33	AV	V	35.30	5.15	27.00	51.78	42.24	54.00	11.76
a) 9648	50.03	PK	V	37.00	6.25	25.65	67.63	58.09	74.00	15.91
a) 9648	35.32	AV	V	37.00	6.25	25.65	52.92	43.38	54.00	10.62
280	42.53	QP	V	13.37	0.26	26.20	29.96	-	46.00	16.04
2399.95	58.69	PK	V	23.20	2.56	26.85	57.60	-	74.00	16.40
2399.95	47.63	AV	V	23.20	2.56	26.85	46.54	-	54.00	7.46
2483.55	50.28	PK	V	23.20	2.57	26.85	49.20	-	74.00	24.80
2483.55	42.23	AV	V	23.20	2.57	26.85	41.15	-	54.00	12.85
802.11b mode, Middle Channel: 2437 MHz										
2437	86.92	PK	H	23.20	2.56	0.00	112.68	-	N/A	N/A
2437	81.75	AV	H	23.20	2.56	0.00	107.51	-	N/A	N/A
2437	90.29	PK	V	23.20	2.56	0.00	116.05	-	N/A	N/A
2437	85.26	AV	V	23.20	2.56	0.00	111.02	-	N/A	N/A
a) 4874	61.28	PK	V	31.40	4.50	26.82	70.36	60.82	74.00	13.18
a) 4874	42.32	AV	V	31.40	4.50	26.82	51.40	41.86	54.00	12.14
a) 7311	53.47	PK	V	35.30	5.15	27.00	66.92	57.38	74.00	16.62
a) 7311	38.25	AV	V	35.30	5.15	27.00	51.70	42.16	54.00	11.84
a) 9748	50.21	PK	V	37.00	6.25	25.65	67.81	58.27	74.00	15.73
a) 9748	36.45	AV	V	37.00	6.25	25.65	54.05	44.51	54.00	9.49
280	41.36	QP	V	13.37	0.26	26.20	28.79	-	46.00	17.21
2399.95	50.24	PK	V	23.20	2.56	26.85	49.15	-	74.00	24.85
2399.95	43.28	AV	V	23.20	2.56	26.85	42.19	-	54.00	11.81
2483.55	49.89	PK	V	23.20	2.57	26.85	48.81	-	74.00	25.19
2483.55	42.31	AV	V	23.20	2.57	26.85	41.23	-	54.00	12.77
802.11b mode, High Channel: 2462 MHz										
2462	87.56	PK	H	23.20	2.56	0.00	113.32	-	N/A	N/A
2462	82.33	AV	H	23.20	2.56	0.00	108.09	-	N/A	N/A
2462	90.14	PK	V	23.20	2.56	0.00	115.90	-	N/A	N/A
2462	84.21	AV	V	23.20	2.56	0.00	109.97	-	N/A	N/A
a) 4924	61.65	PK	V	31.40	4.50	26.82	70.73	61.19	74.00	12.81
a) 4924	40.46	AV	V	31.40	4.50	26.82	49.54	40.00	54.00	14.00
a) 7386	52.23	PK	V	35.30	5.15	27.00	65.68	56.14	74.00	17.86
a) 7386	39.35	AV	V	35.30	5.15	27.00	52.80	43.26	54.00	10.74
a) 9848	50.21	PK	V	37.00	6.25	25.65	67.81	58.27	74.00	15.73
a) 9848	38.31	AV	V	37.00	6.25	25.65	55.91	46.37	54.00	7.63
280	41.04	QP	V	13.37	0.26	26.20	28.47	-	46.00	17.53
2399.95	48.69	PK	V	23.20	2.56	26.85	47.60	-	74.00	26.40
2399.95	41.17	AV	V	23.20	2.56	26.85	40.08	-	54.00	13.92
2483.55	59.86	PK	V	23.20	2.57	26.85	58.78	-	74.00	15.22
2483.55	48.67	AV	V	23.20	2.57	26.85	47.59	-	54.00	6.41

a): See ***Note*** of Page 28

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation Result (dBμV/m)	FCC 15.247	
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					Limit (dBμV/m)	Margin (dB)
802.11g mode, Low Channel: 2412 MHz										
2412	85.86	PK	H	23.20	2.56	0.00	111.62	-	N/A	N/A
2412	80.95	AV	H	23.20	2.56	0.00	106.71	-	N/A	N/A
2412	89.52	PK	V	23.20	2.56	0.00	115.28	-	N/A	N/A
2412	83.24	AV	V	23.20	2.56	0.00	109.00	-	N/A	N/A
a) 4824	59.59	PK	V	31.40	4.50	26.82	68.67	59.13	74.00	14.87
a) 4824	42.32	AV	V	31.40	4.50	26.82	51.40	41.86	54.00	12.14
a) 7236	53.37	PK	V	35.30	5.15	27.00	66.82	57.28	74.00	16.72
a) 7236	38.29	AV	V	35.30	5.15	27.00	51.74	42.20	54.00	11.80
a) 9648	50.24	PK	V	37.00	6.25	25.65	67.84	58.30	74.00	15.70
a) 9648	35.37	AV	V	37.00	6.25	25.65	52.97	43.43	54.00	10.57
280	46.54	QP	V	13.37	0.26	26.20	33.97	-	46.00	12.03
2399.95	51.32	PK	V	23.20	2.56	26.85	50.23	-	74.00	23.77
2399.95	38.26	AV	V	23.20	2.56	26.85	37.17	-	54.00	16.83
2483.55	39.69	PK	V	23.20	2.57	26.85	38.61	-	74.00	35.39
2483.55	30.64	AV	V	23.20	2.57	26.85	29.56	-	54.00	24.44
802.11g mode, Middle Channel: 2437 MHz										
2437	88.96	PK	H	23.20	2.56	0.00	114.72	-	N/A	N/A
2437	84.24	AV	H	23.20	2.56	0.00	110.00	-	N/A	N/A
2437	89.69	PK	V	23.20	2.56	0.00	115.45	-	N/A	N/A
2437	82.24	AV	V	23.20	2.56	0.00	108.00	-	N/A	N/A
a) 4874	58.59	PK	V	31.40	4.50	26.82	67.67	58.13	74.00	15.87
a) 4874	44.58	AV	V	31.40	4.50	26.82	53.66	44.12	54.00	9.88
a) 7311	53.12	PK	V	35.30	5.15	27.00	66.57	57.03	74.00	16.97
a) 7311	38.74	AV	V	35.30	5.15	27.00	52.19	42.65	54.00	11.35
a) 9748	51.28	PK	V	37.00	6.25	25.65	68.88	59.34	74.00	14.66
a) 9748	36.63	AV	V	37.00	6.25	25.65	54.23	44.69	54.00	9.31
280	45.28	QP	V	13.37	0.26	26.20	32.71	-	46.00	13.29
2399.95	43.26	PK	V	23.20	2.56	26.85	42.17	-	74.00	31.83
2399.95	30.28	AV	V	23.20	2.56	26.85	29.19	-	54.00	24.81
2483.55	44.54	PK	V	23.20	2.57	26.85	43.46	-	74.00	30.54
2483.55	31.27	AV	V	23.20	2.57	26.85	30.19	-	54.00	23.81
802.11g mode, High Channel: 2462 MHz										
2462	89.63	PK	H	23.20	2.56	0.00	115.39	-	N/A	N/A
2462	83.59	AV	H	23.20	2.56	0.00	109.35	-	N/A	N/A
2462	90.64	PK	V	23.20	2.56	0.00	116.40	-	N/A	N/A
2462	84.66	AV	V	23.20	2.56	0.00	110.42	-	N/A	N/A
a) 4924	61.34	PK	V	31.40	4.50	26.82	70.42	60.88	74.00	13.12
a) 4924	47.29	AV	V	31.40	4.50	26.82	56.37	46.83	54.00	7.17
a) 7386	53.17	PK	V	35.30	5.15	27.00	66.62	57.08	74.00	16.92
a) 7386	39.84	AV	V	35.30	5.15	27.00	53.29	43.75	54.00	10.25
a) 9848	50.95	PK	V	37.00	6.25	25.65	68.55	59.01	74.00	14.99
a) 9848	35.86	AV	V	37.00	6.25	25.65	53.46	43.92	54.00	10.08
280	45.85	QP	V	13.37	0.26	26.20	33.28	-	46.00	12.72
2399.95	42.62	PK	V	23.20	2.56	26.85	41.53	-	74.00	32.47
2399.95	30.74	AV	V	23.20	2.56	26.85	29.65	-	54.00	24.35
2483.55	50.36	PK	V	23.20	2.57	26.85	49.28	-	74.00	24.72
2483.55	40.66	AV	V	23.20	2.57	26.85	39.58	-	54.00	14.42

a): See ***Note*** of Page 28

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation Result (dBμV/m)	FCC 15.247	
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					Limit (dBμV/m)	Margin (dB)
802.11n HT20 mode, Low Channel: 2412 MHz										
2412	82.96	PK	H	23.20	2.56	0.00	108.72	-	N/A	N/A
2412	77.64	AV	H	23.20	2.56	0.00	103.40	-	N/A	N/A
2412	86.79	PK	V	23.20	2.56	0.00	112.55	-	N/A	N/A
2412	81.23	AV	V	23.20	2.56	0.00	106.99	-	N/A	N/A
a) 4824	59.51	PK	V	31.40	4.50	26.82	68.59	59.05	74.00	14.95
a) 4824	40.36	AV	V	31.40	4.50	26.82	49.44	39.90	54.00	14.10
a) 7236	57.82	PK	V	35.30	5.15	27.00	71.27	61.73	74.00	12.27
a) 7236	39.41	AV	V	35.30	5.15	27.00	52.86	43.32	54.00	10.68
a) 9648	51.18	PK	V	37.00	6.25	25.65	68.78	59.24	74.00	14.76
a) 9648	38.14	AV	V	37.00	6.25	25.65	55.74	46.20	54.00	7.80
280	46.36	QP	V	13.37	0.26	26.20	33.79	-	46.00	12.21
2399.95	49.66	PK	V	23.20	2.56	26.85	48.57	-	74.00	25.43
2399.95	37.63	AV	V	23.20	2.56	26.85	36.54	-	54.00	17.46
2483.55	38.24	PK	V	23.20	2.57	26.85	37.16	-	74.00	36.84
2483.55	28.29	AV	V	23.20	2.57	26.85	27.21	-	54.00	26.79
802.11n HT20mode, Middle Channel: 2437 MHz										
2437	81.65	PK	H	23.20	2.56	0.00	107.41	-	N/A	N/A
2437	76.85	AV	H	23.20	2.56	0.00	102.61	-	N/A	N/A
2437	85.89	PK	V	23.20	2.56	0.00	111.65	-	N/A	N/A
2437	81.69	AV	V	23.20	2.56	0.00	107.45	-	N/A	N/A
a) 4874	60.22	PK	V	31.40	4.50	26.82	69.30	59.76	74.00	14.24
a) 4874	40.23	AV	V	31.40	4.50	26.82	49.31	39.77	54.00	14.23
a) 7311	54.29	PK	V	35.30	5.15	27.00	67.74	58.20	74.00	15.80
a) 7311	38.52	AV	V	35.30	5.15	27.00	51.97	42.43	54.00	11.57
a) 9748	52.62	PK	V	37.00	6.25	25.65	70.22	60.68	74.00	13.32
a) 9748	35.12	AV	V	37.00	6.25	25.65	52.72	43.18	54.00	10.82
280	47.16	QP	V	13.37	0.26	26.20	34.59	-	46.00	11.41
2399.95	40.96	PK	V	23.20	2.56	26.85	39.87	-	74.00	34.13
2399.95	31.28	AV	V	23.20	2.56	26.85	30.19	-	54.00	23.81
2483.55	38.86	PK	V	23.20	2.57	26.85	37.78	-	74.00	36.22
2483.55	30.69	AV	V	23.20	2.57	26.85	29.61	-	54.00	24.39
802.11n HT20 mode, High Channel: 2462 MHz										
2462	81.87	PK	H	23.20	2.56	0.00	107.63	-	N/A	N/A
2462	77.21	AV	H	23.20	2.56	0.00	102.97	-	N/A	N/A
2462	86.24	PK	V	23.20	2.56	0.00	112.00	-	N/A	N/A
2462	80.96	AV	V	23.20	2.56	0.00	106.72	-	N/A	N/A
a) 4924	59.17	PK	V	31.40	4.50	26.82	68.25	58.71	74.00	15.29
a) 4924	39.13	AV	V	31.40	4.50	26.82	48.21	38.67	54.00	15.33
a) 7386	55.29	PK	V	35.30	5.15	27.00	68.74	59.20	74.00	14.80
a) 7386	38.09	AV	V	35.30	5.15	27.00	51.54	42.00	54.00	12.00
a) 9848	52.16	PK	V	37.00	6.25	25.65	69.76	60.22	74.00	13.78
a) 9848	36.76	AV	V	37.00	6.25	25.65	54.36	44.82	54.00	9.18
280	46.19	QP	V	13.37	0.26	26.20	33.62	-	46.00	12.38
2399.95	39.59	PK	V	23.20	2.56	26.85	38.50	-	74.00	35.50
2399.95	29.46	AV	V	23.20	2.56	26.85	28.37	-	54.00	25.63
2483.55	49.74	PK	V	23.20	2.57	26.85	48.66	-	74.00	25.34
2483.55	35.64	AV	V	23.20	2.57	26.85	34.56	-	54.00	19.44

a): See ***Note*** of Page 28

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation Result (dBμV/m)	FCC 15.247	
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					Limit (dBμV/m)	Margin (dB)
802.11n HT40 mode, Low Channel: 2422 MHz										
2422	79.26	PK	H	23.20	2.56	0.00	105.02	-	N/A	N/A
2422	74.59	AV	H	23.20	2.56	0.00	100.35	-	N/A	N/A
2422	81.33	PK	V	23.20	2.56	0.00	107.09	-	N/A	N/A
2422	75.27	AV	V	23.20	2.56	0.00	101.03	-	N/A	N/A
a) 4844	56.69	PK	V	31.40	4.50	26.82	65.77	56.23	74.00	17.77
a) 4844	42.68	AV	V	31.40	4.50	26.82	51.76	42.22	54.00	11.78
a) 7266	52.66	PK	V	35.30	5.15	27.00	66.11	56.57	74.00	17.43
a) 7266	38.35	AV	V	35.30	5.15	27.00	51.80	42.26	54.00	11.74
a) 9688	50.22	PK	V	37.00	6.25	25.65	67.82	58.28	74.00	15.72
a) 9688	35.62	AV	V	37.00	6.25	25.65	53.22	43.68	54.00	10.32
280	44.23	QP	V	13.37	0.26	26.20	31.66	-	46.00	14.34
2399.95	47.24	PK	V	23.20	2.56	26.85	46.15	-	74.00	27.85
2399.95	33.63	AV	V	23.20	2.56	26.85	32.54	-	54.00	21.46
2483.55	41.98	PK	V	23.20	2.57	26.85	40.90	-	74.00	33.10
2483.55	29.86	AV	V	23.20	2.57	26.85	28.78	-	54.00	25.22
802.11n HT40 mode, Middle Channel: 2437 MHz										
2437	78.96	PK	H	23.20	2.56	0.00	104.72	-	N/A	N/A
2437	73.38	AV	H	23.20	2.56	0.00	99.14	-	N/A	N/A
2437	81.27	PK	V	23.20	2.56	0.00	107.03	-	N/A	N/A
2437	77.68	AV	V	23.20	2.56	0.00	103.44	-	N/A	N/A
a) 4874	57.26	PK	V	31.40	4.50	26.82	66.34	56.80	74.00	17.20
a) 4874	41.48	AV	V	31.40	4.50	26.82	50.56	41.02	54.00	12.98
a) 7311	54.65	PK	V	35.30	5.15	27.00	68.10	58.56	74.00	15.44
a) 7311	39.36	AV	V	35.30	5.15	27.00	52.81	43.27	54.00	10.73
a) 9748	51.74	PK	V	37.00	6.25	25.65	69.34	59.80	74.00	14.20
a) 9748	36.16	AV	V	37.00	6.25	25.65	53.76	44.22	54.00	9.78
280	45.55	QP	V	13.37	0.26	26.20	32.98	-	46.00	13.02
2399.95	42.28	PK	V	23.20	2.56	26.85	41.19	-	74.00	32.81
2399.95	28.96	AV	V	23.20	2.56	26.85	27.87	-	54.00	26.13
2483.55	42.33	PK	V	23.20	2.57	26.85	41.25	-	74.00	32.75
2483.55	28.64	AV	V	23.20	2.57	26.85	27.56	-	54.00	26.44
802.11n HT40 mode, High Channel: 2452 MHz										
2452	77.84	PK	H	23.20	2.56	0.00	103.60	-	N/A	N/A
2452	72.53	AV	H	23.20	2.56	0.00	98.29	-	N/A	N/A
2452	81.59	PK	V	23.20	2.56	0.00	107.35	-	N/A	N/A
2452	74.55	AV	V	23.20	2.56	0.00	100.31	-	N/A	N/A
a) 4904	57.59	PK	V	31.40	4.50	26.82	66.67	57.13	74.00	16.87
a) 4904	44.28	AV	V	31.40	4.50	26.82	53.36	43.82	54.00	10.18
a) 7356	54.66	PK	V	35.30	5.15	27.00	68.11	58.57	74.00	15.43
a) 7356	38.24	AV	V	35.30	5.15	27.00	51.69	42.15	54.00	11.85
a) 9808	52.52	PK	V	37.00	6.25	25.65	70.12	60.58	74.00	13.42
a) 9808	35.13	AV	V	37.00	6.25	25.65	52.73	43.19	54.00	10.81
280	46.01	QP	V	13.37	0.26	26.20	33.44	-	46.00	12.56
2399.95	41.16	PK	V	23.20	2.56	26.85	40.07	-	74.00	33.93
2399.95	28.66	AV	V	23.20	2.56	26.85	27.57	-	54.00	26.43
2483.55	49.71	PK	V	23.20	2.57	26.85	48.63	-	74.00	25.37
2483.55	32.18	AV	V	23.20	2.57	26.85	31.10	-	54.00	22.90

a): See ***Note*** of Page 28

For co-location evaluation data (2.4 GHz & 5GHz work simultaneously)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation Result (dBμV/m)	FCC 15.247	
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					Limit (dBμV/m)	Margin (dB)
a) 4824	60.78	PK	V	31.40	4.50	26.82	69.86	60.32	74.00	13.68
a) 4824	42.95	AV	V	31.40	4.50	26.82	52.03	42.49	54.00	11.51
a) 7236	54.28	PK	V	35.30	5.15	27.00	67.73	58.19	74.00	15.81
a) 7236	39.59	AV	V	35.30	5.15	27.00	53.04	43.50	54.00	10.50
a) 9648	50.42	PK	V	37.00	6.25	25.65	68.02	58.48	74.00	15.52
a) 9648	37.14	AV	V	37.00	6.25	25.65	54.74	45.20	54.00	8.80
2399.95	59.66	PK	V	23.20	2.56	26.85	58.57	-	74.00	15.43
2399.95	48.39	AV	V	23.20	2.56	26.85	47.30	-	54.00	6.70
2483.05	50.25	PK	V	23.20	2.57	26.85	49.17	-	74.00	24.83
2483.05	42.45	AV	V	23.20	2.57	26.85	41.37	-	54.00	12.63
280	45.52	QP	V	13.37	0.26	26.20	32.95	-	46.00	13.05
a) 11490	53.69	PK	V	38.00	6.34	23.80	74.23	64.69	68.20	*3.51
a) 11490	38.33	AV	V	38.00	6.34	23.80	58.87	49.33	54.00	*4.67
a) 17235	44.63	PK	V	43.00	6.45	22.40	71.68	62.14	68.20	6.06
a) 17235	30.29	AV	V	43.00	6.45	22.40	57.34	47.80	54.00	6.20
5724.95	57.36	PK	V	32.50	4.10	26.55	67.41	-	78.20	10.79
5724.95	38.62	AV	V	32.50	4.10	26.55	48.67	-	54.00	5.33
5850.05	48.54	PK	V	32.50	4.20	26.55	58.69	-	78.20	19.51
5850.05	35.13	AV	V	32.50	4.20	26.55	45.28	-	54.00	8.72

*Within measurement uncertainty!

Note a):

The distance between EUT and receiving antenna is for 1m.
Extrapolation result = Corrected Amplitude-9.54
Margin = Limit- Extrapolation result

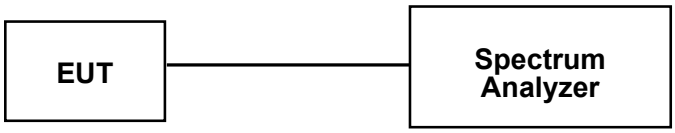
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

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
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2013-10-17	2014-10-16

*** Statement of Traceability:** BACL (Chengdu) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	29 °C & 28 °C
Relative Humidity:	41 % & 56 %
ATM Pressure:	100.5 kPa & 100.5 kPa

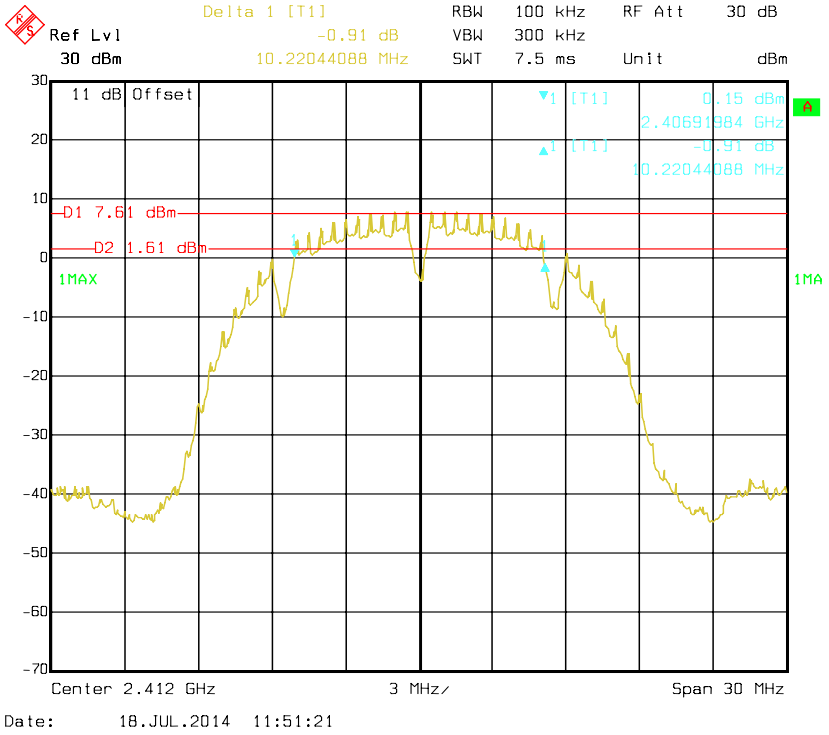
The testing was performed by Fidel Zhou on 2014-07-18 & 2014-07-21.

Test Mode: Transmitting

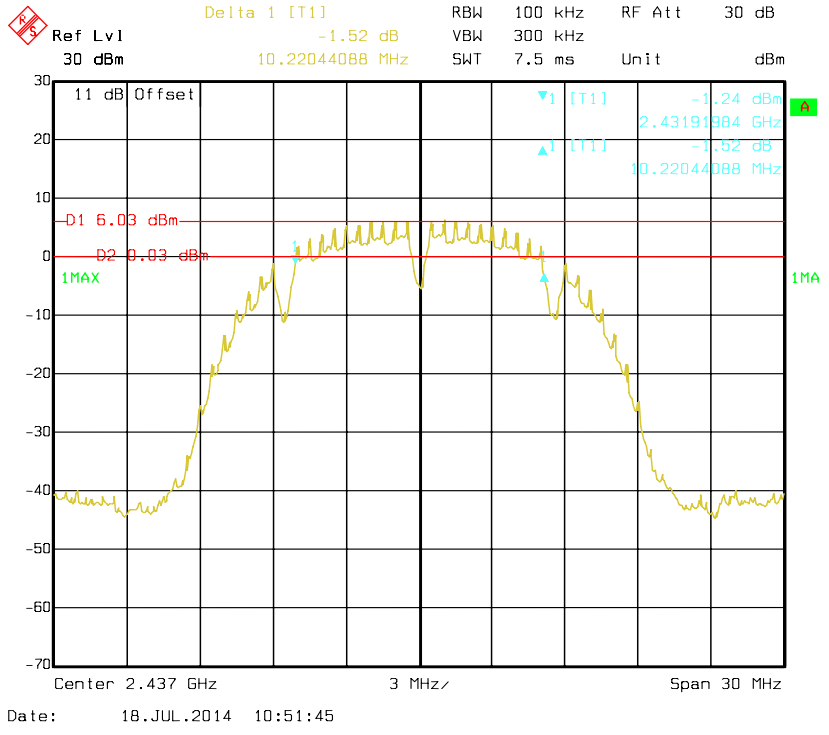
Mode	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		FCC Limit (kHz)
			Antenna 0	Antenna 1	
2.4G band 802.11b	Low	2412	10.22	10.22	> 500
	Middle	2437	10.22	10.22	> 500
	High	2462	10.22	10.22	> 500
2.4G band 802.11g	Low	2412	16.71	16.71	> 500
	Middle	2437	16.71	16.71	> 500
	High	2462	16.71	16.71	> 500
2.4G band 802.11n HT20	Low	2412	17.91	17.91	> 500
	Middle	2437	17.91	17.91	> 500
	High	2462	17.97	17.91	> 500
2.4G band 802.11n HT40	Low	2422	36.91	36.79	> 500
	Middle	2437	36.94	36.82	> 500
	High	2452	36.85	36.85	> 500

Please refer to the following plots:

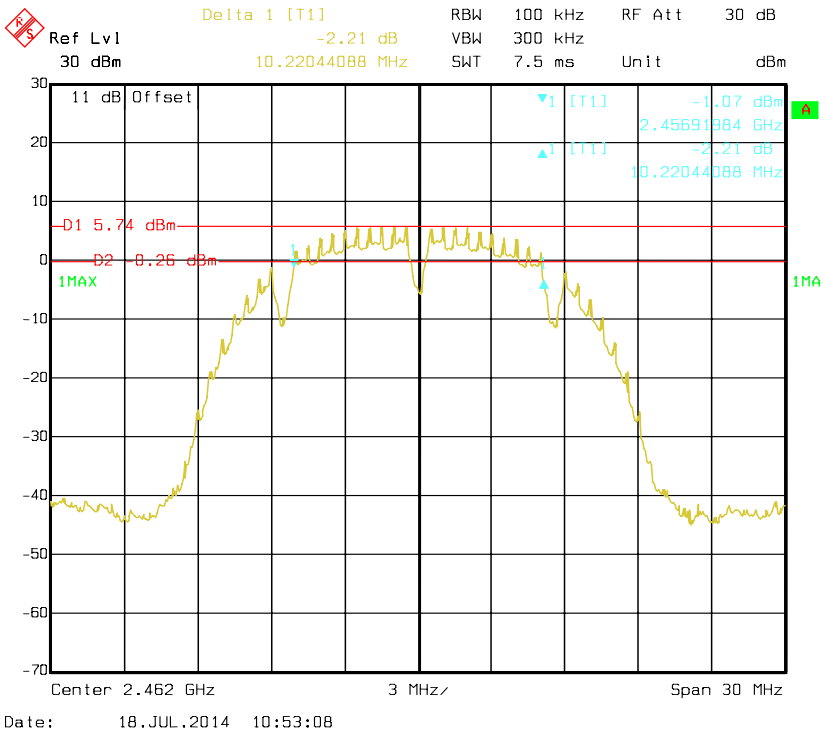
802.11b Low Channel for Antenna 0



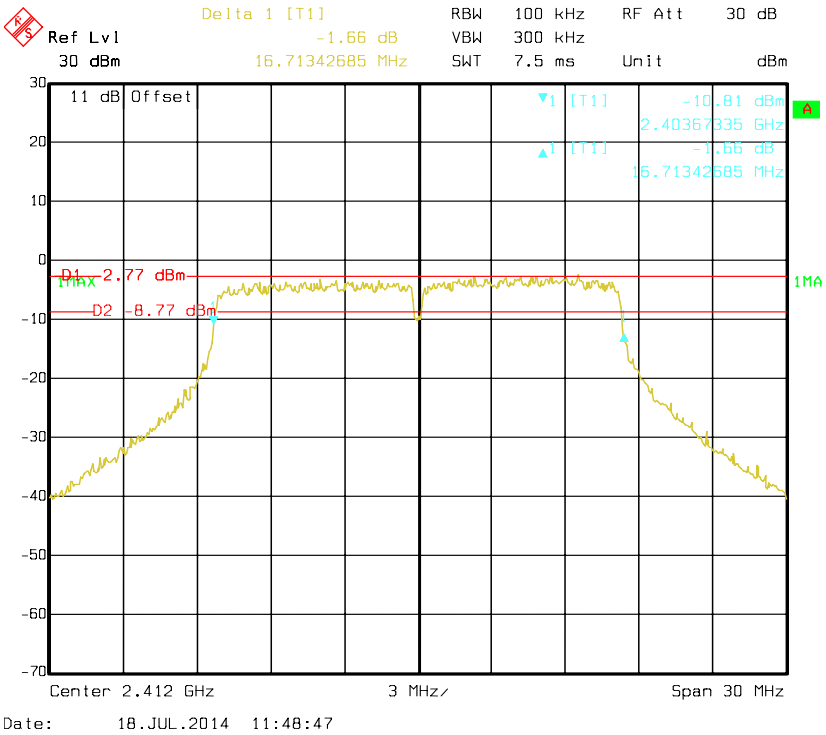
802.11b Middle Channel for Antenna 0



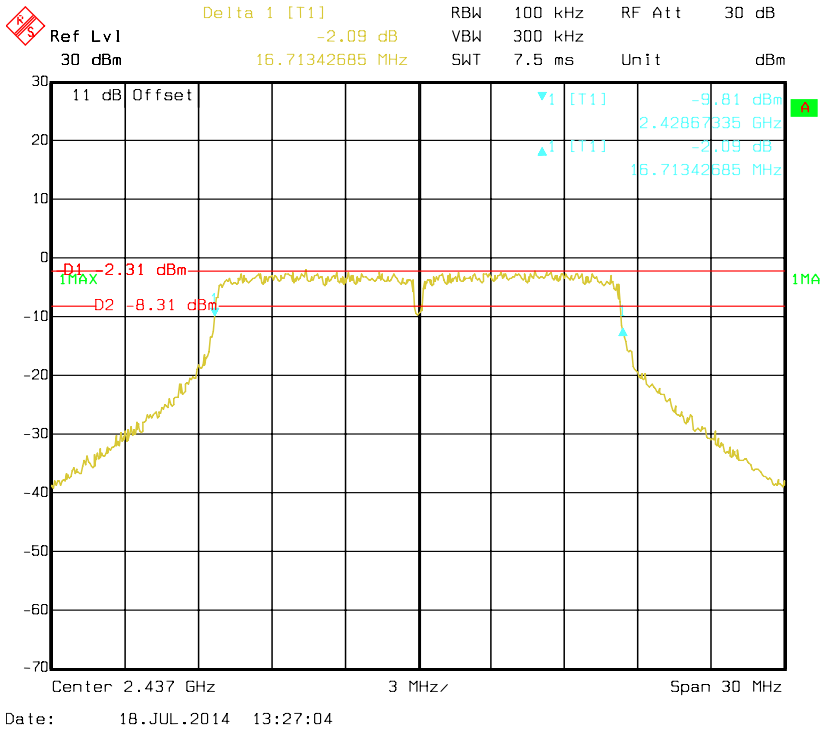
802.11b High Channel for Antenna 0



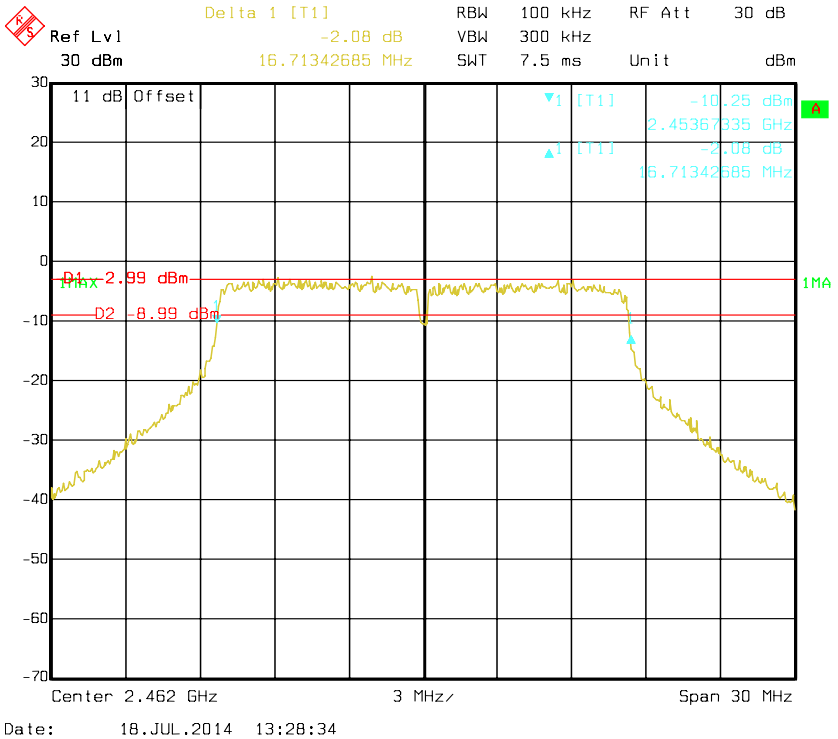
802.11g Low Channel for Antenna 0



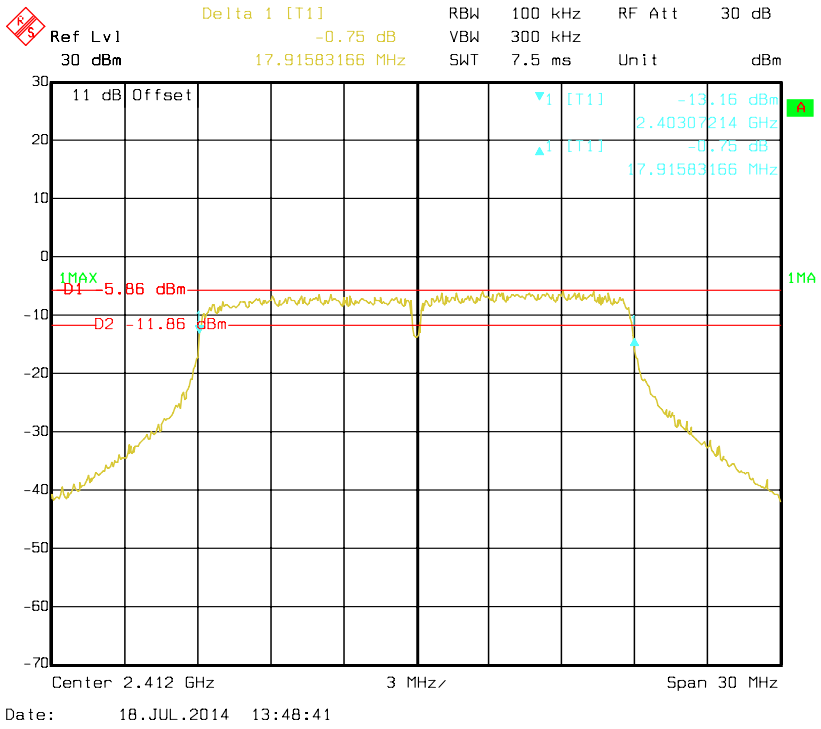
802.11g Middle Channel for Antenna 0



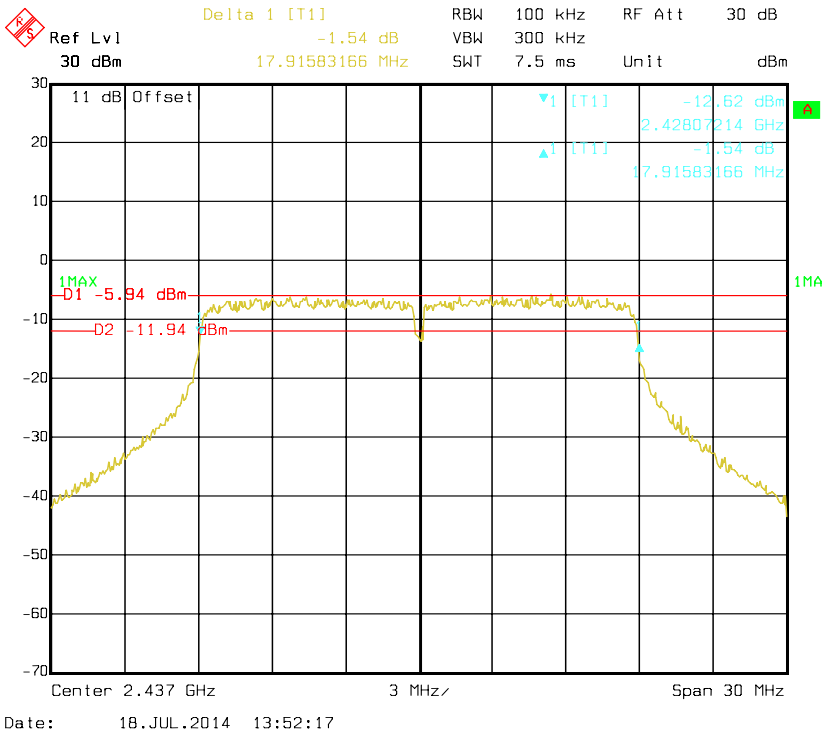
802.11g High Channel for Antenna 0



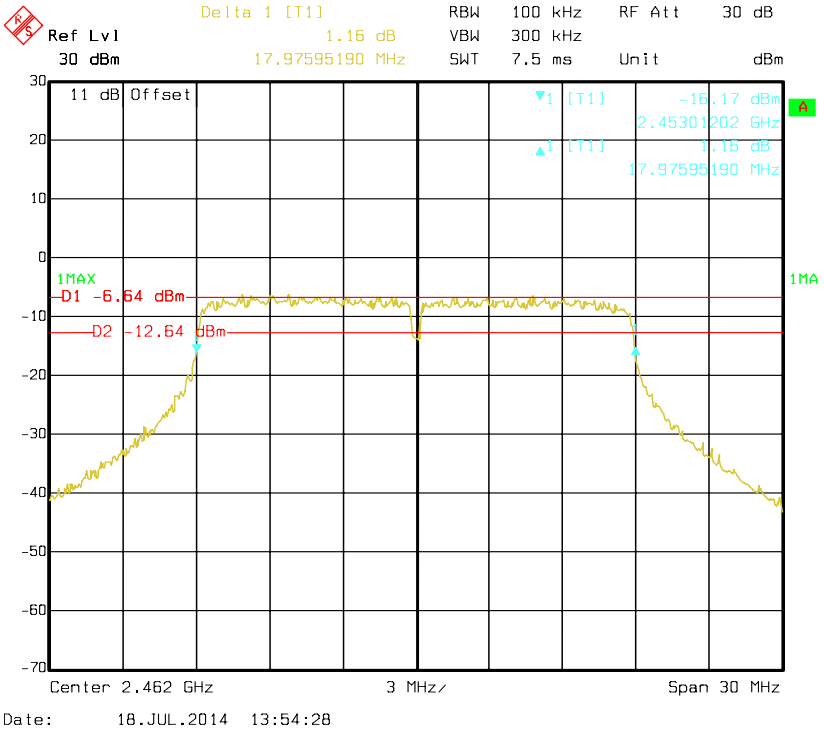
802.11n HT20 Low Channel for Antenna 0



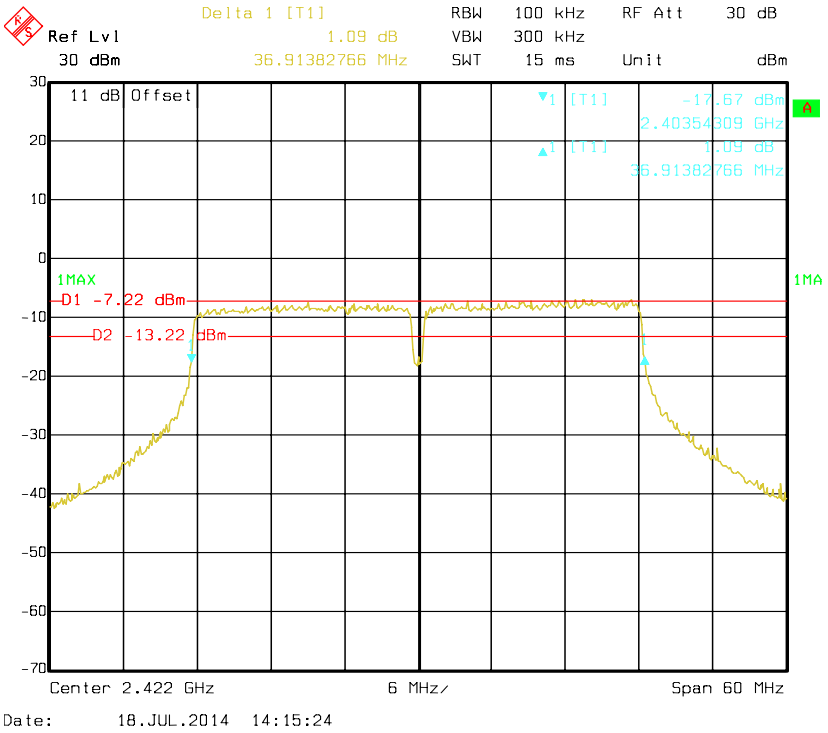
802.11n HT20 Middle Channel for Antenna 0



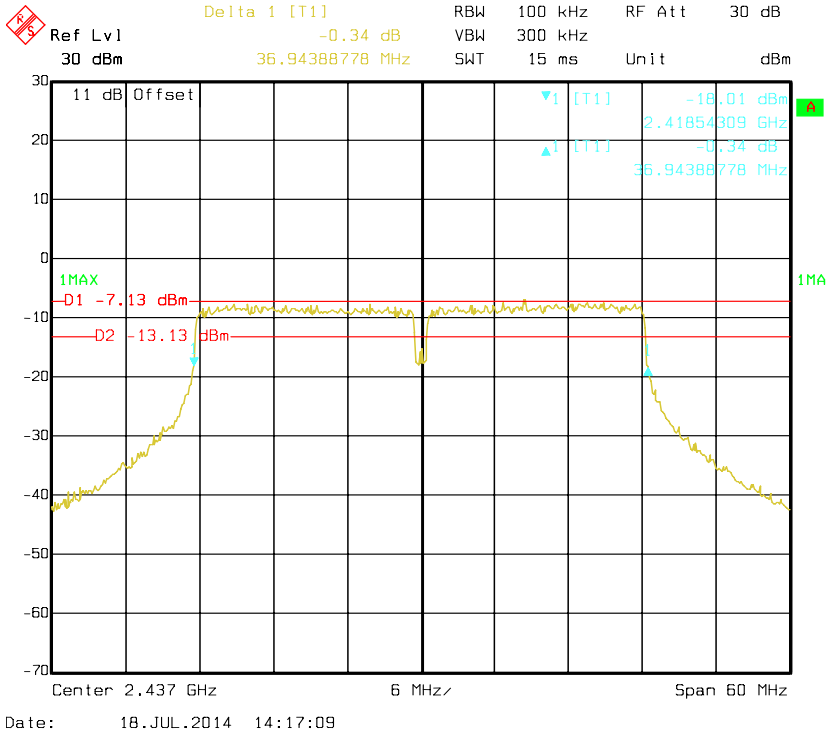
802.11n HT20 High Channel for Antenna 0



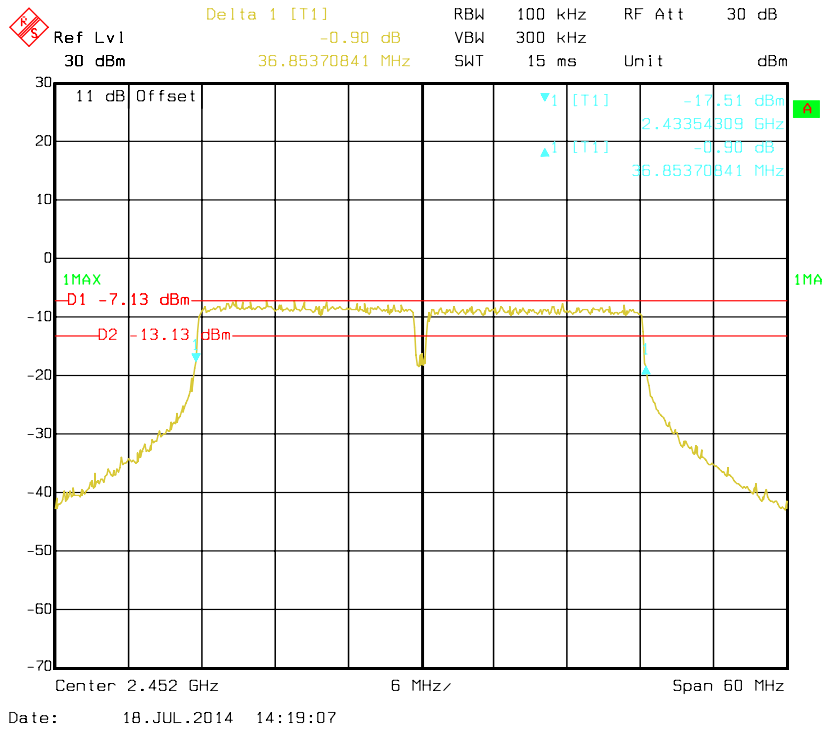
802.11n HT40 Low Channel for Antenna 0



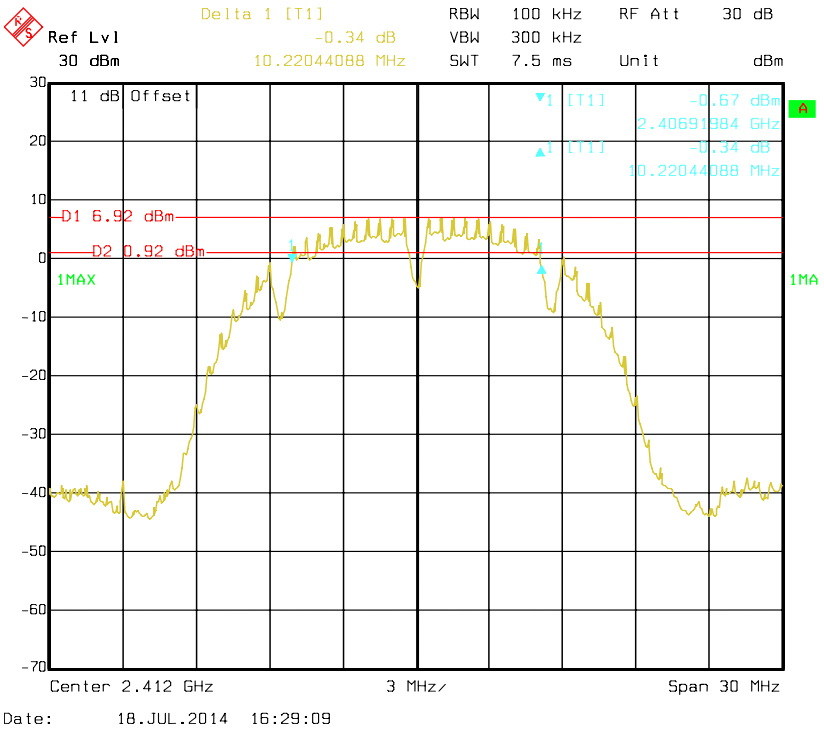
802.11n HT40 Middle Channel for Antenna 0



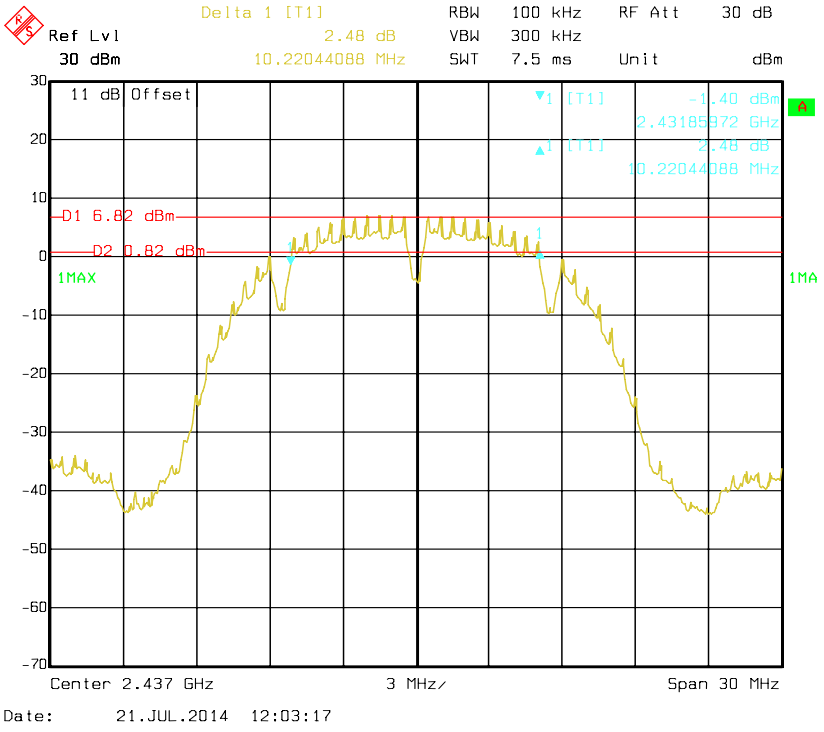
802.11n HT40 High Channel for Antenna 0



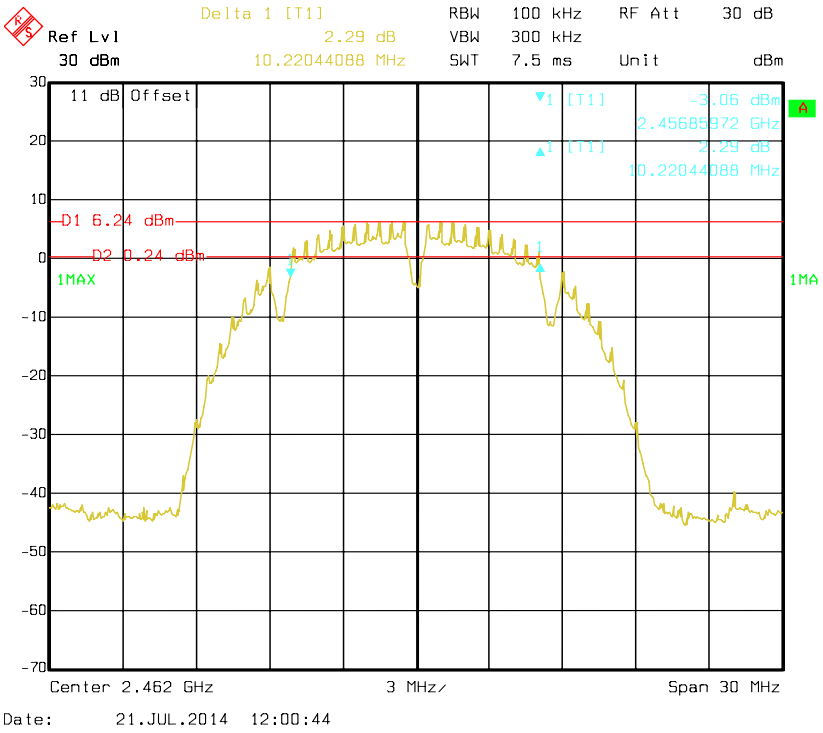
802.11b Low Channel for Antenna 1



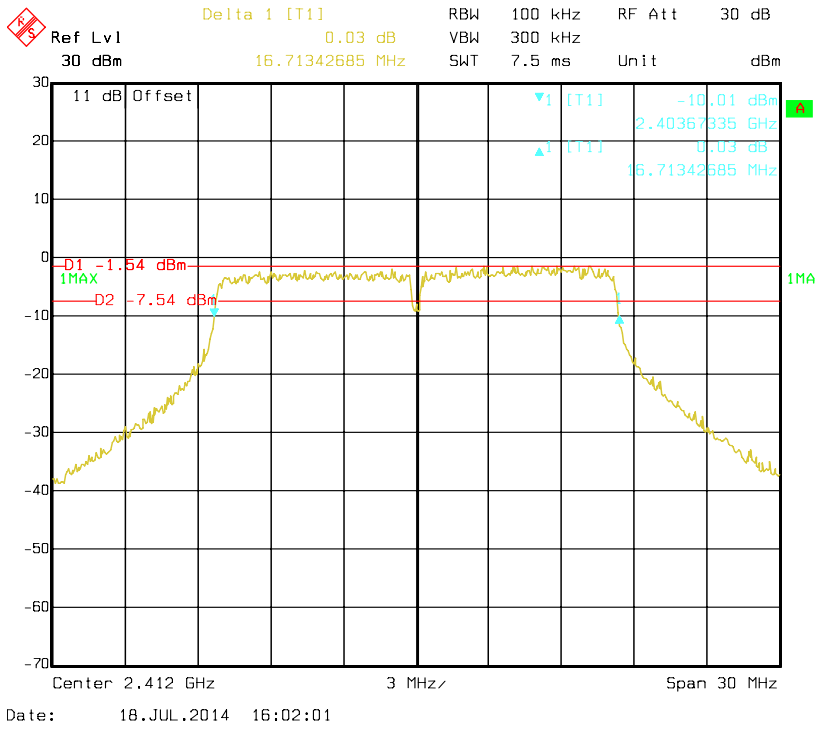
802.11b Middle Channel for Antenna 1



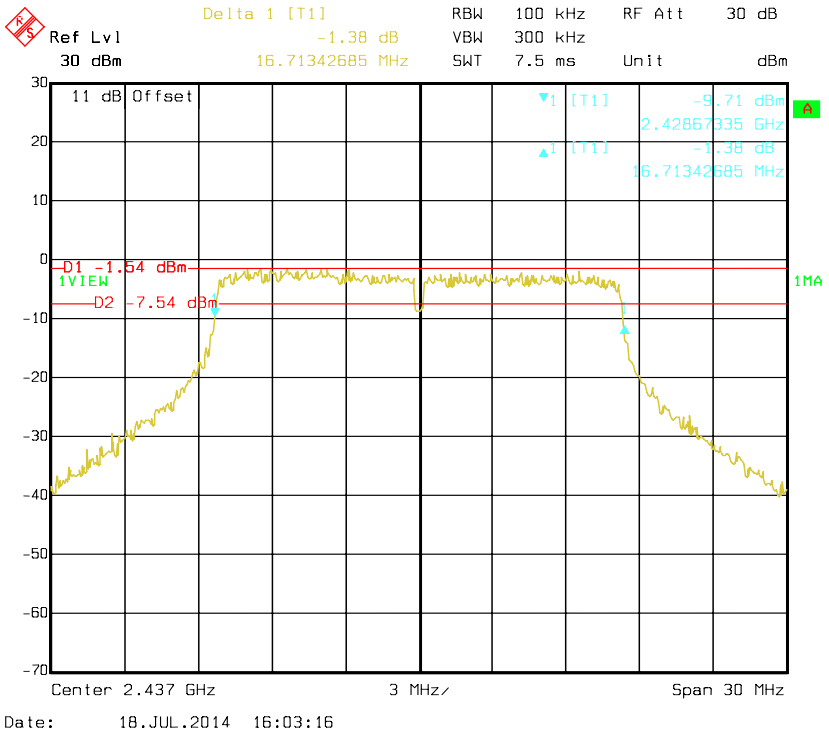
802.11b High Channel for Antenna 1



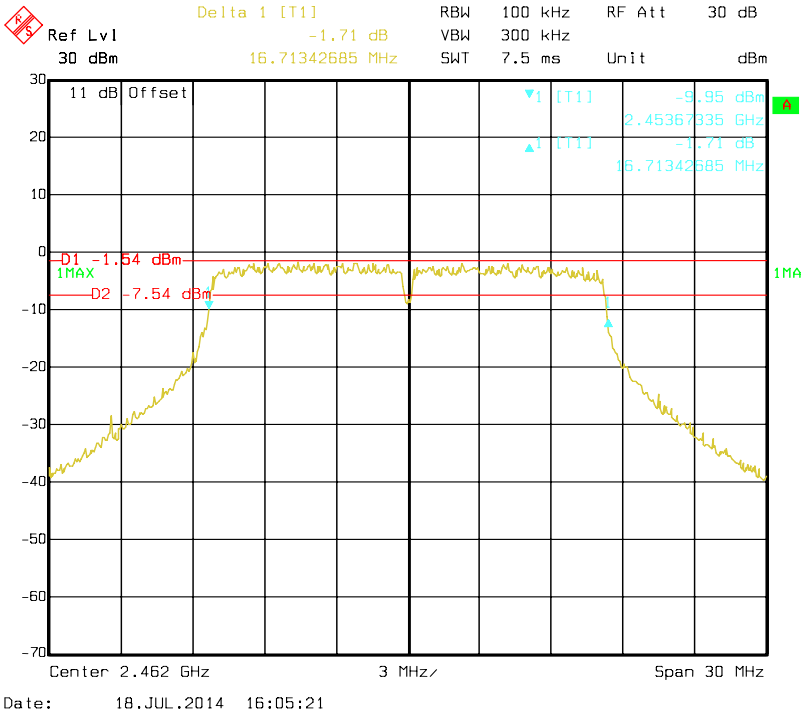
802.11g Low Channel for Antenna 1



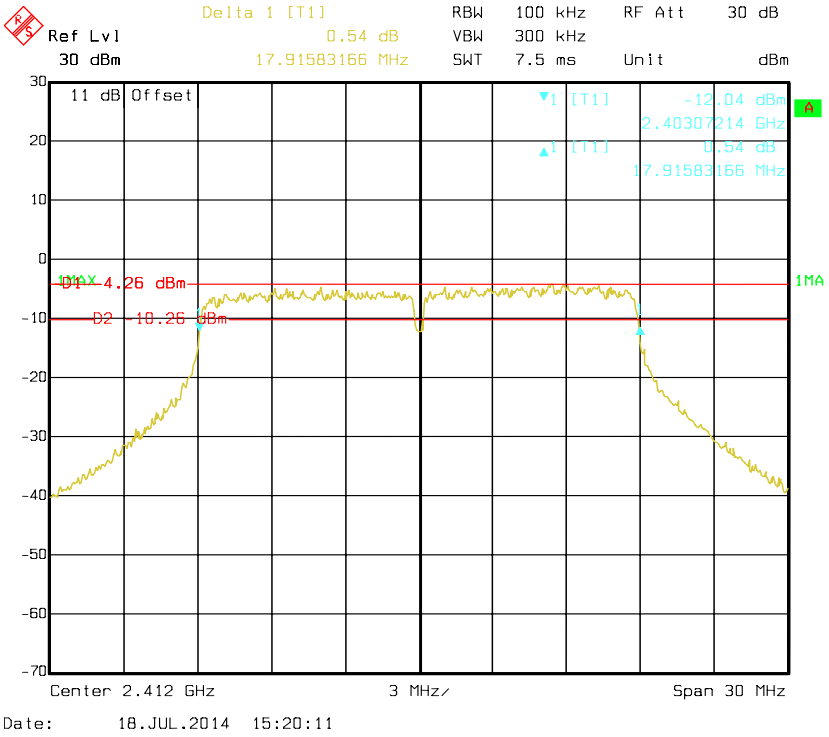
802.11g Middle Channel for Antenna 1



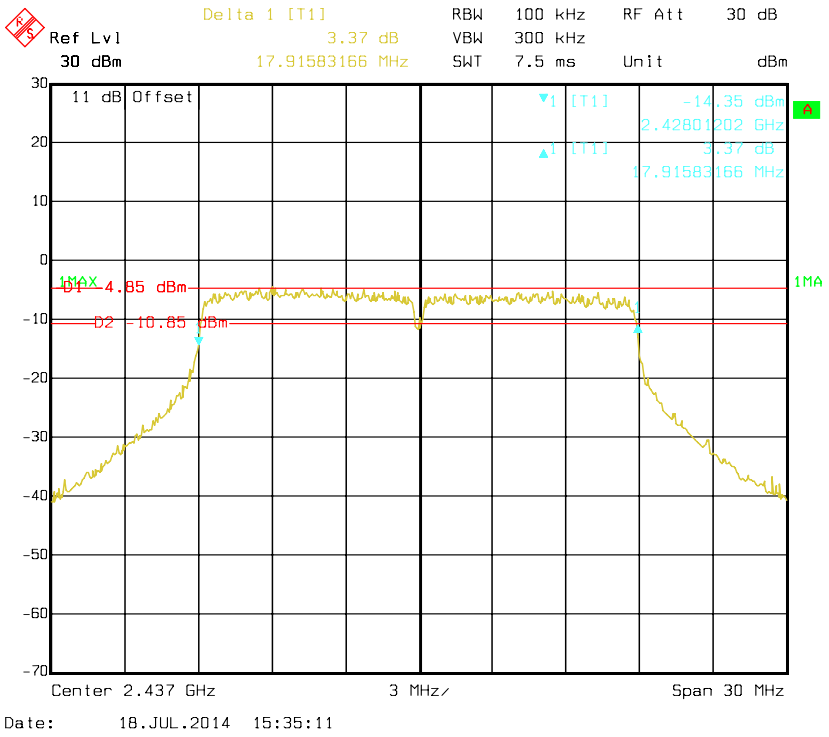
802.11g High Channel for Antenna 1



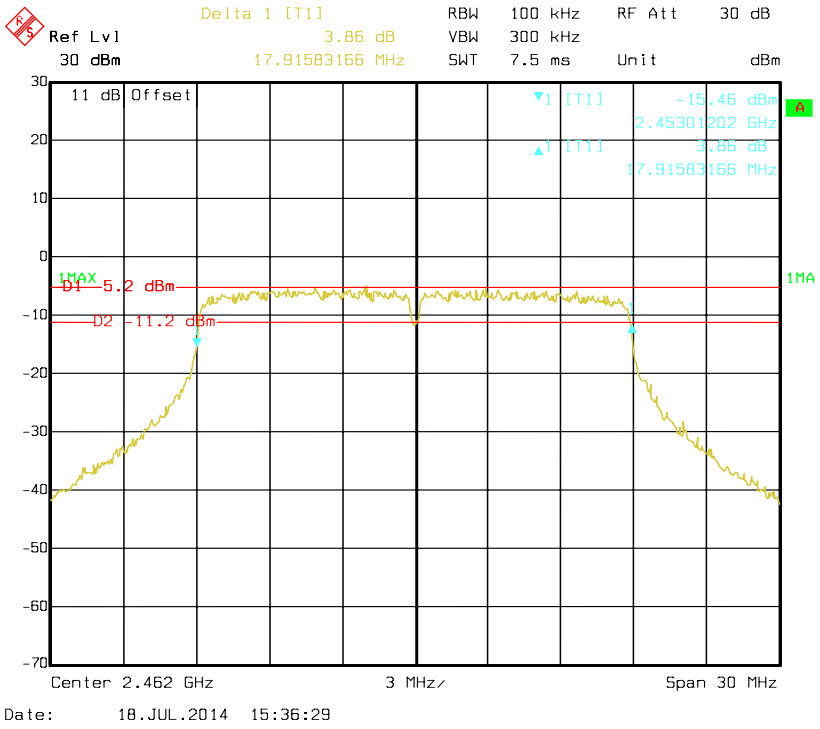
802.11n HT20 Low Channel for Antenna 1



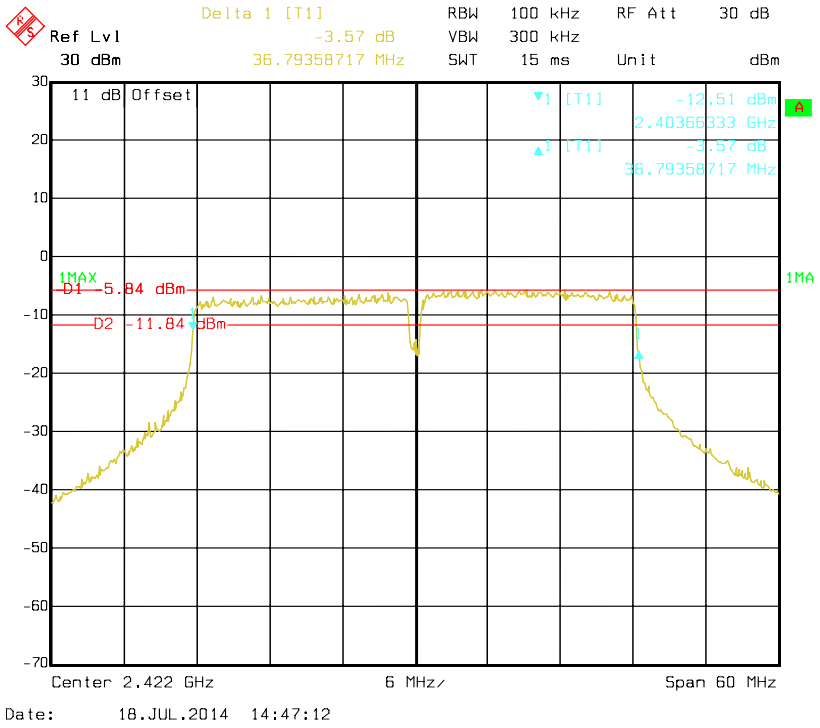
802.11n HT20 Middle Channel for Antenna 1



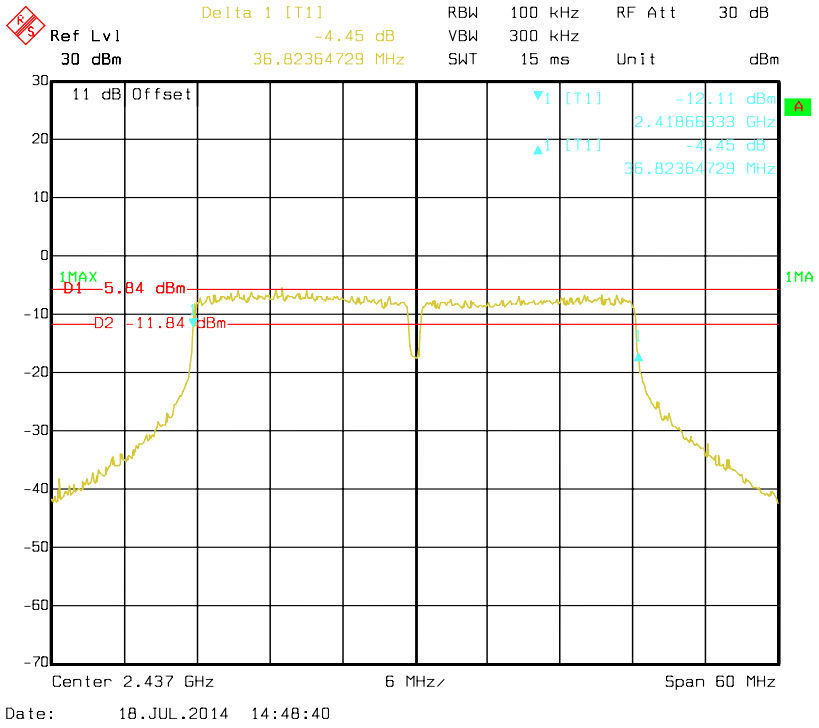
802.11n HT20 High Channel for Antenna 1



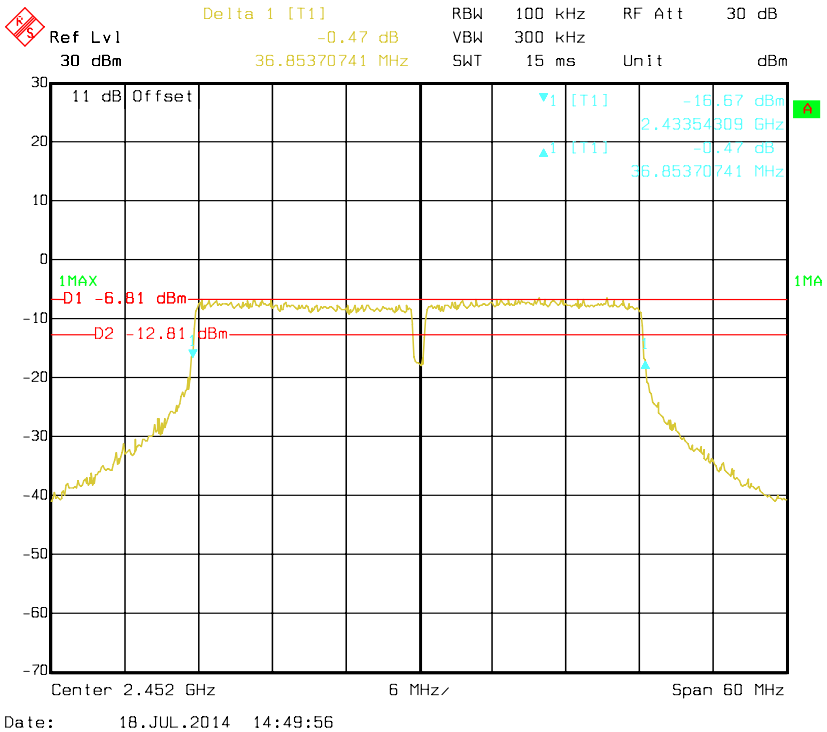
802.11n HT40 Low Channel for Antenna 1



802.11n HT40 Middle Channel for Antenna 1



802.11n HT40 High Channel for Antenna 1



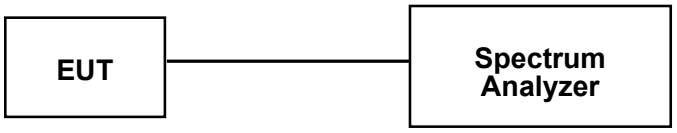
FCC §15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER

Applicable Standard

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

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to 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
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2013-10-17	2014-10-16

*** Statement of Traceability:** BACL (Chengdu) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	30 °C, 29 °C & 28 °C
Relative Humidity:	42 %, 50 % & 56 %
ATM Pressure:	100.7 kPa, 100.7 kPa & 100.5 kPa

The testing was performed by Fidel Zhou on 2014-07-18, 2014-07-21 & 2014-07-25.

Test Mode: Transmitting

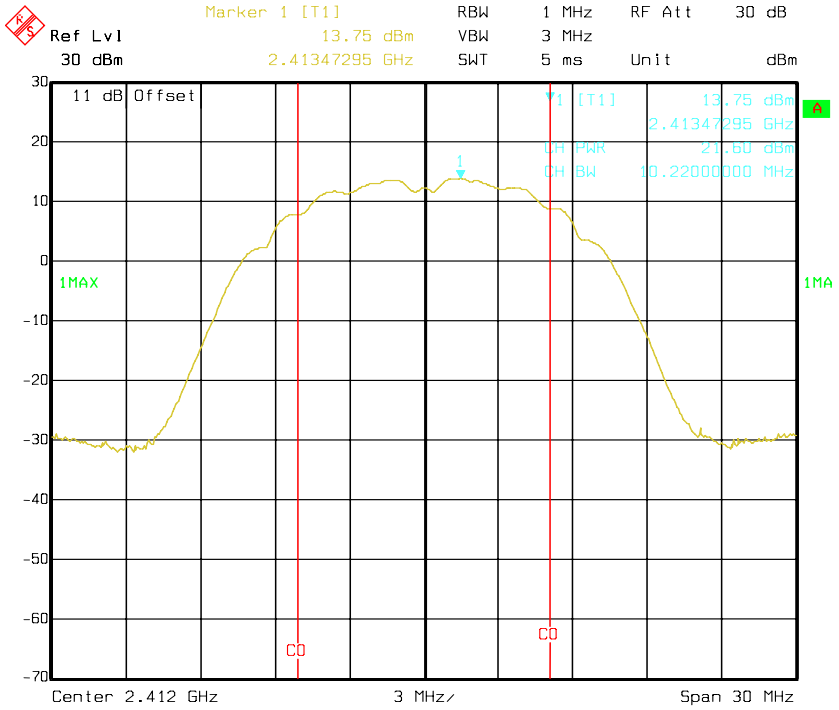
Mode	Channel	Frequency (MHz)	Conducted Output Power (dBm)			Limit (dBm)	Result
			Antenna 0	Antenna 1	Total		
2.4G band 802.11b	Low	2412	21.60	21.41	/	27	Pass
	Middle	2437	21.99	21.56	/	27	Pass
	High	2462	21.58	21.55	/	27	Pass
2.4G band 802.11 g	Low	2412	22.11	21.69	/	27	Pass
	Middle	2437	22.11	22.17	/	27	Pass
	High	2462	21.65	21.90	/	27	Pass
2.4G band 802.11n HT20	Low	2412	16.83	17.21	20.03	27	Pass
	Middle	2437	17.15	16.84	20.01	27	Pass
	High	2462	16.88	16.40	19.66	27	Pass
2.4G band 802.11n HT40	Low	2422	17.66	17.48	20.58	27	Pass
	Middle	2437	17.25	17.15	20.21	27	Pass
	High	2452	17.26	16.92	20.10	27	Pass

Note 1: For all the modes, the duty cycle is more than 98%.

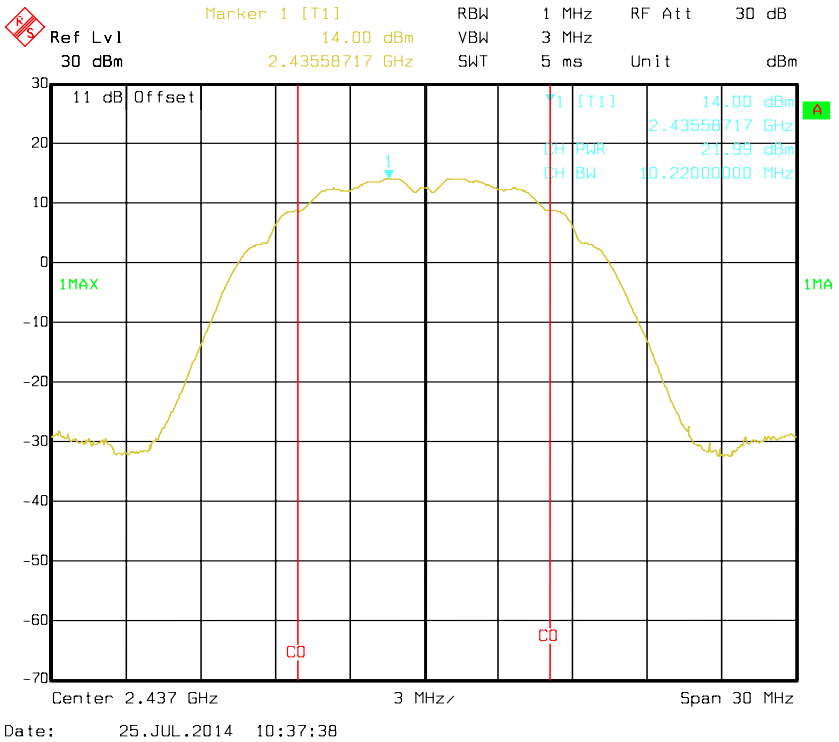
Note 2: The directional antenna gain for 2.4GHz is 14 dBi, so the power limit is 27 dBm

Please refer to the following plots

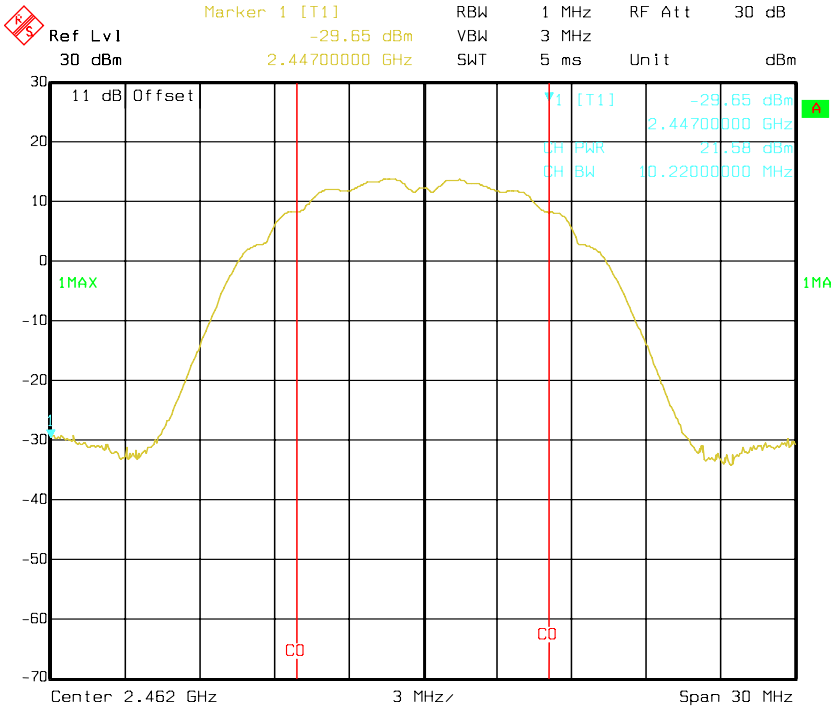
802.11b RF Output Power, Low Channel for Antenna 0



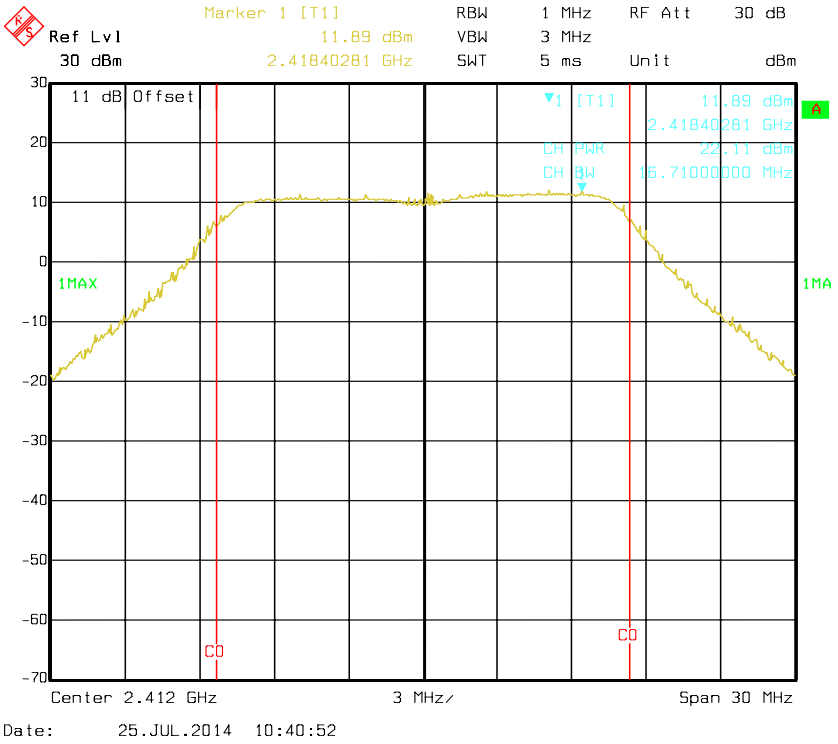
802.11b RF Output Power, Middle Channel for Antenna 0



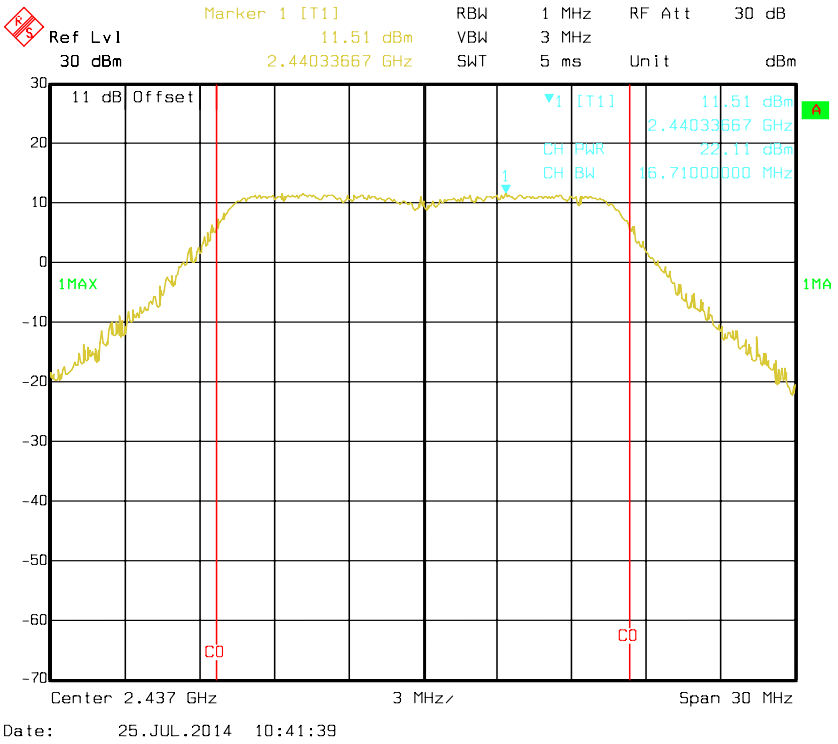
802.11b RF Output Power, High Channel for Antenna 0



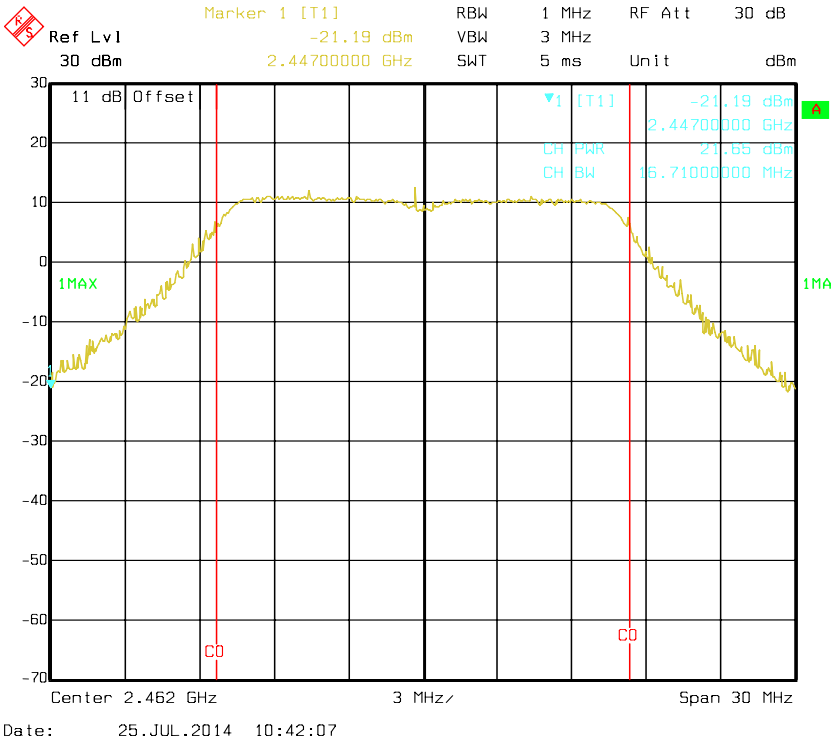
802.11g RF Output Power, Low Channel for Antenna 0



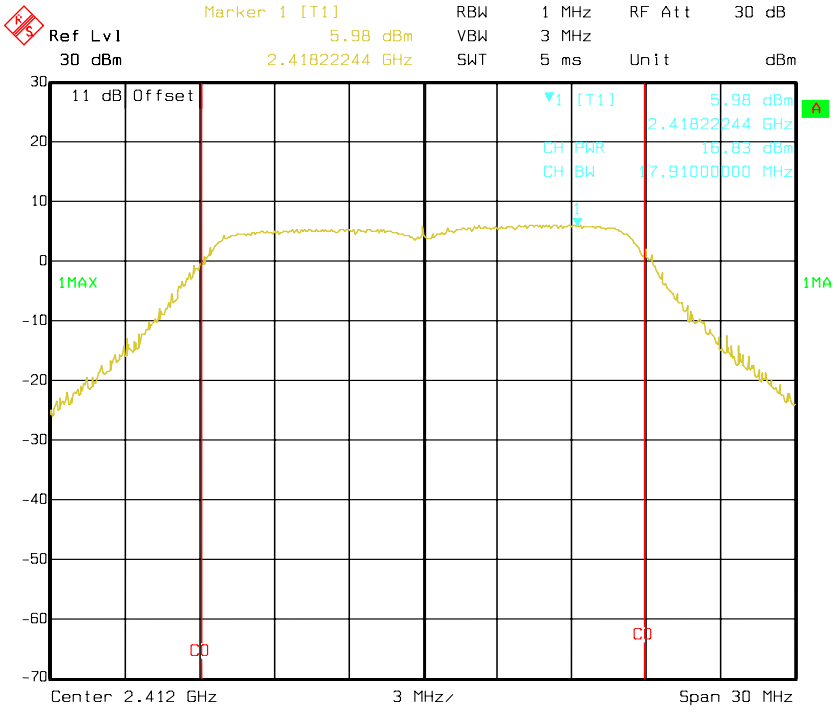
802.11g RF Output Power, Middle Channel for Antenna 0



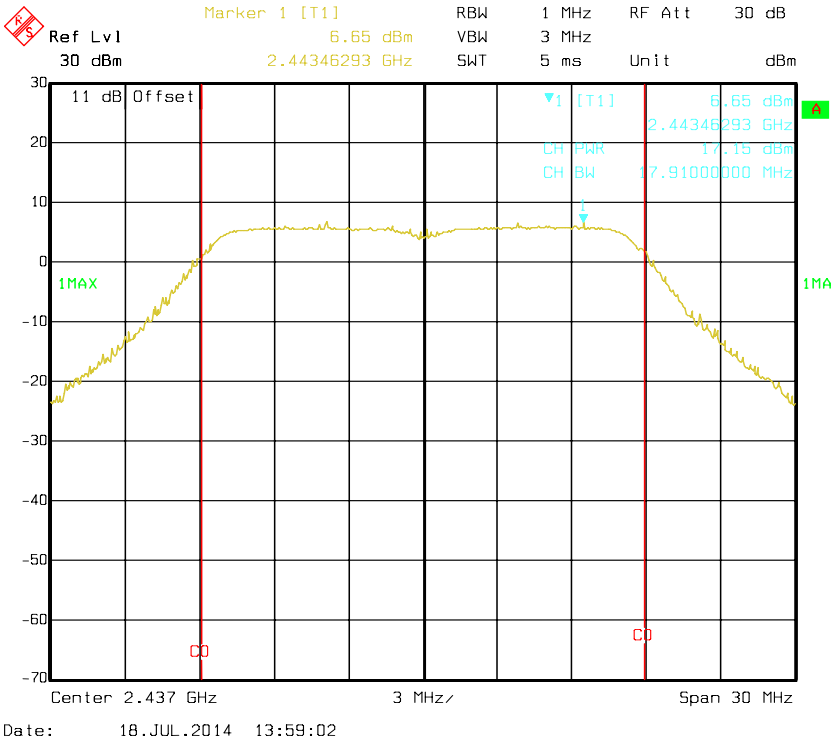
802.11g RF Output Power, High Channel for Antenna 0



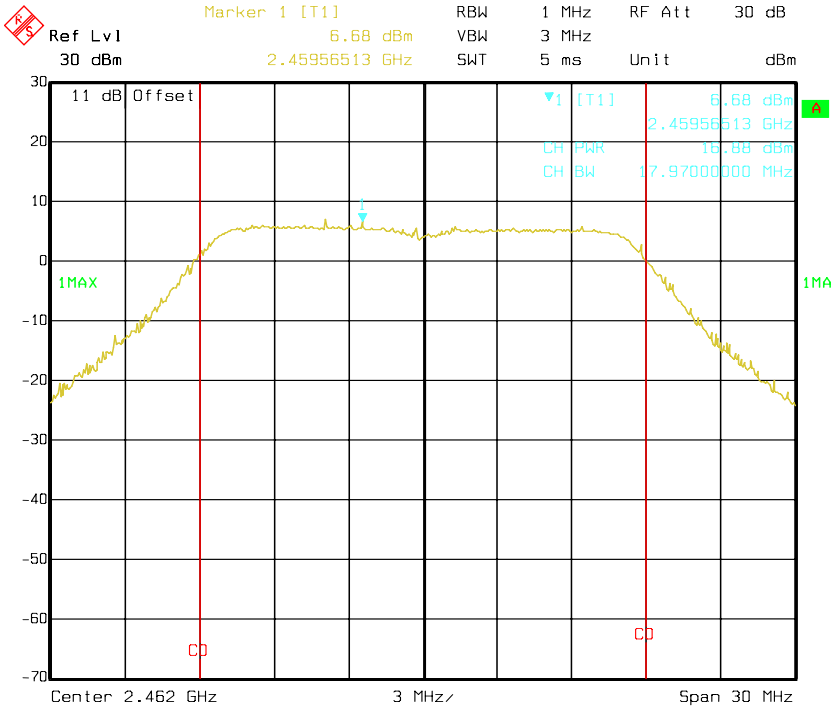
802.11n HT20 RF Output Power, Low Channel for Antenna 0



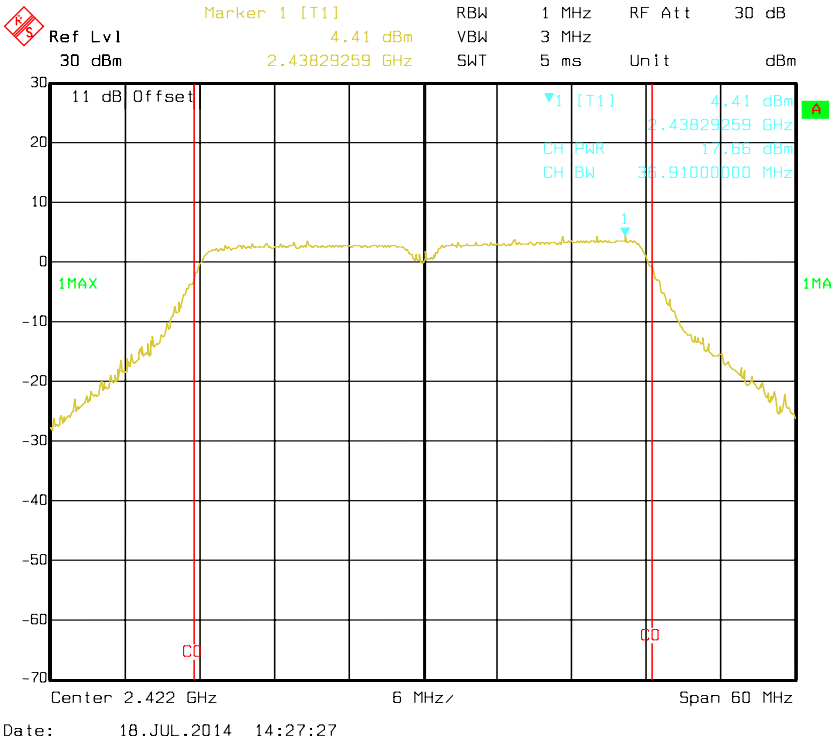
802.11n HT20 RF Output Power, Middle Channel for Antenna 0



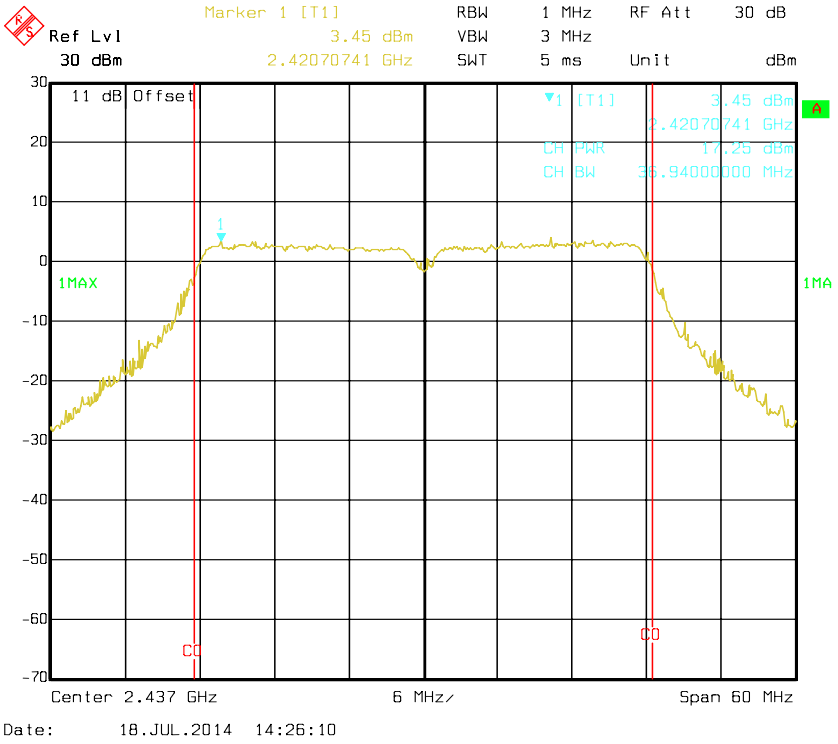
802.11n HT20 RF Output Power, High Channel for Antenna 0



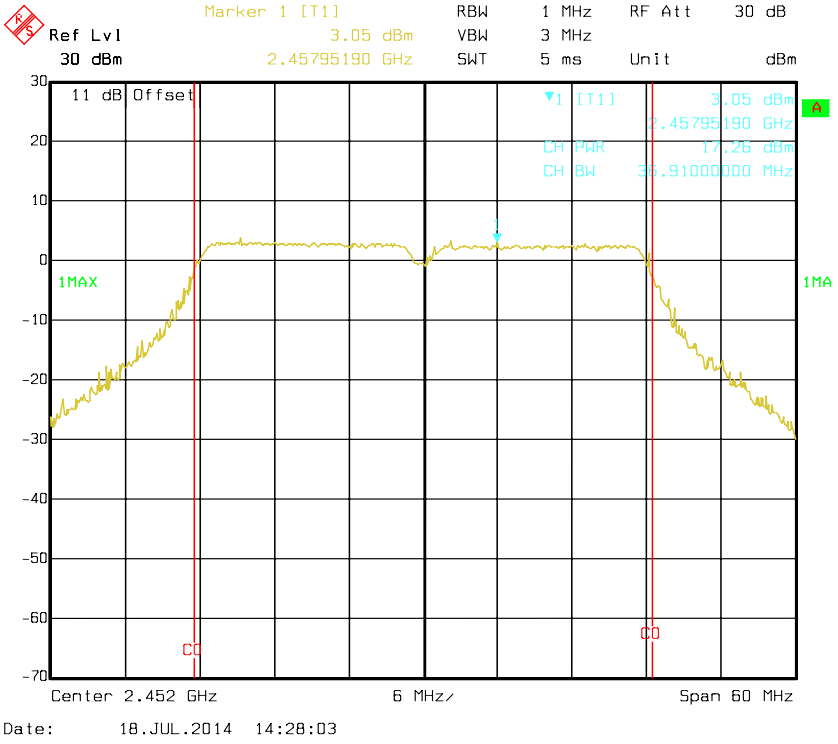
802.11n HT40 RF Output Power, Low Channel for Antenna 0



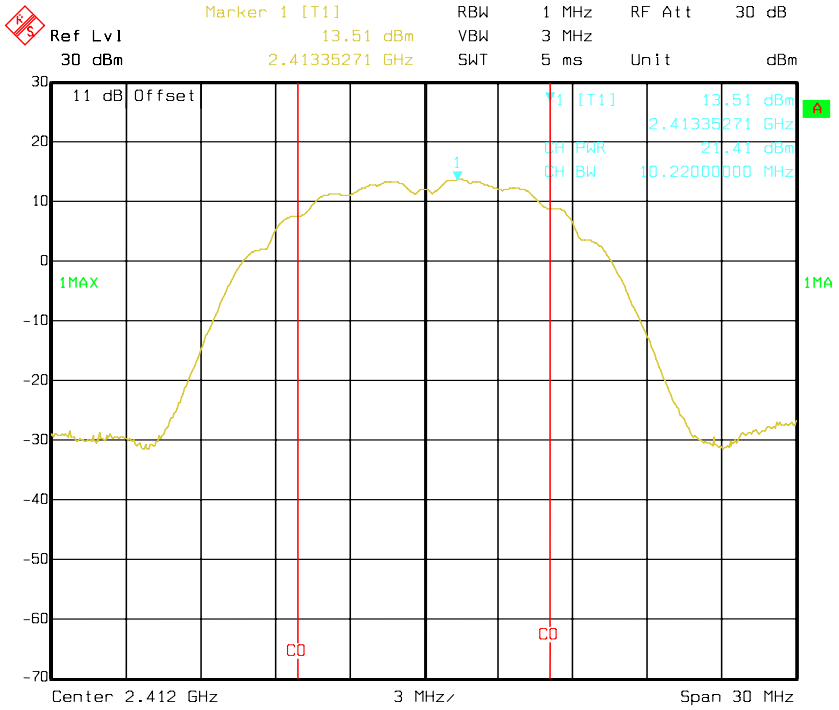
802.11n HT40 RF Output Power, Middle Channel for Antenna 0



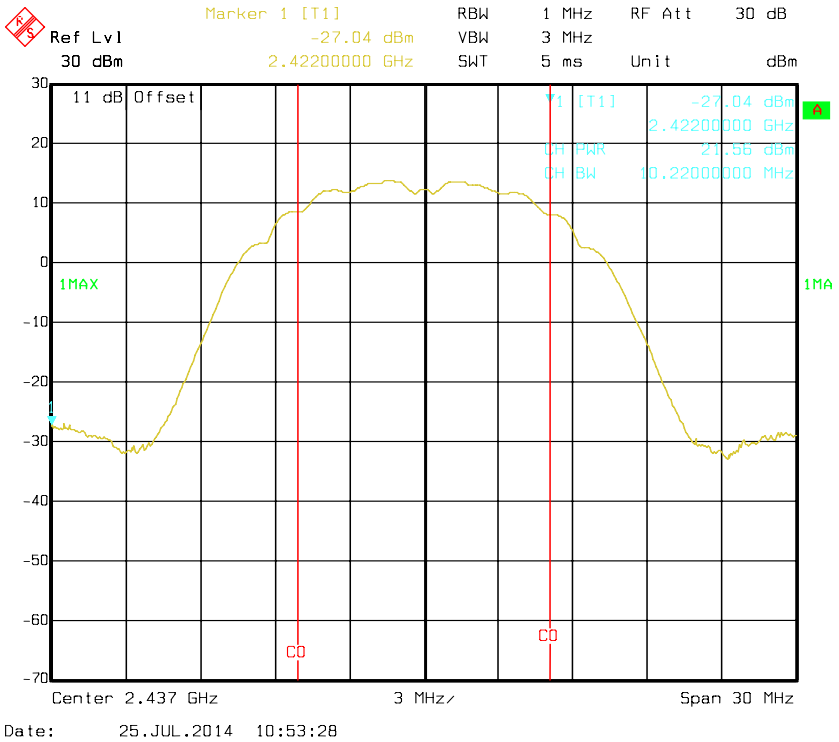
802.11n HT40 RF Output Power, High Channel for Antenna 0



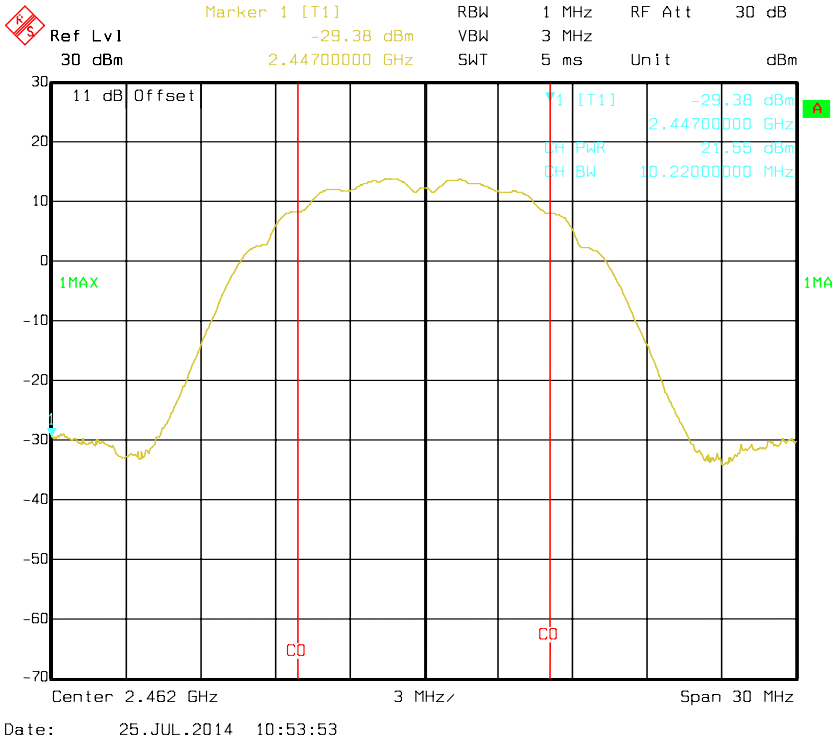
802.11b RF Output Power, Low Channel for Antenna 1



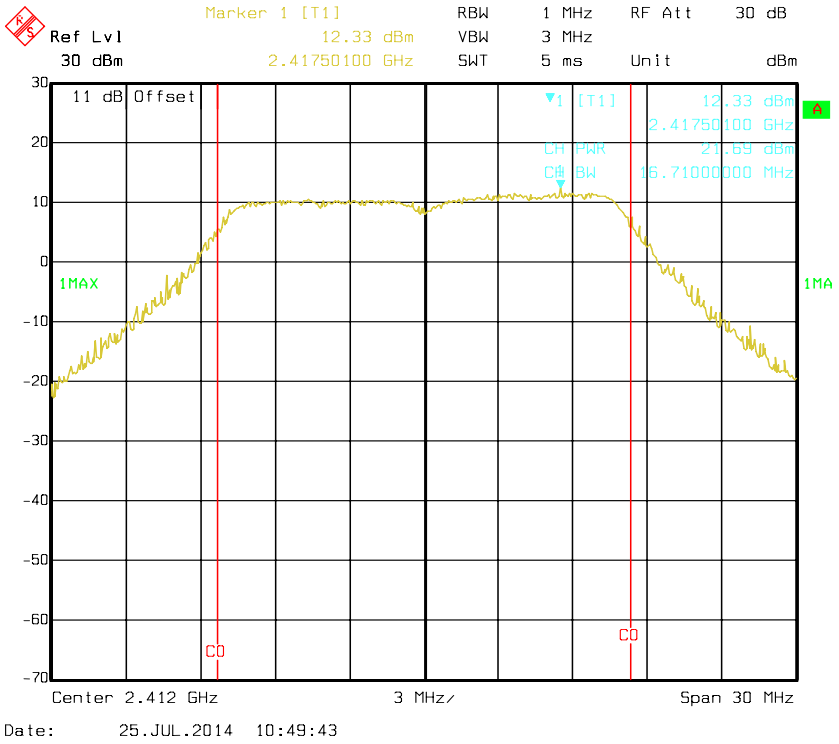
802.11b RF Output Power, Middle Channel for Antenna 1



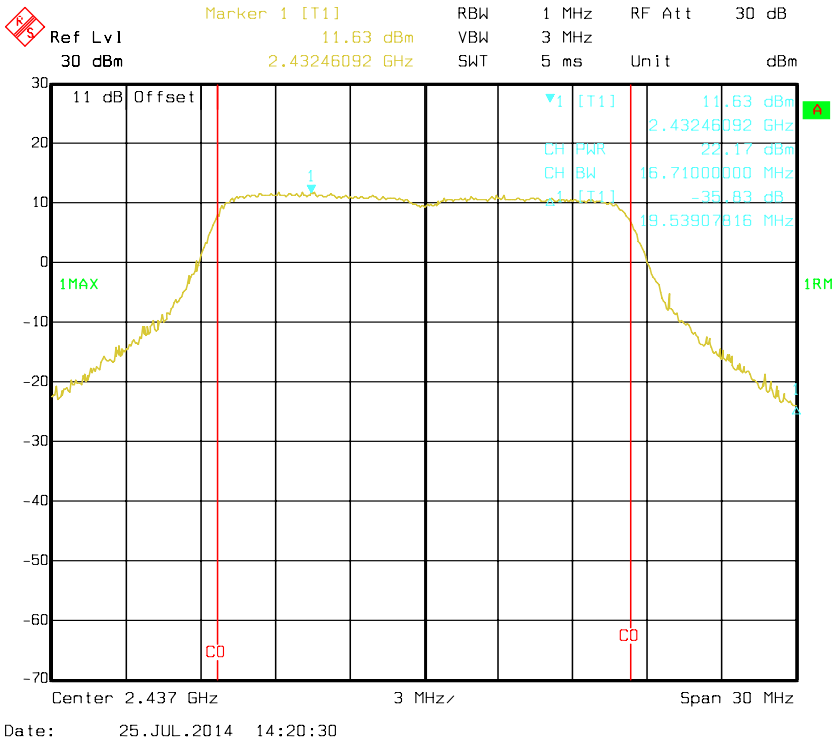
802.11b RF Output Power, High Channel for Antenna 1



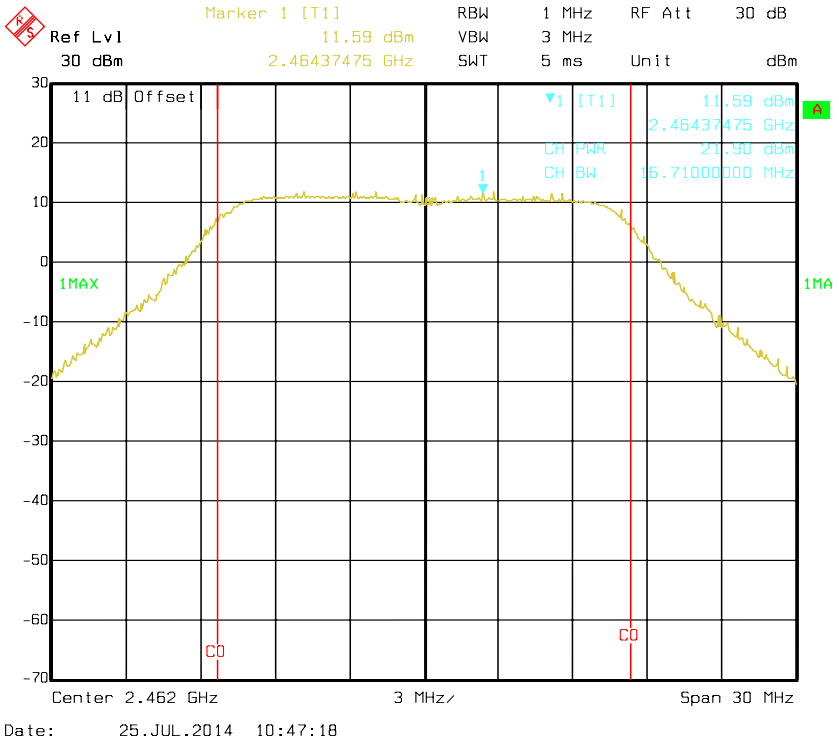
802.11g RF Output Power, Low Channel for Antenna 1



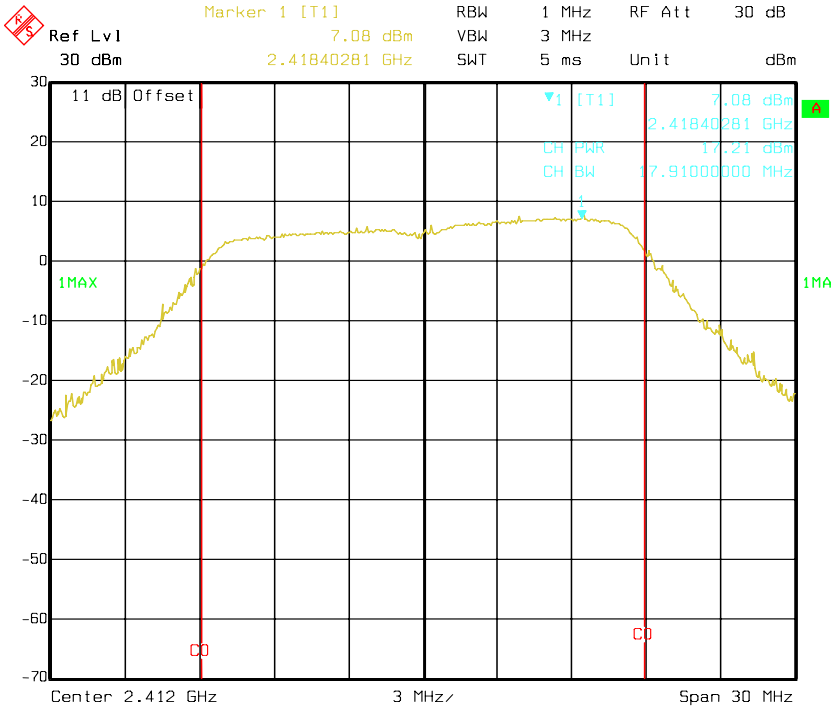
802.11g RF Output Power, Middle Channel for Antenna 1



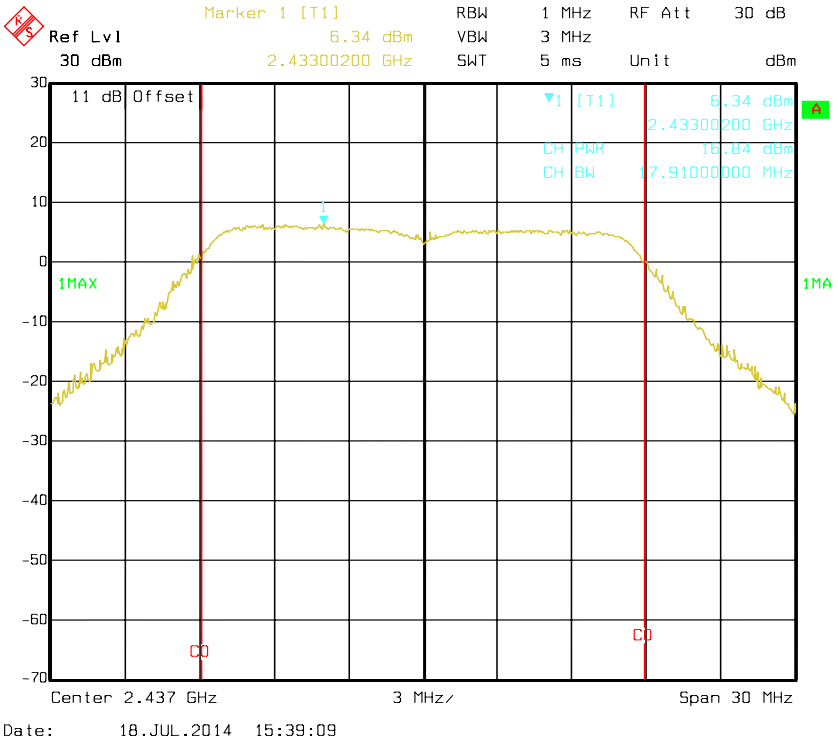
802.11g RF Output Power, High Channel for Antenna 1



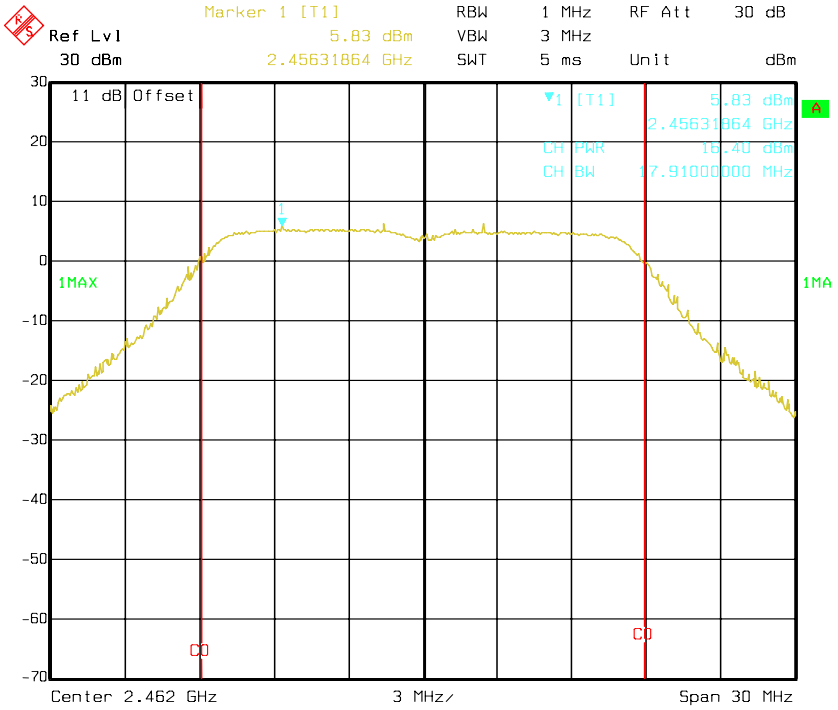
802.11n HT20 RF Output Power, Low Channel for Antenna 1



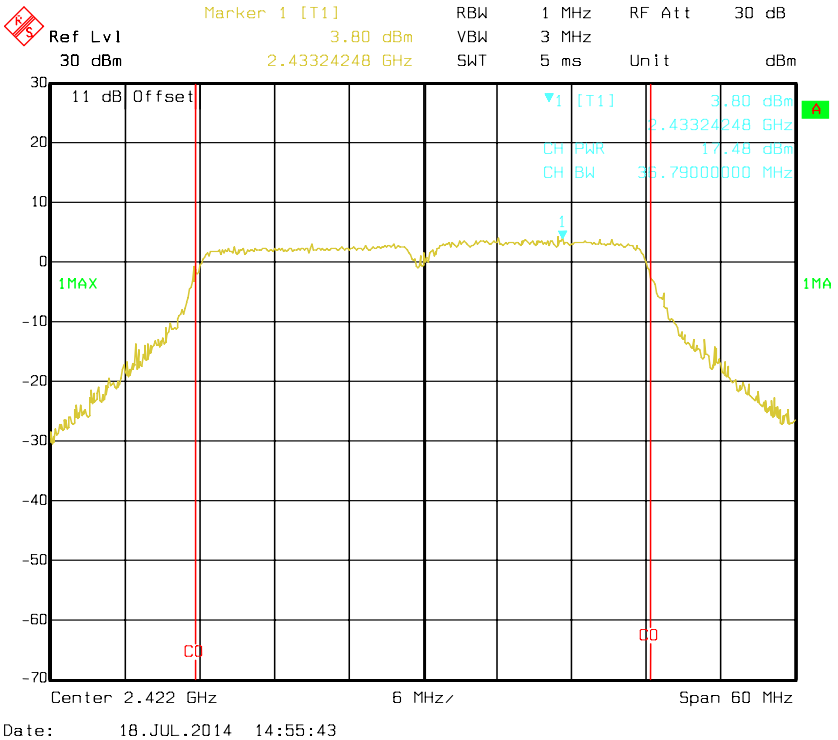
802.11n HT20 RF Output Power, Middle Channel for Antenna 1



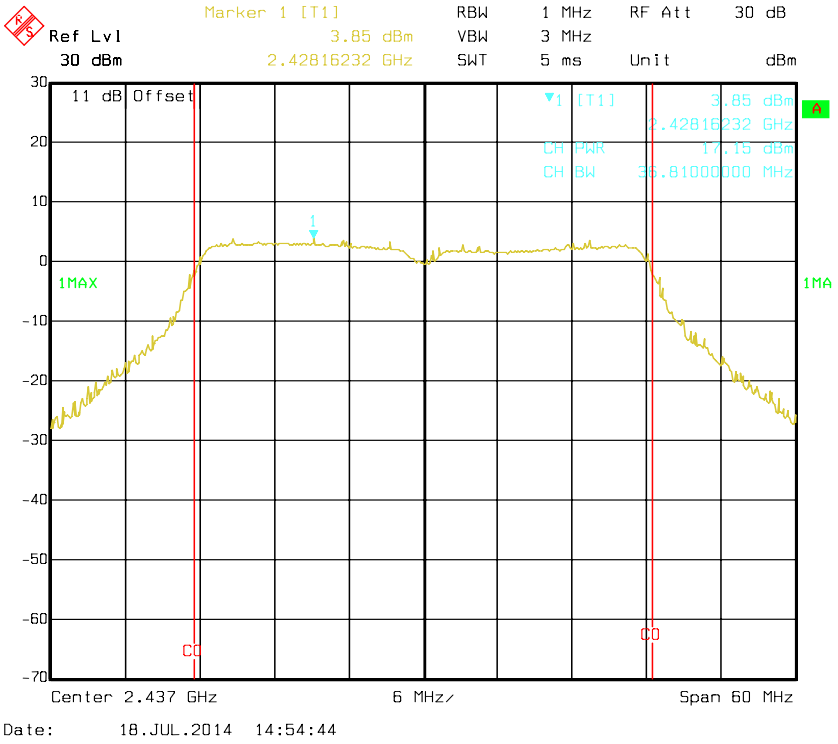
802.11n HT20 RF Output Power, High Channel for Antenna 1



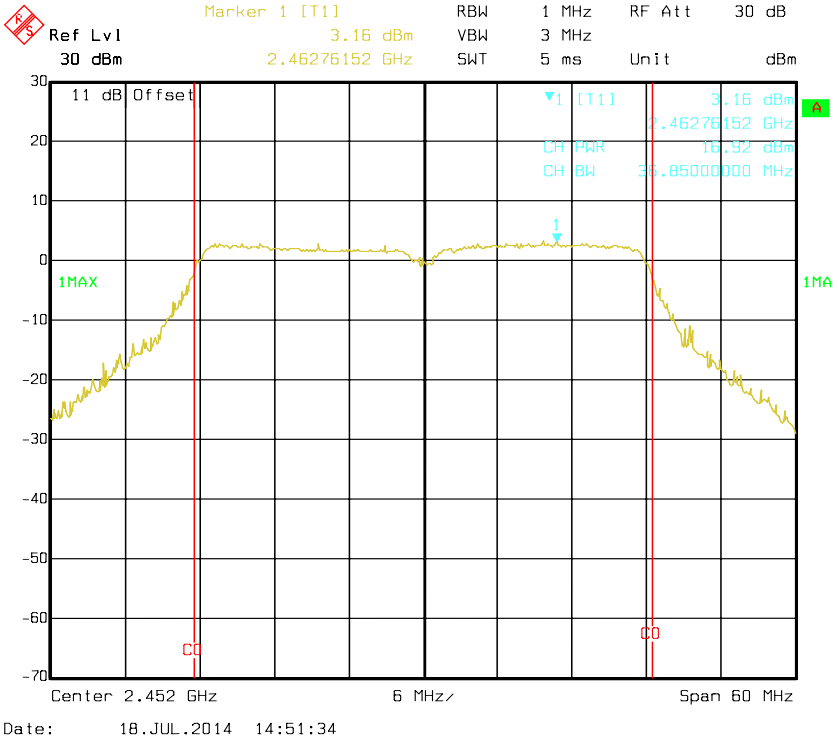
802.11n HT40 RF Output Power, Low Channel for Antenna 1



802.11n HT40 RF Output Power, Middle Channel for Antenna 1



802.11n HT40 RF Output Power, High Channel for Antenna 1



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
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2013-10-17	2014-10-16

*** Statement of Traceability:** BACL (Chengdu) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

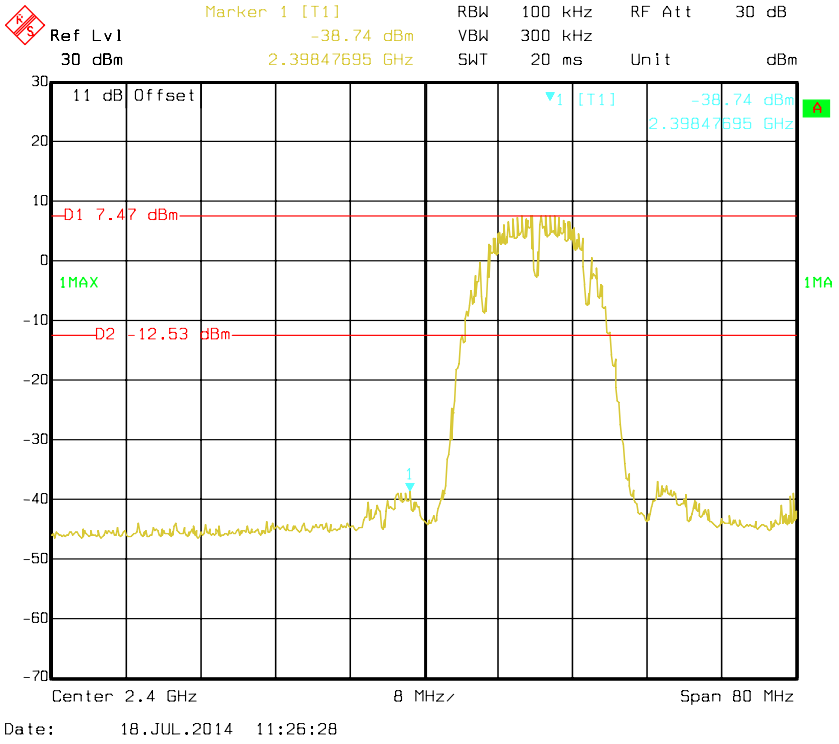
Temperature:	29 °C, 30 °C & 28 °C
Relative Humidity:	48 %, 42 % & 56 %
ATM Pressure:	100.9 kPa, 100.7 kPa & 100.5 kPa

The testing was performed by Fidel Zhou on 2014-07-10, 2014-07-18 & 2014-07-21.

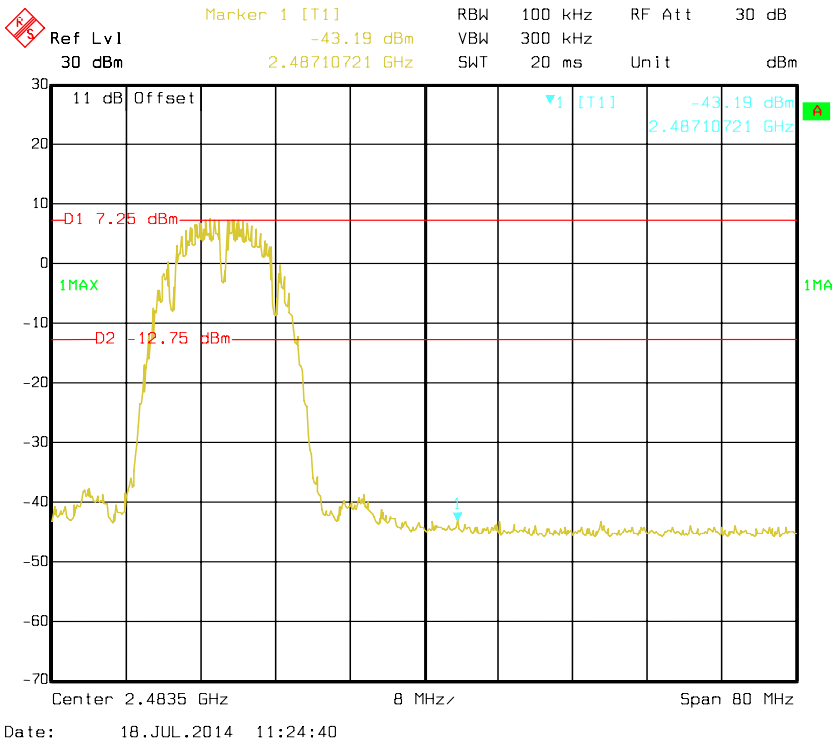
Test Mode: Transmitting

Test Result: Compliance, Please refer to following table and plots.

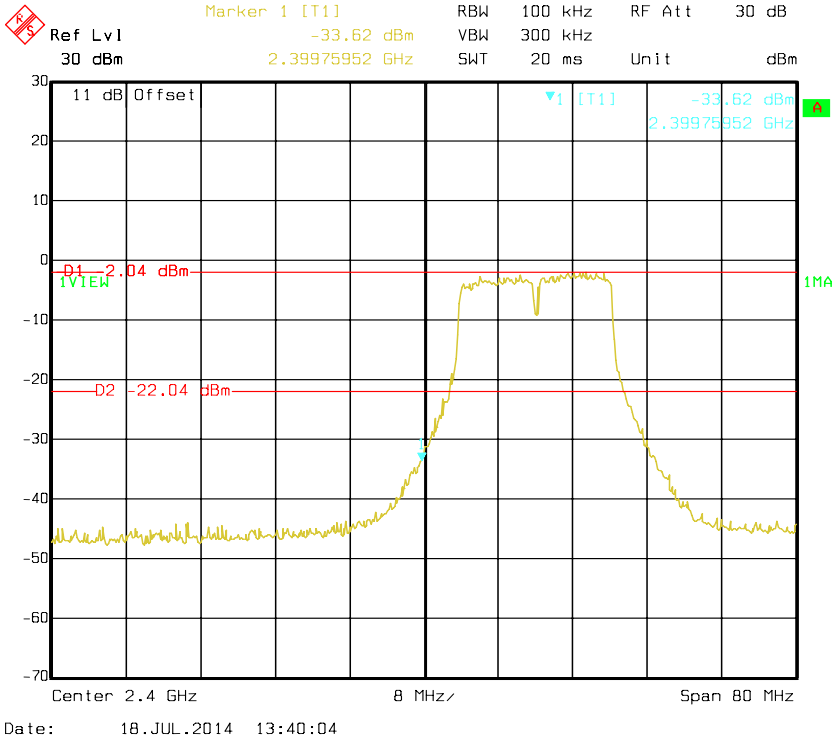
802.11b: Band Edge, Left Side for Antenna 0



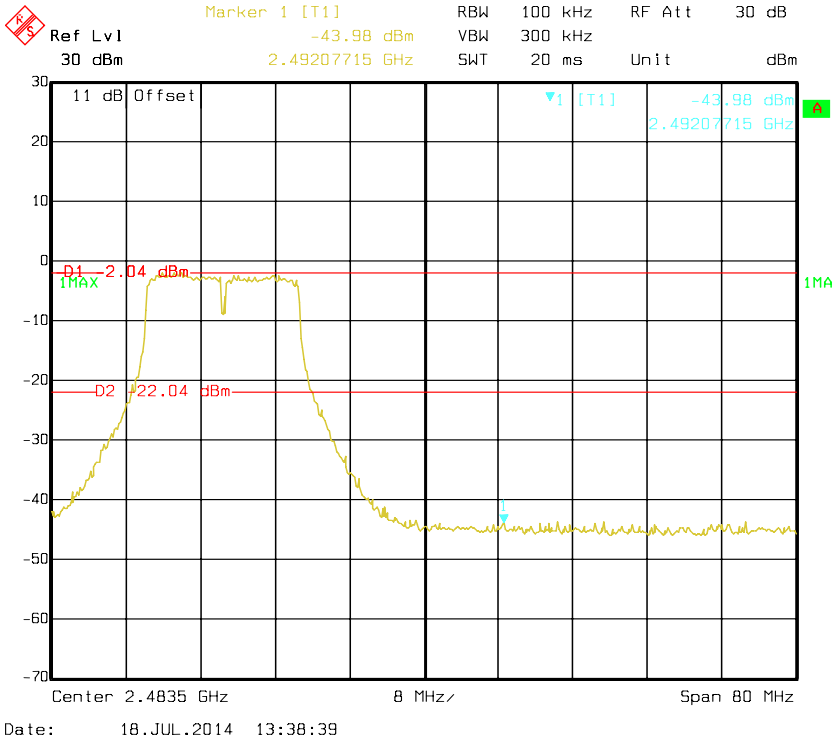
802.11b: Band Edge, Right Side for Antenna 0



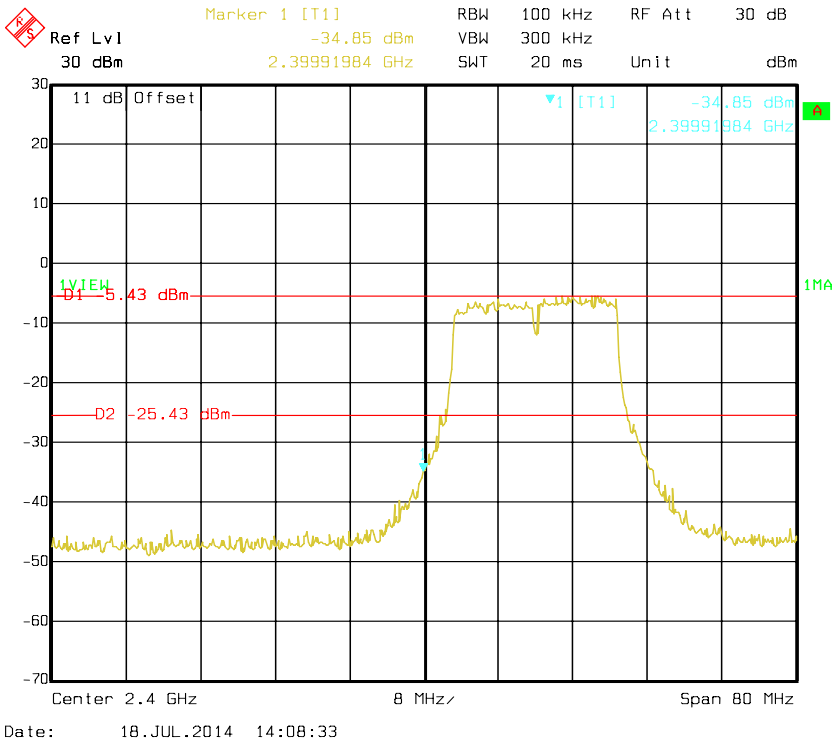
802.11g: Band Edge, Left Side for Antenna 0



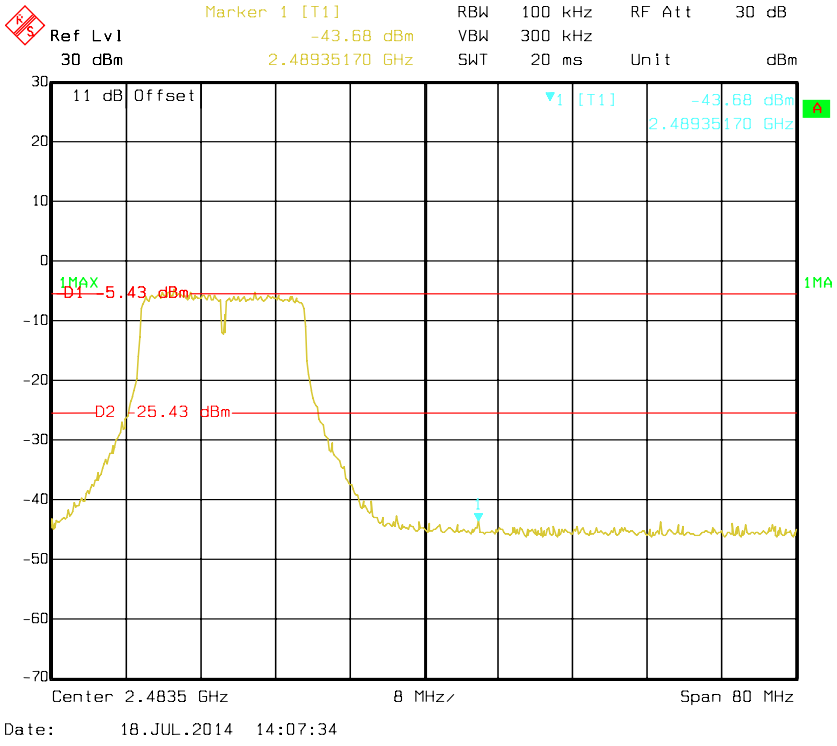
802.11g: Band Edge, Right Side for Antenna 0



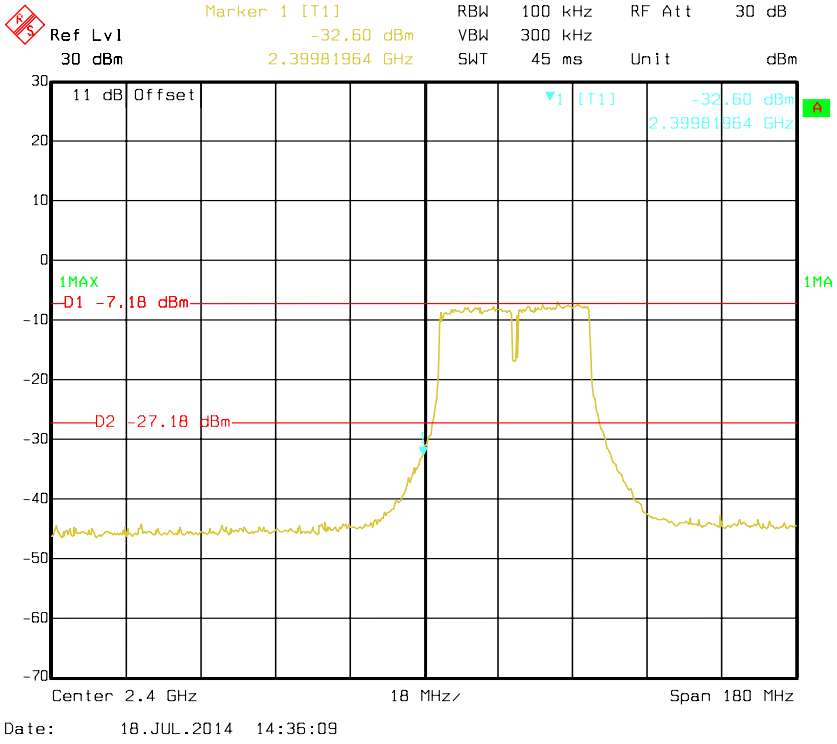
802.11n HT20 Band Edge, Left Side for Antenna 0



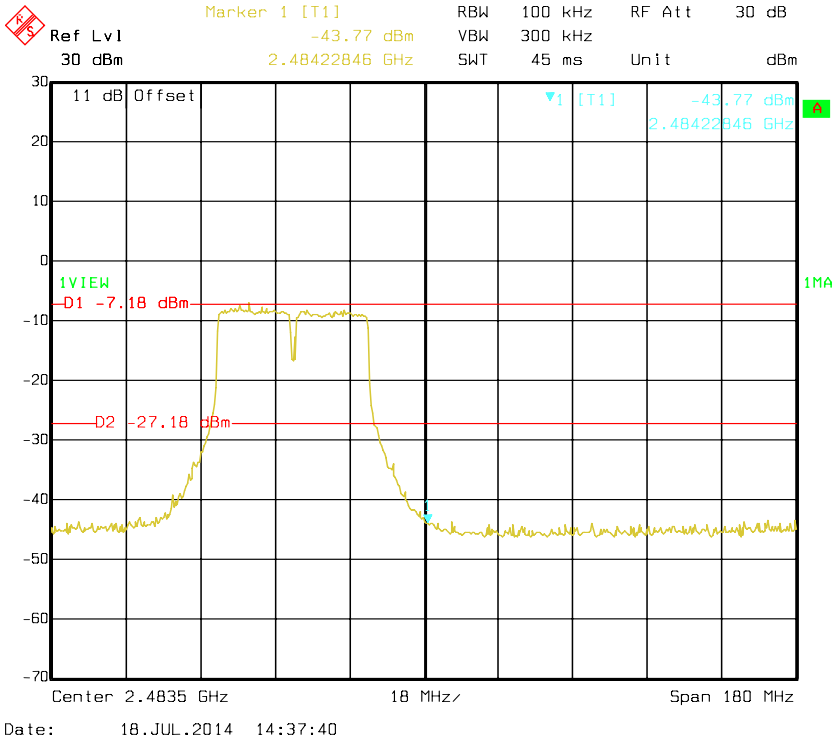
802.11n HT20 Band Edge, Right Side for Antenna 0



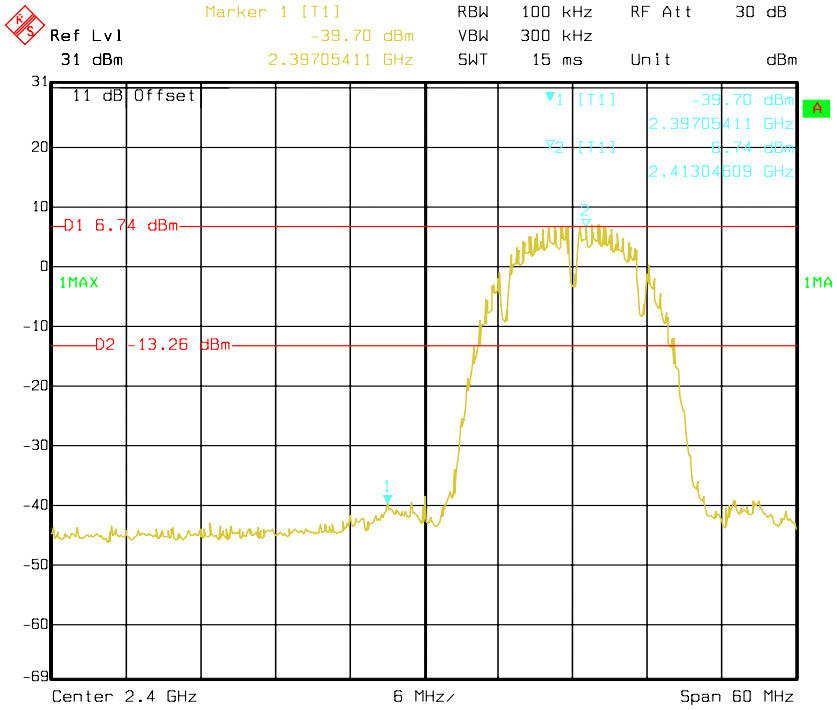
802.11n HT40 Band Edge, Left Side for Antenna 0



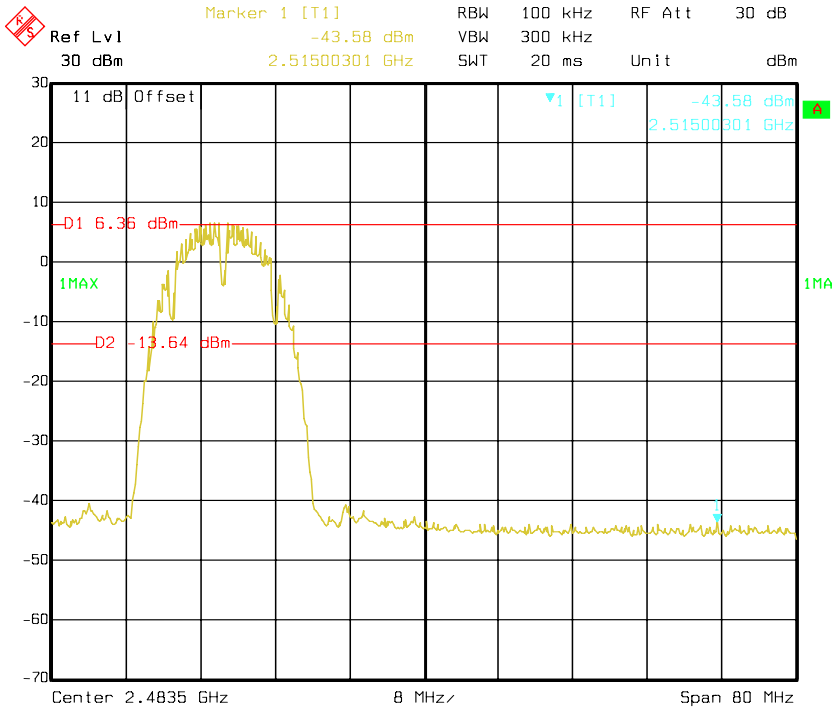
802.11n HT40 Band Edge, Right Side for Antenna 0



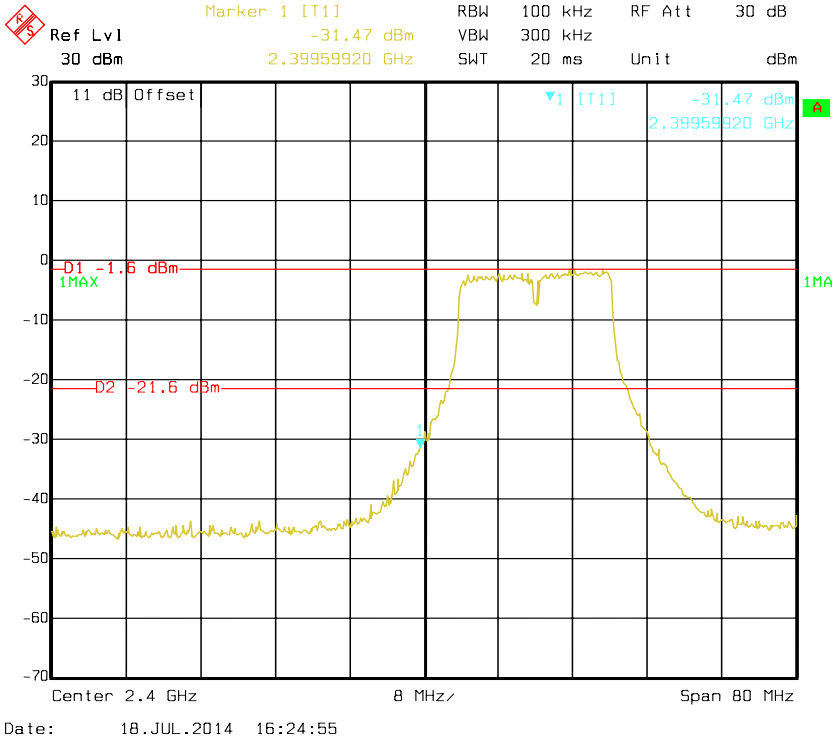
802.11b: Band Edge, Left Side for Antenna 1



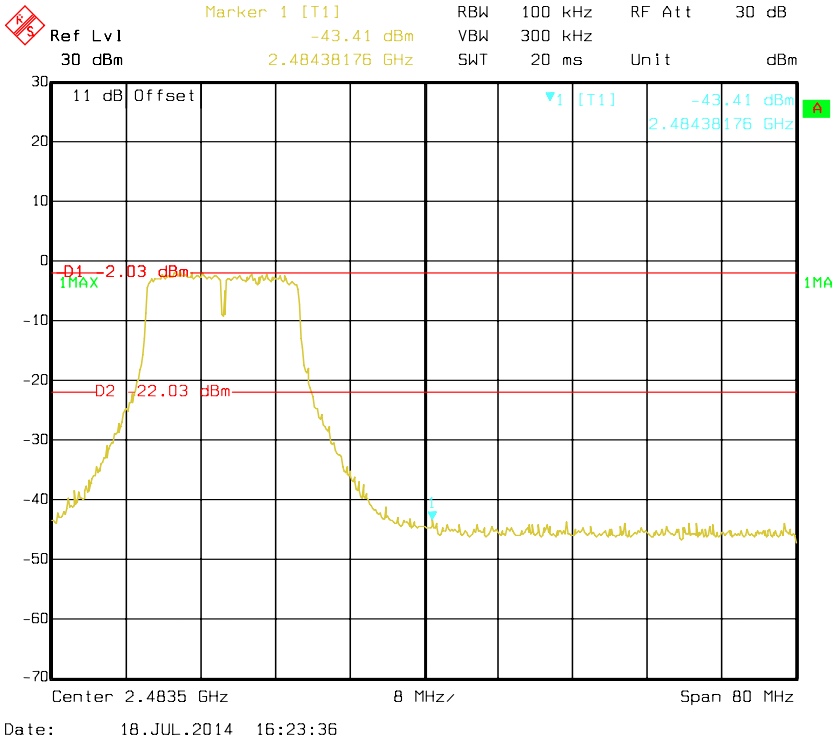
802.11b: Band Edge, Right Side for Antenna 1



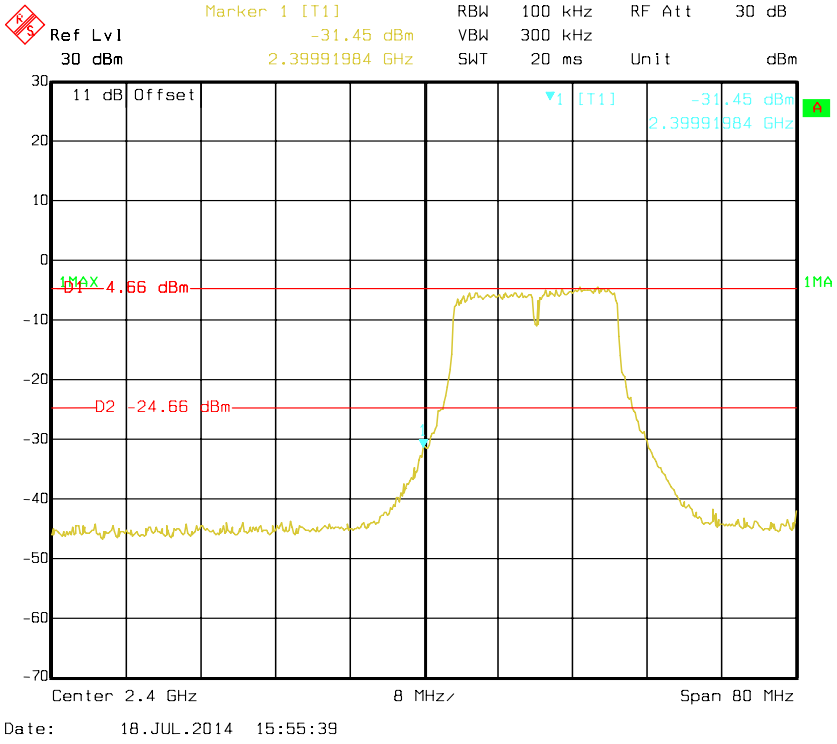
802.11g: Band Edge, Left Side for Antenna 1



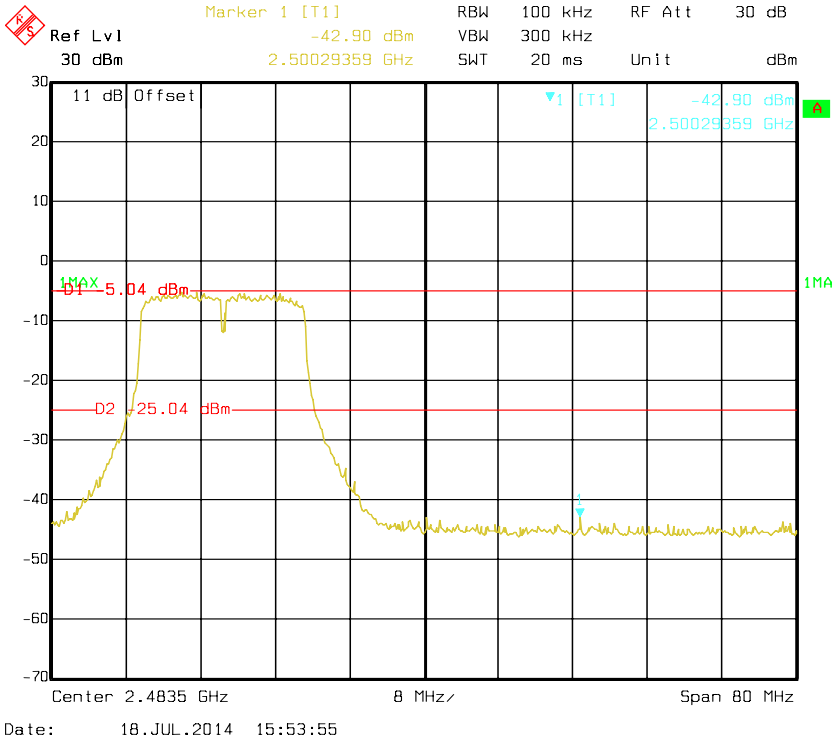
802.11g: Band Edge, Right Side for Antenna 1



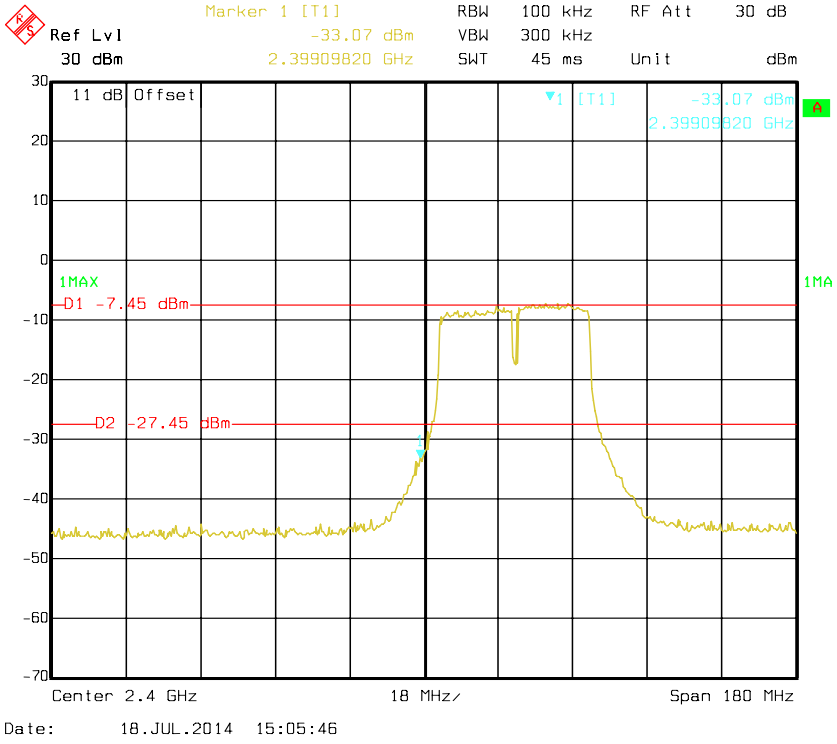
802.11n HT20 Band Edge, Left Side for Antenna 1



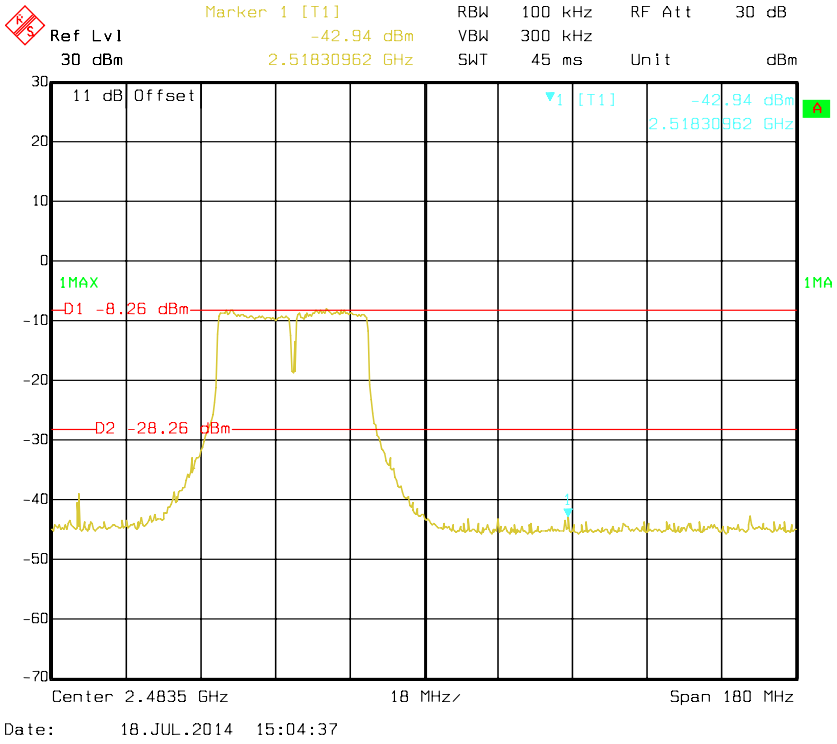
802.11n HT20 Band Edge, Right Side for Antenna 1



802.11n HT40 Band Edge, Left Side for Antenna 1



802.11n HT40 Band Edge, Right Side for Antenna 1



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. According to KDB 558074 D01 DTS Meas Guidance v03r02, 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
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2013-10-17	2014-10-16

*** Statement of Traceability:** BACL (Chengdu) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	30 °C & 29 °C
Relative Humidity:	42 % & 50 %
ATM Pressure:	100.7 kPa & 100.7 kPa

The testing was performed by Fidel Zhou on 2014-07-18 & 2014-07-25.

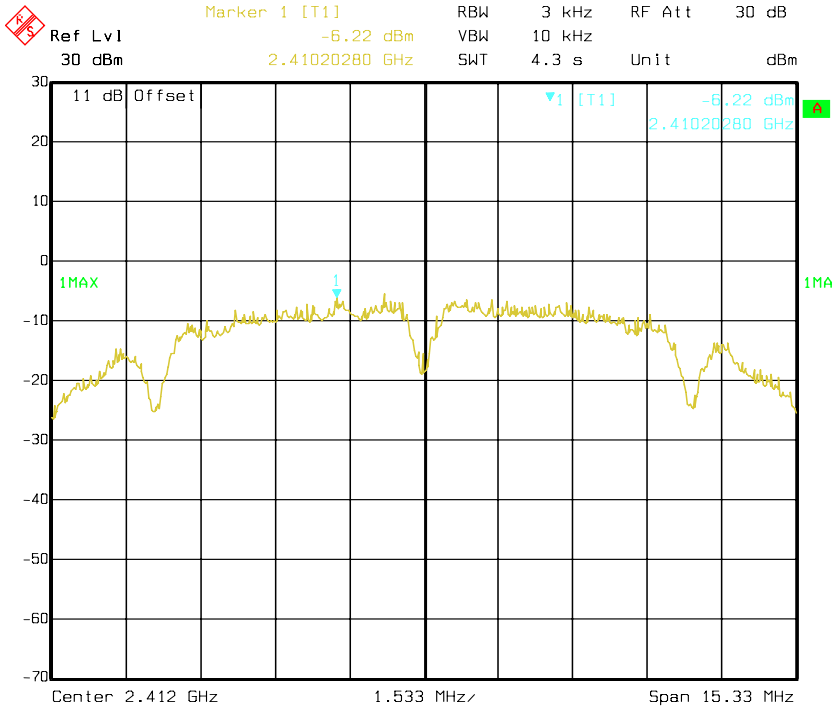
Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	Conducted Output Power (dBm)			Limit (dBm)	Result
			Antenna 0	Antenna 1	Total		
2.4G band 802.11b	Low	2412	-6.22	-5.22	/	8	Pass
	Middle	2437	-6.27	-6.55	/	8	Pass
	High	2462	-6.70	-6.28	/	8	Pass
2.4G band 802.11 g	Low	2412	-12.46	-12.80	/	8	Pass
	Middle	2437	-13.79	-13.25	/	8	Pass
	High	2462	-13.10	-14.31	/	8	Pass
2.4G band 802.11n HT20	Low	2412	-15.92	-17.03	-13.43	8	Pass
	Middle	2437	-16.87	-15.98	-13.39	8	Pass
	High	2462	-17.25	-17.25	-14.24	8	Pass
2.4G band 802.11n HT40	Low	2422	-18.35	-18.80	-15.56	8	Pass
	Middle	2437	-19.74	-19.63	-16.67	8	Pass
	High	2452	-19.65	-20.47	-17.03	8	Pass

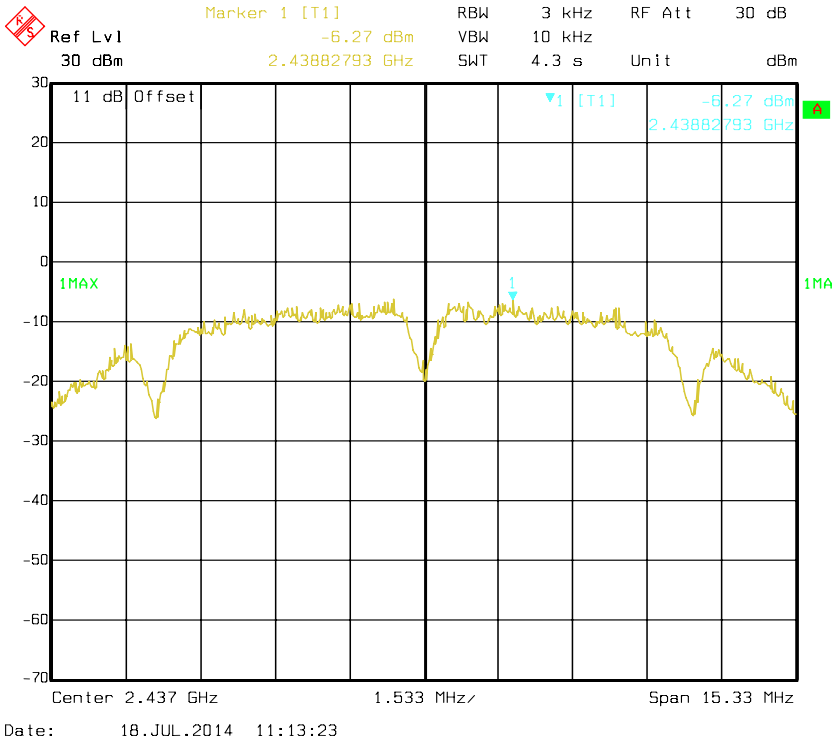
Note: Duty cycle is more than 98%.

Please refer to the following plots.

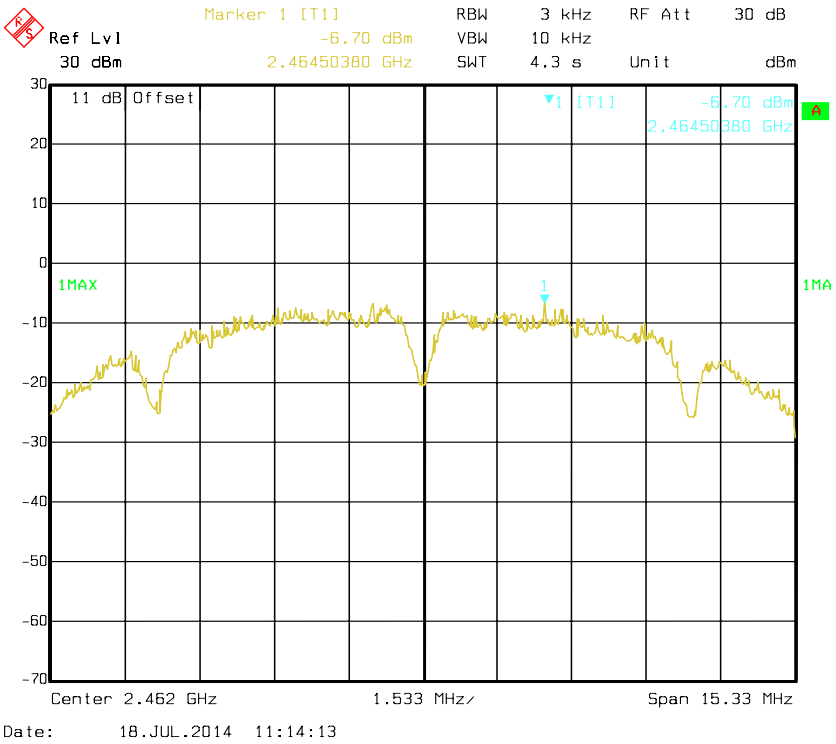
Power Spectral Density, 802.11b Low Channel for Antenna 0



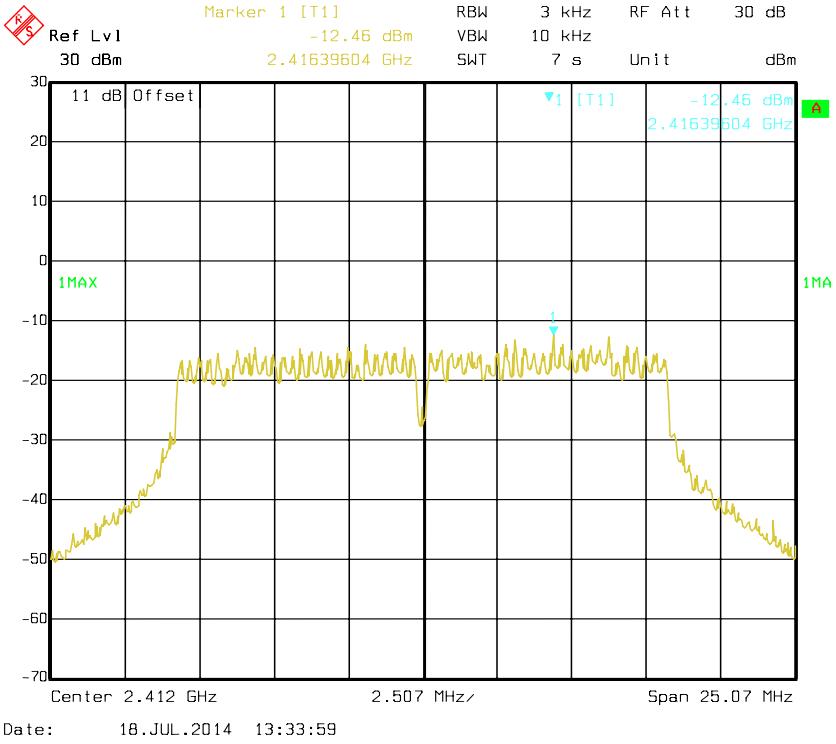
Power Spectral Density, 802.11b Middle Channel for Antenna 0



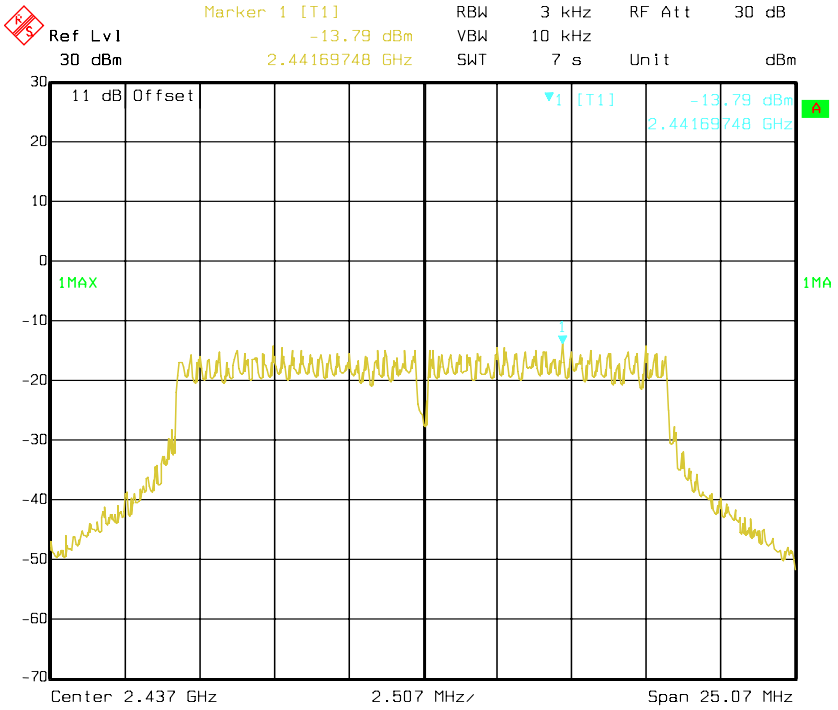
Power Spectral Density, 802.11b High Channel for Antenna 0



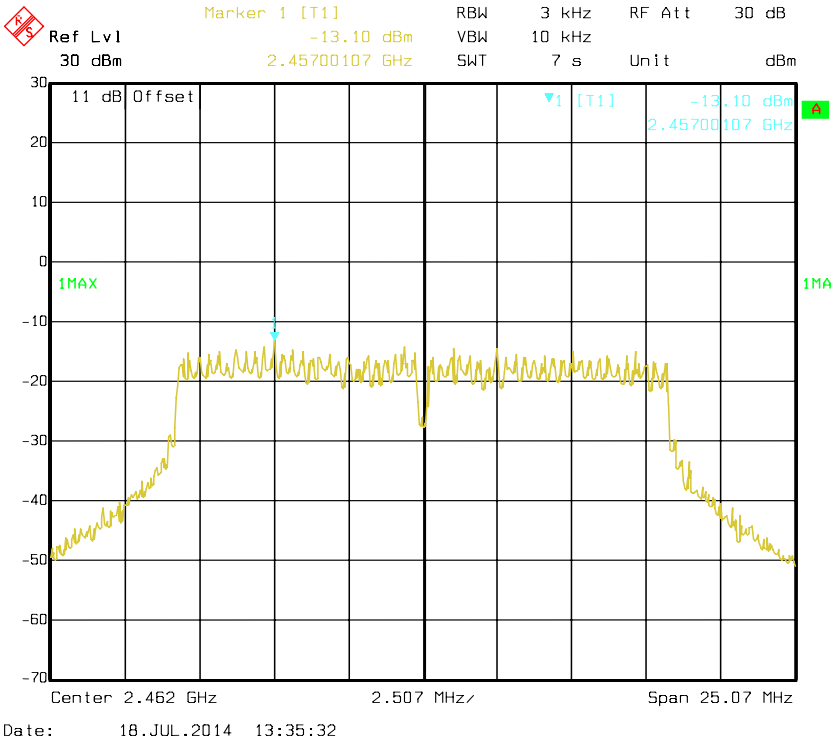
Power Spectral Density, 802.11g Low Channel for Antenna 0



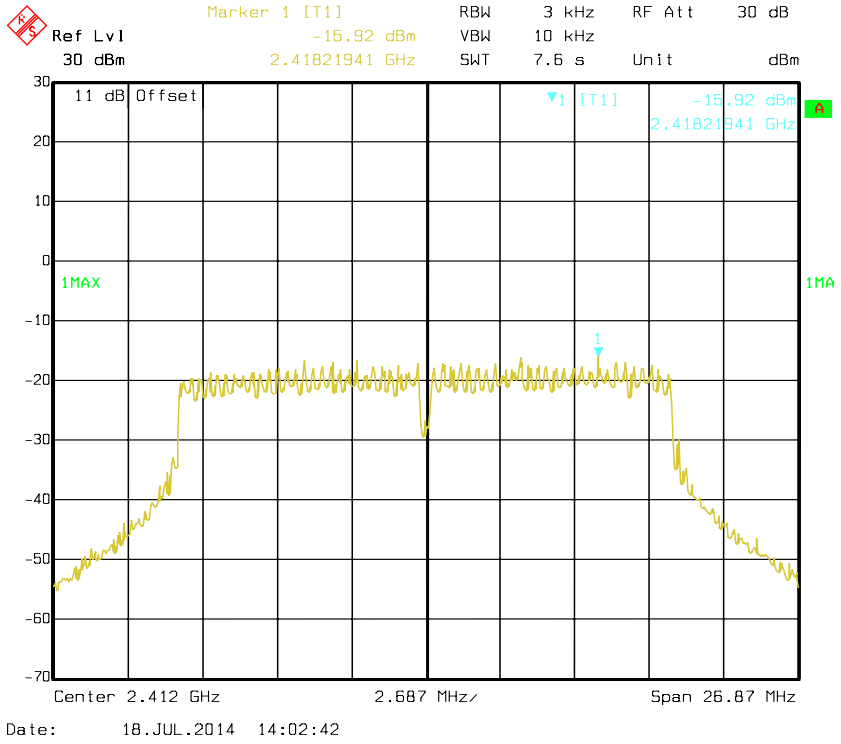
Power Spectral Density, 802.11g Middle Channel for Antenna 0



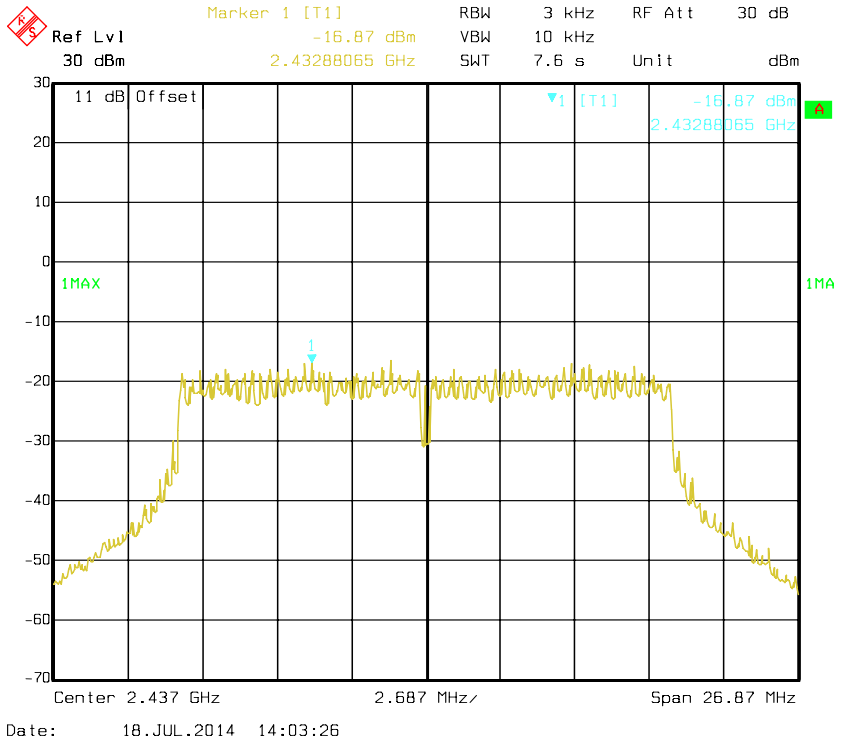
Power Spectral Density, 802.11g High Channel for Antenna 0



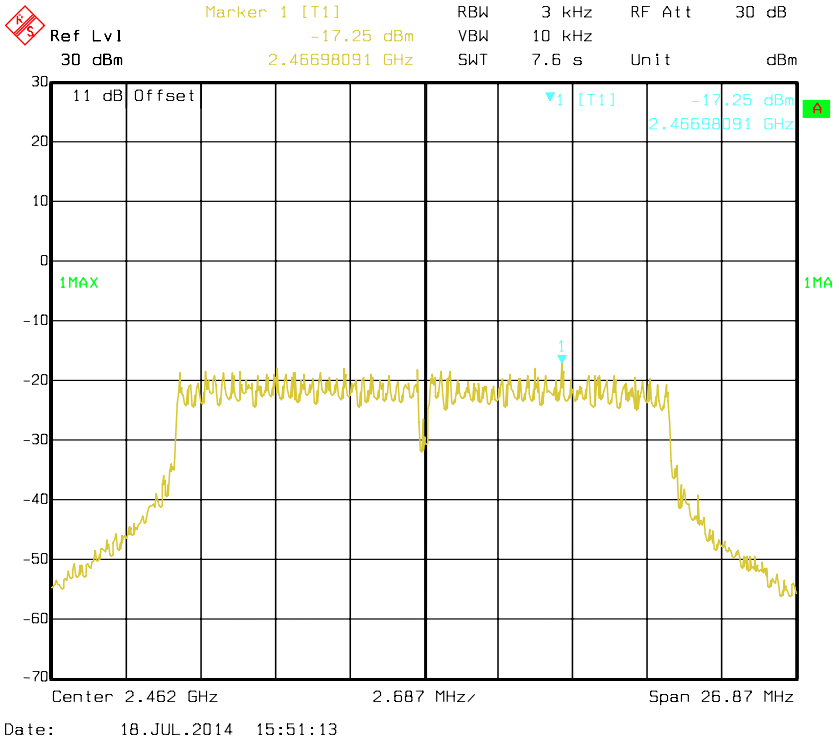
Power Spectral Density, 802.11n HT20 Low Channel for Antenna 0



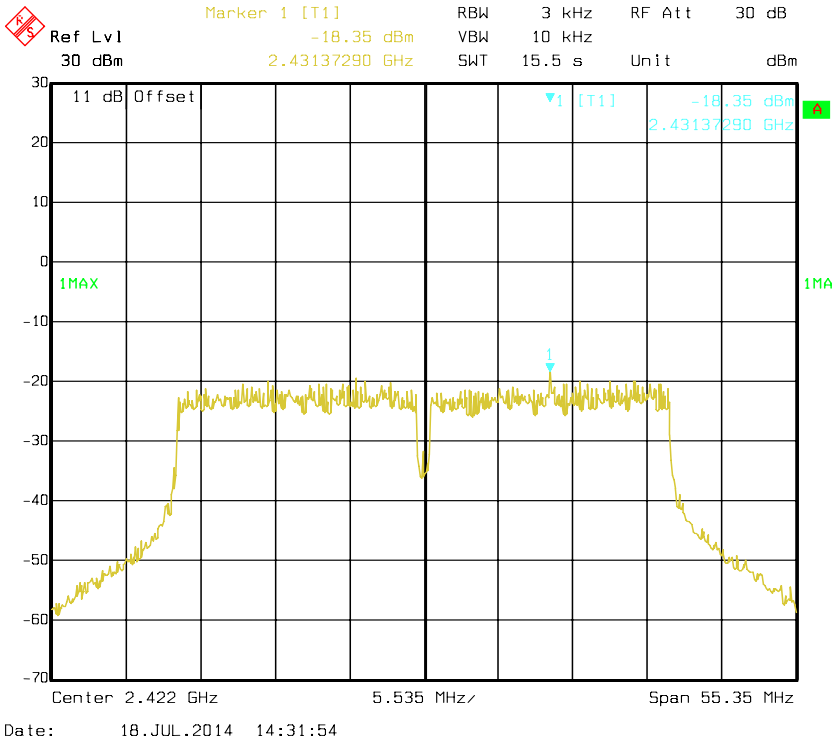
Power Spectral Density, 802.11n HT20 Middle Channel for Antenna 0



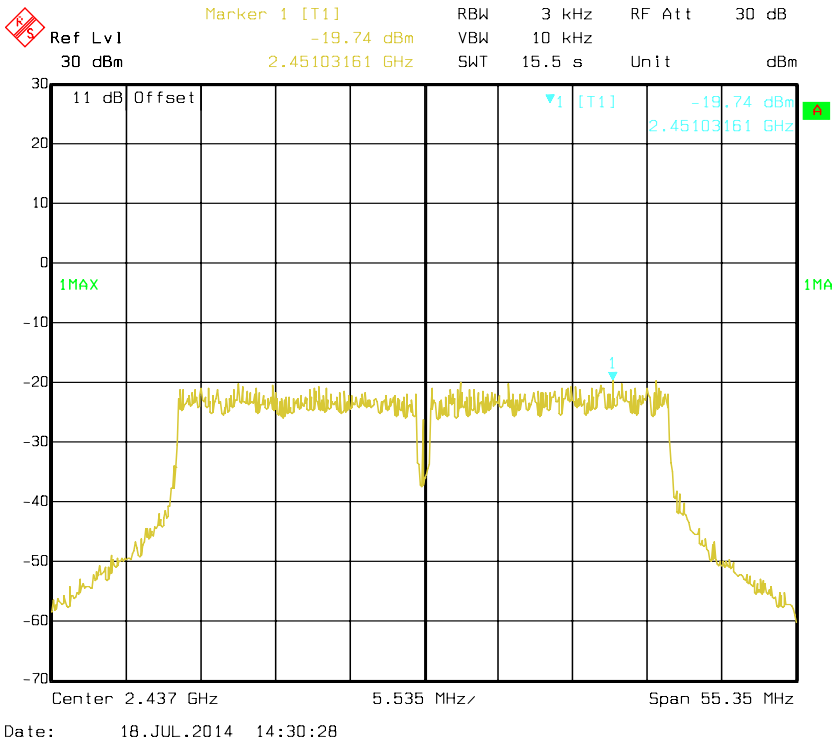
Power Spectral Density, 802.11n HT20 High Channel for Antenna 0



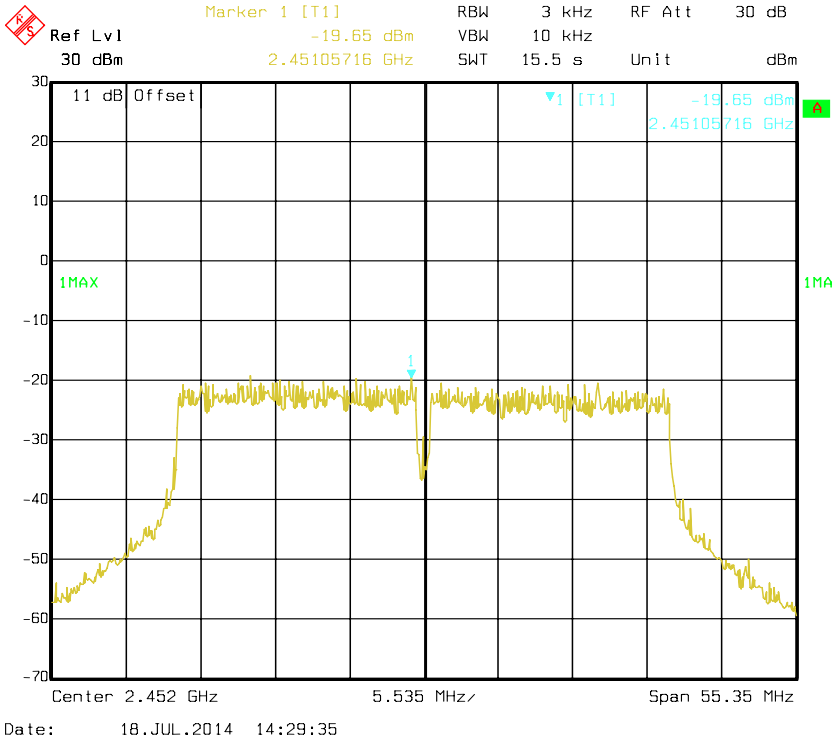
Power Spectral Density, 802.11n HT40 Low Channel for Antenna 0



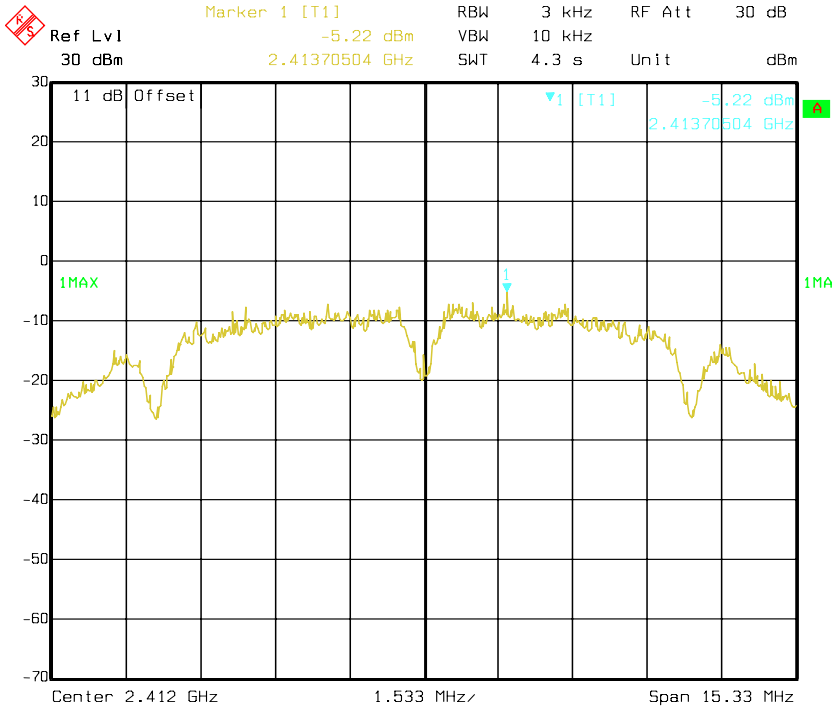
Power Spectral Density, 802.11n HT40 Middle Channel for Antenna 0



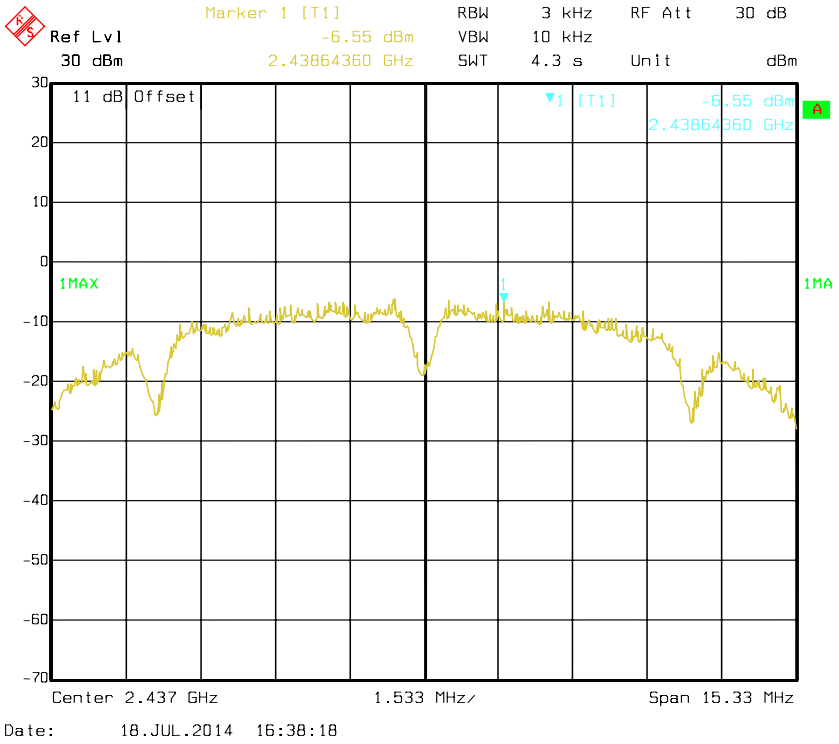
Power Spectral Density, 802.11n HT40 High Channel for Antenna 0



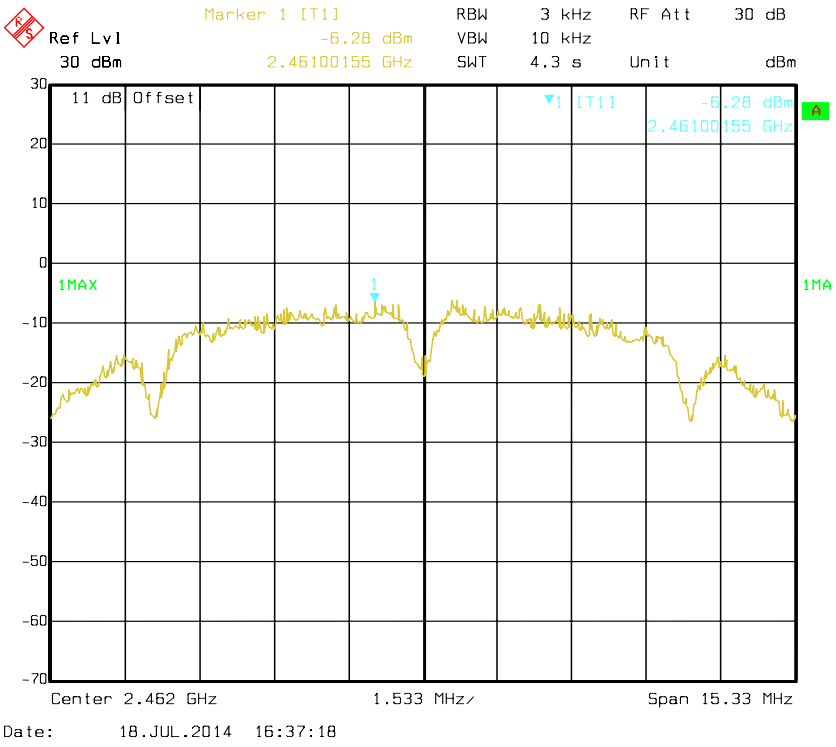
Power Spectral Density, 802.11b Low Channel for Antenna 1



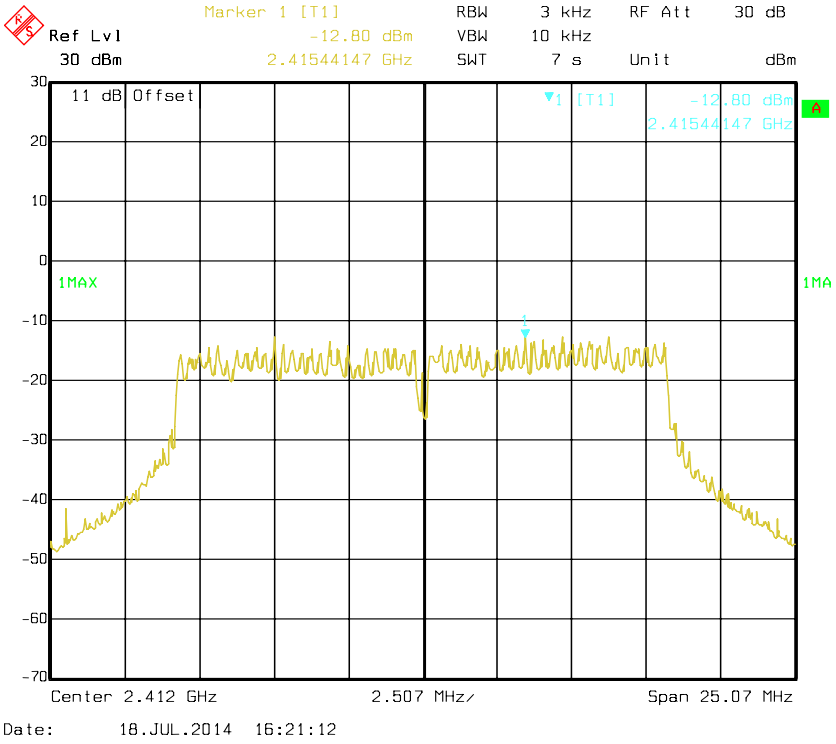
Power Spectral Density, 802.11b Middle Channel for Antenna 1



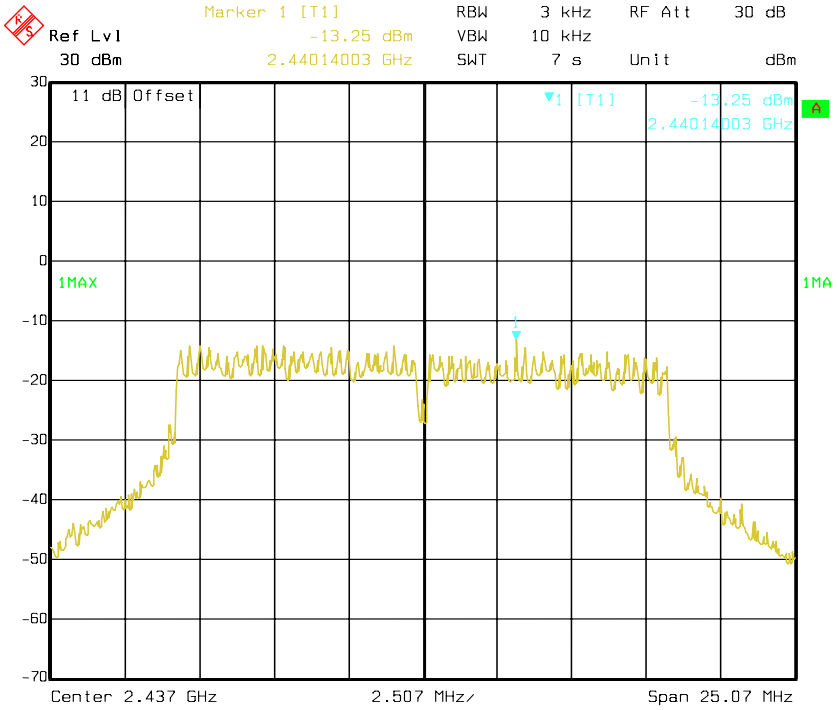
Power Spectral Density, 802.11b High Channel for Antenna 1



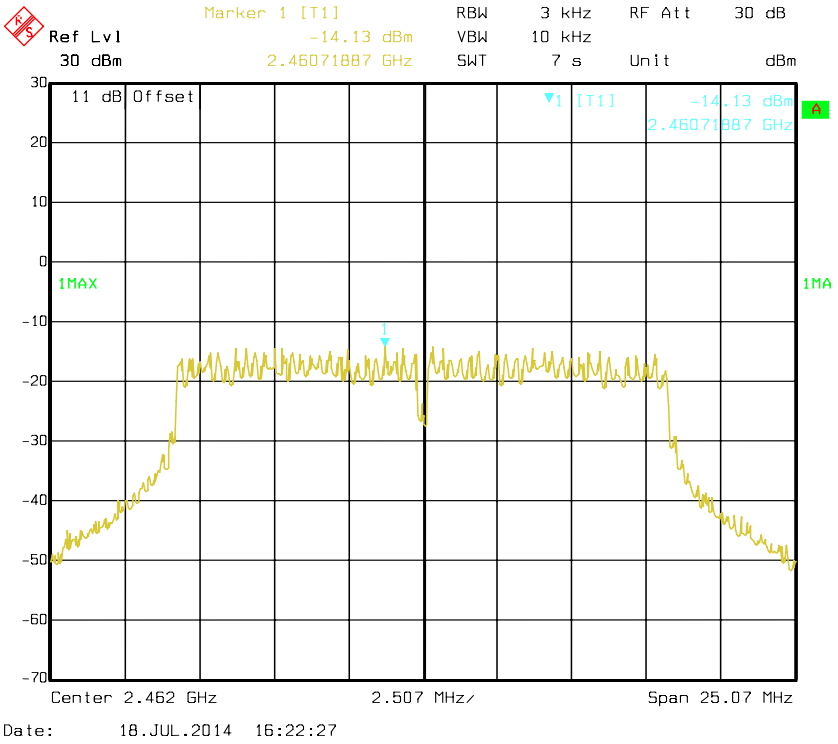
Power Spectral Density, 802.11g Low Channel for Antenna 1



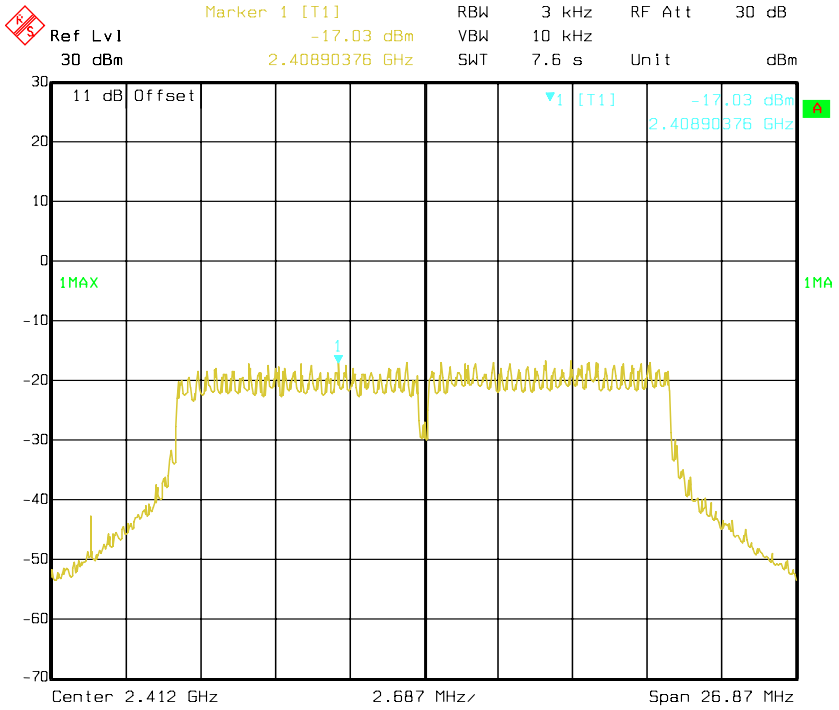
Power Spectral Density, 802.11g Middle Channel for Antenna 1



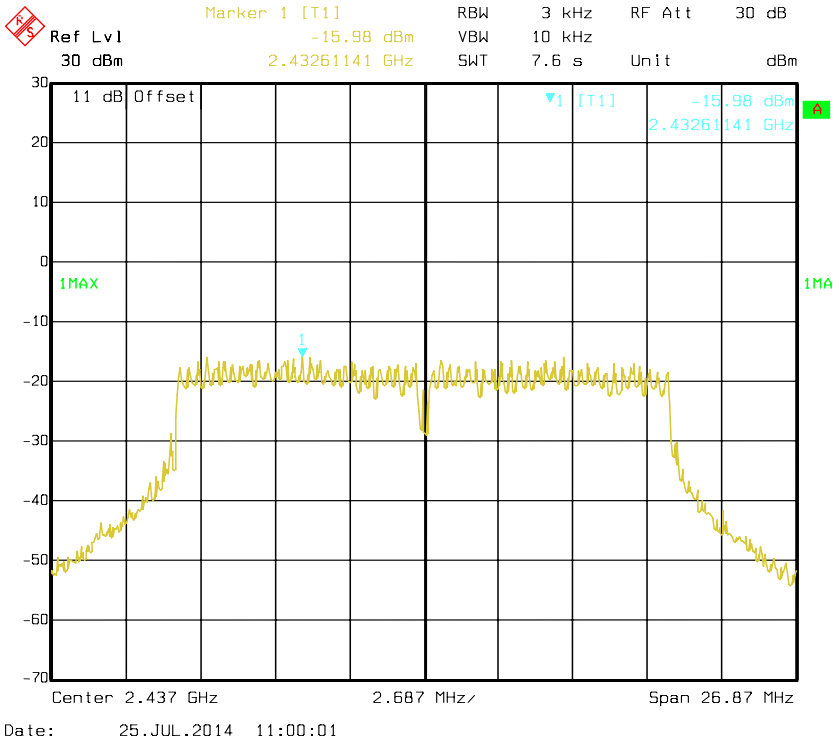
Power Spectral Density, 802.11g High Channel for Antenna 1



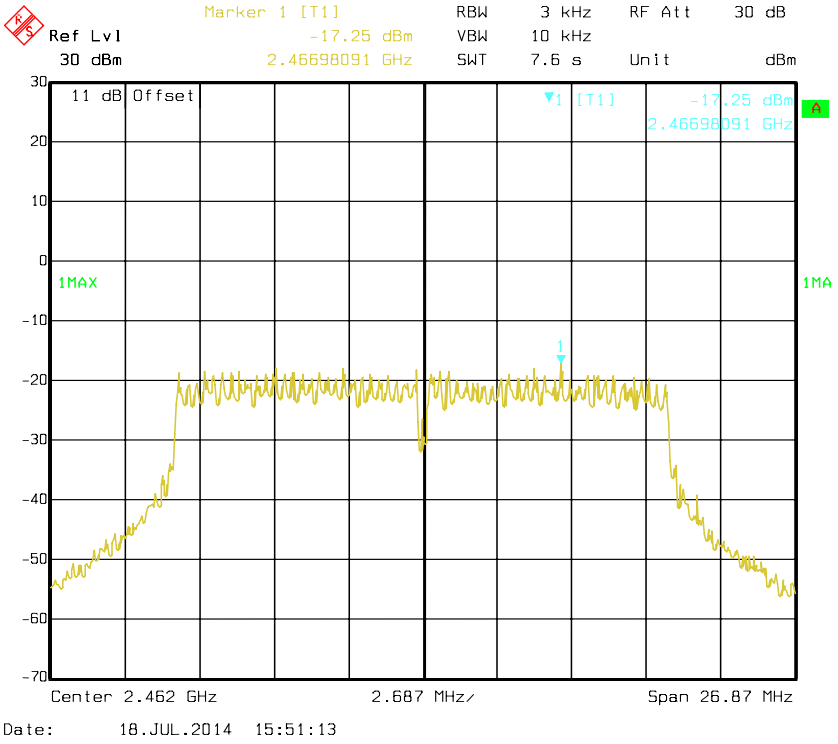
Power Spectral Density, 802.11n HT20 Low Channel for Antenna 1



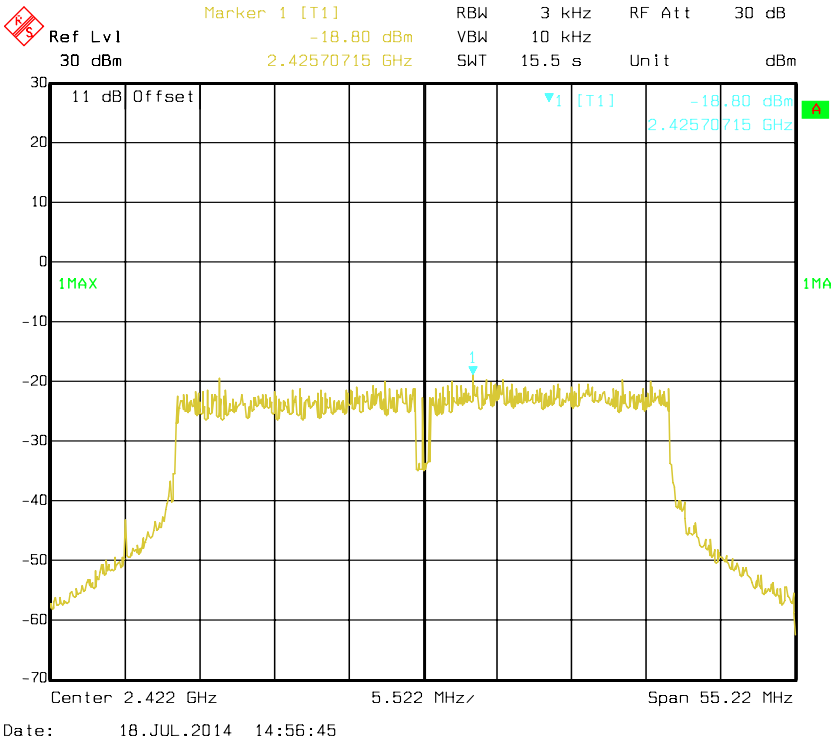
Power Spectral Density, 802.11n HT20 Middle Channel for Antenna 1



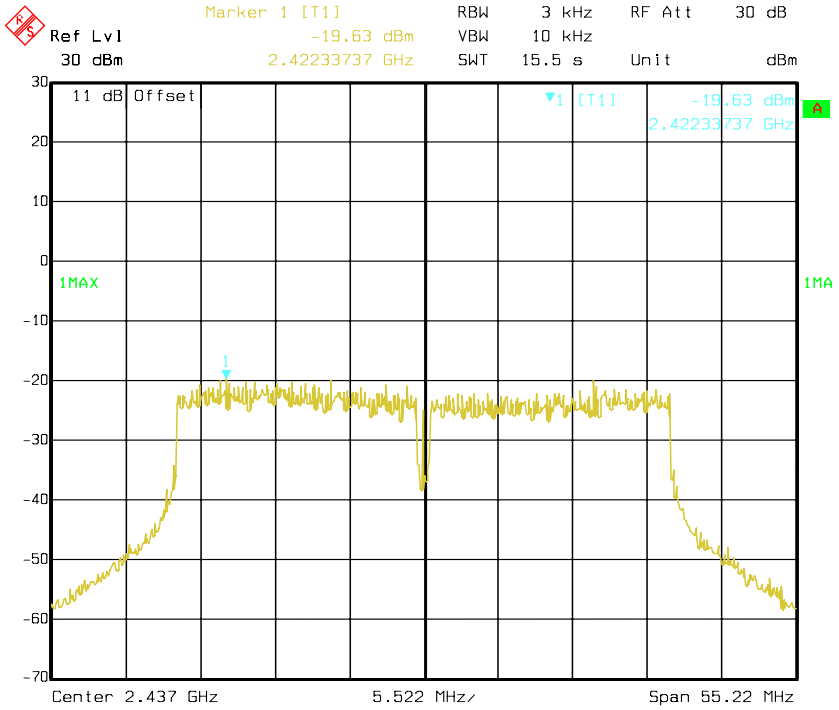
Power Spectral Density, 802.11n HT20 High Channel for Antenna 1



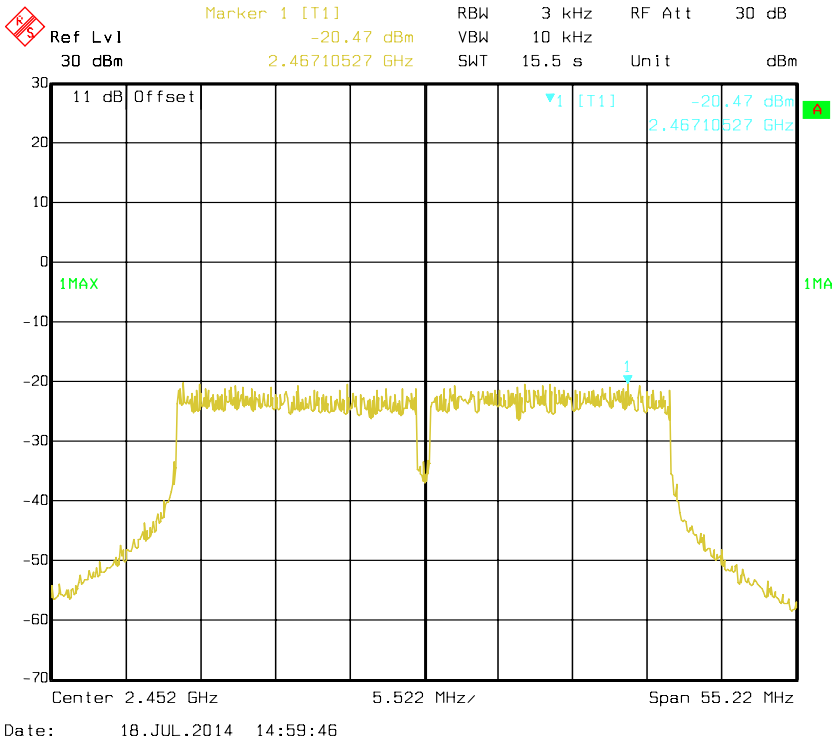
Power Spectral Density, 802.11n HT40 Low Channel for Antenna 1



Power Spectral Density, 802.11n HT40 Middle Channel for Antenna 1



Power Spectral Density, 802.11n HT40 High Channel for Antenna 1



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