



FCC PART 15.247

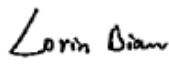
TEST REPORT

For

Huawei Technologies Co.,Ltd

Administration Building, Headquarters of Huawei Technologies Co.,Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

Test Model: EchoLife HS8245W
FCC ID: QISHS8245W1

Report Type: Original Report	Product Name: GPON Terminal
Test Engineer: <u>Lorin Bian</u>	
Report Number: <u>RDG170105002C</u>	
Report Date: <u>2017-01-20</u>	
Reviewed By: <u>Henry Ding</u>	
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

Note: This test report was prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Chengdu). Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. This report was valid only with a valid digital signature.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The **Huawei Technologies Co.,Ltd**'s product, model number: **EchoLife HS8245W** (**FCC ID: QISHS8245W1**) (the "EUT") in this report was a **GPON Terminal**, which was measured approximately:295 mm (L) x 180 mm (W) x 82 mm (H), rated input voltage: DC 12V from adapter.

Objective

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

The tests were performed in order to determine the compliance of the EUT with FCC Part 15-Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

This is the second application for model number: **EchoLife HS8245W**, the first application was certified with FCC ID: **QISHS8245W**, granted on 2016-12-13, the difference between the original device and the current one is as follows:

- 1.Changed the 5GHz band antenna connector type from welded to IPEX type, cable and antenna have not changed.
2. Removed the heat sink of main chip SD5116T.
3. Increased the output power of 5.8GHz band 20MHz SISO mode middle channels.
4. Added U-NII 5150MHz-5250MHz band 20MHz mode channel 36,40, 44 and 40MHz mode channel 38.

The change made to the device affected the SISO mode data and band 5150-5250MHz all data, recorded in the report.

Related Submittal(s)/Grant(s)

FCC Part 15E NII submissions with FCC ID: QISHS8245W1.
FCC Part 15B JBP submissions with FCC ID: QISHS8245W1.

Test Methodology

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

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (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: ± 5.13 dB;
6G~25GHz: ± 5.47 dB;

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 April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

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.

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §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*

Compliance*: The change made to the device have not affected the results, please refer to the original report: RDG161027004A, Issued on 2016-11-14, by Bay Area Compliance Laboratories Corp. (Chengdu).

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

Applicable Standard

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

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

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

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

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

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

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

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

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

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

Frequency (MHz)	Antenna Gain		Tune-up Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
2400-2483.5	2	1.58	30	1000	20.00	0.31	1.0
5150-5850	2	1.58	30	1000	20.00	0.31	1.0

The 2.4GHz and 5GHz band can transmit simultaneously:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$$=S_{2.4}/S_{limit-2.4} + S_5/S_{limit-5}$$

$$=0.31/1+0.31/1$$

$$=0.62$$

$$< 1.0$$

Result: The device meet FCC MPE at 20 cm distance

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

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

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

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

Antenna Connector Construction

The EUT have 3 internal antennas for 2.4G WIFI and the gain of each antenna is 2.0 dBi, 4 internal antennas for 5G WIFI and the gain of each antenna is 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

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



FCC PART 15.247

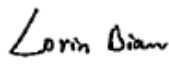
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FCC ID: QISHS8245W

Report Type: Original Report	Product Name: GPON Terminal
Test Engineer: <u>Lorin Bian</u>	
Report Number: <u>RDG161027004A</u>	
Report Date: <u>2016-11-14</u>	
Reviewed By: <u>Henry Ding</u>	
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 **Huawei Technologies Co.,Ltd**'s product, model number: **EchoLife HS8245W** (**FCC ID: QISHS8245W**) (the "EUT") in this report was a **GPON Terminal**, which was measured approximately: 295 mm (L) x 180 mm (W) x 82 mm (H), rated input voltage: DC 12V from adapter.

**All measurement and test data in this report was gathered from final production sample, serial number: 161027004 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2016-10-28, and EUT conformed to test requirement.*

Objective

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

The tests were performed in order to determine the compliance of the EUT with FCC Part 15-Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15E NII submissions with FCC ID: QISHS8245W.
FCC Part 15B JBP submissions with FCC ID: QISHS8245W.

Test Methodology

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

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (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: ± 5.13 dB;
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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 testing in testing mode, which was provided by manufacturer.

For 2.4G band, the device support SISO, 2 x 2 MIMO, 3x3 MIMO at 802.11 n system, and 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. Preliminary tests were performed in difference data rate and all the possible configurations, the worst cases as below table and shown in the report.

Configurations	Test Mode	Data Rate	Channel	Antenna Chain
SISO	802.11b	1Mbps	1,6,11	0, 1, 2
	802.11g	6Mbps	1,6,11	0, 1, 2
	802.11 ht20	MCS0	1,6,11	0, 1, 2
	802.11 ht40	MCS0	3,6,9	0, 1, 2
2*2 MIMO	802.11b	1Mbps	1,6,11	1+2
	802.11g	6Mbps	1,6,11	1+2
	802.11 ht20	MCS0	1,6,11	1+2
	802.11 ht40	MCS0	3,6,9	1+2
3*3 MIMO	802.11b	1Mbps	1,6,11	0+1+2
	802.11g	6Mbps	1,6,11	0+1+2
	802.11 ht20	MCS0	1,6,11	0+1+2
	802.11 ht40	MCS0	3,6,9	0+1+2

EUT Exercise Software

The IPOR&QSPR was used for testing, and the commands were provided by manufacturer. The maximum power and duty cycle was set by commands as following table:

SISO:

Software and version			IPOR&QSPR			
Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Power Level		
				Chain 0	Chain 1	Chain 2
802.11 b	Low	2412	1	23	23	23
	Middle	2437	1	23	23	23
	High	2462	1	23	23	23
802.11 g	Low	2412	6	20	18	19
	Middle	2437	6	20	19	20
	High	2462	6	20	19	20
802.11 n20	Low	2412	MCS0	19	18	18
	Middle	2437	MCS0	19	19	19
	High	2462	MCS0	19	19	19
802.11 n40	Low	2422	MCS0	16	14	14
	Middle	2437	MCS0	16	14	14
	High	2452	MCS0	16	14	14

MIMO 2T2R:

Software and version			IPOR&QSPR	
Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Power Level (Chain 1+2)
802.11 b	Low	2412	1	18
	Middle	2437	1	18
	High	2462	1	18
802.11 g	Low	2412	6	14
	Middle	2437	6	14
	High	2462	6	14
802.11 n20	Low	2412	MCS0	14
	Middle	2437	MCS0	14
	High	2462	MCS0	14
802.11 n40	Low	2422	MCS0	13
	Middle	2437	MCS0	13
	High	2452	MCS0	12

MIMO 3T3R:

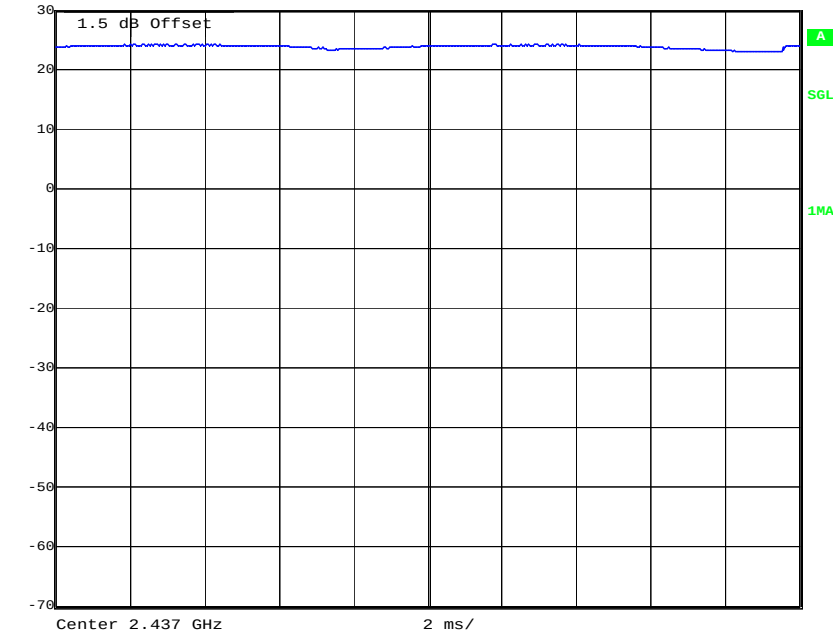
Software and version			IPOR&QSPR	
Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Power Level (Chain 0+1+2)
802.11 b	Low	2412	1	18
	Middle	2437	1	18
	High	2462	1	18
802.11 g	Low	2412	6	14
	Middle	2437	6	14
	High	2462	6	14
802.11 n20	Low	2412	MCS0	14
	Middle	2437	MCS0	14
	High	2462	MCS0	14
802.11 n40	Low	2422	MCS0	13
	Middle	2437	MCS0	13
	High	2452	MCS0	12

The duty cycle as below:

Mode	T _{on} (ms)	T _{on+off} (ms)	Duty Cycle (%)	Minimum Transmission Duration (T) (ms)
802.11b	20	20	100	0
802.11g	2.05	2.08	98.56	2.05
802.11n ht20	1.91	1.95	97.95	1.91
802.11n ht40	0.95	0.97	97.94	0.95

802.11b

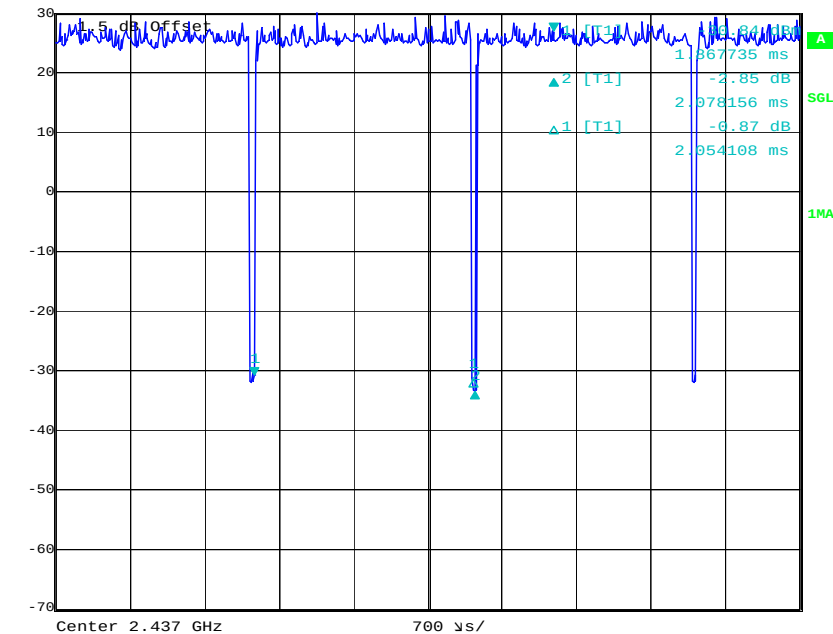
Ref Lvl 30 dBm RBW 10 MHz RF Att 40 dB
 VBW 10 MHz
 SWT 20 ms Unit dBm



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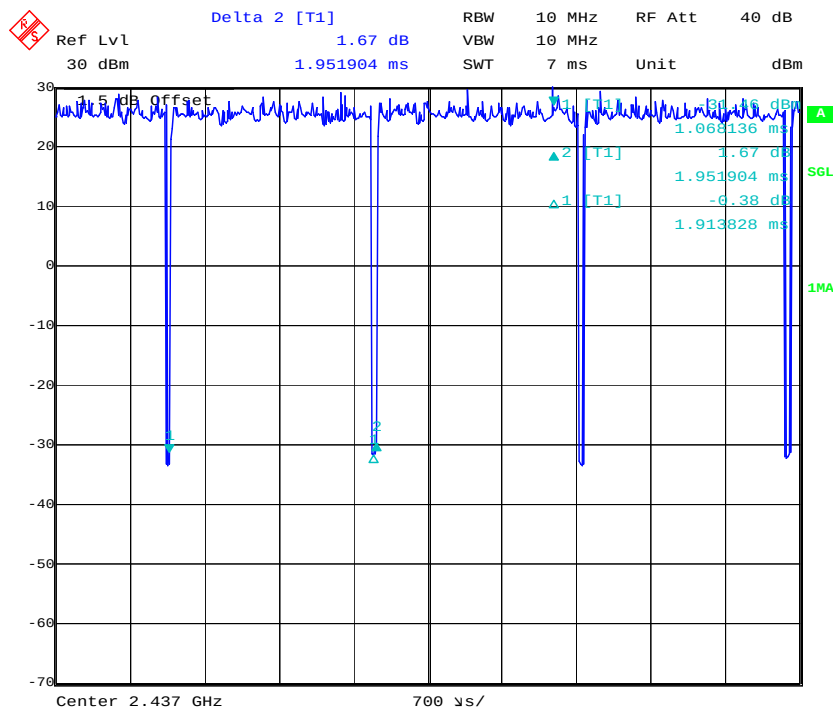
802.11g

Ref Lvl 30 dBm RBW 10 MHz RF Att 40 dB
 VBW 10 MHz
 SWT 7 ms Unit dBm

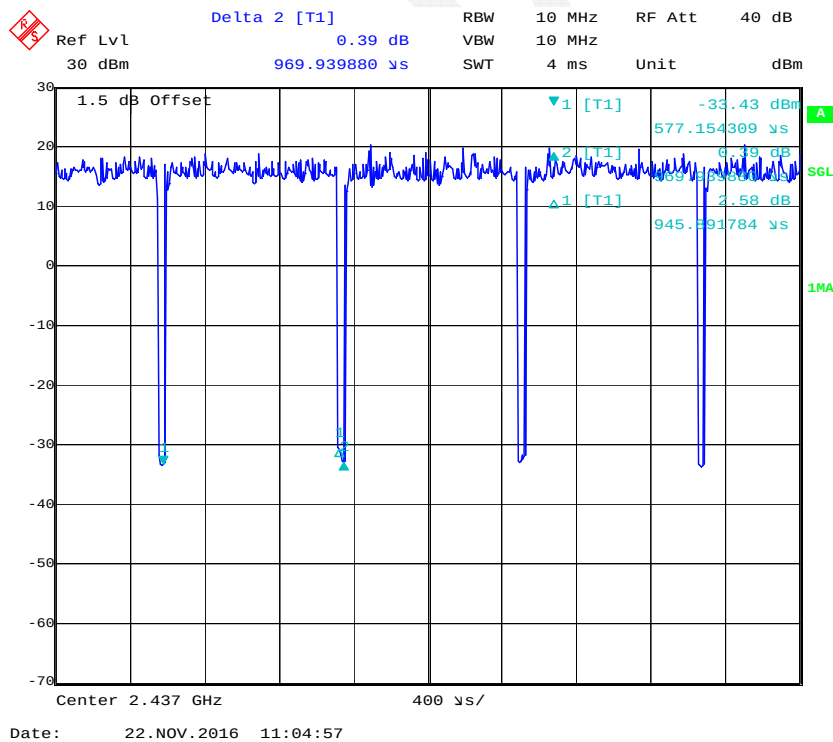


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802.11n ht20



802.11n ht40



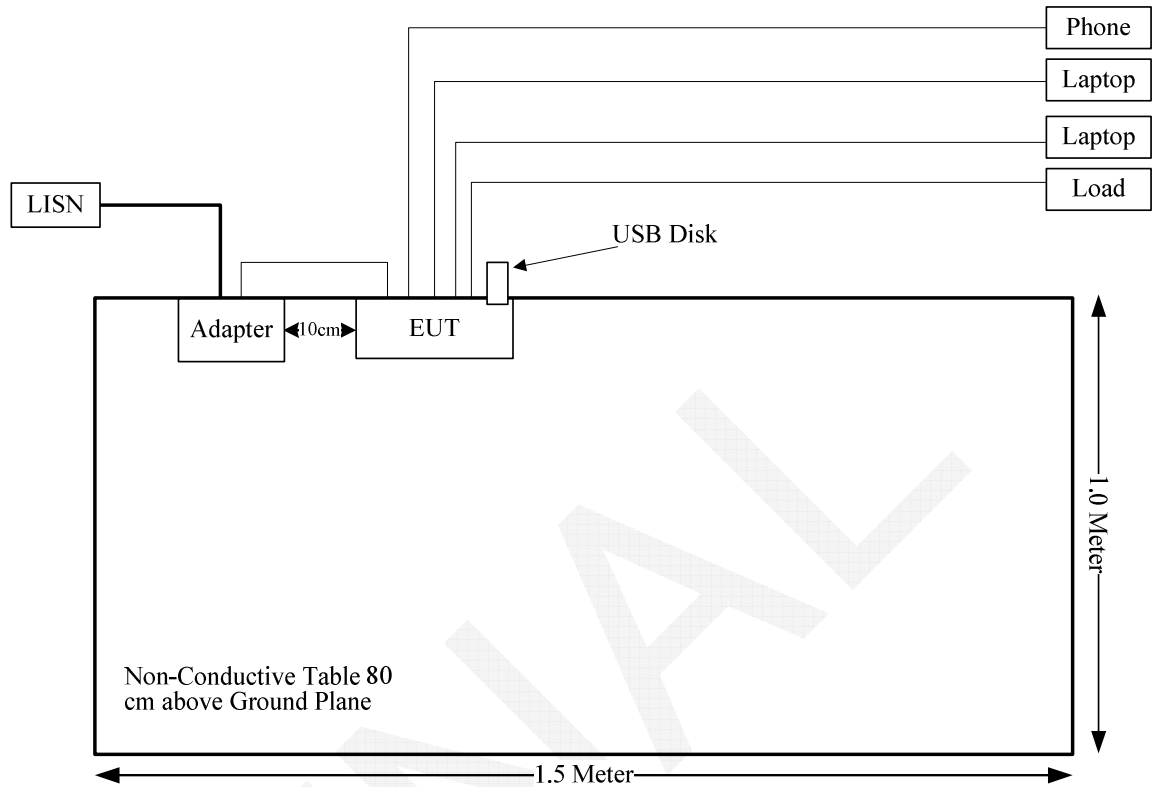
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Dell	Laptop	E6410	/
HUAWEI	Adapter	HW-120300U3W	/
Kingston	USB Disk	8G	/
Lusent	Phone	08D+	48589
DELL	Laptop	PP11L	QDS-BRCM1017

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45 Cable*2	No	Yes	10	RJ45 Port of Laptop	EUT
DC Power Line	No	No	1.2	Adapter	EUT
RJ45 Cable*2	No	Yes	10	EUT	Load
RJ11 Cable	No	No	10	EUT	phone

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	Maximum Permissible Exposure (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 ²)	Averaging Time (minutes)
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30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

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

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

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

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

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

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

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

Frequency (MHz)	Antenna Gain		Tune-up Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
2400-2483.5	2	1.58	30	1000	20.00	0.31	1.0
5150-5850	2	1.58	30	1000	20.00	0.31	1.0

The 2.4GHz and 5GHz band can transmit simultaneously:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$$=S_{2.4}/S_{limit-2.4} + S_5/S_{limit-5}$$

$$=0.31/1+0.31/1$$

$$=0.62$$

$$< 1.0$$

Result: The device meet FCC MPE at 20 cm distance

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

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

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

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

Antenna Connector Construction

The EUT have 3 internal antennas for 2.4G WIFI and the gain of each antenna is 2.0 dBi, 4 internal antennas for 5G WIFI and the gain of each antenna is 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT 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:

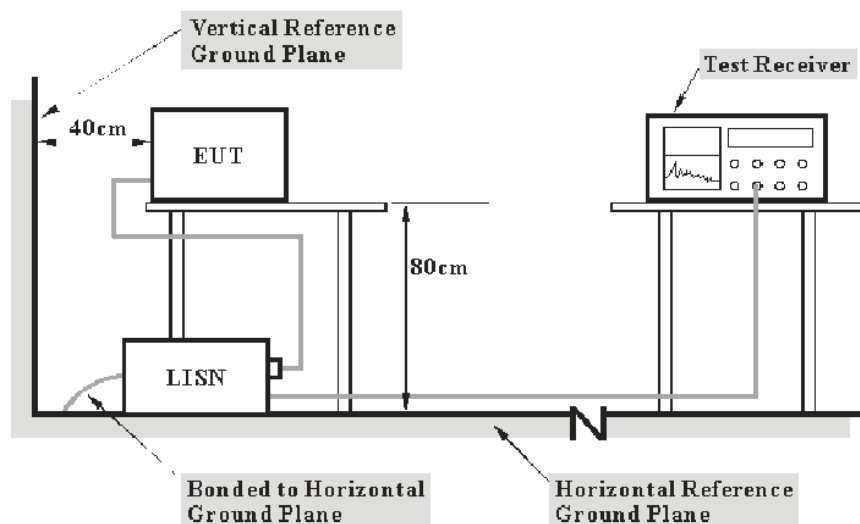
- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

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 is according with per ANSI C63.10-2013 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 V/60 Hz AC 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 first 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
Rohde & Schwarz	EMI Test Receiver	ESCS 30	836858/0016	2015-12-02	2016-12-01
Rohde & Schwarz	L.I.S.N.	ENV216	3560.6550.06	2015-12-02	2016-12-01
Rohde & Schwarz	PULSE LIMITER	ESH3Z2	357.8810.52	2016-10-31	2017-10-30
N/A	Conducted Cable	NO.5	N/A	2015-11-10	2016-11-09
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

* **Statement of Traceability:** BACL (Chengdu) attested 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.

Test Data

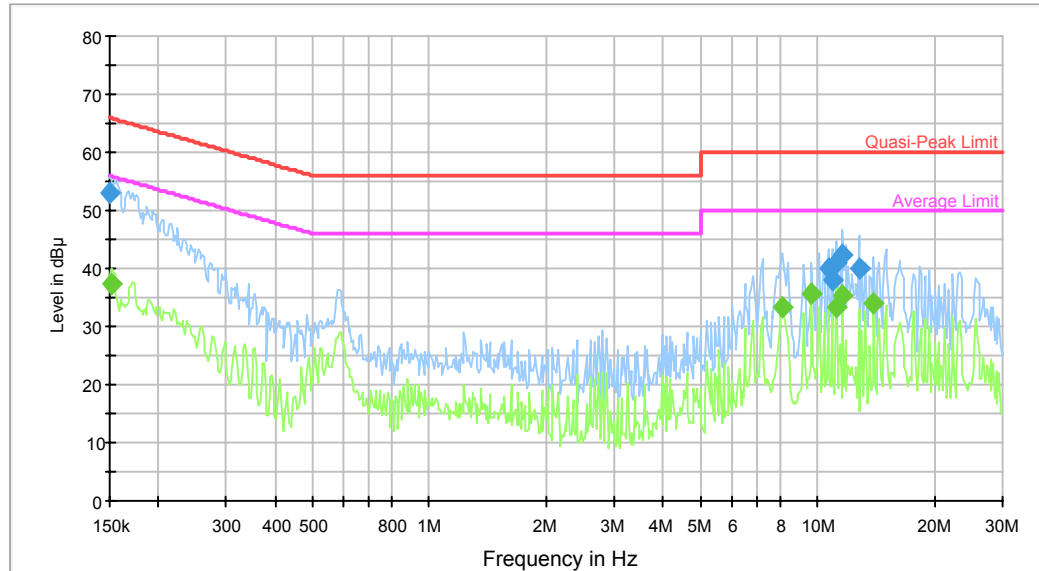
Environmental Conditions

Temperature:	28.6 °C
Relative Humidity:	40 %
ATM Pressure:	101.2 kPa

The testing was performed by Lorin Bian on 2016-11-08.

Test Mode: Transmitting

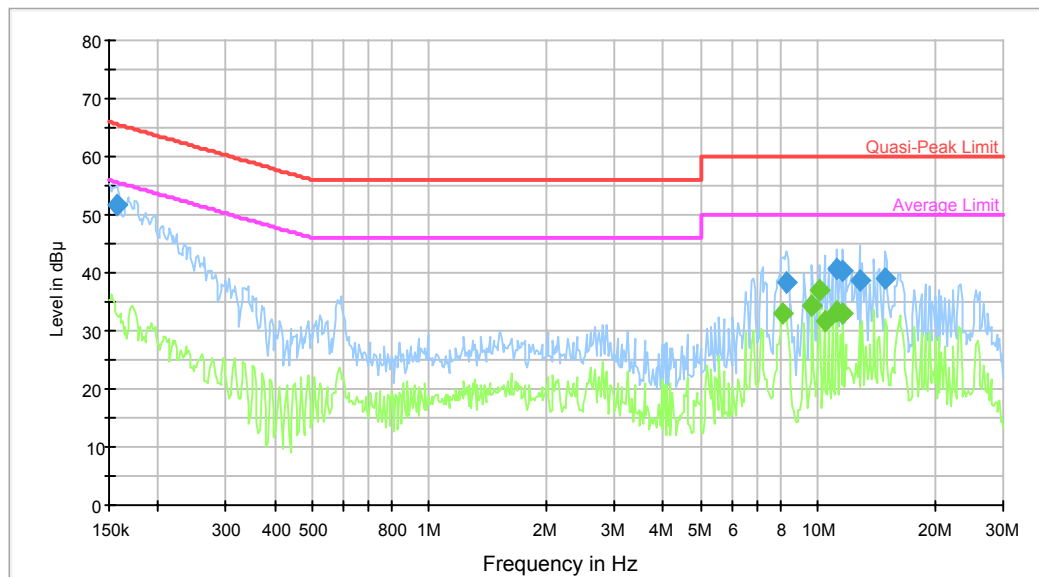
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	53.0	9.000	L1	18.79	13.0	66.0	Compliance
10.653105	39.8	9.000	L1	19.77	20.2	60.0	Compliance
10.910831	38.1	9.000	L1	19.78	21.9	60.0	Compliance
11.174791	40.9	9.000	L1	19.79	19.1	60.0	Compliance
11.628992	42.4	9.000	L1	19.81	17.6	60.0	Compliance
12.795830	40.0	9.000	L1	19.85	20.0	60.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.152410	37.4	9.000	L1	18.79	18.5	55.9	Compliance
8.124902	33.4	9.000	L1	19.7	16.6	50.0	Compliance
9.681660	35.7	9.000	L1	19.74	14.3	50.0	Compliance
11.174791	33.4	9.000	L1	19.79	16.6	50.0	Compliance
11.628992	35.4	9.000	L1	19.81	14.6	50.0	Compliance
13.968003	34.0	9.000	L1	19.88	16.0	50.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.157346	51.8	9.000	N	18.77	13.8	65.6	Compliance
8.321464	38.5	9.000	N	19.69	21.5	60.0	Compliance
11.174791	40.5	9.000	N	19.79	19.5	60.0	Compliance
11.628992	40.4	9.000	N	19.81	19.6	60.0	Compliance
12.795830	38.8	9.000	N	19.85	21.2	60.0	Compliance
14.887390	38.9	9.000	N	19.93	21.1	60.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
8.124902	33.0	9.000	N	19.69	17.0	50.0	Compliance
9.681660	34.2	9.000	N	19.74	15.8	50.0	Compliance
10.075173	36.9	9.000	N	19.75	13.1	50.0	Compliance
10.401468	31.8	9.000	N	19.76	18.2	50.0	Compliance
11.174791	33.3	9.000	N	19.79	16.7	50.0	Compliance
11.628992	32.9	9.000	N	19.81	17.1	50.0	Compliance

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

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

Measurement Uncertainty

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

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

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

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

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

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

30M~200MHz: ± 4.7 dB ;

200M~1GHz: ± 6.0 dB ;

1G-6GHz: ± 5.13 dB;

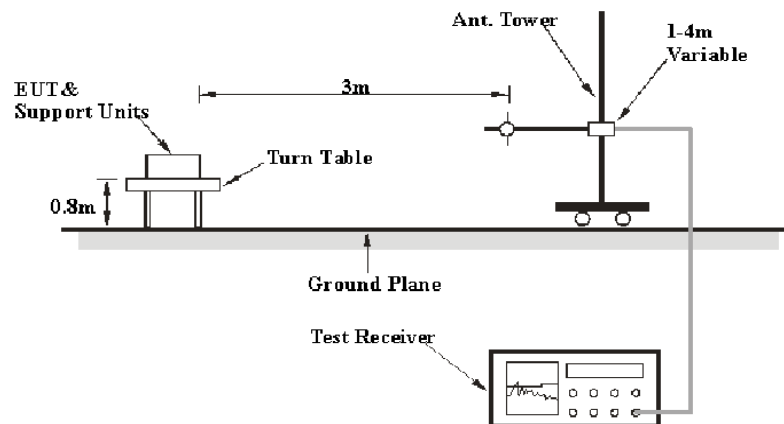
6G~25GHz: ± 5.47 dB;

Table 2 – Values of U_{cispr}

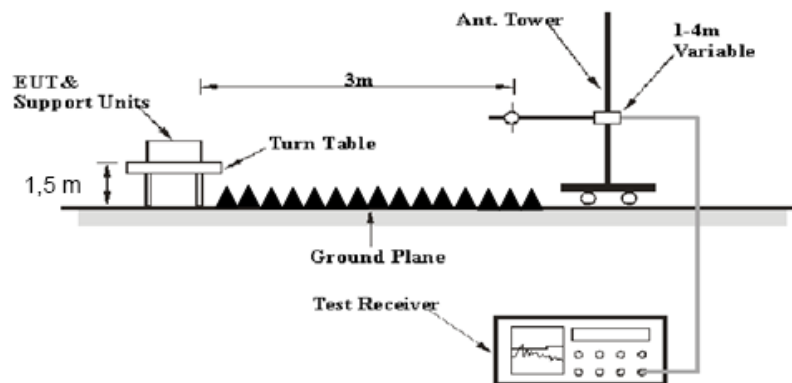
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1GHz:



Above 1GHz:



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

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

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

30-1000MHz:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP

1GHz- 25GHz:

Detector	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
Ave.	>98%	1MHz	10 Hz
	<98%	1MHz	1/T

Test Procedure

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

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

Corrected Amplitude & Margin Calculation

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

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

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

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2015-12-02	2016-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2015-12-02	2016-12-01
Sunol Sciences	Broadband Antenna	JB3	A101808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2015-12-02	2016-12-01
ETS	Horn Antenna	3115	003-6076	2015-12-02	2016-12-01
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-0113024	2014-06-16	2017-06-15
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2016-05-20	2017-05-19
HP	Amplifier	8449B	3008A00277	2015-12-02	2016-12-01
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
N/A	RF Cable (below 1GHz)	NO.1	N/A	2015-11-10	2016-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2015-11-10	2016-11-09
N/A	RF Cable (above 1GHz)	NO.2	N/A	2015-11-10	2016-11-09

* **Statement of Traceability:** BACL (Chengdu) attested 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.

Test Data

Environmental Conditions

Temperature:	28.6 °C
Relative Humidity:	40 %
ATM Pressure:	101.2 kPa

* The testing was performed by Lorin Bian on 2016-11-08.

Test Mode: Transmitting

SISO:

802.11b Mode (Chain 3 was the worst)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	79.81	PK	H	23.50	3.00	0.00	106.31	N/A	N/A
2412	75.07	AV	H	23.50	3.00	0.00	101.57	N/A	N/A
2412	87.90	PK	V	23.50	3.00	0.00	114.40	N/A	N/A
2412	82.55	AV	V	23.50	3.00	0.00	109.05	N/A	N/A
2390	34.80	PK	V	23.57	3.00	0.00	61.37	74.00	12.63
2390	22.84	AV	V	23.57	3.00	0.00	49.41	54.00	4.59
4824	32.37	PK	V	30.84	5.11	26.87	41.45	74.00	32.55
4824	26.08	AV	V	30.84	5.11	26.87	35.16	54.00	18.84
7236	32.86	PK	V	34.77	6.18	26.36	47.45	74.00	26.55
7236	25.47	AV	V	34.77	6.18	26.36	40.06	54.00	13.94
3131	37.14	PK	V	24.93	3.63	26.46	39.24	74.00	34.76
3131	29.37	AV	V	24.93	3.63	26.46	31.47	54.00	22.53
437.4	40.76	QP	V	16.89	1.57	28.43	30.79	46.00	15.21
Middle Channel: 2437 MHz									
2437	78.32	PK	H	23.41	3.00	0.00	104.73	N/A	N/A
2437	73.13	AV	H	23.41	3.00	0.00	99.54	N/A	N/A
2437	87.24	PK	V	23.41	3.00	0.00	113.65	N/A	N/A
2437	82.91	AV	V	23.41	3.00	0.00	109.32	N/A	N/A
4874	32.38	PK	V	31.00	5.09	26.87	41.6	74.00	32.40
4874	25.56	AV	V	31.00	5.09	26.87	34.78	54.00	19.22
7311	32.65	PK	V	34.92	6.21	26.40	47.38	74.00	26.62
7311	26.20	AV	V	34.92	6.21	26.40	40.93	54.00	13.07
3131	37.51	PK	V	24.93	3.63	26.46	39.61	74.00	34.39
3131	29.86	AV	V	24.93	3.63	26.46	31.96	54.00	22.04
3190	35.88	PK	V	25.26	3.72	26.48	38.38	74.00	35.62
3190	28.94	AV	V	25.26	3.72	26.48	31.44	54.00	22.56
437.4	41.26	QP	V	16.89	1.57	28.43	31.29	46.00	14.71
High Channel: 2462 MHz									
2462	78.81	PK	H	23.33	2.99	0.00	105.13	N/A	N/A
2462	73.39	AV	H	23.33	2.99	0.00	99.71	N/A	N/A
2462	87.28	PK	V	23.33	2.99	0.00	113.6	N/A	N/A
2462	82.66	AV	V	23.33	2.99	0.00	108.98	N/A	N/A
2483.5	35.35	PK	V	23.26	2.99	0.00	61.6	74.00	12.40
2483.5	23.80	AV	V	23.26	2.99	0.00	50.05	54.00	3.95
4924	33.01	PK	V	31.16	5.07	26.88	42.36	74.00	31.64
4924	26.17	AV	V	31.16	5.07	26.88	35.52	54.00	18.48
7386	32.83	PK	V	35.07	6.25	26.43	47.72	74.00	26.28
7386	25.95	AV	V	35.07	6.25	26.43	40.84	54.00	13.16
1524	30.35	PK	V	24.14	2.69	26.35	30.83	74.00	43.17
1524	22.92	AV	V	24.14	2.69	26.35	23.4	54.00	30.60
437.4	42.05	QP	V	16.89	1.57	28.43	32.08	46.00	13.92

802.11g Mode (Chain 3 was the worst)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	79.54	PK	H	23.50	3.00	0.00	106.04	N/A	N/A
2412	66.57	AV	H	23.50	3.00	0.00	93.07	N/A	N/A
2412	86.10	PK	V	23.50	3.00	0.00	112.6	N/A	N/A
2412	73.42	AV	V	23.50	3.00	0.00	99.92	N/A	N/A
2390	44.87	PK	V	23.57	3.00	0.00	71.44	74.00	2.56
2390	26.78	AV	V	23.57	3.00	0.00	53.35	54.00	0.65
4824	32.63	PK	V	30.84	5.11	26.87	41.71	74.00	32.29
4824	20.84	AV	V	30.84	5.11	26.87	29.92	54.00	24.08
7236	31.46	PK	V	34.77	6.18	26.36	46.05	74.00	27.95
7236	20.79	AV	V	34.77	6.18	26.36	35.38	54.00	18.62
1663	29.87	PK	V	24.36	2.79	26.49	30.53	74.00	43.47
1663	18.46	AV	V	24.36	2.79	26.49	19.12	54.00	34.88
437.4	42.69	QP	V	16.89	1.57	28.43	32.72	46.00	13.28
Middle Channel: 2437 MHz									
2437	79.23	PK	H	23.41	3.00	0.00	105.64	N/A	N/A
2437	65.70	AV	H	23.41	3.00	0.00	92.11	N/A	N/A
2437	86.80	PK	V	23.41	3.00	0.00	113.21	N/A	N/A
2437	73.53	AV	V	23.41	3.00	0.00	99.94	N/A	N/A
4874	32.83	PK	V	31.00	5.09	26.87	42.05	74.00	31.95
4874	20.42	AV	V	31.00	5.09	26.87	29.64	54.00	24.36
7311	31.59	PK	V	34.92	6.21	26.40	46.32	74.00	27.68
7311	21.23	AV	V	34.92	6.21	26.40	35.96	54.00	18.04
1705	30.64	PK	V	24.43	2.83	26.53	31.37	74.00	42.63
1705	19.09	AV	V	24.43	2.83	26.53	19.82	54.00	34.18
2258	32.47	PK	V	24.02	3.02	26.86	32.65	74.00	41.35
2258	21.54	AV	V	24.02	3.02	26.86	21.72	54.00	32.28
437.4	42.97	QP	V	16.89	1.57	28.43	33.00	46.00	13.00
High Channel: 2462 MHz									
2462	78.88	PK	H	23.33	2.99	0.00	105.2	N/A	N/A
2462	65.72	AV	H	23.33	2.99	0.00	92.04	N/A	N/A
2462	86.47	PK	V	23.33	2.99	0.00	112.79	N/A	N/A
2462	73.55	AV	V	23.33	2.99	0.00	99.87	N/A	N/A
2483.5	45.01	PK	V	23.26	2.99	0.00	71.26	74.00	2.74
2483.5	26.43	AV	V	23.26	2.99	0.00	52.68	54.00	1.32
4924	33.20	PK	V	31.16	5.07	26.88	42.55	74.00	31.45
4924	21.09	AV	V	31.16	5.07	26.88	30.44	54.00	23.56
7386	32.19	PK	V	35.07	6.25	26.43	47.08	74.00	26.92
7386	20.93	AV	V	35.07	6.25	26.43	35.82	54.00	18.18
1623	30.02	PK	V	24.30	2.76	26.45	30.63	74.00	43.37
1623	18.33	AV	V	24.30	2.76	26.45	18.94	54.00	35.06
437.4	43.36	QP	V	16.89	1.57	28.43	33.39	46.00	12.61

802.11 n ht20 Mode (Chain 3 was the worst)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	79.70	PK	H	23.50	3.00	0.00	106.2	N/A	N/A
2412	66.28	AV	H	23.50	3.00	0.00	92.78	N/A	N/A
2412	85.23	PK	V	23.50	3.00	0.00	111.73	N/A	N/A
2412	72.00	AV	V	23.50	3.00	0.00	98.5	N/A	N/A
2390	46.89	PK	V	23.57	3.00	0.00	73.46	74.00	0.54
2390	26.96	AV	V	23.57	3.00	0.00	53.53	54.00	0.47
4824	32.57	PK	V	30.84	5.11	26.87	41.65	74.00	32.35
4824	20.60	AV	V	30.84	5.11	26.87	29.68	54.00	24.32
7236	32.06	PK	V	34.77	6.18	26.36	46.65	74.00	27.35
7236	20.28	AV	V	34.77	6.18	26.36	34.87	54.00	19.13
1453	30.39	PK	V	23.98	2.61	26.38	30.6	74.00	43.4
1453	19.35	AV	V	23.98	2.61	26.38	19.56	54.00	34.44
437.4	41.68	QP	V	16.89	1.57	28.43	31.71	46.00	14.29
Middle Channel: 2437 MHz									
2437	79.77	PK	H	23.41	3.00	0.00	106.18	N/A	N/A
2437	65.92	AV	H	23.41	3.00	0.00	92.33	N/A	N/A
2437	86.20	PK	V	23.41	3.00	0.00	112.61	N/A	N/A
2437	73.09	AV	V	23.41	3.00	0.00	99.5	N/A	N/A
4874	33.36	PK	V	31.00	5.09	26.87	42.58	74.00	31.42
4874	20.70	AV	V	31.00	5.09	26.87	29.92	54.00	24.08
7311	32.06	PK	V	34.92	6.21	26.40	46.79	74.00	27.21
7311	21.10	AV	V	34.92	6.21	26.40	35.83	54.00	18.17
1364	31.80	PK	V	23.75	2.48	26.46	31.57	74.00	42.43
1364	19.43	AV	V	23.75	2.48	26.46	19.2	54.00	34.8
3025	36.77	PK	V	24.34	3.47	26.42	38.16	74.00	35.84
3025	25.71	AV	V	24.34	3.47	26.42	27.1	54.00	26.9
437.4	41.96	QP	V	16.89	1.57	28.43	31.99	46.00	14.01
High Channel: 2462 MHz									
2462	79.21	PK	H	23.33	2.99	0.00	105.53	N/A	N/A
2462	66.95	AV	H	23.33	2.99	0.00	93.27	N/A	N/A
2462	85.75	PK	V	23.33	2.99	0.00	112.07	N/A	N/A
2462	73.40	AV	V	23.33	2.99	0.00	99.72	N/A	N/A
2483.5	43.14	PK	V	23.26	2.99	0.00	69.39	74.00	4.61
2483.5	26.62	AV	V	23.26	2.99	0.00	52.87	54.00	1.13
4924	33.01	PK	V	31.16	5.07	26.88	42.36	74.00	31.64
4924	21.25	AV	V	31.16	5.07	26.88	30.6	54.00	23.4
7386	32.54	PK	V	35.07	6.25	26.43	47.43	74.00	26.57
7386	20.79	AV	V	35.07	6.25	26.43	35.68	54.00	18.32
1522	29.81	PK	V	24.14	2.69	26.35	30.29	74.00	43.71
1522	18.48	AV	V	24.14	2.69	26.35	18.96	54.00	35.04
437.4	42.35	QP	V	16.89	1.57	28.43	32.38	46.00	13.62

802.11 n ht40 Mode (Chain 3 was the worst)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2422 MHz									
2422	73.58	PK	H	23.47	3.00	0.00	100.05	N/A	N/A
2422	60.13	AV	H	23.47	3.00	0.00	86.6	N/A	N/A
2422	79.52	PK	V	23.47	3.00	0.00	105.99	N/A	N/A
2422	56.28	AV	V	23.47	3.00	0.00	82.75	N/A	N/A
2390	45.24	PK	V	23.57	3.00	0.00	71.81	74.00	2.19
2390	26.04	AV	V	23.57	3.00	0.00	52.61	54.00	1.39
4844	33.02	PK	V	30.90	5.10	26.87	42.15	74.00	31.85
4844	20.54	AV	V	30.90	5.10	26.87	29.67	54.00	24.33
7266	32.35	PK	V	34.83	6.19	26.38	46.99	74.00	27.01
7266	20.63	AV	V	34.83	6.19	26.38	35.27	54.00	18.73
1463	30.23	PK	V	24.00	2.62	26.37	30.48	74.00	43.52
1463	19.11	AV	V	24.00	2.62	26.37	19.36	54.00	34.64
437.4	42.08	QP	V	16.89	1.57	28.43	32.11	46.00	13.89
Middle Channel: 2437 MHz									
2437	78.24	PK	H	23.41	3.00	0.00	104.65	N/A	N/A
2437	65.60	AV	H	23.41	3.00	0.00	92.01	N/A	N/A
2437	86.35	PK	V	23.41	3.00	0.00	112.76	N/A	N/A
2437	73.72	AV	V	23.41	3.00	0.00	100.13	N/A	N/A
4874	33.35	PK	V	31.00	5.09	26.87	42.57	74.00	31.43
4874	21.17	AV	V	31.00	5.09	26.87	30.39	54.00	23.61
7311	32.25	PK	V	34.92	6.21	26.40	46.98	74.00	27.02
7311	20.96	AV	V	34.92	6.21	26.40	35.69	54.00	18.31
1485	30.85	PK	V	24.06	2.65	26.34	31.22	74.00	42.78
1485	18.91	AV	V	24.06	2.65	26.34	19.28	54.00	34.72
2242	32.47	PK	V	24.08	3.02	26.85	32.72	74.00	41.28
2242	21.66	AV	V	24.08	3.02	26.85	21.91	54.00	32.09
437.4	42.36	QP	V	16.89	1.57	28.43	32.39	46.00	13.61
High Channel: 2452 MHz									
2452	72.35	PK	H	23.36	3.00	0.00	98.71	N/A	N/A
2452	59.94	AV	H	23.36	3.00	0.00	86.3	N/A	N/A
2452	78.95	PK	V	23.36	3.00	0.00	105.31	N/A	N/A
2452	65.71	AV	V	23.36	3.00	0.00	92.07	N/A	N/A
2483.5	46.43	PK	V	23.26	2.99	0.00	72.68	74.00	1.32
2483.5	26.04	AV	V	23.26	2.99	0.00	52.29	54.00	1.71
4904	33.21	PK	V	31.09	5.08	26.87	42.51	74.00	31.49
4904	21.41	AV	V	31.09	5.08	26.87	30.71	54.00	23.29
7356	31.83	PK	V	35.01	6.23	26.42	46.65	74.00	27.35
7356	20.76	AV	V	35.01	6.23	26.42	35.58	54.00	18.42
1526	30.51	PK	V	24.14	2.69	26.36	30.98	74.00	43.02
1526	18.83	AV	V	24.14	2.69	26.36	19.3	54.00	34.7
437.4	42.75	QP	V	16.89	1.57	28.43	32.78	46.00	13.22

MIMO (Chain 1+2):

802.11 b Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	85.83	PK	H	23.50	3.00	0.00	112.33	N/A	N/A
2412	81.31	AV	H	23.50	3.00	0.00	107.81	N/A	N/A
2412	80.70	PK	V	23.50	3.00	0.00	107.2	N/A	N/A
2412	75.22	AV	V	23.50	3.00	0.00	101.72	N/A	N/A
2390	33.18	PK	H	23.57	3.00	0.00	59.75	74.00	14.25
2390	21.83	AV	H	23.57	3.00	0.00	48.4	54.00	5.6
4824	31.80	PK	H	30.84	5.11	26.87	40.88	74.00	33.12
4824	24.94	AV	H	30.84	5.11	26.87	34.02	54.00	19.98
7236	31.66	PK	H	34.77	6.18	26.36	46.25	74.00	27.75
7236	25.08	AV	H	34.77	6.18	26.36	39.67	54.00	14.33
2263	34.51	PK	H	24.01	3.02	26.86	34.68	74.00	39.32
2263	27.55	AV	H	24.01	3.02	26.86	27.72	54.00	26.28
437.4	41.27	QP	V	16.89	1.57	28.43	31.30	46.00	14.70
Middle Channel: 2437 MHz									
2437	85.44	PK	H	23.41	3.00	0.00	111.85	N/A	N/A
2437	80.49	AV	H	23.41	3.00	0.00	106.9	N/A	N/A
2437	80.36	PK	V	23.41	3.00	0.00	106.77	N/A	N/A
2437	75.70	AV	V	23.41	3.00	0.00	102.11	N/A	N/A
4874	31.62	PK	H	31.00	5.09	26.87	40.84	74.00	33.16
4874	23.96	AV	H	31.00	5.09	26.87	33.18	54.00	20.82
7311	32.52	PK	H	34.92	6.21	26.40	47.25	74.00	26.75
7311	26.31	AV	H	34.92	6.21	26.40	41.04	54.00	12.96
1528	30.91	PK	H	24.14	2.69	26.36	31.38	74.00	42.62
1528	23.75	AV	H	24.14	2.69	26.36	24.22	54.00	29.78
2148	33.51	PK	H	24.40	3.03	26.84	34.1	74.00	39.9
2148	26.05	AV	H	24.40	3.03	26.84	26.64	54.00	27.36
437.4	41.55	QP	V	16.89	1.57	28.43	31.58	46.00	14.42
High Channel: 2462 MHz									
2462	83.46	PK	H	23.33	2.99	0.00	109.78	N/A	N/A
2462	78.90	AV	H	23.33	2.99	0.00	105.22	N/A	N/A
2462	86.86	PK	V	23.33	2.99	0.00	113.18	N/A	N/A
2462	81.35	AV	V	23.33	2.99	0.00	107.67	N/A	N/A
2483.5	32.94	PK	H	23.26	2.99	0.00	59.19	74.00	14.81
2483.5	21.76	AV	H	23.26	2.99	0.00	48.01	54.00	5.99
4924	31.98	PK	H	31.16	5.07	26.88	41.33	74.00	32.67
4924	19.94	AV	H	31.16	5.07	26.88	29.29	54.00	24.71
7386	32.30	PK	H	35.07	6.25	26.43	47.19	74.00	26.81
7386	25.16	AV	H	35.07	6.25	26.43	40.05	54.00	13.95
2231	34.01	PK	H	24.11	3.02	26.85	34.29	74.00	39.71
2231	26.23	AV	H	24.11	3.02	26.85	26.51	54.00	27.49
437.4	41.94	QP	V	16.89	1.57	28.43	31.97	46.00	14.03

802.11 g Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	86.91	PK	H	23.50	3.00	0.00	113.41	N/A	N/A
2412	73.26	AV	H	23.50	3.00	0.00	99.76	N/A	N/A
2412	82.43	PK	V	23.50	3.00	0.00	108.93	N/A	N/A
2412	69.12	AV	V	23.50	3.00	0.00	95.62	N/A	N/A
2390	42.55	PK	H	23.57	3.00	0.00	69.12	74.00	4.88
2390	24.28	AV	H	23.57	3.00	0.00	50.85	54.00	3.15
4824	31.60	PK	H	30.84	5.11	26.87	40.68	74.00	33.32
4824	20.06	AV	H	30.84	5.11	26.87	29.14	54.00	24.86
7236	32.44	PK	H	34.77	6.18	26.36	47.03	74.00	26.97
7236	19.58	AV	H	34.77	6.18	26.36	34.17	54.00	19.83
1504	37.74	PK	H	24.11	2.67	26.33	38.19	74.00	35.81
1504	25.17	AV	H	24.11	2.67	26.33	25.62	54.00	28.38
437.4	41.74	QP	V	16.89	1.57	28.43	31.77	46.00	14.23
Middle Channel: 2437 MHz									
2437	87.33	PK	H	23.41	3.00	0.00	113.74	N/A	N/A
2437	73.41	AV	H	23.41	3.00	0.00	99.82	N/A	N/A
2437	82.54	PK	V	23.41	3.00	0.00	108.95	N/A	N/A
2437	69.92	AV	V	23.41	3.00	0.00	96.33	N/A	N/A
4874	31.73	PK	H	31.00	5.09	26.87	40.95	74.00	33.05
4874	19.98	AV	H	31.00	5.09	26.87	29.2	54.00	24.8
7311	32.23	PK	H	34.92	6.21	26.40	46.96	74.00	27.04
7311	19.79	AV	H	34.92	6.21	26.40	34.52	54.00	19.48
1445	31.68	PK	H	23.96	2.59	26.38	31.85	74.00	42.15
1445	20.30	AV	H	23.96	2.59	26.38	20.47	54.00	33.53
2184	34.06	PK	H	24.27	3.03	26.85	34.51	74.00	39.49
2184	21.67	AV	H	24.27	3.03	26.85	22.12	54.00	31.88
437.4	42.02	QP	V	16.89	1.57	28.43	32.05	46.00	13.95
High Channel: 2462 MHz									
2462	86.63	PK	H	23.33	2.99	0.00	112.95	N/A	N/A
2462	73.70	AV	H	23.33	2.99	0.00	100.02	N/A	N/A
2462	81.58	PK	V	23.33	2.99	0.00	107.9	N/A	N/A
2462	69.07	AV	V	23.33	2.99	0.00	95.39	N/A	N/A
2483.5	43.33	PK	H	23.26	2.99	0.00	69.58	74.00	4.42
2483.5	24.70	AV	H	23.26	2.99	0.00	50.95	54.00	3.05
4924	31.52	PK	H	31.16	5.07	26.88	40.87	74.00	33.13
4924	19.88	AV	H	31.16	5.07	26.88	29.23	54.00	24.77
7386	32.60	PK	H	35.07	6.25	26.43	47.49	74.00	26.51
7386	20.45	AV	H	35.07	6.25	26.43	35.34	54.00	18.66
2271	33.99	PK	H	23.98	3.02	26.86	34.13	74.00	39.87
2271	21.76	AV	H	23.98	3.02	26.86	21.9	54.00	32.1
437.4	42.41	QP	V	16.89	1.57	28.43	32.44	46.00	13.56

802.11 n ht20 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	86.87	PK	H	23.50	3.00	0.00	113.37	N/A	N/A
2412	73.98	AV	H	23.50	3.00	0.00	100.48	N/A	N/A
2412	84.50	PK	V	23.50	3.00	0.00	111	N/A	N/A
2412	71.63	AV	V	23.50	3.00	0.00	98.13	N/A	N/A
2390	44.89	PK	H	23.57	3.00	0.00	71.46	74.00	2.54
2390	25.83	AV	H	23.57	3.00	0.00	52.4	54.00	1.6
4824	31.79	PK	H	30.84	5.11	26.87	40.87	74.00	33.13
4824	19.74	AV	H	30.84	5.11	26.87	28.82	54.00	25.18
7236	32.66	PK	H	34.77	6.18	26.36	47.25	74.00	26.75
7236	20.00	AV	H	34.77	6.18	26.36	34.59	54.00	19.41
1420	32.56	PK	H	23.89	2.56	26.41	32.6	74.00	41.4
1420	20.25	AV	H	23.89	2.56	26.41	20.29	54.00	33.71
437.4	41.29	QP	V	16.89	1.57	28.43	31.32	46.00	14.68
Middle Channel: 2437 MHz									
2437	87.43	PK	H	23.41	3.00	0.00	113.84	N/A	N/A
2437	73.50	AV	H	23.41	3.00	0.00	99.91	N/A	N/A
2437	83.70	PK	V	23.41	3.00	0.00	110.11	N/A	N/A
2437	70.42	AV	V	23.41	3.00	0.00	96.83	N/A	N/A
4874	31.24	PK	H	31.00	5.09	26.87	40.46	74.00	33.54
4874	20.36	AV	H	31.00	5.09	26.87	29.58	54.00	24.42
7311	32.69	PK	H	34.92	6.21	26.40	47.42	74.00	26.58
7311	19.92	AV	H	34.92	6.21	26.40	34.65	54.00	19.35
1325	33.04	PK	H	23.65	2.43	26.50	32.62	74.00	41.38
1325	20.47	AV	H	23.65	2.43	26.50	20.05	54.00	33.95
2331	34.18	PK	H	23.77	3.01	26.87	34.09	74.00	39.91
2331	22.82	AV	H	23.77	3.01	26.87	22.73	54.00	31.27
437.4	41.57	QP	V	16.89	1.57	28.43	31.60	46.00	14.40
High Channel: 2462 MHz									
2462	85.81	PK	H	23.33	2.99	0.00	112.13	N/A	N/A
2462	73.36	AV	H	23.33	2.99	0.00	99.68	N/A	N/A
2462	83.85	PK	V	23.33	2.99	0.00	110.17	N/A	N/A
2462	72.57	AV	V	23.33	2.99	0.00	98.89	N/A	N/A
2483.5	42.71	PK	H	23.26	2.99	0.00	68.96	74.00	5.04
2483.5	26.43	AV	H	23.26	2.99	0.00	52.68	54.00	1.32
4924	31.65	PK	H	31.16	5.07	26.88	41	74.00	33
4924	20.62	AV	H	31.16	5.07	26.88	29.97	54.00	24.03
7386	32.40	PK	H	35.07	6.25	26.43	47.29	74.00	26.71
7386	19.85	AV	H	35.07	6.25	26.43	34.74	54.00	19.26
1255	32.72	PK	H	23.46	2.33	26.57	31.94	74.00	42.06
1255	20.76	AV	H	23.46	2.33	26.57	19.98	54.00	34.02
437.4	41.96	QP	V	16.89	1.57	28.43	31.99	46.00	14.01

802.11 n ht40 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2422 MHz									
2422	81.32	PK	H	23.47	3.00	0.00	107.79	N/A	N/A
2422	68.16	AV	H	23.47	3.00	0.00	94.63	N/A	N/A
2422	77.38	PK	V	23.47	3.00	0.00	103.85	N/A	N/A
2422	64.52	AV	V	23.47	3.00	0.00	90.99	N/A	N/A
2390	45.01	PK	H	23.57	3.00	0.00	71.58	74.00	2.42
2390	26.42	AV	H	23.57	3.00	0.00	52.99	54.00	1.01
4844	31.17	PK	H	30.90	5.10	26.87	40.3	74.00	33.7
4844	19.64	AV	H	30.90	5.10	26.87	28.77	54.00	25.23
7266	32.74	PK	H	34.83	6.19	26.38	47.38	74.00	26.62
7266	19.58	AV	H	34.83	6.19	26.38	34.22	54.00	19.78
2203	34.04	PK	H	24.21	3.03	26.85	34.43	74.00	39.57
2203	22.40	AV	H	24.21	3.03	26.85	22.79	54.00	31.21
437.4	42.05	QP	V	16.89	1.57	28.43	32.08	46.00	13.92
Middle Channel: 2437 MHz									
2437	81.60	PK	H	23.41	3.00	0.00	108.01	N/A	N/A
2437	68.71	AV	H	23.41	3.00	0.00	95.12	N/A	N/A
2437	77.32	PK	V	23.41	3.00	0.00	103.73	N/A	N/A
2437	64.83	AV	V	23.41	3.00	0.00	91.24	N/A	N/A
4874	31.95	PK	H	31.00	5.09	26.87	41.17	74.00	32.83
4874	20.19	AV	H	31.00	5.09	26.87	29.41	54.00	24.59
7311	32.10	PK	H	34.92	6.21	26.40	46.83	74.00	27.17
7311	19.93	AV	H	34.92	6.21	26.40	34.66	54.00	19.34
1567	31.12	PK	H	24.21	2.72	26.40	31.65	74.00	42.35
1567	19.47	AV	H	24.21	2.72	26.40	20	54.00	34
3022	38.07	PK	H	24.32	3.46	26.42	39.43	74.00	34.57
3022	25.94	AV	H	24.32	3.46	26.42	27.3	54.00	26.7
437.4	42.33	QP	V	16.89	1.57	28.43	32.36	46.00	13.64
High Channel: 2452 MHz									
2452	81.70	PK	H	23.36	3.00	0.00	108.06	N/A	N/A
2452	68.47	AV	H	23.36	3.00	0.00	94.83	N/A	N/A
2452	79.48	PK	V	23.36	3.00	0.00	105.84	N/A	N/A
2452	66.74	AV	V	23.36	3.00	0.00	93.1	N/A	N/A
2483.5	46.36	PK	H	23.26	2.99	0.00	72.61	74.00	1.39
2483.5	26.67	AV	H	23.26	2.99	0.00	52.92	54.00	1.08
4904	31.79	PK	H	31.09	5.08	26.87	41.09	74.00	32.91
4904	19.87	AV	H	31.09	5.08	26.87	29.17	54.00	24.83
7356	33.03	PK	H	35.01	6.23	26.42	47.85	74.00	26.15
7356	20.07	AV	H	35.01	6.23	26.42	34.89	54.00	19.11
1412	32.28	PK	H	23.87	2.55	26.41	32.29	74.00	41.71
1412	20.22	AV	H	23.87	2.55	26.41	20.23	54.00	33.77
437.4	42.72	QP	V	16.89	1.57	28.43	32.75	46.00	13.25

MIMO (Chain 0+1+2):

802.11 b Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	84.19	PK	H	23.50	3.00	0.00	110.69	N/A	N/A
2412	79.37	AV	H	23.50	3.00	0.00	105.87	N/A	N/A
2412	85.23	PK	V	23.50	3.00	0.00	111.73	N/A	N/A
2412	80.53	AV	V	23.50	3.00	0.00	107.03	N/A	N/A
2390	37.34	PK	V	23.57	3.00	0.00	63.91	74.00	10.09
2390	21.10	AV	V	23.57	3.00	0.00	47.67	54.00	6.33
4824	31.74	PK	V	30.84	5.11	26.87	40.82	74.00	33.18
4824	24.43	AV	V	30.84	5.11	26.87	33.51	54.00	20.49
7236	32.05	PK	V	34.77	6.18	26.36	46.64	74.00	27.36
7236	24.94	AV	V	34.77	6.18	26.36	39.53	54.00	14.47
1425	41.27	PK	V	23.91	2.57	26.40	41.35	74.00	32.65
1425	35.50	AV	V	23.91	2.57	26.40	35.58	54.00	18.42
437.4	43.03	QP	V	16.89	1.57	28.43	33.06	46.00	12.94
Middle Channel: 2437 MHz									
2437	84.81	PK	H	23.41	3.00	0.00	111.22	N/A	N/A
2437	79.87	AV	H	23.41	3.00	0.00	106.28	N/A	N/A
2437	85.49	PK	V	23.41	3.00	0.00	111.9	N/A	N/A
2437	80.77	AV	V	23.41	3.00	0.00	107.18	N/A	N/A
4874	32.20	PK	V	31.00	5.09	26.87	41.42	74.00	32.58
4874	24.65	AV	V	31.00	5.09	26.87	33.87	54.00	20.13
7311	32.02	PK	V	34.92	6.21	26.40	46.75	74.00	27.25
7311	25.09	AV	V	34.92	6.21	26.40	39.82	54.00	14.18
1532	40.12	PK	V	24.15	2.69	26.36	40.6	74.00	33.4
1532	33.44	AV	V	24.15	2.69	26.36	33.92	54.00	20.08
3025	43.34	PK	V	24.34	3.47	26.42	44.73	74.00	29.27
3025	35.77	AV	V	24.34	3.47	26.42	37.16	54.00	16.84
437.4	43.35	QP	V	16.89	1.57	28.43	33.38	46.00	12.62
High Channel: 2462 MHz									
2462	85.63	PK	H	23.33	2.99	0.00	111.95	N/A	N/A
2462	81.10	AV	H	23.33	2.99	0.00	107.42	N/A	N/A
2462	86.50	PK	V	23.33	2.99	0.00	112.82	N/A	N/A
2462	82.60	AV	V	23.33	2.99	0.00	108.92	N/A	N/A
2483.5	35.31	PK	V	23.26	2.99	0.00	61.56	74.00	12.44
2483.5	22.20	AV	V	23.26	2.99	0.00	48.45	54.00	5.55
4924	32.34	PK	V	31.16	5.07	26.88	41.69	74.00	32.31
4924	24.76	AV	V	31.16	5.07	26.88	34.11	54.00	19.89
7386	32.70	PK	V	35.07	6.25	26.43	47.59	74.00	26.41
7386	24.88	AV	V	35.07	6.25	26.43	39.77	54.00	14.23
1655	40.01	PK	V	24.35	2.79	26.48	40.67	74.00	33.33
1655	35.17	AV	V	24.35	2.79	26.48	35.83	54.00	18.17
437.4	43.46	QP	V	16.89	1.57	28.43	33.49	46.00	12.51

802.11 g Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	84.50	PK	H	23.50	3.00	0.00	111	N/A	N/A
2412	71.97	AV	H	23.50	3.00	0.00	98.47	N/A	N/A
2412	84.81	PK	V	23.50	3.00	0.00	111.31	N/A	N/A
2412	72.15	AV	V	23.50	3.00	0.00	98.65	N/A	N/A
2390	36.72	PK	V	23.57	3.00	0.00	63.29	74.00	10.71
2390	21.33	AV	V	23.57	3.00	0.00	47.9	54.00	6.1
4824	31.76	PK	V	30.84	5.11	26.87	40.84	74.00	33.16
4824	20.14	AV	V	30.84	5.11	26.87	29.22	54.00	24.78
7236	32.10	PK	V	34.77	6.18	26.36	46.69	74.00	27.31
7236	19.36	AV	V	34.77	6.18	26.36	33.95	54.00	20.05
1663	41.10	PK	V	24.36	2.79	26.49	41.76	74.00	32.24
1663	28.66	AV	V	24.36	2.79	26.49	29.32	54.00	24.68
437.4	43.07	QP	V	16.89	1.57	28.43	33.10	46.00	12.90
Middle Channel: 2437 MHz									
2437	85.03	PK	H	23.41	3.00	0.00	111.44	N/A	N/A
2437	71.75	AV	H	23.41	3.00	0.00	98.16	N/A	N/A
2437	84.60	PK	V	23.41	3.00	0.00	111.01	N/A	N/A
2437	72.42	AV	V	23.41	3.00	0.00	98.83	N/A	N/A
4874	31.72	PK	V	31.00	5.09	26.87	40.94	74.00	33.06
4874	20.31	AV	V	31.00	5.09	26.87	29.53	54.00	24.47
7311	32.45	PK	V	34.92	6.21	26.40	47.18	74.00	26.82
7311	20.27	AV	V	34.92	6.21	26.40	35	54.00	19
1490	41.32	PK	V	24.07	2.66	26.34	41.71	74.00	32.29
1490	29.01	AV	V	24.07	2.66	26.34	29.4	54.00	24.6
3250	40.95	PK	V	25.60	3.81	26.50	43.86	74.00	30.14
3250	28.32	AV	V	25.60	3.81	26.50	31.23	54.00	22.77
437.4	41.27	QP	V	16.89	1.57	28.43	31.30	46.00	14.70
High Channel: 2462 MHz									
2462	83.08	PK	H	23.33	2.99	0.00	109.4	N/A	N/A
2462	70.75	AV	H	23.33	2.99	0.00	97.07	N/A	N/A
2462	84.85	PK	V	23.33	2.99	0.00	111.17	N/A	N/A
2462	72.96	AV	V	23.33	2.99	0.00	99.28	N/A	N/A
2483.5	37.22	PK	V	23.26	2.99	0.00	63.47	74.00	10.53
2483.5	22.77	AV	V	23.26	2.99	0.00	49.02	54.00	4.98
4924	32.14	PK	V	31.16	5.07	26.88	41.49	74.00	32.51
4924	20.63	AV	V	31.16	5.07	26.88	29.98	54.00	24.02
7386	32.33	PK	V	35.07	6.25	26.43	47.22	74.00	26.78
7386	19.94	AV	V	35.07	6.25	26.43	34.83	54.00	19.17
1432	45.98	PK	V	23.92	2.58	26.40	46.08	74.00	27.92
1432	32.71	AV	V	23.92	2.58	26.40	32.81	54.00	21.19
437.4	41.55	QP	V	16.89	1.57	28.43	31.58	46.00	14.42

802.11 n ht20 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	87.38	PK	H	23.50	3.00	0.00	113.88	N/A	N/A
2412	76.13	AV	H	23.50	3.00	0.00	102.63	N/A	N/A
2412	84.91	PK	V	23.50	3.00	0.00	111.41	N/A	N/A
2412	72.43	AV	V	23.50	3.00	0.00	98.93	N/A	N/A
2390	38.92	PK	V	23.57	3.00	0.00	65.49	74.00	8.51
2390	21.25	AV	V	23.57	3.00	0.00	47.82	54.00	6.18
4824	32.16	PK	V	30.84	5.11	26.87	41.24	74.00	32.76
4824	19.42	AV	V	30.84	5.11	26.87	28.5	54.00	25.5
7236	32.62	PK	V	34.77	6.18	26.36	47.21	74.00	26.79
7236	20.38	AV	V	34.77	6.18	26.36	34.97	54.00	19.03
1490	41.73	PK	V	24.07	2.66	26.34	42.12	74.00	31.88
1490	29.19	AV	V	24.07	2.66	26.34	29.58	54.00	24.42
437.4	41.94	QP	V	16.89	1.57	28.43	31.97	46.00	14.03
Middle Channel: 2437 MHz									
2437	87.41	PK	H	23.41	3.00	0.00	113.82	N/A	N/A
2437	75.99	AV	H	23.41	3.00	0.00	102.4	N/A	N/A
2437	85.64	PK	V	23.41	3.00	0.00	112.05	N/A	N/A
2437	72.93	AV	V	23.41	3.00	0.00	99.34	N/A	N/A
4874	31.76	PK	V	31.00	5.09	26.87	40.98	74.00	33.02
4874	19.63	AV	V	31.00	5.09	26.87	28.85	54.00	25.15
7311	31.91	PK	V	34.92	6.21	26.40	46.64	74.00	27.36
7311	19.30	AV	V	34.92	6.21	26.40	34.03	54.00	19.97
1504	42.87	PK	V	24.11	2.67	26.33	43.32	74.00	30.68
1504	29.70	AV	V	24.11	2.67	26.33	30.15	54.00	23.85
3149	42.97	PK	V	25.03	3.65	26.46	45.19	74.00	28.81
3149	30.36	AV	V	25.03	3.65	26.46	32.58	54.00	21.42
437.4	42.25	QP	V	16.89	1.57	28.43	32.28	46.00	13.72
High Channel: 2462 MHz									
2462	83.65	PK	H	23.33	2.99	0.00	109.97	N/A	N/A
2462	71.39	AV	H	23.33	2.99	0.00	97.71	N/A	N/A
2462	84.30	PK	V	23.33	2.99	0.00	110.62	N/A	N/A
2462	72.19	AV	V	23.33	2.99	0.00	98.51	N/A	N/A
2483.5	44.50	PK	V	23.26	2.99	0.00	70.75	74.00	3.25
2483.5	23.23	AV	V	23.26	2.99	0.00	49.48	54.00	4.52
4924	31.49	PK	V	31.16	5.07	26.88	40.84	74.00	33.16
4924	20.54	AV	V	31.16	5.07	26.88	29.89	54.00	24.11
7386	32.70	PK	V	35.07	6.25	26.43	47.59	74.00	26.41
7386	19.54	AV	V	35.07	6.25	26.43	34.43	54.00	19.57
1505	38.88	PK	V	24.11	2.67	26.33	39.33	74.00	34.67
1505	26.70	AV	V	24.11	2.67	26.33	27.15	54.00	26.85
437.4	42.57	QP	V	16.89	1.57	28.43	32.60	46.00	13.40

802.11 n ht40 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2422 MHz									
2422	80.77	PK	H	23.47	3.00	0.00	107.24	N/A	N/A
2422	67.52	AV	H	23.47	3.00	0.00	93.99	N/A	N/A
2422	82.36	PK	V	23.47	3.00	0.00	108.83	N/A	N/A
2422	69.48	AV	V	23.47	3.00	0.00	95.95	N/A	N/A
2390	45.19	PK	V	23.57	3.00	0.00	71.76	74.00	2.24
2390	24.00	AV	V	23.57	3.00	0.00	50.57	54.00	3.43
4844	31.27	PK	V	30.90	5.10	26.87	40.4	74.00	33.6
4844	19.92	AV	V	30.90	5.10	26.87	29.05	54.00	24.95
7266	32.42	PK	V	34.83	6.19	26.38	47.06	74.00	26.94
7266	19.62	AV	V	34.83	6.19	26.38	34.26	54.00	19.74
1473	36.19	PK	V	24.03	2.63	26.36	36.49	74.00	37.51
1473	24.07	AV	V	24.03	2.63	26.36	24.37	54.00	29.63
437.4	42.68	QP	V	16.89	1.57	28.43	32.71	46.00	13.29
Middle Channel: 2437 MHz									
2437	80.75	PK	H	23.41	3.00	0.00	107.16	N/A	N/A
2437	67.72	AV	H	23.41	3.00	0.00	94.13	N/A	N/A
2437	82.52	PK	V	23.41	3.00	0.00	108.93	N/A	N/A
2437	69.81	AV	V	23.41	3.00	0.00	96.22	N/A	N/A
4874	31.49	PK	V	31.00	5.09	26.87	40.71	74.00	33.29
4874	20.37	AV	V	31.00	5.09	26.87	29.59	54.00	24.41
7311	32.40	PK	V	34.92	6.21	26.40	47.13	74.00	26.87
7311	19.56	AV	V	34.92	6.21	26.40	34.29	54.00	19.71
1662	39.49	PK	V	24.36	2.79	26.49	40.15	74.00	33.85
1662	28.00	AV	V	24.36	2.79	26.49	28.66	54.00	25.34
2883	43.29	PK	V	23.97	3.33	26.52	44.07	74.00	29.93
2883	30.70	AV	V	23.97	3.33	26.52	31.48	54.00	22.52
437.4	42.29	QP	V	16.89	1.57	28.43	32.32	46.00	13.68
High Channel: 2452 MHz									
2452	79.06	PK	H	23.36	3.00	0.00	105.42	N/A	N/A
2452	66.49	AV	H	23.36	3.00	0.00	92.85	N/A	N/A
2452	81.06	PK	V	23.36	3.00	0.00	107.42	N/A	N/A
2452	68.81	AV	V	23.36	3.00	0.00	95.17	N/A	N/A
2483.5	46.50	PK	V	23.26	2.99	0.00	72.75	74.00	1.25
2483.5	25.03	AV	V	23.26	2.99	0.00	51.28	54.00	2.72
4904	32.12	PK	V	31.09	5.08	26.87	41.42	74.00	32.58
4904	20.48	AV	V	31.09	5.08	26.87	29.78	54.00	24.22
7356	32.61	PK	V	35.01	6.23	26.42	47.43	74.00	26.57
7356	19.40	AV	V	35.01	6.23	26.42	34.22	54.00	19.78
1362	38.10	PK	V	23.74	2.48	26.46	37.86	74.00	36.14
1362	26.26	AV	V	23.74	2.48	26.46	26.02	54.00	27.98
437.4	41.55	QP	V	16.89	1.57	28.43	31.58	46.00	14.42

2.4GHz band and 5.8GHz band transmit simultaneously

(2.4GHz 3x3 N40 2452MHz + 5.8GHz 4x4 AC80 5775MHz with beamforming was the worst):

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
11550	32.58	PK	H	38.02	8.21	26.01	52.80	74.00	21.20
11550	21.22	AV	H	38.02	8.21	26.01	41.44	54.00	12.56
17325	29.99	PK	H	43.40	10.98	26.12	58.25	74.00	15.75
17325	20.47	AV	H	43.40	10.98	26.12	48.73	54.00	5.27
4904	33.25	PK	V	31.09	5.08	26.87	42.55	74.00	31.45
4904	21.58	AV	V	31.09	5.08	26.87	30.88	54.00	23.12
7356	33.96	PK	V	35.01	6.23	26.42	48.78	74.00	25.22
7356	20.78	AV	V	35.01	6.23	26.42	35.60	54.00	18.40
2471	43.69	PK	H	23.30	2.99	26.89	43.09	74.00	30.91
2471	38.85	AV	H	23.30	2.99	26.89	38.25	54.00	15.75
500.45	46.69	QP	V	18.10	1.61	28.82	37.58	46.00	8.42

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

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
N/A	RF Cable	N/A	N/A	Each Time	/

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

Test Data

Environmental Conditions

Temperature:	29.3 °C
Relative Humidity:	47 %
ATM Pressure:	101.1 kPa

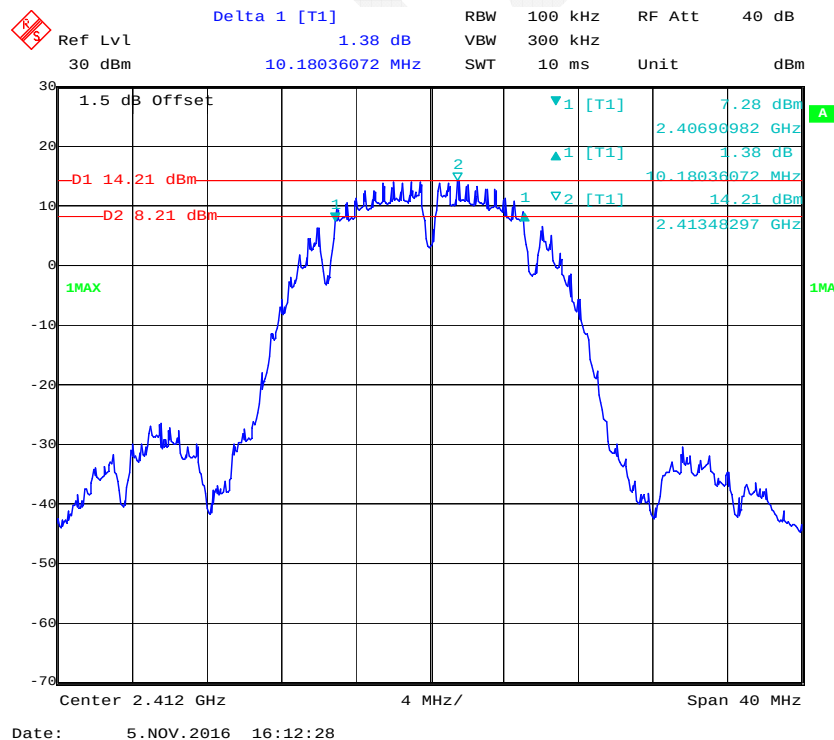
* The testing was performed by Lorin Bian on 2016-11-05.

Test Mode: Transmitting (Test performed at SISO mode Chain 0)

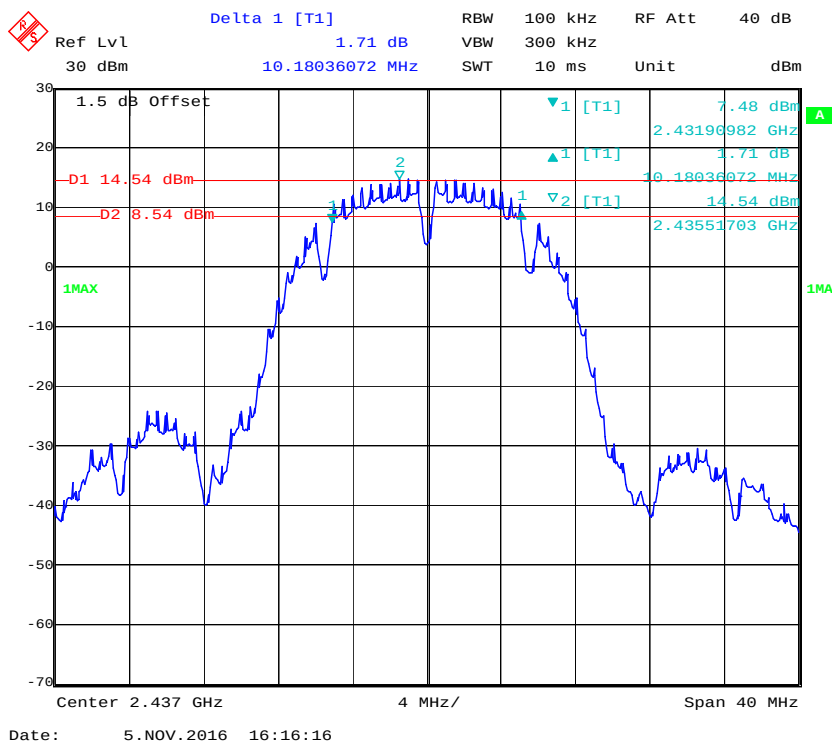
Test Result: Compliant. Please refer to the following table and plots.

Test mode	Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	10.18	≥0.5
	Middle	2437	10.18	≥0.5
	High	2462	10.1	≥0.5
802.11g	Low	2412	16.43	≥0.5
	Middle	2437	16.51	≥0.5
	High	2462	16.51	≥0.5
802.11n20	Low	2412	17.64	≥0.5
	Middle	2437	17.72	≥0.5
	High	2462	17.64	≥0.5
802.11 n40	Low	2422	36.55	≥0.5
	Middle	2437	36.71	≥0.5
	High	2452	36.39	≥0.5

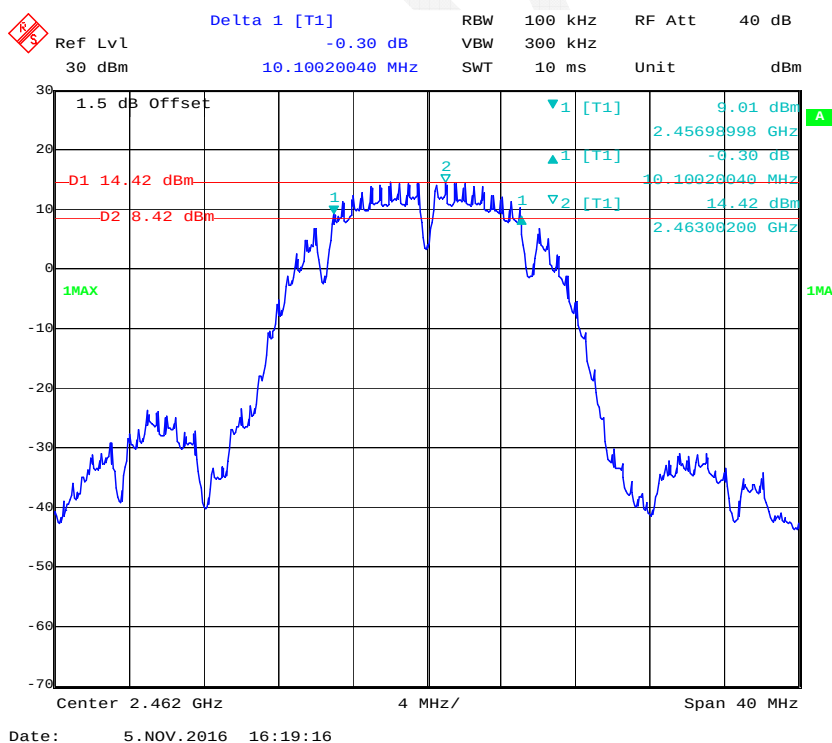
802.11b Low Channel



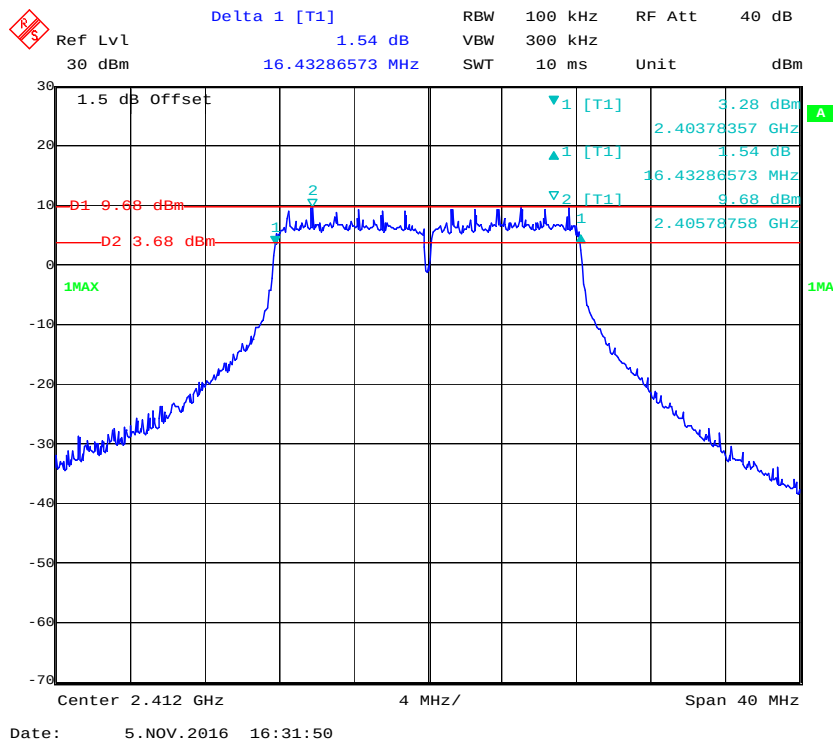
802.11b Middle Channel



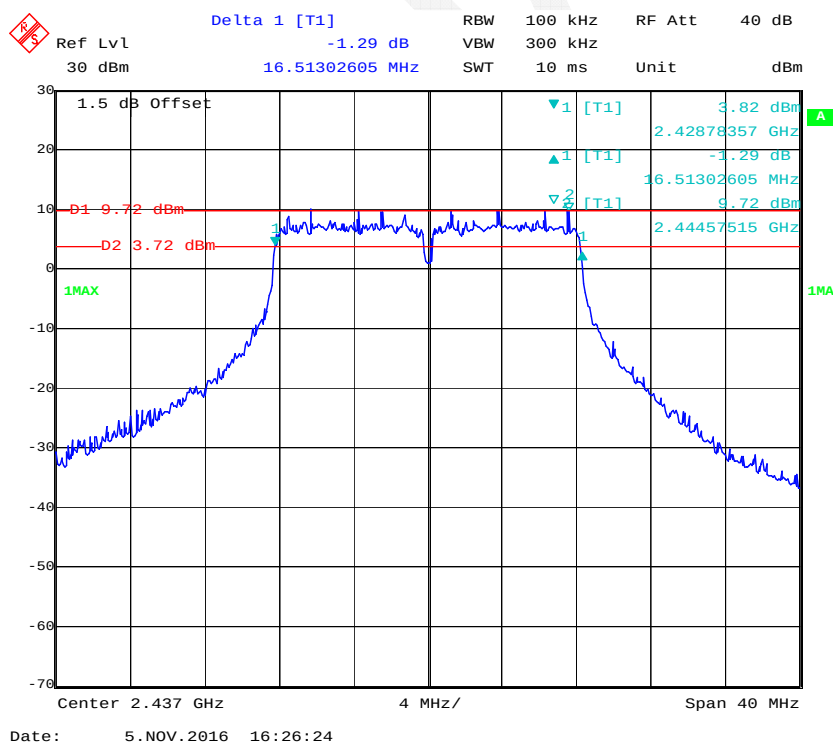
802.11b High Channel



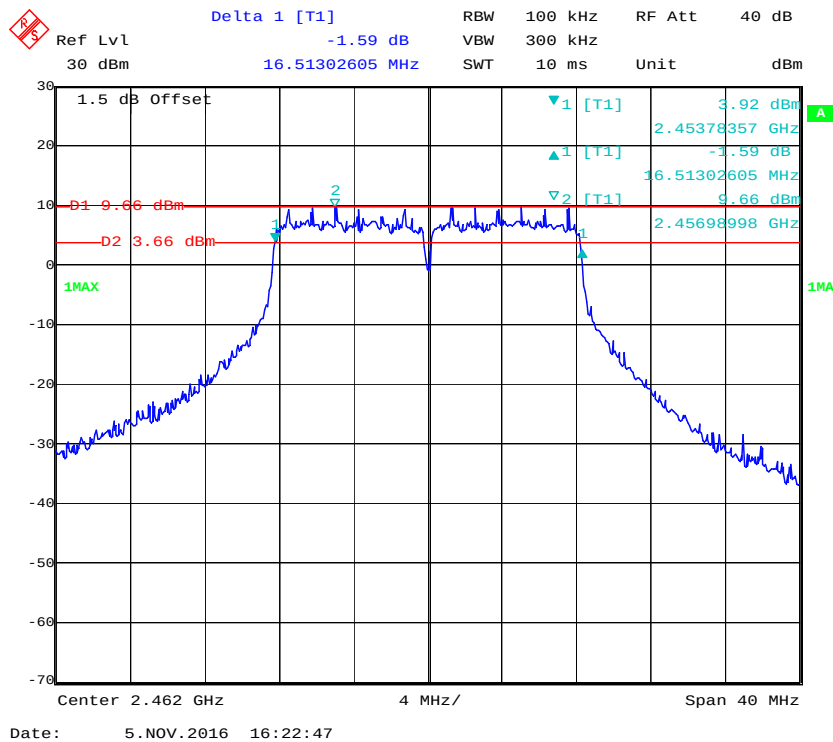
802.11g Low Channel



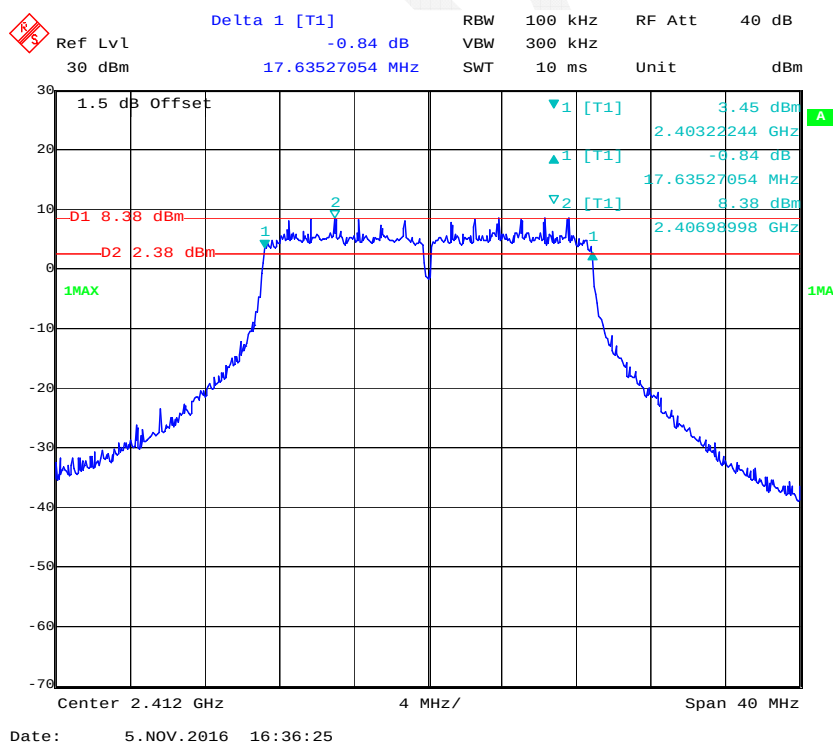
802.11g Middle Channel



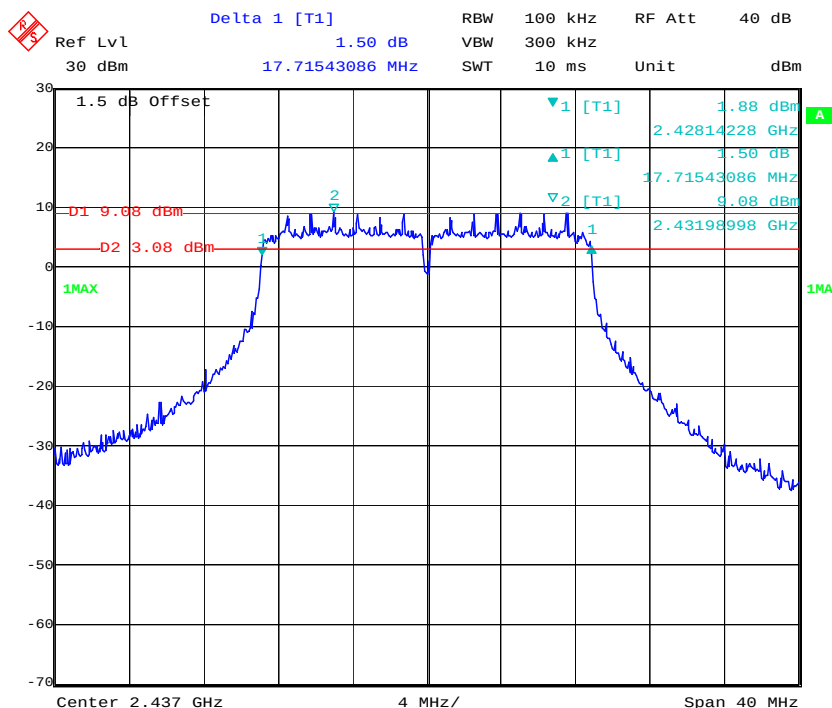
802.11g High Channel



802.11n ht20 Low Channel

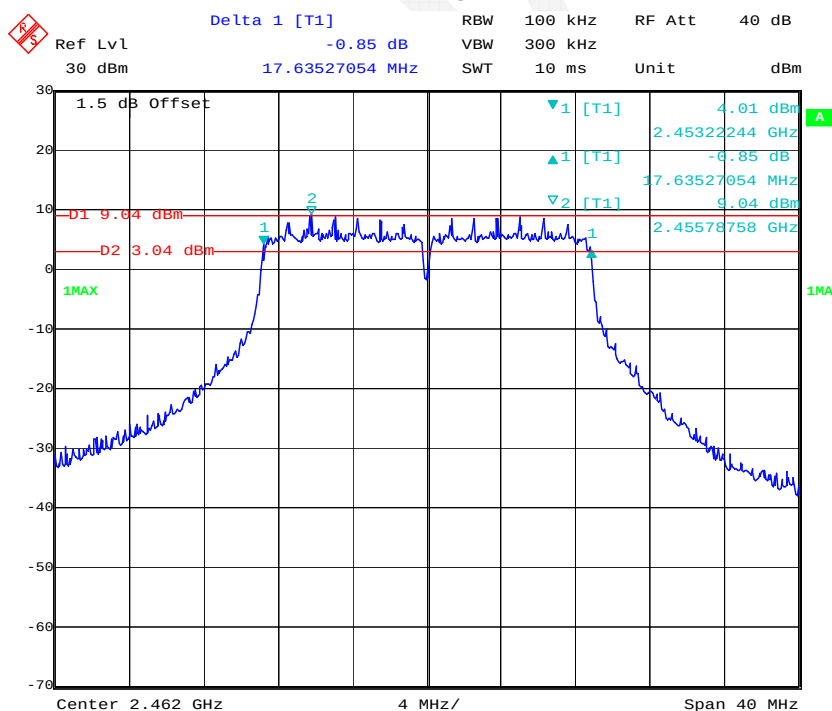


802.11n ht20 Middle Channel



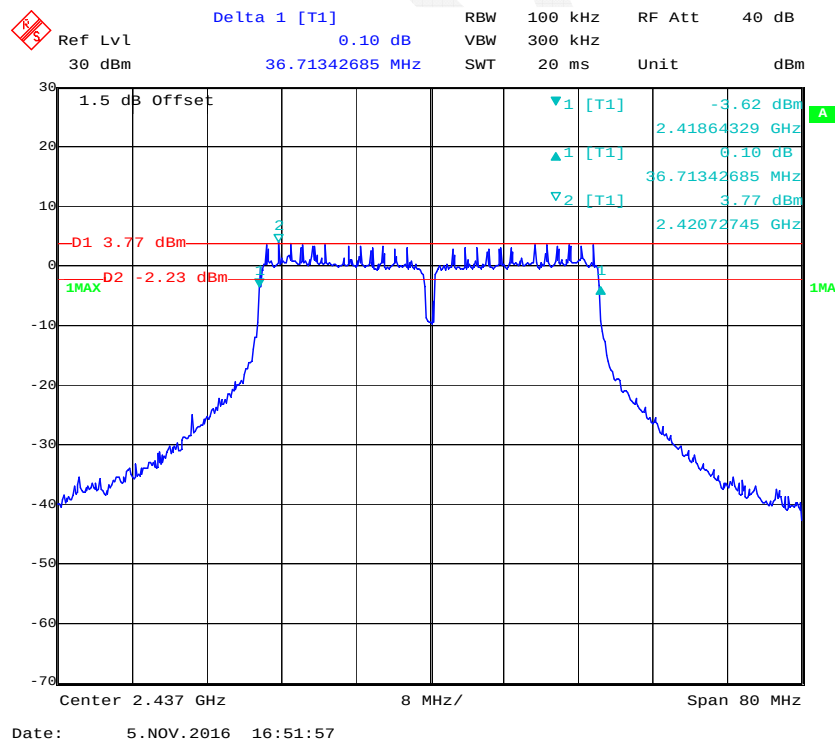
Date: 5.NOV.2016 16:39:29

802.11n ht20 High Channel

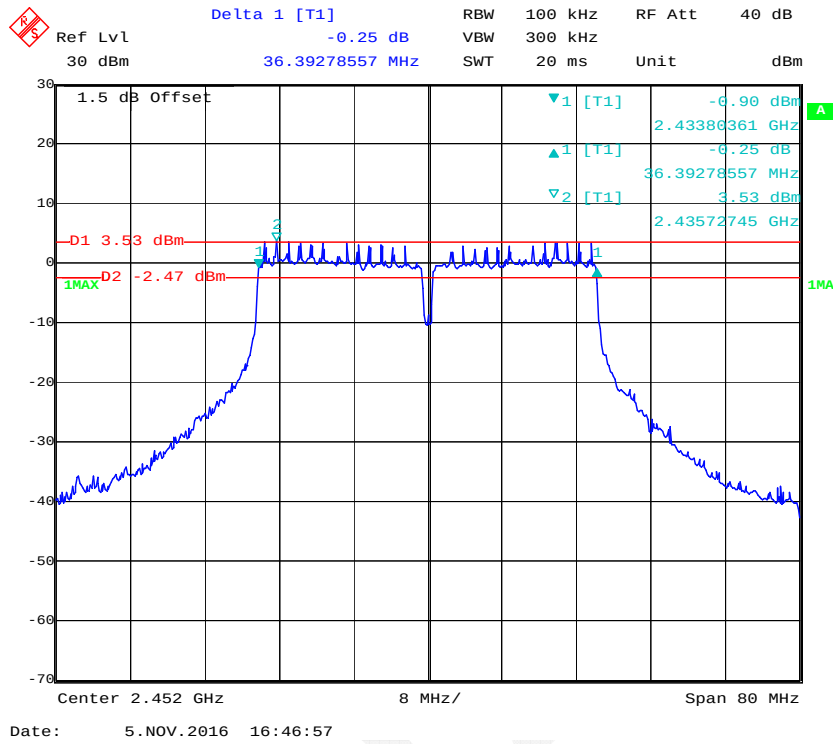


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802.11n ht40 High Channel



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

Applicable Standard

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

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to test equipment.
3. Add a correction factor to the display.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Wideband Power Sensor	N1921A	MY54170074	2016-01-03	2017-01-03
Agilent	P-Series Power Meter	N1912A	MY5000798	2016-01-03	2017-01-03
N/A	RF Cable	N/A	N/A	Each Time	/

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

Test Data

Environmental Conditions

Temperature:	29.3 °C
Relative Humidity:	47 %
ATM Pressure:	101.1 kPa

* The testing was performed by Lorin Bian on 2016-11-05.

Test Mode: Transmitting

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

SISO:

Test mode	Channel	Frequency	Max Peak Conducted Output Power (dBm)			Limit
		(MHz)	Chain 0	Chain 1	Chain 2	(dBm)
802.11b	Low	2412	27.47	29.17	28.86	30
	Middle	2437	28.03	29.23	29.35	30
	High	2462	27.79	28.87	28.78	30
802.11g	Low	2412	28.04	27.03	28.55	30
	Middle	2437	28.49	28	29.27	30
	High	2462	28.2	27.69	29.08	30
802.11n20	Low	2412	26.95	26.88	27.69	30
	Middle	2437	27.48	27.91	28.25	30
	High	2462	27.24	27.69	27.96	30
802.11n40	Low	2422	24.95	24.46	25.48	30
	Middle	2437	25.19	24.53	25.07	30
	High	2452	25.11	23.98	23.91	30

MIMO 2T2R:

Test mode	Channel	Frequency	Max Peak Conducted Output Power (dBm)		Total (dBm)	Limit (dBm)
		(MHz)	Chain 1	Chain 2		
802.11b	Low	2412	25.74	26.13	28.95	30
	Middle	2437	25.64	26.09	28.88	30
	High	2462	26	25.73	28.88	30
802.11g	Low	2412	25.48	26.65	29.11	30
	Middle	2437	25.97	26.72	29.37	30
	High	2462	25.77	26.2	29	30
802.11n20	Low	2412	25.73	26.33	29.05	30
	Middle	2437	25.94	26.21	29.09	30
	High	2462	25.78	26.24	29.03	30
802.11n40	Low	2422	24	25.98	28.11	30
	Middle	2437	25.53	25.97	28.77	30
	High	2452	25.51	25.98	28.76	30

MIMO 3T3R:

Test mode	Channel	Frequency	Max Peak Conducted Output Power (dBm)			Total (dBm)	Limit (dBm)
		(MHz)	Chain 0	Chain 1	Chain 2		
802.11b	Low	2412	24.45	24.65	25.35	29.61	30
	Middle	2437	23.99	24.34	24.63	29.1	30
	High	2462	24.12	24.24	24.2	28.96	30
802.11g	Low	2412	22.24	23.74	24.37	28.31	30
	Middle	2437	22.67	23.73	24.18	28.34	30
	High	2462	22.67	23.53	23.87	28.16	30
802.11n20	Low	2412	22.33	23.3	23.92	28	30
	Middle	2437	22.8	23.47	23.72	28.12	30
	High	2462	22.71	23.34	23.4	27.93	30
802.11n40	Low	2422	23.97	23.85	24.59	28.92	30
	Middle	2437	24.2	23.99	24.37	28.96	30
	High	2452	22.64	23.13	23.4	27.84	30

Note: the device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices:

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

So:

Directional gain = GANT + Array Gain = 2dBi < 6dBi

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

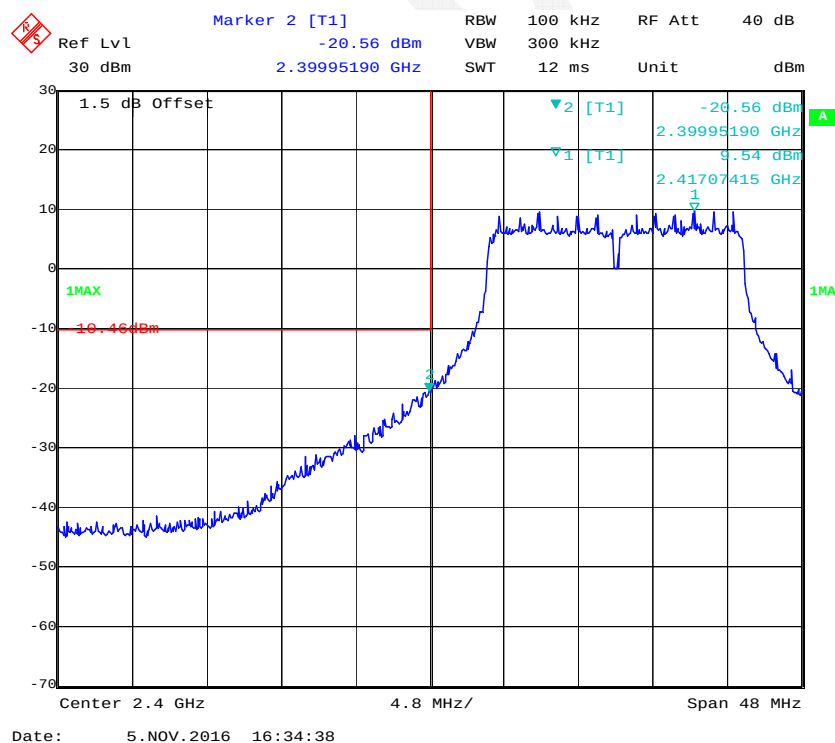
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then 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

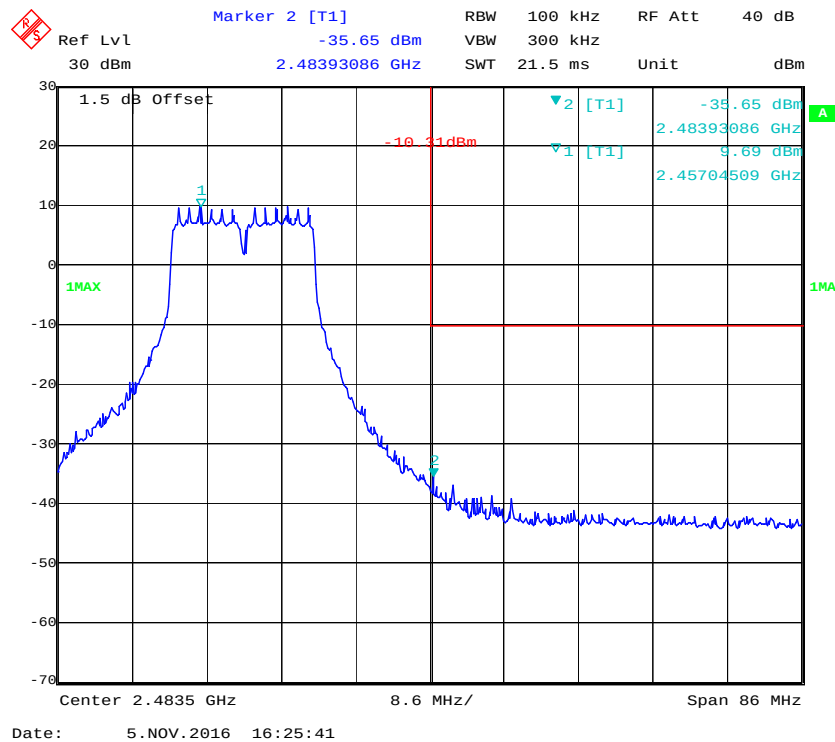
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
N/A	RF Cable	N/A	N/A	Each Time	/

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

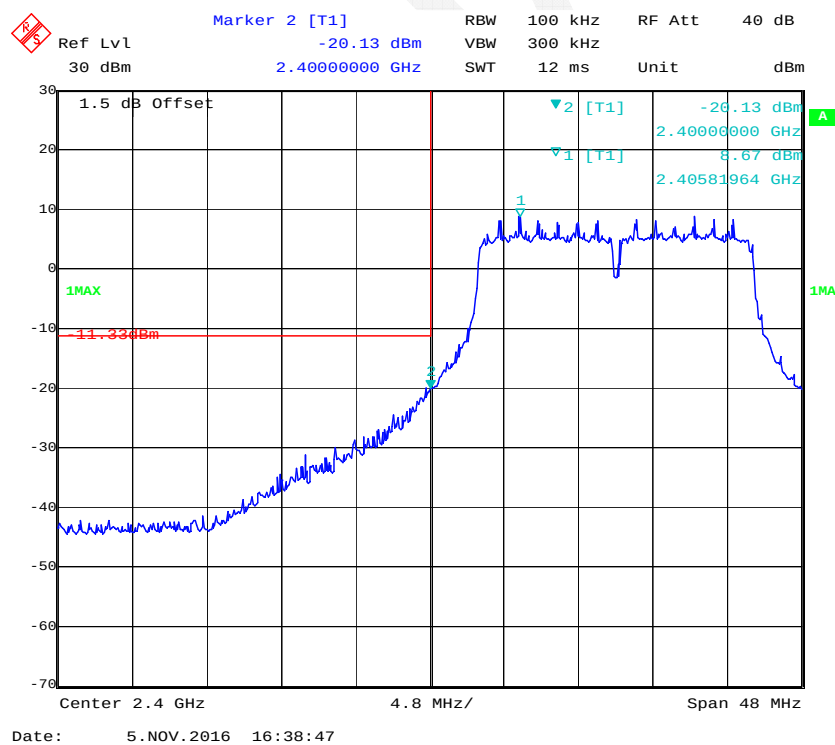
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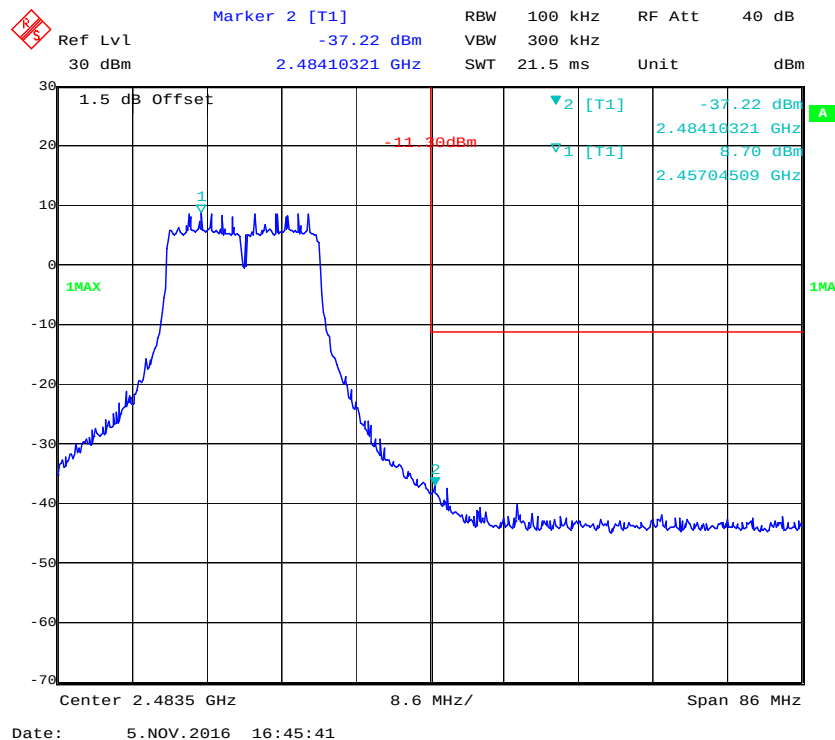
Chain 0, 802.11g: Band Edge, Right Side



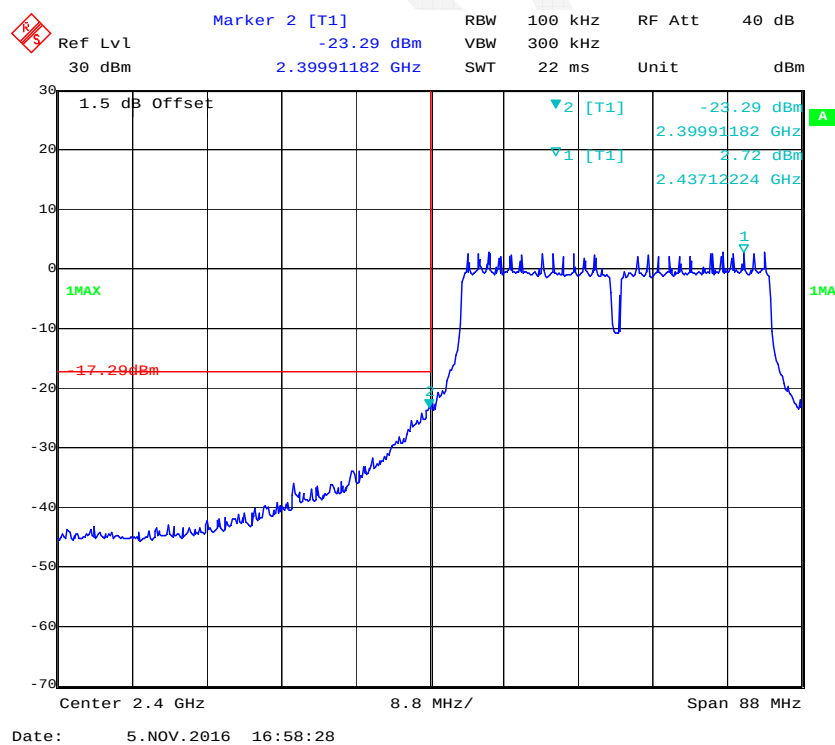
Chain 0, 802.11n ht20 Band Edge, Left Side



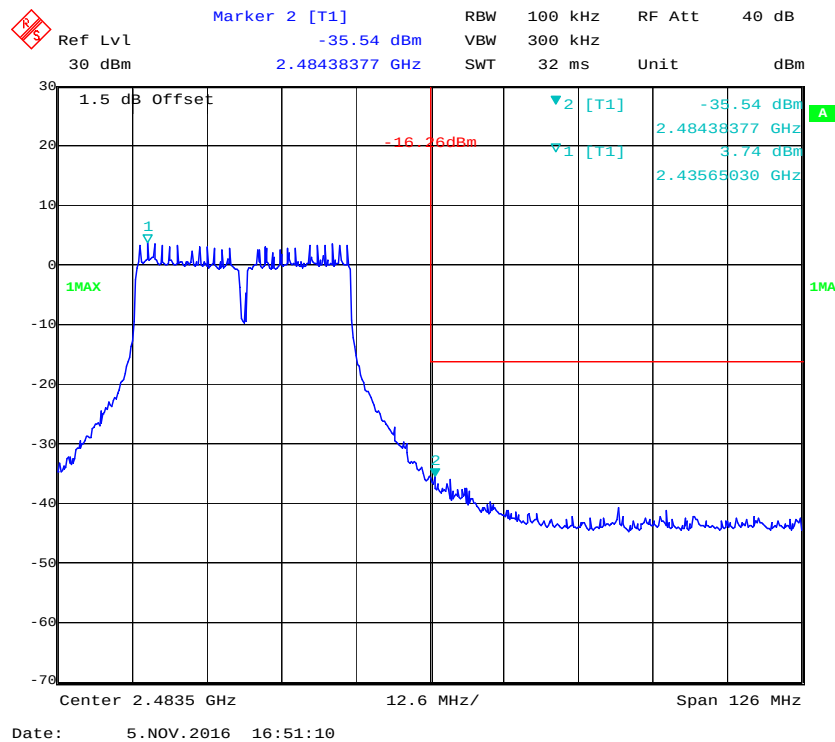
Chain 0, 802.11n ht20 Band Edge, Right Side



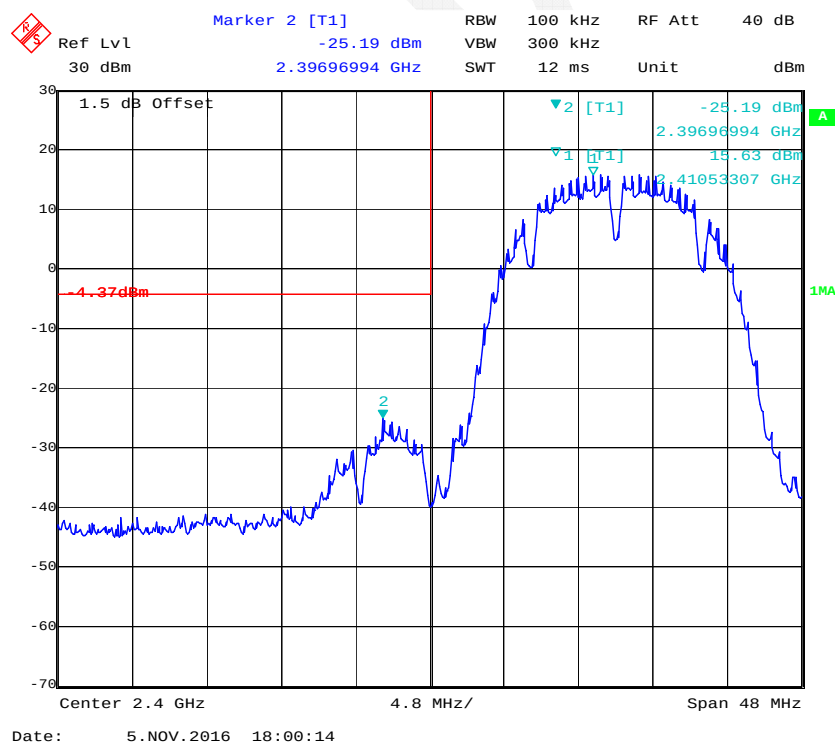
Chain 0, 802.11n ht40 Band Edge, Left Side



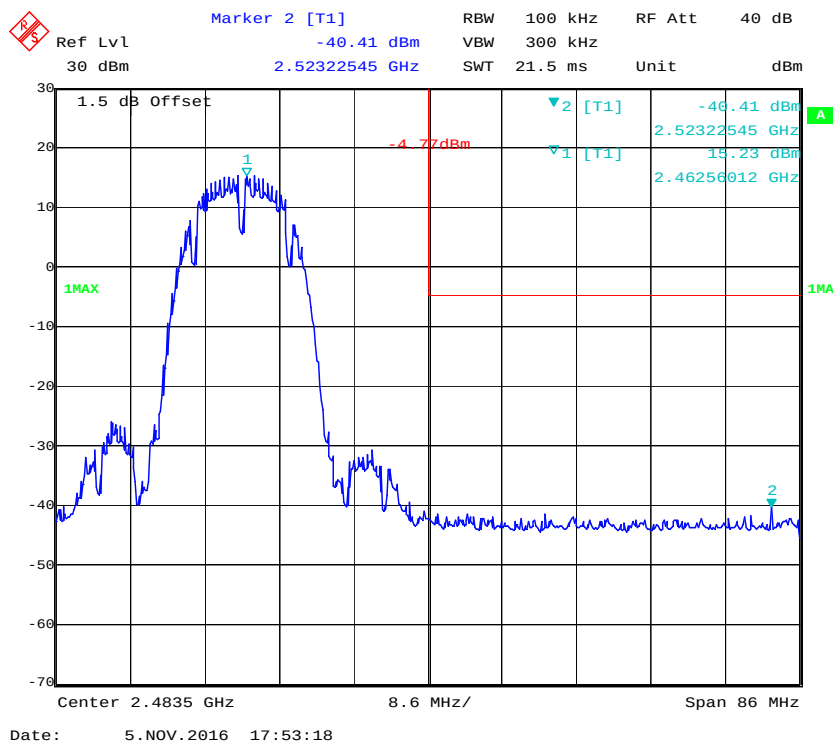
Chain 0, 802.11n ht40 Band Edge, Right Side



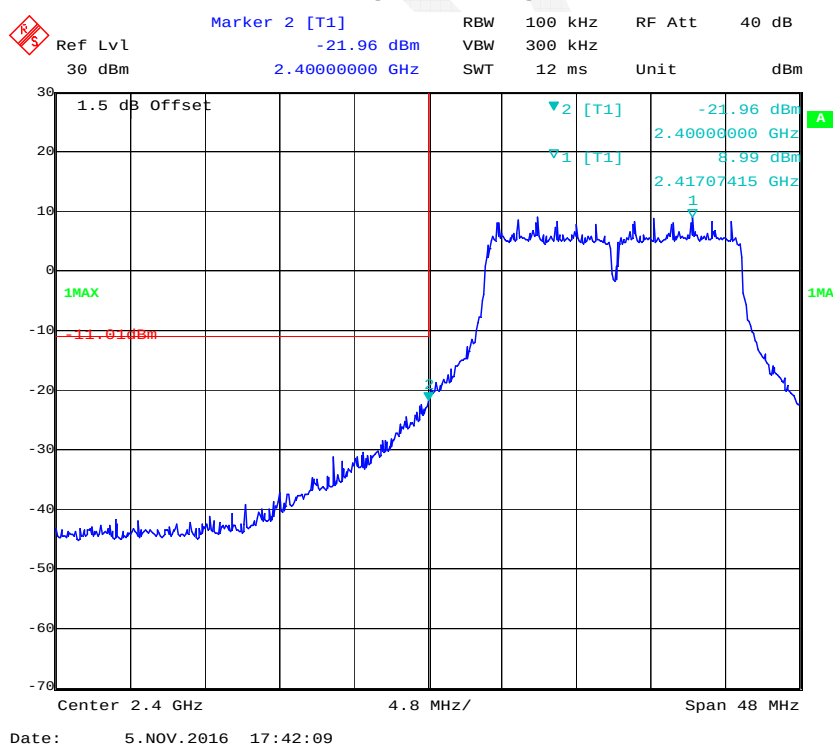
Chain 1, 802.11b: Band Edge, Left Side



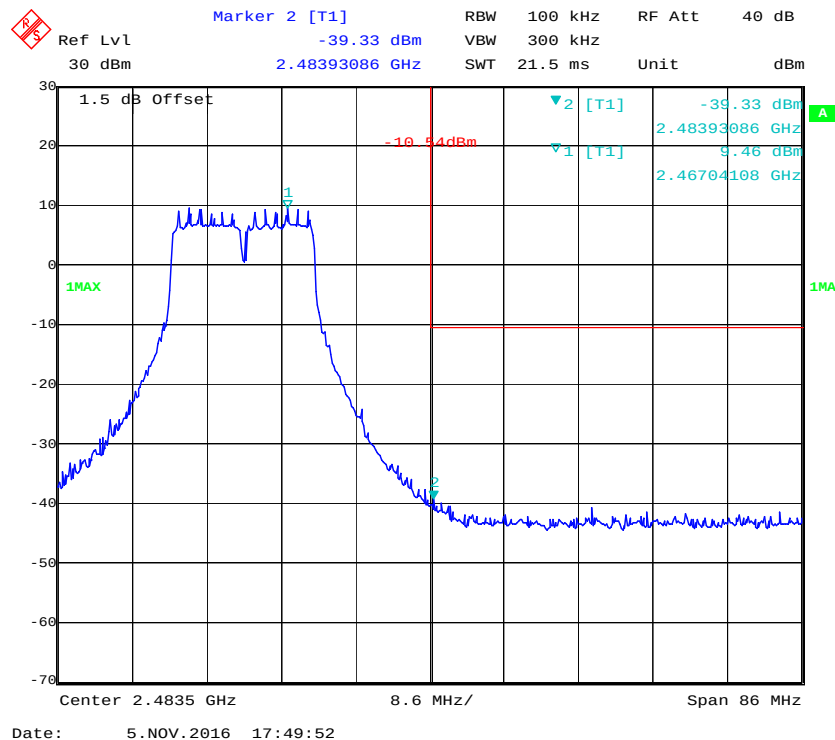
Chain 1, 802.11b: Band Edge, Right Side



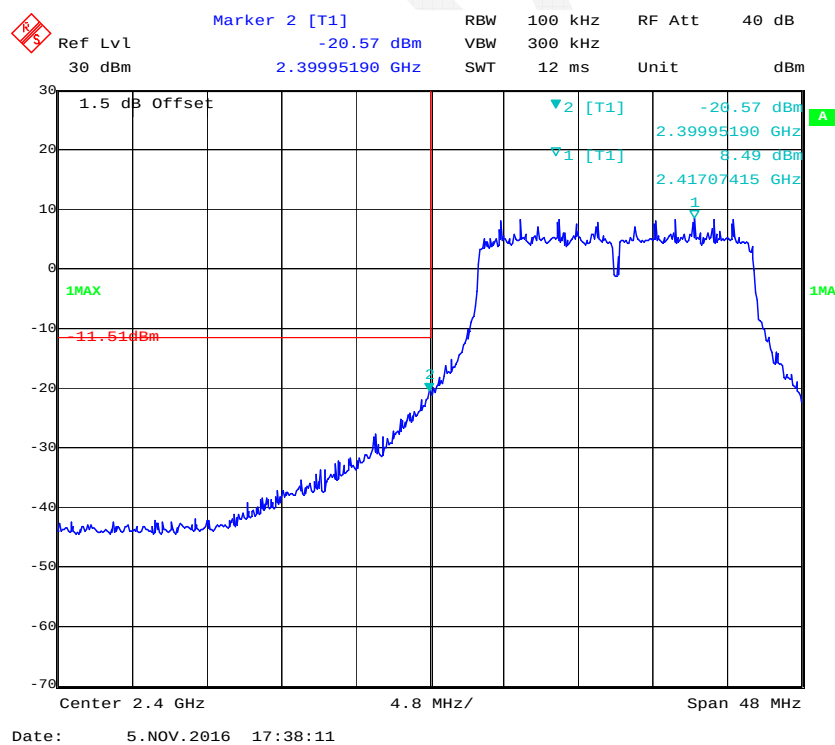
Chain 1, 802.11g: Band Edge, Left Side



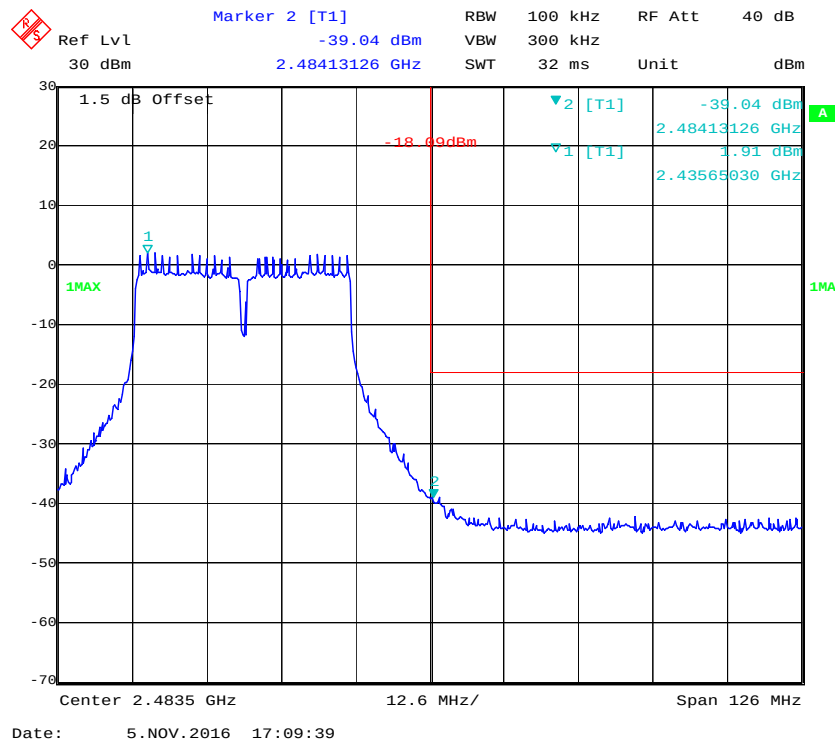
Chain 1, 802.11g: Band Edge, Right Side



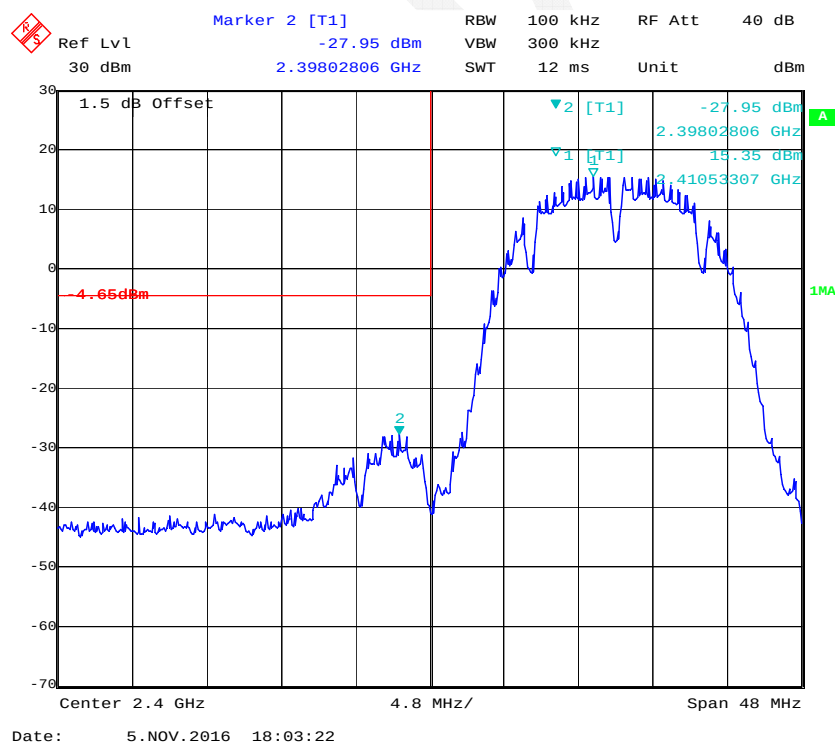
Chain 1, 802.11n ht20 Band Edge, Left Side



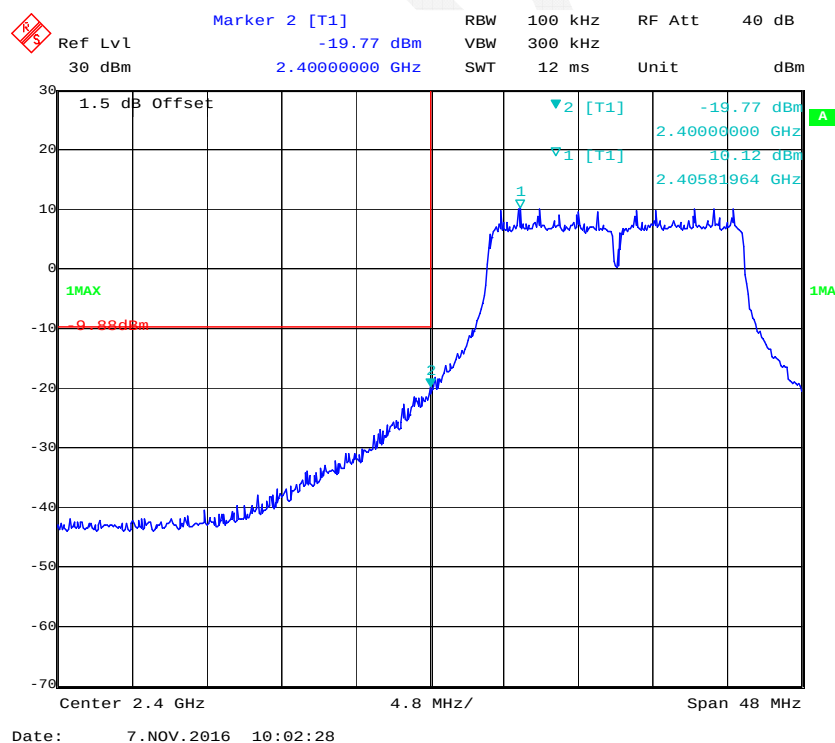
Chain 1, 802.11n ht40 Band Edge, Right Side



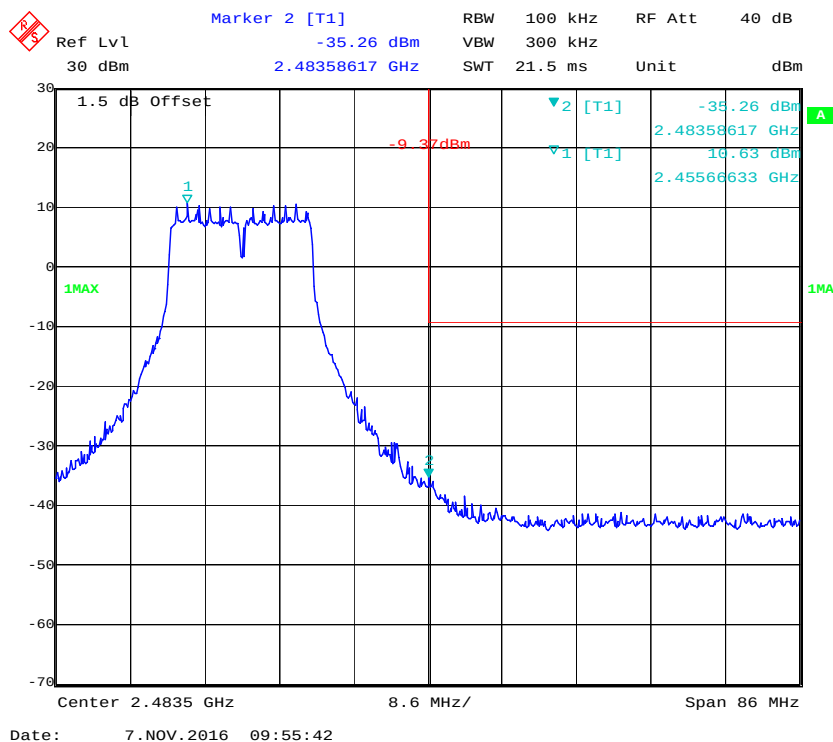
Chain 2, 802.11b: Band Edge, Left Side



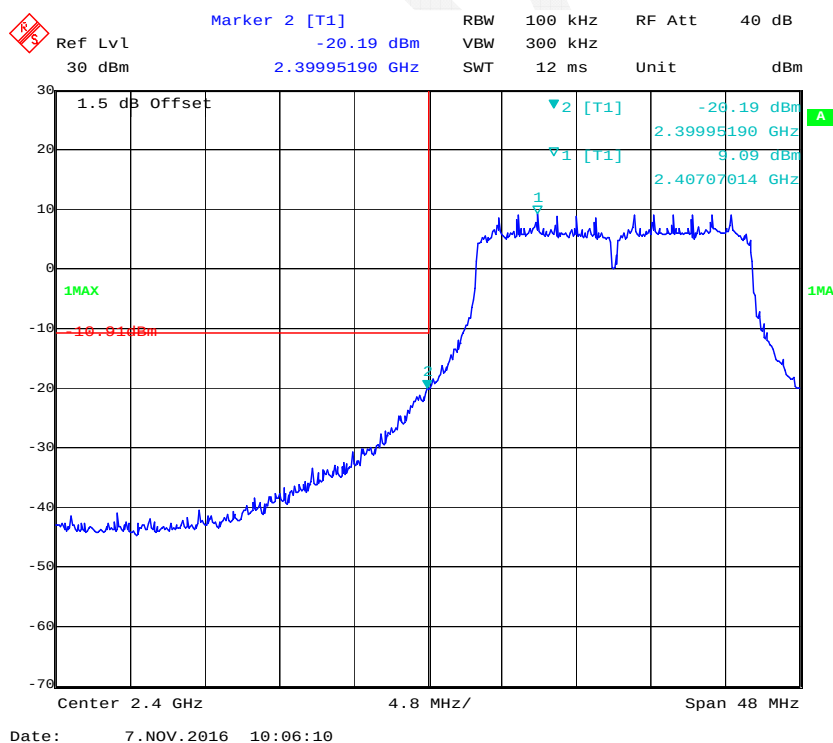
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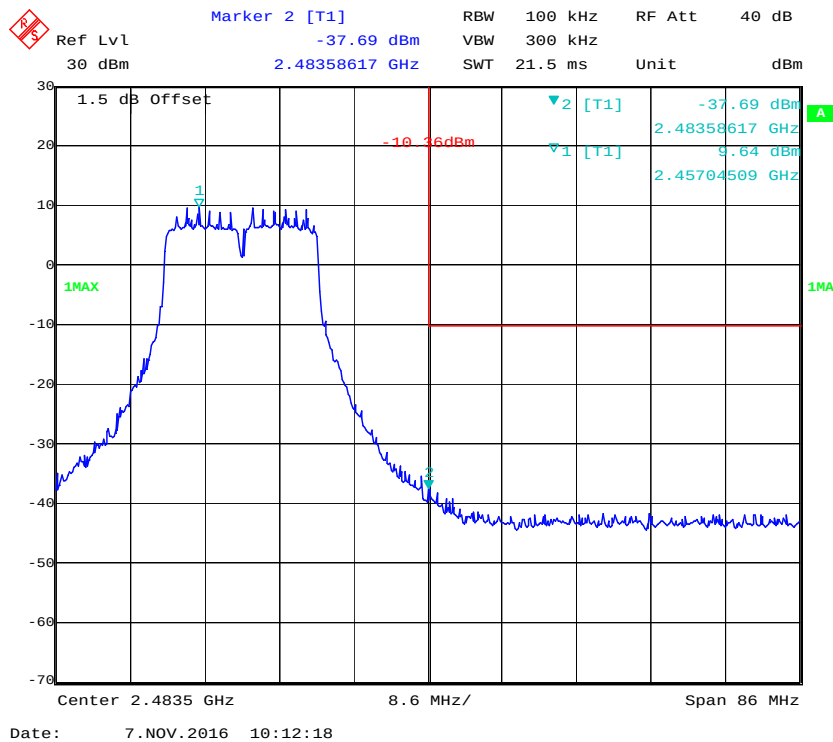
Chain 2, 802.11g: Band Edge, Right Side



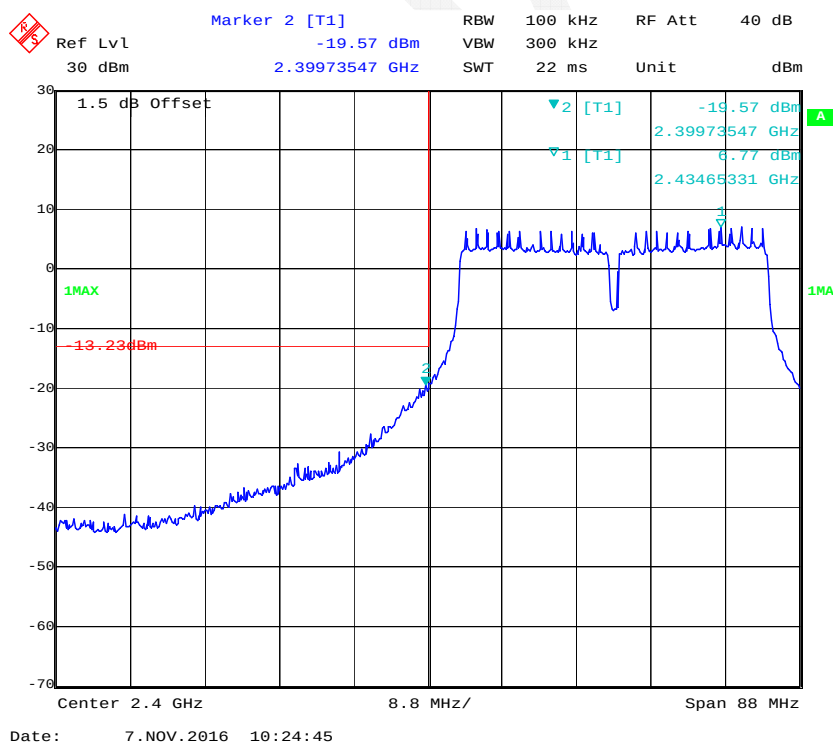
Chain 2, 802.11n ht20 Band Edge, Left Side



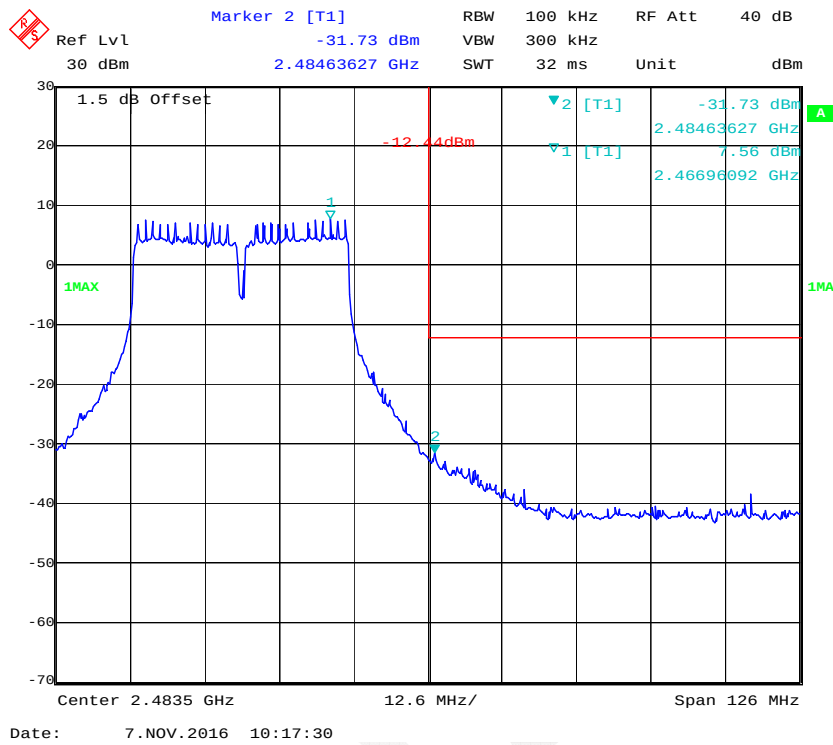
Chain 2, 802.11n ht20 Band Edge, Right Side



Chain 2, 802.11n ht40 Band Edge, Left Side



Chain 2, 802.11n ht40 Band Edge, Right Side



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

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set the VBW $\geq 3 \times \text{RBW}$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
N/A	RF Cable	N/A	N/A	Each Time	/

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

Test Data

Environmental Conditions

Temperature:	25.6~29.3 °C
Relative Humidity:	31~47 %
ATM Pressure:	100.8~101.1 kPa

* The testing was performed by Lorin Bian from 2016-11-05 to 2016-11-23.

Test Mode: Transmitting (SISO mode was the maximum power mode per chain, so the MIMO modes PSD is less than SISO mode per chain)

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

Test mode	Channel	Frequency (MHz)	PSD (dBm/3kHz)			Total (dBm/3kHz)	Limit (dBm/3kHz)
			Chain 0	Chain 1	Chain 2		
802.11b	Low	2412	-0.42	1.39	1.09	5.53	≤7.23
	Middle	2437	0.56	1.37	1.52	5.94	≤7.23
	High	2462	0.32	0.91	0.89	5.49	≤7.23
802.11g	Low	2412	-4.26	-3.86	-3.82	0.80	≤7.23
	Middle	2437	-3.55	-4.47	-3.28	1.03	≤7.23
	High	2462	-4.27	-4.32	-2.88	1.00	≤7.23
802.11n20	Low	2412	-4.97	-5.4	-4.68	-0.24	≤7.23
	Middle	2437	-4.55	-4.1	-3.84	0.62	≤7.23
	High	2462	-4.83	-5.16	-4.94	-0.20	≤7.23
802.11n40	Low	2422	-11.38	-11.68	-10.16	-6.25	≤7.23
	Middle	2437	-10.37	-11.92	-10.06	-5.94	≤7.23
	High	2452	-9.51	-12.33	-10.11	-5.72	≤7.23

Note: the device is a master device. the 3 antenna maximum antenna gain are 2.0dBi, and employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices:

Array Gain = $10 \log(N_{\text{ANT}}/N_{\text{SS}})$ dB.

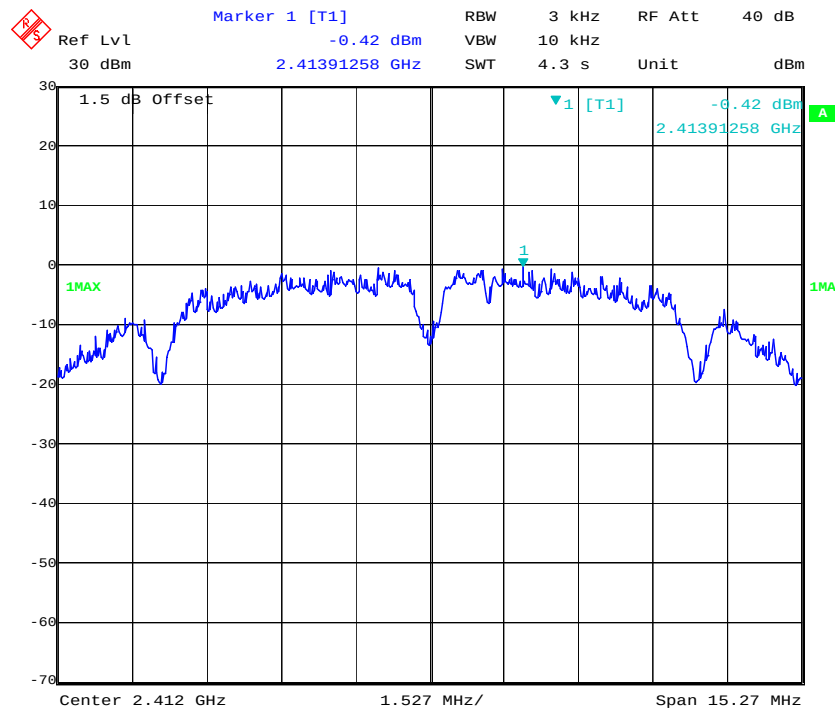
So:

Directional gain = GANT + Array Gain = $2 + 10 \cdot \log(3) = 6.77$ dBi

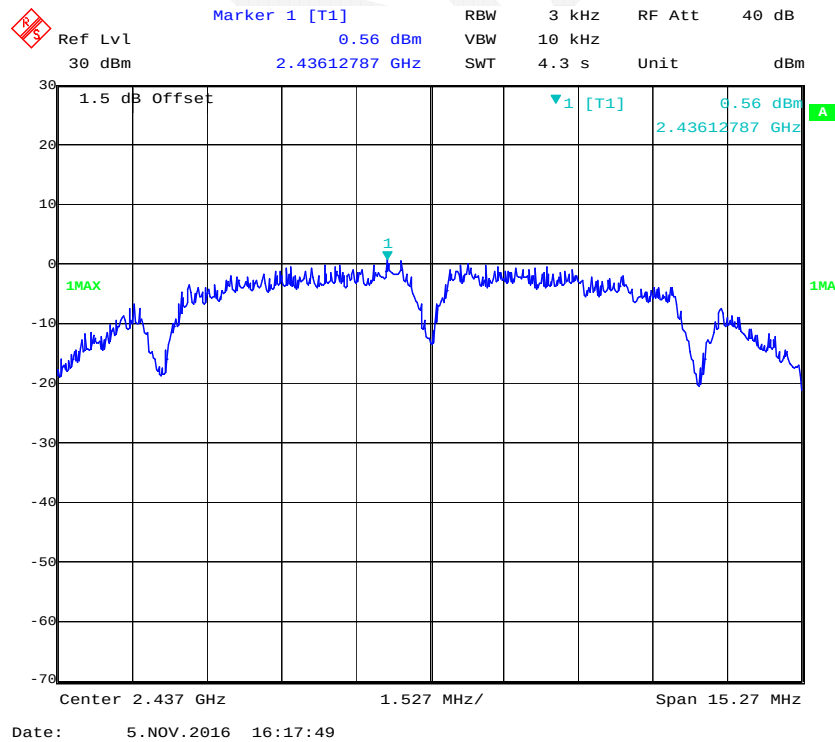
The Power density Limits was reduce 0.77dB

SISO-Chain 0

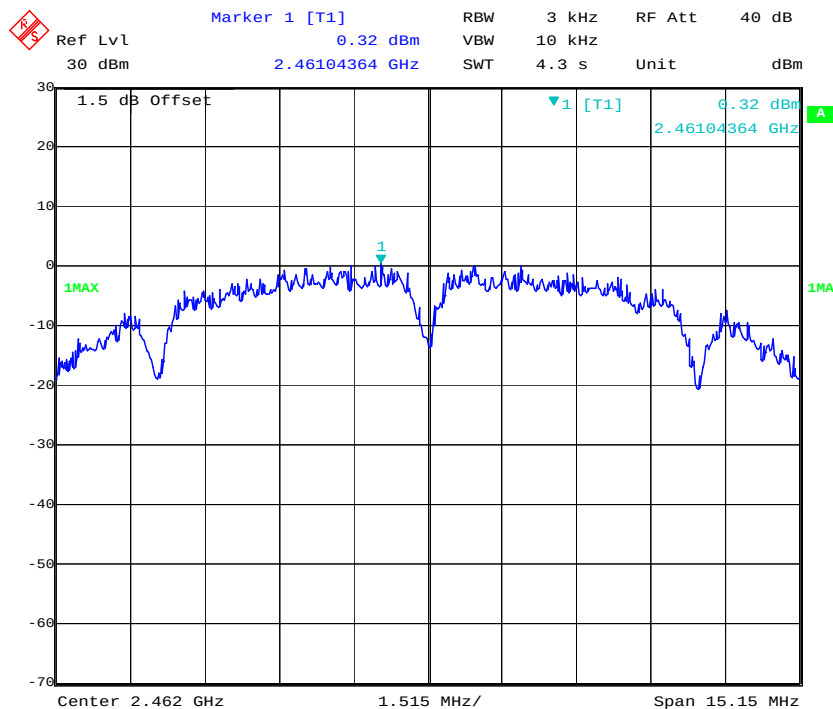
Power Spectral Density, 802.11b Low Channel



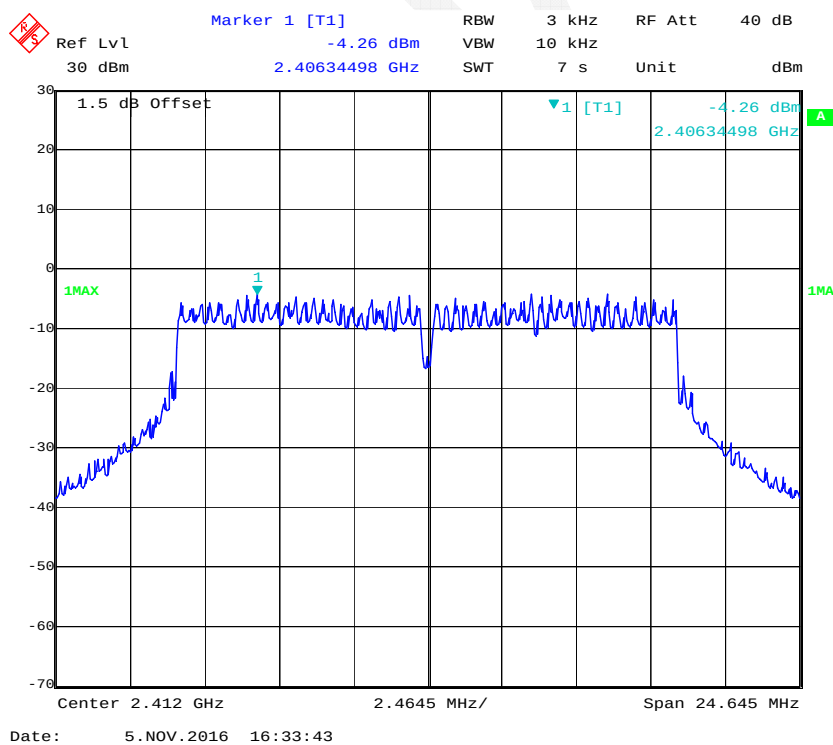
Power Spectral Density, 802.11b Middle Channel



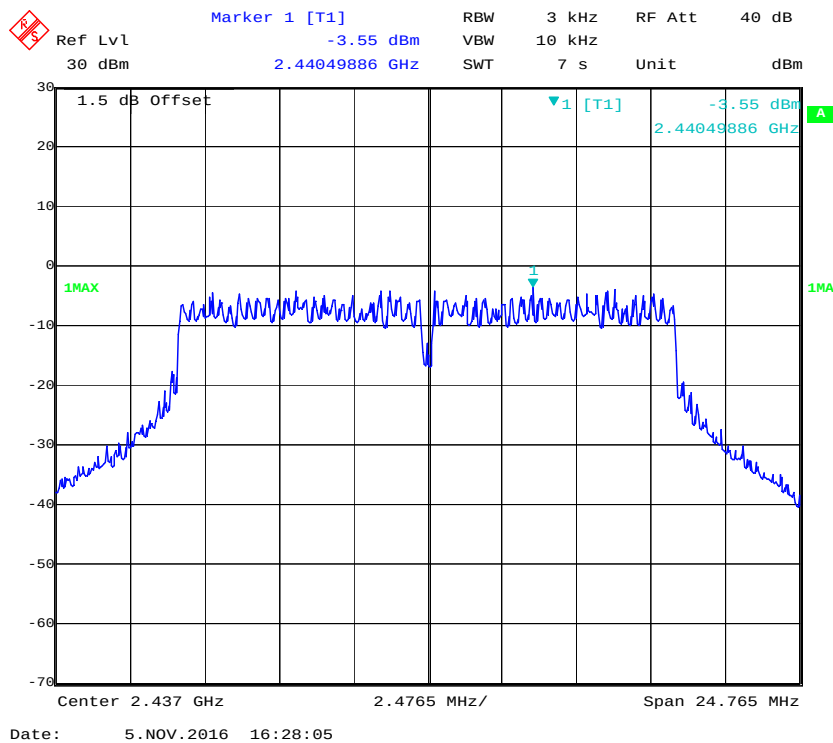
Power Spectral Density, 802.11b High Channel



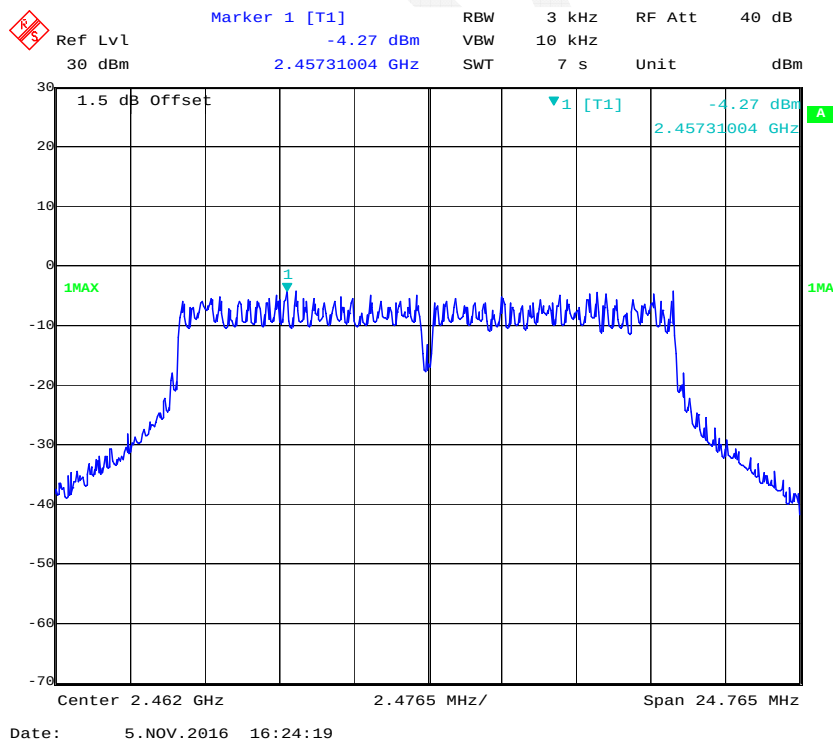
Power Spectral Density, 802.11g Low Channel



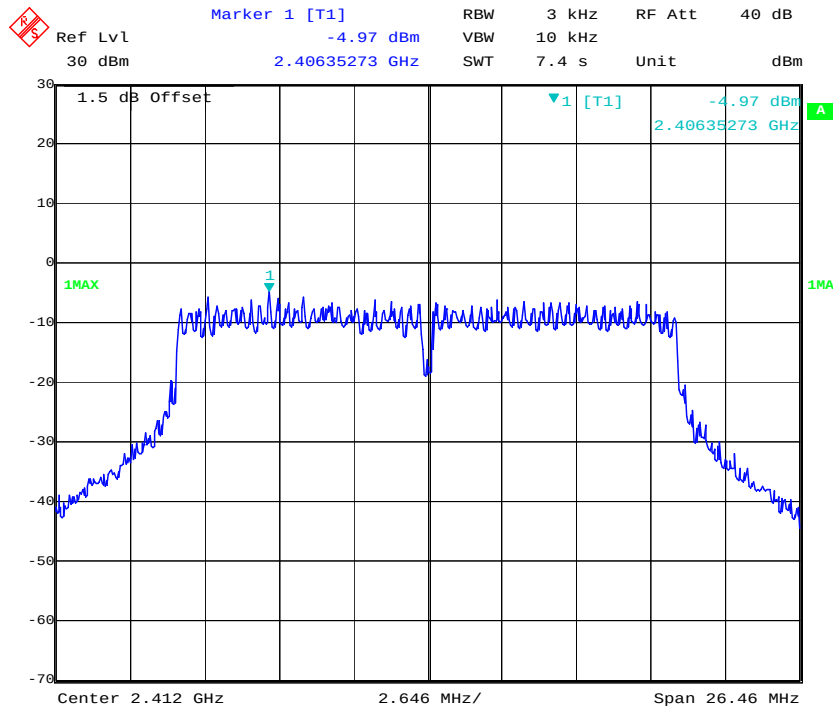
Power Spectral Density, 802.11g Middle Channel



Power Spectral Density, 802.11g High Channel

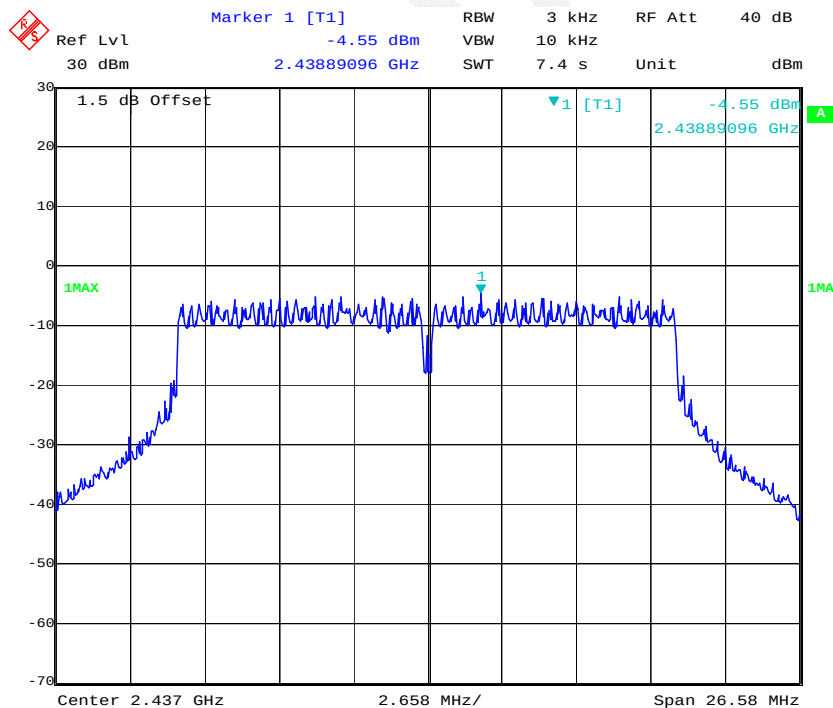


Power Spectral Density, 802.11n ht20 Low Channel



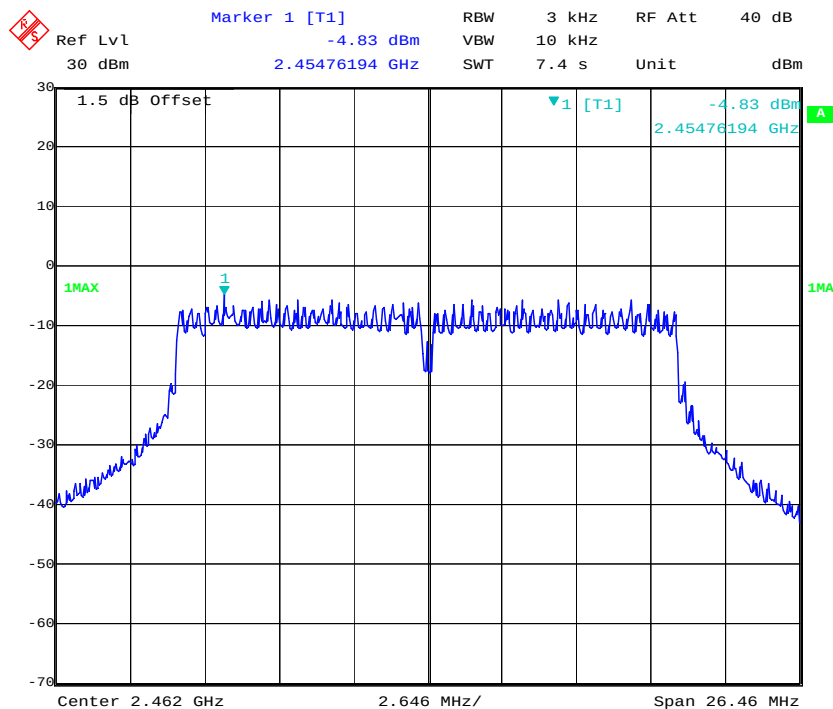
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Power Spectral Density, 802.11n ht20 Middle Channel

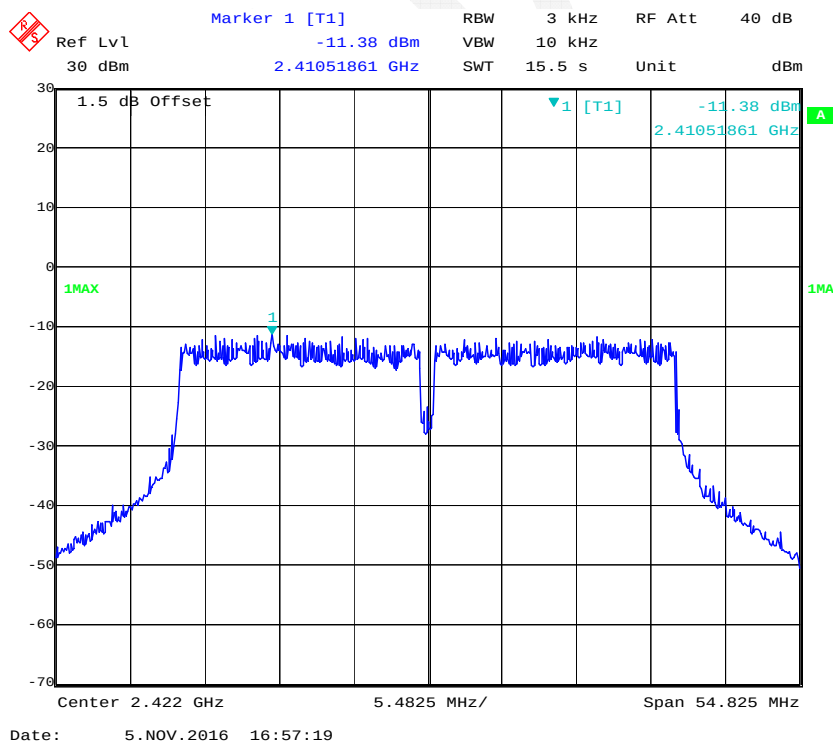


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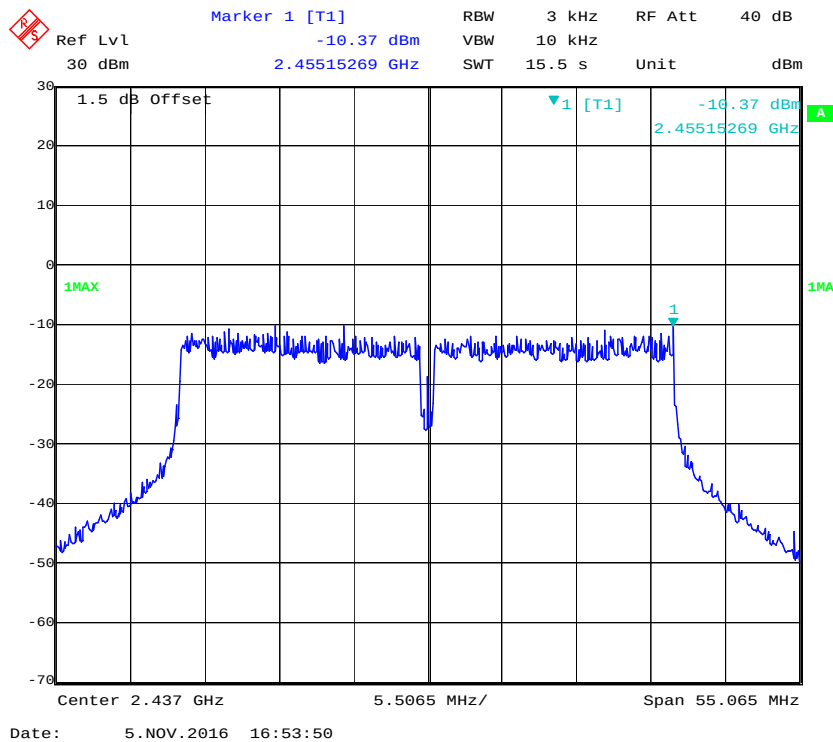
Power Spectral Density, 802.11n ht20 High Channel



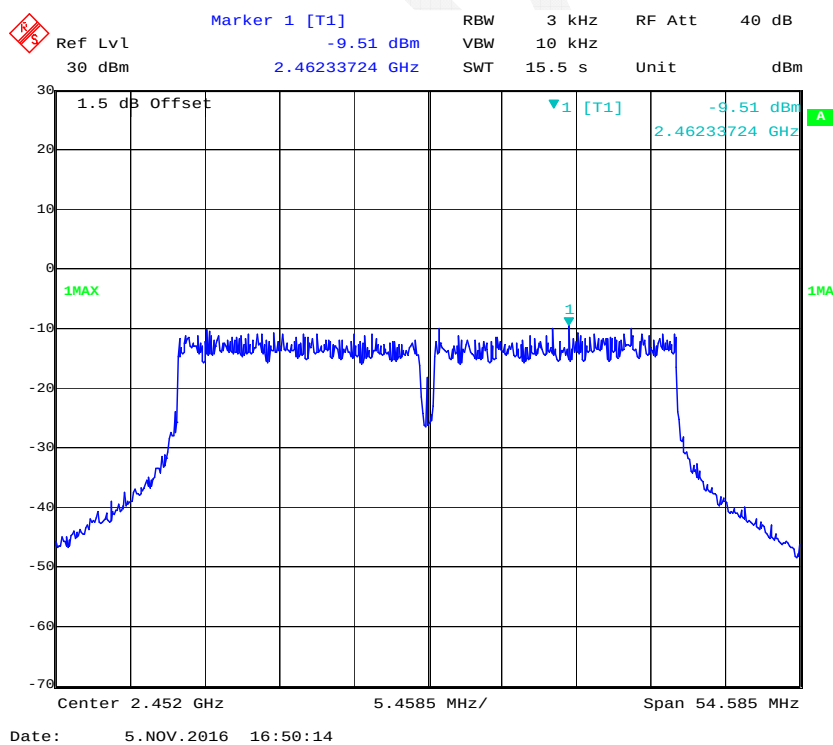
Power Spectral Density, 802.11n ht40 Low Channel



Power Spectral Density, 802.11n ht40 Middle Channel

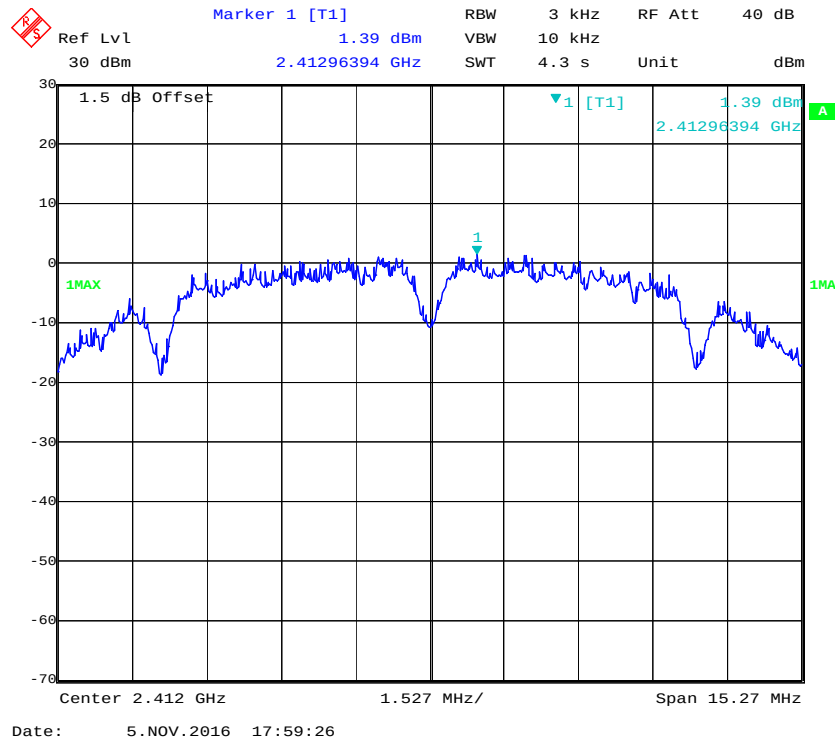


Power Spectral Density, 802.11n ht40 High Channel

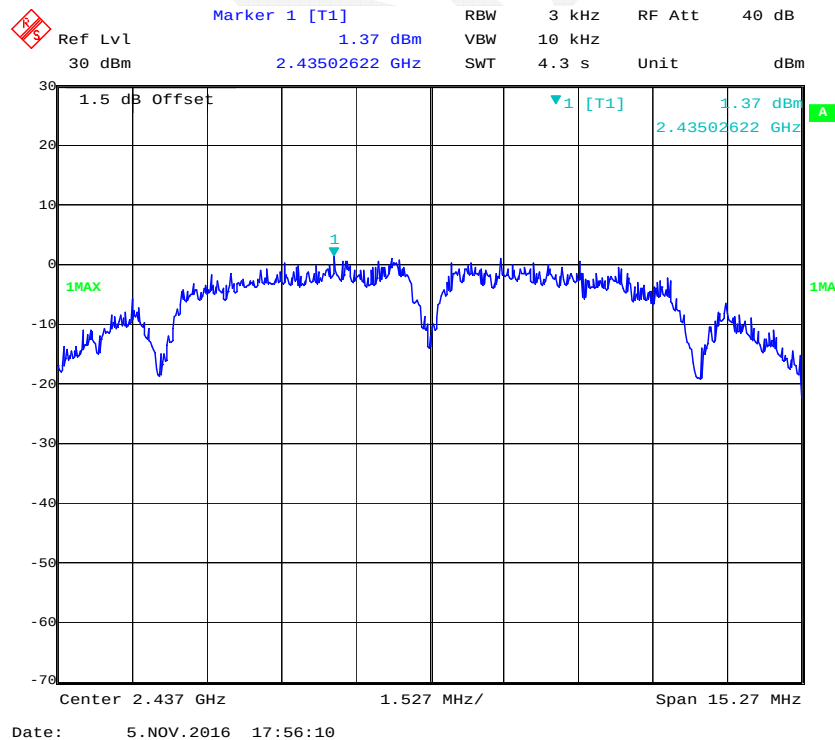


SISO-Chain 1

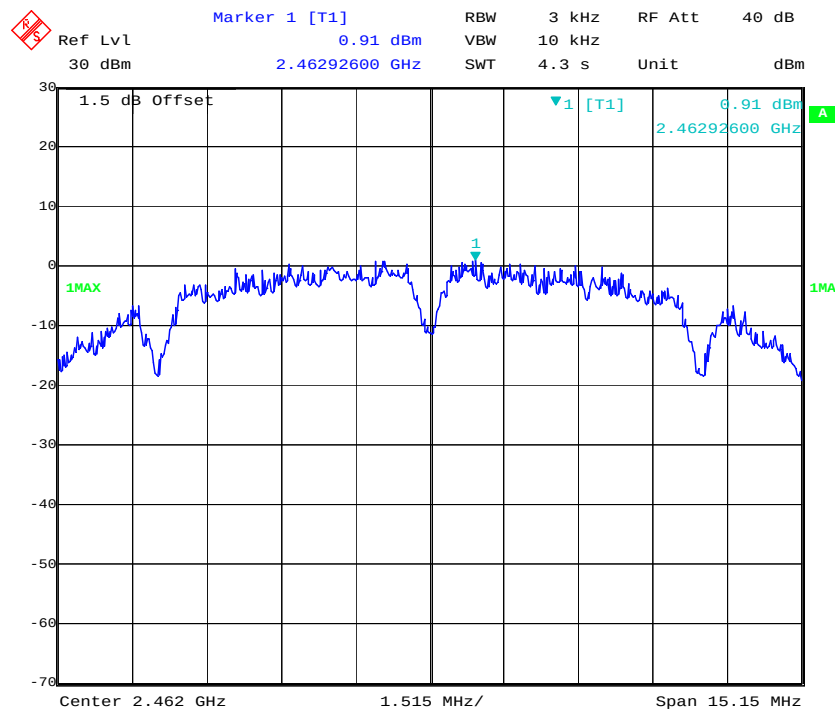
Power Spectral Density, 802.11b Low Channel



Power Spectral Density, 802.11b Middle Channel

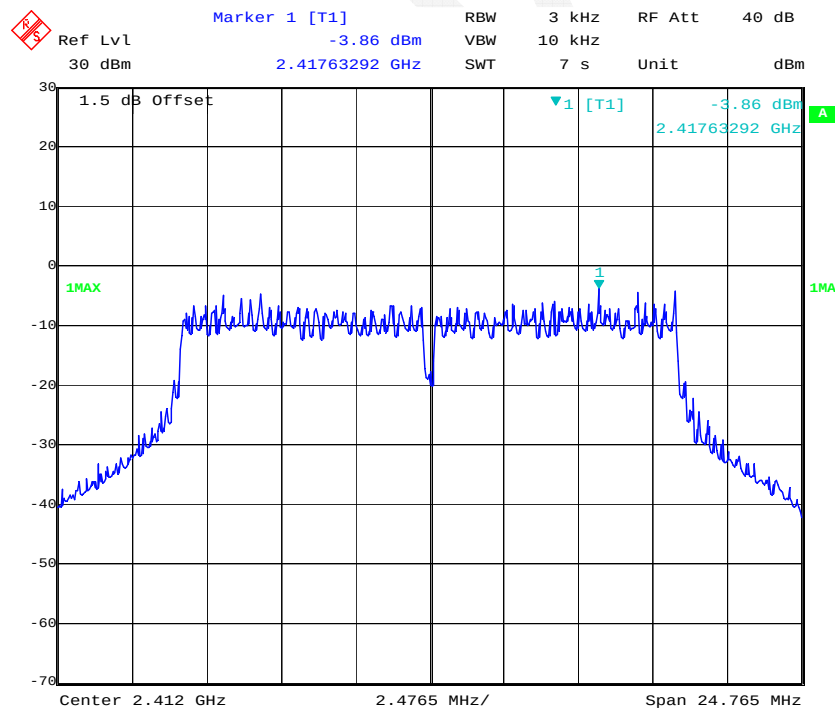


Power Spectral Density, 802.11b High Channel



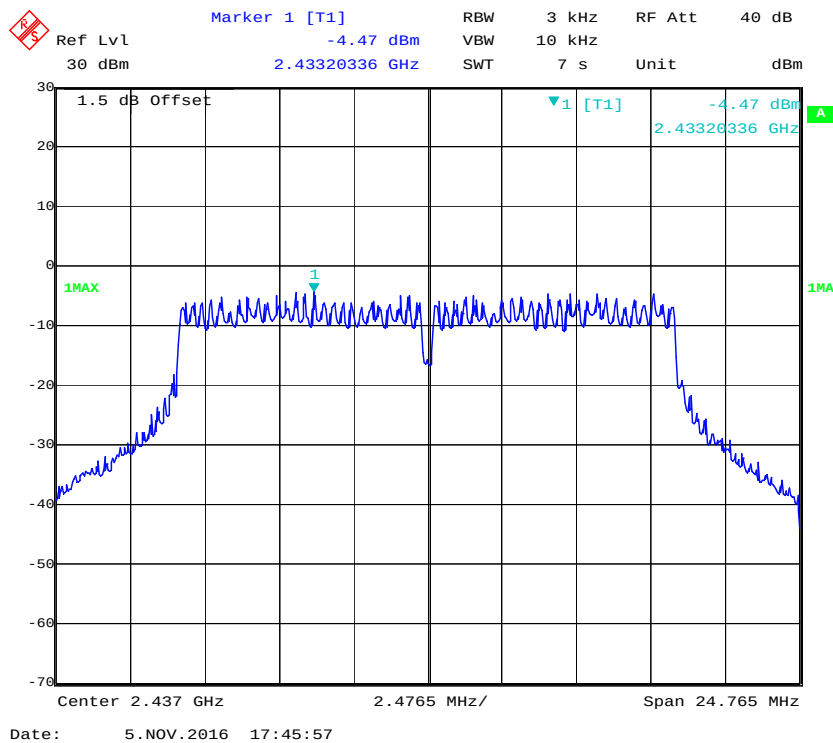
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Power Spectral Density, 802.11g Low Channel

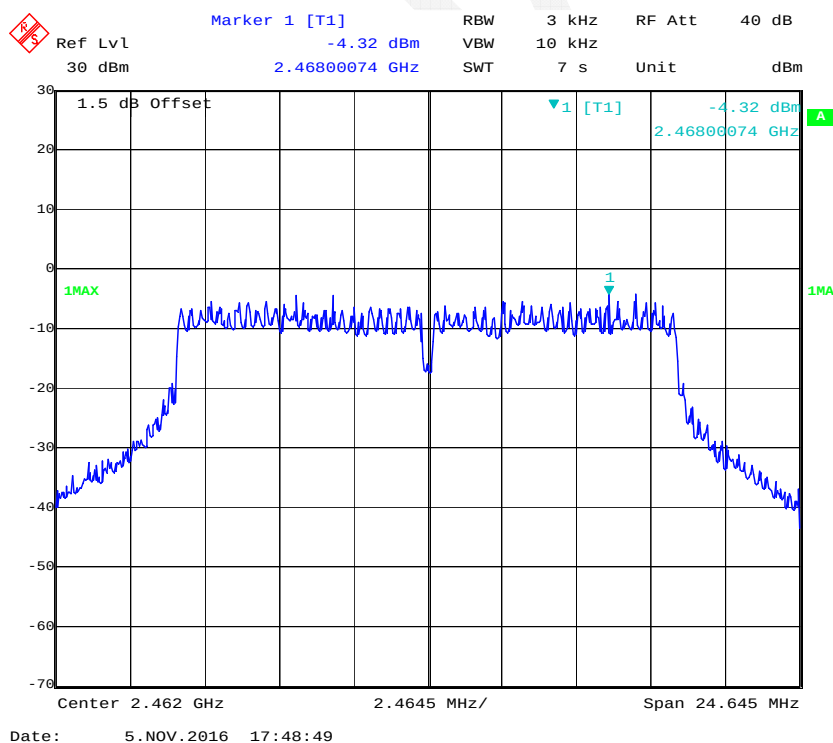


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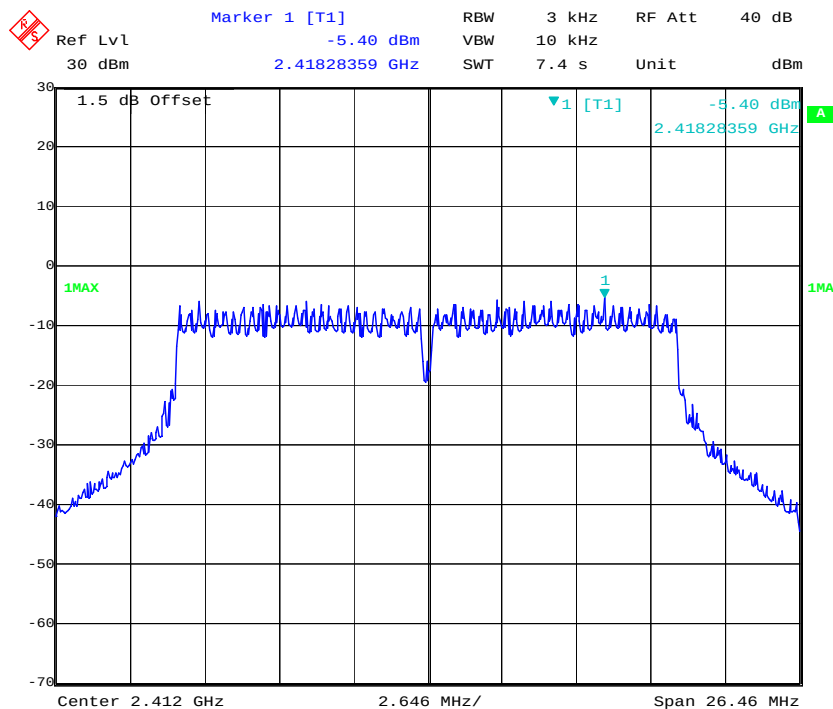
Power Spectral Density, 802.11g Middle Channel



Power Spectral Density, 802.11g High Channel

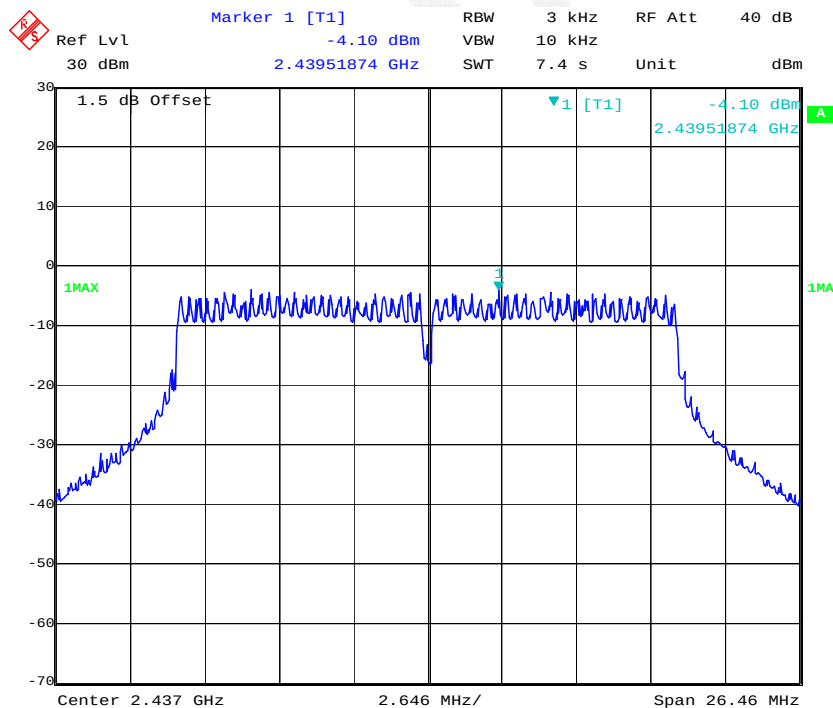


Power Spectral Density, 802.11n ht20 Low Channel



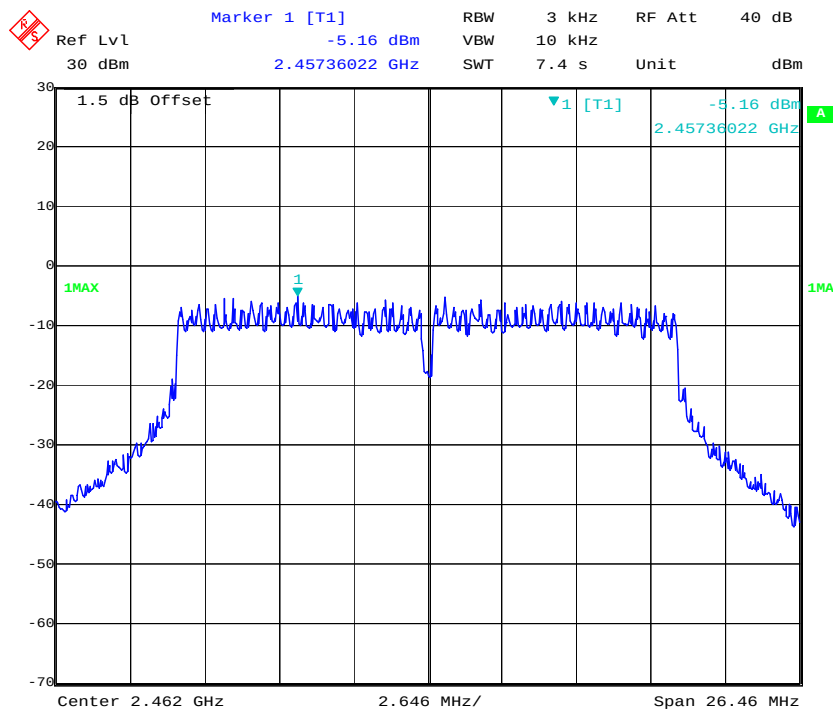
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Power Spectral Density, 802.11n ht20 Middle Channel

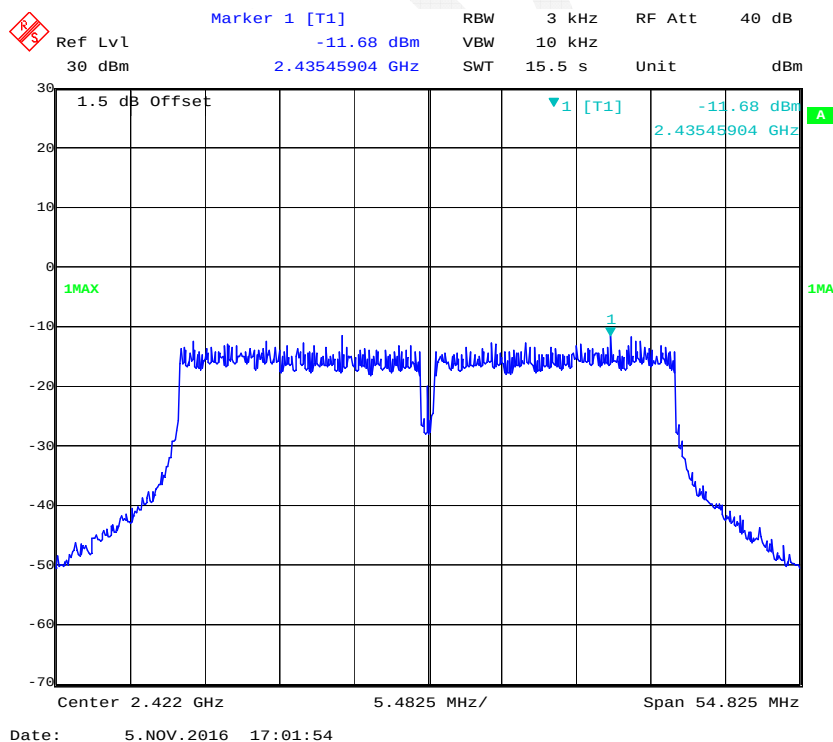


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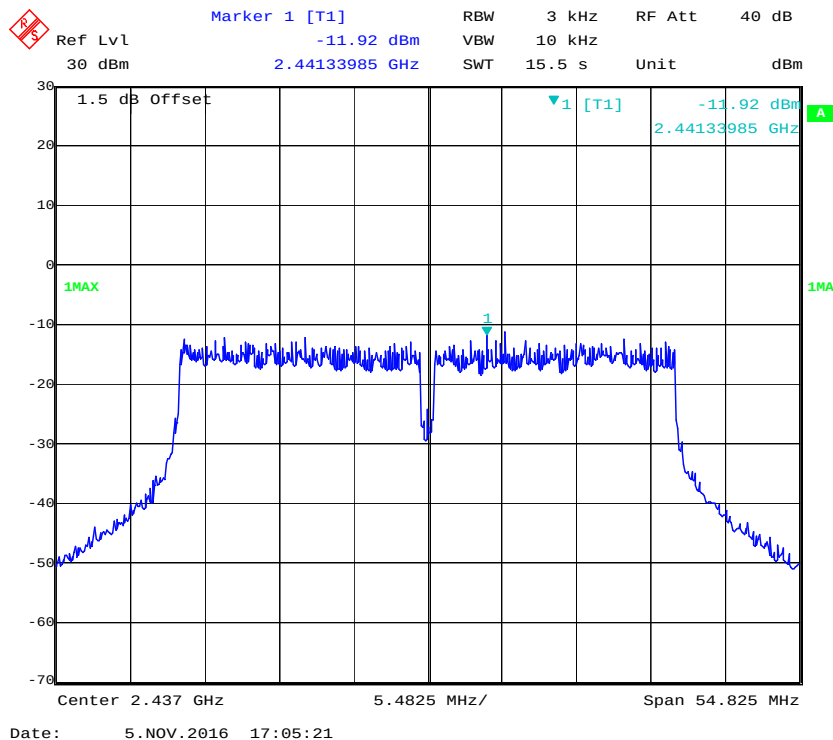
Power Spectral Density, 802.11n ht20 High Channel



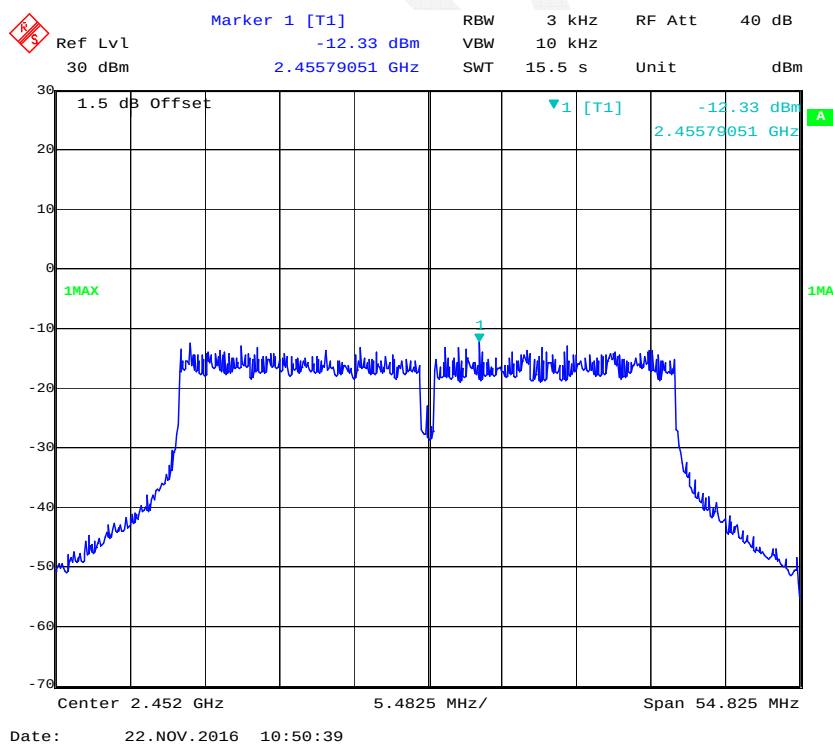
Power Spectral Density, 802.11n ht40 Low Channel



Power Spectral Density, 802.11n ht40 Middle Channel

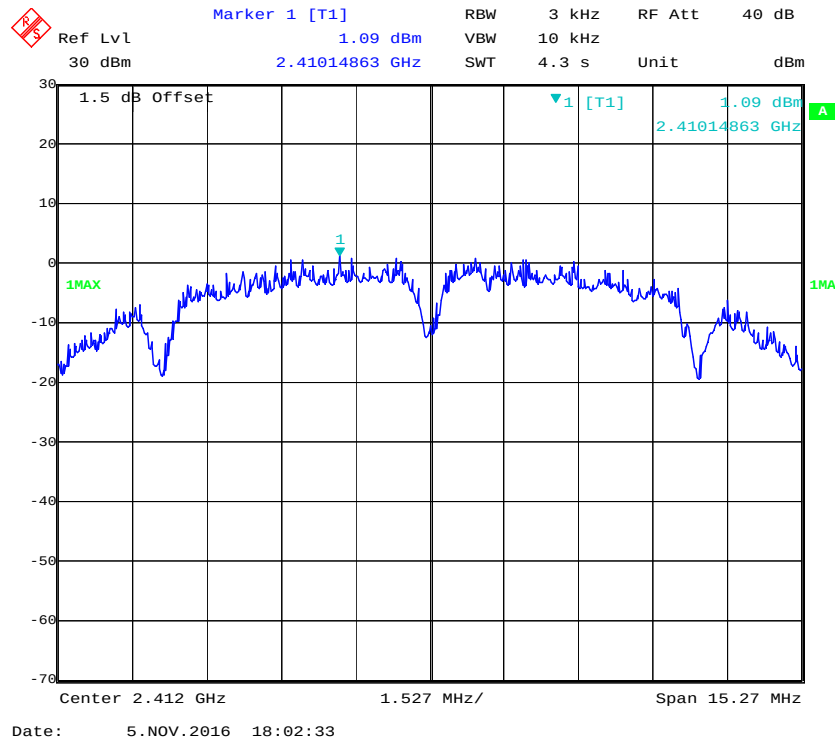


Power Spectral Density, 802.11n ht40 High Channel

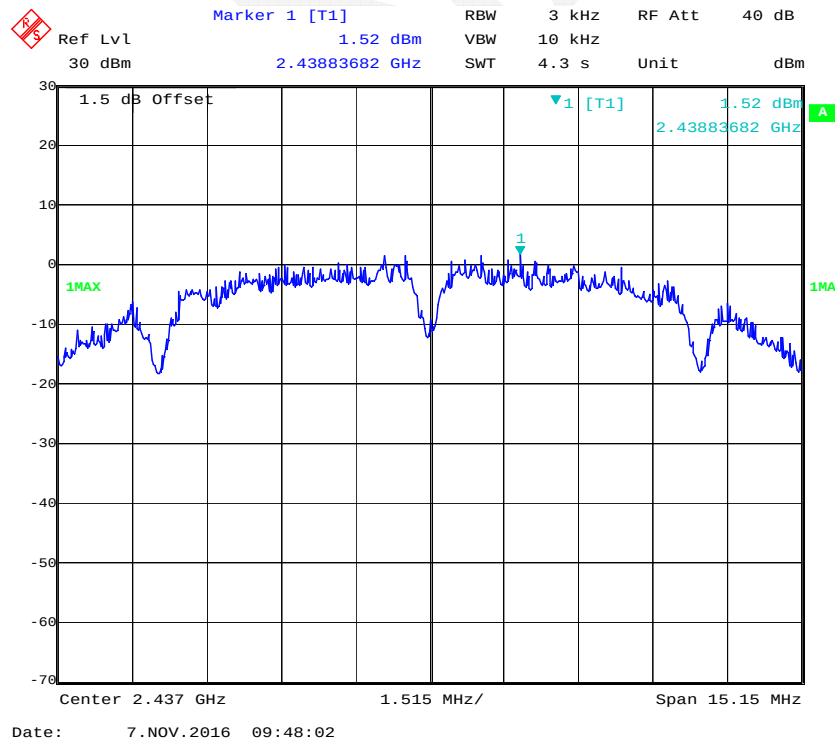


SISO-Chain 2

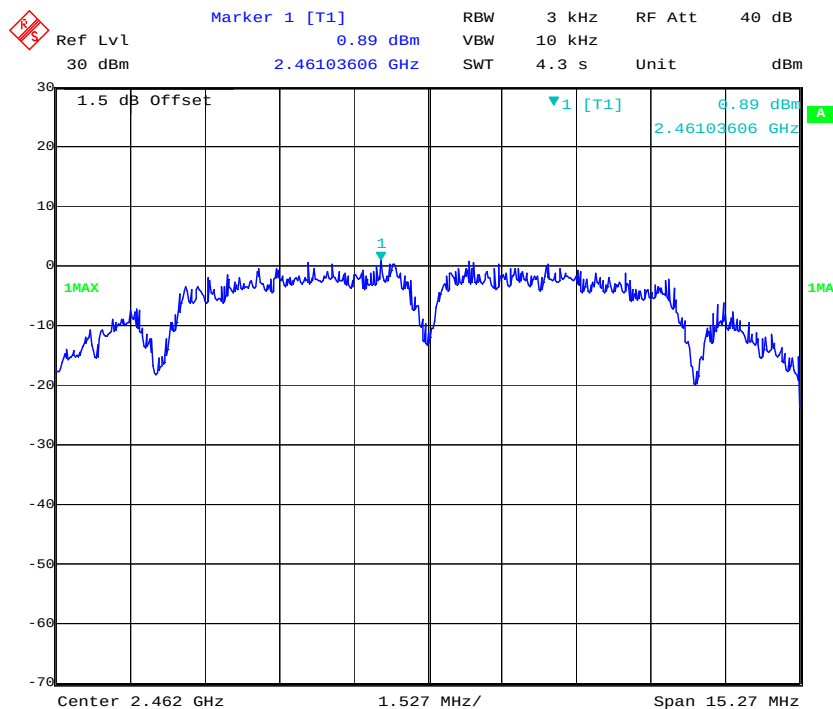
Power Spectral Density, 802.11b Low Channel



Power Spectral Density, 802.11b Middle Channel

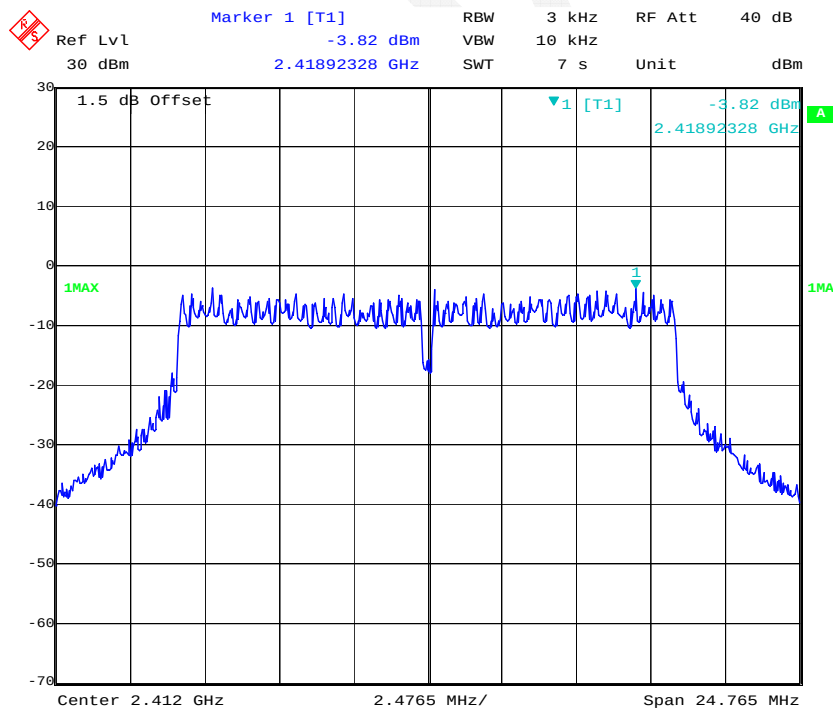


Power Spectral Density, 802.11b High Channel



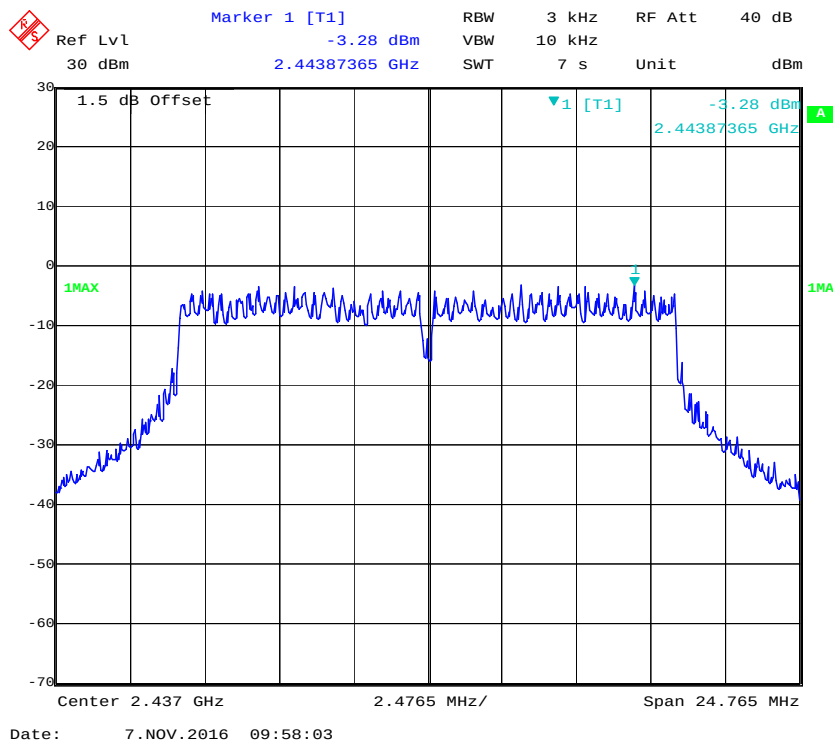
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Power Spectral Density, 802.11g Low Channel

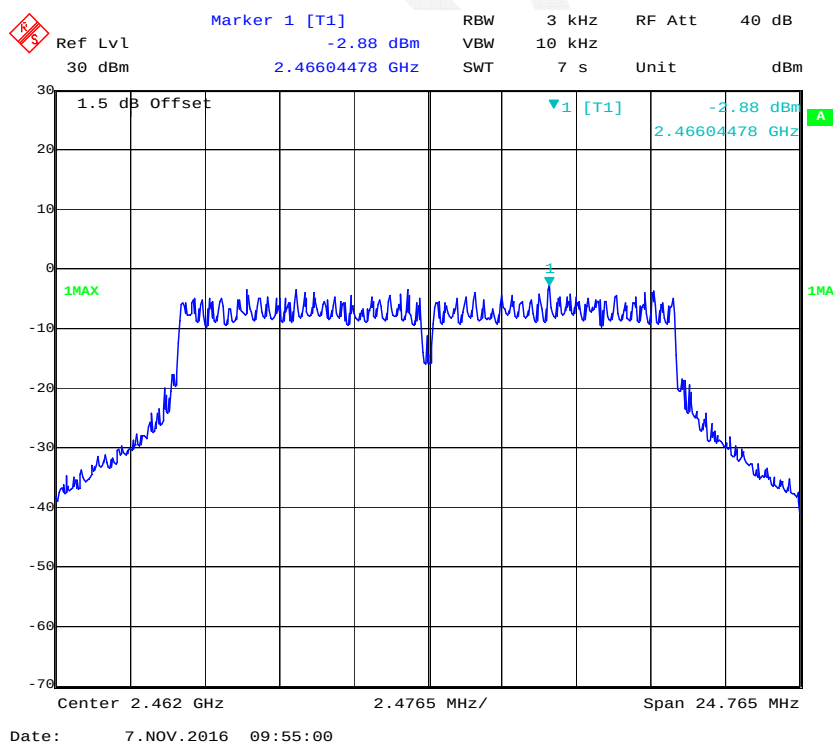


Date: 7.NOV.2016 10:01:40

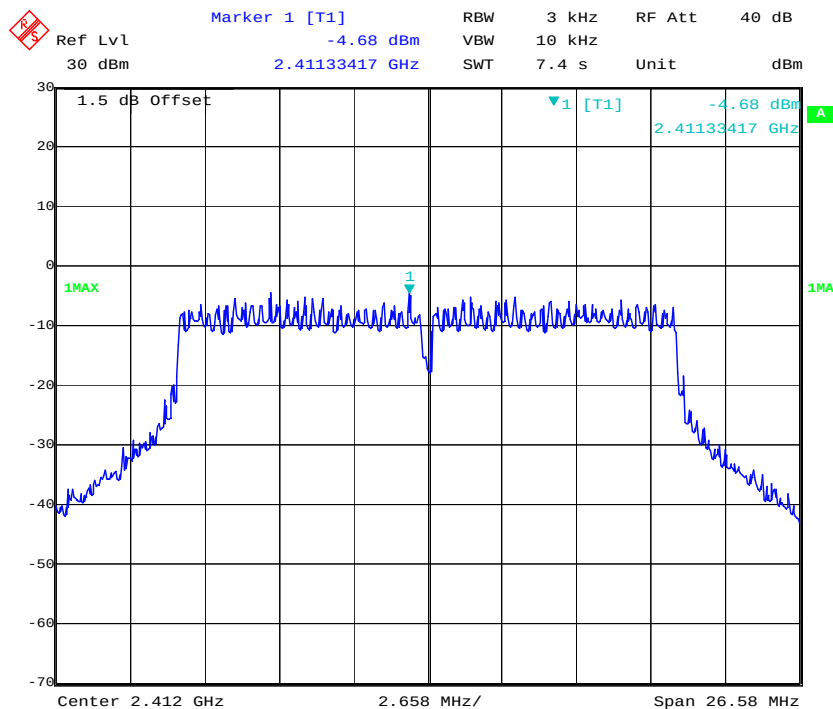
Power Spectral Density, 802.11g Middle Channel



Power Spectral Density, 802.11g High Channel

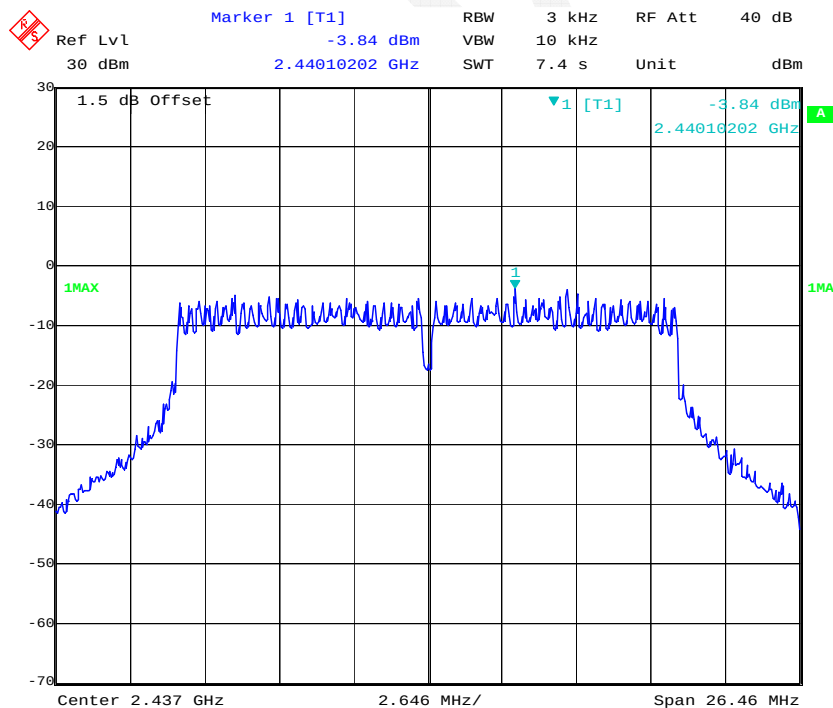


Power Spectral Density, 802.11n ht20 Low Channel



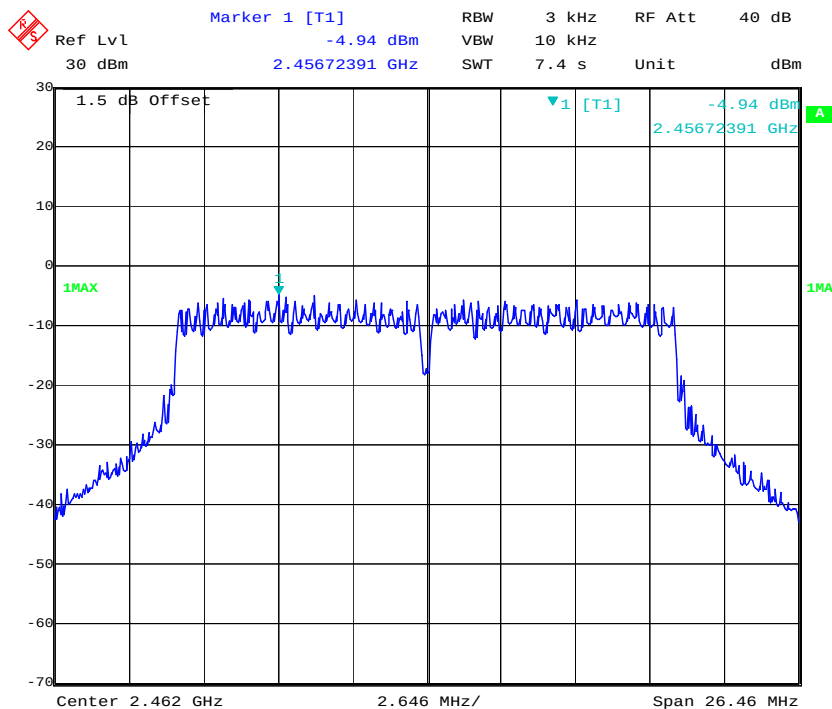
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Power Spectral Density, 802.11n ht20 Middle Channel

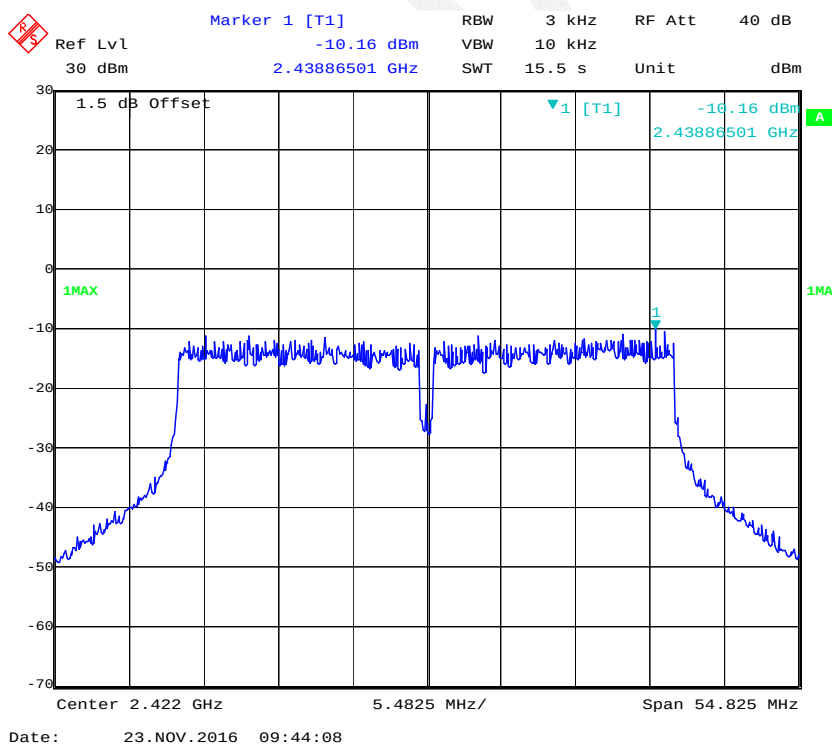


Date: 7.NOV.2016 10:08:28

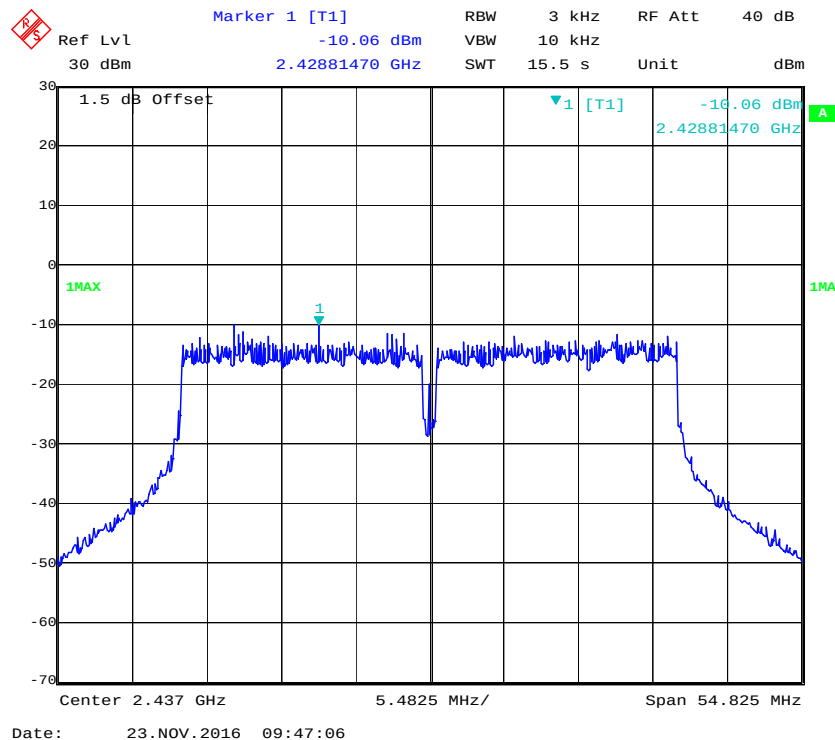
Power Spectral Density, 802.11n ht20 High Channel



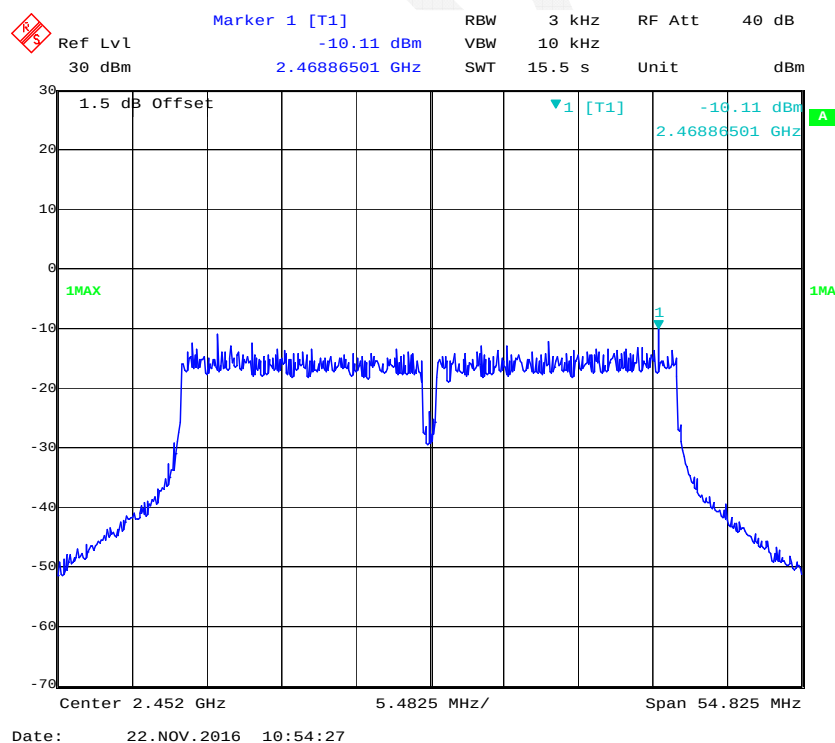
Power Spectral Density, 802.11n ht40 Low Channel



Power Spectral Density, 802.11n ht40 Middle Channel



Power Spectral Density, 802.11n ht40 High Channel



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