FCC PART 15.247

TEST REPORT

For

SHENZHEN IP-COM NETWORKS CO.,LTD

Unit A, First Floor, Tower E3, No. 1001, Zhongshanyuan Road,Nanshan District, Shenzhen, China

FCC ID: 2ABZMAP375

Report Type:	Product Name:
Original Report	Wireless Access Point

Test Engineer:	*Kevin Hu*
Report Number:	RDG170314002A
Report Date:	2017-05-04
Reviewed By:	Henry Ding EMC Leader
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China Tel: 028-65523123, Fax: 028-65525125 www.baclcorp.com

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The ***SHENZHEN IP-COM NETWORKS CO.,LTD***'s product, model number: ***AP375 (FCC ID: 2ABZMAP375)*** (the "EUT") in this report was a ***Wireless Access Point***, which was measured approximately: 23.3 cm (L) x 23.3 cm (W) x 5.2 cm (H), rated input voltage: DC 51V from POE Port.

Adapter Information:
MODEL: BN031-A65051
INPUT: AC 100-240V, 50/60Hz, 1.5A
OUTPUT: DC 51V, 1.25A

**All measurement and test data in this report was gathered from final production sample, serial number: 170314002 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-03-14, and EUT conformed to test requirement.*

Objective

This report is prepared on behalf of ***SHENZHEN IP-COM NETWORKS CO.,LTD*** in accordance with Part 2, Subpart J, Part 15, Subparts A, and C of the Federal Communications Commission's rules

The tests were performed in order to determine the compliance of the EUT with FCC Rules 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: 2ABZMAP375.

Test Methodology

All measurements detailed in this Test Report were performed in accordance with ANSI C63.10-2013 "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices".

All of the measurements detailed in this Test Report were performed by Bay Area Compliance Laboratories Corp. (Chengdu).

The Bay Area Compliance Laboratories Corp. Chengdu's measurement Uncertainties (calculated for a k=2 Coverage Factor corresponding to approximately 95% Coverage) were as follows:

-For all of the AC Line Conducted Emissions Tests reported herein: ±3.17 dB.
-For of all of the Direct Antenna Conducted Emissions Tests reported herein: ±0.56 dB.

-For of all of the direct Radiated Emissions Tests reported herein are:
30 MHz to 200 MHz: ±4.7 dB;
200 MHz to 1 GHz: ±6.0 dB;
1 GHz to 6 GHz: ±5.13dB; and,
6 GHz to 40 GHz: ±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 No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, 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.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in testing mode, which was provided by manufacturer.

The device has 3 identical WLAN modules, which supports 2.4GHz and 5GHz bands. For this device, manufacturer only enabled 2.4GHz band for module 1, enabled 5150-5250 MHz and 5725-5850 MHz band for module 2. Module 3 enabled 2.4GHz, 5150-5250 MHz and 5725-5850 MHz, other bands were disabled by software. Per pre-test, the related frequency band`s RF parameters and setting for module 1 and module 2 were identical with module 3, So all conducted test performed at module 3.

For 2.4G band, the modules support SISO, 2 x 2 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.

EUT Exercise Software

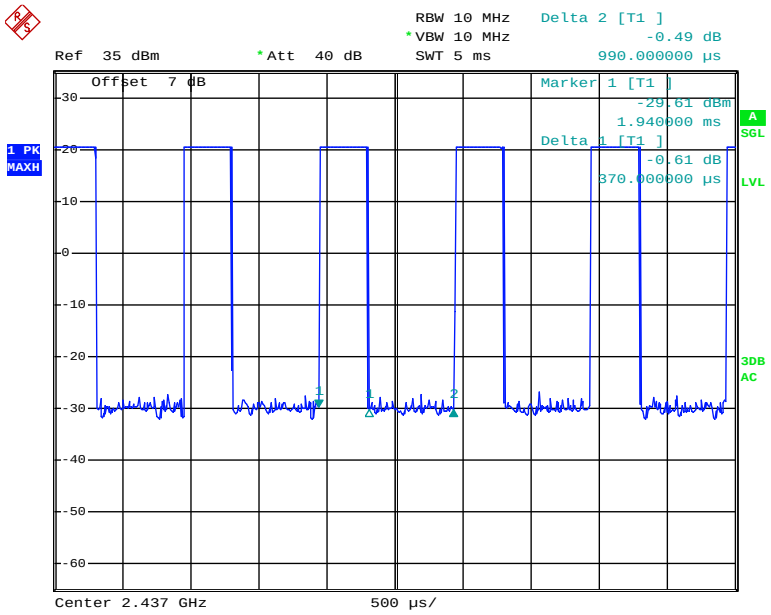
The software “MTool _2.0.0.3” was used for testing, which was provided by manufacturer. The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all date rates bandwidths, and modulations. The maximum power was configured as below table, that provided by the manufacturer:

Test Mode	Test Software Version	MTool _2.0.0.3		
802.11b	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	1Mbps	1Mbps	1Mbps
	Power Level Setting	90	90	90
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	90	90	90
802.11n20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	90	90	90
802.11n40	Test Frequency	2422MHz	2437MHz	2452MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	90	90	90

The duty cycle as below:

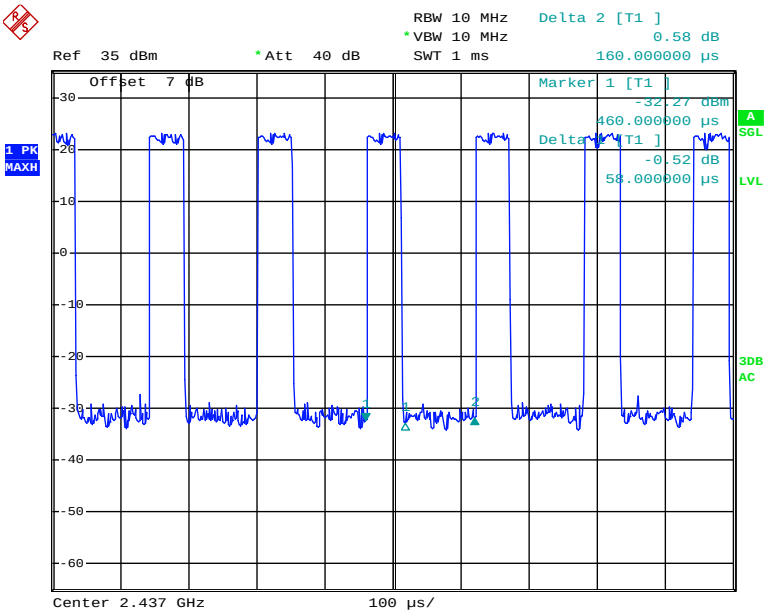
Mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle (%)	Minimum Transmission Duration (T) (ms)	Duty cycle Corrected Factor (10*log(1/x)) (dB)
802.11 b	0.37	0.99	37.37%	0.37	4.27
802.11 g	0.058	0.160	36.25%	0.058	4.41
802.11n ht20	0.060	0.154	38.96%	0.060	4.09
802.11n ht40	0.060	0.152	39.47%	0.060	4.04

802.11b



Date: 14.APR.2017 00:04:44

802.11g



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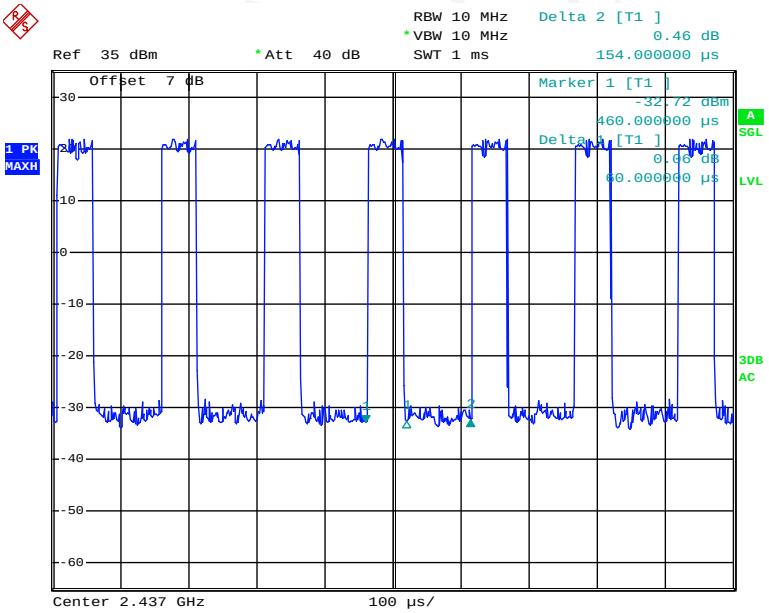
802.11n ht20



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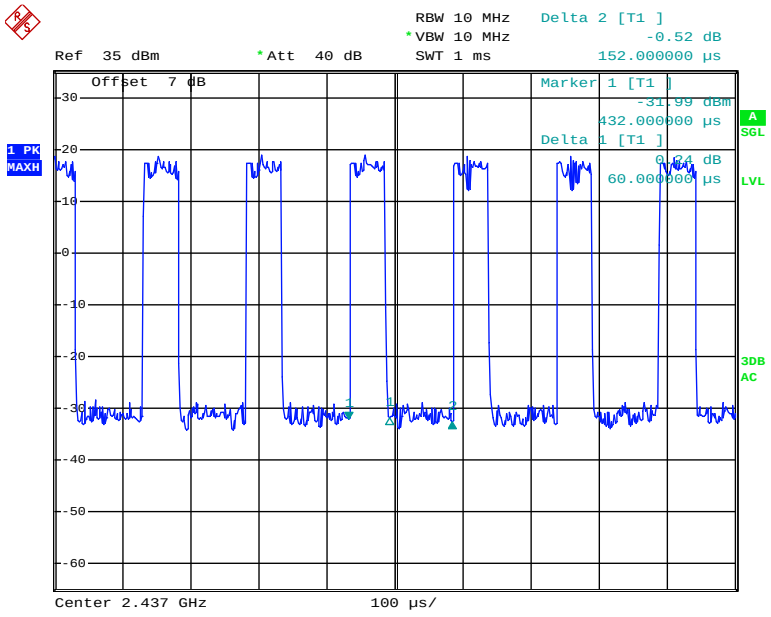
802.11n ht40



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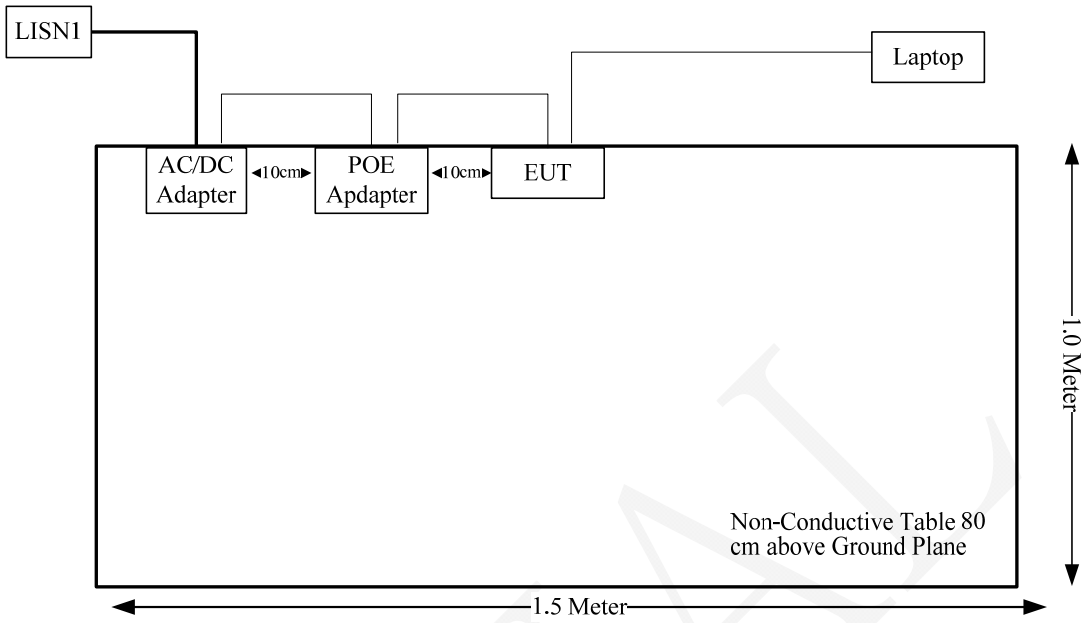
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
IBM	PC	8176	99Y7315

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45 cable	Yes	No	1.0	POE Adapter	EUT
RJ45 Cable	Yes	No	10	EUT	PC
DC Cable	No	No	1.0	AC/DC Adapter	POE Adapter

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	Maximum Permissable 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 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)**
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.

Calculation formula:

Prediction of power density at the distance of the applicable MPE limit
$S = PG/4\pi R^2$ = 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);

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

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

Calculated Data:

Modules	Frequency (MHz)	Antenna Gain		Conducted average output power including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
1	2412-2462	3.9	2.45	24	251.19	20.00	0.12	1.0
2	5180-5240	2.6	1.82	23	199.53	20.00	0.07	1.0
	5745-5825	4.4	2.75	23	199.53	20.00	0.11	1.0
3	2412-2462	4.7	2.95	24	251.19	20.00	0.15	1.0
	5180-5240	4.6	2.88	23	199.53	20.00	0.11	1.0
	5745-5825	4.7	2.95	23	199.53	20.00	0.12	1.0

The module 1, 2 and 3 can transmit simultaneously, module 3 5G and 2.4G can`t transmit simultaneously :

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

$=S_{mod1}/S_{limit-\ mod1} + S_{mod2}/S_{limit-\ mod2} + S_{mod3}/S_{limit-\ mod3}$

=0.12/1+0.11/1+0.15/1

=0.38

< 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 4 internal antennas permanently attached to the unit, module 1 and 2 use same antenna 1 and antenna 2, the antenna gain is 3.9dBi in 2.4GHz band, 2.6dBi in 5.2GHz band, 4.4dBi in 5.8GHz band, antenna 3 and antenna 4 are for module 3, the antenna gain is 4.7dBi in 2.4GHz band, 4.6dBi in 5.2GHz band, 4.7dBi in 5.8GHz band,fulfill the requirement of this section. Please refer to the EUT photos.

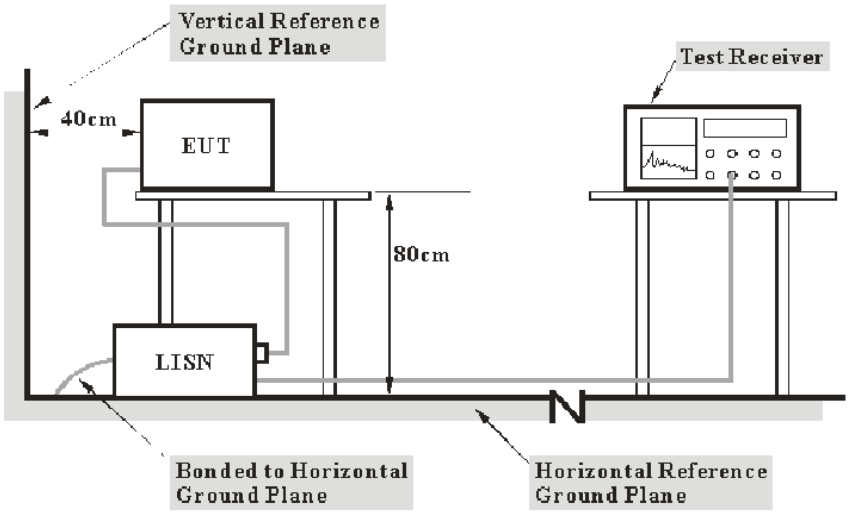
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207(a)

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:

Margin = Limit – 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	2016-12-02	2017-12-01
Rohde & Schwarz	L.I.S.N.	ENV216	100018	2016-12-02	2017-12-01
SOLAR ELECTRONICS	L.I.S.N.	9252-50-24-BNC	984413	2016-12-02	2017-12-01
Rohde & Schwarz	PULSE LIMITER	ESH3Z2	DE14781	2016-10-31	2017-10-30
Unknown	Conducted Cable	Unknown	NO.5	2016-11-10	2017-11-09
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data

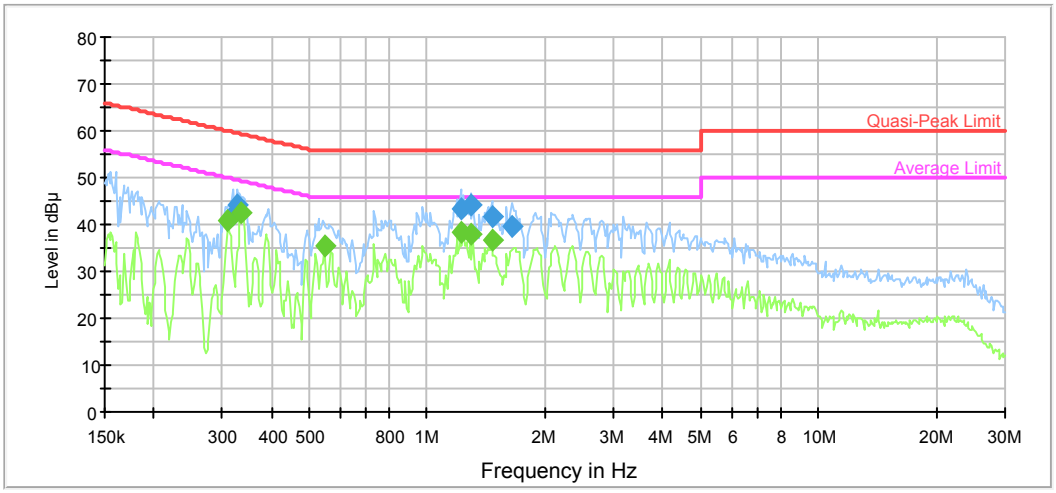
Environmental Conditions

Temperature:	19 °C
Relative Humidity:	58 %
ATM Pressure:	95.6 kPa

The testing was performed by Kevin Hu on 2017-03-16.

Test Mode: Transmitting

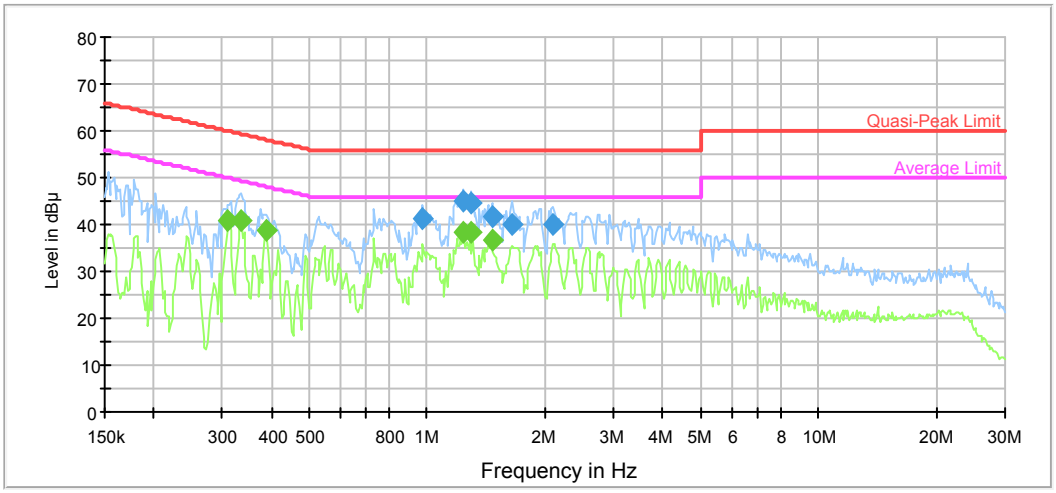
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.319773	42.2	9.000	L1	19.7	17.5	59.7	Compliance
0.327509	44.2	9.000	L1	19.7	15.3	59.5	Compliance
1.219583	43.4	9.000	L1	19.7	12.6	56.0	Compliance
1.289541	44.0	9.000	L1	19.7	12.0	56.0	Compliance
1.464886	41.5	9.000	L1	19.7	14.5	56.0	Compliance
1.650866	39.4	9.000	L1	19.7	16.6	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.309742	40.9	9.000	L1	19.7	9.1	50.0	Compliance
0.335433	42.7	9.000	L1	19.7	6.6	49.3	Compliance
0.545378	35.4	9.000	L1	19.7	10.6	46.0	Compliance
1.219583	38.4	9.000	L1	19.7	7.6	46.0	Compliance
1.289541	37.8	9.000	L1	19.7	8.2	46.0	Compliance
1.464886	36.6	9.000	L1	19.7	9.4	46.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.975701	41.2	9.000	N	19.7	14.8	56.0	Compliance
1.239175	44.8	9.000	N	19.6	11.2	56.0	Compliance
1.289541	44.4	9.000	N	19.6	11.6	56.0	Compliance
1.464886	41.8	9.000	N	19.7	14.2	56.0	Compliance
1.650866	39.8	9.000	N	19.7	16.2	56.0	Compliance
2.096658	40.0	9.000	N	19.7	16.0	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.309742	40.7	9.000	N	19.6	9.3	50.0	Compliance
0.335433	40.8	9.000	N	19.6	8.5	49.3	Compliance
0.387164	38.7	9.000	N	19.6	9.4	48.1	Compliance
1.239175	38.5	9.000	N	19.6	7.5	46.0	Compliance
1.289541	38.3	9.000	N	19.6	7.7	46.0	Compliance
1.464886	36.6	9.000	N	19.7	9.4	46.0	Compliance

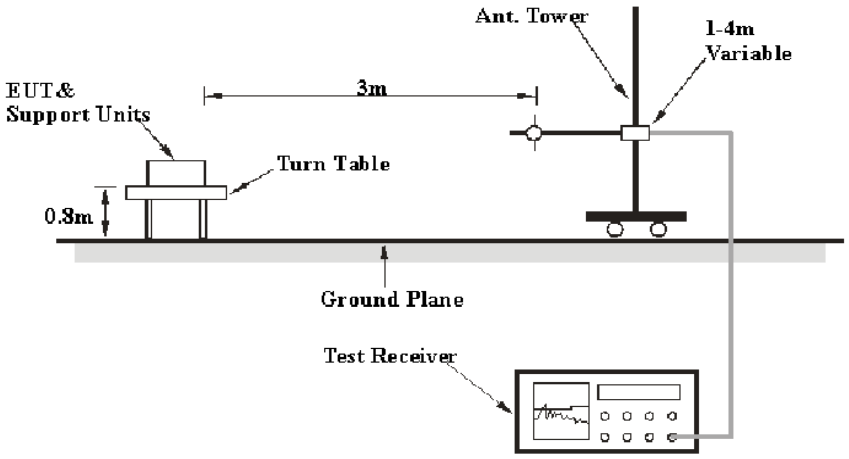
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

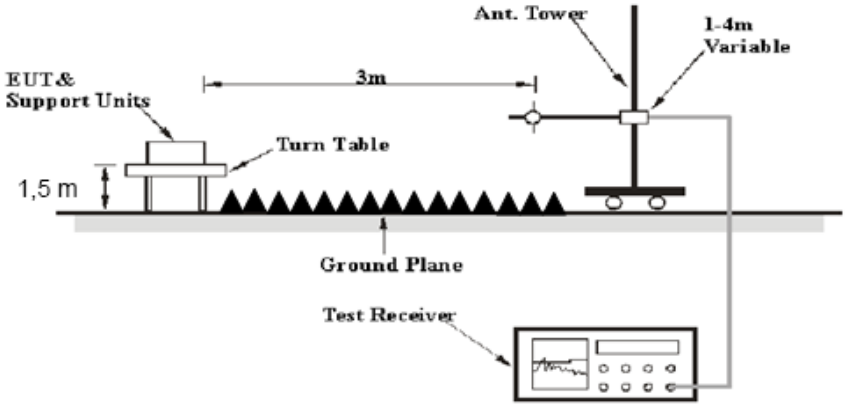
FCC §15.247 (d); §15.209; §15.205;

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:

Corrected Amplitude = Meter Reading + Antenna Loss + Cable Loss - 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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A121808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
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
EMCT	Semi-Anechoic Chamber	966	966-1	2015-04-24	2018-04-23
Unknown	RF Cable (below 1GHz)	Unknown	NO.1	2016-11-10	2017-11-09
Unknown	RF Cable (below 1GHz)	Unknown	NO.4	2016-11-10	2017-11-09
Unknown	RF Cable (above 1GHz)	Unknown	NO.2	2016-11-10	2017-11-09
Ducommun Technolagies	Horn Antenna	ARH-2823-02	1007726-01 1312	2016-08-18	2017-08-18
Quinstar	Amplifier	QLW-18405536-JO	15964001032	2016-08-18	2017-08-18
Agilent	Spectrum Analyzer	8564E	5943A01752	2016-08-18	2017-08-18

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

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

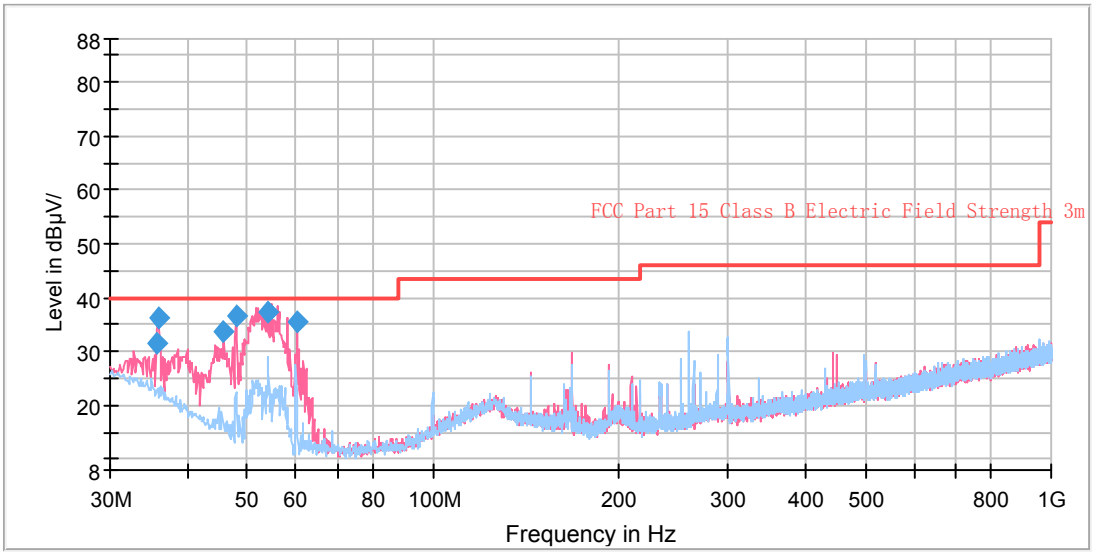
Environmental Conditions

Temperature:	25.0°C
Relative Humidity:	36.4 %
ATM Pressure:	100.9 kPa

** The testing was performed by Kevin Hu on 2017-04-20.*

Test Mode: Transmitting

1) **30MHz-1GHz**(Worst is Module 1 n20 middle channel+ Module 2 n20 mode Low channel+ module 3 n20 mode middle channel transmitting simultaneously):



Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
35.698750	31.7	100.0	V	253.0	-2.9	8.3	40.0
35.941250	36.3	100.0	V	279.0	-3.1	3.7	40.0
45.762500	33.6	100.0	V	183.0	-10.5	6.4	40.0
47.945000	36.6	100.0	V	210.0	-11.6	3.4	40.0
53.886250	37.4	200.0	V	177.0	-13.5	3.4	40.0
60.191250	35.6	200.0	V	41.0	-13.9	4.4	40.0

2) 1GHz-25GHz

Module 1:
802.11b Mode(Chain 0 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	82.43	PK	H	23.50	3.00	0.00	108.93	N/A	N/A
2412	78.17	AV	H	23.50	3.00	0.00	104.67	N/A	N/A
2412	85.81	PK	V	23.50	3.00	0.00	112.31	N/A	N/A
2412	81.05	AV	V	23.50	3.00	0.00	107.55	N/A	N/A
2390	44.23	PK	V	23.57	3.00	0.00	70.8	74	3.2
2390	25.29	AV	V	23.57	3.00	0.00	51.86	54	2.14
4824	41.10	PK	V	30.84	5.11	26.87	50.18	74	23.82
4824	29.41	AV	V	30.84	5.11	26.87	38.49	54	15.51
7236	43.53	PK	V	34.77	6.18	26.36	58.12	74	15.88
7236	30.24	AV	V	34.77	6.18	26.36	44.83	54	9.17
1338	31.77	PK	V	23.68	2.45	26.49	31.41	74	42.59
1338	19.68	AV	V	23.68	2.45	26.49	19.32	54	34.68
Middle Channel: 2437 MHz									
2437	82.73	PK	H	23.41	3.00	0.00	109.14	N/A	N/A
2437	78.02	AV	H	23.41	3.00	0.00	104.43	N/A	N/A
2437	86.46	PK	V	23.41	3.00	0.00	112.87	N/A	N/A
2437	80.81	AV	V	23.41	3.00	0.00	107.22	N/A	N/A
4874	40.30	PK	V	31.00	5.09	26.87	49.52	74	24.48
4874	28.81	AV	V	31.00	5.09	26.87	38.03	54	15.97
7311	42.94	PK	V	34.92	6.21	26.40	57.67	74	16.33
7311	29.03	AV	V	34.92	6.21	26.40	43.76	54	10.24
1374	31.05	PK	V	23.77	2.50	26.45	30.87	74	43.13
1374	19.41	AV	V	23.77	2.50	26.45	19.23	54	34.77
2119	32.34	PK	V	24.50	3.04	26.84	33.04	74	40.96
2119	20.79	AV	V	24.50	3.04	26.84	21.49	54	32.51
High Channel: 2462 MHz									
2462	82.50	PK	H	23.33	2.99	0.00	108.82	N/A	N/A
2462	78.43	AV	H	23.33	2.99	0.00	104.75	N/A	N/A
2462	87.04	PK	V	23.33	2.99	0.00	113.36	N/A	N/A
2462	81.17	AV	V	23.33	2.99	0.00	107.49	N/A	N/A
2483.5	36.52	PK	V	23.26	2.99	0.00	62.77	74	11.23
2483.5	25.96	AV	V	23.26	2.99	0.00	52.21	54	1.79
4924	39.77	PK	V	31.16	5.07	26.88	49.12	74	24.88
4924	27.34	AV	V	31.16	5.07	26.88	36.69	54	17.31
7386	43.36	PK	V	35.07	6.25	26.43	58.25	74	15.75
7386	31.25	AV	V	35.07	6.25	26.43	46.14	54	7.86
1413	33.57	PK	V	23.87	2.55	26.41	33.58	74	40.42
1413	21.82	AV	V	23.87	2.55	26.41	21.83	54	32.17

802.11g Mode(Chain 0 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	78.23	PK	H	23.50	3.00	0.00	104.73	N/A	N/A
2412	70.71	AV	H	23.50	3.00	0.00	97.21	N/A	N/A
2412	81.84	PK	V	23.50	3.00	0.00	108.34	N/A	N/A
2412	74.67	AV	V	23.50	3.00	0.00	101.17	N/A	N/A
2390	42.86	PK	V	23.57	3.00	0.00	69.43	74	4.57
2390	25.70	AV	V	23.57	3.00	0.00	52.27	54	1.73
4824	41.94	PK	V	30.84	5.11	26.87	51.02	74	22.98
4824	29.65	AV	V	30.84	5.11	26.87	38.73	54	15.27
7236	42.63	PK	V	34.77	6.18	26.36	57.22	74	16.78
7236	30.81	AV	V	34.77	6.18	26.36	45.4	54	8.6
1338	32.09	PK	V	23.68	2.45	26.49	31.73	74	42.27
1338	19.56	AV	V	23.68	2.45	26.49	19.2	54	34.8
Middle Channel: 2437 MHz									
2437	78.07	PK	H	23.41	3.00	0.00	104.48	N/A	N/A
2437	71.20	AV	H	23.41	3.00	0.00	97.61	N/A	N/A
2437	81.99	PK	V	23.41	3.00	0.00	108.4	N/A	N/A
2437	74.41	AV	V	23.41	3.00	0.00	100.82	N/A	N/A
4874	40.59	PK	V	31.00	5.09	26.87	49.81	74	24.19
4874	28.81	AV	V	31.00	5.09	26.87	38.03	54	15.97
7311	41.64	PK	V	34.92	6.21	26.40	56.37	74	17.63
7311	38.47	AV	V	34.92	6.21	26.40	53.2	54	0.8
1374	31.42	PK	V	23.77	2.50	26.45	31.24	74	42.76
1374	20.04	AV	V	23.77	2.50	26.45	19.86	54	34.14
2119	32.41	PK	V	24.50	3.04	26.84	33.11	74	40.89
2119	21.28	AV	V	24.50	3.04	26.84	21.98	54	32.02
High Channel: 2462 MHz									
2462	78.87	PK	H	23.33	2.99	0.00	105.19	N/A	N/A
2462	71.73	AV	H	23.33	2.99	0.00	98.05	N/A	N/A
2462	82.25	PK	V	23.33	2.99	0.00	108.57	N/A	N/A
2462	73.32	AV	V	23.33	2.99	0.00	99.64	N/A	N/A
2483.5	45.29	PK	V	23.26	2.99	0.00	71.54	74	2.46
2483.5	25.16	AV	V	23.26	2.99	0.00	51.41	54	2.59
4924	39.82	PK	V	31.16	5.07	26.88	49.17	74	24.83
4924	26.67	AV	V	31.16	5.07	26.88	36.02	54	17.98
7386	42.67	PK	V	35.07	6.25	26.43	57.56	74	16.44
7386	30.53	AV	V	35.07	6.25	26.43	45.42	54	8.58
1413	33.54	PK	V	23.87	2.55	26.41	33.55	74	40.45
1413	20.96	AV	V	23.87	2.55	26.41	20.97	54	33.03

802.11 n ht20 Mode (2TX 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	76.05	PK	H	23.50	3.00	0.00	102.55	N/A	N/A
2412	61.84	AV	H	23.50	3.00	0.00	88.34	N/A	N/A
2412	81.70	PK	V	23.50	3.00	0.00	108.2	N/A	N/A
2412	65.66	AV	V	23.50	3.00	0.00	92.16	N/A	N/A
2390	45.35	PK	V	23.57	3.00	0.00	71.92	74	2.08
2390	26.38	AV	V	23.57	3.00	0.00	52.95	54	1.05
4824	42.11	PK	V	30.84	5.11	26.87	51.19	74	22.81
4824	30.27	AV	V	30.84	5.11	26.87	39.35	54	14.65
7236	42.83	PK	V	34.77	6.18	26.36	57.42	74	16.58
7236	30.19	AV	V	34.77	6.18	26.36	44.78	54	9.22
1338	31.81	PK	V	23.68	2.45	26.49	31.45	74	42.55
1338	20.08	AV	V	23.68	2.45	26.49	19.72	54	34.28
Middle Channel: 2437 MHz									
2437	76.39	PK	H	23.41	3.00	0.00	102.8	N/A	N/A
2437	61.12	AV	H	23.41	3.00	0.00	87.53	N/A	N/A
2437	81.58	PK	V	23.41	3.00	0.00	107.99	N/A	N/A
2437	66.81	AV	V	23.41	3.00	0.00	93.22	N/A	N/A
4874	39.64	PK	V	31.00	5.09	26.87	48.86	74	25.14
4874	28.19	AV	V	31.00	5.09	26.87	37.41	54	16.59
7311	42.62	PK	V	34.92	6.21	26.40	57.35	74	16.65
7311	39.10	AV	V	34.92	6.21	26.40	53.83	54	0.17
1374	31.09	PK	V	23.77	2.50	26.45	30.91	74	43.09
1374	19.50	AV	V	23.77	2.50	26.45	19.32	54	34.68
2119	32.68	PK	V	24.50	3.04	26.84	33.38	74	40.62
2119	20.85	AV	V	24.50	3.04	26.84	21.55	54	32.45
High Channel: 2462 MHz									
2462	76.90	PK	H	23.33	2.99	0.00	103.22	N/A	N/A
2462	62.43	AV	H	23.33	2.99	0.00	88.75	N/A	N/A
2462	82.14	PK	V	23.33	2.99	0.00	108.46	N/A	N/A
2462	67.32	AV	V	23.33	2.99	0.00	93.64	N/A	N/A
2483.5	46.29	PK	V	23.26	2.99	0.00	72.54	74	1.46
2483.5	25.44	AV	V	23.26	2.99	0.00	51.69	54	2.31
4924	39.47	PK	V	31.16	5.07	26.88	48.82	74	25.18
4924	26.84	AV	V	31.16	5.07	26.88	36.19	54	17.81
7386	43.25	PK	V	35.07	6.25	26.43	58.14	74	15.86
7386	30.90	AV	V	35.07	6.25	26.43	45.79	54	8.21
1413	33.08	PK	V	23.87	2.55	26.41	33.09	74	40.91
1413	20.92	AV	V	23.87	2.55	26.41	20.93	54	33.07

802.11 n ht40 Mode (2TX 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	73.88	PK	H	23.47	3.00	0.00	100.35	N/A	N/A
2422	59.70	AV	H	23.47	3.00	0.00	86.17	N/A	N/A
2422	78.62	PK	V	23.47	3.00	0.00	105.09	N/A	N/A
2422	64.09	AV	V	23.47	3.00	0.00	90.56	N/A	N/A
2390	42.67	PK	V	23.57	3.00	0.00	69.24	74	4.76
2390	24.99	AV	V	23.57	3.00	0.00	51.56	54	2.44
4844	41.62	PK	V	30.90	5.10	26.87	50.75	74	23.25
4844	29.38	AV	V	30.90	5.10	26.87	38.51	54	15.49
7266	43.00	PK	V	34.83	6.19	26.38	57.64	74	16.36
7266	30.64	AV	V	34.83	6.19	26.38	45.28	54	8.72
1338	31.77	PK	V	23.68	2.45	26.49	31.41	74	42.59
1338	20.01	AV	V	23.68	2.45	26.49	19.65	54	34.35
Middle Channel: 2437 MHz									
2437	73.65	PK	H	23.41	3.00	0.00	100.06	N/A	N/A
2437	59.78	AV	H	23.41	3.00	0.00	86.19	N/A	N/A
2437	78.27	PK	V	23.41	3.00	0.00	104.68	N/A	N/A
2437	64.39	AV	V	23.41	3.00	0.00	90.8	N/A	N/A
4874	40.28	PK	V	31.00	5.09	26.87	49.5	74	24.5
4874	28.56	AV	V	31.00	5.09	26.87	37.78	54	16.22
7311	42.10	PK	V	34.92	6.21	26.40	56.83	74	17.17
7311	28.92	AV	V	34.92	6.21	26.40	43.65	54	10.35
1374	31.42	PK	V	23.77	2.50	26.45	31.24	74	42.76
1374	19.44	AV	V	23.77	2.50	26.45	19.26	54	34.74
2119	32.79	PK	V	24.50	3.04	26.84	33.49	74	40.51
2119	20.88	AV	V	24.50	3.04	26.84	21.58	54	32.42
High Channel: 2452 MHz									
2452	73.95	PK	H	23.36	3.00	0.00	100.31	N/A	N/A
2452	59.63	AV	H	23.36	3.00	0.00	85.99	N/A	N/A
2452	79.37	PK	V	23.36	3.00	0.00	105.73	N/A	N/A
2452	63.31	AV	V	23.36	3.00	0.00	89.67	N/A	N/A
2483.5	46.36	PK	V	23.26	2.99	0.00	72.61	74	1.39
2483.5	26.18	AV	V	23.26	2.99	0.00	52.43	54	1.57
4904	39.59	PK	V	31.09	5.08	26.87	48.89	74	25.11
4904	26.93	AV	V	31.09	5.08	26.87	36.23	54	17.77
7356	42.70	PK	V	35.01	6.23	26.42	57.52	74	16.48
7356	30.63	AV	V	35.01	6.23	26.42	45.45	54	8.55
1413	32.94	PK	V	23.87	2.55	26.41	32.95	74	41.05
1413	21.36	AV	V	23.87	2.55	26.41	21.37	54	32.63

Module 3:
802.11b Mode, (Chain 0 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	89.25	PK	H	23.50	3.00	0.00	115.75	N/A	N/A
2412	83.84	AV	H	23.50	3.00	0.00	110.34	N/A	N/A
2412	86.10	PK	V	23.50	3.00	0.00	112.6	N/A	N/A
2412	81.42	AV	V	23.50	3.00	0.00	107.92	N/A	N/A
2390	45.06	PK	H	23.57	3.00	0.00	71.63	74	2.37
2390	25.74	AV	H	23.57	3.00	0.00	52.31	54	1.69
4824	41.48	PK	H	30.84	5.11	26.87	50.56	74	23.44
4824	34.64	AV	H	30.84	5.11	26.87	43.72	54	10.28
7236	41.81	PK	H	34.77	6.18	26.36	56.4	74	17.6
7236	34.44	AV	H	34.77	6.18	26.36	49.03	54	4.97
1612	33.13	PK	H	24.28	2.76	26.44	33.73	74	40.27
1612	24.02	AV	H	24.28	2.76	26.44	24.62	54	29.38
Middle Channel: 2437 MHz									
2437	88.97	PK	H	23.41	3.00	0.00	115.38	N/A	N/A
2437	83.38	AV	H	23.41	3.00	0.00	109.79	N/A	N/A
2437	76.59	PK	V	23.41	3.00	0.00	103	N/A	N/A
2437	71.05	AV	V	23.41	3.00	0.00	97.46	N/A	N/A
4874	41.78	PK	H	31.00	5.09	26.87	51	74	23
4874	35.15	AV	H	31.00	5.09	26.87	44.37	54	9.63
7311	42.49	PK	H	34.92	6.21	26.40	57.22	74	16.78
7311	34.71	AV	H	34.92	6.21	26.40	49.44	54	4.56
1646	32.85	PK	H	24.33	2.78	26.47	33.49	74	40.51
1646	24.05	AV	H	24.33	2.78	26.47	24.69	54	29.31
2245	34.07	PK	H	24.07	3.02	26.85	34.31	74	39.69
2245	24.74	AV	H	24.07	3.02	26.85	24.98	54	29.02
High Channel: 2462 MHz									
2462	88.67	PK	H	23.33	2.99	0.00	114.99	N/A	N/A
2462	83.79	AV	H	23.33	2.99	0.00	110.11	N/A	N/A
2462	76.29	PK	V	23.33	2.99	0.00	102.61	N/A	N/A
2462	71.46	AV	V	23.33	2.99	0.00	97.78	N/A	N/A
2483.5	34.10	PK	H	23.26	2.99	0.00	60.35	74	13.65
2483.5	24.86	AV	H	23.26	2.99	0.00	51.11	54	2.89
4924	41.94	PK	H	31.16	5.07	26.88	51.29	74	22.71
4924	34.97	AV	H	31.16	5.07	26.88	44.32	54	9.68
7386	42.72	PK	H	35.07	6.25	26.43	57.61	74	16.39
7386	35.15	AV	H	35.07	6.25	26.43	50.04	54	3.96
1682	32.44	PK	H	24.39	2.81	26.51	33.13	74	40.87
1682	23.82	AV	H	24.39	2.81	26.51	24.51	54	29.49

802.11g Mode(Chain 0 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	86.70	PK	H	23.50	3.00	0.00	113.2	N/A	N/A
2412	78.14	AV	H	23.50	3.00	0.00	104.64	N/A	N/A
2412	74.17	PK	V	23.50	3.00	0.00	100.67	N/A	N/A
2412	65.42	AV	V	23.50	3.00	0.00	91.92	N/A	N/A
2390	45.73	PK	H	23.57	3.00	0.00	72.3	74	1.7
2390	26.28	AV	H	23.57	3.00	0.00	52.85	54	1.15
4824	43.12	PK	H	30.84	5.11	26.87	52.2	74	21.8
4824	31.77	AV	H	30.84	5.11	26.87	40.85	54	13.15
7236	36.33	PK	H	34.77	6.18	26.36	50.92	74	23.08
7236	23.75	AV	H	34.77	6.18	26.36	38.34	54	15.66
1612	31.97	PK	H	24.28	2.76	26.44	32.57	74	41.43
1612	19.73	AV	H	24.28	2.76	26.44	20.33	54	33.67
Middle Channel: 2437 MHz									
2437	86.92	PK	H	23.41	3.00	0.00	113.33	N/A	N/A
2437	78.38	AV	H	23.41	3.00	0.00	104.79	N/A	N/A
2437	74.90	PK	V	23.41	3.00	0.00	101.31	N/A	N/A
2437	65.76	AV	V	23.41	3.00	0.00	92.17	N/A	N/A
4874	42.05	PK	H	31.00	5.09	26.87	51.27	74	22.73
4874	29.74	AV	H	31.00	5.09	26.87	38.96	54	15.04
7311	42.59	PK	H	34.92	6.21	26.40	57.32	74	16.68
7311	30.78	AV	H	34.92	6.21	26.40	45.51	54	8.49
1646	33.07	PK	H	24.33	2.78	26.47	33.71	74	40.29
1646	20.62	AV	H	24.33	2.78	26.47	21.26	54	32.74
2245	34.37	PK	H	24.07	3.02	26.85	34.61	74	39.39
2245	22.13	AV	H	24.07	3.02	26.85	22.37	54	31.63
High Channel: 2462 MHz									
2462	86.17	PK	H	23.33	2.99	0.00	112.49	N/A	N/A
2462	77.31	AV	H	23.33	2.99	0.00	103.63	N/A	N/A
2462	74.72	PK	V	23.33	2.99	0.00	101.04	N/A	N/A
2462	67.00	AV	V	23.33	2.99	0.00	93.32	N/A	N/A
2483.5	72.44	PK	H	23.26	2.99	26.89	71.8	74	2.2
2483.5	52.36	AV	H	23.26	2.99	26.89	51.72	54	2.28
4924	43.78	PK	H	31.16	5.07	26.88	53.13	74	20.87
4924	32.06	AV	H	31.16	5.07	26.88	41.41	54	12.59
7386	36.73	PK	H	35.07	6.25	26.43	51.62	74	22.38
7386	24.18	AV	H	35.07	6.25	26.43	39.07	54	14.93
2950	37.71	PK	H	24.10	3.39	26.46	38.74	74	35.26
2950	25.88	AV	H	24.10	3.39	26.46	26.91	54	27.09

802.11 n ht20 Mode (2TX 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	81.64	PK	H	23.50	3.00	0.00	108.14	N/A	N/A
2412	66.59	AV	H	23.50	3.00	0.00	93.09	N/A	N/A
2412	68.79	PK	V	23.50	3.00	0.00	95.29	N/A	N/A
2412	53.76	AV	V	23.50	3.00	0.00	80.26	N/A	N/A
2390	43.81	PK	H	23.57	3.00	0.00	70.38	74	3.62
2390	24.88	AV	H	23.57	3.00	0.00	51.45	54	2.55
4824	43.28	PK	H	30.84	5.11	26.87	52.36	74	21.64
4824	31.15	AV	H	30.84	5.11	26.87	40.23	54	13.77
7236	36.85	PK	H	34.77	6.18	26.36	51.44	74	22.56
7236	23.62	AV	H	34.77	6.18	26.36	38.21	54	15.79
1612	32.31	PK	H	24.28	2.76	26.44	32.91	74	41.09
1612	19.85	AV	H	24.28	2.76	26.44	20.45	54	33.55
Middle Channel: 2437 MHz									
2437	82.70	PK	H	23.41	3.00	0.00	109.11	N/A	N/A
2437	67.13	AV	H	23.41	3.00	0.00	93.54	N/A	N/A
2437	68.95	PK	V	23.41	3.00	0.00	95.36	N/A	N/A
2437	53.82	AV	V	23.41	3.00	0.00	80.23	N/A	N/A
4874	42.34	PK	H	31.00	5.09	26.87	51.56	74	22.44
4874	29.60	AV	H	31.00	5.09	26.87	38.82	54	15.18
7311	42.54	PK	H	34.92	6.21	26.40	57.27	74	16.73
7311	30.83	AV	H	34.92	6.21	26.40	45.56	54	8.44
2950	39.36	PK	H	24.10	3.39	26.46	40.39	74	33.61
2950	26.75	AV	H	24.10	3.39	26.46	27.78	54	26.22
3610	36.43	PK	H	27.44	4.34	26.58	41.63	74	32.37
3610	24.10	AV	H	27.44	4.34	26.58	29.3	54	24.7
High Channel: 2462 MHz									
2462	81.21	PK	H	23.33	2.99	0.00	107.53	N/A	N/A
2462	66.12	AV	H	23.33	2.99	0.00	92.44	N/A	N/A
2462	68.37	PK	V	23.33	2.99	0.00	94.69	N/A	N/A
2462	53.04	AV	V	23.33	2.99	0.00	79.36	N/A	N/A
2483.5	46.56	PK	H	23.26	2.99	0.00	72.81	74	1.19
2483.5	25.94	AV	H	23.26	2.99	0.00	52.19	54	1.81
4924	43.81	PK	H	31.16	5.07	26.88	53.16	74	20.84
4924	31.98	AV	H	31.16	5.07	26.88	41.33	54	12.67
7386	36.99	PK	H	35.07	6.25	26.43	51.88	74	22.12
7386	24.07	AV	H	35.07	6.25	26.43	38.96	54	15.04
1682	31.77	PK	H	24.39	2.81	26.51	32.46	74	41.54
1682	19.50	AV	H	24.39	2.81	26.51	20.19	54	33.81

802.11 n ht40 Mode (2TX 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	78.87	PK	H	23.47	3.00	0.00	105.34	N/A	N/A
2422	63.70	AV	H	23.47	3.00	0.00	90.17	N/A	N/A
2422	65.98	PK	V	23.47	3.00	0.00	92.45	N/A	N/A
2422	51.05	AV	V	23.47	3.00	0.00	77.52	N/A	N/A
2390	43.82	PK	H	23.57	3.00	0.00	70.39	74	3.61
2390	25.19	AV	H	23.57	3.00	0.00	51.76	54	2.24
4844	43.18	PK	H	30.90	5.10	26.87	52.31	74	21.69
4844	31.41	AV	H	30.90	5.10	26.87	40.54	54	13.46
7266	36.60	PK	H	34.83	6.19	26.38	51.24	74	22.76
7266	23.50	AV	H	34.83	6.19	26.38	38.14	54	15.86
1612	32.09	PK	H	24.28	2.76	26.44	32.69	74	41.31
1612	20.15	AV	H	24.28	2.76	26.44	20.75	54	33.25
Middle Channel: 2437 MHz									
2437	78.19	PK	H	23.41	3.00	0.00	104.6	N/A	N/A
2437	63.06	AV	H	23.41	3.00	0.00	89.47	N/A	N/A
2437	65.29	PK	V	23.41	3.00	0.00	91.7	N/A	N/A
2437	49.98	AV	V	23.41	3.00	0.00	76.39	N/A	N/A
4874	42.10	PK	H	31.00	5.09	26.87	51.32	74	22.68
4874	29.62	AV	H	31.00	5.09	26.87	38.84	54	15.16
7311	42.63	PK	H	34.92	6.21	26.40	57.36	74	16.64
7311	30.97	AV	H	34.92	6.21	26.40	45.7	54	8.3
1646	33.33	PK	H	24.33	2.78	26.47	33.97	74	40.03
1646	20.57	AV	H	24.33	2.78	26.47	21.21	54	32.79
2245	34.32	PK	H	24.07	3.02	26.85	34.56	74	39.44
2245	21.91	AV	H	24.07	3.02	26.85	22.15	54	31.85
High Channel: 2452 MHz									
2452	86.37	PK	H	23.36	3.00	0.00	112.73	N/A	N/A
2452	70.31	AV	H	23.36	3.00	0.00	96.67	N/A	N/A
2452	72.94	PK	V	23.36	3.00	0.00	99.3	N/A	N/A
2452	58.16	AV	V	23.36	3.00	0.00	84.52	N/A	N/A
2483.5	46.36	PK	H	23.26	2.99	0.00	72.61	74	1.39
2483.5	26.18	AV	H	23.26	2.99	0.00	52.43	54	1.57
4904	43.86	PK	H	31.09	5.08	26.87	53.16	74	20.84
4904	31.74	AV	H	31.09	5.08	26.87	41.04	54	12.96
7356	36.91	PK	H	35.01	6.23	26.42	51.73	74	22.27
7356	23.76	AV	H	35.01	6.23	26.42	38.58	54	15.42
1682	31.81	PK	H	24.39	2.81	26.51	32.5	74	41.5
1682	19.37	AV	H	24.39	2.81	26.51	20.06	54	33.94

Transmitting simultaneously(Test at 3m distance):
(Worst is Module 1 n20 mode 2437MHz+ Module 2 n20 mode 5745MHz+ module 3 n20 mode 2412MHz transmitting simultaneously)

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)					
4824	41.21	PK	V	30.84	5.11	26.87	50.29	74.00	23.71
4824	29.37	AV	V	30.84	5.11	26.87	38.45	54.00	15.55
7236	42.65	PK	V	34.77	6.18	26.36	57.24	74.00	16.76
7236	30.01	AV	V	34.77	6.18	26.36	44.60	54.00	9.40
1338	36.16	PK	V	23.68	2.45	26.49	35.80	74.00	38.20
1338	24.43	AV	V	23.68	2.45	26.49	24.07	54.00	29.93
4874	38.95	PK	H	31.00	5.09	26.87	48.17	74.00	25.83
4874	27.34	AV	H	31.00	5.09	26.87	36.56	54.00	17.44
7311	41.72	PK	H	34.92	6.21	26.40	56.45	74.00	17.55
7311	28.97	AV	H	34.92	6.21	26.40	43.70	54.00	10.30
11490	35.41	PK	H	37.99	8.22	26.02	55.60	74.00	18.40
11490	25.69	AV	H	37.99	8.22	26.02	45.88	54.00	8.12
17235	30.22	PK	H	42.98	10.82	25.99	58.03	74.00	15.97
17235	17.96	AV	H	42.98	10.82	25.99	45.77	54.00	8.23
4512	36.66	PK	V	29.84	5.26	26.85	44.91	74.00	29.09
4512	22.08	AV	V	29.84	5.26	26.85	30.33	54.00	23.67
11490	35.41	PK	H	37.99	8.22	26.02	55.60	74.00	18.40
11490	25.69	AV	H	37.99	8.22	26.02	45.88	54.00	8.12

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) ≥ 3×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	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Unknown	RF Cable	Unknown	C-5	Each Time	/

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

Test Data

Environmental Conditions

Temperature:	24.9 °C
Relative Humidity:	44.1%
ATM Pressure:	100.7 kPa

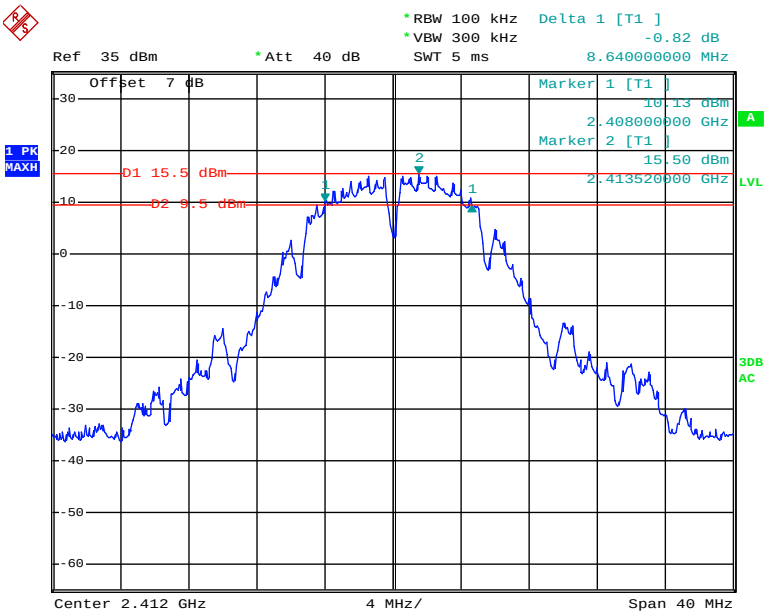
** The testing was performed by Kevin Hu on 2017-04-13.*

Test Mode: Transmitting(Test performed at Module 3)
Test Result: Compliant. Please refer to the following table and plots.

Test mode	Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)		Limit (MHz)
			Con 1	Con 2	
802.11b	Low	2412	8.64	9.12	≥0.5
	Middle	2437	9.2	9.6	≥0.5
	High	2462	9.12	9.68	≥0.5
802.11g	Low	2412	15.28	15.36	≥0.5
	Middle	2437	15.84	15.84	≥0.5
	High	2462	15.28	15.28	≥0.5
802.11n ht20	Low	2412	15.76	15.76	≥0.5
	Middle	2437	16.4	15.84	≥0.5
	High	2462	15.28	15.28	≥0.5
802.11n ht40	Low	2422	34.08	32.8	≥0.5
	Middle	2437	36.16	36.64	≥0.5
	High	2452	35.84	35.84	≥0.5

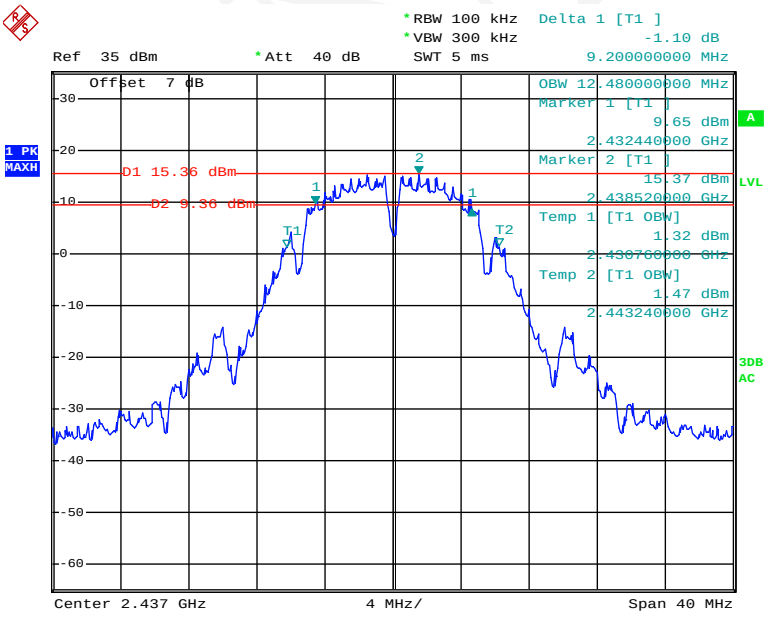
Con 1:

802.11b Low Channel



Date: 13.APR.2017 22:39:06

802.11b Middle Channel



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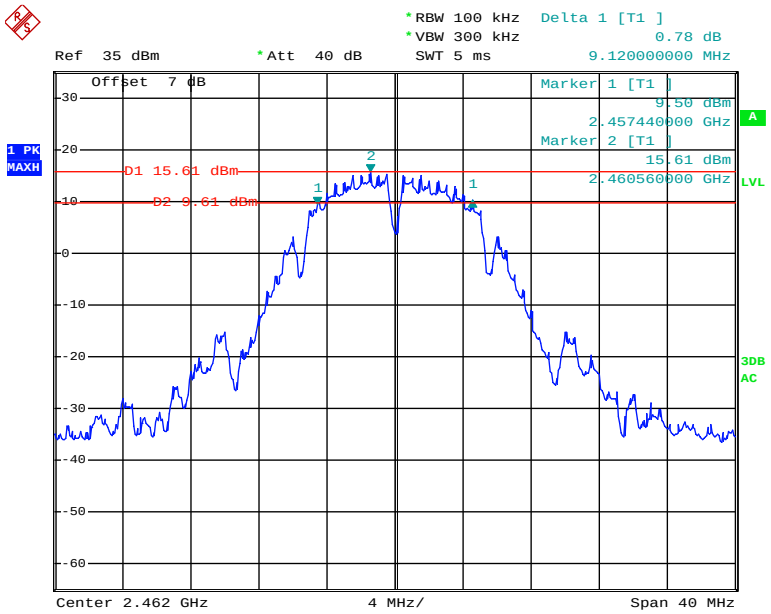
802.11b High Channel



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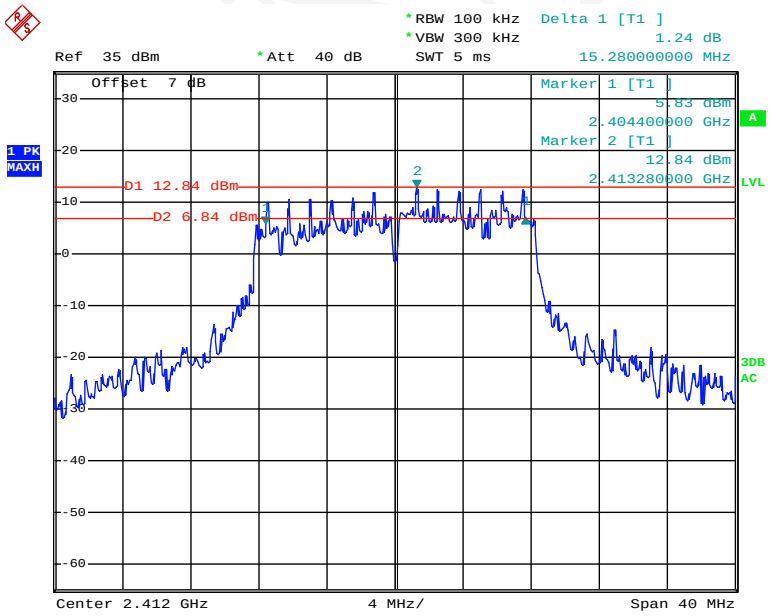
802.11g Low Channel



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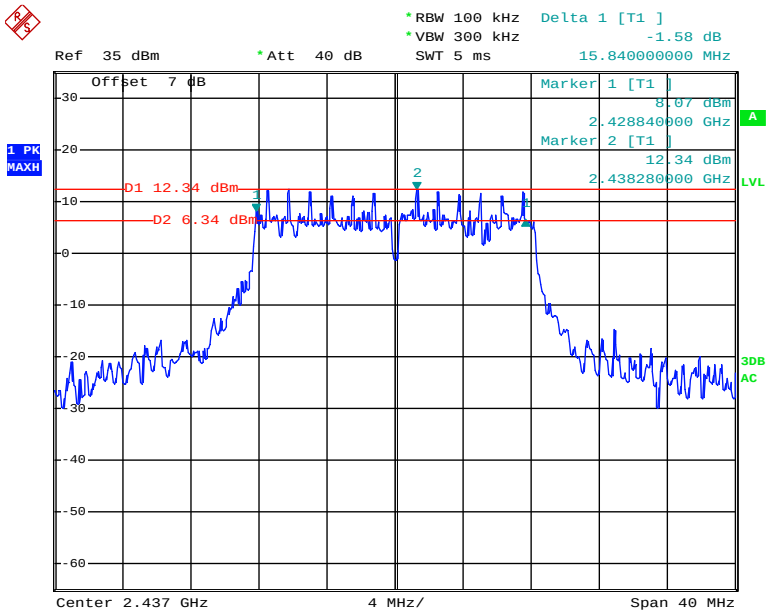
802.11g Middle Channel



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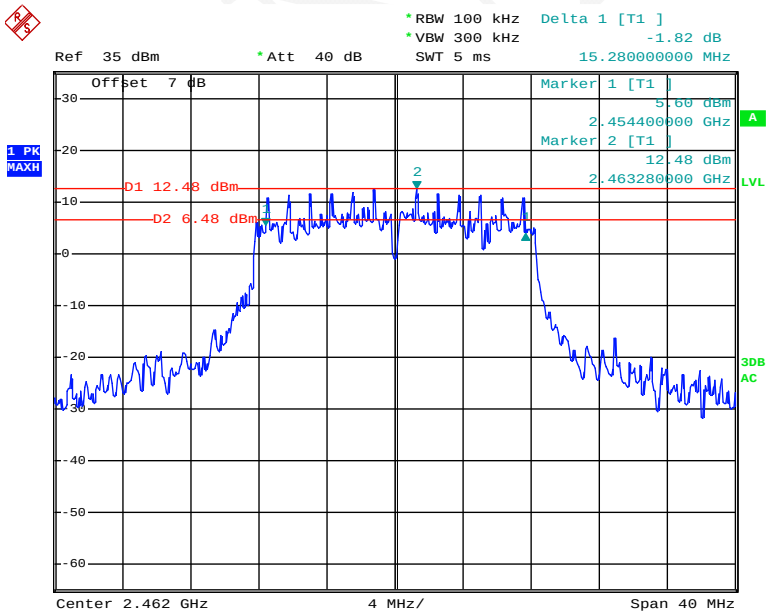
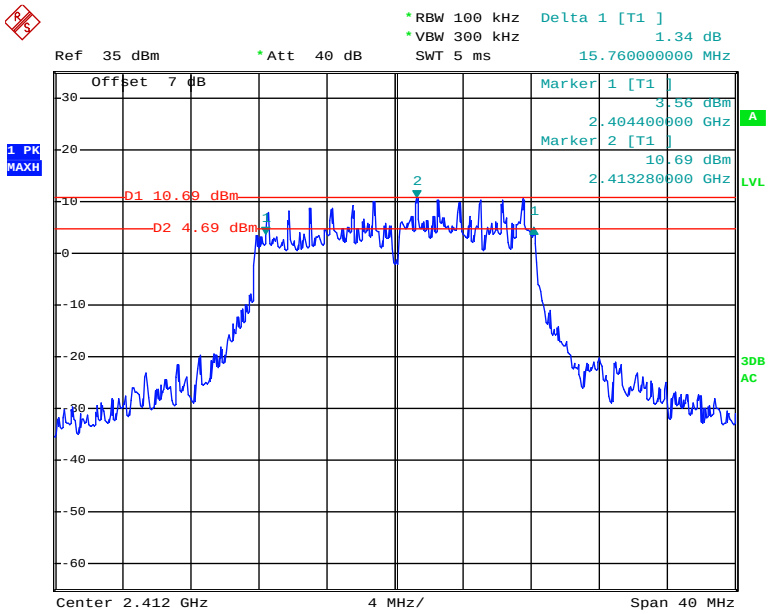
802.11g High Channel



Date: 13.APR.2017 22:55:49

802.11n ht20 Low Channel



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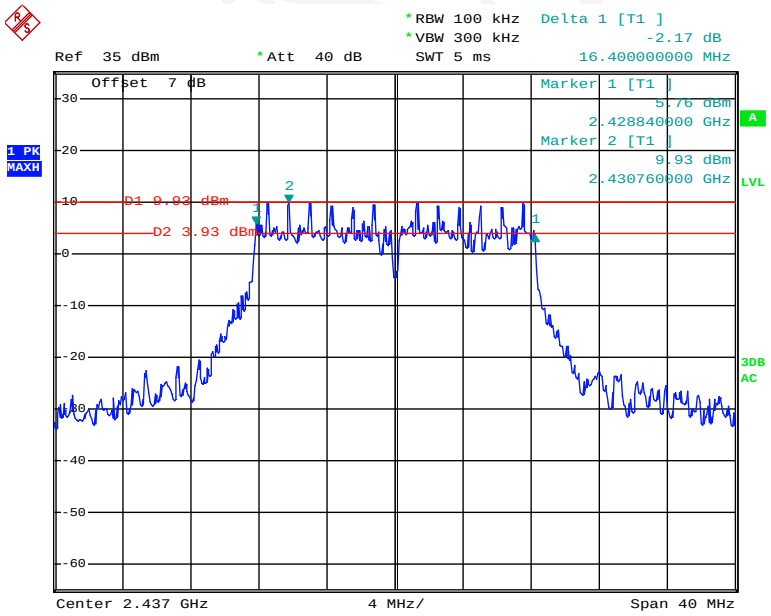

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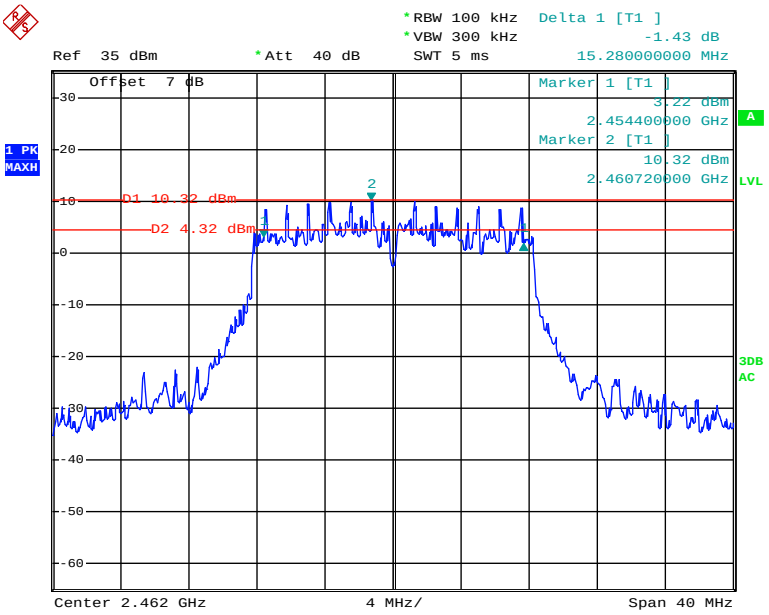

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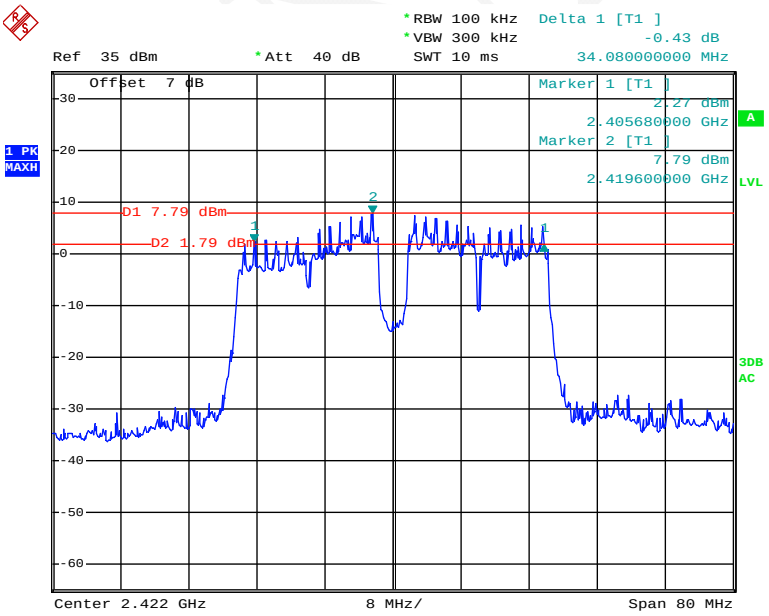

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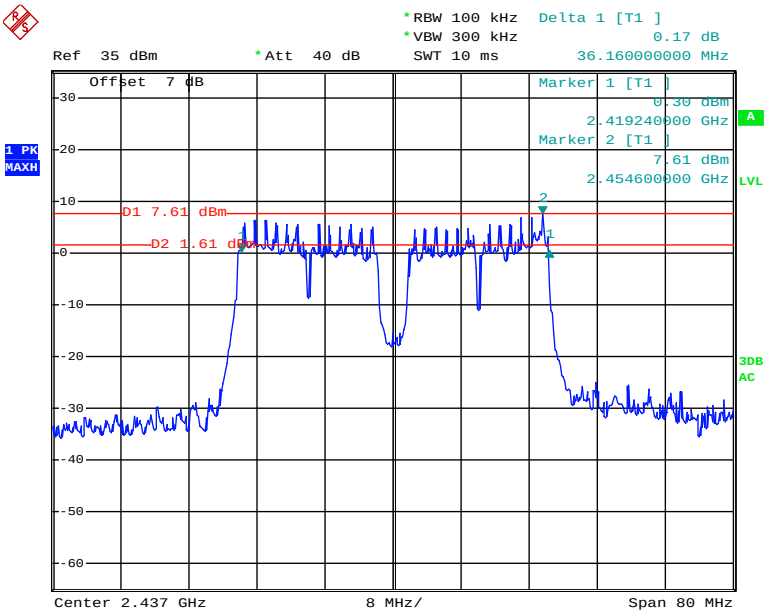
802.11n ht40 Middle Channel



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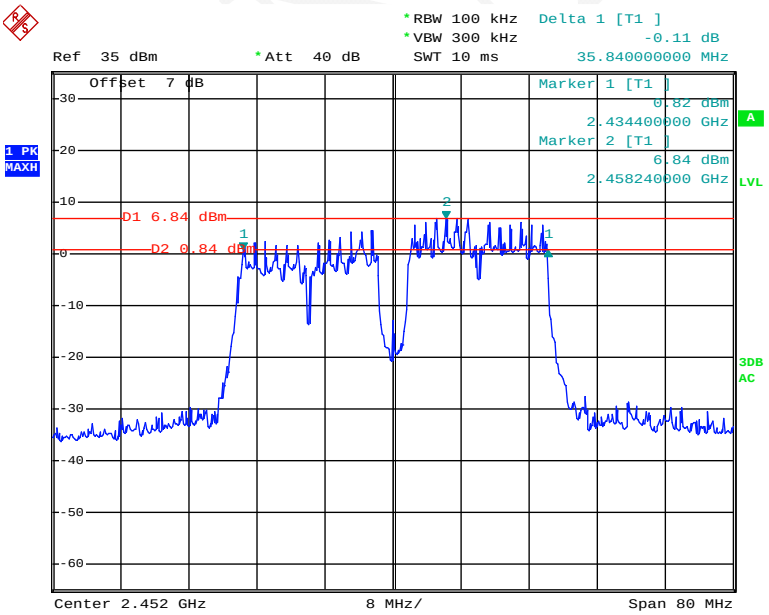
802.11n ht40 High Channel



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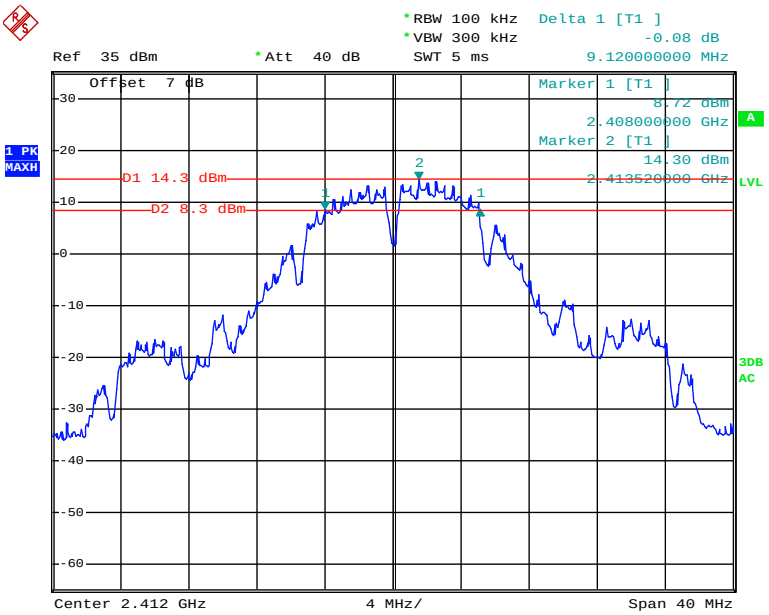
Con 2:

802.11b Low Channel



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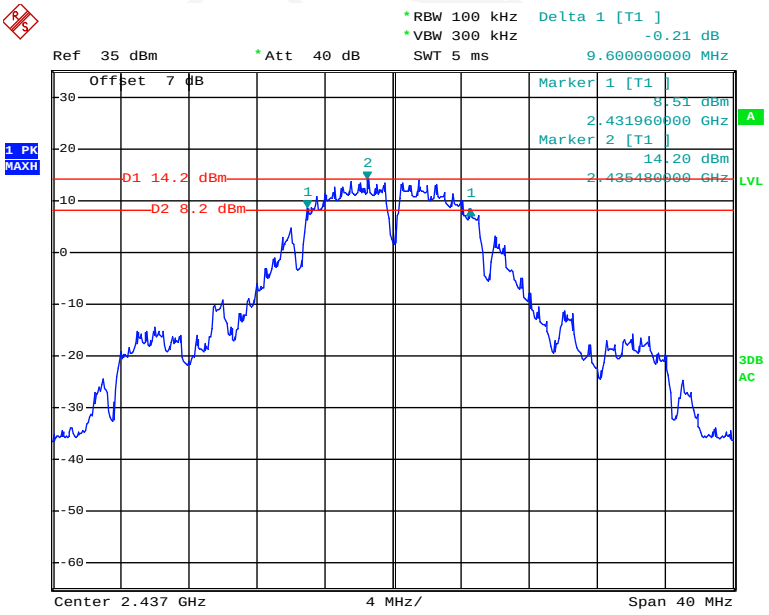
802.11b Middle Channel



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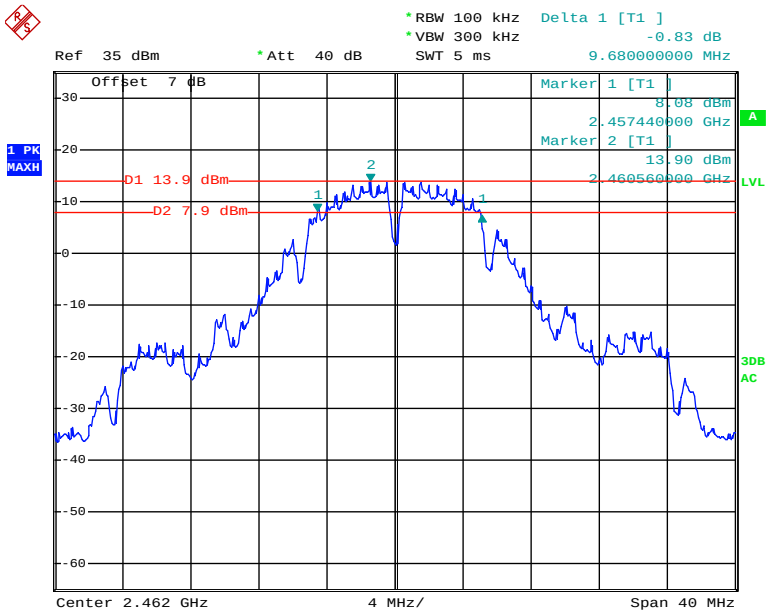
802.11b High Channel



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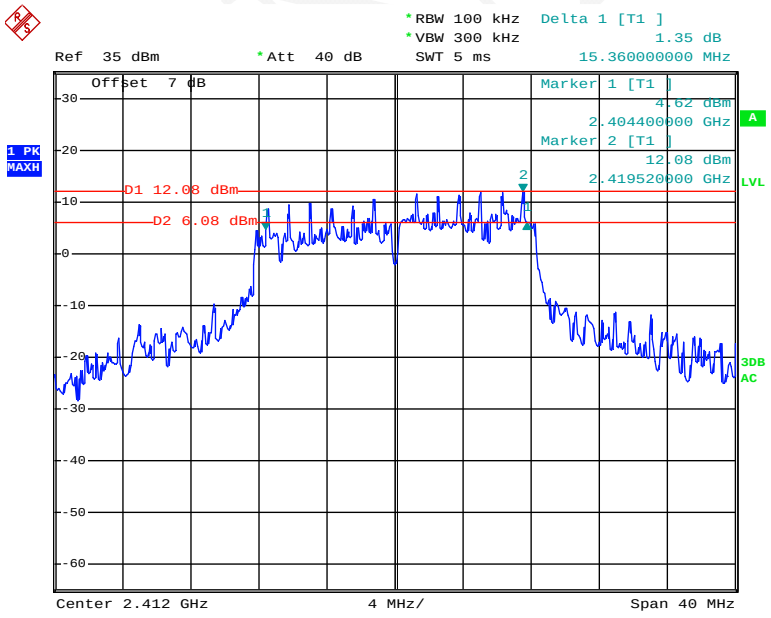
802.11g Low Channel



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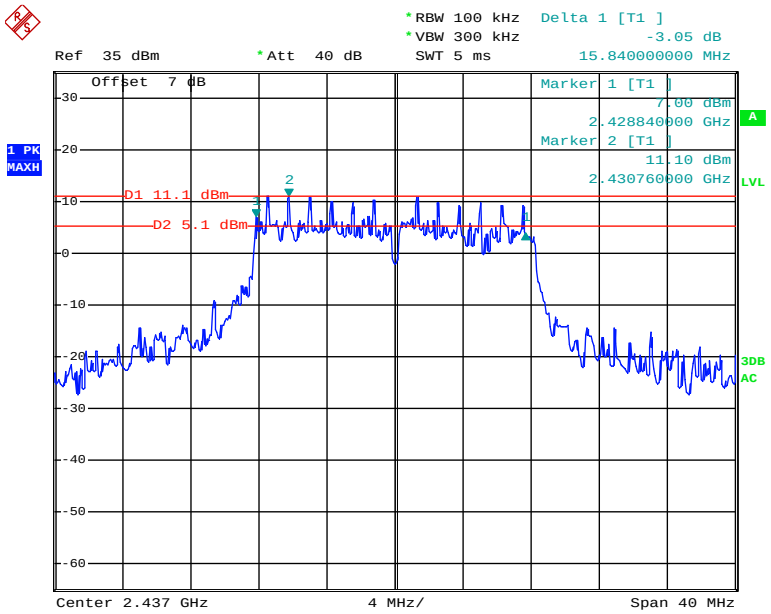
802.11g Middle Channel



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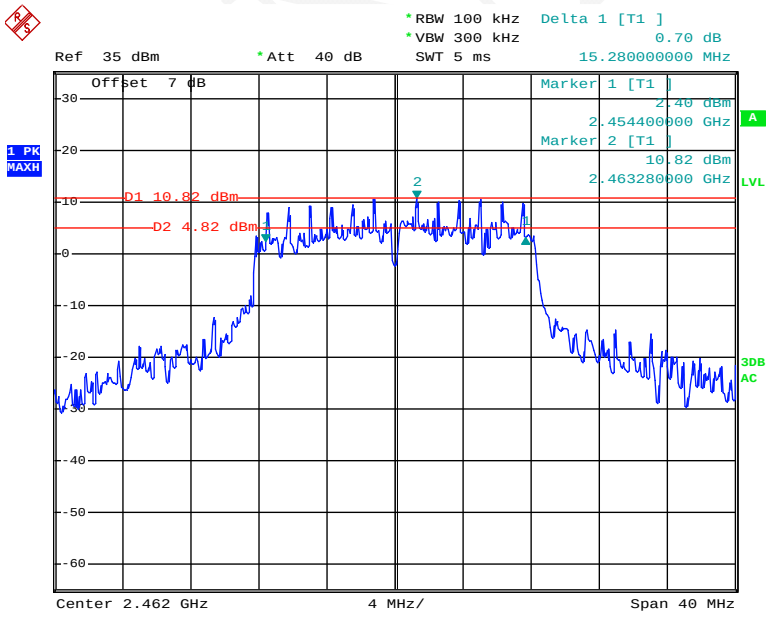
802.11g High Channel



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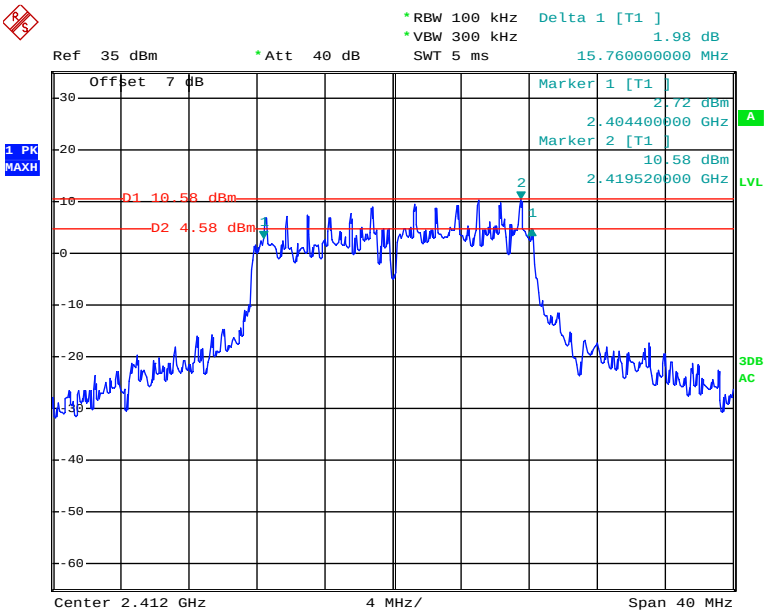
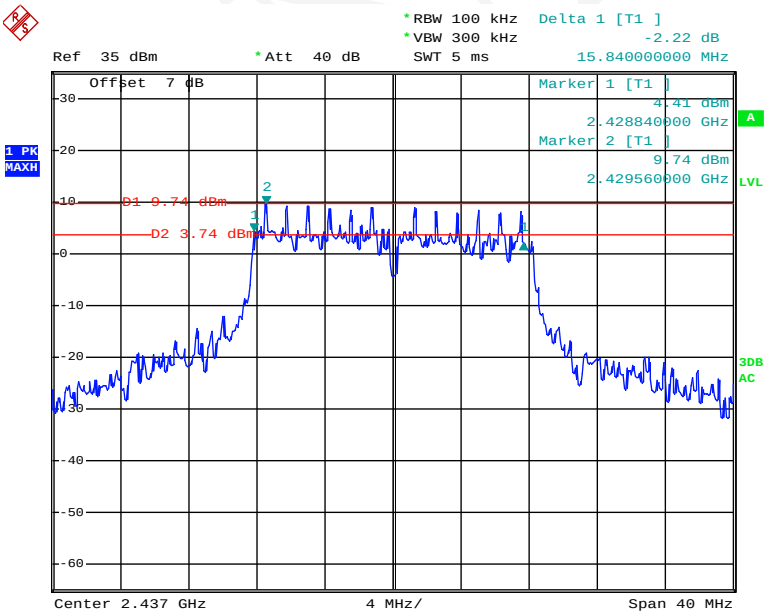
802.11n ht20 Low Channel



Date: 13.APR.2017 23:19:07

802.11n ht20 Middle Channel



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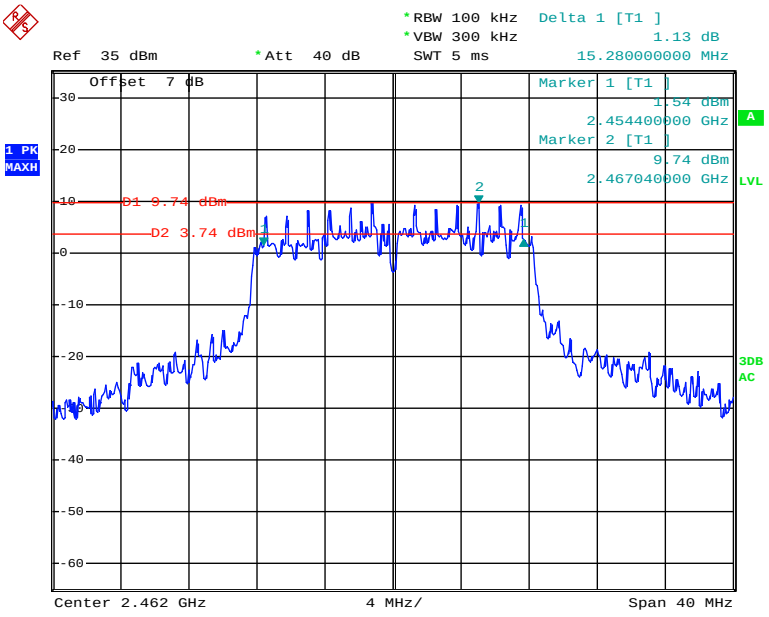
802.11n ht20 High Channel



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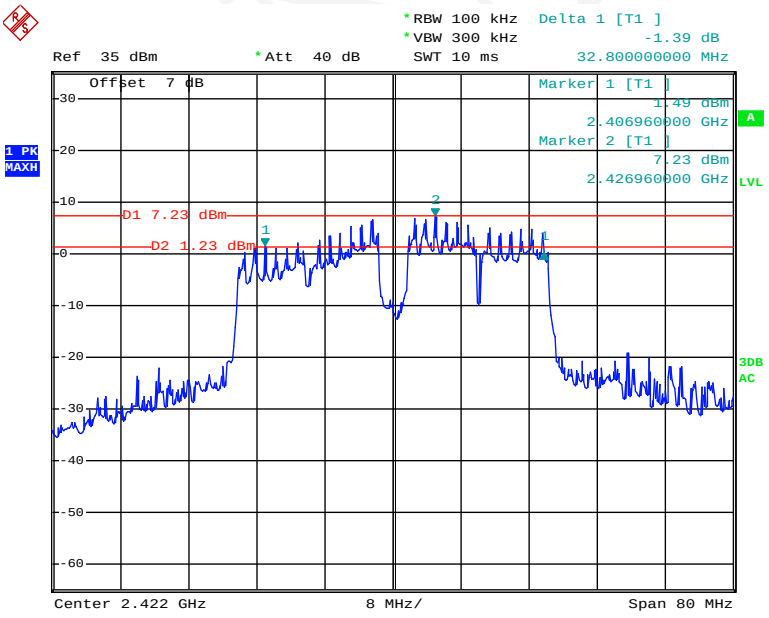
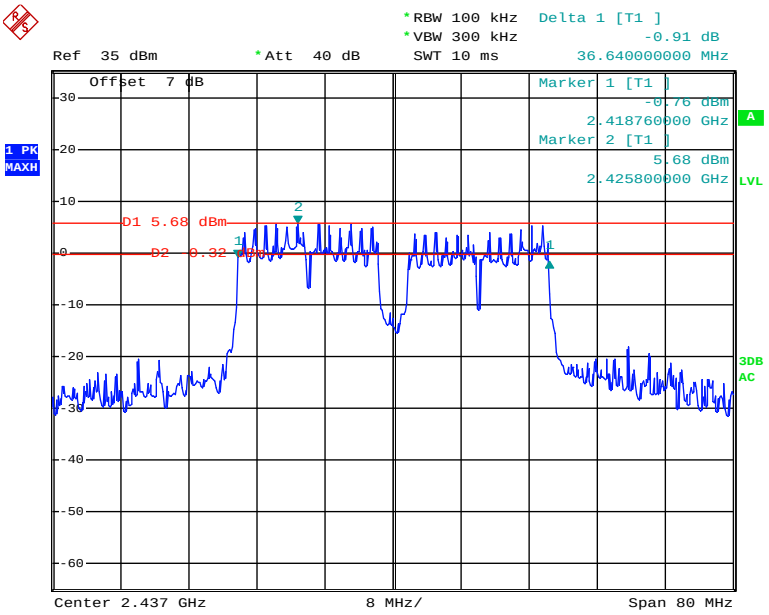
802.11n ht40 Low Channel



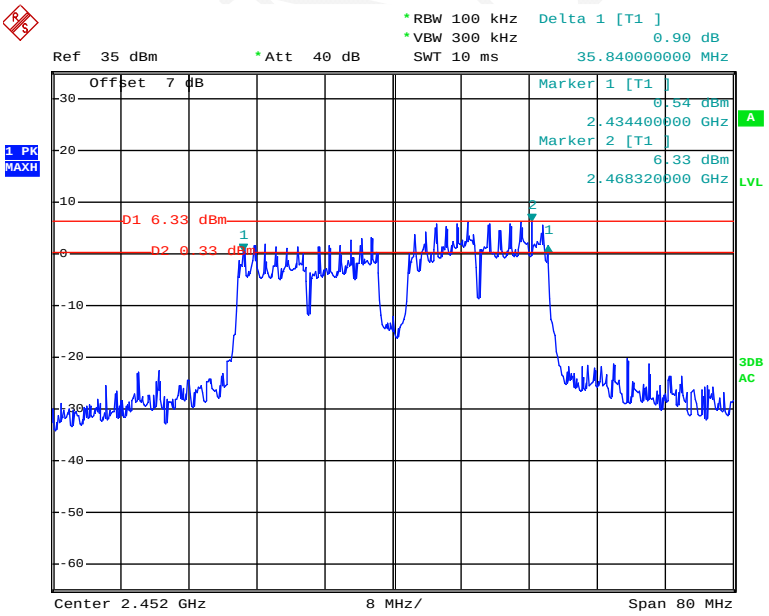
Date: 13.APR.2017 23:45:27

802.11n ht40 Middle Channel



Date: 13.APR.2017 23:44:29

802.11n ht40 High Channel



Date: 13.APR.2017 23:33:25

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.
4. Set the power Meter to test Peak output power, record the result as peak power.
5. Set the power meter to test average output power, record the result as average power.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Wideband Power Sensor	N1921A	MY54170074	2017-01-03	2018-01-03
Agilent	P-Series Power Meter	N1912A	MY5000798	2017-01-03	2018-01-03
Unknown	RF Cable	Unknown	C-5	Each Time	/

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

Environmental Conditions

Temperature:	24.9 °C
Relative Humidity:	44.1%
ATM Pressure:	100.7 kPa

** The testing was performed by Kevin Hu on 2017-04-13.*

Test Mode: Transmitting(Test performed at Module 3)

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

Test mode	Channel	Frequency (MHz)	Max Peak Conducted Output Power (dBm)			Limit (dBm)
			Con 1	Con 2	Total	
802.11b	Low	2412	27.8	26.55	/	30
	Middle	2437	28.06	26.79	/	30
	High	2462	28	26.73	/	30
802.11g	Low	2412	29.56	28.35	/	30
	Middle	2437	29.62	27.91	/	30
	High	2462	29.63	27.66	/	30
802.11n ht20	Low	2412	27.39	26.25	29.87	30
	Middle	2437	27.16	26.12	29.68	30
	High	2462	27.16	26.23	29.73	30
802.11n ht40	Low	2422	26.59	25.62	29.14	30
	Middle	2437	26.86	25.82	29.38	30
	High	2452	26.08	25.11	28.63	30

Test mode	Channel	Frequency (MHz)	Max Average Conducted Output Power (dBm)			Limit (dBm)
			Con 1	Con 2	Total	
802.11b	Low	2412	24.82	23.15	/	30
	Middle	2437	24.95	23.23	/	30
	High	2462	25.02	23.10	/	30
802.11g	Low	2412	23.15	22.11	/	30
	Middle	2437	22.97	21.58	/	30
	High	2462	23.22	21.23	/	30
802.11n ht20	Low	2412	20.77	20.01	23.42	30
	Middle	2437	20.65	19.83	23.27	30
	High	2462	20.70	19.90	23.33	30
802.11n ht40	Low	2422	19.77	21.02	23.45	30
	Middle	2437	19.96	20.92	23.48	30
	High	2452	19.17	20.65	22.98	30

Note: the maximum antenna gain is 3.9 dBi for module 1 and 4.7 for module 3 in 2.4GHz band, 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:

For module 1: Directional gain = G_{ANT} + Array Gain = 3.9dBi < 6dBi

For module 3: Directional gain = G_{ANT} + Array Gain = 4.7dBi < 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 to 300 kHz of spectrum analyzer 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	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Unknown	RF Cable	Unknown	C-5	Each Time	/

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

Environmental Conditions

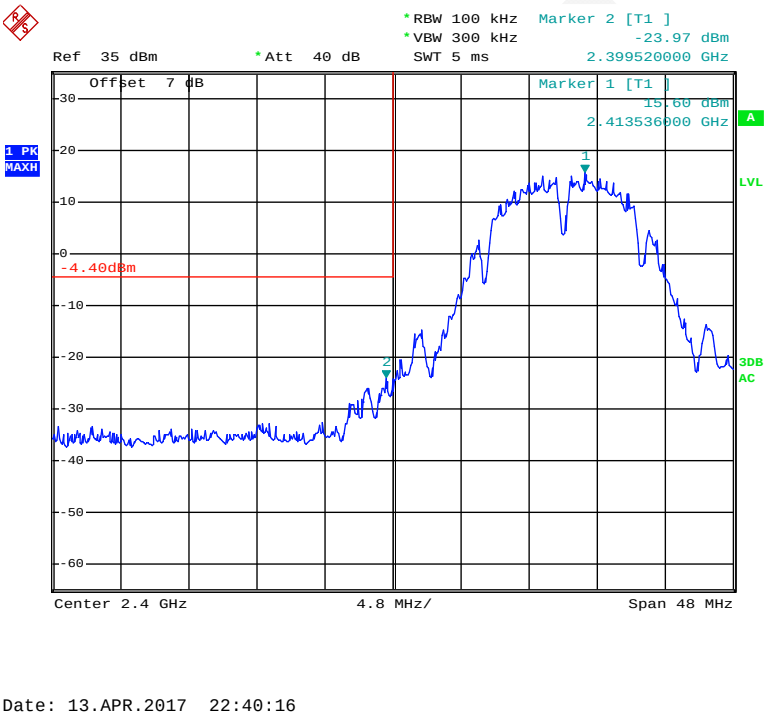
Temperature:	24.9 °C
Relative Humidity:	44.1%
ATM Pressure:	100.7 kPa

** The testing was performed by Kevin Hu on 2017-04-13.*

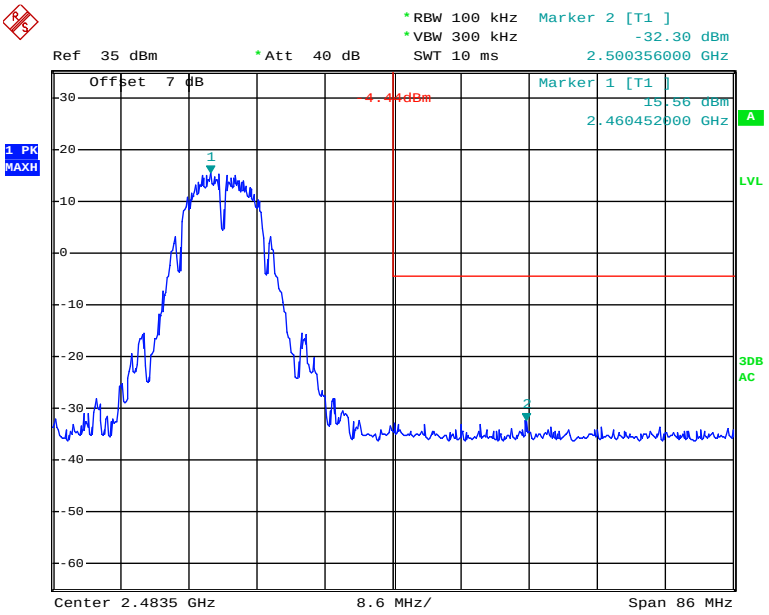
Test mode: Transmitting(Test performed at Module 3)

Test Result: Compliant. Please refer to following plots.

Con 1, 802.11b: Band Edge, Left Side

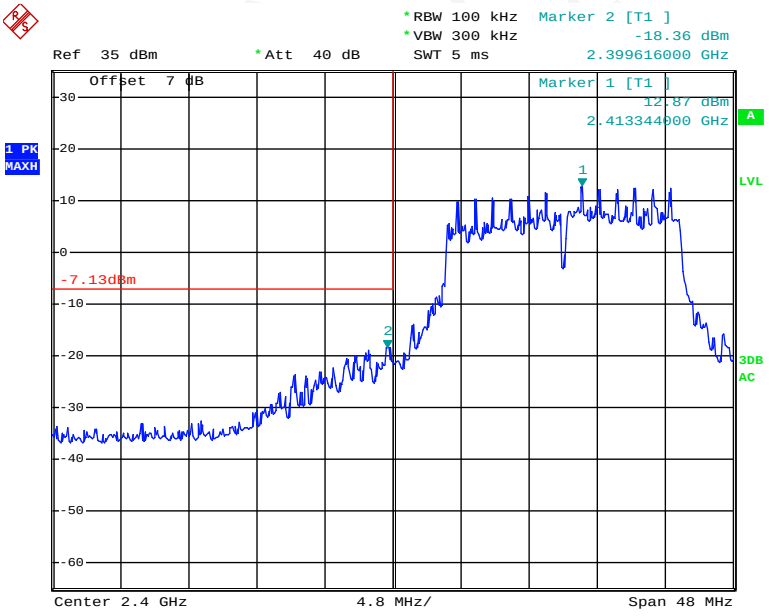


Con 1, 802.11b: Band Edge, Right Side



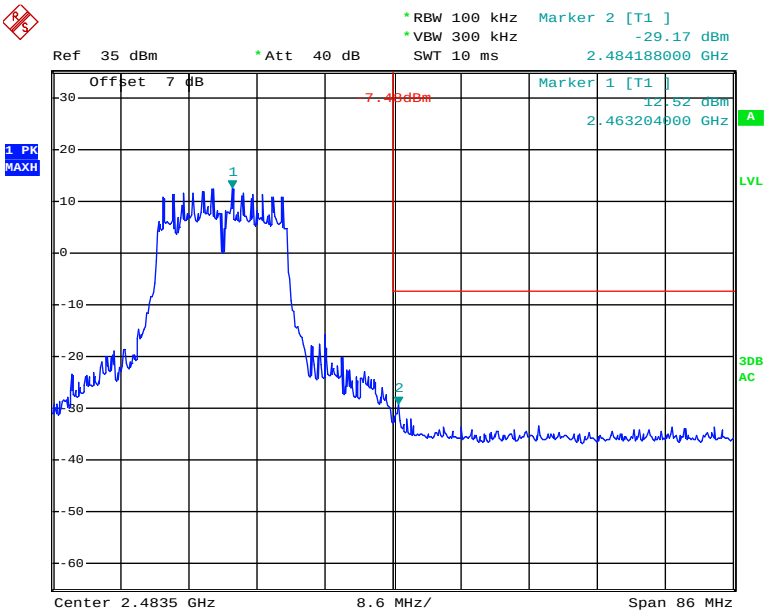
Date: 13.APR.2017 22:46:11

Con 1, 802.11g: Band Edge, Left Side



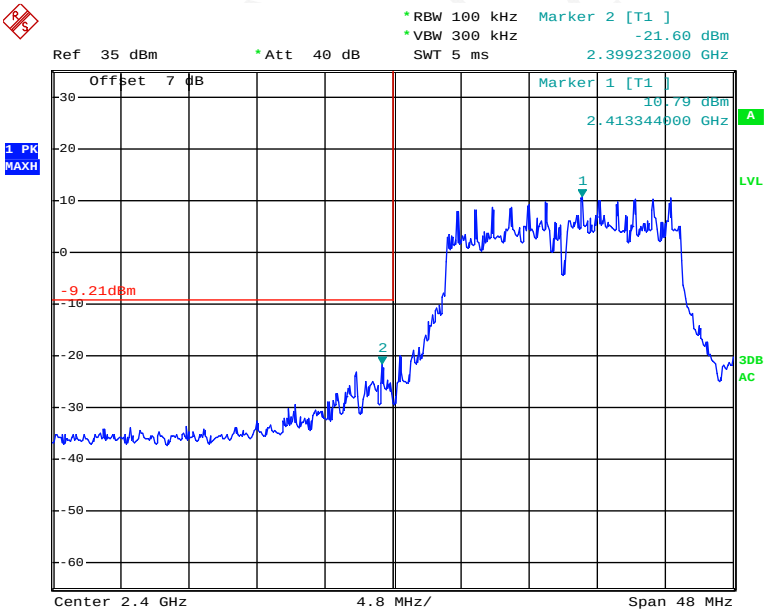
Date: 13.APR.2017 23:00:24

Con 1, 802.11g: Band Edge, Right Side



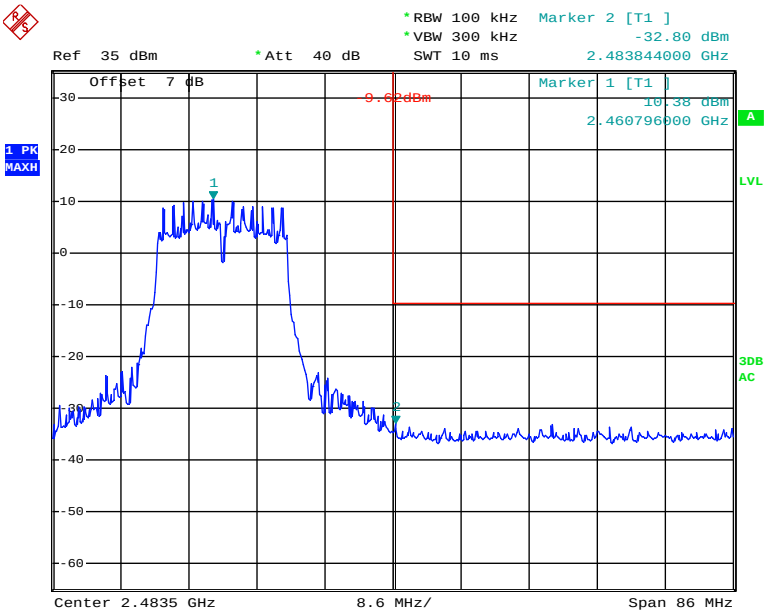
Date: 13.APR.2017 22:56:50

Con 1, 802.11n ht20 Band Edge, Left Side



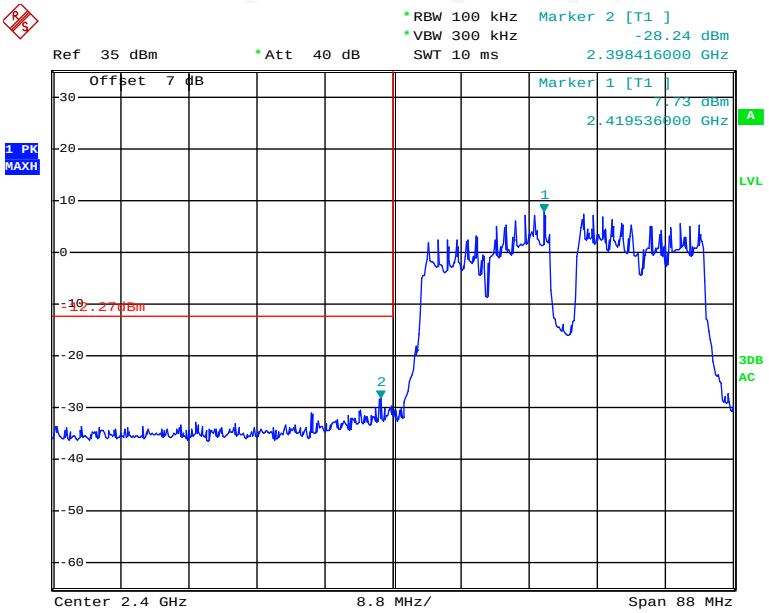
Date: 13.APR.2017 23:21:13

Con 1, 802.11n ht20 Band Edge, Right Side



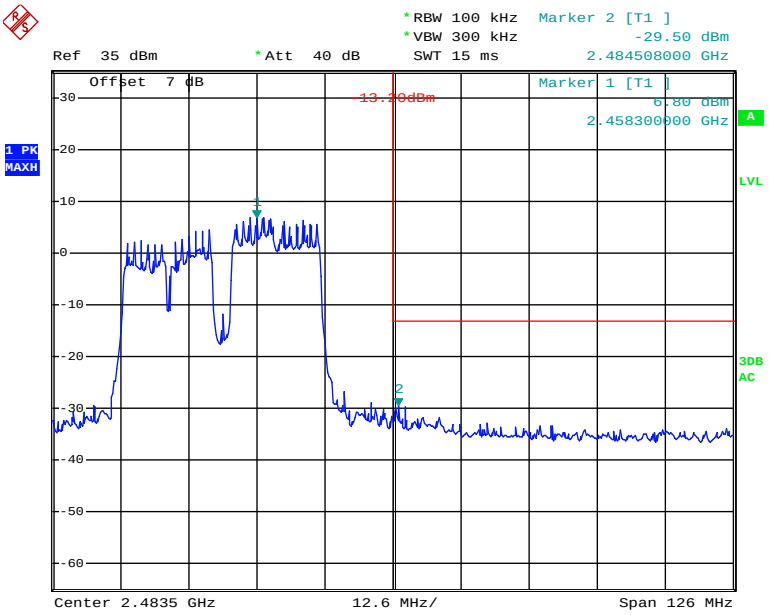
Date: 13.APR.2017 23:29:42

Con 1, 802.11n ht40 Band Edge, Left Side



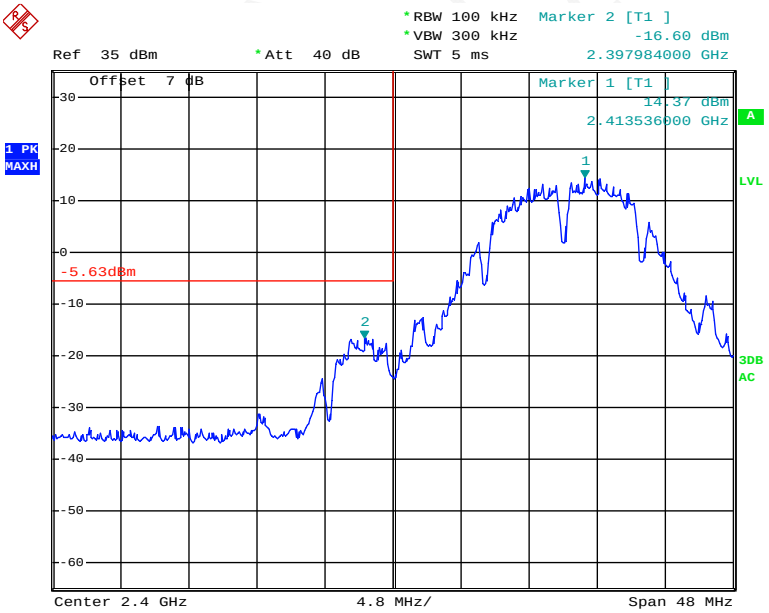
Date: 13.APR.2017 23:50:31

Con 1, 802.11n ht40 Band Edge, Right Side



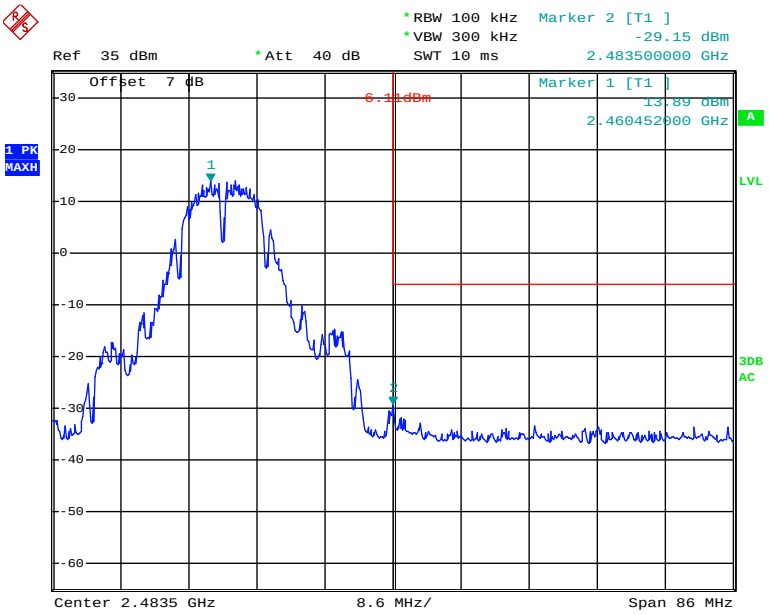
Date: 13.APR.2017 23:36:39

Con 2, 802.11b: Band Edge, Left Side



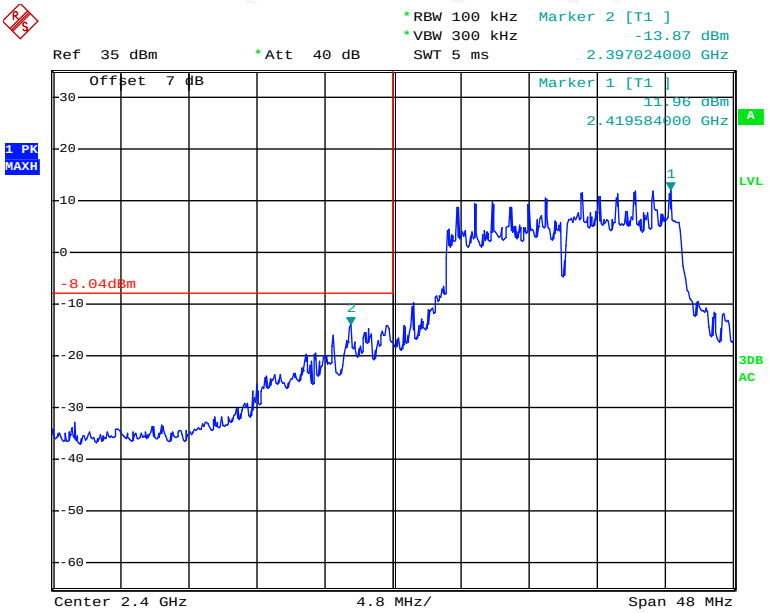
Date: 13.APR.2017 23:13:35

Con 2, 802.11b: Band Edge, Right Side



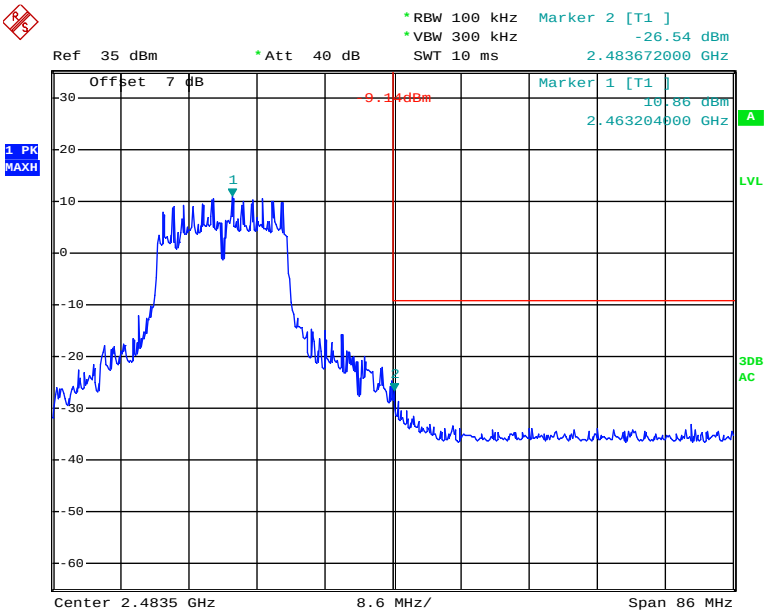
Date: 13.APR.2017 23:09:20

Con 2, 802.11g: Band Edge, Left Side



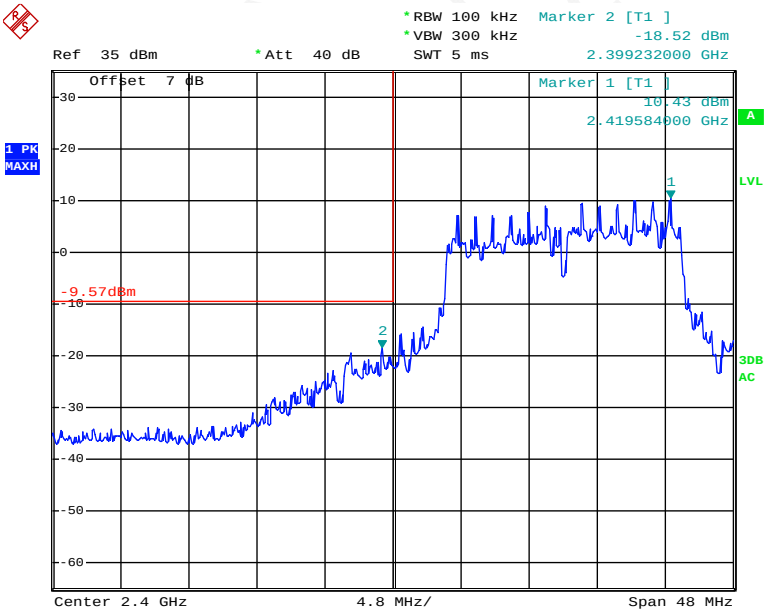
Date: 13.APR.2017 23:03:42

Con 2, 802.11g: Band Edge, Right Side



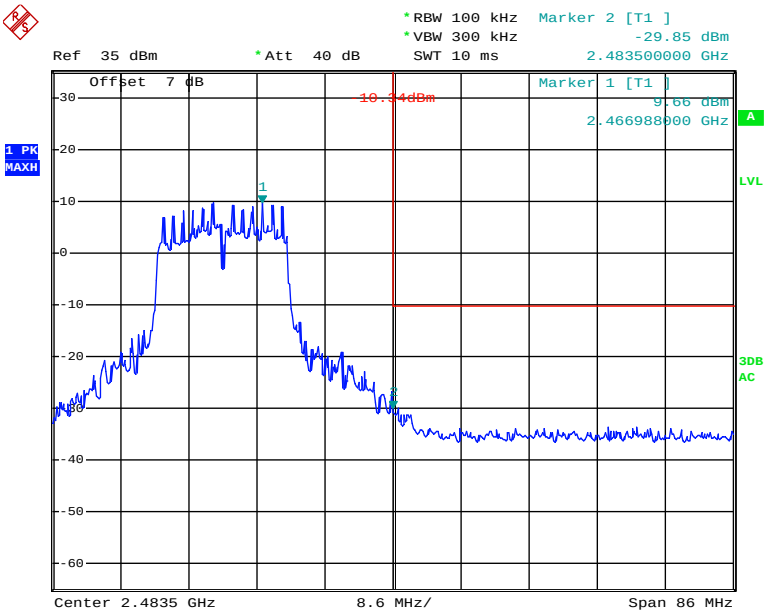
Date: 13.APR.2017 23:07:39

Con 2, 802.11n ht20 Band Edge, Left Side



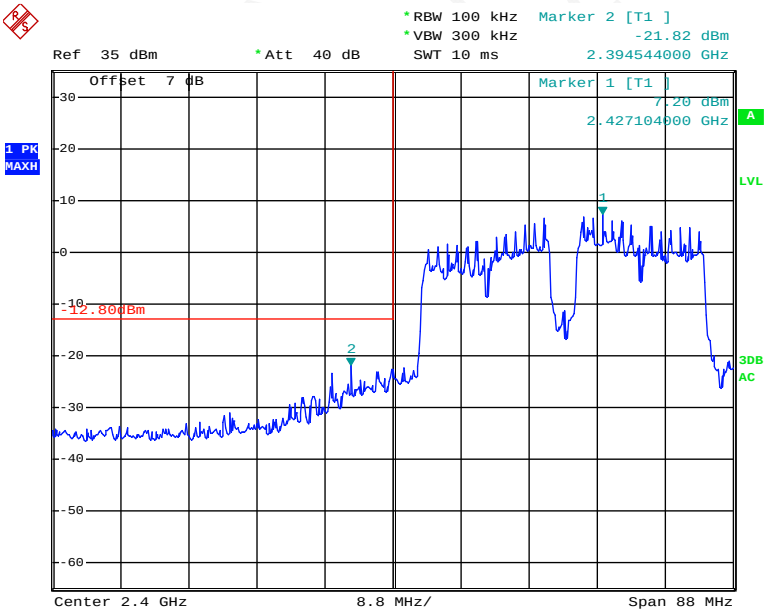
Date: 13.APR.2017 23:20:22

Con 2, 802.11n ht20 Band Edge, Right Side



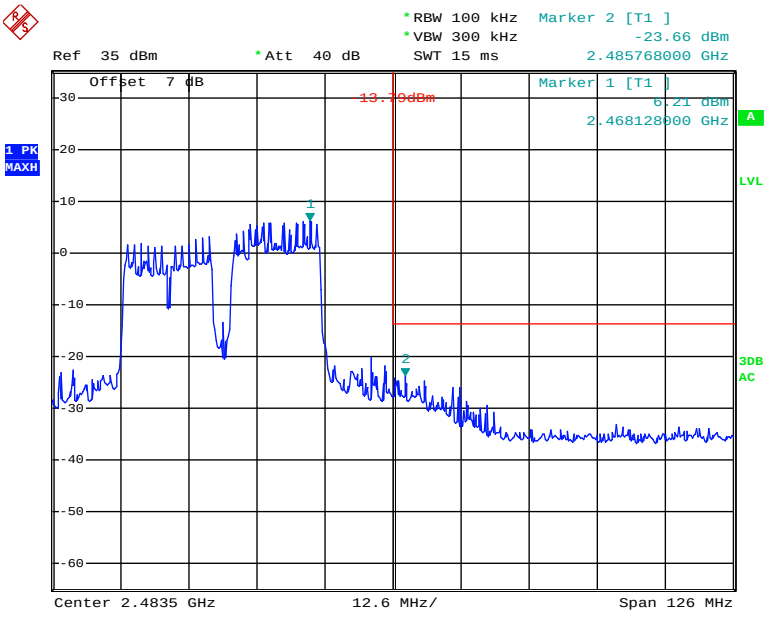
Date: 13.APR.2017 23:28:45

Con 2, 802.11n ht40 Band Edge, Left Side



Date: 13.APR.2017 23:52:06

Con 2, 802.11n ht40 Band Edge, Right Side



Date: 13.APR.2017 23:34:30

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 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3×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	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Unknown	RF Cable	Unknown	C-5	Each Time	/

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

Environmental Conditions

Temperature:	24.1 °C
Relative Humidity:	44.1 %
ATM Pressure:	100.7 kPa

** The testing was performed by Kevin Hu on 2017-04-13.*

Test Mode: Transmitting(Test performed at Module 3)

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

Test mode	Channel	Frequency (MHz)	PSD (dBm/3kHz)			Limit (dBm/3kHz)
			Con 1	Con 2	Total	
802.11b	Low	2412	0.27	-1	/	≤8.0
	Middle	2437	0.02	-1.29	/	≤8.0
	High	2462	0.31	-1.37	/	≤8.0
802.11g	Low	2412	-4.44	-5	/	≤8.0
	Middle	2437	-4.47	-5.99	/	≤8.0
	High	2462	-5.14	-6.61	/	≤8.0
802.11n ht20	Low	2412	-6.66	-7.2	-3.91	≤6.3
	Middle	2437	-5.13	-6.77	-2.86	≤6.3
	High	2462	-5.55	-7.43	-3.38	≤6.3
802.11n ht40	Low	2422	-9.26	-8.98	-6.11	≤6.3
	Middle	2437	-8.91	-9.78	-6.31	≤6.3
	High	2452	-10.22	-10.96	-7.56	≤6.3

Note: the maximum antenna gain is 3.9 dBi for module 1 and 4.7dBi for module 3 in 2.4GHz band, the device 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 $\log(N_{ANT}/N_{SS})$ dB.

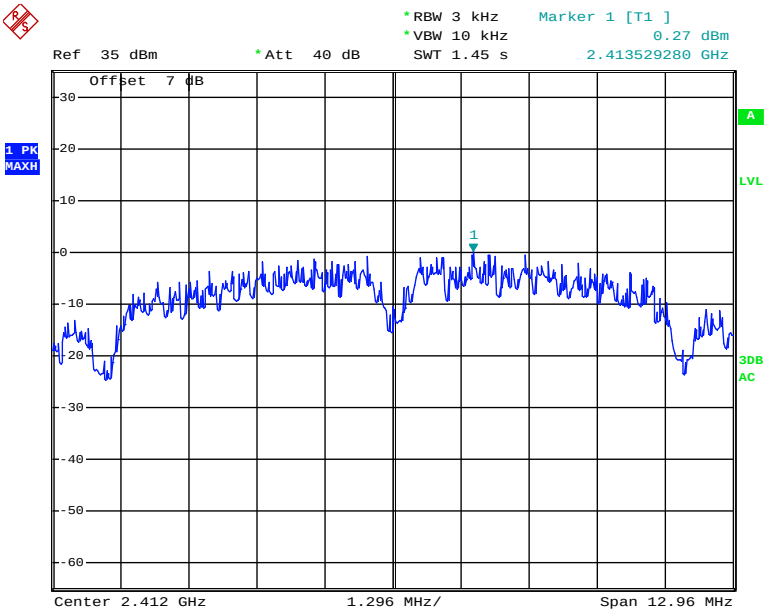
So:

For module 1: Directional gain = GANT + Array Gain = 3.9+10*log(2) =6.9 dBi
For module 3: Directional gain = GANT + Array Gain = 4.7+10*log(2) =7.7 dBi

The limit should be reduced 1.7dB.

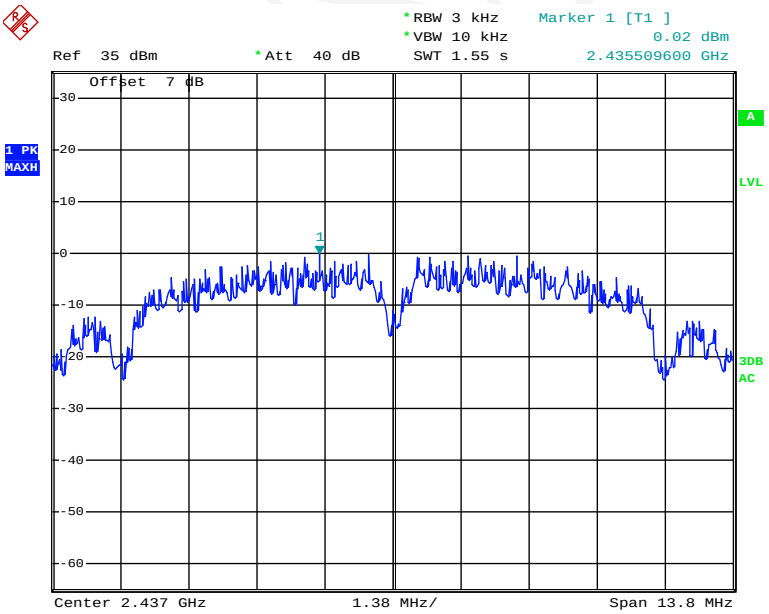
Con 1

Power Spectral Density, 802.11b Low Channel



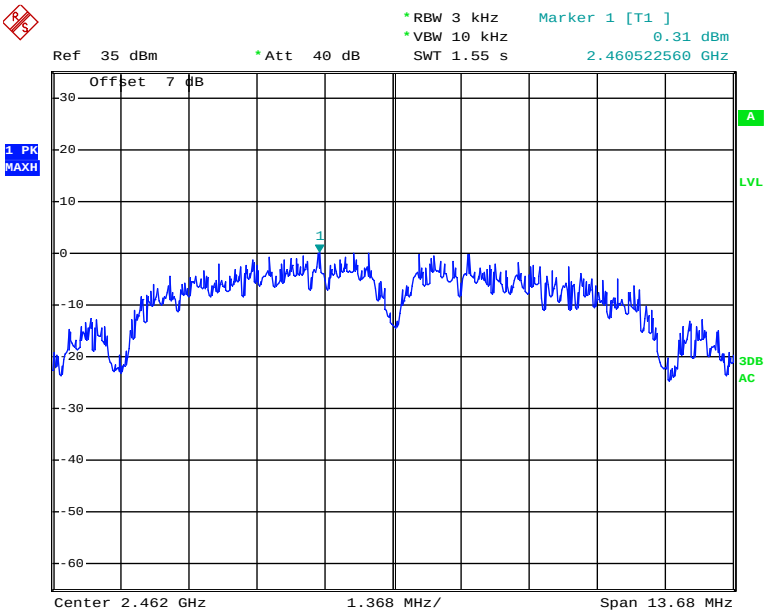
Date: 13.APR.2017 22:40:01

Power Spectral Density, 802.11b Middle Channel



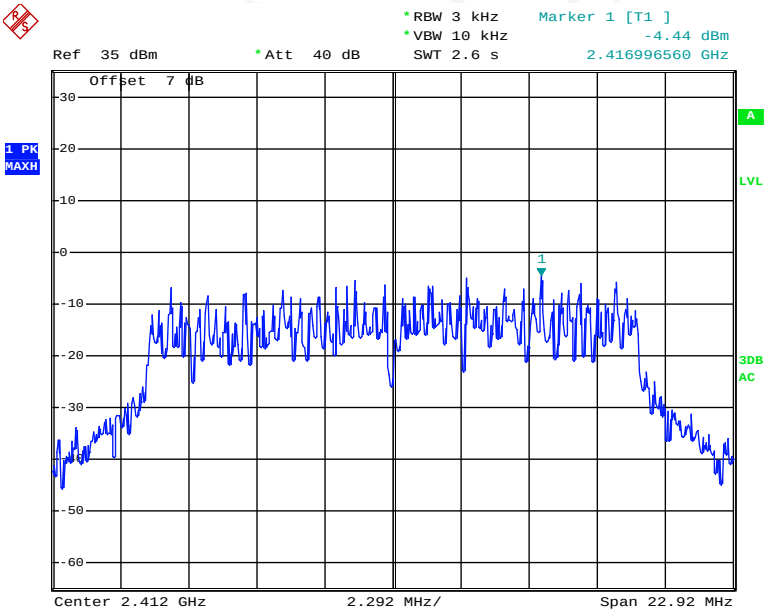
Date: 13.APR.2017 22:42:49

Power Spectral Density, 802.11b High Channel



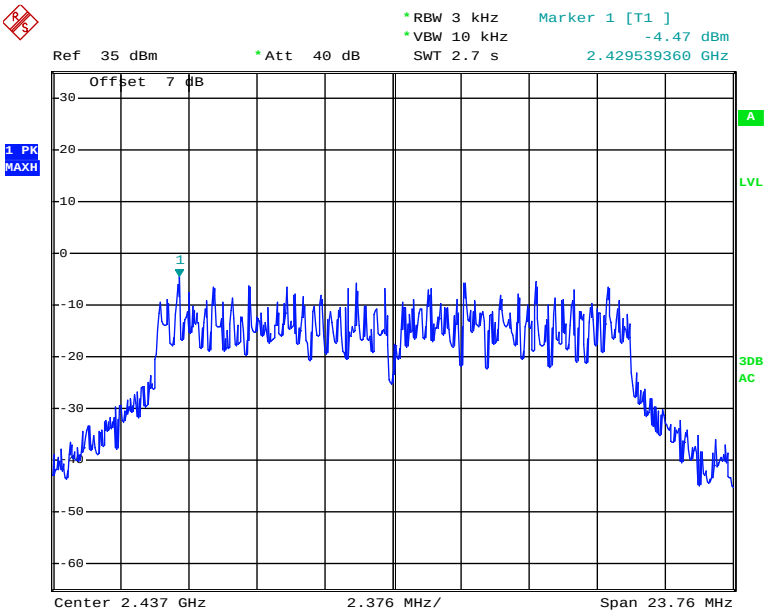
Date: 13.APR.2017 22:45:50

Power Spectral Density, 802.11g Low Channel



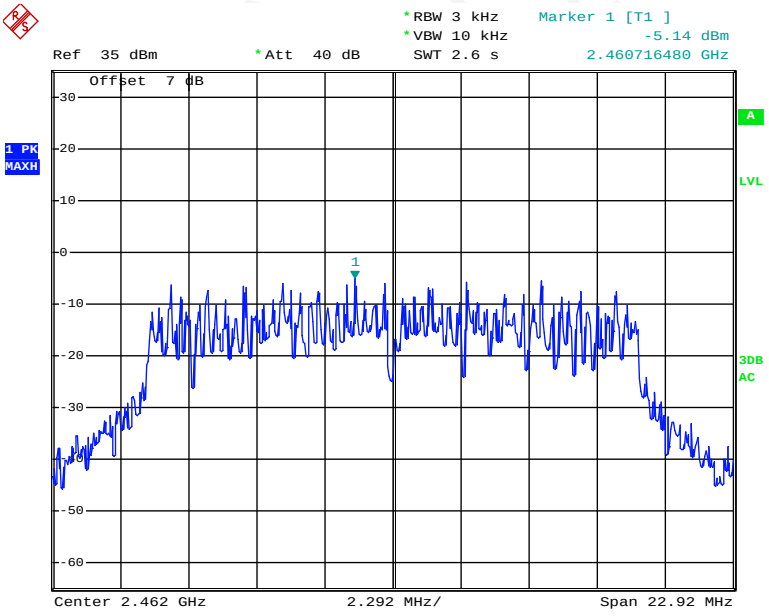
Date: 13.APR.2017 23:00:09

Power Spectral Density, 802.11g Middle Channel



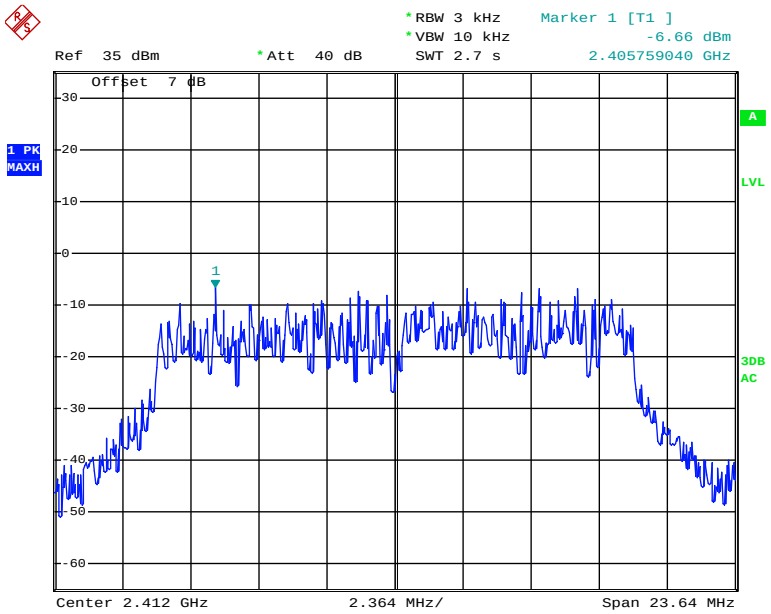
Date: 13.APR.2017 22:58:32

Power Spectral Density, 802.11g High Channel



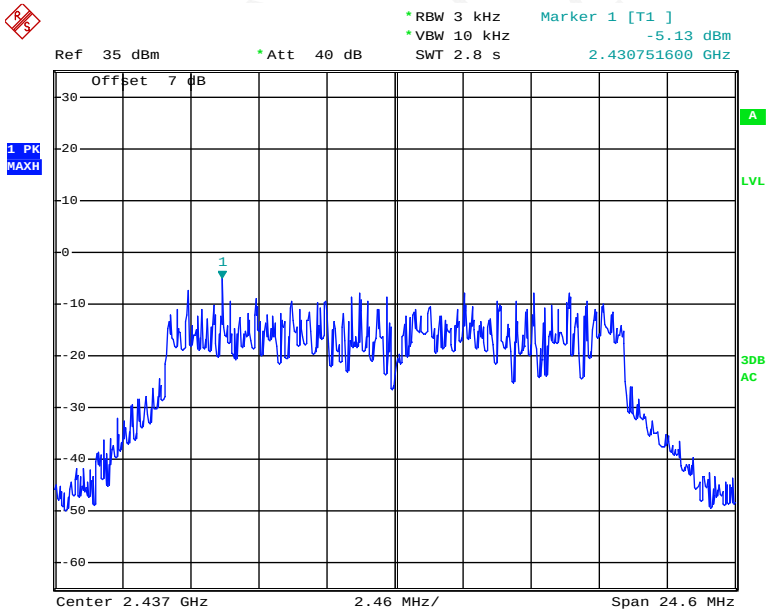
Date: 13.APR.2017 22:56:34

Power Spectral Density, 802.11n ht20 Low Channel



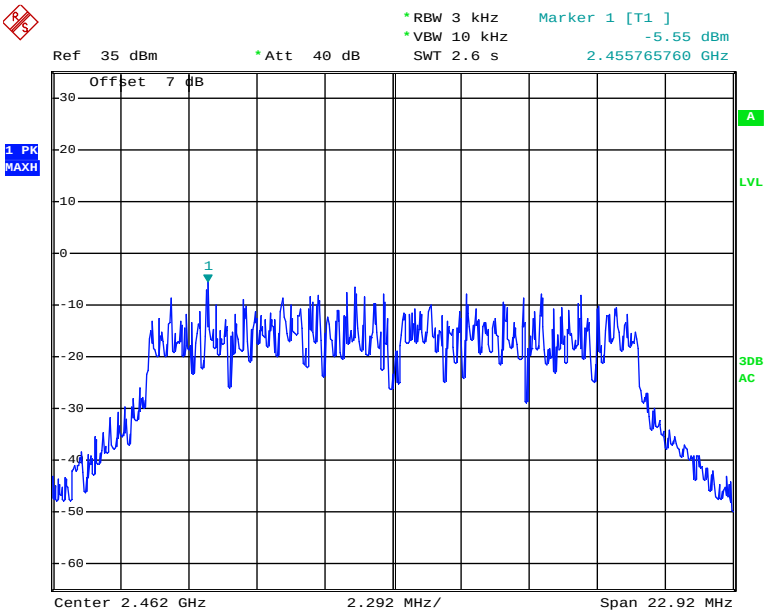
Date: 13.APR.2017 23:20:58

Power Spectral Density, 802.11n ht20 Middle Channel



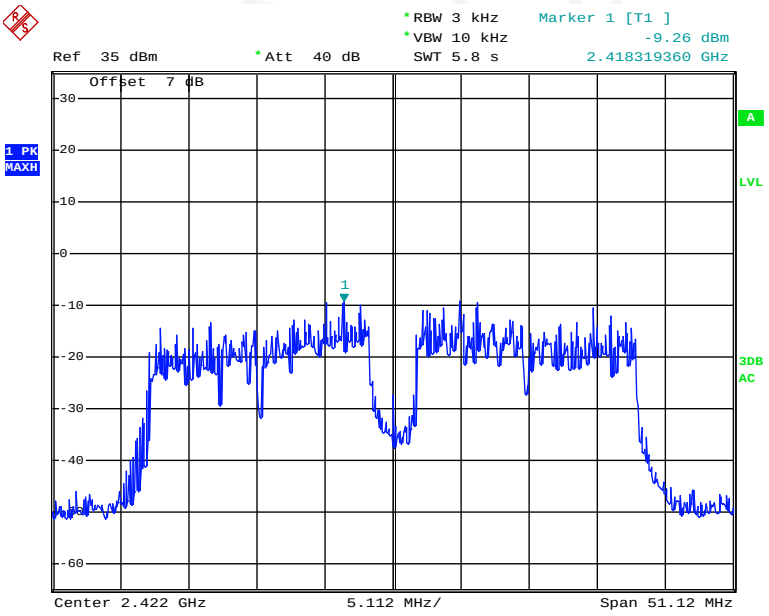
Date: 13.APR.2017 23:25:30

Power Spectral Density, 802.11n ht20 High Channel



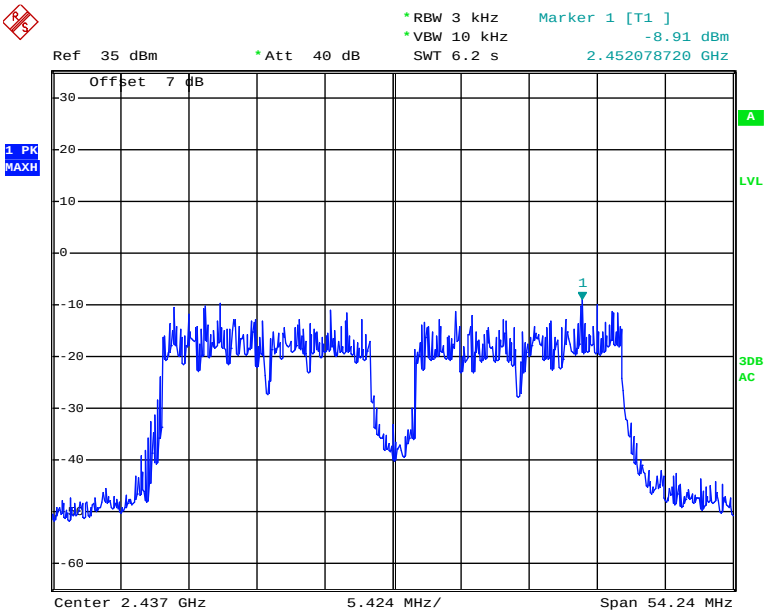
Date: 13.APR.2017 23:29:27

Power Spectral Density, 802.11n ht40 Low Channel



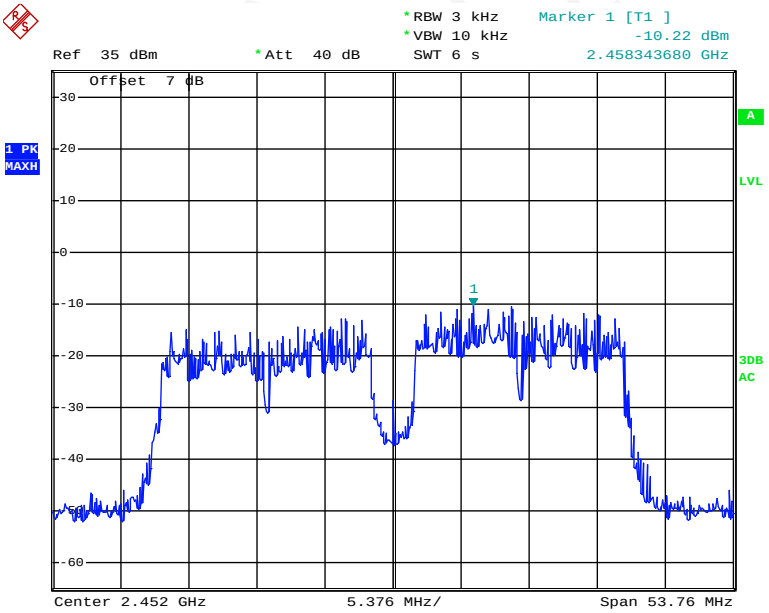
Date: 13.APR.2017 23:50:08

Power Spectral Density, 802.11n ht40 Middle Channel



Date: 13.APR.2017 23:43:04

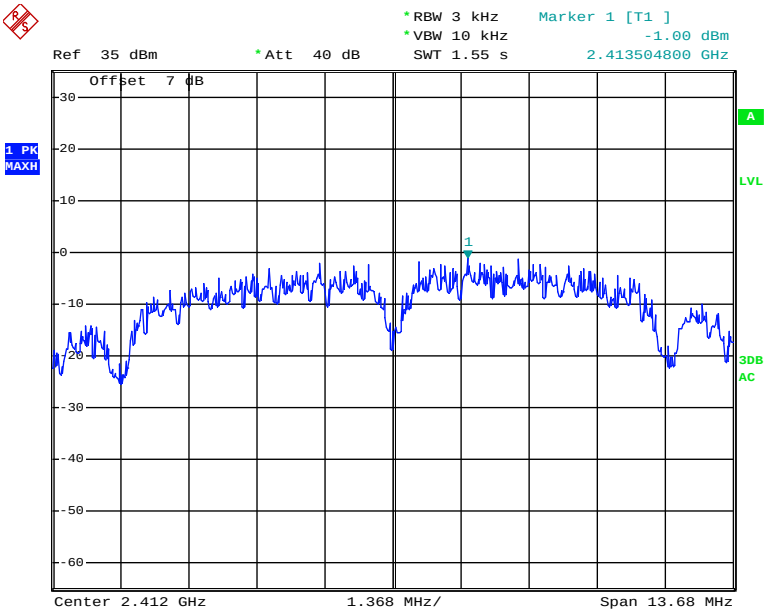
Power Spectral Density, 802.11n ht40 High Channel



Date: 13.APR.2017 23:36:18

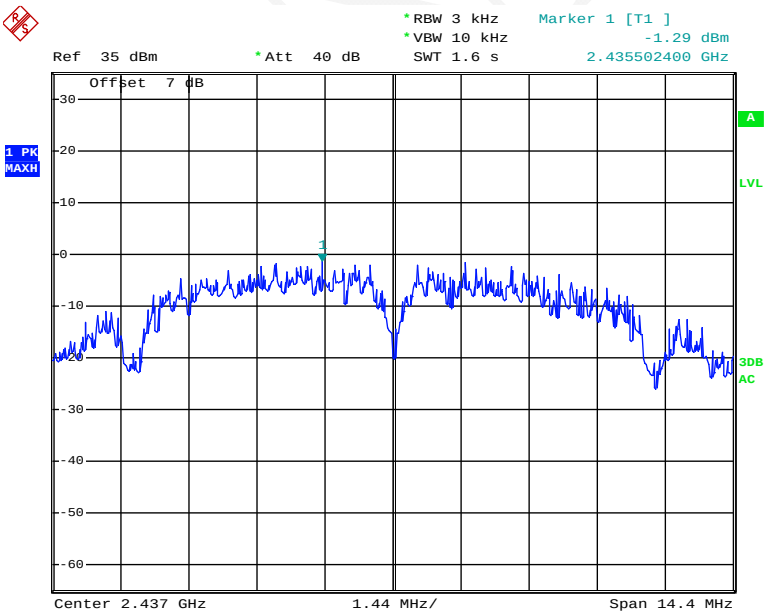
Con 2:

Power Spectral Density, 802.11b Low Channel



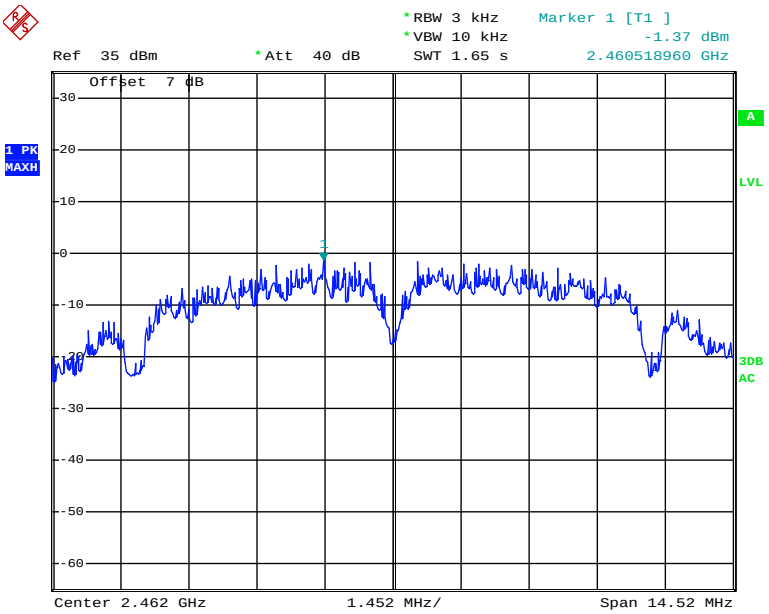
Date: 13.APR.2017 23:13:14

Power Spectral Density, 802.11b Middle Channel



Date: 13.APR.2017 23:11:17

Power Spectral Density, 802.11b High Channel



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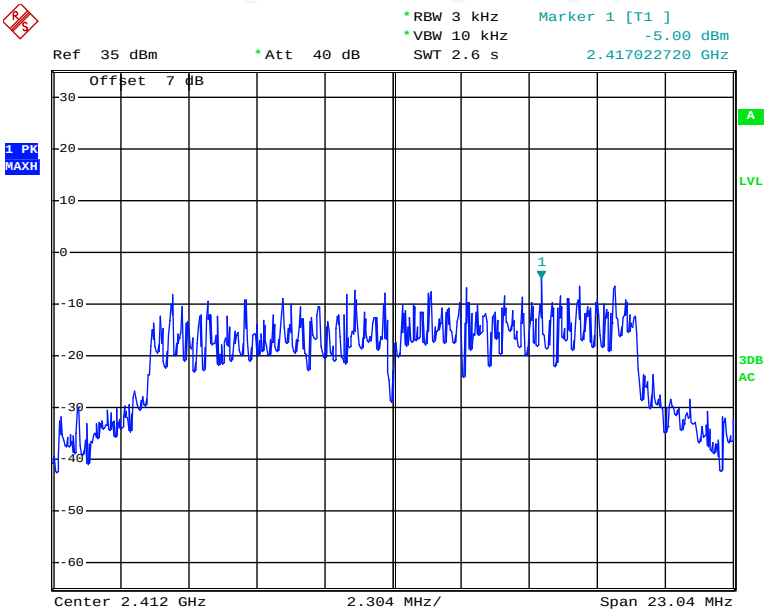
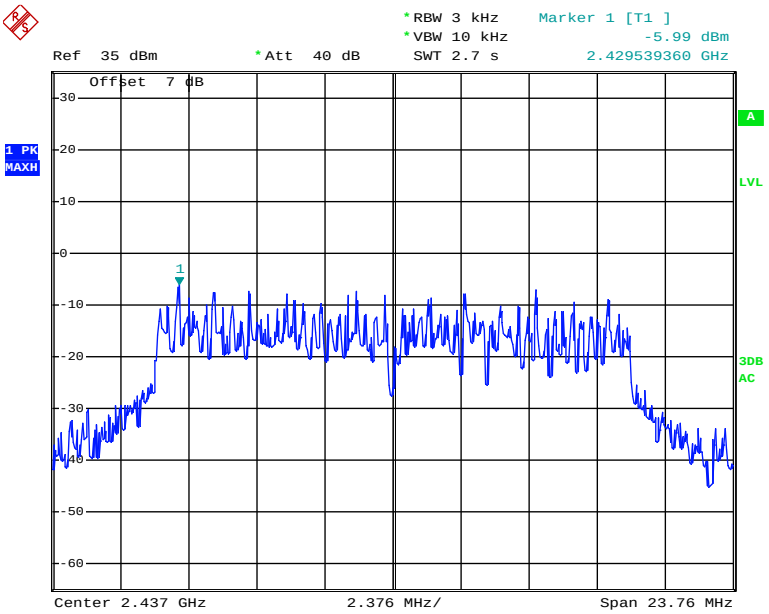
Power Spectral Density, 802.11g Low Channel



Date: 13.APR.2017 23:03:21

Power Spectral Density, 802.11g Middle Channel



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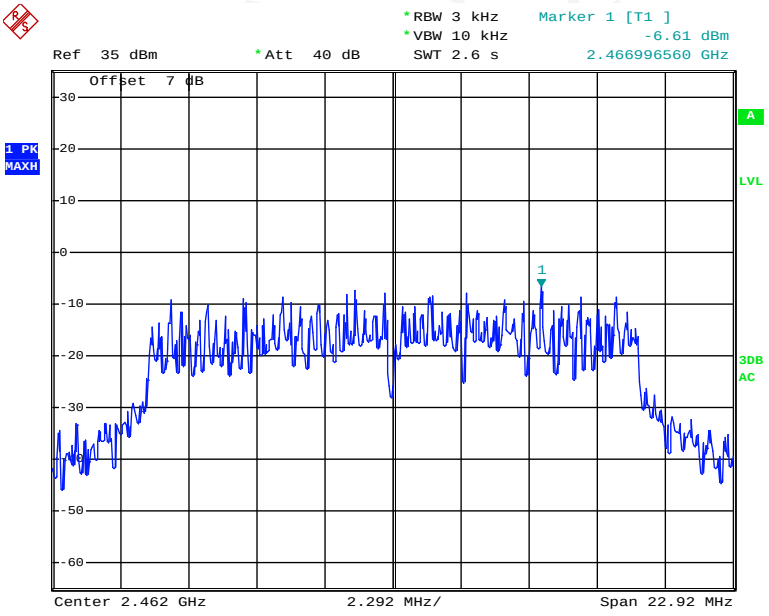
Power Spectral Density, 802.11g High Channel



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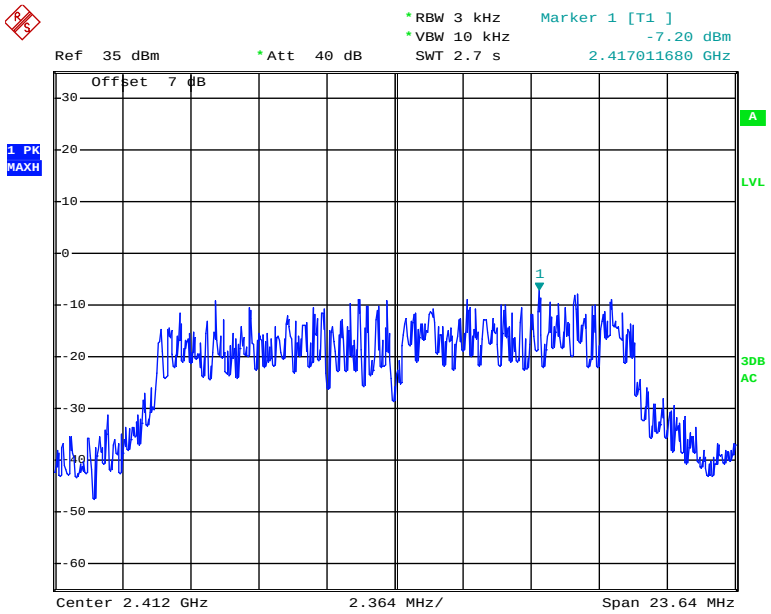
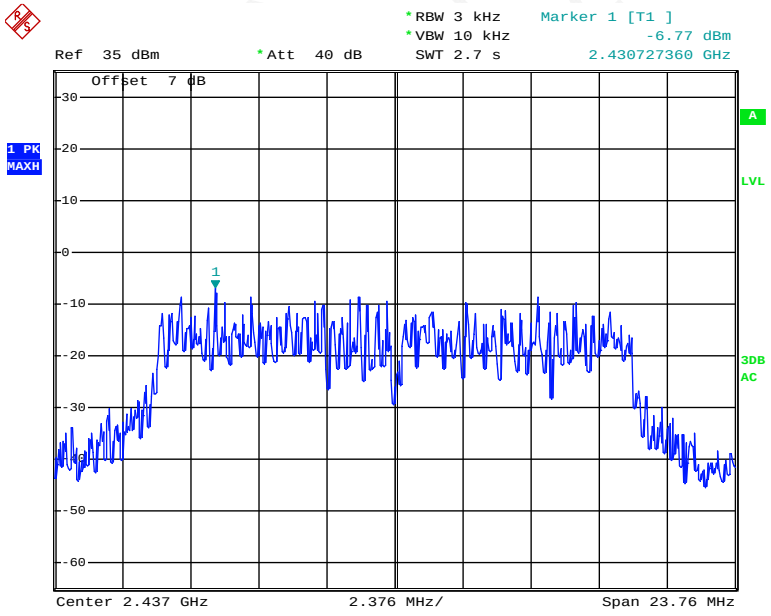
Power Spectral Density, 802.11n ht20 Low Channel



Date: 13.APR.2017 23:20:07

Power Spectral Density, 802.11n ht20 Middle Channel



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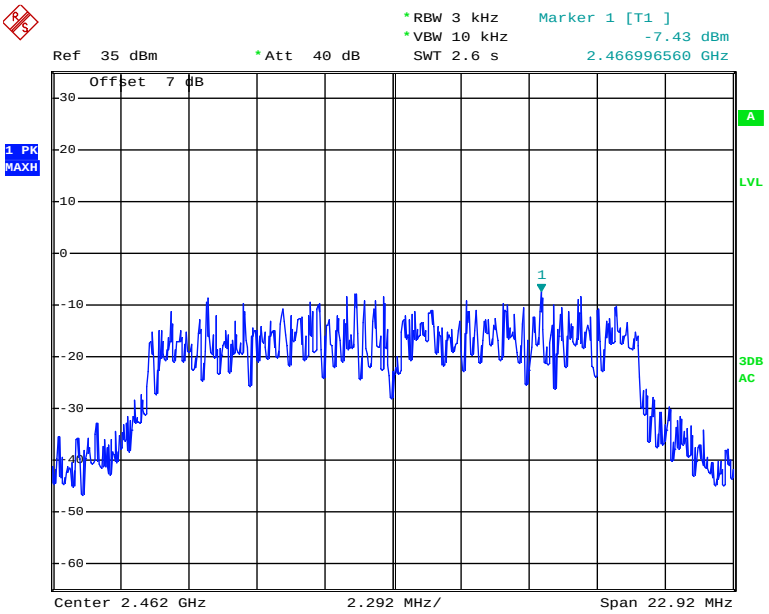
Power Spectral Density, 802.11n ht20 High Channel



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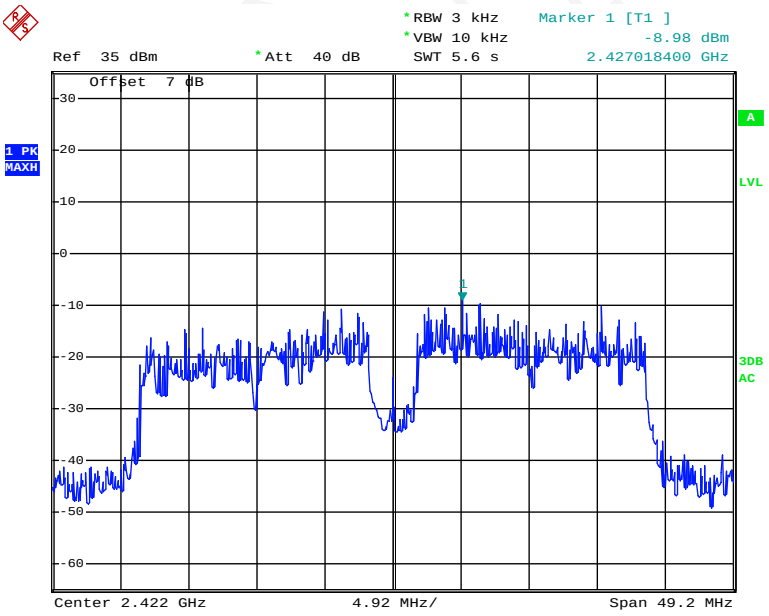
Power Spectral Density, 802.11n ht40 Low Channel



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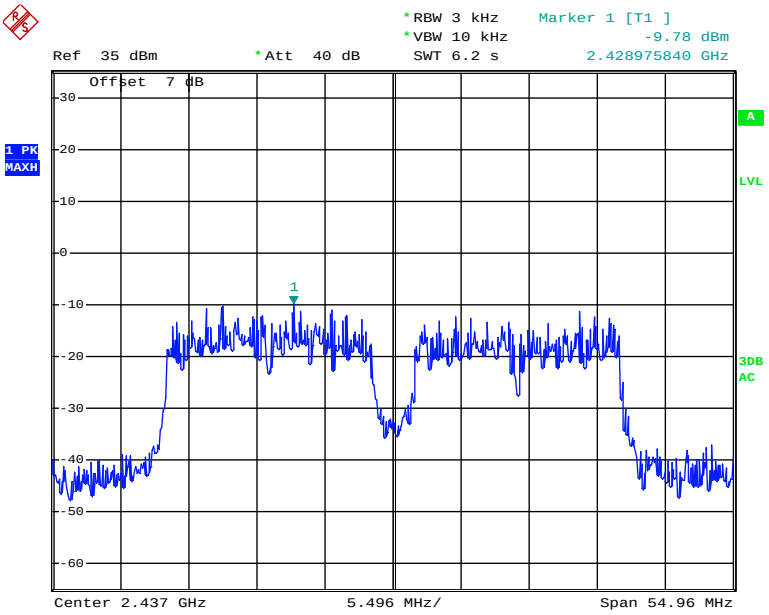
Power Spectral Density, 802.11n ht40 Middle Channel



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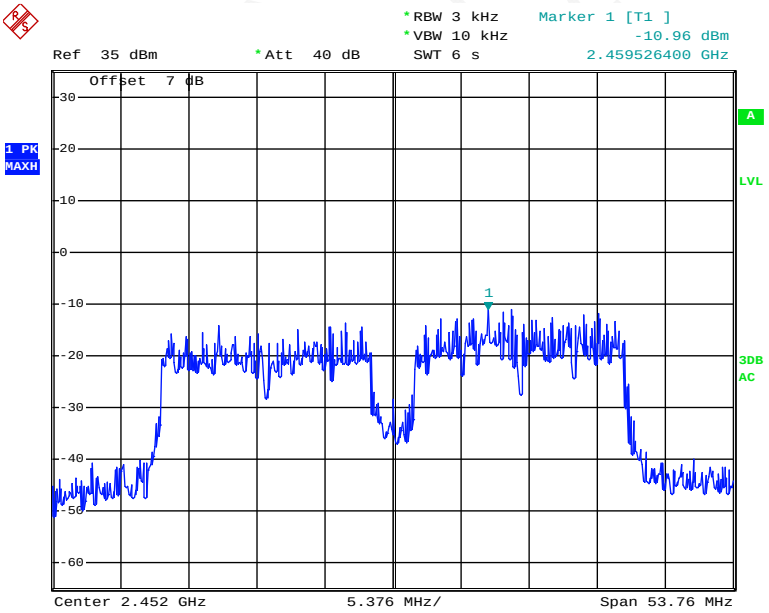
Power Spectral Density, 802.11n ht40 High Channel



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