FCC PART 15.247

TEST REPORT

For

CHUNGHSIN INTERNATIONAL ELECTRONICS CO.,LTD

618 GONGREN WEST ROAD,JIAOJIANG AREA TAIZHOU ZHEJIANG 318000 China

FCC ID: 2AI5MN1186Q

Report Type:	**Product Type:**
Original Report	Notebook

Test Engineer:	Rocky Xiao
Report Number:	RDG160622804-00C
Report Date:	2016-07-25
Reviewed By:	Dean Liu RF Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

Note: This test report is 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. (Dongguan).

TABLE OF CONTENTS

FINAL

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *CHUNGHSIN INTERNATIONAL ELECTRONICS CO.,LTD*'s product, model number: *MI1166R (FCC ID: 2AI5MN1186Q)* (the "EUT") in this report was a *Notebook* , which was measured approximately: 30.0 cm (L) x 20.0 cm (W) x 2.1 cm (H), rated input voltage: DC 3.7V rechargeable Li-ion battery or DC5V from adapter.

Adapter #1 Information:
MODEL: BSYB050250U U
INPUT: 100-240V ~, 50/60Hz, 0.4A
OUTPUT: DC 5.0V, 2.5A

Adapter#2 Information:
MODEL: JK050250-S04US
INPUT: 100-240V ~, 50/60Hz, 0.5A
OUTPUT: DC 5.0V, 2500mA

All measurement and test data in this report was gathered from production sample serial number: 160622804 (Assigned by BACL, Dongguan). The EUT was received on 2016-06-29.

Objective

This report is prepared on behalf of *CHUNGHSIN INTERNATIONAL ELECTRONICS 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 15B JBC submissions with FCC ID: 2AI5MN1186Q
FCC Part 15C DSS submissions with FCC ID: 2AI5MN1186Q

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. (Dongguan).

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communications Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 06, 2015.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

FINAL

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in testing mode, which was provided by manufacturer.
For 2.4GHz band, 11 channels are provided to testing:

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

For 802.11b, 802.11g, and 802.11n ht20 modes were tested with channel 1, 6 and 11.
For 802.11n ht40 mode were tested with Channel 3, 6 and 9.

The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations.

For Bluetooth LE mode, 40 channels are provided for testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	…	…
…	…	…	…
…	…	…	…
..	…	38	2478
19	2440	39	2480

EUT was tested with channel 0, 19 and 39.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

The worst condition (maximum power with 100% duty cycle) was setting by the software as following table:

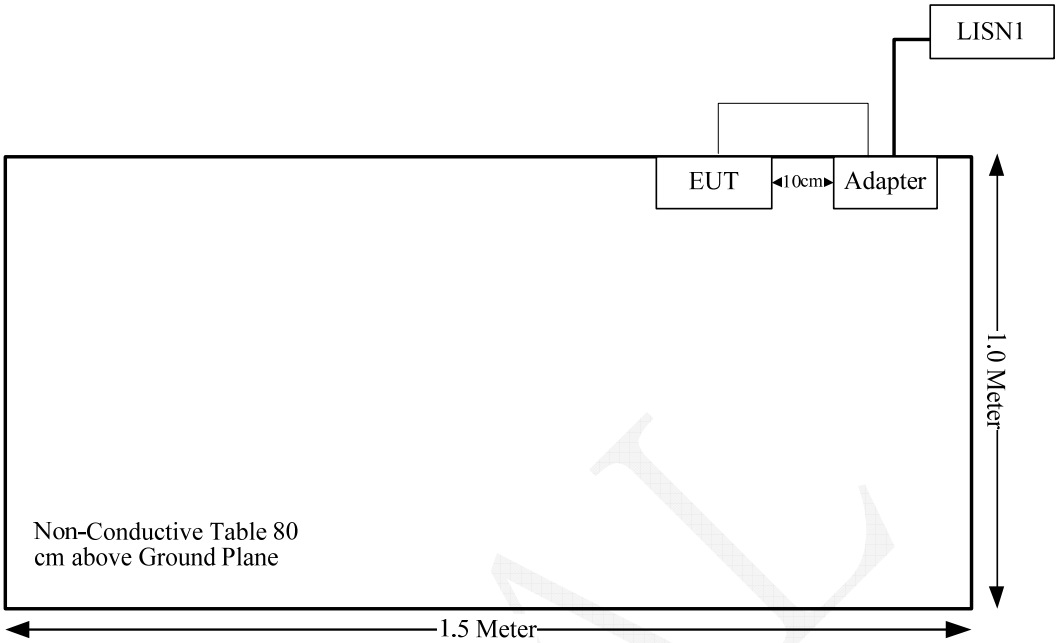
Test Mode	Test Software Version	MPTool		
802.11b	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	CCK 1M	CCK 1M	CCK 1M
	Power Level Setting	46	45	45
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	OFDM 6M	OFDM 6M	OFDM 6M
	Power Level Setting	54	53	52
802.11n ht20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	54	53	52
802.11n ht40	Test Frequency	2422MHz	2437MHz	2452MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	54	53	52

Note: BLE mode configured as maximum power by the system default setting.

External I/O Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
DC Cable	No	No	1.2	Adapter	EUT

Block Diagram of Test Setup



FINAL

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1093	RF Exposure	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

FINAL

FCC §15.247 (i) & §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

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

According to KDB447498 D01 General RF Exposure Guidance v06:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

Measurement Result

For bluetooth LE mode

The max tune-up conducted power is 4.7 dBm (2.95 mW).
[(max. power of channel, mW)/(min. test separation distance, mm)][√f(GHz)]
= 2.95/5*(√2.48) = 0.9 < 3.0

The stand-alone SAR evaluation for BLE is not necessary.

For Wlan, please refer to the SAR report: RDG160622804-20

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 has one internal antenna arrangement for Wifi/BT, and the antenna gain is 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FINAL

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

Measurement Uncertainty

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

If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

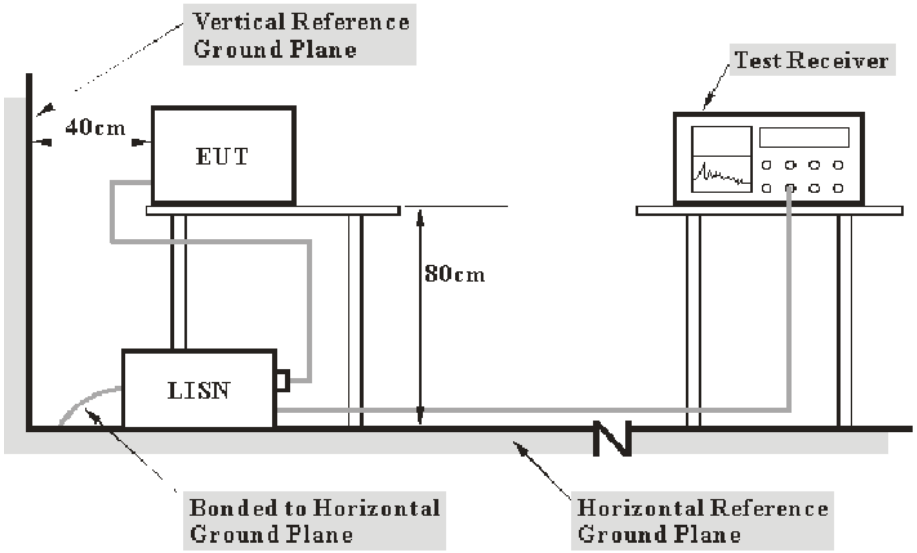
If U_{lab} is greater than U_{cispr} of Table 1, then:
- compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

Based on CISPR 16-4-2-2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.12 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 VAC/60 Hz power source

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the 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
R&S	EMI Test Receiver	ESCS 30	830245/006	2015-12-10	2016-12-09
R&S	L.I.S.N	ESH2-Z5	892107/021	2016-07-16	2017-07-15
R&S	Two-line V-network	ENV 216	3560.6550.12	2015-11-26	2016-11-25
N/A	Coaxial Cable	1.8m	N/A	2016-05-06	2017-05-06
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

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

Test Results Summary

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

7.6 dB at **1.048242 MHz** in the **Line** conducted mode for BLE

Test Data

Environmental Conditions

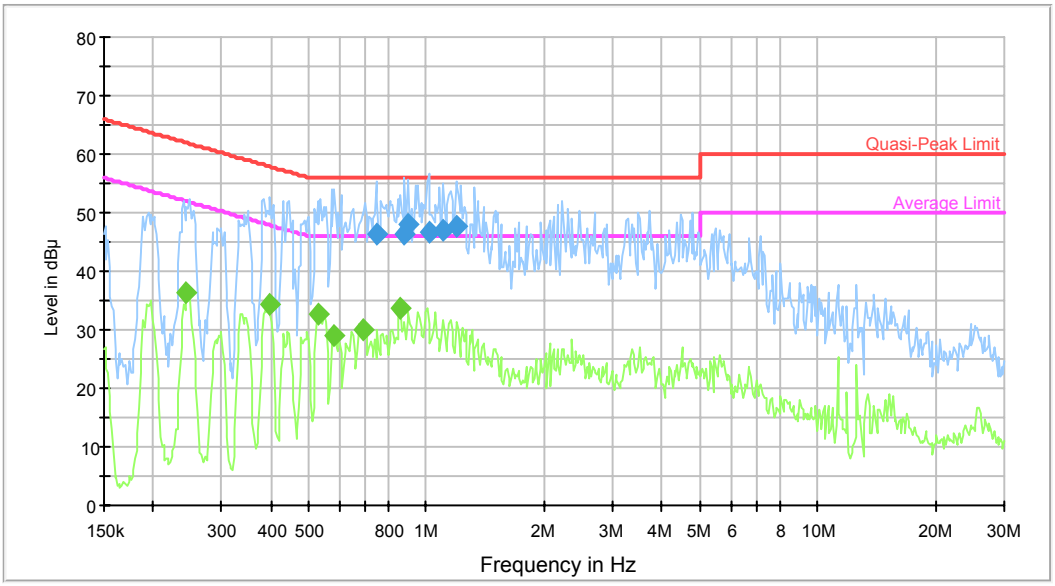
Temperature:	29.7 °C
Relative Humidity:	57 %
ATM Pressure:	100.5 kPa

The testing was performed by Rocky Xiao on 2016-07-21.

Test Mode: Transmitting (Wi-Fi)

Adapter #1

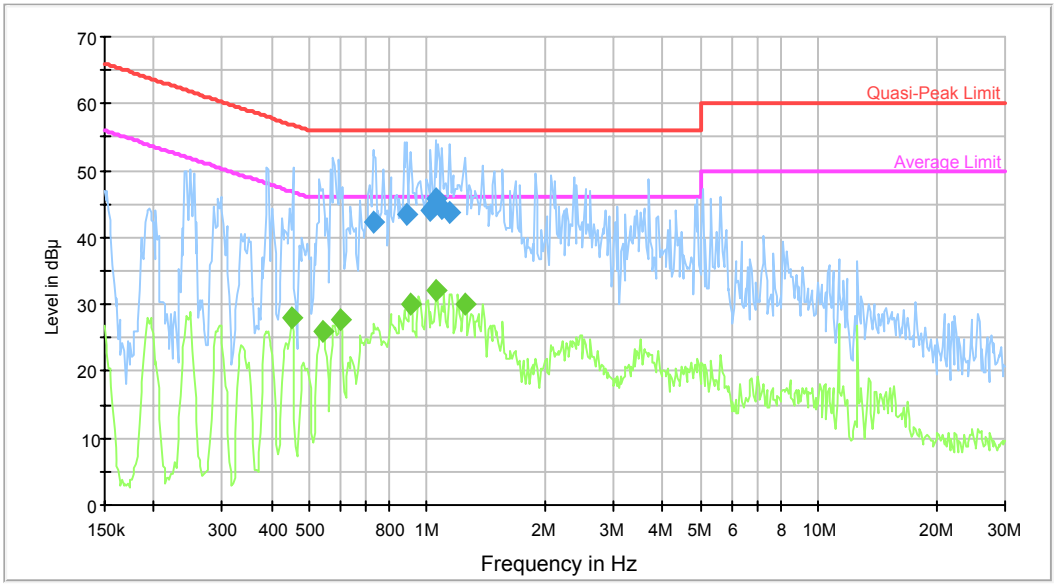
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.744147	46.3	9.000	L1	10.4	9.7	56.0	Compliance
0.879690	46.2	9.000	L1	10.4	9.8	56.0	Compliance
0.900972	48.0	9.000	L1	10.4	8.0	56.0	Compliance
1.015358	46.5	9.000	L1	10.4	9.5	56.0	Compliance
1.099574	47.0	9.000	L1	10.4	9.0	56.0	Compliance
1.190776	47.6	9.000	L1	10.4	8.4	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.243884	36.4	9.000	L1	10.2	15.6	52.0	Compliance
0.396530	34.3	9.000	L1	10.2	13.6	47.9	Compliance
0.528270	32.8	9.000	L1	10.1	13.2	46.0	Compliance
0.581275	28.8	9.000	L1	10.2	17.2	46.0	Compliance
0.692650	30.1	9.000	L1	10.4	15.9	46.0	Compliance
0.858911	33.5	9.000	L1	10.4	12.5	46.0	Compliance

AC120 V, 60 Hz, Neutral:

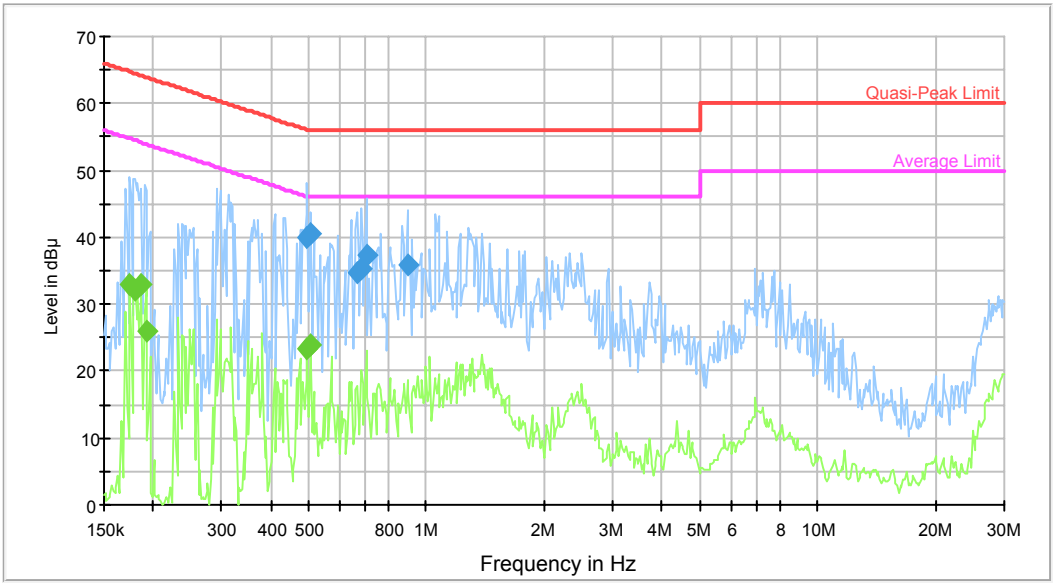


Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.726569	42.4	9.000	N	10.4	13.6	56.0	Compliance
0.886728	43.5	9.000	N	10.4	12.5	56.0	Compliance
1.023481	44.2	9.000	N	10.4	11.8	56.0	Compliance
1.048242	45.9	9.000	N	10.4	10.1	56.0	Compliance
1.090848	44.3	9.000	N	10.4	11.7	56.0	Compliance
1.144267	43.7	9.000	N	10.4	12.3	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.450448	28.0	9.000	N	10.1	18.9	46.9	Compliance
0.541050	26.0	9.000	N	10.1	20.0	46.0	Compliance
0.600101	27.8	9.000	N	10.2	18.2	46.0	Compliance
0.908180	29.9	9.000	N	10.4	16.1	46.0	Compliance
1.056628	32.1	9.000	N	10.4	13.9	46.0	Compliance
1.249088	30.2	9.000	N	10.4	15.8	46.0	Compliance

Adapter #2

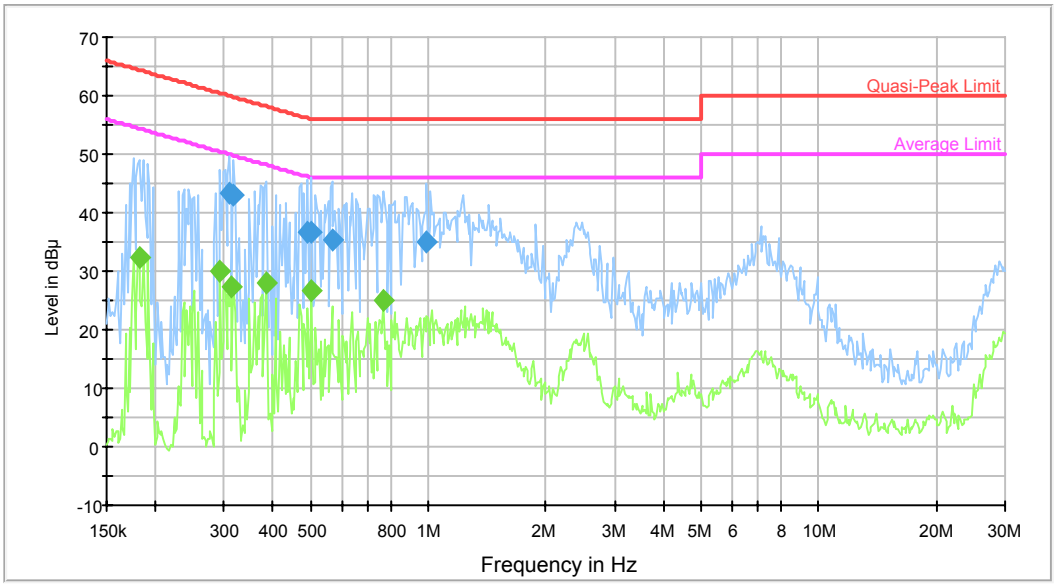
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.495646	40.1	9.000	L1	10.1	16.0	56.1	Compliance
0.507637	40.5	9.000	L1	10.1	15.5	56.0	Compliance
0.665597	34.9	9.000	L1	10.4	21.1	56.0	Compliance
0.681699	35.3	9.000	L1	10.4	20.7	56.0	Compliance
0.703777	37.2	9.000	L1	10.4	18.8	56.0	Compliance
0.893821	35.7	9.000	L1	10.4	20.3	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.174519	32.9	9.000	L1	10.1	21.8	54.7	Compliance
0.180171	32.1	9.000	L1	10.2	22.4	54.5	Compliance
0.187494	32.9	9.000	L1	10.2	21.2	54.1	Compliance
0.192030	25.9	9.000	L1	10.2	28.0	53.9	Compliance
0.495646	23.3	9.000	L1	10.1	22.8	46.1	Compliance
0.507637	23.8	9.000	L1	10.1	22.2	46.0	Compliance

AC120 V, 60 Hz, Neutral:



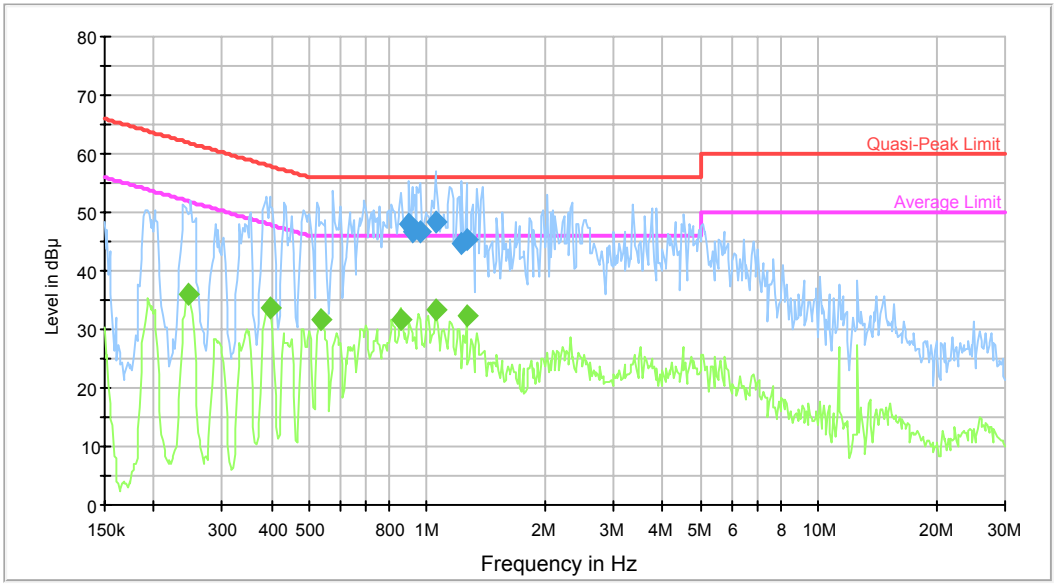
Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.309742	43.2	9.000	N	10.3	16.8	60.0	Compliance
0.317235	42.9	9.000	N	10.3	16.9	59.8	Compliance
0.491712	36.7	9.000	N	10.1	19.4	56.1	Compliance
0.499611	36.7	9.000	N	10.1	19.3	56.0	Compliance
0.567545	35.2	9.000	N	10.1	20.8	56.0	Compliance
0.991374	34.9	9.000	N	10.4	21.1	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.181612	32.2	9.000	N	10.1	22.2	54.4	Compliance
0.292938	30.0	9.000	N	10.3	20.4	50.4	Compliance
0.312220	27.2	9.000	N	10.3	22.7	49.9	Compliance
0.384091	27.9	9.000	N	10.2	20.3	48.2	Compliance
0.503608	26.7	9.000	N	10.1	19.3	46.0	Compliance
0.768247	25.1	9.000	N	10.4	20.9	46.0	Compliance

Test Mode: Transmitting (BLE)

Adapter #1

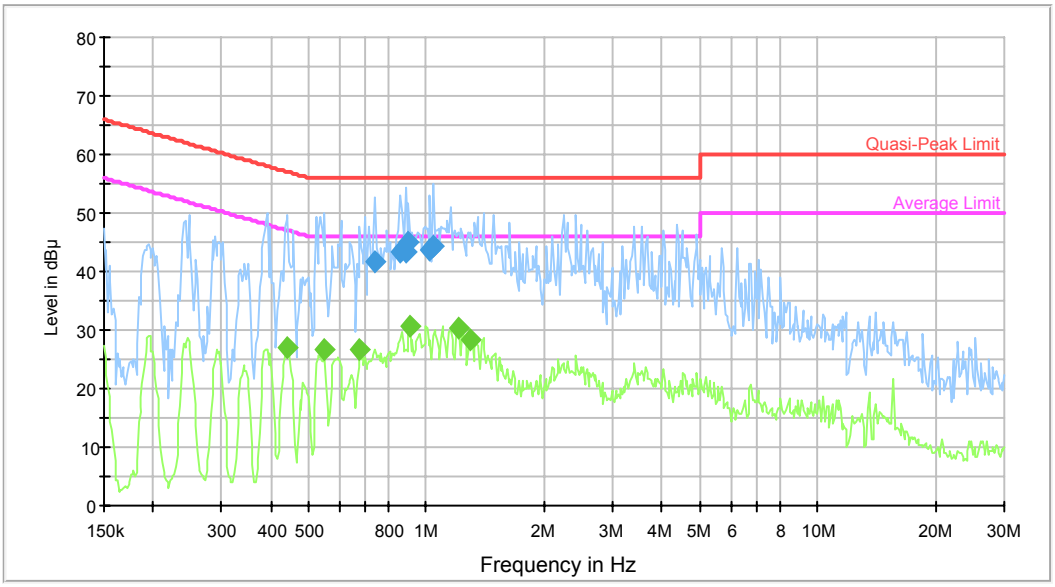
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.900972	47.8	9.000	L1	10.4	8.2	56.0	Compliance
0.915445	46.6	9.000	L1	10.4	9.4	56.0	Compliance
0.960275	46.8	9.000	L1	10.4	9.2	56.0	Compliance
1.048242	48.4	9.000	L1	10.4	7.6	56.0	Compliance
1.229340	44.5	9.000	L1	10.4	11.5	56.0	Compliance
1.259081	45.3	9.000	L1	10.4	10.7	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.245835	36.0	9.000	L1	10.2	15.9	51.9	Compliance
0.399703	33.5	9.000	L1	10.2	14.4	47.9	Compliance
0.536756	31.7	9.000	L1	10.1	14.3	46.0	Compliance
0.858911	31.8	9.000	L1	10.4	14.2	46.0	Compliance
1.048242	33.3	9.000	L1	10.4	12.7	46.0	Compliance
1.259081	32.3	9.000	L1	10.4	13.7	46.0	Compliance

AC120 V, 60 Hz, Neutral:

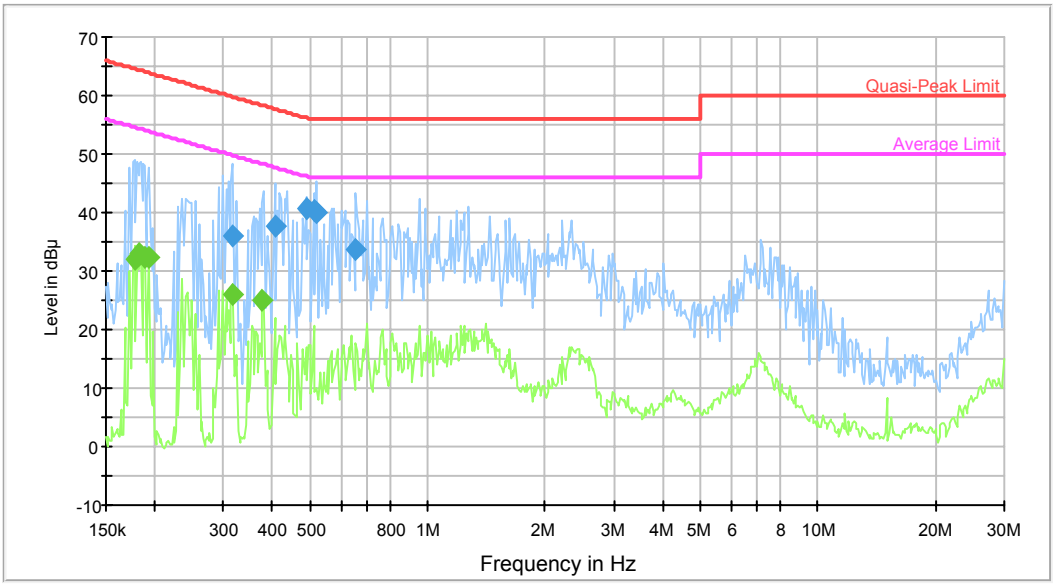


Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.738241	41.6	9.000	N	10.4	14.4	56.0	Compliance
0.858911	43.4	9.000	N	10.3	12.6	56.0	Compliance
0.886728	43.3	9.000	N	10.4	12.7	56.0	Compliance
0.900972	44.8	9.000	N	10.4	11.2	56.0	Compliance
1.023481	43.6	9.000	N	10.4	12.4	56.0	Compliance
1.039922	44.4	9.000	N	10.4	11.6	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.443327	27.0	9.000	N	10.1	20.0	47.0	Compliance
0.549741	26.7	9.000	N	10.1	19.3	46.0	Compliance
0.676289	26.7	9.000	N	10.4	19.3	46.0	Compliance
0.908180	30.5	9.000	N	10.4	15.5	46.0	Compliance
1.209904	30.2	9.000	N	10.4	15.8	46.0	Compliance
1.289541	28.3	9.000	N	10.4	17.7	46.0	Compliance

Adapter #2

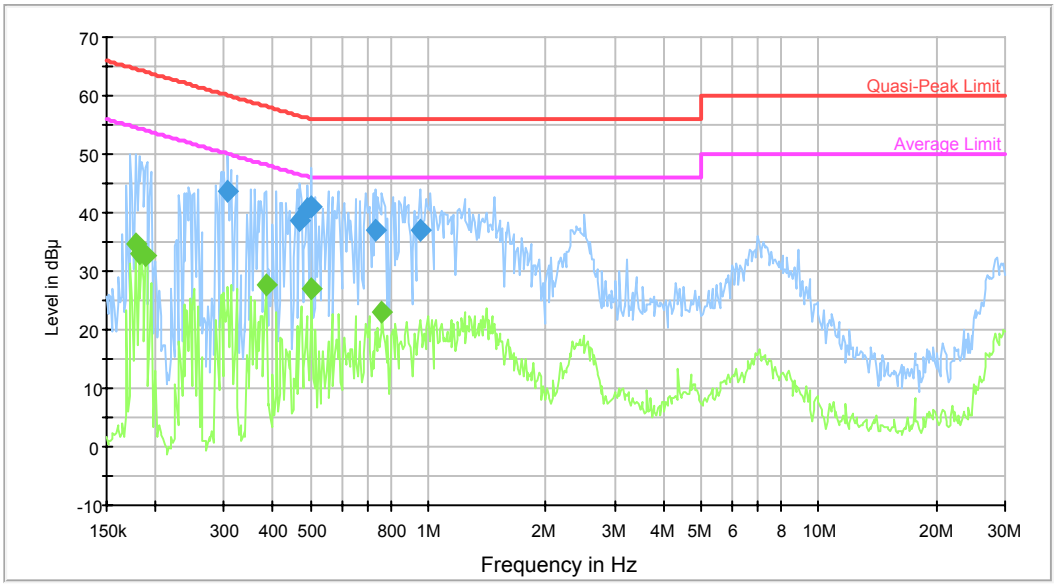
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.317235	36.1	9.000	L1	10.3	23.7	59.8	Compliance
0.406123	37.6	9.000	L1	10.2	20.1	57.7	Compliance
0.487810	40.6	9.000	L1	10.1	15.6	56.2	Compliance
0.511698	40.3	9.000	L1	10.1	15.7	56.0	Compliance
0.519918	39.9	9.000	L1	10.1	16.1	56.0	Compliance
0.655073	33.7	9.000	L1	10.4	22.3	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.177322	31.9	9.000	L1	10.1	22.7	54.6	Compliance
0.183065	32.9	9.000	L1	10.2	21.4	54.3	Compliance
0.188994	32.4	9.000	L1	10.2	21.7	54.1	Compliance
0.193566	32.3	9.000	L1	10.2	21.6	53.9	Compliance
0.317235	26.0	9.000	L1	10.3	23.8	49.8	Compliance
0.378019	25.1	9.000	L1	10.2	23.2	48.3	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.307284	43.7	9.000	N	10.3	16.3	60.0	Compliance
0.468757	38.7	9.000	N	10.1	17.8	56.5	Compliance
0.491712	40.7	9.000	N	10.1	15.4	56.1	Compliance
0.503608	41.0	9.000	N	10.1	15.0	56.0	Compliance
0.732382	36.9	9.000	N	10.4	19.1	56.0	Compliance
0.952654	37.0	9.000	N	10.4	19.0	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.177322	34.6	9.000	N	10.1	20.0	54.6	Compliance
0.181612	33.0	9.000	N	10.1	21.4	54.4	Compliance
0.188994	32.7	9.000	N	10.2	21.4	54.1	Compliance
0.384091	27.7	9.000	N	10.2	20.5	48.2	Compliance
0.503608	27.0	9.000	N	10.1	19.0	46.0	Compliance
0.762149	23.0	9.000	N	10.4	23.0	46.0	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.

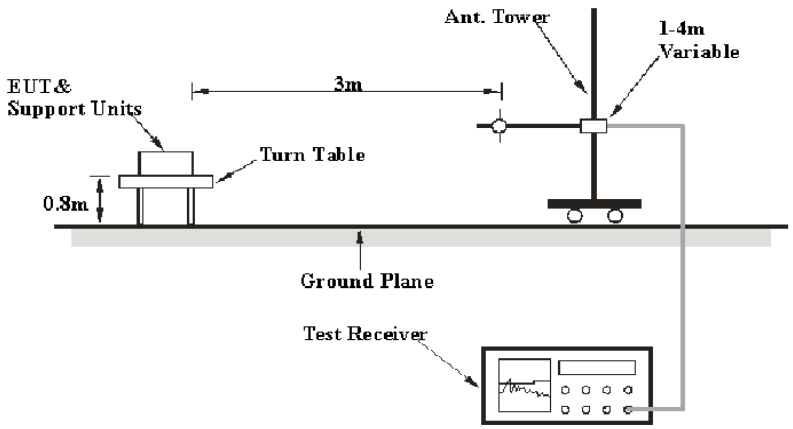
Based on CISPR 16-4-2-2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical; 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical; 1G~6GHz: 4.45 dB, 6G~18GHz: 5.23 dB

Table 2 – Values of U_{cispr}

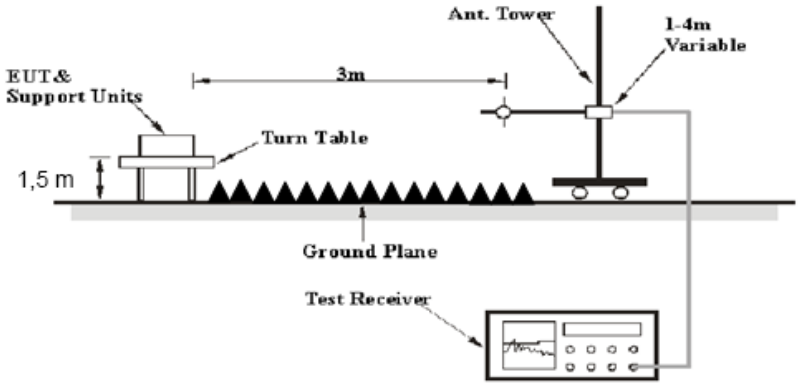
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. 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:

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

Test Procedure

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

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

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna 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
R&S	EMI Test Receiver	ESCI	100224	2015-08-03	2016-08-02
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2015-09-01	2016-09-01
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
ETS-Lindgren	Horn Antenna	3115	9808-5557	2015-09-06	2018-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2016-02-19	2017-02-19
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2015-09-06	2016-09-06
N/A	Coaxial Cable	14m	N/A	2016-05-06	2017-05-06
N/A	Coaxial Cable	8m	N/A	2016-05-06	2017-05-06
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

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

Test Data

Environmental Conditions

Temperature:	27.5°C
Relative Humidity:	53 %
ATM Pressure:	100.5 kPa

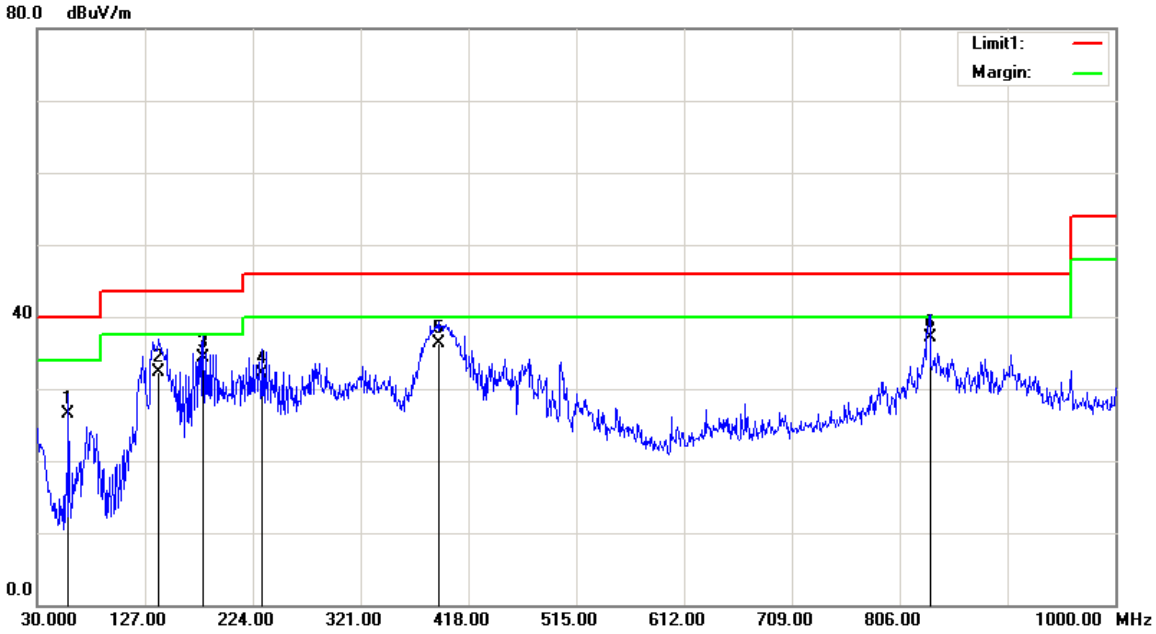
** The testing was performed by Rocky Xiao on 2016-07-21.*

Test Mode: Transmitting

1) Below 1GHz(per pretest, 802.11b mode low channel was the worst**):**

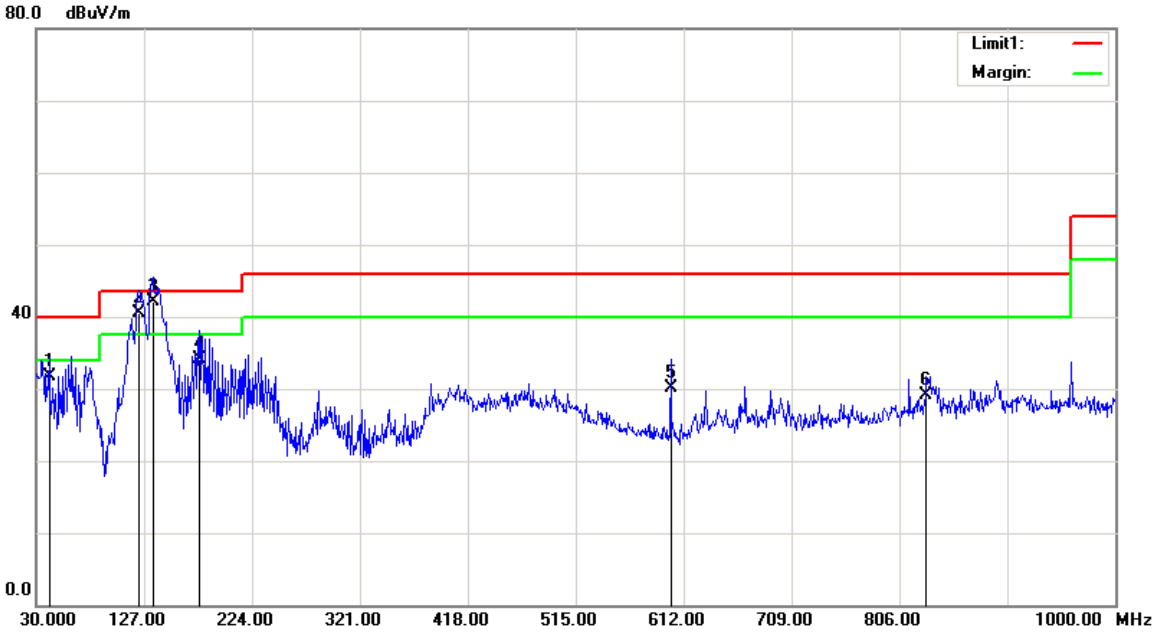
Adapter #1

Horizontal



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
58.1300	39.70	QP	-13.10	26.60	40.00	13.40
139.6100	38.90	QP	-6.60	32.30	43.50	11.20
179.3800	42.60	QP	-8.30	34.30	43.50	9.20
232.7300	40.16	QP	-7.96	32.20	46.00	13.80
391.8100	40.19	QP	-3.89	36.30	46.00	9.70
833.1600	33.72	QP	3.38	37.10	46.00	8.90

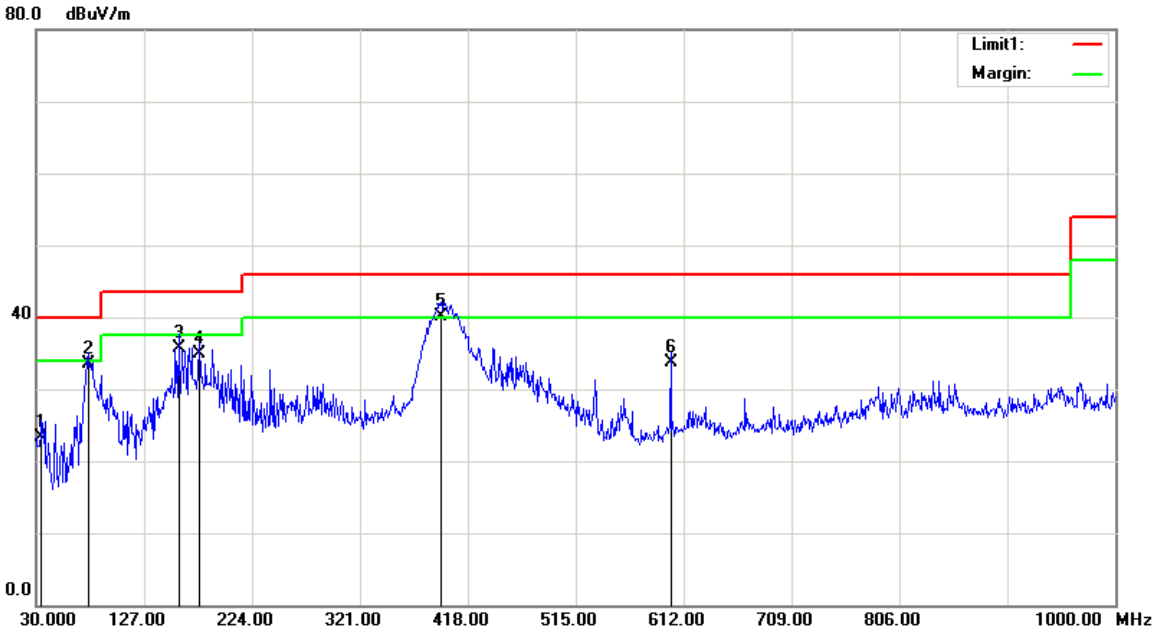
Vertical



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
41.6400	39.45	QP	-7.65	31.80	40.00	8.20
122.1500	46.11	QP	-5.51	40.60	43.50	2.90
134.7600	48.15	QP	-6.05	42.10	43.50	1.40
176.4700	42.29	QP	-8.19	34.10	43.50	9.40
600.3600	30.87	QP	-0.67	30.20	46.00	15.80
830.2500	25.72	QP	3.38	29.10	46.00	16.90

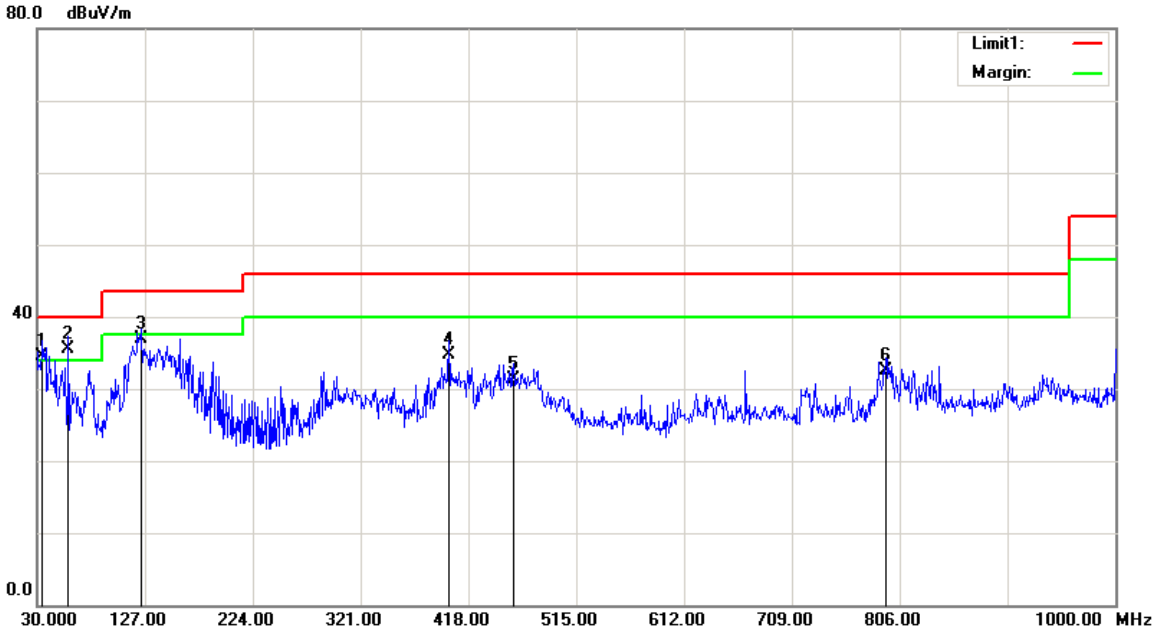
Adapter #2

Horizontal



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
34.8500	26.03	QP	-2.63	23.40	40.00	16.60
76.5600	45.54	QP	-11.94	33.60	40.00	6.40
158.0400	42.89	QP	-7.09	35.80	43.50	7.70
176.4700	43.09	QP	-8.19	34.90	43.50	8.60
393.7500	43.91	QP	-3.81	40.10	46.00	5.90
600.3600	34.37	QP	-0.67	33.70	46.00	12.30

Vertical



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
34.8500	37.13	QP	-2.63	34.50	40.00	5.50
58.1300	48.70	QP	-13.10	35.60	40.00	4.40
123.1200	42.40	QP	-5.50	36.90	43.50	6.60
400.5400	38.27	QP	-3.57	34.70	46.00	11.30
458.7400	33.49	QP	-2.19	31.30	46.00	14.70
793.3900	29.53	QP	2.97	32.50	46.00	13.50

2) 1-25GHz(Adapter #1 was used for above 1GHz test)**:**

802.11b 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	65.61	PK	H	25.67	3.68	0.00	94.96	N/A	N/A
2412	61.29	AV	H	25.67	3.68	0.00	90.64	N/A	N/A
2412	59.08	PK	V	25.67	3.68	0.00	88.43	N/A	N/A
2412	54.08	AV	V	25.67	3.68	0.00	83.43	N/A	N/A
2390	26.94	PK	H	25.61	3.63	0.00	56.18	74.00	17.82
2390	14.36	AV	H	25.61	3.63	0.00	43.60	54.00	10.40
4824	35.75	PK	H	30.64	5.03	27.41	44.01	74.00	29.99
4824	23.46	AV	H	30.64	5.03	27.41	31.72	54.00	22.28
7236	32.81	PK	H	34.17	6.65	25.90	47.73	74.00	26.27
7236	20.58	AV	H	34.17	6.65	25.90	35.50	54.00	18.50
3670	34.68	PK	H	29.17	4.57	27.31	41.11	74.00	32.89
3670	12.37	AV	H	29.17	4.57	27.31	18.80	54.00	35.20
Middle Channel: 2437 MHz									
2437	64.62	PK	H	25.74	3.75	0.00	94.11	N/A	N/A
2437	60.14	AV	H	25.74	3.75	0.00	89.63	N/A	N/A
2437	58.57	PK	V	25.74	3.75	0.00	88.06	N/A	N/A
2437	53.3	AV	V	25.74	3.75	0.00	82.79	N/A	N/A
4874	32.85	PK	H	30.77	5.14	27.42	41.34	74.00	32.66
4874	21.05	AV	H	30.77	5.14	27.42	29.54	54.00	24.46
7311	33.97	PK	H	34.35	6.74	25.88	49.18	74.00	24.82
7311	21.79	AV	H	34.35	6.74	25.88	37.00	54.00	17.00
3670	34.52	PK	H	29.17	4.57	27.31	40.95	74.00	33.05
3670	22.46	AV	H	29.17	4.57	27.31	28.89	54.00	25.11
6601	35.45	PK	H	32.56	6.19	26.58	47.62	74.00	26.38
6601	22.94	AV	H	32.56	6.19	26.58	35.11	54.00	18.89
High Channel: 2462 MHz									
2462	63.31	PK	H	25.80	3.75	0.00	92.86	N/A	N/A
2462	58.77	AV	H	25.80	3.75	0.00	88.32	N/A	N/A
2462	57.68	PK	V	25.80	3.75	0.00	87.23	N/A	N/A
2462	52.14	AV	V	25.80	3.75	0.00	81.69	N/A	N/A
2483.5	27.81	PK	H	25.86	3.67	0.00	57.34	74.00	16.66
2483.5	14.36	AV	H	25.86	3.67	0.00	43.89	54.00	10.11
4924	34.54	PK	H	30.90	5.34	27.43	43.35	74.00	30.65
4924	22.18	AV	H	30.90	5.34	27.43	30.99	54.00	23.01
7386	32.73	PK	H	34.53	6.83	25.86	48.23	74.00	25.77
7386	20.41	AV	H	34.53	6.83	25.86	35.91	54.00	18.09
3670	33.17	PK	H	29.17	4.57	27.31	39.60	74.00	34.40
3670	20.93	AV	H	29.17	4.57	27.31	27.36	54.00	26.64

802.11g 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	66.46	PK	H	25.67	3.68	0.00	95.81	N/A	N/A
2412	57.24	AV	H	25.67	3.68	0.00	86.59	N/A	N/A
2412	57.04	PK	V	25.67	3.68	0.00	86.39	N/A	N/A
2412	47.96	AV	V	25.67	3.68	0.00	77.31	N/A	N/A
2390	27.14	PK	H	25.61	3.63	0.00	56.38	74.00	17.62
2390	14.36	AV	H	25.61	3.63	0.00	43.60	54.00	10.40
4824	33.18	PK	H	30.64	5.03	27.41	41.44	74.00	32.56
4824	21.21	AV	H	30.64	5.03	27.41	29.47	54.00	24.53
7236	33.63	PK	H	34.17	6.65	25.90	48.55	74.00	25.45
7236	21.57	AV	H	34.17	6.65	25.90	36.49	54.00	17.51
3670	34.36	PK	H	29.17	4.57	27.31	40.79	74.00	33.21
3670	22.21	AV	H	29.17	4.57	27.31	28.64	54.00	25.36
Middle Channel: 2437 MHz									
2437	65.69	PK	H	25.74	3.75	0.00	95.18	N/A	N/A
2437	56.29	AV	H	25.74	3.75	0.00	85.78	N/A	N/A
2437	57.06	PK	V	25.74	3.75	0.00	86.55	N/A	N/A
2437	47.94	AV	V	25.74	3.75	0.00	77.43	N/A	N/A
4874	33.02	PK	H	30.77	5.14	27.42	41.51	74.00	32.49
4874	20.97	AV	H	30.77	5.14	27.42	29.46	54.00	24.54
7311	33.70	PK	H	34.35	6.74	25.88	48.91	74.00	25.09
7311	21.69	AV	H	34.35	6.74	25.88	36.90	54.00	17.10
3670	34.37	PK	H	29.17	4.57	27.31	40.80	74.00	33.20
3670	22.17	AV	H	29.17	4.57	27.31	28.60	54.00	25.40
6601	35.27	PK	H	32.56	6.19	26.58	47.44	74.00	26.56
6601	22.97	AV	H	32.56	6.19	26.58	35.14	54.00	18.86
High Channel: 2462 MHz									
2462	64.85	PK	H	25.80	3.75	0.00	94.40	N/A	N/A
2462	55.16	AV	H	25.80	3.75	0.00	84.71	N/A	N/A
2462	56.85	PK	V	25.80	3.75	0.00	86.40	N/A	N/A
2462	47.56	AV	V	25.80	3.75	0.00	77.11	N/A	N/A
2483.5	27.47	PK	H	25.86	3.67	0.00	57.00	74.00	17.00
2483.5	15.06	AV	H	25.86	3.67	0.00	44.59	54.00	9.41
4924	33.16	PK	H	30.90	5.34	27.43	41.97	74.00	32.03
4924	21.08	AV	H	30.90	5.34	27.43	29.89	54.00	24.11
7386	33.46	PK	H	34.53	6.83	25.86	48.96	74.00	25.04
7386	21.37	AV	H	34.53	6.83	25.86	36.87	54.00	17.13
3670	34.15	PK	H	29.17	4.57	27.31	40.58	74.00	33.42
3670	22.11	AV	H	29.17	4.57	27.31	28.54	54.00	25.46

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	65.33	PK	H	25.67	3.68	0.00	94.68	N/A	N/A
2412	55.66	AV	H	25.67	3.68	0.00	85.01	N/A	N/A
2412	56.63	PK	V	25.67	3.68	0.00	85.98	N/A	N/A
2412	47.12	AV	V	25.67	3.68	0.00	76.47	N/A	N/A
2390	27.48	PK	H	25.61	3.63	0.00	56.72	74.00	17.28
2390	14.36	AV	H	25.61	3.63	0.00	43.60	54.00	10.40
4824	32.95	PK	H	30.64	5.03	27.41	41.21	74.00	32.79
4824	20.69	AV	H	30.64	5.03	27.41	28.95	54.00	25.05
7236	33.7	PK	H	34.17	6.65	25.90	48.62	74.00	25.38
7236	21.65	AV	H	34.17	6.65	25.90	36.57	54.00	17.43
3670	34.14	PK	H	29.17	4.57	27.31	40.57	74.00	33.43
3670	21.95	AV	H	29.17	4.57	27.31	28.38	54.00	25.62
Middle Channel: 2437 MHz									
2437	67.91	PK	H	25.74	3.75	0.00	97.40	N/A	N/A
2437	58.34	AV	H	25.74	3.75	0.00	87.83	N/A	N/A
2437	56.31	PK	V	25.74	3.75	0.00	85.80	N/A	N/A
2437	47.14	AV	V	25.74	3.75	0.00	76.63	N/A	N/A
4874	33.13	PK	H	30.77	5.14	27.42	41.62	74.00	32.38
4874	20.86	AV	H	30.77	5.14	27.42	29.35	54.00	24.65
7311	33.78	PK	H	34.35	6.74	25.88	48.99	74.00	25.01
7311	21.74	AV	H	34.35	6.74	25.88	36.95	54.00	17.05
3670	34.35	PK	H	29.17	4.57	27.31	40.78	74.00	33.22
3670	22.45	AV	H	29.17	4.57	27.31	28.88	54.00	25.13
6601	35.13	PK	H	32.56	6.19	26.58	47.30	74.00	26.70
6601	22.75	AV	H	32.56	6.19	26.58	34.92	54.00	19.08
High Channel: 2462 MHz									
2462	70.12	PK	H	25.80	3.75	0.00	99.67	N/A	N/A
2462	60.76	AV	H	25.80	3.75	0.00	90.31	N/A	N/A
2462	55.79	PK	V	25.80	3.75	0.00	85.34	N/A	N/A
2462	47.13	AV	V	25.80	3.75	0.00	76.68	N/A	N/A
2483.5	36.12	PK	H	25.86	3.67	0.00	65.65	74.00	8.35
2483.5	17.89	AV	H	25.86	3.67	0.00	47.42	54.00	6.58
4924	32.46	PK	H	30.90	5.34	27.43	41.27	74.00	32.73
4924	20.15	AV	H	30.90	5.34	27.43	28.96	54.00	25.04
7386	33.32	PK	H	34.53	6.83	25.86	48.82	74.00	25.18
7386	21.28	AV	H	34.53	6.83	25.86	36.78	54.00	17.22
3670	33.43	PK	H	29.17	4.57	27.31	39.86	74.00	34.14
3670	21.19	AV	H	29.17	4.57	27.31	27.62	54.00	26.38

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	62.62	PK	H	25.70	3.71	0.00	92.03	N/A	N/A
2422	52.95	AV	H	25.70	3.71	0.00	82.36	N/A	N/A
2422	54.13	PK	V	25.70	3.71	0.00	83.54	N/A	N/A
2422	44.87	AV	V	25.70	3.71	0.00	74.28	N/A	N/A
2390	28.52	PK	H	25.61	3.63	0.00	57.76	74.00	16.24
2390	14.96	AV	H	25.61	3.63	0.00	44.20	54.00	9.80
4844	32.76	PK	H	30.69	4.99	27.42	41.02	74.00	32.98
4844	20.55	AV	H	30.69	4.99	27.42	28.81	54.00	25.19
7266	33.45	PK	H	34.24	6.68	25.89	48.48	74.00	25.52
7266	21.43	AV	H	34.24	6.68	25.89	36.46	54.00	17.54
3670	33.71	PK	H	29.17	4.57	27.31	40.14	74.00	33.86
3670	21.69	AV	H	29.17	4.57	27.31	28.12	54.00	25.88
Middle Channel: 2437 MHz									
2437	61.9	PK	H	25.74	3.75	0.00	91.39	N/A	N/A
2437	52.21	AV	H	25.74	3.75	0.00	81.70	N/A	N/A
2437	53.09	PK	V	25.74	3.75	0.00	82.58	N/A	N/A
2437	43.93	AV	V	25.74	3.75	0.00	73.42	N/A	N/A
4874	32.87	PK	H	30.77	5.14	27.42	41.36	74.00	32.64
4874	20.84	AV	H	30.77	5.14	27.42	29.33	54.00	24.67
7311	33.52	PK	H	34.35	6.74	25.88	48.73	74.00	25.27
7311	21.51	AV	H	34.35	6.74	25.88	36.72	54.00	17.28
3670	34.13	PK	H	29.17	4.57	27.31	40.56	74.00	33.44
3670	21.86	AV	H	29.17	4.57	27.31	28.29	54.00	25.71
6601	35.01	PK	H	32.56	6.19	26.58	47.18	74.00	26.82
6601	22.65	AV	H	32.56	6.19	26.58	34.82	54.00	19.18
High Channel: 2452 MHz									
2452	60.82	PK	H	25.78	3.78	0.00	90.38	N/A	N/A
2452	51.26	AV	H	25.78	3.78	0.00	80.82	N/A	N/A
2452	51.83	PK	V	25.78	3.78	0.00	81.39	N/A	N/A
2452	42.66	AV	V	25.78	3.78	0.00	72.22	N/A	N/A
2483.5	35.12	PK	H	25.86	3.67	0.00	64.65	74.00	9.35
2483.5	17.88	AV	H	25.86	3.67	0.00	47.41	54.00	6.59
4904	32.83	PK	H	30.85	5.31	27.43	41.56	74.00	32.44
4904	20.66	AV	H	30.85	5.31	27.43	29.39	54.00	24.61
7356	33.55	PK	H	34.45	6.79	25.87	48.92	74.00	25.08
7356	21.49	AV	H	34.45	6.79	25.87	36.86	54.00	17.14
3670	33.89	PK	H	29.17	4.57	27.31	40.32	74.00	33.68
3670	21.75	AV	H	29.17	4.57	27.31	28.18	54.00	25.82

BLE 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: 2402 MHz									
2402	64.72	PK	H	25.65	3.66	0.00	94.03	N/A	N/A
2402	49.36	AV	H	25.65	3.66	0.00	78.67	N/A	N/A
2402	53.34	PK	V	25.65	3.66	0.00	82.65	N/A	N/A
2402	38.03	AV	V	25.65	3.66	0.00	67.34	N/A	N/A
2390	25.32	PK	H	25.61	3.63	0.00	54.56	74.00	19.44
2390	13.56	AV	H	25.61	3.63	0.00	42.80	54.00	11.20
4804	31.59	PK	H	30.59	5.06	27.41	39.83	74.00	34.17
4804	18.79	AV	H	30.59	5.06	27.41	27.03	54.00	26.97
7206	30.95	PK	H	34.09	6.61	25.91	45.74	74.00	28.26
7206	18.46	AV	H	34.09	6.61	25.91	33.25	54.00	20.75
3190	33.04	PK	H	27.81	6.26	27.38	39.73	74.00	34.27
3190	20.71	AV	H	27.81	6.26	27.38	27.40	54.00	26.60
Middle Channel: 2440 MHz									
2440	63.92	PK	H	25.74	3.76	0.00	93.42	N/A	N/A
2440	48.6	AV	H	25.74	3.76	0.00	78.10	N/A	N/A
2440	52.39	PK	V	25.74	3.76	0.00	81.89	N/A	N/A
2440	37.56	AV	V	25.74	3.76	0.00	67.06	N/A	N/A
4880	31.64	PK	H	30.79	5.18	27.42	40.19	74.00	33.81
4880	18.99	AV	H	30.79	5.18	27.42	27.54	54.00	26.46
7320	31.03	PK	H	34.37	6.75	25.88	46.27	74.00	27.73
7320	18.56	AV	H	34.37	6.75	25.88	33.80	54.00	20.20
2950	33.25	PK	H	27.07	6.61	27.54	39.39	74.00	34.61
2935	20.95	AV	H	27.03	6.40	27.54	26.84	54.00	27.16
3190	32.15	PK	H	27.81	6.26	27.38	38.84	74.00	35.16
3190	20.01	AV	H	27.81	6.26	27.38	26.70	54.00	27.30
High Channel: 2480 MHz									
2480	62.89	PK	H	25.85	3.68	0.00	92.42	N/A	N/A
2480	47.57	AV	H	25.85	3.68	0.00	77.10	N/A	N/A
2480	51.39	PK	V	25.85	3.68	0.00	80.92	N/A	N/A
2480	36.86	AV	V	25.85	3.68	0.00	66.39	N/A	N/A
2483.5	26.27	PK	H	25.86	3.67	0.00	55.80	74.00	18.20
2483.5	13.94	AV	H	25.86	3.67	0.00	43.47	54.00	10.53
4960	31.63	PK	H	31.00	5.34	27.43	40.54	74.00	33.46
4960	18.91	AV	H	31.00	5.34	27.43	27.82	54.00	26.18
7440	31.12	PK	H	34.66	6.89	25.97	46.70	74.00	27.30
7440	18.6	AV	H	34.66	6.89	25.97	34.18	54.00	19.82
3190	33.14	PK	H	27.81	6.26	27.38	39.83	74.00	34.17
3190	20.83	AV	H	27.81	6.26	27.38	27.52	54.00	26.48

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
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

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

Test Data

Environmental Conditions

Temperature:	28.4 – 31.4 °C
Relative Humidity:	40 - 60 %
ATM Pressure:	99.9 – 100.3 kPa

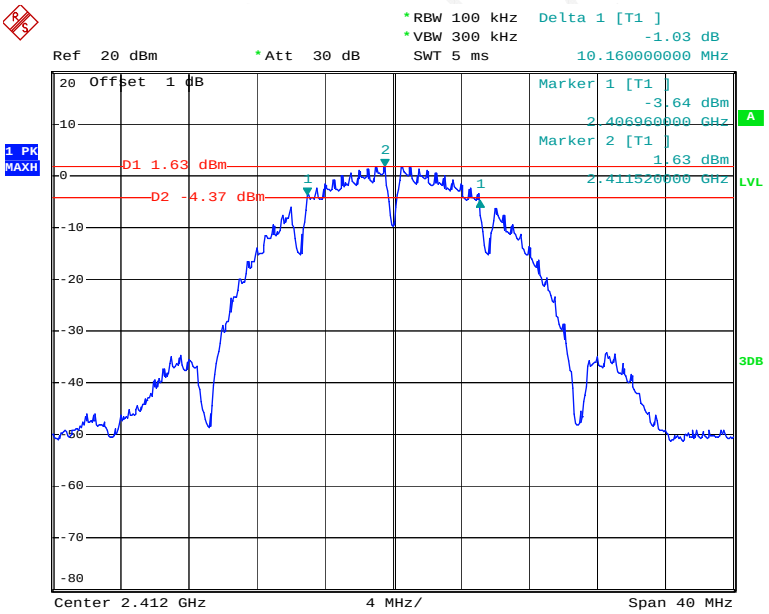
** The testing was performed by Rocky Xiao from 2016-07-03 to 2016-07-07.*

Test Mode: Transmitting

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

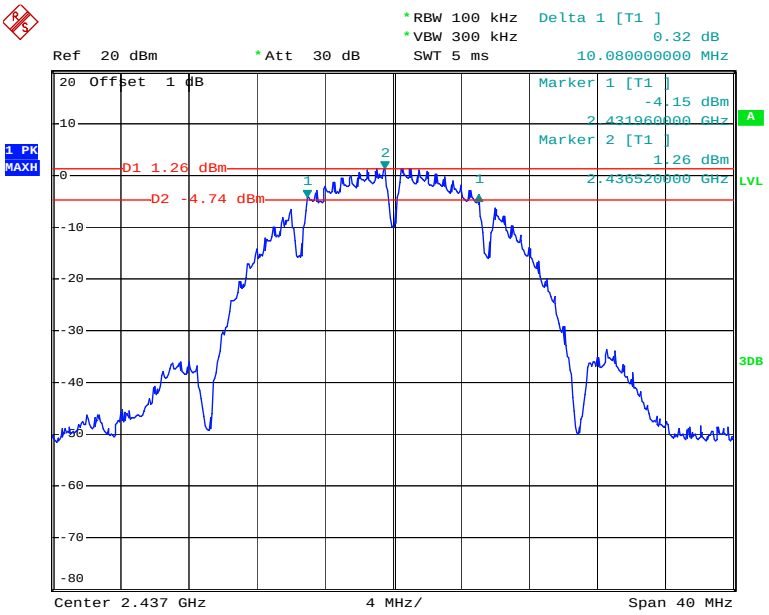
Test mode	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	10.16	≥0.5
	Middle	2437	10.08	≥0.5
	High	2462	10.16	≥0.5
802.11g	Low	2412	16.64	≥0.5
	Middle	2437	16.64	≥0.5
	High	2462	16.64	≥0.5
802.11n20	Low	2412	17.92	≥0.5
	Middle	2437	17.84	≥0.5
	High	2462	17.84	≥0.5
802.11n40	Low	2422	36.64	≥0.5
	Middle	2437	36.64	≥0.5
	High	2452	36.64	≥0.5
BLE	Low	2402	0.72	≥0.5
	Middle	2440	0.64	≥0.5
	High	2480	0.73	≥0.5

802.11b Low Channel



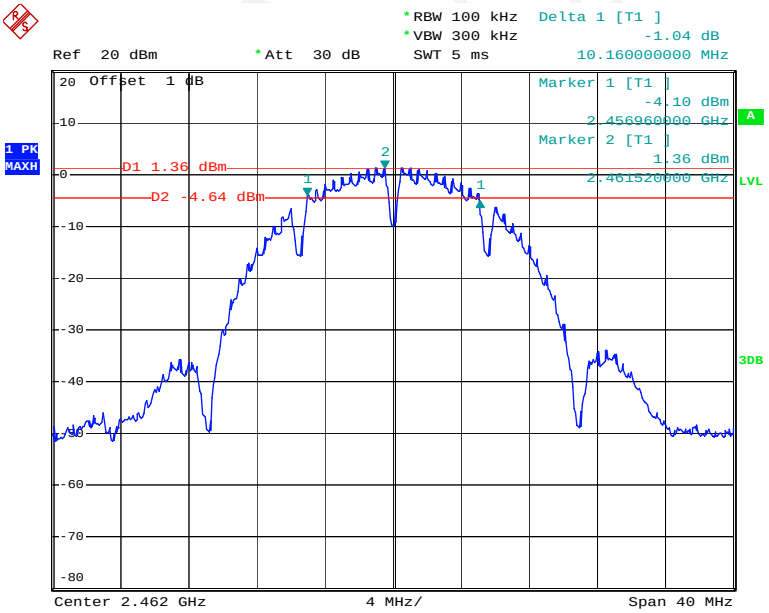
Date: 3.JUL.2016 01:07:35

802.11b Middle Channel



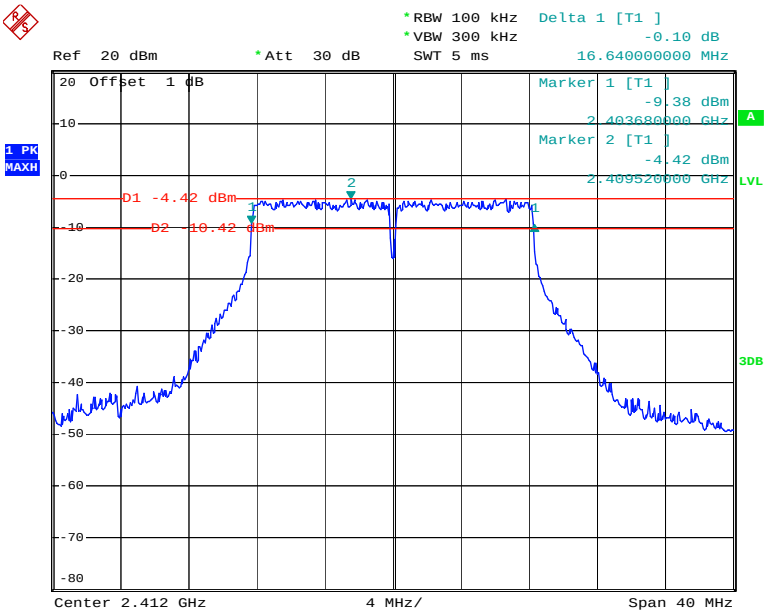
Date: 3.JUL.2016 01:11:50

802.11b High Channel



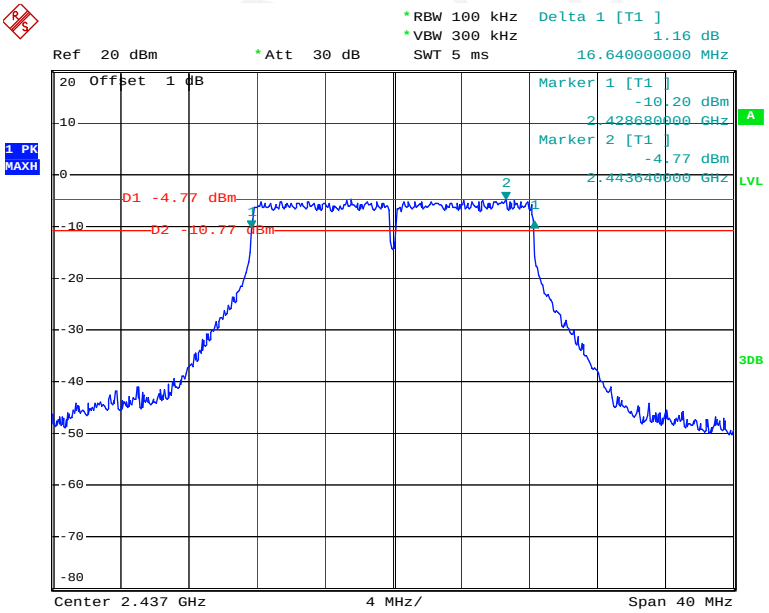
Date: 3.JUL.2016 01:14:27

802.11g Low Channel



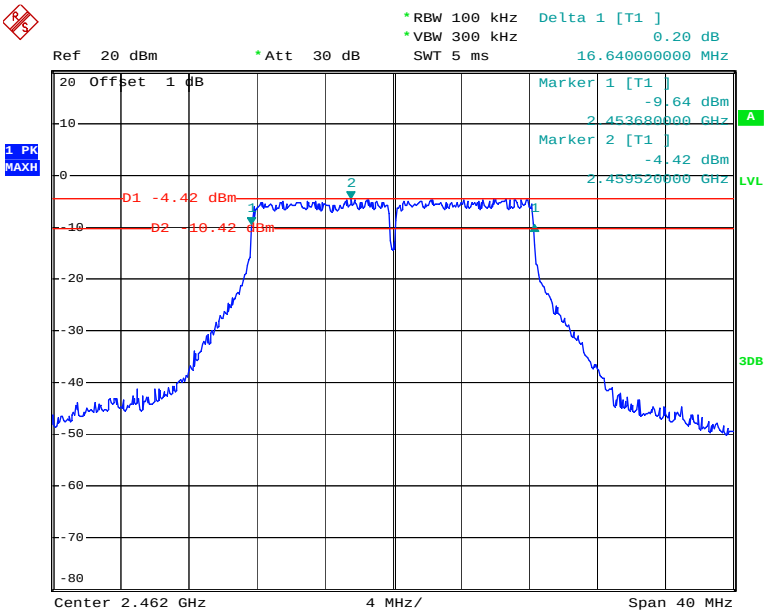
Date: 4.JUL.2016 20:34:12

802.11g Middle Channel



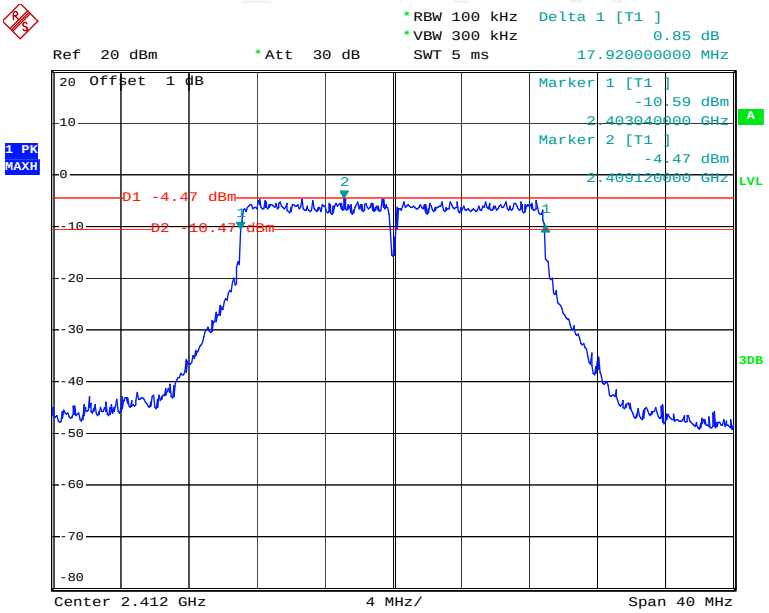
Date: 4.JUL.2016 20:36:52

802.11g High Channel



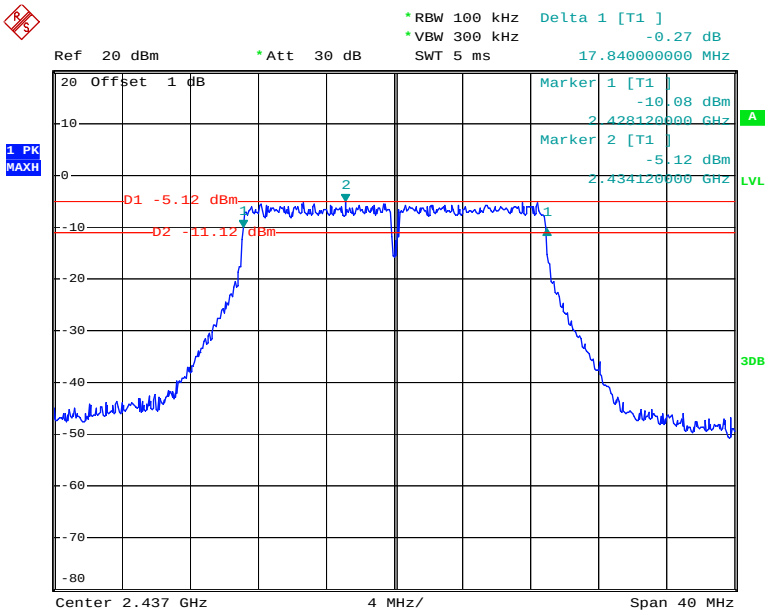
Date: 4.JUL.2016 20:39:35

802.11n ht20 Low Channel



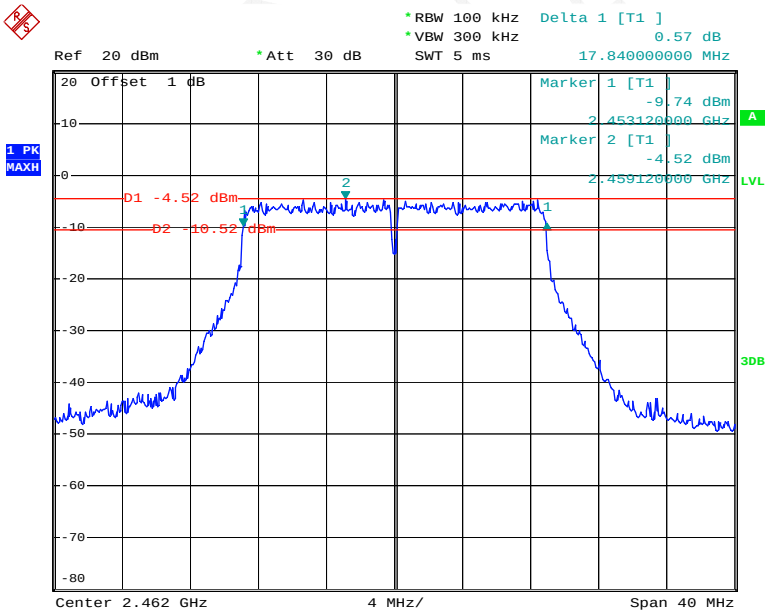
Date: 4.JUL.2016 20:42:41

802.11n ht20 Middle Channel



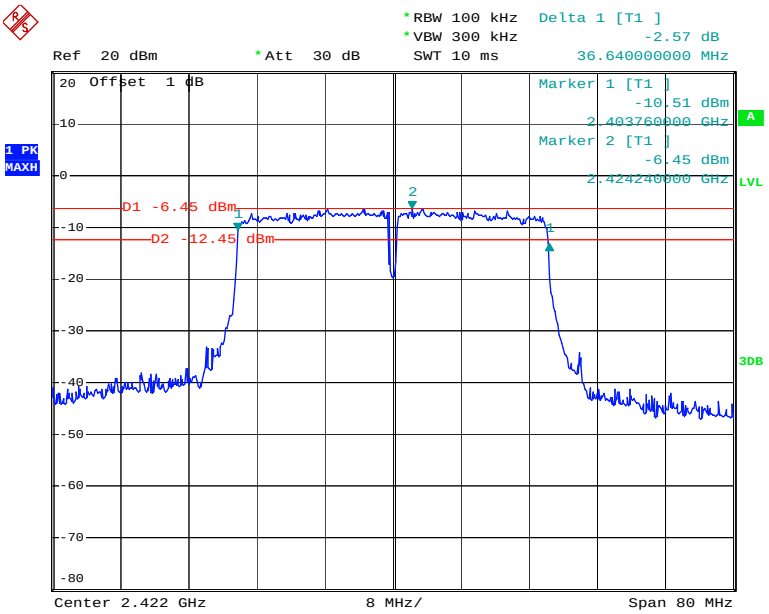
Date: 4.JUL.2016 20:45:01

802.11n ht20 High Channel



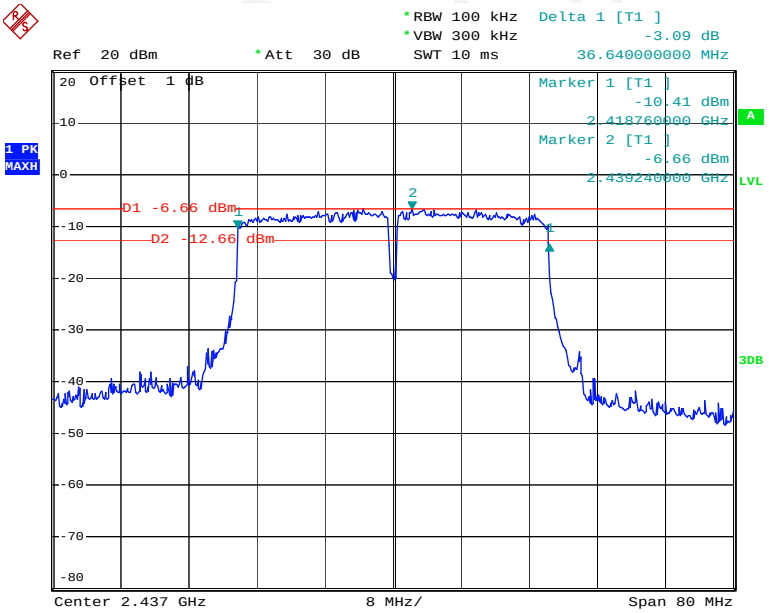
Date: 4.JUL.2016 20:47:08

802.11n ht40 Low Channel



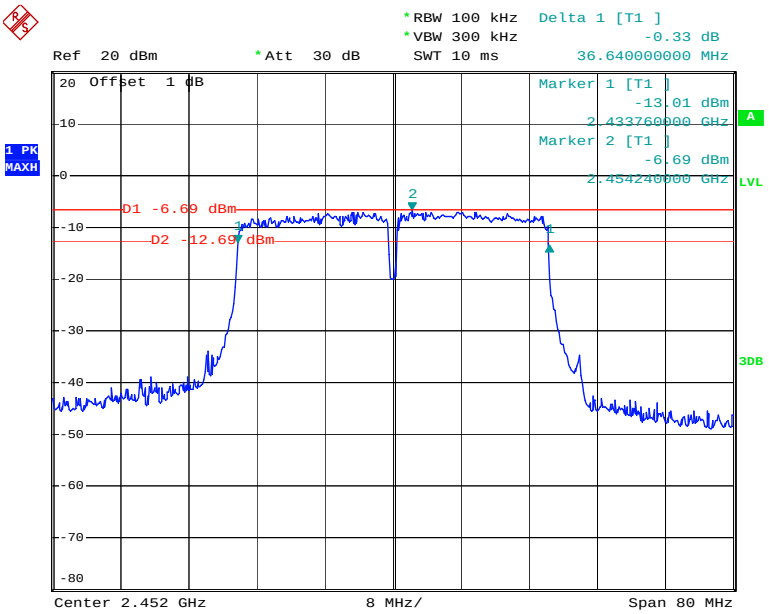
Date: 4.JUL.2016 20:49:51

802.11n ht40 Middle Channel



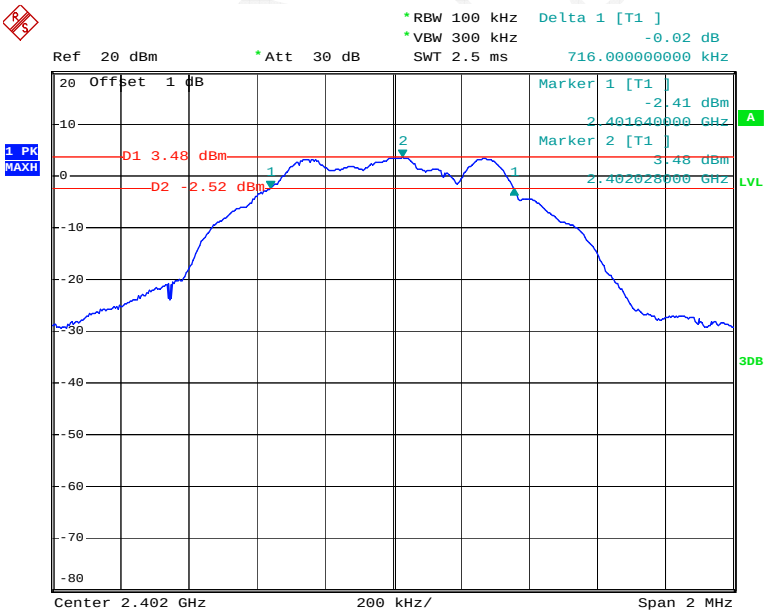
Date: 4.JUL.2016 20:53:05

802.11n ht40 High Channel



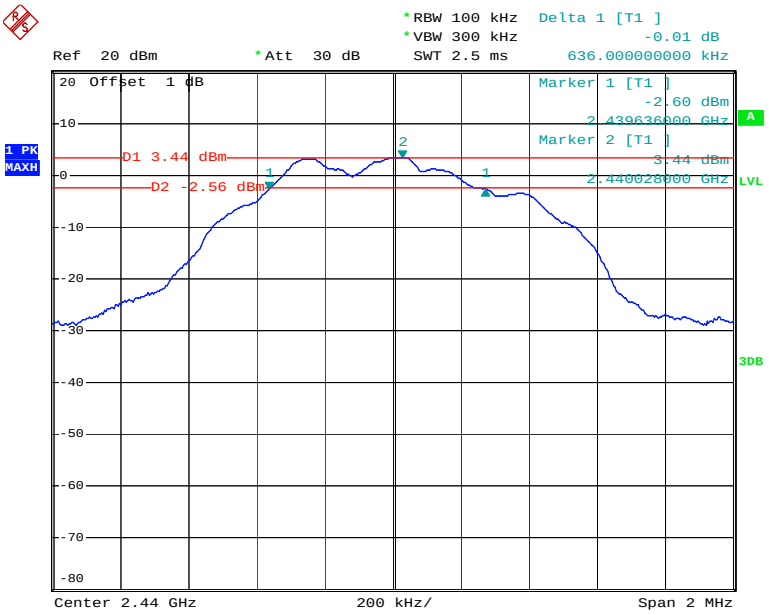
Date: 4.JUL.2016 20:55:47

BLE Low Channel



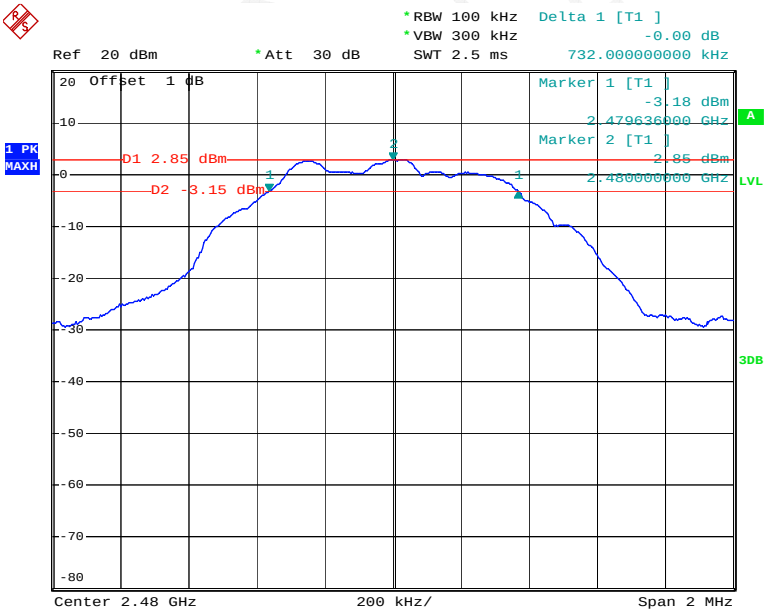
Date: 7.JUL.2016 13:16:04

BLE Middle Channel



Date: 7.JUL.2016 13:18:44

BLE High Channel



Date: 7.JUL.2016 13:19:51

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	MY54210016	2015-11-03	2016-11-03
Agilent	Wideband Power Sensor	N1921A	MY54170013	2015-11-03	2016-11-03
Agilent	P-Series Power Meter	N1912A	MY5000448	2015-11-03	2016-11-03
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

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

Test Data

Environmental Conditions

Temperature:	30.2 °C
Relative Humidity:	52 %
ATM Pressure:	100 kPa

** The testing was performed by Rocky Xiao on 2016-07-07.*

Test Mode: Transmitting

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

Test mode	Channel	Frequency	Max Peak Conducted Output Power	Max Conducted Average Output Power	Limit
		(MHz)	(dBm)	(dBm)	(dBm)
802.11b	Low	2412	15.79	14.88	30
	Middle	2437	15.42	14.54	30
	High	2462	15.51	14.6	30
802.11g	Low	2412	16.77	13.32	30
	Middle	2437	16.29	12.92	30
	High	2462	16.59	13.12	30
802.11n20	Low	2412	16.22	12.62	30
	Middle	2437	15.93	12.41	30
	High	2462	16.36	12.82	30
802.11n40	Low	2422	18.5	12.24	30
	Middle	2437	18.22	11.99	30
	High	2452	18.02	11.83	30
BLE	Low	2402	4.5	/	30
	Middle	2440	4.56	/	30
	High	2480	4.01	/	30

FINAL

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
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

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

Test Data

Environmental Conditions

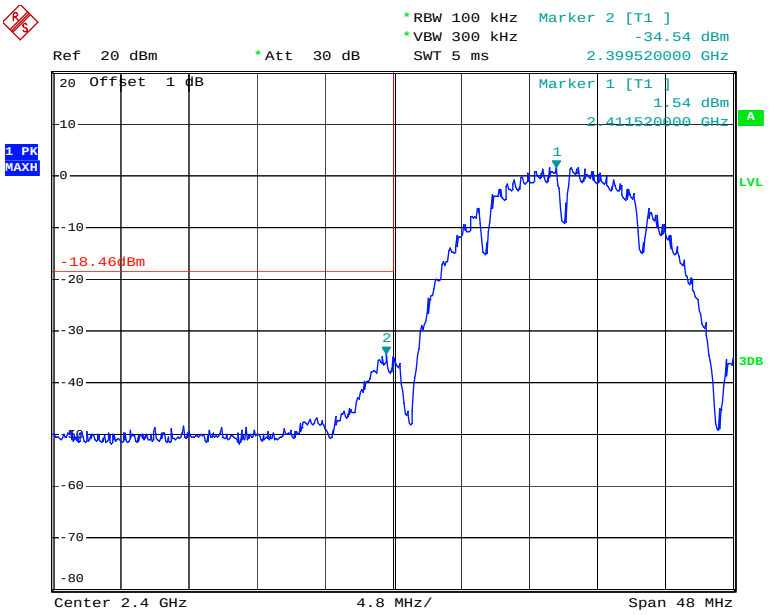
Temperature:	28.4 – 31.4°C
Relative Humidity:	40 - 60 %
ATM Pressure:	99.9 – 100.3 kPa

** The testing was performed by Rocky Xiao from 2016-07-03 to 2016-07-07.*

Test mode: Transmitting

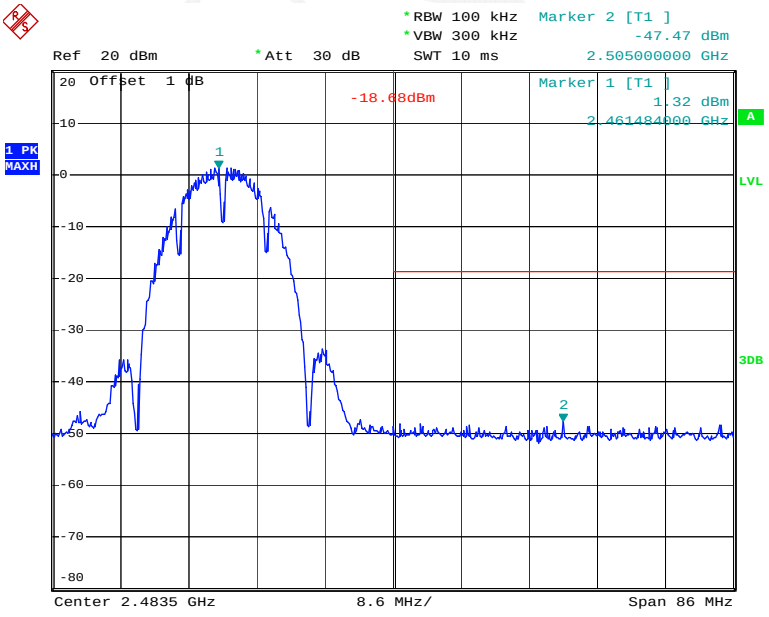
Test Result: Compliant. Please refer to following plots.

802.11b: Band Edge, Left Side



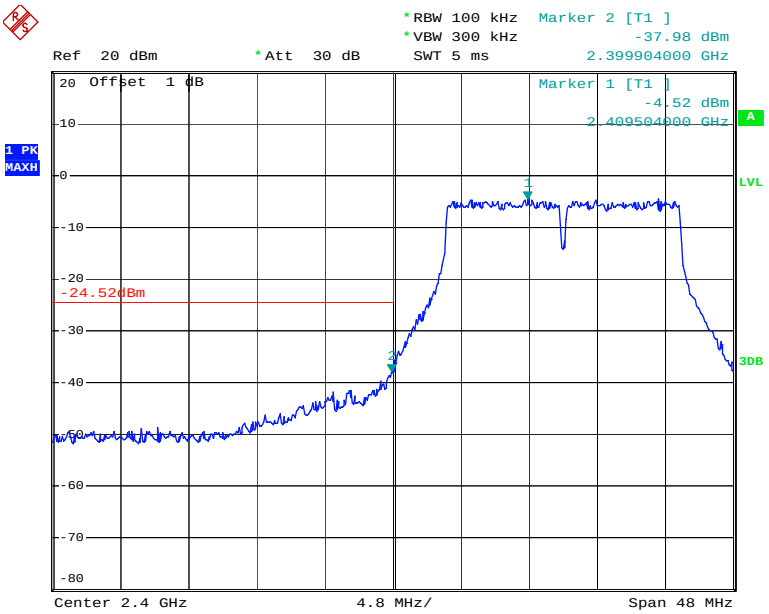
Date: 3.JUL.2016 01:09:16

802.11b: Band Edge, Right Side



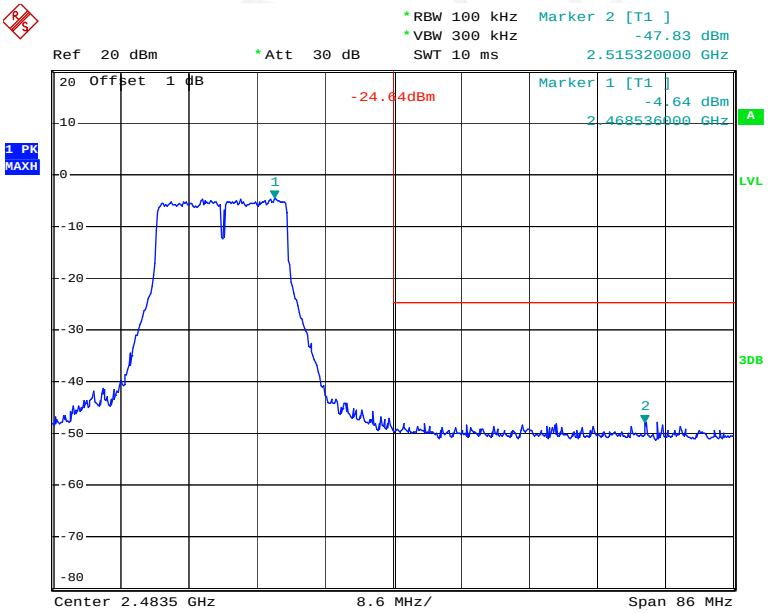
Date: 3.JUL.2016 01:16:18

802.11g: Band Edge, Left Side



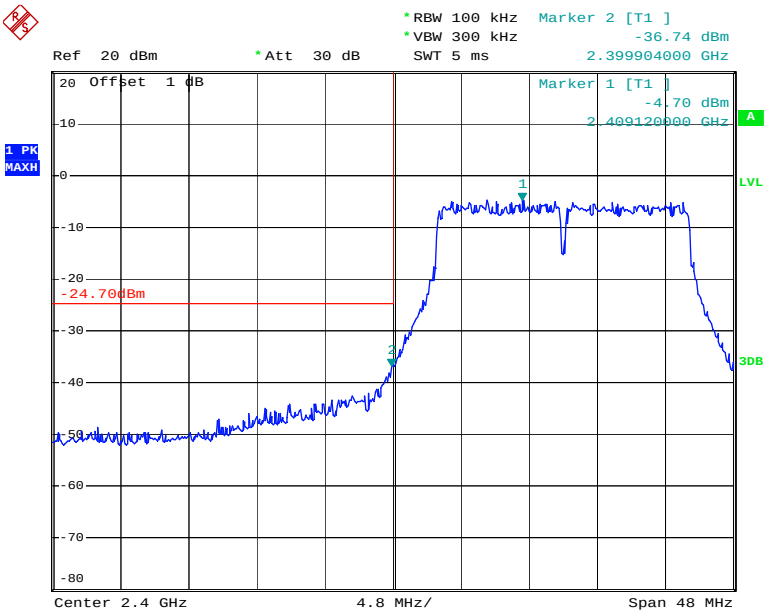
Date: 4.JUL.2016 20:36:08

802.11g: Band Edge, Right Side



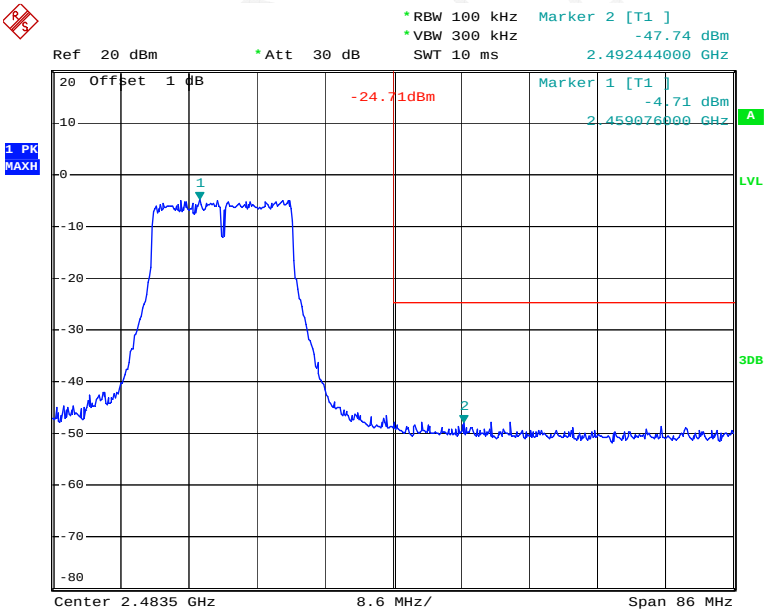
Date: 4.JUL.2016 20:41:36

802.11n ht20 Band Edge, Left Side



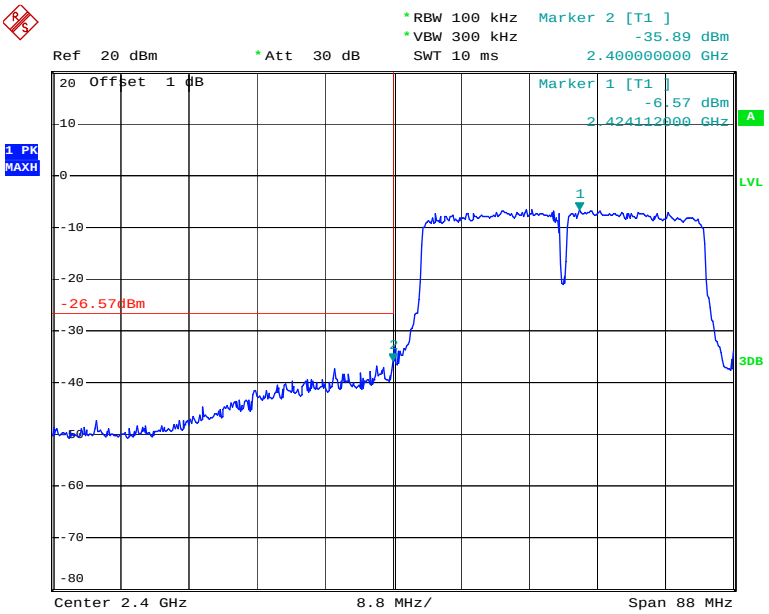
Date: 4.JUL.2016 20:44:21

802.11n ht20 Band Edge, Right Side



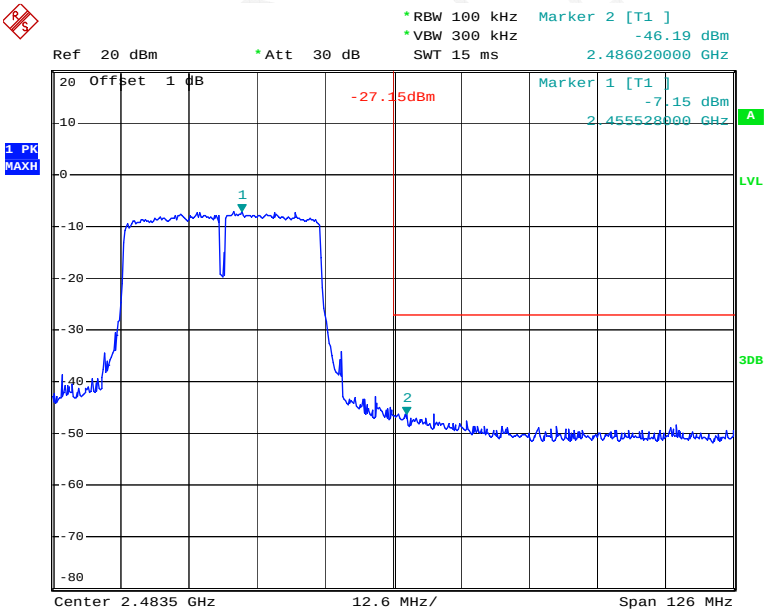
Date: 4.JUL.2016 20:49:05

802.11n ht40 Band Edge, Left Side



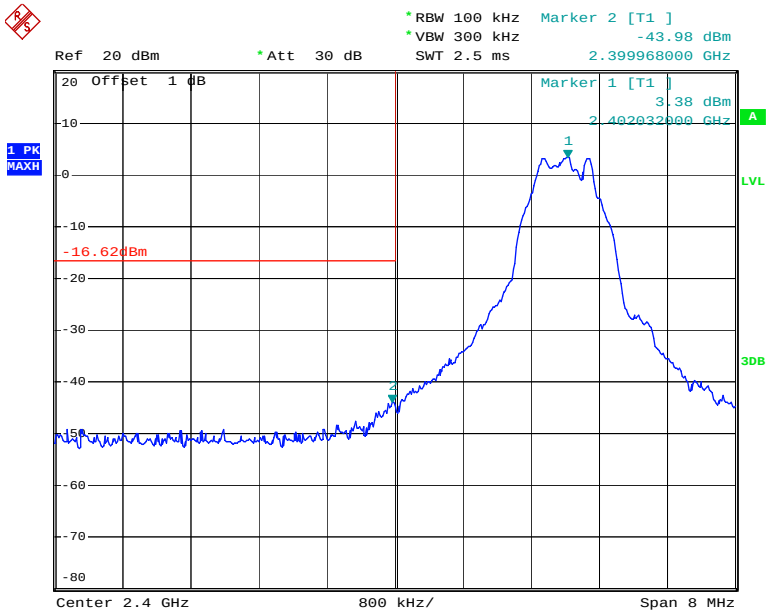
Date: 4.JUL.2016 20:52:16

802.11n ht40 Band Edge, Right Side



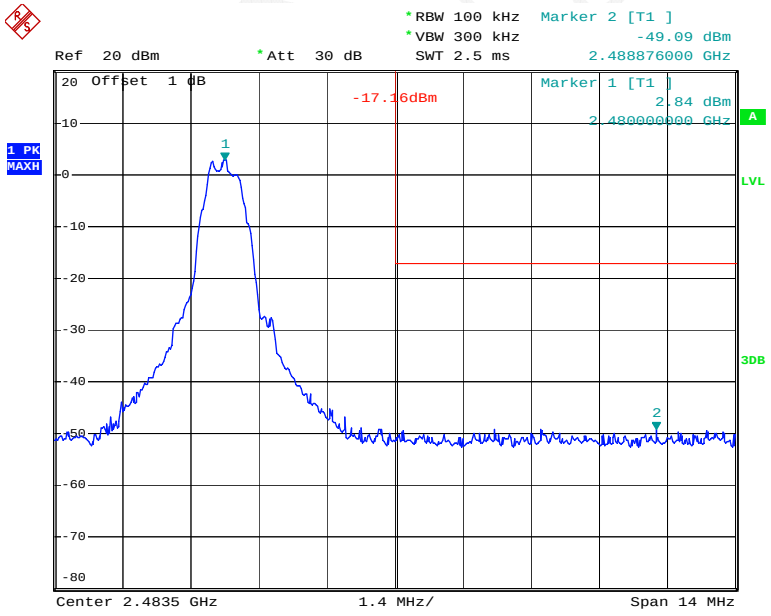
Date: 4.JUL.2016 20:57:52

BLE Band Edge， Left Side



Date: 7.JUL.2016 13:17:04

BLE Band Edge, Right Side



Date: 7.JUL.2016 13:20:44

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
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

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

Test Data

Environmental Conditions

Temperature:	28.4 – 31.4°C
Relative Humidity:	40 - 60 %
ATM Pressure:	99.9 – 100.3 kPa

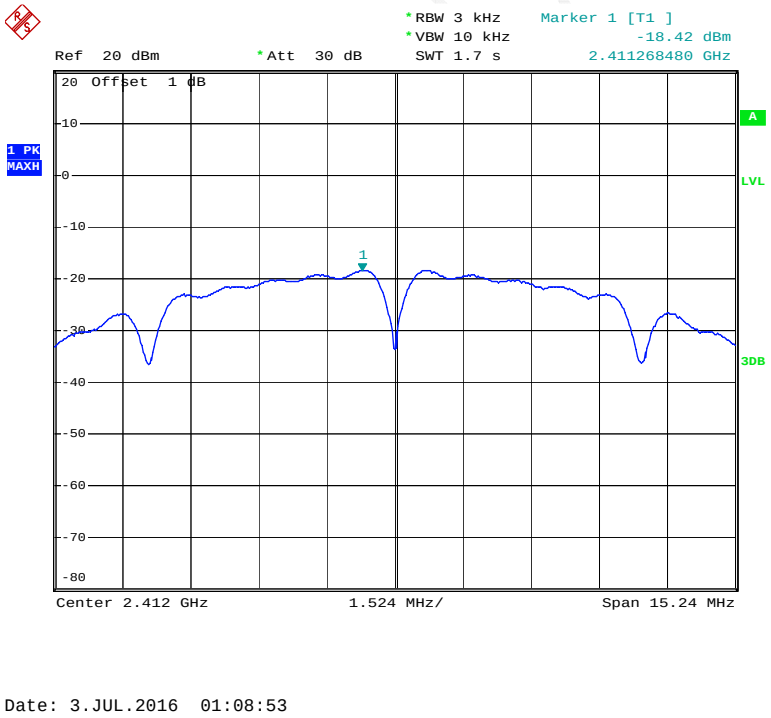
** The testing was performed by Rocky Xiao from 2016-07-03 to 2016-07-07.*

Test Mode: Transmitting

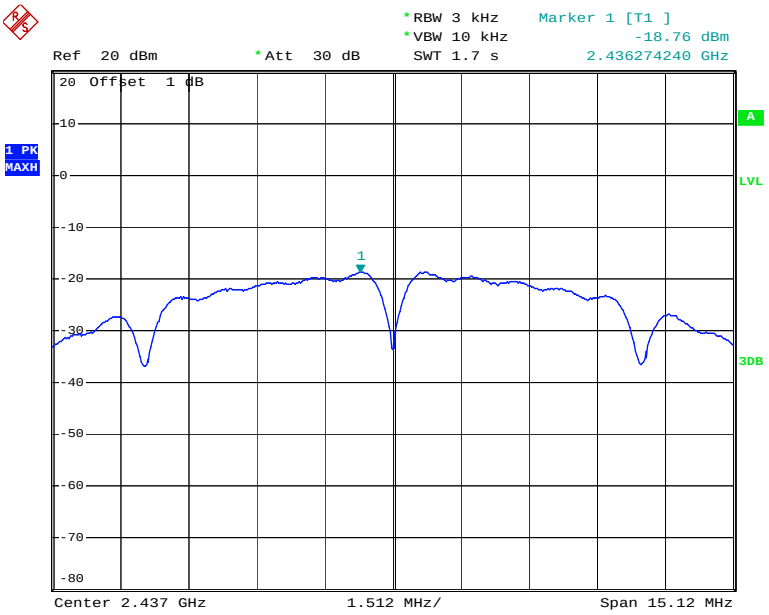
Test Result: Compliant. Please refer to the following table and plots

Test mode	Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	Low	2412	-18.42	≤8
	Middle	2437	-18.76	≤8
	High	2462	-18.6	≤8
802.11g	Low	2412	-18.65	≤8
	Middle	2437	-19.4	≤8
	High	2462	-18.67	≤8
802.11n20	Low	2412	-19.03	≤8
	Middle	2437	-19.57	≤8
	High	2462	-18.46	≤8
802.11n40	Low	2422	-18.9	≤8
	Middle	2437	-17.18	≤8
	High	2452	-17.37	≤8
BLE	Low	2402	-13.28	≤8
	Middle	2440	-13.03	≤8
	High	2480	-14.6	≤8

Power Spectral Density, 802.11b Low Channel

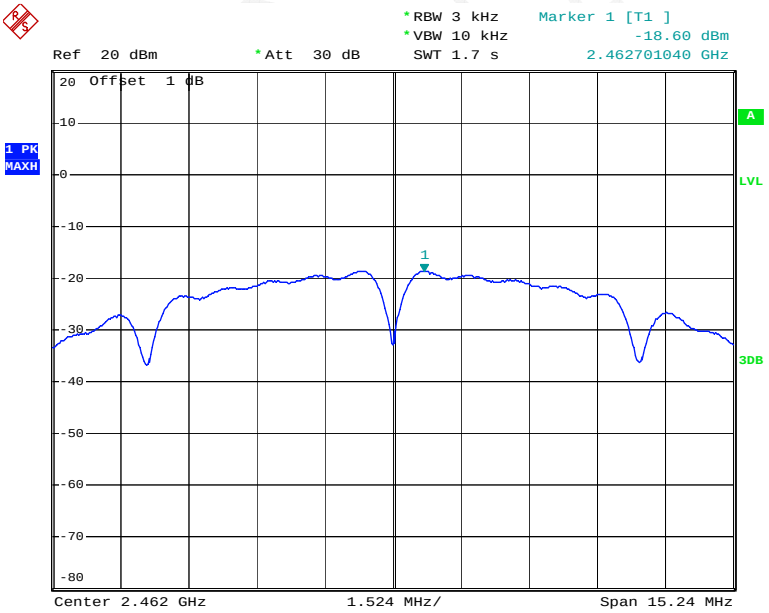


Power Spectral Density, 802.11b Middle Channel



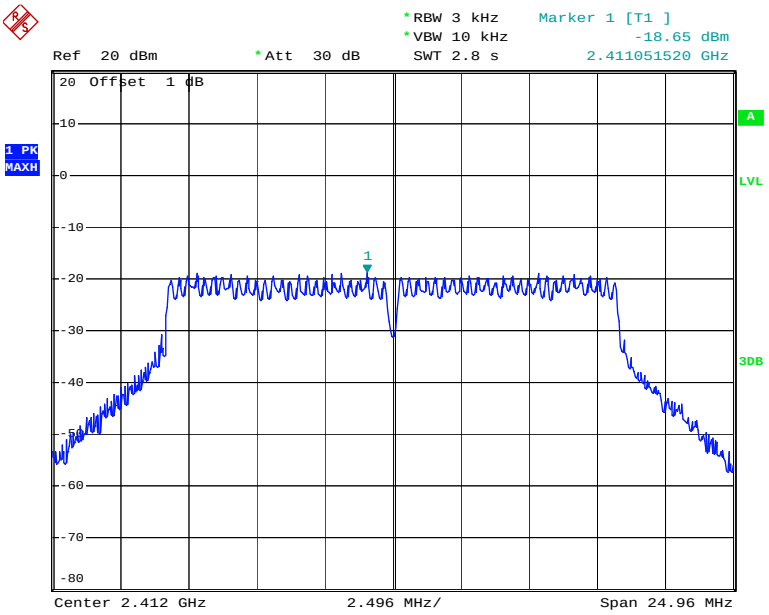
Date: 3.JUL.2016 01:13:04

Power Spectral Density, 802.11b High Channel



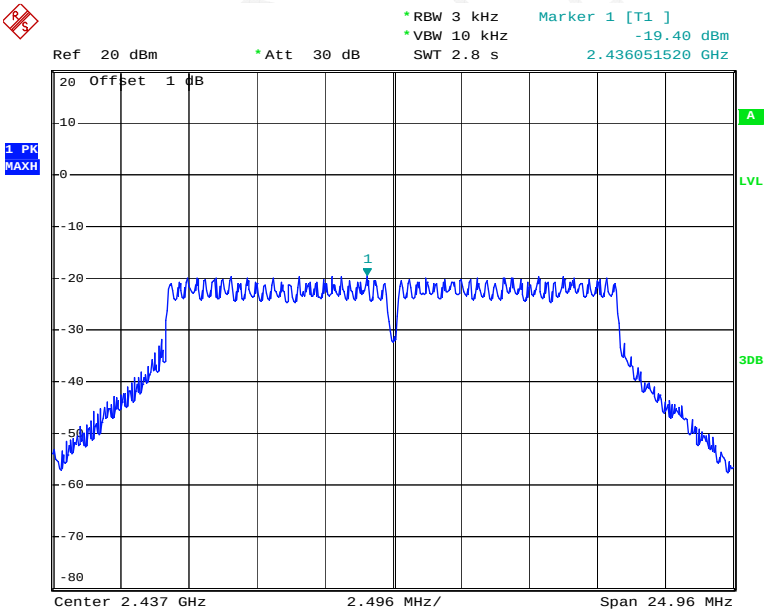
Date: 3.JUL.2016 01:15:48

Power Spectral Density, 802.11g Low Channel



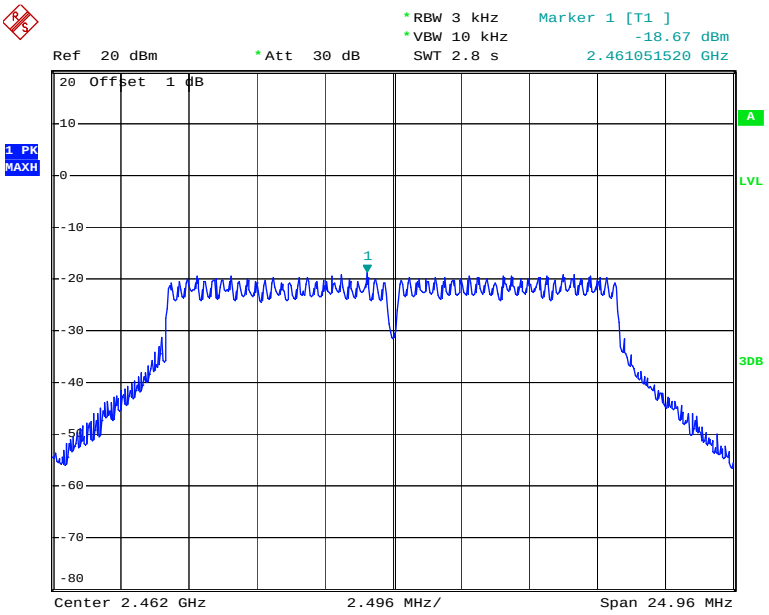
Date: 4.JUL.2016 20:35:45

Power Spectral Density, 802.11g Middle Channel



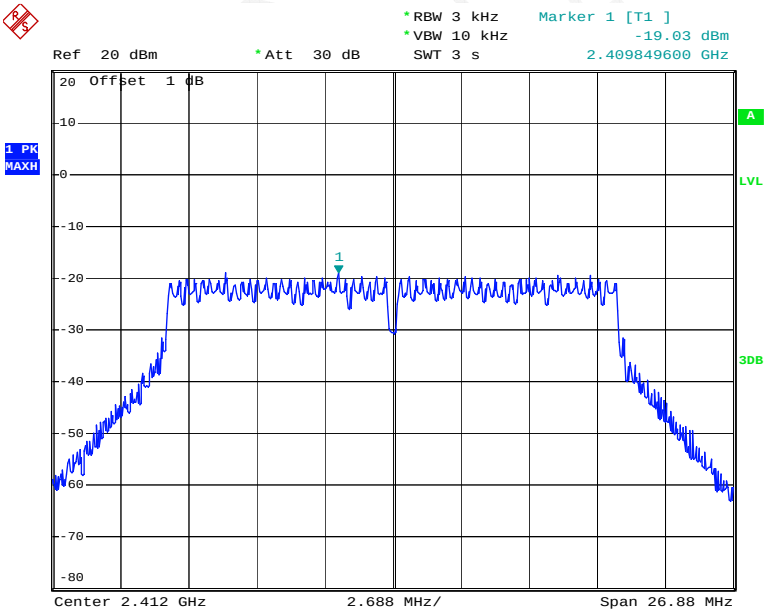
Date: 4.JUL.2016 20:38:13

Power Spectral Density, 802.11g High Channel



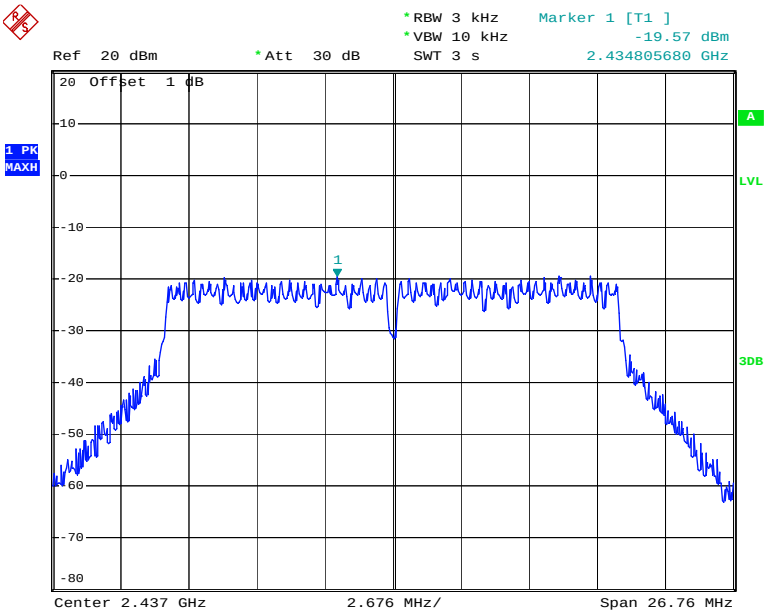
Date: 4.JUL.2016 20:41:00

Power Spectral Density, 802.11n ht20 Low Channel



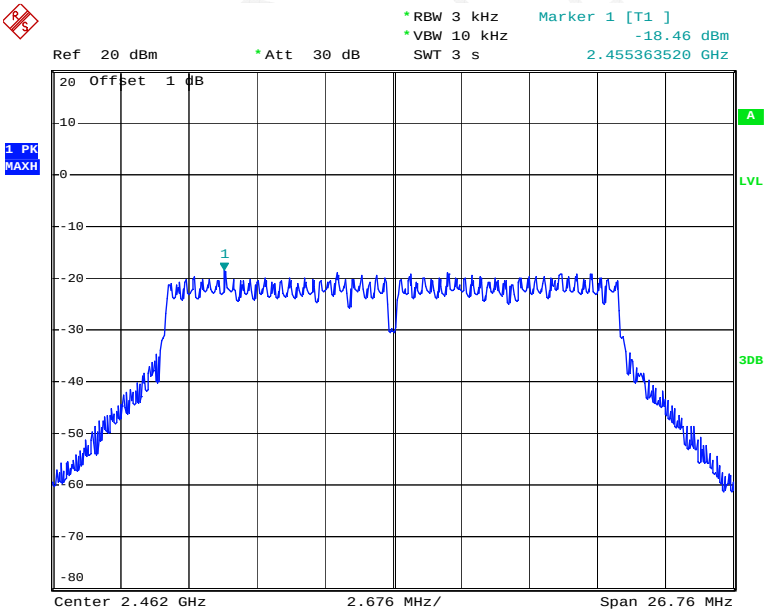
Date: 4.JUL.2016 20:44:03

Power Spectral Density, 802.11n ht20 Middle Channel



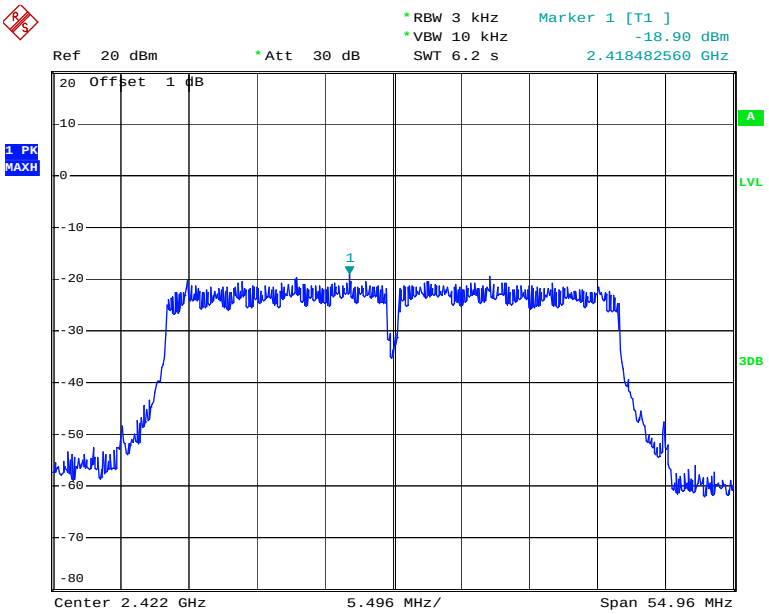
Date: 4.JUL.2016 20:46:23

Power Spectral Density, 802.11n ht20 High Channel



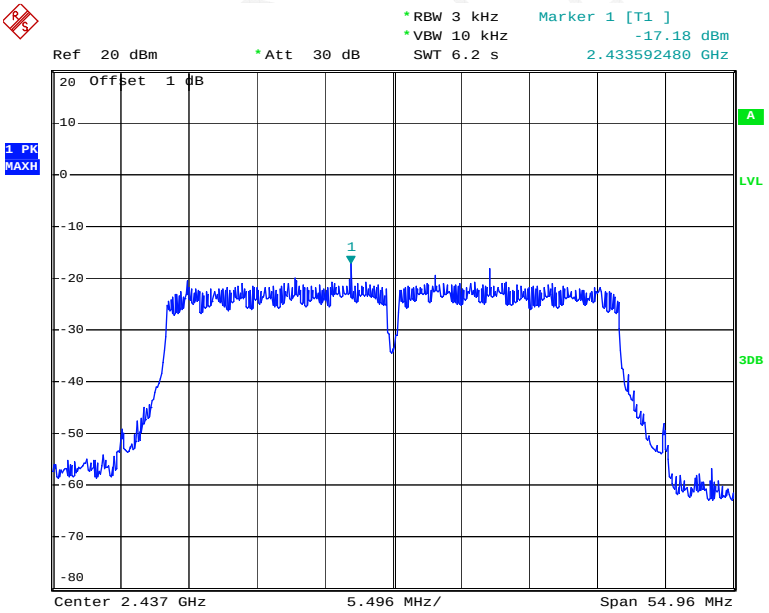
Date: 4.JUL.2016 20:48:41

Power Spectral Density, 802.11n ht40 Low Channel



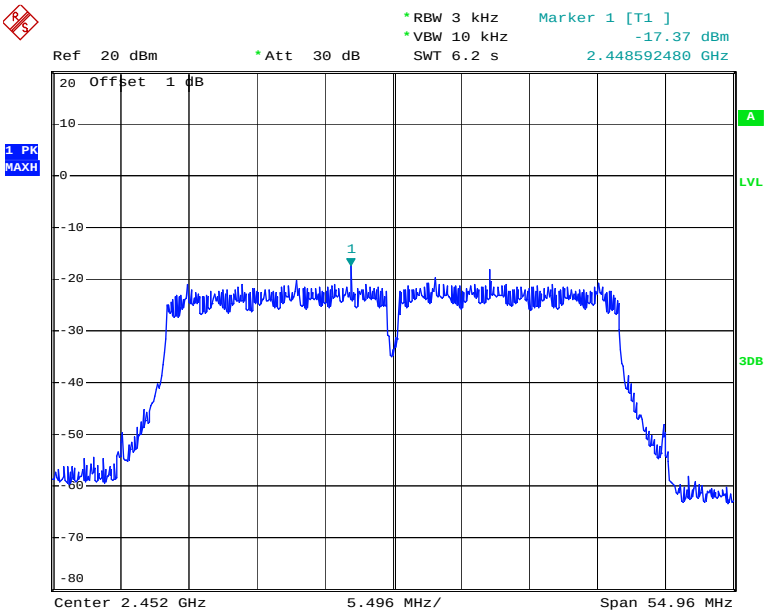
Date: 4.JUL.2016 20:51:28

Power Spectral Density, 802.11n ht40 Middle Channel



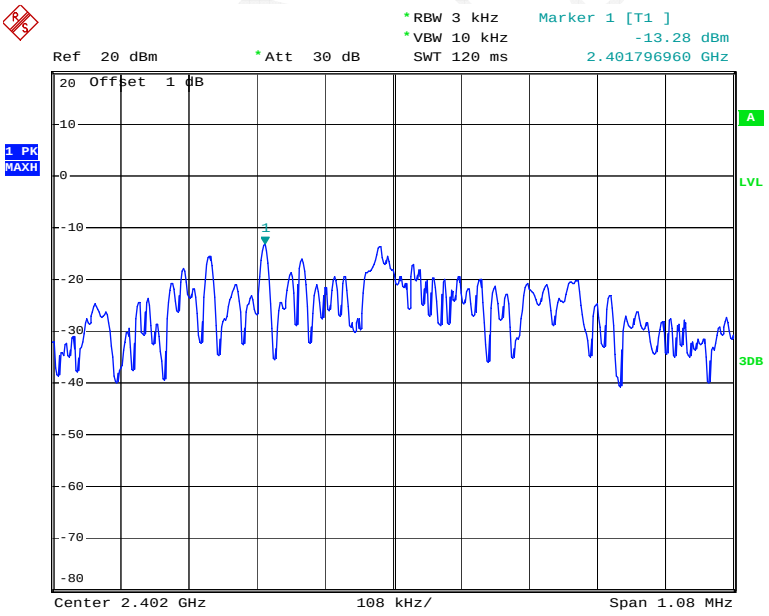
Date: 4.JUL.2016 20:54:41

Power Spectral Density, 802.11n ht40 High Channel



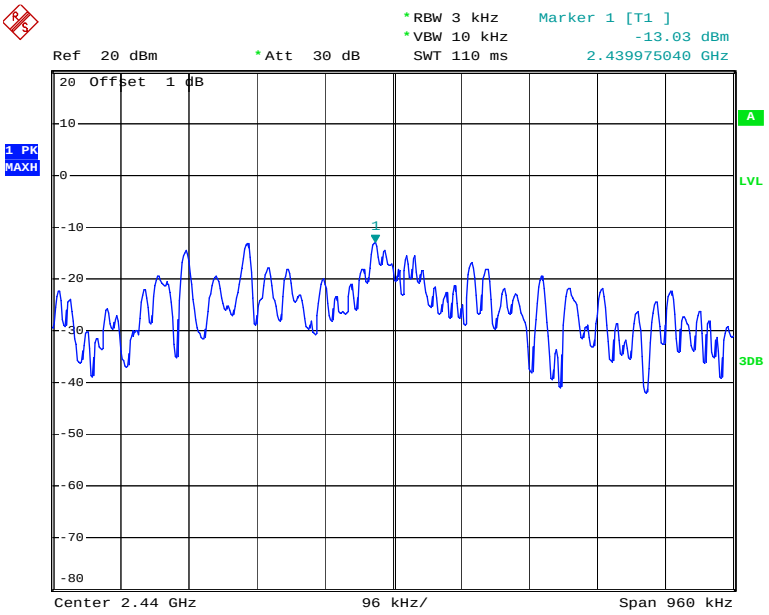
Date: 4.JUL.2016 20:57:34

Power Spectral Density, BLE Low Channel



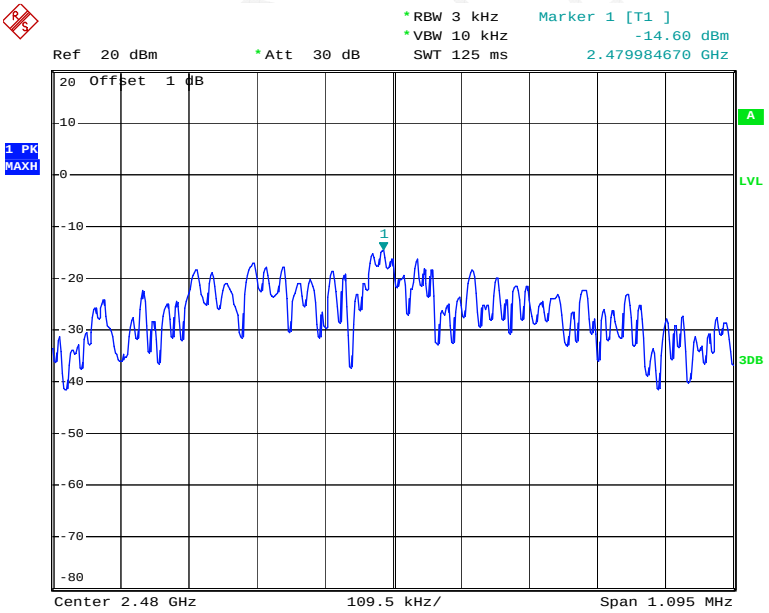
Date: 7.JUL.2016 13:16:41

Power Spectral Density, BLE Middle Channel



Date: 7.JUL.2016 13:19:20

Power Spectral Density, BLE High Channel



Date: 7.JUL.2016 13:20:26

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