FCC PART 15.247

TEST REPORT

For

Alinket Electronic Technology (Shanghai) Co., Ltd.

Room 403, No. 10, Lane 198,Zhangheng Road, Pudong,Shanghai,China

FCC ID: 2AELJ-ALXCOMBA

Report Type:	**Product Type:**
Original Report	Alinket Wi-Fi & BT Combo Controller

Test Engineer:	Chris Wang
Report Number:	RKS161031009-00B
Report Date:	2016-11-07
Reviewed By:	Jesse Huang EMC Manager
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road,Kunshan,Jiangsu province,China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The Alinket Electronic Technology (Shanghai) Co., Ltd.'s product, model number: ALXC2X (FCC ID: 2AELJ-ALXCOMBA) or the "EUT" in this report was a Alinket Wi-Fi & BT Combo Controller, which was measured approximately:28mm (L) x14.3 mm (W) x2.2mm(H). Rated input voltage: 3.3VDC.

** Note: The product's series model number: ALXC1X, ALX85X. The difference between them was explained in the declaration letter.*

**All measurement and test data in this report was gathered from production sample serial number: 20160527001 (Assigned by the BACL. The EUT supplied by the applicant was received on 2016-05-27)*

Objective

This report is prepared on behalf of Alinket Electronic Technology (Shanghai) Co., Ltd. in accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

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

Related Submittal(s)/Grant(s)

FCC part 15.407 NII and FCC part 15.247 DSS submission with FCC ID: 2AELJ-ALXCOMBA.

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 and FCC KDB558074 D01 DTS Meas Guidance v03r05.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with RF radiated emission is 5.91 dB for 30MHz-1GHz.and 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road,Kunshan,Jiangsu province,China.

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) 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 November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. 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

For 802.11b, 802.11g and 802.11n-HT20 mode, 11 channels are provided to testing:

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

For 802.11b, 802.11g, 802.11n-HT20 mode, EUT was tested with Channel 1, 6 and 11.

For BLE mode, 40 channels are provided to 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 software “WL43341B0” for wifi and “BLUETOOL_MI_1.9.4.4” for BLE.

The worst case was performed under:
802.11b: Data rate:1 Mbps, Power level: 17
802.11g: Data rate: 6 Mbps, Power level: 17
802.11n-HT20: Data rate: MCS0, Power level: 17
BLE : Power level: 4

Support Equipment List and Details

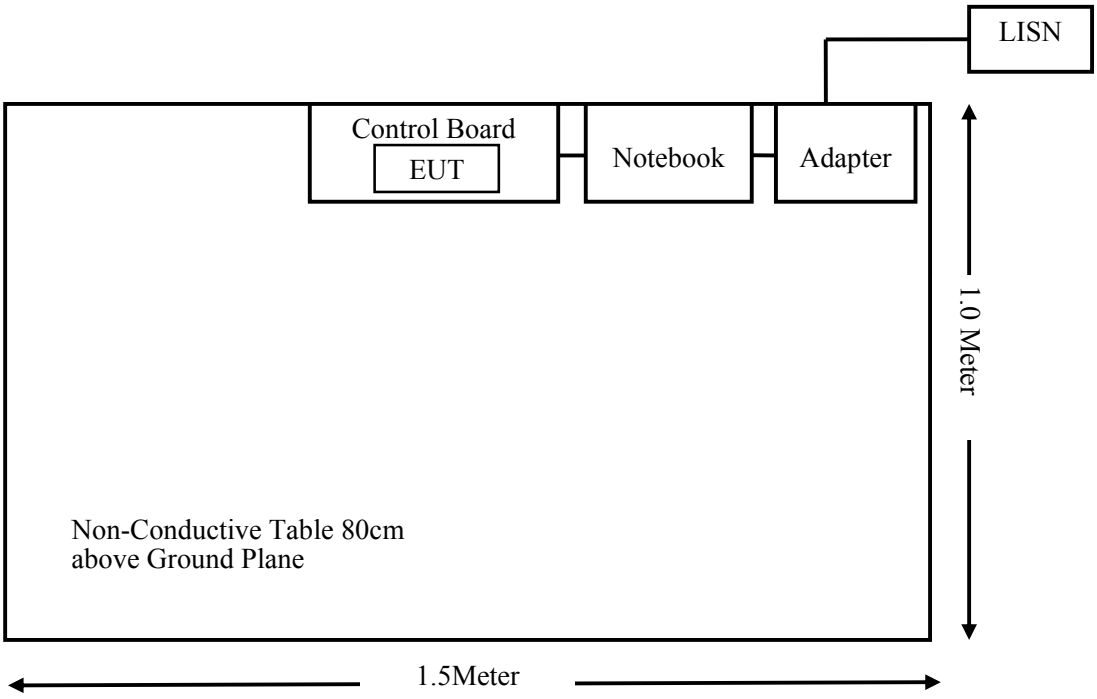
Manufacturer	Description	Model	Serial Number
DELL	Notebook	GX620	D65874152
Alinket	Control Board	N/A	N/A

External I/O Cable

Cable Description	Length (m)	From Port	To
USB Cable	0.3	Control Board	Notebook

Block Diagram of Test Setup

For conducted emission



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b) (1)& §2.1091	MAXIMUM PERMISSIBLE EXPOSURE (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.247(d)	Spurious Emissions at Antenna Port	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Conducted Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

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

Applicable Standard

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

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

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

f = frequency in MHz; * = Plane-wave equivalent power density;
According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/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);

Calculated Data:

Mode	Frequency Range	Antenna Gain		Output Power		Evaluation Distance	Power Density	MPE Limit
	(MHz)	(dBi)	(numeric)	(dBm)	(mW)	(cm)	(mW/cm^2)	(mW/cm^2)
802.11b	2412-2462	1.0	1.26	18.00	63.10	20	0.0158	1
802.11g	2412-2462	1.0	1.26	18.00	63.10	20	0.0158	1
802.11n HT20	2412-2462	1.0	1.26	18.00	63.10	20	0.0158	1
BLE	2402-2480	1.0	1.26	4.00	2.51	20	0.0006	1
BT	2402-2480	1.0	1.26	7.00	5.01	20	0.0013	1
802.11a	5150-5250	1.0	1.26	14.00	25.12	20	0.0063	1
802.11n-HT20		1.0	1.26	14.00	25.12	20	0.0063	1
802.11a	5725-5850	1.0	1.26	14.00	25.12	20	0.0063	1
802.11n-HT20		1.0	1.26	14.00	25.12	20	0.0063	1

Note: (1) The target output power:
802.11b： 17±1dBm, which declared by the Manufacturer.
802.11g： 17±1dBm, which declared by the Manufacturer.
802.11n HT20： 17±1dBm, which declared by the Manufacturer.
BLE：3±1dBm, which declared by the Manufacturer.
BT：5±2dBm,which declared by the Manufacturer.
802.11a： 12±2 dBm, which declared by the Manufacturer.
802.11n-HT20： 12±2 dBm, which declared by the Manufacturer.

(2) The EUT has the BT, 2.4GHz WIFI, 5GHz WIFI functions, they can transmitting simultaneously. According to KDB 447498 D01 General RF Exposure Guidance v06 and test data, the BT, 2.4G WIFI (802.11n HT20), 5GHz WIFI (802.11a 5150-5250) model is the worst case, their sum of MPE ratio is 0.0234 which is less than 1.0,so the collocation exposure exclusion applies.

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.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has a ceramic antenna arrangement for wifi & BLE, which the antenna gain is 1dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

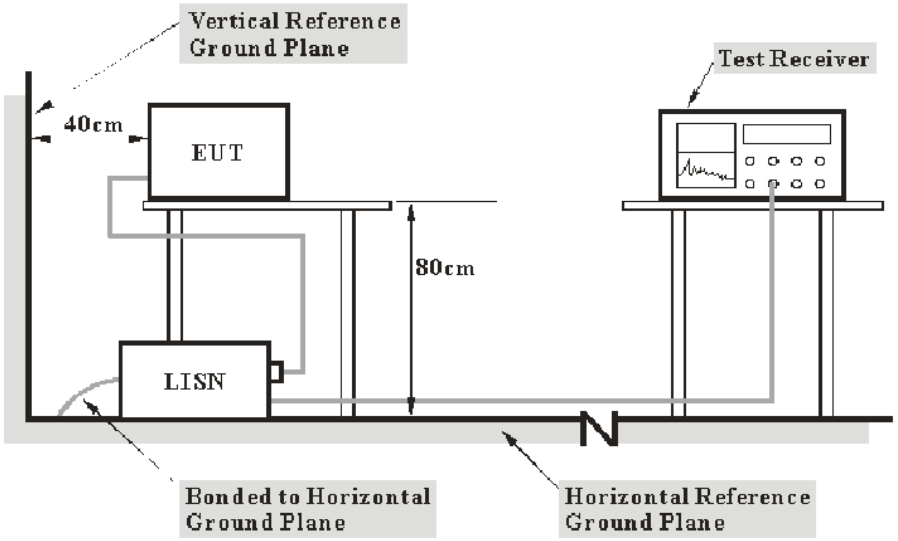
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between LISN and receiver, LISN voltage division factor, LISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Kunshan) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report.

Port	Expanded Measurement uncertainty
AC Mains	3.26 dB (k=2, 95% level of confidence)
CAT 3	3.70 dB (k=2, 95% level of confidence)
CAT 5	3.86 dB (k=2, 95% level of confidence)
CAT 6	4.64 dB (k=2, 95% level of confidence)

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 adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

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

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

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

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the 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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	834115/007	2015-11-12	2016-11-11
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2016-10-10	2017-10-10
Rohde & Schwarz	LISN	ESH3-Z5	892239/018	2016-07-04	2017-07-03
Rohde & Schwarz	Pulse limiter	ESH3-Z2	879940/0058	2016-06-19	2017-06-18
HP	Current probe	11967A	636	2016-07-04	2017-07-03
FCC	ISN	FCC-TLISN-T8-02	20376	2016-07-04	2017-07-03
Rohde & Schwarz	CE Test software	EMC 32	V 09.10.0	/	/
MICRO-COAX	Coaxial line	UFB-293B-1-0480-50X50	97F0173	2016-09-08	2017-09-08

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

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Correction Factor = LISN VDF + Cable Loss

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

Margin = Limit – Corrected Amplitude

Test Results Summary

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

13.07 dB at **0.170000 MHz** in the **Neutral** conducted BLE Mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

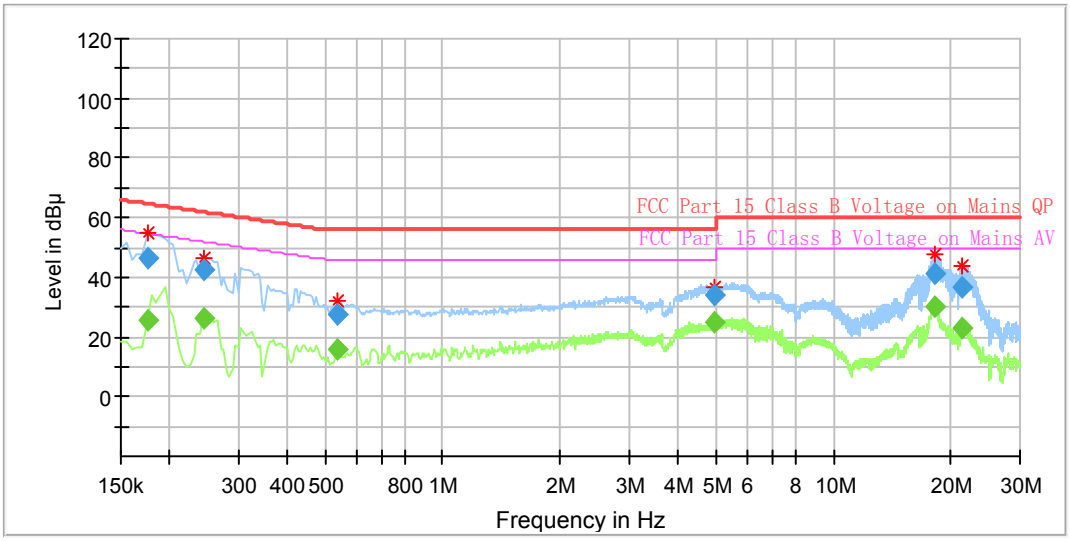
Temperature:	22.8 ℃
Relative Humidity:	55 %
ATM Pressure:	101.1kPa

The testing was performed by Chris Wang on 2016-10-29 to 2016-10-31.

EUT operation mode: Transmitting

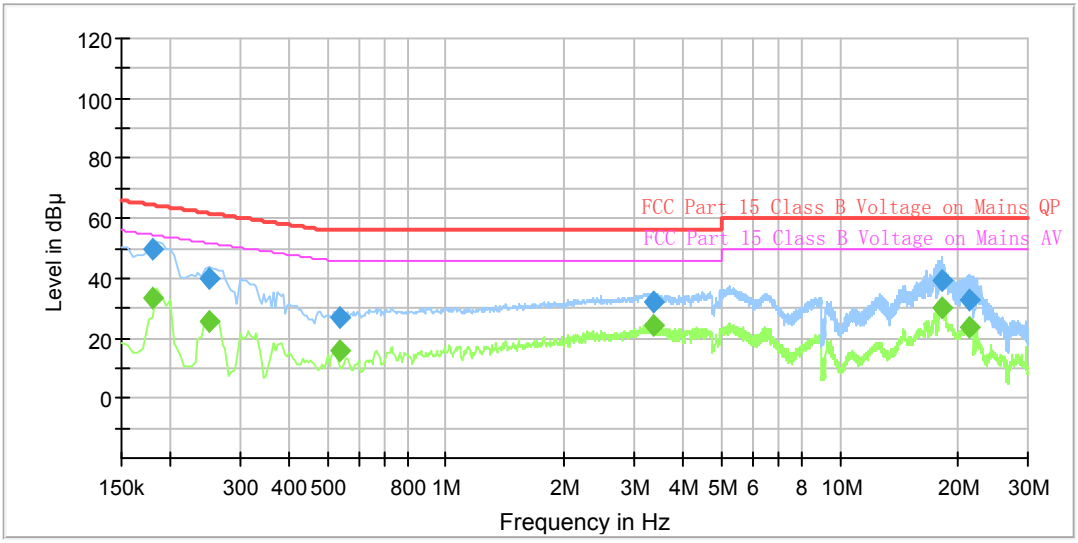
WIFI Mode:

AC 120V/60 Hz, Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.175000	---	25.50	9.000	L1	10.3	29.22	54.72	Compliance
0.175000	46.70	---	9.000	L1	10.3	18.02	64.72	Compliance
0.245000	---	26.30	9.000	L1	10.3	25.62	51.92	Compliance
0.245000	42.28	---	9.000	L1	10.3	19.64	61.92	Compliance
0.535000	---	15.74	9.000	L1	10.3	30.26	46.00	Compliance
0.535000	27.23	---	9.000	L1	10.3	28.77	56.00	Compliance
4.985000	---	24.72	9.000	L1	10.5	21.28	46.00	Compliance
4.985000	34.32	---	9.000	L1	10.5	21.68	56.00	Compliance
18.225000	---	30.37	9.000	L1	10.5	19.63	50.00	Compliance
18.225000	41.10	---	9.000	L1	10.5	18.90	60.00	Compliance
21.380000	---	22.93	9.000	L1	10.5	27.07	50.00	Compliance
21.380000	36.76	---	9.000	L1	10.5	23.24	60.00	Compliance

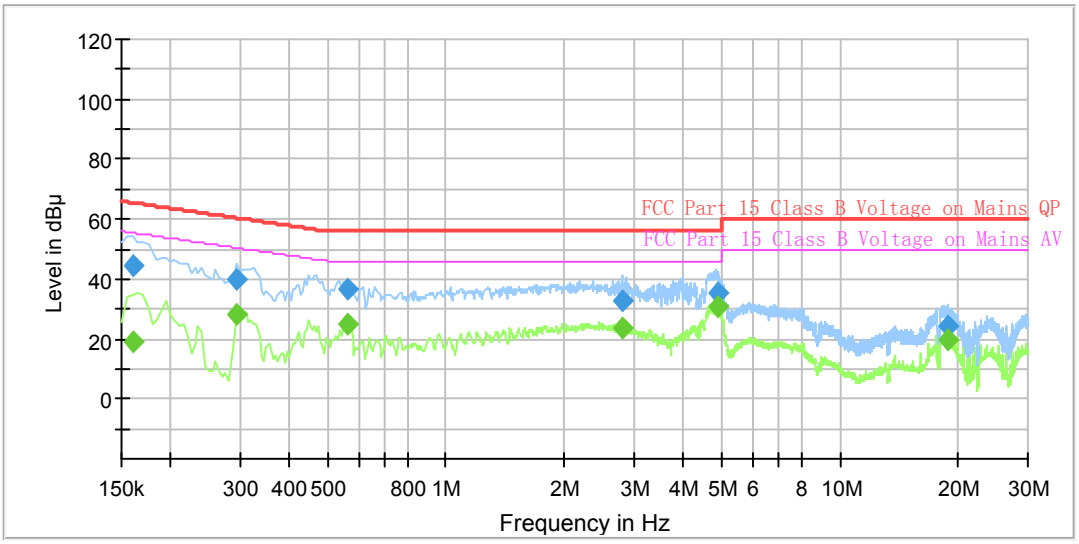
AC 120V/60 Hz, Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.180000	---	33.53	9.000	N	10.3	20.96	54.49	Compliance
0.180000	49.63	---	9.000	N	10.3	14.86	64.49	Compliance
0.250000	---	25.56	9.000	N	10.3	26.20	51.76	Compliance
0.250000	39.97	---	9.000	N	10.3	21.79	61.76	Compliance
0.540000	---	15.63	9.000	N	10.3	30.37	46.00	Compliance
0.540000	27.20	---	9.000	N	10.3	28.80	56.00	Compliance
3.370000	---	24.57	9.000	N	10.5	21.43	46.00	Compliance
3.370000	32.36	---	9.000	N	10.5	23.64	56.00	Compliance
18.170000	---	30.15	9.000	N	10.5	19.85	50.00	Compliance
18.170000	39.38	---	9.000	N	10.5	20.62	60.00	Compliance
21.205000	---	23.88	9.000	N	10.5	26.12	50.00	Compliance
21.205000	32.86	---	9.000	N	10.5	27.14	60.00	Compliance

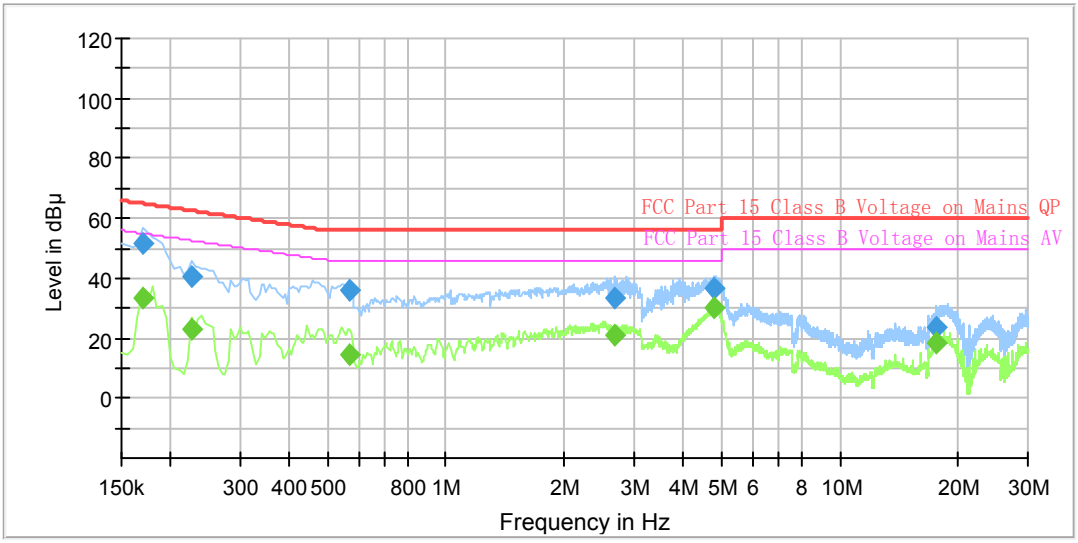
BLE Mode:

AC 120V/60 Hz, Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.160000	---	19.29	9.000	L1	10.3	36.17	55.46	Compliance
0.160000	44.18	---	9.000	L1	10.3	21.28	65.46	Compliance
0.295000	---	28.14	9.000	L1	10.3	22.24	50.38	Compliance
0.295000	39.78	---	9.000	L1	10.3	20.60	60.38	Compliance
0.565000	---	24.82	9.000	L1	10.3	21.18	46.00	Compliance
0.565000	36.90	---	9.000	L1	10.3	19.10	56.00	Compliance
2.790000	---	23.81	9.000	L1	10.4	22.19	46.00	Compliance
2.790000	32.68	---	9.000	L1	10.4	23.32	56.00	Compliance
4.915000	---	30.67	9.000	L1	10.5	15.33	46.00	Compliance
4.915000	35.46	---	9.000	L1	10.5	20.54	56.00	Compliance
18.855000	---	19.71	9.000	L1	10.5	30.29	50.00	Compliance
18.855000	24.54	---	9.000	L1	10.5	35.46	60.00	Compliance

AC 120V/60 Hz, Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.170000	---	33.14	9.000	N	10.3	21.82	54.96	Compliance
0.170000	51.89	---	9.000	N	10.3	13.07	64.96	Compliance
0.225000	---	22.88	9.000	N	10.3	29.75	52.63	Compliance
0.225000	40.61	---	9.000	N	10.3	22.02	62.63	Compliance
0.570000	---	14.27	9.000	N	10.3	31.73	46.00	Compliance
0.570000	36.28	---	9.000	N	10.3	19.72	56.00	Compliance
2.680000	---	20.89	9.000	N	10.5	25.11	46.00	Compliance
2.680000	33.18	---	9.000	N	10.5	22.82	56.00	Compliance
4.770000	---	30.30	9.000	N	10.6	15.70	46.00	Compliance
4.770000	36.64	---	9.000	N	10.6	19.36	56.00	Compliance
17.610000	---	18.52	9.000	N	10.5	31.48	50.00	Compliance
17.610000	23.95	---	9.000	N	10.5	36.05	60.00	Compliance

Note:

1) Corr.=LISN VDF (Voltage Division Factor) + Cable Loss
2) Corrected Amplitude = Reading + Corr.
3) Margin = Limit –Corrected Amplitude

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

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

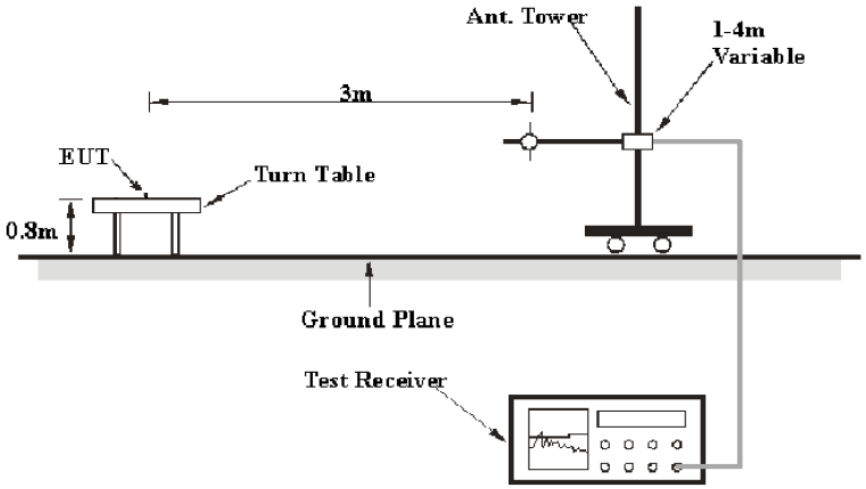
Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

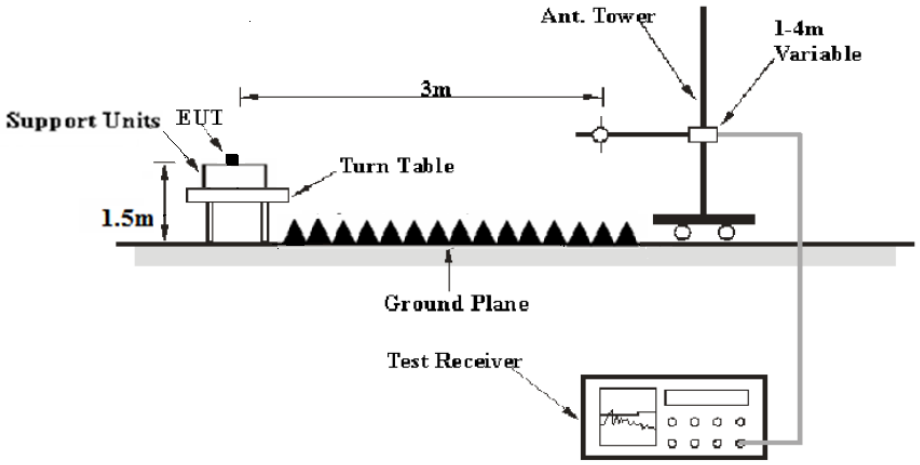
Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Kunshan) is 5.91 dB for 30MHz-1GHz and 4.92 dB for above 1GHz, 1.95dB for conducted measurement at antenna port. And the uncertainty will not be taken into consideration for the test data recorded in the report

EUT Setup

Below 1 GHz:



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 adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sonoma Instrunent	Amplifier	330	171377	2016-10-21	2017-10-21
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-12	2017-11-11
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
ETS	Horn Antenna	3115	6229	2016-11-07	2017-11-06
EMCO	Horn Antenna	3116	2516	2016-11-07	2019-11-06
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2016-09-21	2017-09-21
Mini	Pre-amplifier	ZVA-183-S+	857001418	2016-09-16	2017-09-16
DUCOMMUN	Pre-amplifier	ALN-22093530-01	990147	2016-09-16	2017-09-16
champrotek	Chamber	Chamber A	1#	/	/
R&S	Auto test Software	EMC32	V 09.10.0	/	/
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15
BACL	RF cable	KS-LAB-010	KS-LAB-010	2016-09-16	2017-09-15

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

Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Meter Reading + Antenna Factor + 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 Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

WIFI Mode: 3.02 dB at 4924.0 MHz in 802.11b Mode High Channel

BLE Mode: 3.21 dB at 4960.0 MHz in High Channel

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

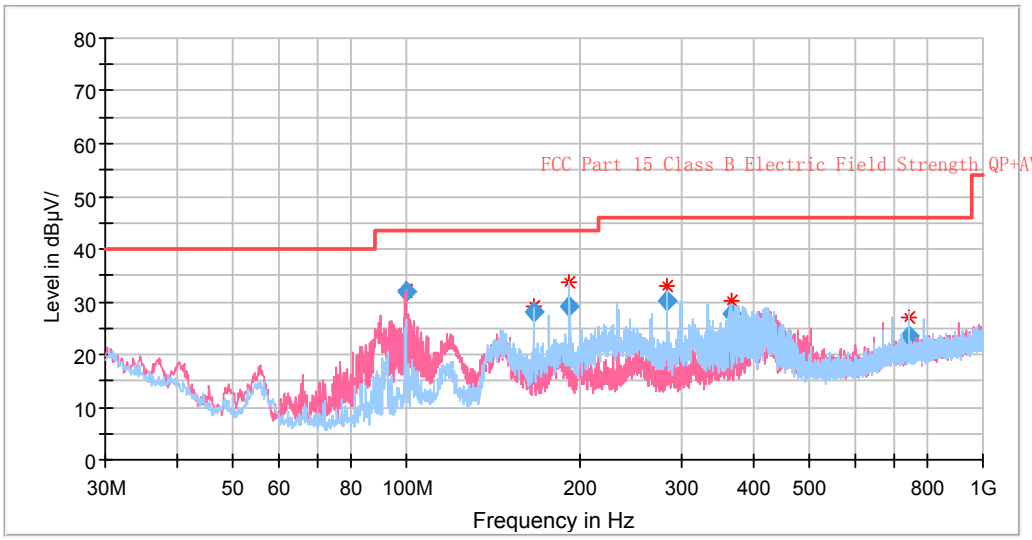
Temperature:	25.1 ℃
Relative Humidity:	54 %
ATM Pressure:	101.2kPa

The testing was performed by Chris Wang on 2016-10-31 to 2016-11-02.

EUT operation mode: Transmitting

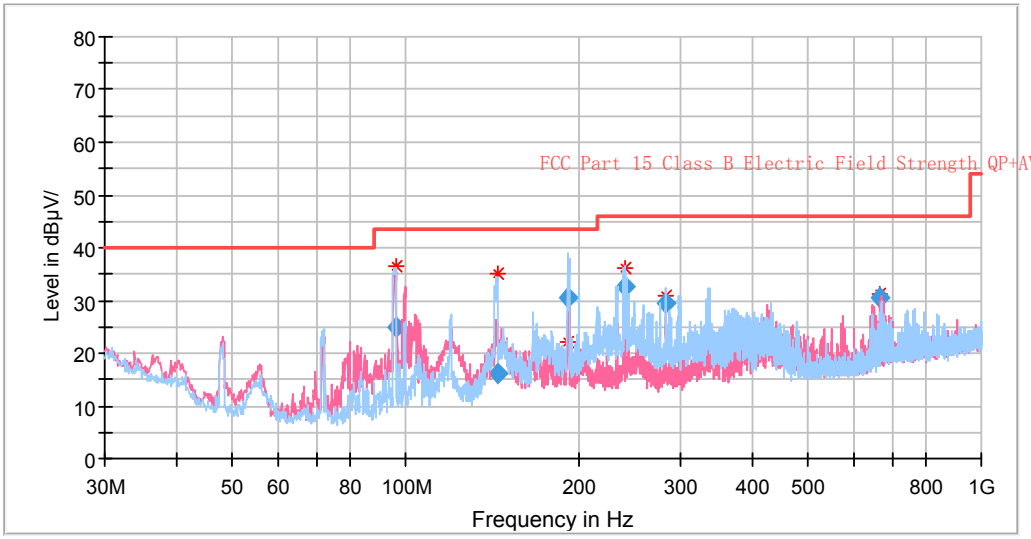
30M-1GHz

WIFI Mode:



Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/205/209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB µ V/m)	Margin (dB)
99.893700	45.79	QP	55.0	100.0	V	-13.8	31.99	43.50	11.51
166.514000	40.23	QP	55.0	100.0	H	-12.2	28.03	43.50	15.47
191.981750	41.51	QP	160.0	100.0	H	-12.3	29.21	43.50	14.29
282.483000	41.10	QP	103.0	100.0	H	-10.9	30.2	46.00	15.80
365.982300	36.92	QP	179.0	100.0	H	-9.1	27.82	46.00	18.18
744.002400	25.74	QP	79.0	100.0	H	-2.2	23.54	46.00	22.46

BLE Mode:



Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/205/209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB µ V/m)	Margin (dB)
96.246550	40.88	QP	182.0	100.0	H	-16.1	24.78	43.50	18.72
144.158500	28.2	QP	172.0	100.0	H	-12.0	16.2	43.50	27.30
191.103950	42.8	QP	172.0	100.0	H	-12.2	30.6	43.50	12.90
240.387450	44.62	QP	148.0	100.0	H	-12.1	32.52	46.00	13.48
283.526900	40.18	QP	120.0	100.0	H	-10.8	29.38	46.00	16.62
668.137900	33.87	QP	76.0	100.0	V	-3.4	30.47	46.00	15.53

1GHz-25GHz

802.11b Mode:

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBµV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBµV/m)	(dB µ V/m)	(dB)
Low Channel (2412 MHz)									
2412.0	99.28	PK	18	216	V	-3.4	95.88	/	/
2412.0	89.03	Ave	18	216	V	-3.4	85.63	/	/
2412.0	98.56	PK	314	214	H	-3.4	95.16	/	/
2412.0	88.44	Ave	314	214	H	-3.4	85.04	/	/
2390.0	65.21	PK	105	176	V	-3.5	61.71	74	12.29
2390.0	51.70	Ave	105	176	V	-3.5	48.20	54	5.80
2372.0	63.76	PK	11	235	V	-3.5	60.26	74	13.74
2372.0	53.37	Ave	11	235	V	-3.5	49.87	54	4.13
4824.0	51.00	PK	111	133	H	7.3	58.30	74	15.70
4824.0	43.22	Ave	111	133	H	7.3	50.52	54	3.48
6620.0	36.87	PK	157	228	V	13.6	50.45	74	23.55
6620.0	22.63	Ave	157	228	V	13.6	36.21	54	17.79
7236.0	44.51	PK	138	210	H	14.5	59.01	74	14.99
7236.0	35.95	Ave	138	210	H	14.5	50.45	54	3.55

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBµV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBµV/m)	(dB µ V/m)	(dB)
Middle Channel (2437 MHz)									
2437.0	99.19	PK	253	141	V	-3.0	96.17	/	/
2437.0	89.16	Ave	253	141	V	-3.0	86.14	/	/
2437.0	98.57	PK	96	142	H	-3.0	95.55	/	/
2437.0	89.01	Ave	96	142	H	-3.0	85.99	/	/
1600.0	50.62	PK	0	136	V	-7.0	43.64	74	30.36
1600.0	31.53	Ave	0	136	V	-7.0	24.55	54	29.45
3656.0	41.95	PK	178	163	H	2.8	44.75	74	29.25
3656.0	35.09	Ave	178	163	H	2.8	37.89	54	16.11
4874.0	49.73	PK	5	184	V	7.9	57.63	74	16.37
4874.0	42.38	Ave	5	184	V	7.9	50.28	54	3.72
6665.0	36.42	PK	53	197	H	13.4	49.82	74	24.18
6665.0	22.71	Ave	53	197	H	13.4	36.11	54	17.89
7311.0	43.26	PK	59	103	H	15.0	58.26	74	15.74
7311.0	35.97	Ave	59	103	H	15.0	50.97	54	3.03

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBμV/m)	(dB μ V/m)	(dB)
High Channel (2462 MHz)									
2462.0	109.99	PK	199	131	V	-3.2	95.98	/	/
2462.0	105.65	Ave	199	131	V	-3.2	84.55	/	/
2462.0	106.68	PK	236	160	H	-3.2	95.75	/	/
2462.0	102.02	Ave	236	160	H	-3.2	84.13	/	/
2483.5	44.90	PK	320	226	V	-3.2	65.44	74	8.56
2483.5	33.91	Ave	320	226	V	-3.2	45.85	54	8.15
2498.0	44.36	PK	127	182	V	-3.1	60.96	74	13.04
2498.0	37.48	Ave	127	182	V	-3.1	47.95	54	6.05
4924.0	33.29	PK	61	143	H	8.1	58.03	74	15.97
4924.0	26.73	Ave	61	143	H	8.1	50.98	54	3.02
6665.0	30.81	PK	125	105	H	13.4	49.76	74	24.24
6665.0	22.18	Ave	125	105	H	13.4	35.74	54	18.26
7386.0	27.82	PK	277	130	H	15.3	58.53	74	15.47
7386.0	21.13	Ave	277	130	H	15.3	50.07	54	3.93

802.11g Mode:

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBμV/m)	(dB μ V/m)	(dB)
Low Channel (2412 MHz)									
2412.0	99.22	PK	73	195	V	-3.4	95.82	/	/
2412.0	87.71	Ave	73	195	V	-3.4	84.31	/	/
2412.0	97.67	PK	5	241	H	-3.4	94.27	/	/
2412.0	87.19	Ave	5	241	H	-3.4	83.79	/	/
2390.0	69.06	PK	28	159	V	-3.5	65.56	74	8.44
2390.0	48.52	Ave	28	159	V	-3.5	45.02	54	8.98
2376.0	64.96	PK	203	200	V	-3.5	61.46	74	12.54
2376.0	51.51	Ave	203	200	V	-3.5	48.01	54	5.99
4824.0	59.56	PK	300	230	H	7.3	66.86	74	7.14
4824.0	43.66	Ave	300	230	H	7.3	50.96	54	3.04
6667.0	37.05	PK	21	223	V	13.4	50.46	74	23.54
6667.0	22.79	Ave	21	223	V	13.4	36.20	54	17.80
7236.0	40.06	PK	195	190	H	14.5	54.51	74	19.49
7236.0	23.89	Ave	195	190	H	14.5	38.34	54	15.66

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Middle Channel (2437 MHz)									
2437.0	98.39	PK	119	239	V	-3.0	95.37	/	/
2437.0	89.13	Ave	119	239	V	-3.0	86.11	/	/
2437.0	97.80	PK	17	189	H	-3.0	94.78	/	/
2437.0	88.93	Ave	17	189	H	-3.0	85.91	/	/
1588.0	48.60	PK	0	189	V	-7.1	41.50	74	32.50
1588.0	30.56	Ave	0	189	V	-7.1	23.46	54	30.54
3058.0	38.33	PK	307	219	H	0.3	38.63	74	35.37
3058.0	24.53	Ave	307	219	H	0.3	24.83	54	29.17
4874.0	59.80	PK	37	235	V	7.9	67.70	74	6.30
4874.0	42.79	Ave	37	235	V	7.9	50.69	54	3.31
6652.0	37.24	PK	128	204	H	13.3	50.54	74	23.46
6652.0	23.11	Ave	128	204	H	13.3	36.41	54	17.59
7311.0	38.98	PK	121	217	H	15.0	53.98	74	20.02
7311.0	23.05	Ave	121	217	H	15.0	38.05	54	15.95

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
High Channel (2462 MHz)									
2462.0	97.53	PK	117	231	V	-3.2	95.91	/	/
2462.0	93.08	Ave	117	231	V	-3.2	86.72	/	/
2462.0	93.72	PK	116	193	H	-3.2	95.14	/	/
2462.0	89.06	Ave	116	193	H	-3.2	85.89	/	/
2483.5	43.51	PK	106	127	V	-3.2	62.37	74	11.63
2483.5	30.35	Ave	106	127	V	-3.2	46.88	54	7.12
2490.0	42.09	PK	63	163	V	-3.1	62.45	74	11.55
2490.0	34.44	Ave	63	163	V	-3.1	50.09	54	3.91
4924.0	34.62	PK	71	174	H	8.1	66.12	74	7.88
4924.0	27.77	Ave	71	174	H	8.1	50.59	54	3.41
6665.0	31.42	PK	217	243	H	13.4	44.82	74	29.18
6665.0	23.44	Ave	217	243	H	13.4	36.84	54	17.16
7386.0	26.22	PK	163	208	H	15.3	58.94	74	15.06
7386.0	20.17	Ave	163	208	H	15.3	50.34	54	3.66

802.11n-HT20 Mode:

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Low Channel (2412 MHz)									
2412.0	99.17	PK	114	168	V	-3.4	95.77	/	/
2412.0	87.41	Ave	114	168	V	-3.4	84.01	/	/
2412.0	98.94	PK	206	114	H	-3.4	95.54	/	/
2412.0	86.96	Ave	206	114	H	-3.4	83.56	/	/
2390.0	70.85	PK	347	162	V	-3.5	67.35	74	6.65
2390.0	49.74	Ave	347	162	V	-3.5	46.24	54	7.76
2376.0	64.46	PK	216	212	V	-3.5	60.96	74	13.04
2376.0	51.17	Ave	216	212	V	-3.5	47.67	54	6.33
4824.0	59.29	PK	38	211	H	7.3	66.59	74	7.41
4824.0	43.48	Ave	38	211	H	7.3	50.78	54	3.22
6667.0	36.45	PK	238	197	V	13.4	49.86	74	24.14
6667.0	22.76	Ave	238	197	V	13.4	36.17	54	17.83
7236.0	39.60	PK	236	238	H	14.5	54.05	74	19.95
7236.0	23.10	Ave	236	238	H	14.5	37.55	54	16.45

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Middle Channel (2437 MHz)									
2437.0	98.87	PK	268	158	V	-3.0	95.85	/	/
2437.0	87.50	Ave	268	158	V	-3.0	84.48	/	/
2437.0	98.15	PK	29	153	H	-3.0	95.13	/	/
2437.0	87.07	Ave	29	153	H	-3.0	84.05	/	/
1588.0	48.68	PK	0	123	V	-5.7	42.98	74	31.02
1588.0	27.15	Ave	0	123	V	-5.7	21.45	54	32.55
3670.0	37.66	PK	193	121	H	2.9	40.56	74	33.44
3670.0	24.25	Ave	193	121	H	2.9	27.15	54	26.85
4874.0	58.80	PK	84	116	V	7.9	66.70	74	7.30
4874.0	42.66	Ave	84	116	V	7.9	50.56	54	3.44
6608.0	36.36	PK	92	180	H	13.2	49.56	74	24.44
6608.0	22.78	Ave	92	180	H	13.2	35.98	54	18.02
7311.0	38.92	PK	319	240	H	15.0	53.92	74	20.08
7311.0	22.04	Ave	319	240	H	15.0	37.04	54	16.96

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
High Channel (2462 MHz)									
2462.0	97.94	PK	191	235	V	-3.2	95.93	/	/
2462.0	93.77	Ave	191	235	V	-3.2	84.24	/	/
2462.0	93.87	PK	255	107	H	-3.2	95.45	/	/
2462.0	89.07	Ave	255	107	H	-3.2	83.96	/	/
2483.5	45.51	PK	263	198	V	-3.2	68.66	74	5.34
2483.5	32.87	Ave	263	198	V	-3.2	47.47	54	6.53
2508.0	46.88	PK	326	228	V	-3.0	62.06	74	11.94
2508.0	36.84	Ave	326	228	V	-3.0	49.31	54	4.69
4924.0	34.43	PK	84	221	H	8.1	66.65	74	7.35
4924.0	29.34	Ave	84	221	H	8.1	50.87	54	3.13
6665.0	31.33	PK	12	137	H	13.4	50.01	74	23.99
6665.0	23.84	Ave	12	137	H	13.4	35.41	54	18.59
7386.0	27.06	PK	256	202	H	15.3	54.13	74	19.87
7386.0	22.49	Ave	256	202	H	15.3	38.05	54	15.95

BLE Mode:

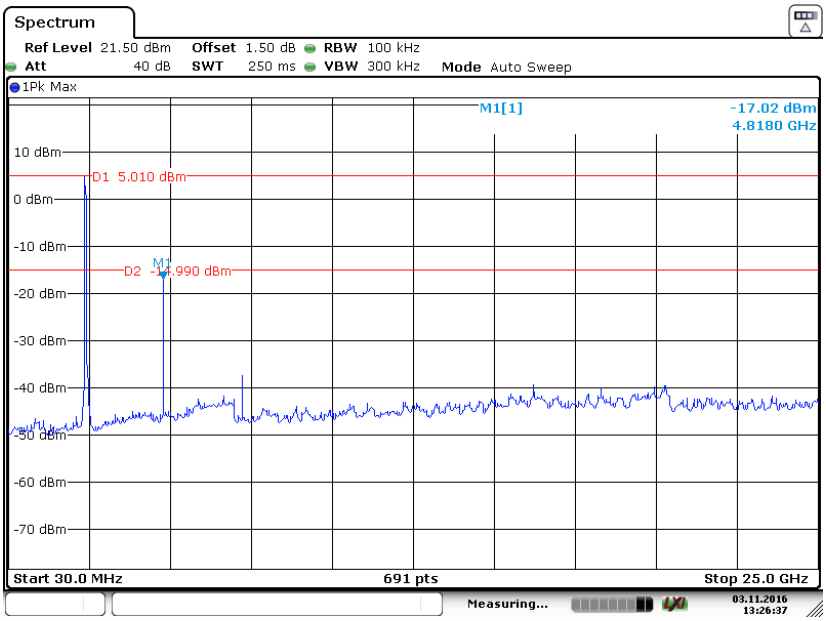
Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Low Channel (2402 MHz)									
2402.0	90.73	PK	166	154	V	-3.4	87.33	/	/
2402.0	89.06	Ave	166	154	V	-3.4	85.66	/	/
2402.0	91.27	PK	113	209	H	-3.4	87.87	/	/
2402.0	89.12	Ave	113	209	H	-3.4	85.72	/	/
2390.0	69.65	PK	228	195	V	-3.4	66.25	74	7.75
2390.0	39.93	Ave	228	195	V	-3.4	36.53	54	17.47
2382.0	73.74	PK	139	160	V	-3.4	70.34	74	3.66
2382.0	40.56	Ave	139	160	V	-3.4	37.16	54	16.84
1510.0	48.66	PK	20	192	H	-6.0	42.65	74	31.35
1510.0	27.05	Ave	20	192	H	-6.0	21.04	54	32.96
4804.0	52.97	PK	50	109	V	7.2	60.13	74	13.87
4804.0	43.24	Ave	50	109	V	7.2	50.40	54	3.60
7206.0	30.84	PK	145	106	H	16.0	46.84	74	27.16
7206.0	16.69	Ave	145	106	H	16.0	32.69	54	21.31

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Middle Channel (2440 MHz)									
2440.0	90.76	PK	270	166	V	-3.0	87.74	/	/
2440.0	88.84	Ave	270	166	V	-3.0	85.82	/	/
2440.0	91.80	PK	326	169	H	-3.0	88.78	/	/
2440.0	89.47	Ave	326	169	H	-3.0	86.45	/	/
1829.0	50.68	PK	209	161	V	-7.0	43.70	74	30.30
1829.0	28.88	Ave	209	161	V	-7.0	21.90	54	32.10
2868.0	44.35	PK	346	216	H	-5.4	38.92	74	35.08
2868.0	31.18	Ave	346	216	H	-5.4	25.75	54	28.25
4880.0	50.76	PK	305	211	V	7.3	58.02	74	15.98
4880.0	43.21	Ave	305	211	V	7.3	50.47	54	3.53
6677.0	37.53	PK	1	165	H	13.8	51.32	74	22.68
6677.0	20.64	Ave	1	165	H	13.8	34.43	54	19.57
7320.0	30.60	PK	314	135	H	16.3	46.93	74	27.07
7320.0	16.67	Ave	314	135	H	16.3	33.00	54	21.00

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
High Channel (2480MHz)									
2480.0	93.54	PK	47	228	V	-3.0	90.55	/	/
2480.0	89.28	Ave	47	228	V	-3.0	86.29	/	/
2480.0	91.73	PK	72	203	H	-3.0	88.74	/	/
2480.0	88.45	Ave	72	203	H	-3.0	85.46	/	/
2483.5	73.61	PK	236	194	V	-3.0	70.62	74	3.38
2483.5	46.24	Ave	236	194	V	-3.0	43.25	54	10.75
2511.0	71.88	PK	293	107	V	-2.6	69.28	74	4.72
2511.0	39.06	Ave	293	107	V	-2.6	36.46	54	17.54
4960.0	50.92	PK	357	204	H	7.4	58.32	74	15.68
4960.0	43.39	Ave	357	204	H	7.4	50.79	54	3.21
6681.0	37.84	PK	185	139	H	14.0	51.84	74	22.16
6681.0	21.55	Ave	185	139	H	14.0	35.55	54	18.46
7440.0	27.90	PK	90	109	H	19.8	47.70	74	26.30
7440.0	14.06	Ave	90	109	H	19.8	33.86	54	20.14

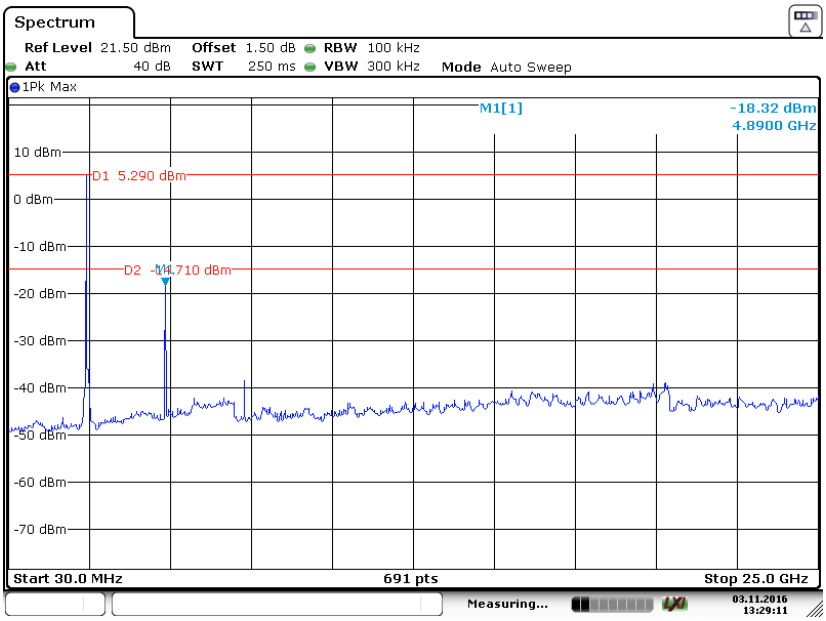
Conducted Spurious Emissions at Antenna Port

802.11b Low Channel



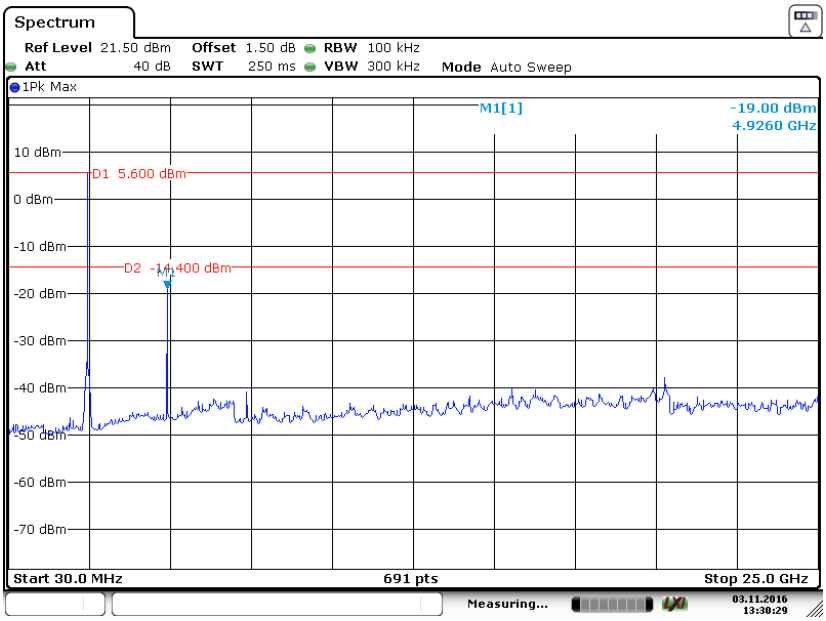
Date: 3.NOV.2016 13:26:38

802.11b Middle Channel



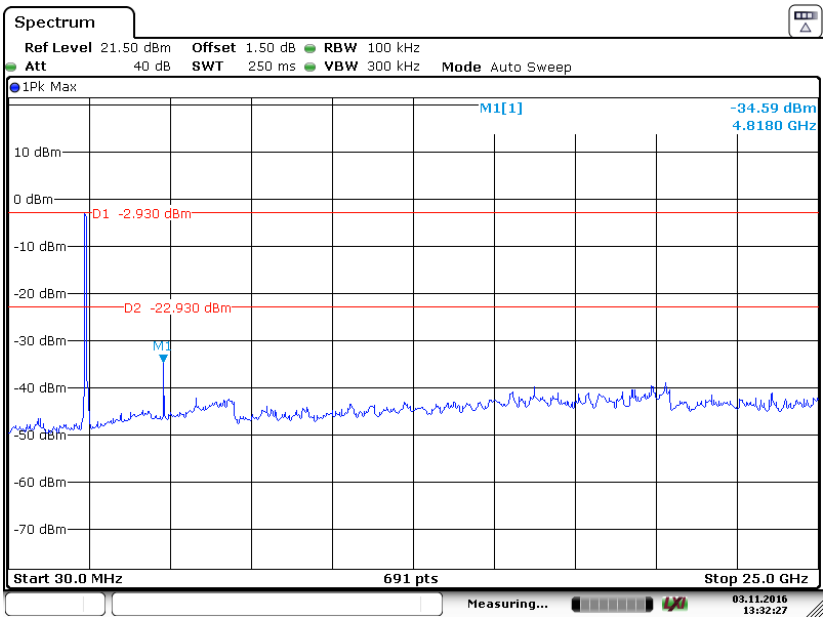
Date: 3.NOV.2016 13:29:10

802.11b High Channel



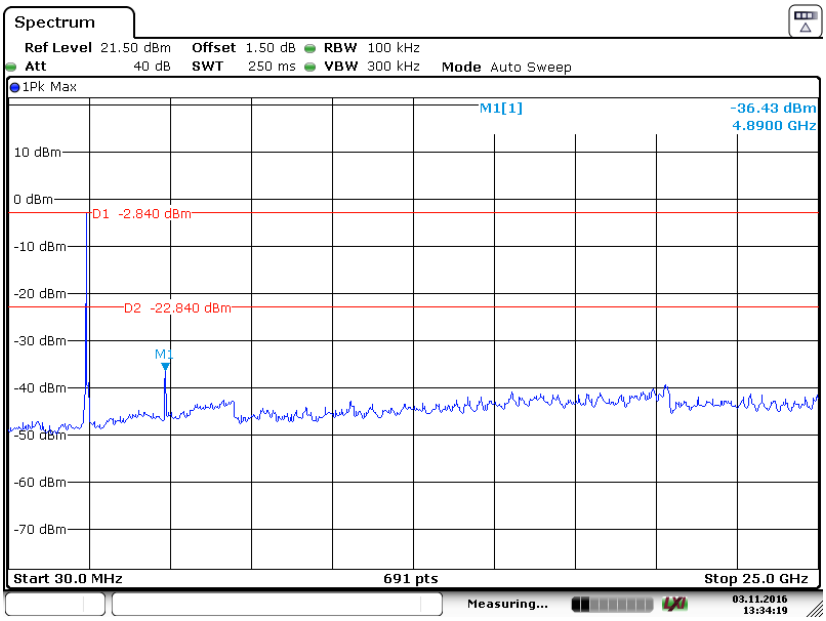
Date: 3.NOV.2016 13:30:29

802.11g Low Channel



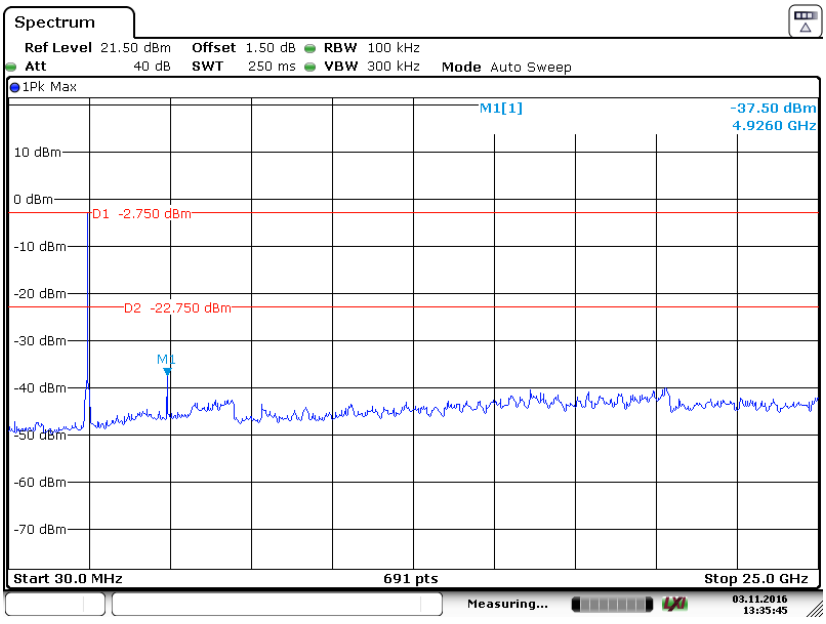
Date: 3.NOV.2016 13:32:27

802.11g Middle Channel



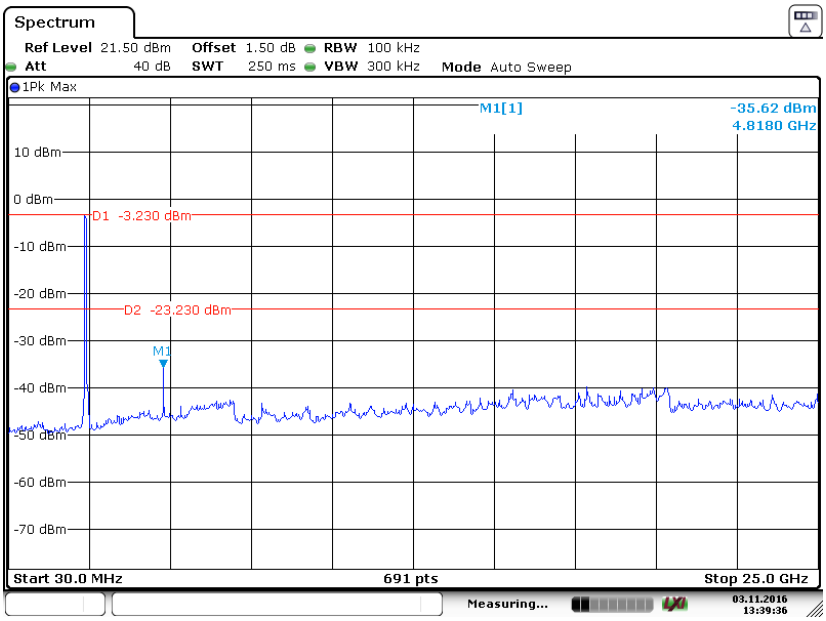
Date: 3.NOV.2016 13:34:19

802.11g High Channel



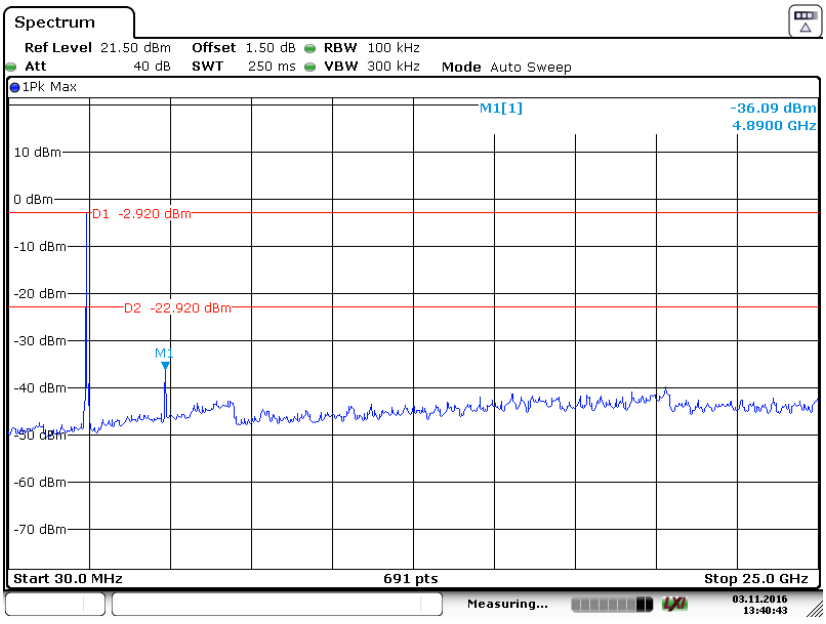
Date: 3.NOV.2016 13:35:46

802.11n-HT20 Low Channel



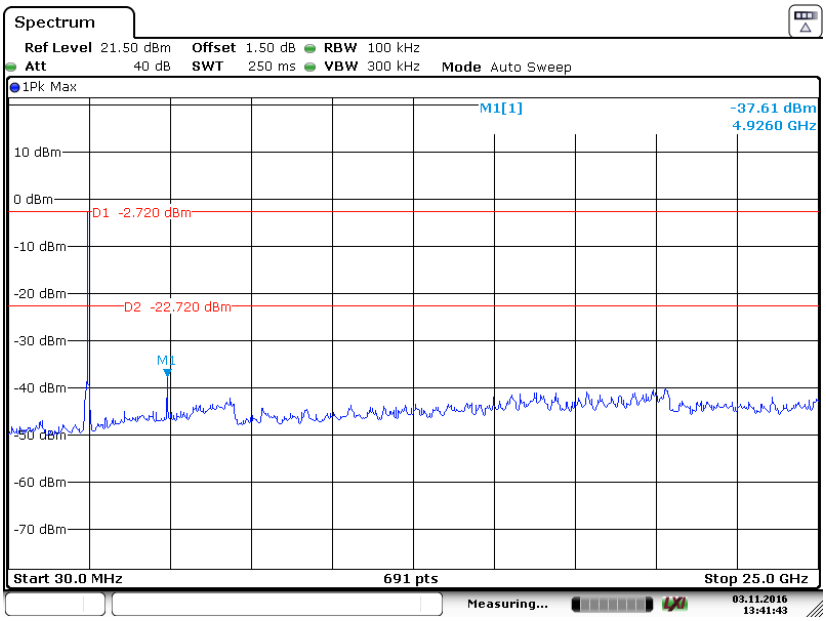
Date: 3.NOV.2016 13:39:36

802.11n-HT20 Middle Channel



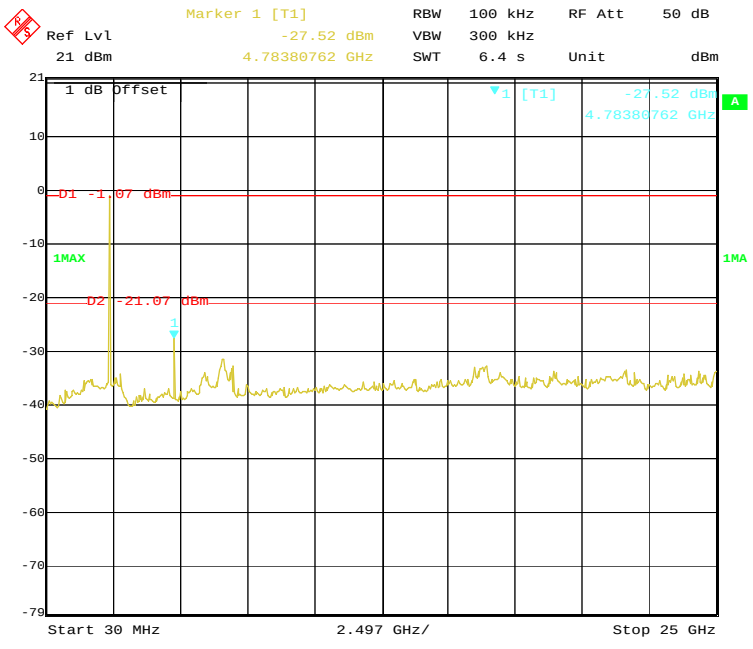
Date: 3.NOV.2016 13:40:43

802.11n-HT20 High Channel



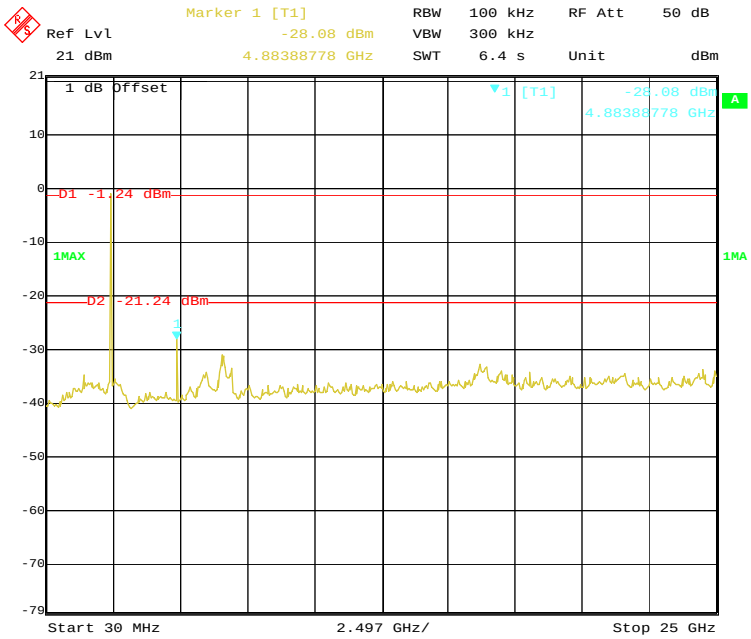
Date: 3.NOV.2016 13:41:43

BLE Mode Low Channel



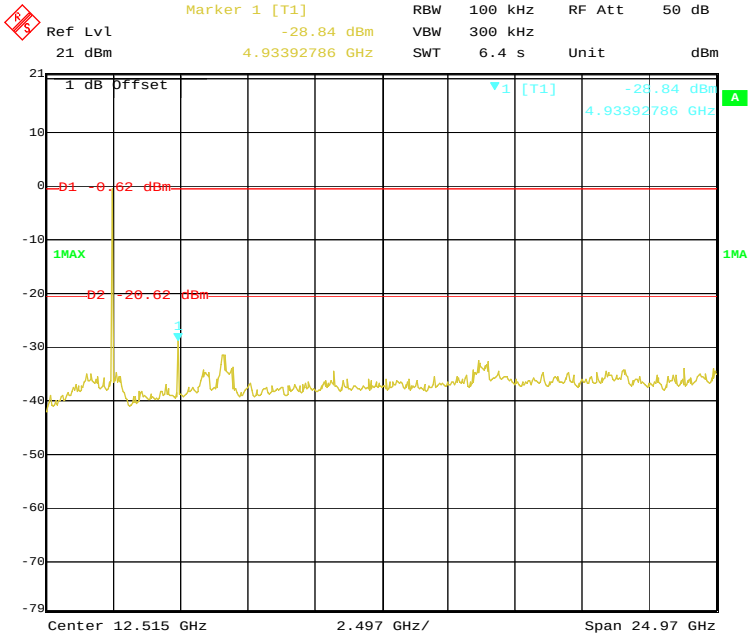
Date: 25.OCT.2016 16:51:06

BLE Mode Middle Channel



Date: 25.OCT.2016 16:52:50

BLE Mode High Channel



Date: 25.OCT.2016 16:54:01

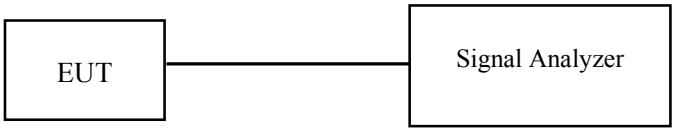
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2016-07-04	2017-07-03
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2016-09-21	2017-09-21
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15

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

Test Data

Environmental Conditions

Temperature:	27 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Chris Wang on 2016-10-25 to 2016-11-03.

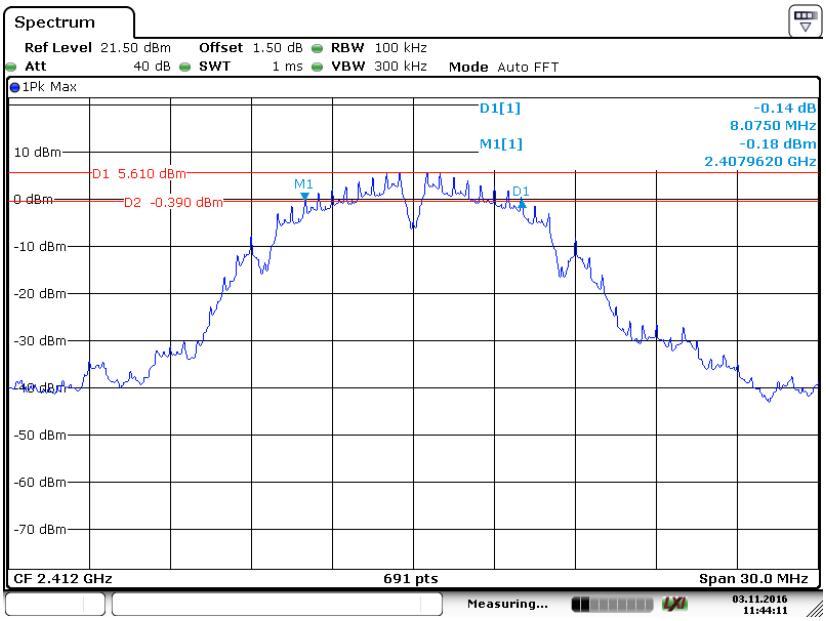
Test Result: Pass.

Please refer to the following tables and plots.

EUT operation mode: Transmitting

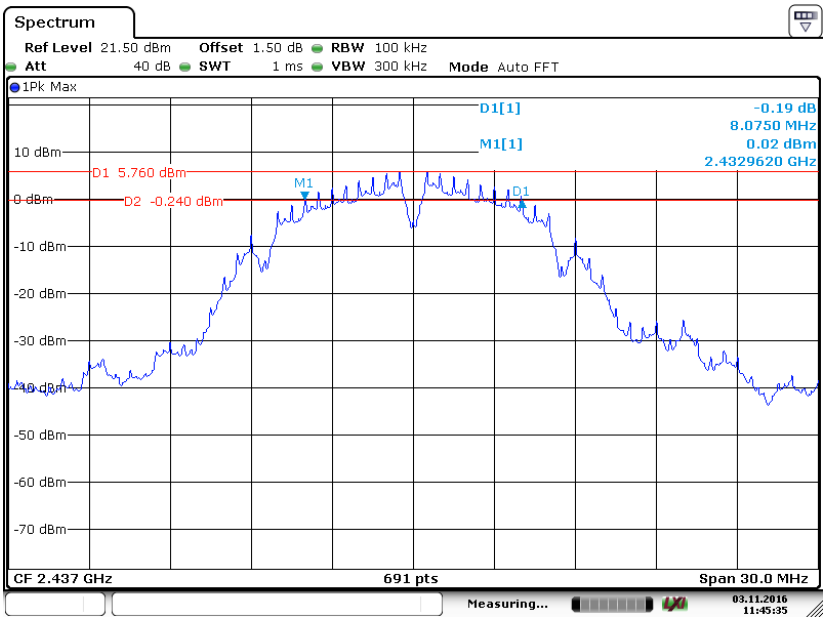
Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b mode			
Low	2412	8.075	≥0.5
Middle	2437	8.075	≥0.5
High	2462	8.075	≥0.5
802.11g mode			
Low	2412	16.411	≥0.5
Middle	2437	16.411	≥0.5
High	2462	16.411	≥0.5
802.11n-HT20 mode			
Low	2412	17.627	≥0.5
Middle	2437	17.627	≥0.5
High	2462	17.627	≥0.5
BLE mode			
Low	2402	1.100	≥0.5
Middle	2440	1.106	≥0.5
High	2480	1.106	≥0.5

802.11b Low Channel



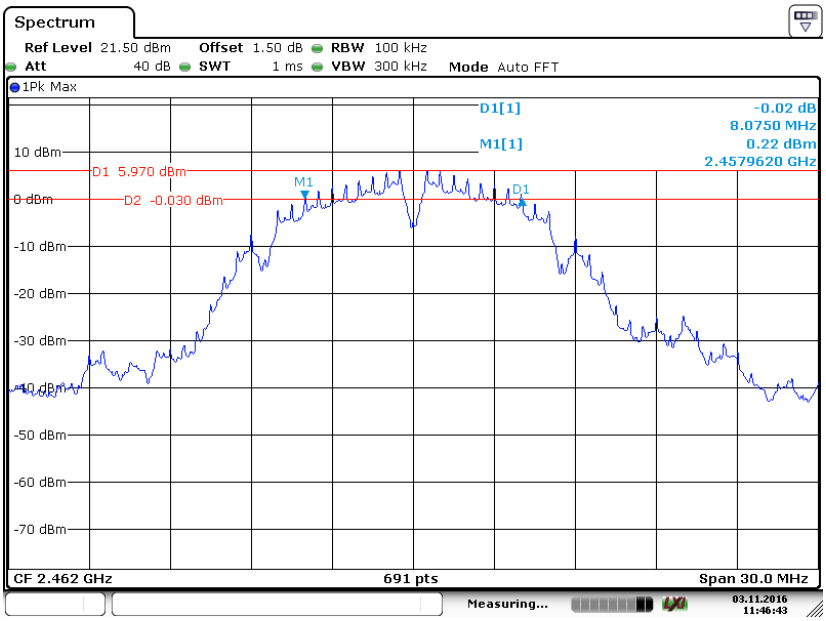
Date: 3.NOV.2016 11:44:10

802.11b Middle Channel



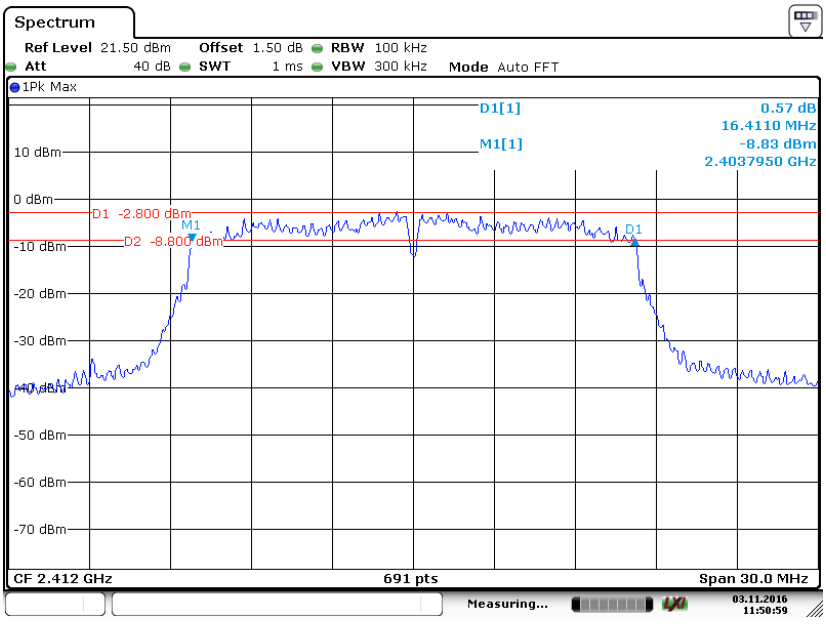
Date: 3.NOV.2016 11:45:34

802.11b High Channel



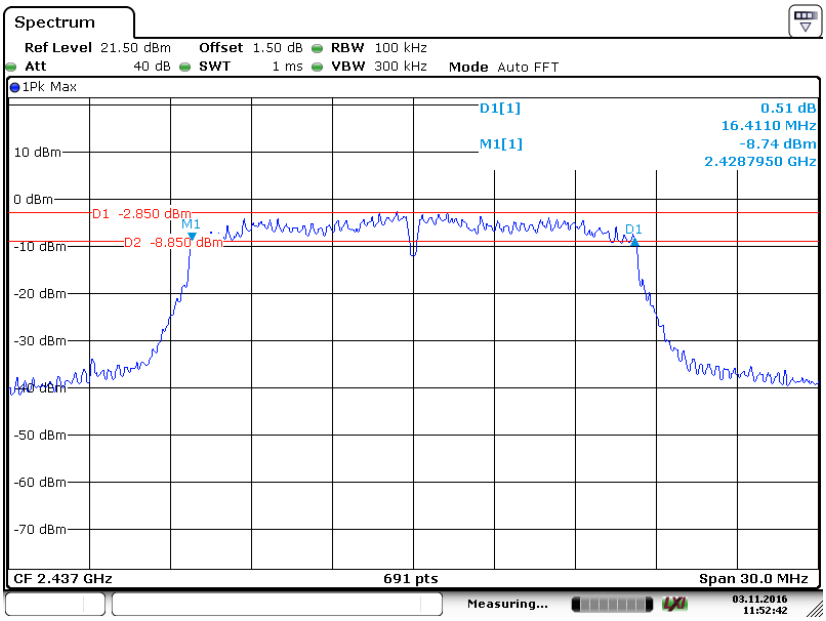
Date: 3.NOV.2016 11:46:43

802.11g Low Channel



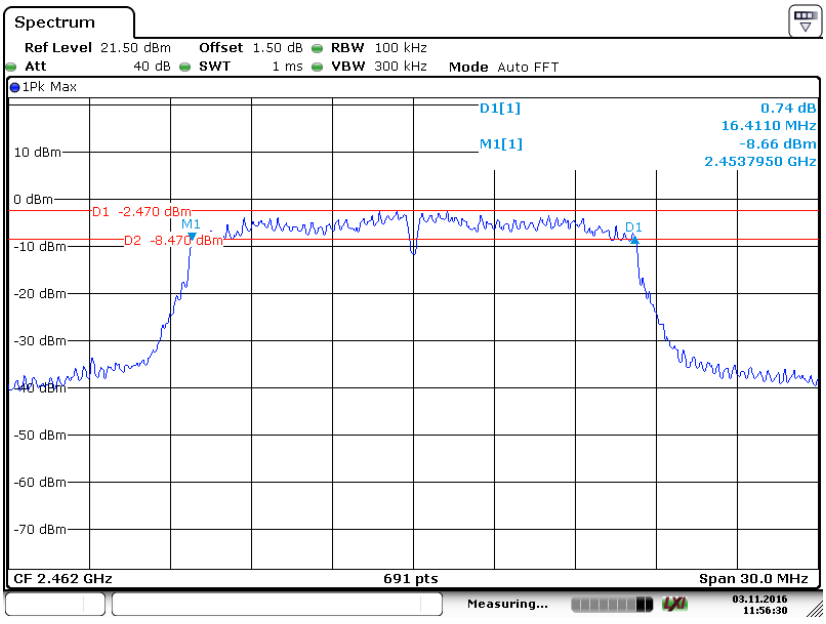
Date: 3.NOV.2016 11:50:59

802.11g Middle Channel



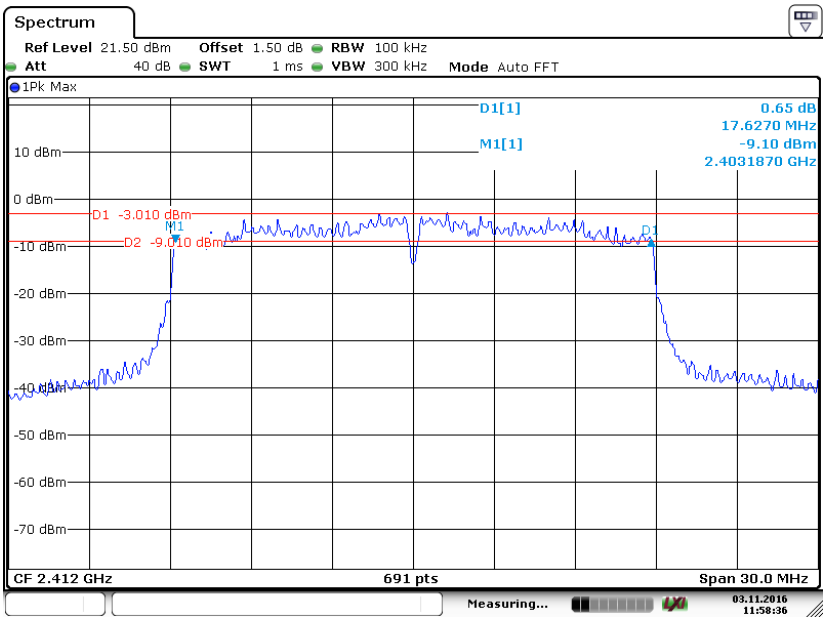
Date: 3.NOV.2016 11:52:42

802.11g High Channel



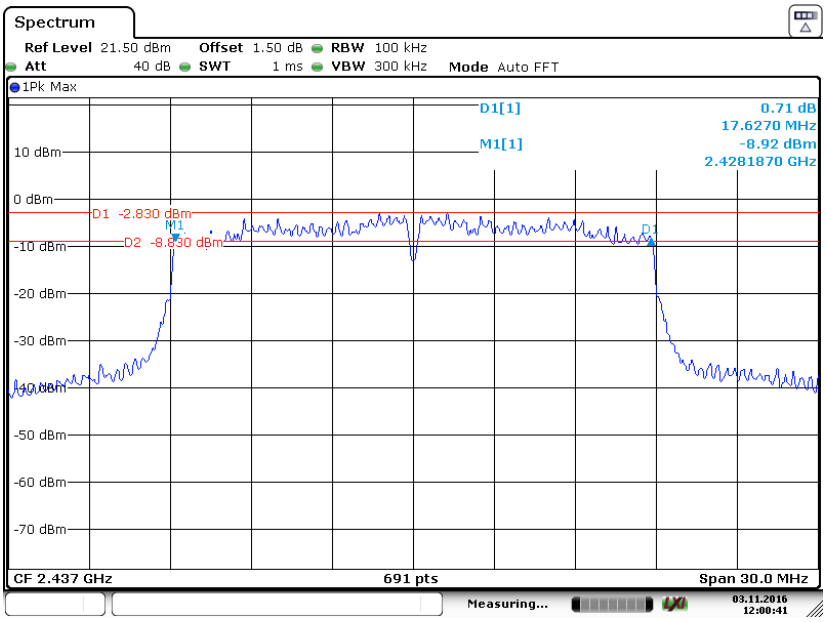
Date: 3.NOV.2016 11:56:30

802.11n-HT20 Low Channel



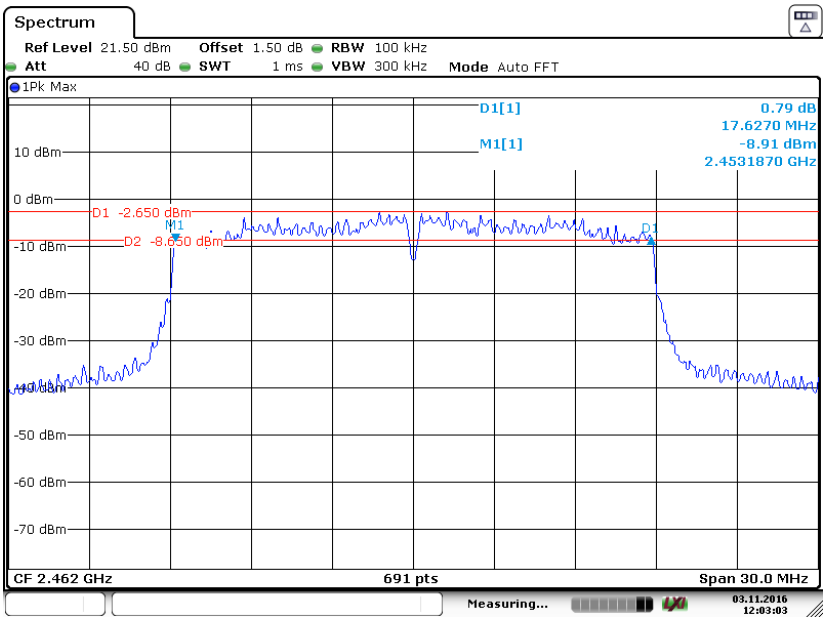
Date: 3.NOV.2016 11:58:36

802.11n-HT20 Middle Channel



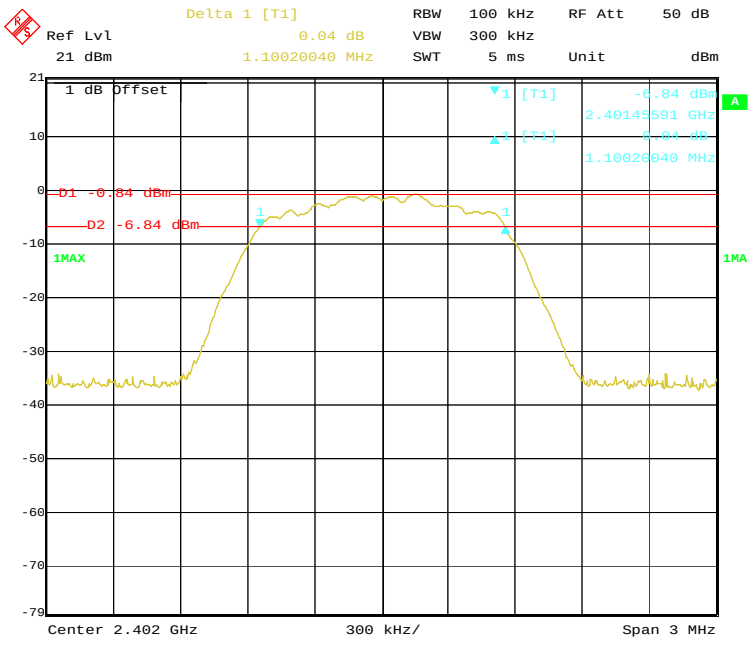
Date: 3.NOV.2016 12:00:42

802.11n-HT20 High Channel



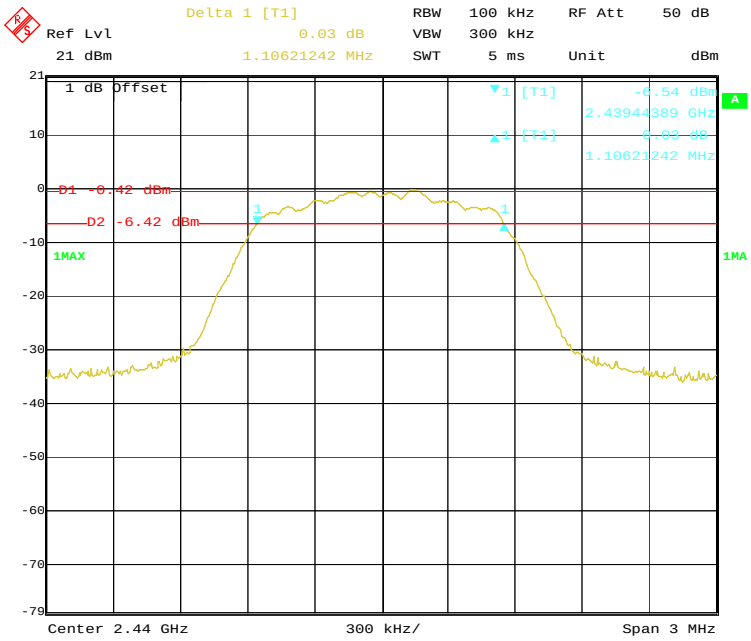
Date: 3.NOV.2016 12:03:04

BLE Mode Low Channel

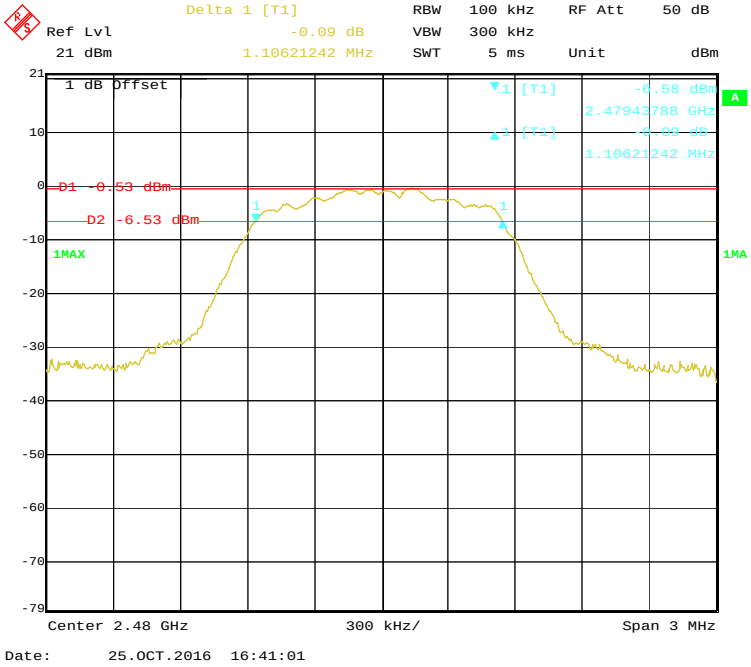


Date: 25.OCT.2016 16:35:02

BLE Mode Middle Channel



BLE Mode High Channel



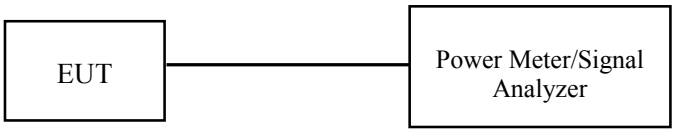
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

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

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one 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	Power Meter	N1912A	MY5000492	2016-11-18	2017-11-17
Agilent	Power Sensor	N1921A	MY54210024	2016-11-18	2017-11-17
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2016-07-04	2017-07-03
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2016-9-20	2017-9-20
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15

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

Test Data

Environmental Conditions

Temperature:	26℃
Relative Humidity:	54 %
ATM Pressure:	101.2 kPa

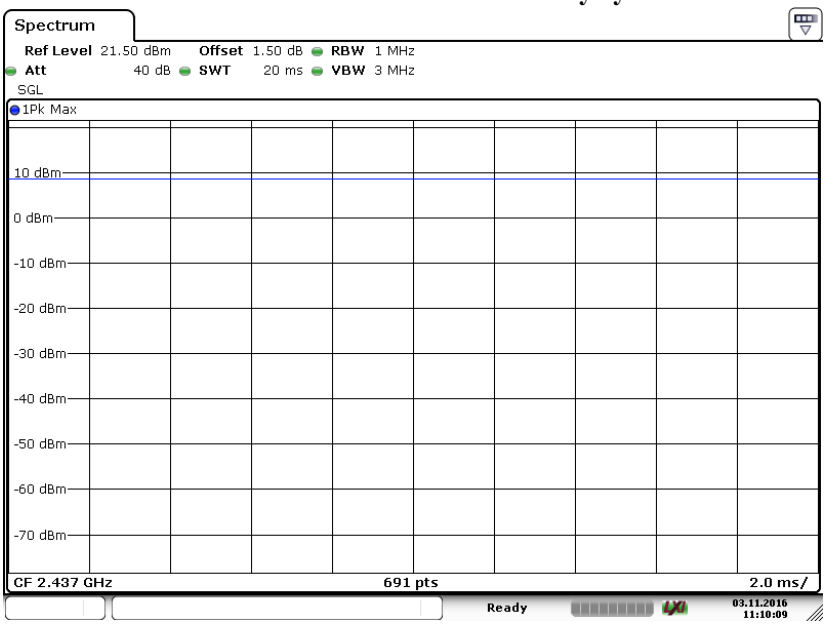
The testing was performed by Chris Wang on2016-10-25 to 2016-11-03.

EUT operation mode: Transmitting

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Conducted Average Output Power Reading (dBm)	Corrected Factor 10log(1/x) (dB)	Conducted Average Output Power (dBm)	Limit (dBm)	Result
802.11b							
Low	2412	16.65	14.44	0	14.44	30	Pass
Middle	2437	16.88	14.71	0	14.71	30	Pass
High	2462	16.98	14.97	0	14.97	30	Pass
802.11g							
Low	2412	17.60	13.83	0.79	14.62	30	Pass
Middle	2437	17.45	14.17	0.79	14.96	30	Pass
High	2462	17.77	14.75	0.79	15.54	30	Pass
802.11n-HT20							
Low	2412	16.77	13.56	0.85	14.41	30	Pass
Middle	2437	16.96	13.54	0.85	14.39	30	Pass
High	2462	17.15	13.87	0.85	14.72	30	Pass
BLE mode							
Low	2402	2.70	2.68	0	2.68	30	Pass
Middle	2440	3.06	3.06	0	3.06	30	Pass
High	2480	3.31	3.12	0	3.12	30	Pass

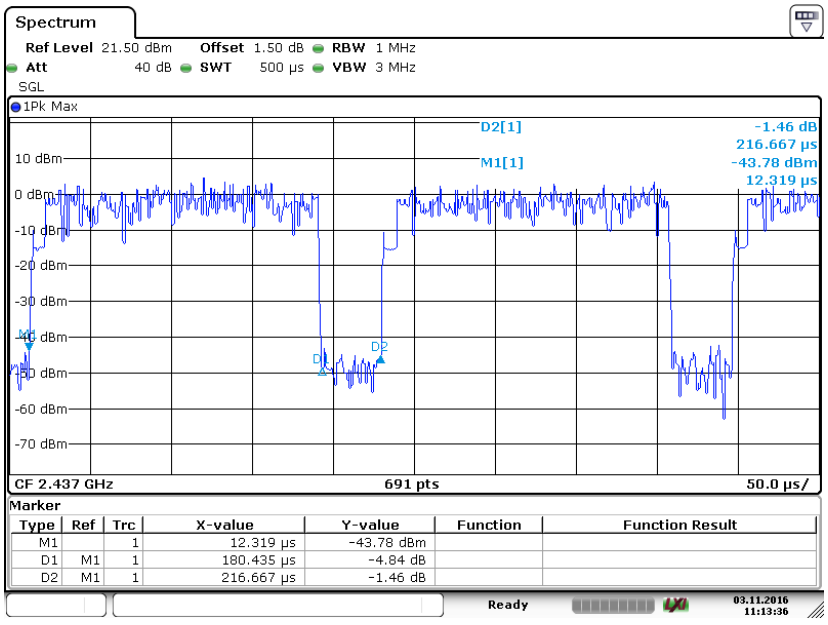
Note: x is the duty cycle. For 802.11b: x=1.0, 802.11g: x=0.833, 802.11n20: x=0.823, BLE: x=1.0.
Conducted Average Output Power= Reading+ Corrected Factor
The reading value is reading from the test software.

802.11b Mode Middle Channel duty cycle



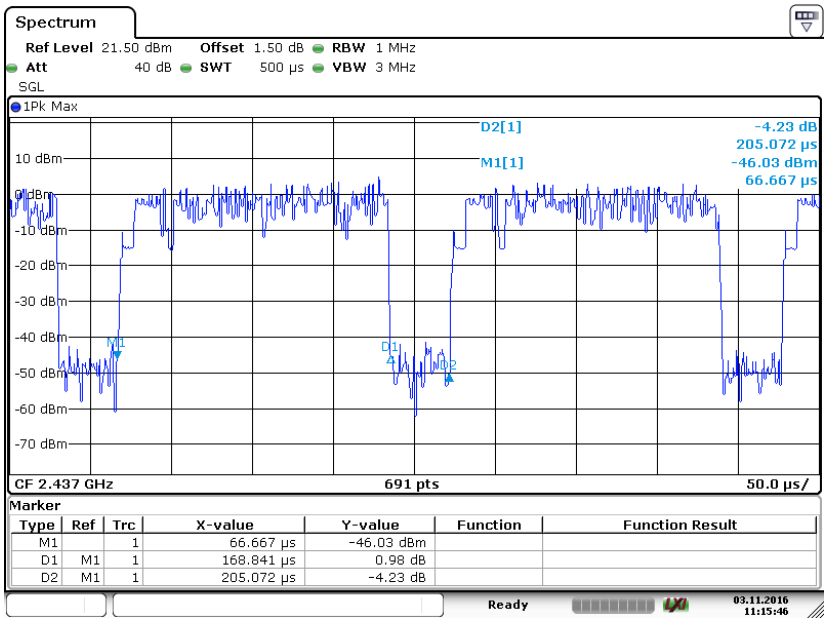
Date:3.NOV.2016 11:10:10

802.11g Mode Middle Channel duty cycle



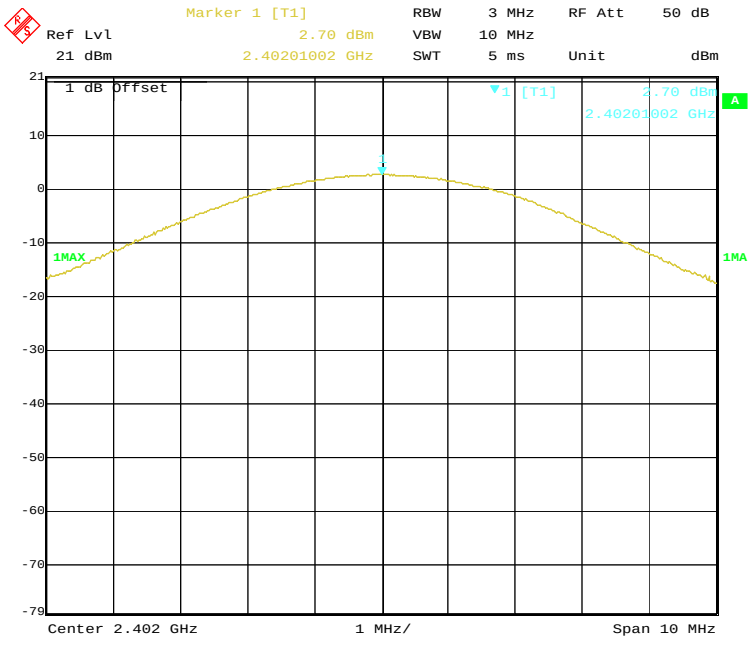
Date:3.NOV.2016 11:13:36

802.11n20 Mode Middle Channel duty cycle



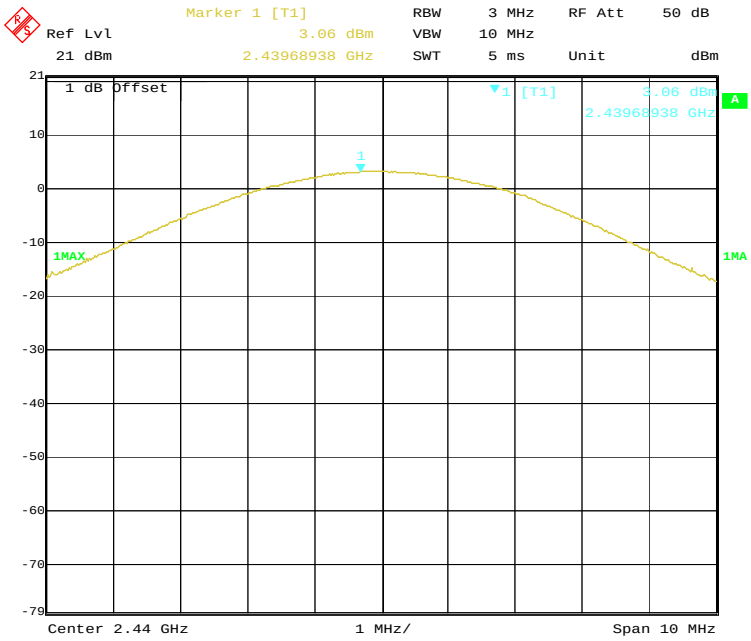
Date:3.NOV.2016 11:15:47

BLE Mode Low Channel power

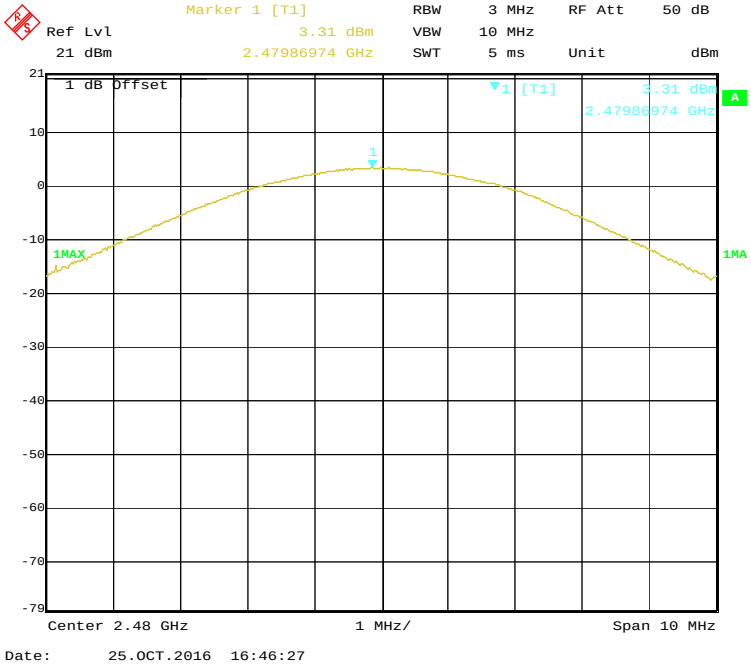


Date: 25.OCT.2016 16:42:44

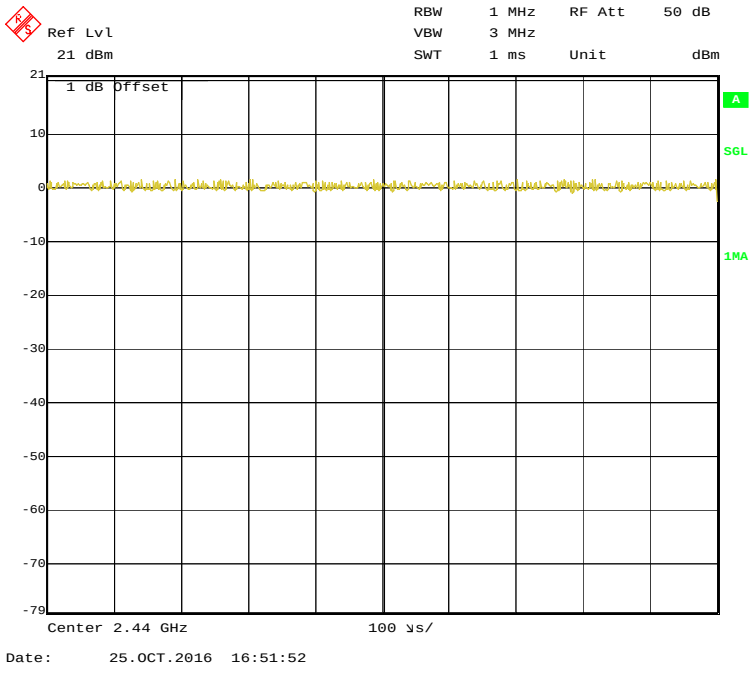
BLE Mode Middle Channel power



BLE Mode High Channel power



BLE Mode Middle Channel duty cycle



FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2016-07-04	2017-07-03
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2016-09-21	2017-09-21
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15

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

Test Data

Environmental Conditions

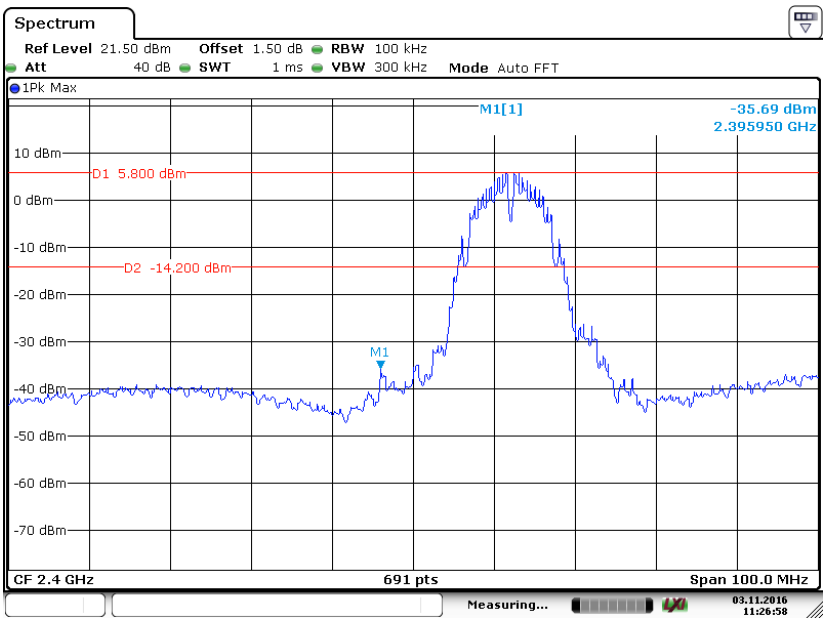
Temperature:	27.1 ℃
Relative Humidity:	55 %
ATM Pressure:	101.3 kPa

The testing was performed by Chris Wang on 2016-10-25 to 2016-11-03.

Test Result: *Compliance*

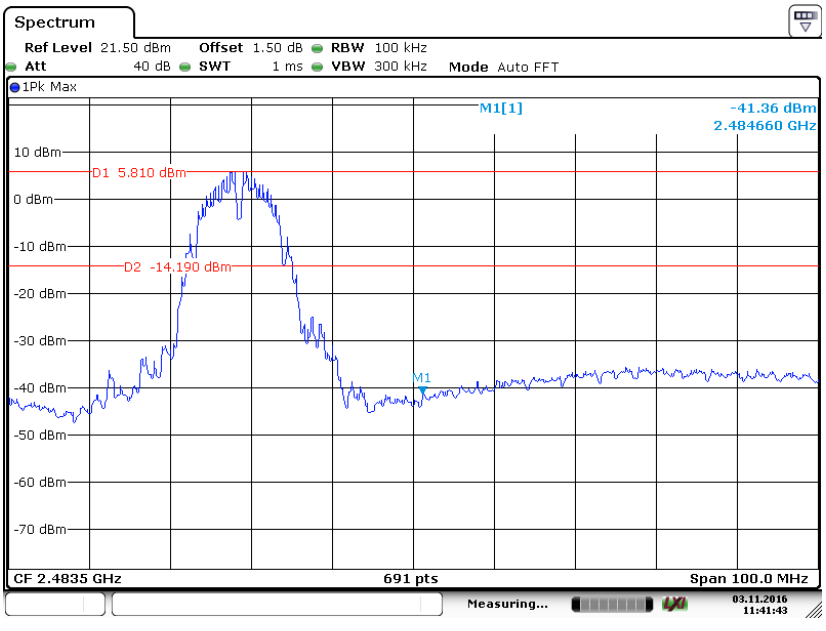
Please refer to the following table and plots.

802.11b: Band Edge, Left Side



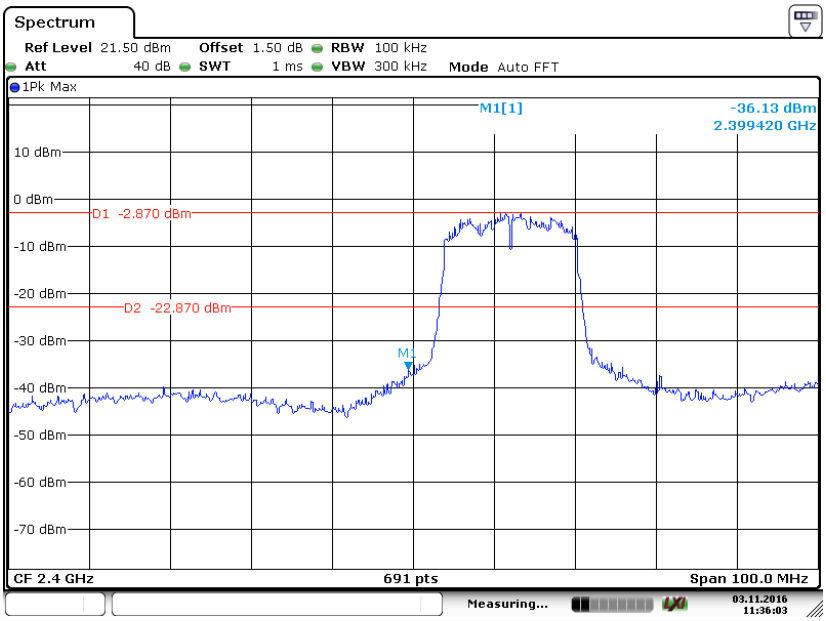
Date: 3.NOV.2016 11:26:59

802.11b: Band Edge, Right Side



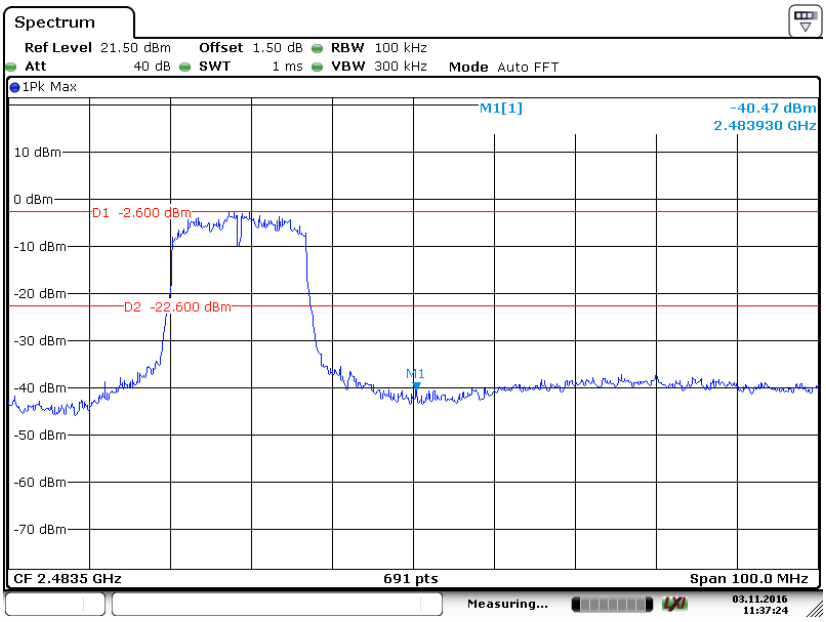
Date: 3.NOV.2016 11:41:43

802.11g: Band Edge, Left Side



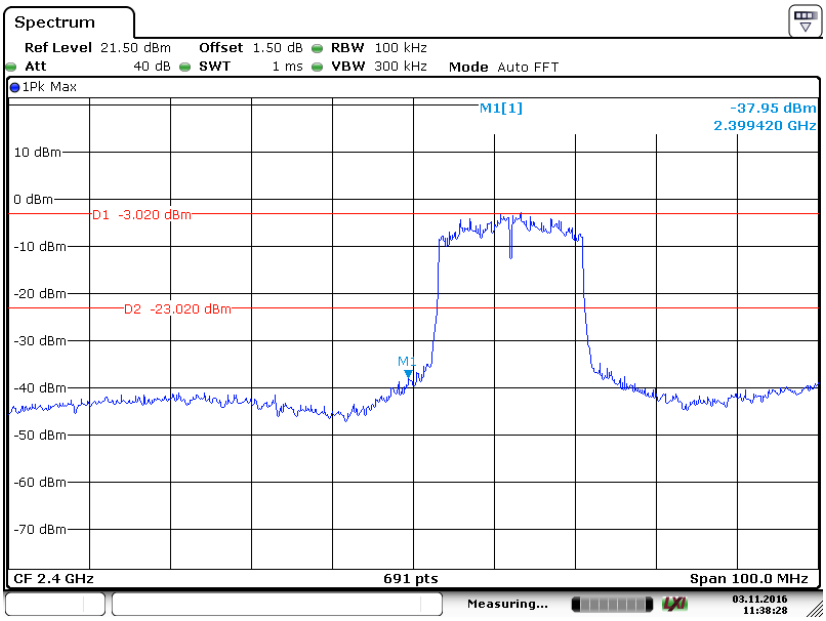
Date: 3.NOV.2016 11:36:04

802.11g: Band Edge, Right Side



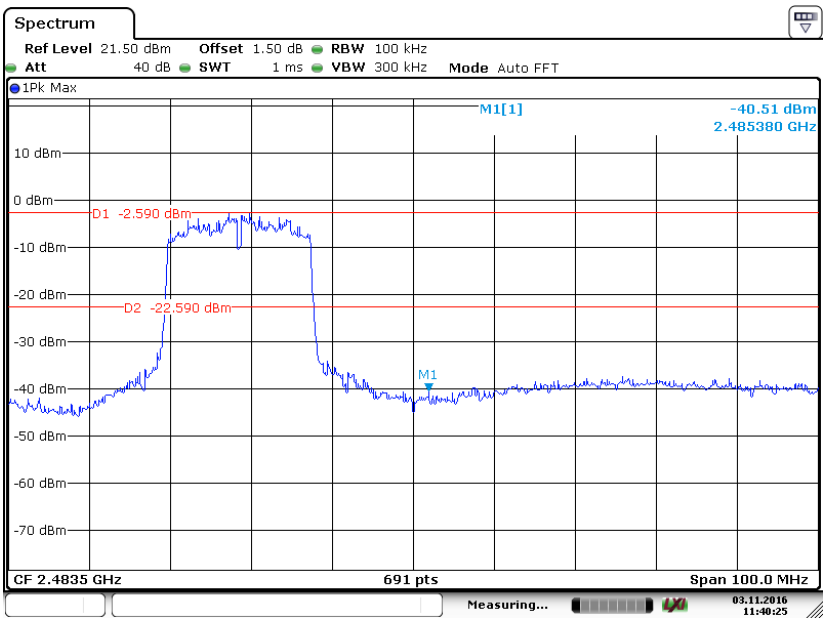
Date: 3.NOV.2016 11:37:24

802.11n-HT20: Band Edge, Left Side



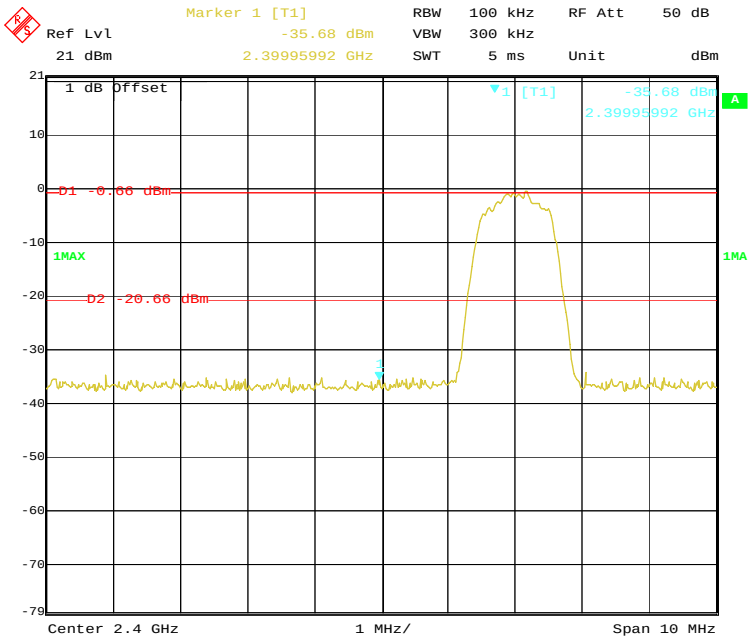
Date: 3.NOV.2016 11:38:28

802.11n-HT20: Band Edge, Right Side

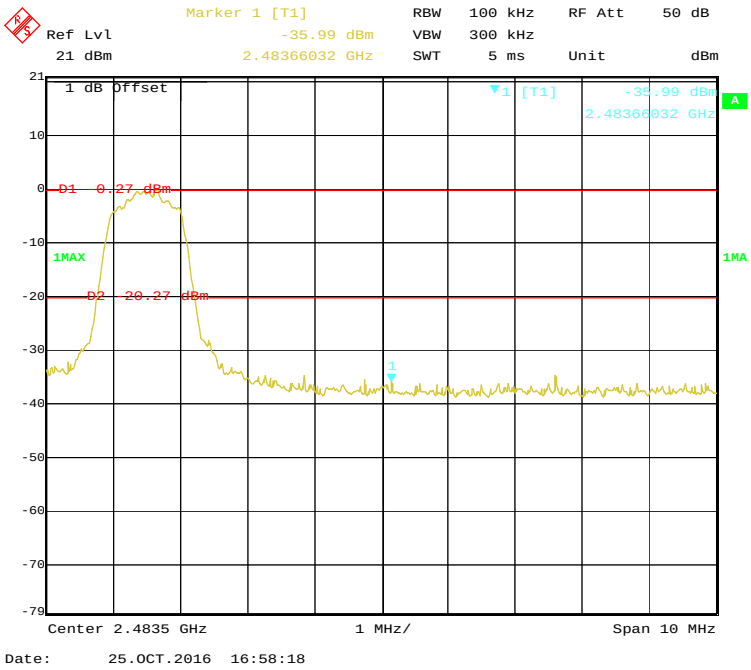


Date: 3.NOV.2016 11:40:26

BLE: Band Edge, Left Side



BLE: Band Edge, Right Side



FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

According to KDB558074 D01 DTS Meas Guidance v03r05.

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×RBW.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2016-07-04	2017-07-03
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2016-09-21	2017-09-21
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15

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

Test Data

Environmental Conditions

Temperature:	27.1 ℃
Relative Humidity:	54 %
ATM Pressure:	101.3 kPa

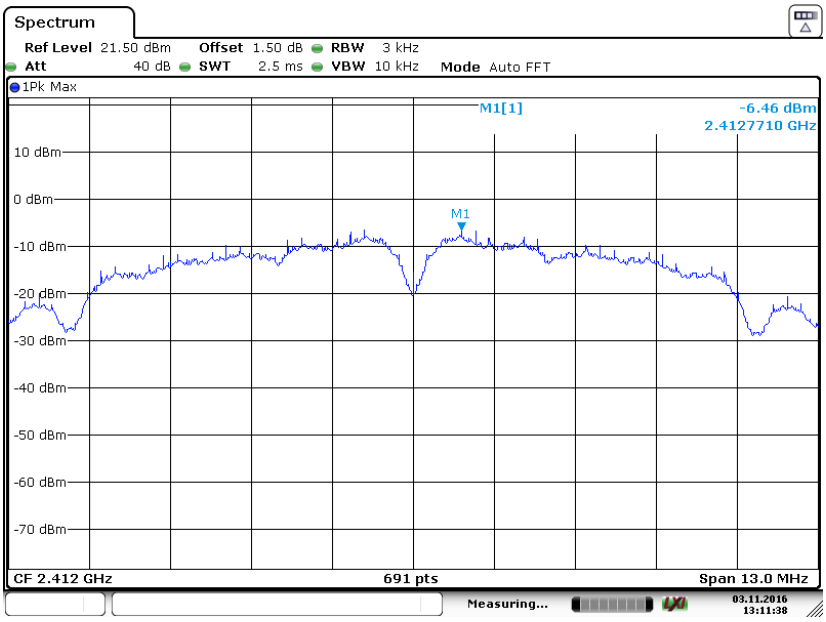
The testing was performed by Chris Wang on 2016-10-25 to 2016-11-03.

EUT operation mode: Transmitting

Test Result: Pass

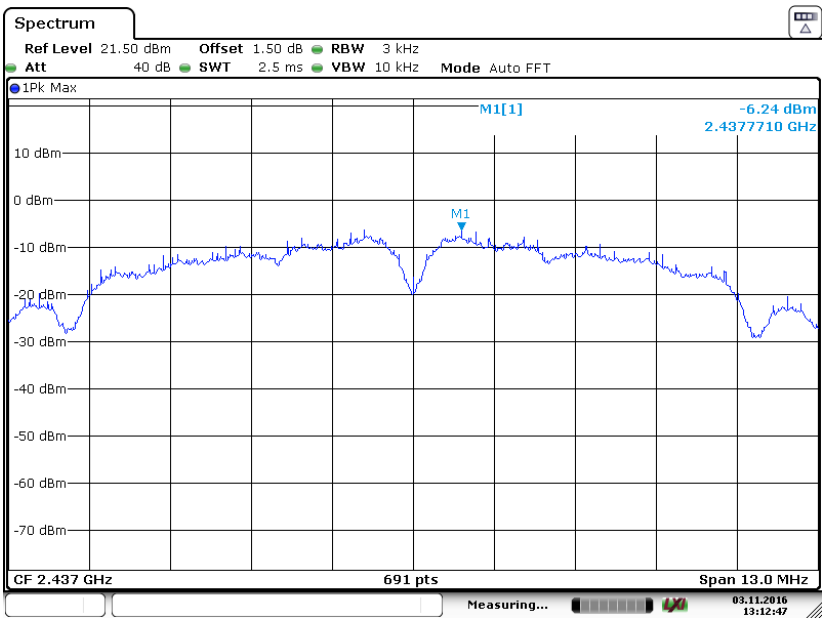
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b mode			
Low	2412	-6.46	≤8
Middle	2437	-6.24	≤8
High	2462	-6.06	≤8
802.11g mode			
Low	2412	-15.75	≤8
Middle	2437	-15..38	≤8
High	2462	-14.97	≤8
802.11n-HT20 mode			
Low	2412	-16.72	≤8
Middle	2437	-16.31	≤8
High	2462	-16.06	≤8
BLE mode			
Low	2402	-15.86	≤8
Middle	2440	-15.43	≤8
High	2480	-14.78	≤8

Power Spectral Density , 802.11b Low Channel



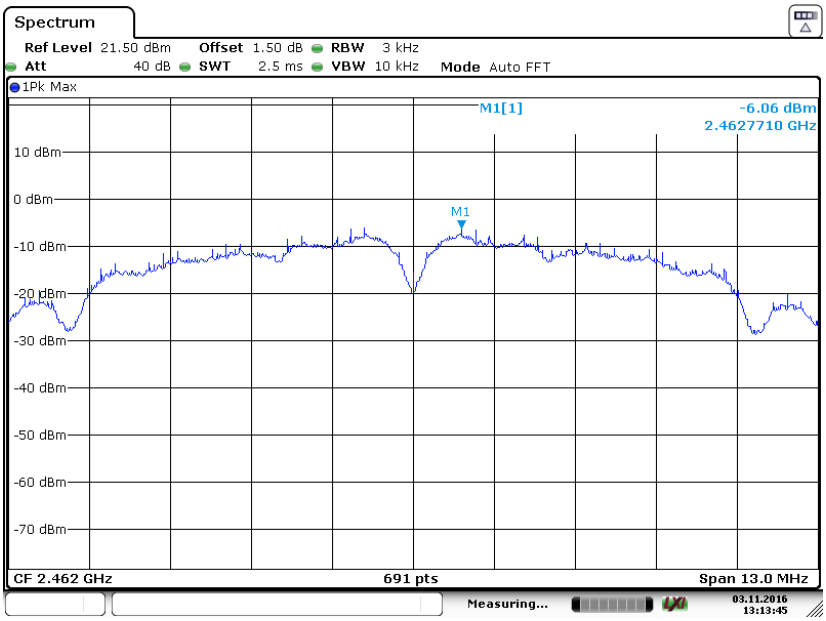
Date: 3.NOV.2016 13:11:38

Power Spectral Density , 802.11b Middle Channel



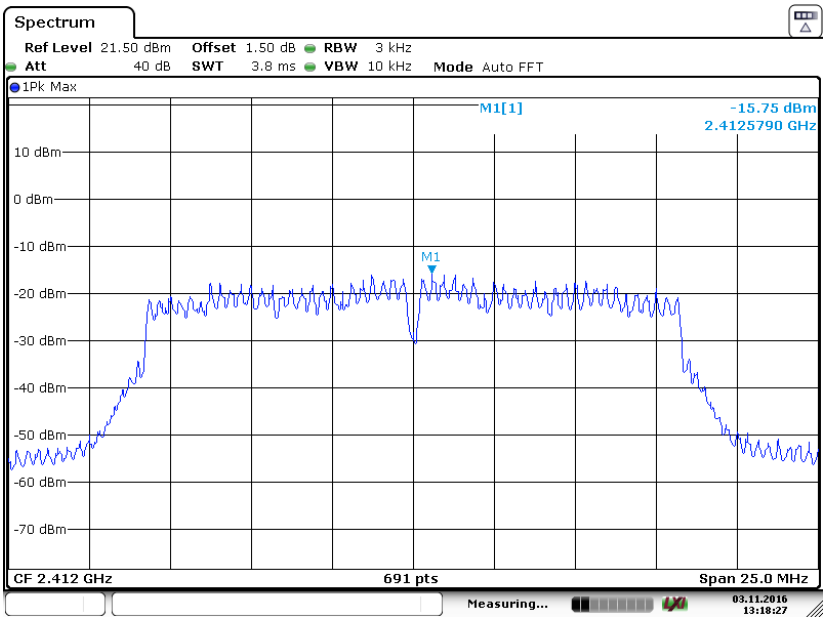
Date: 3.NOV.2016 13:12:47

Power Spectral Density , 802.11b High Channel



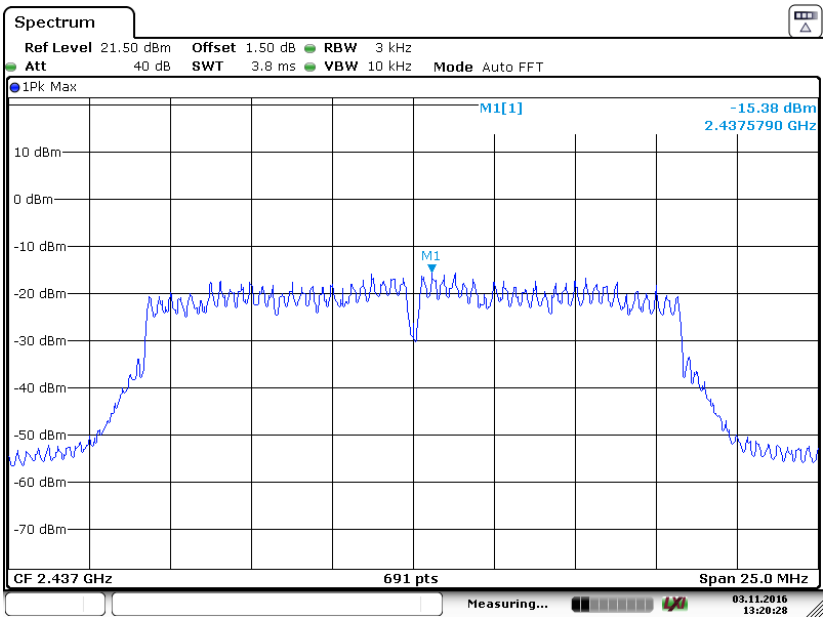
Date: 3.NOV.2016 13:13:45

Power Spectral Density , 802.11g Low Channel



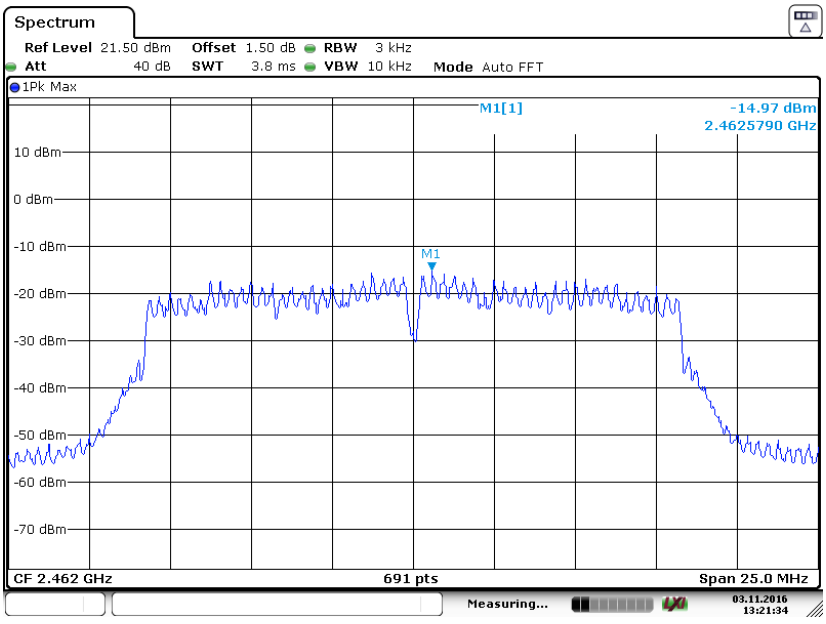
Date: 3.NOV.2016 13:18:26

Power Spectral Density , 802.11g Middle Channel



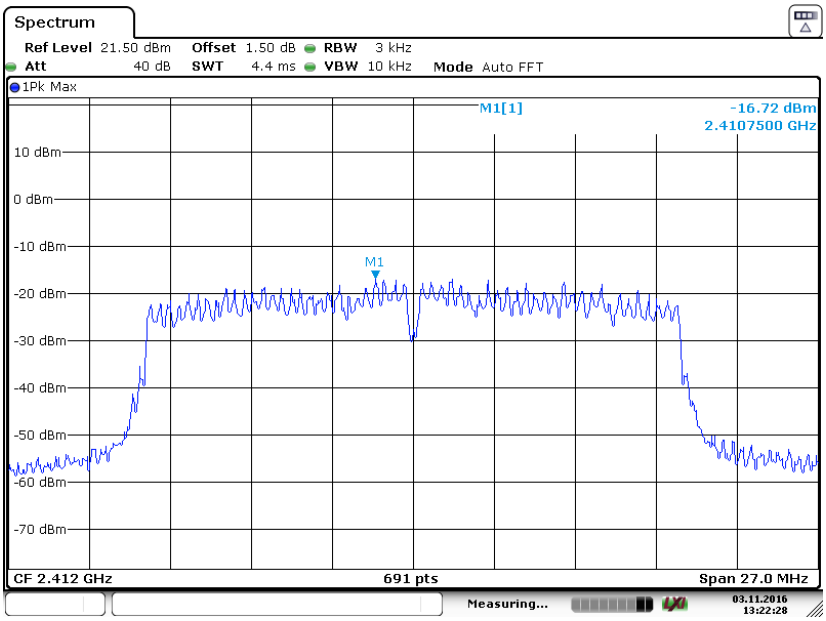
Date: 3.NOV.2016 13:20:28

Power Spectral Density , 802.11g High Channel



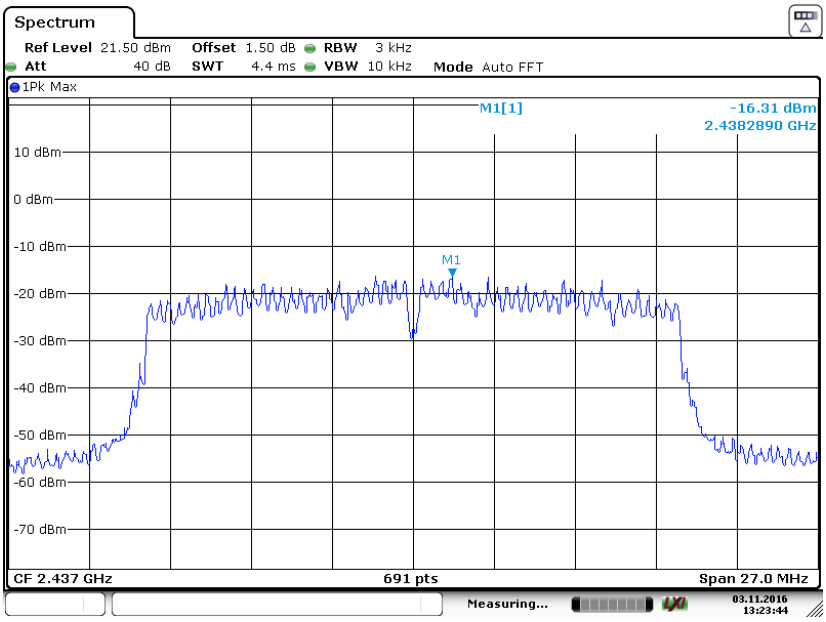
Date: 3.NOV.2016 13:21:34

Power Spectral Density , 802.11n-HT20 Low Channel



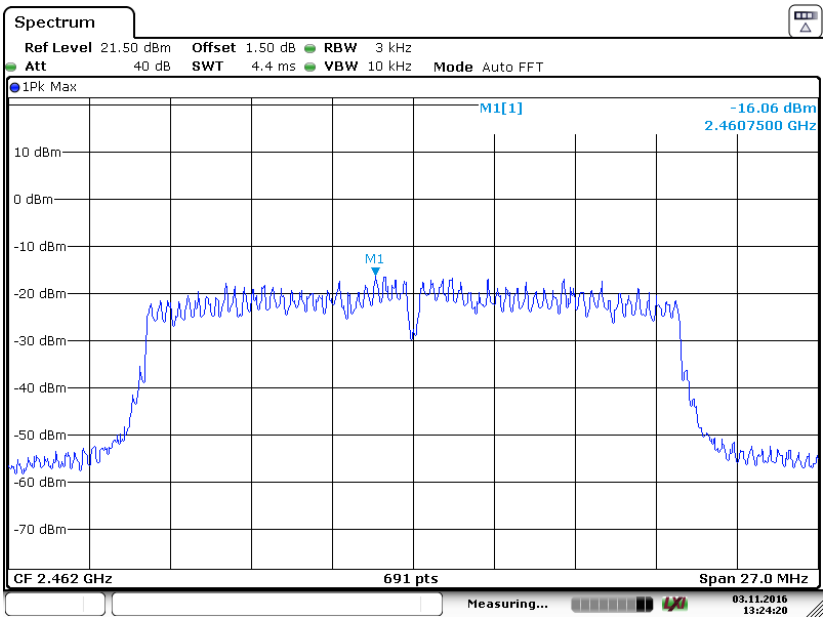
Date: 3.NOV.2016 13:22:28

Power Spectral Density , 802.11n-HT20 Middle Channel



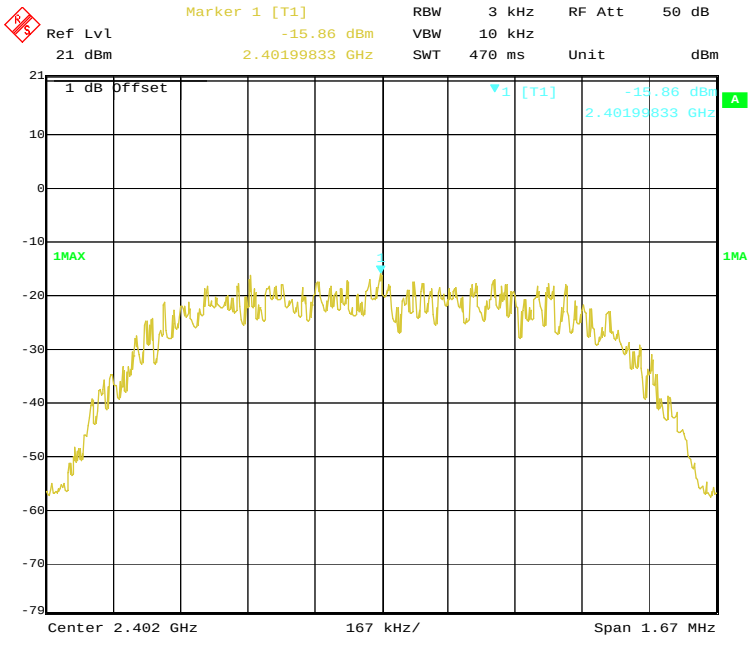
Date: 3.NOV.2016 13:23:44

Power Spectral Density , 802.11n-HT20 High Channel



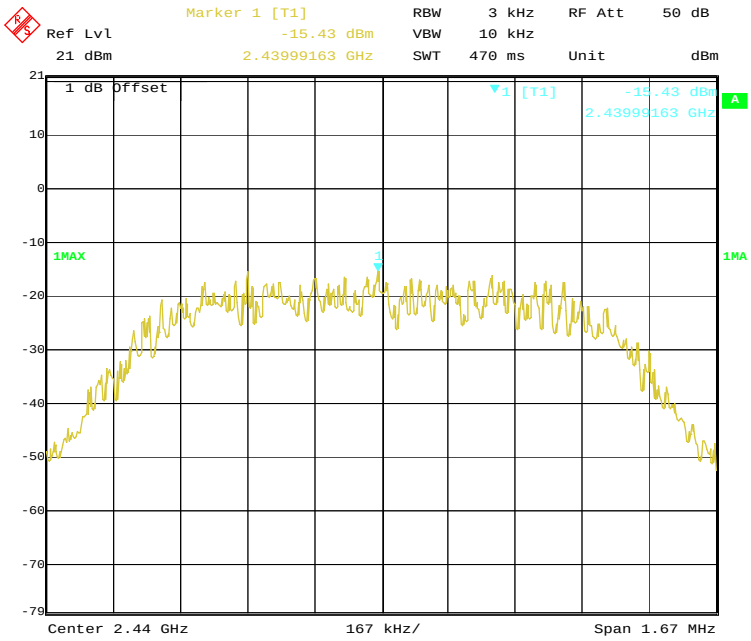
Date:3.NOV.2016 13:24:20

Power Spectral Density , BLE Mode Low Channel

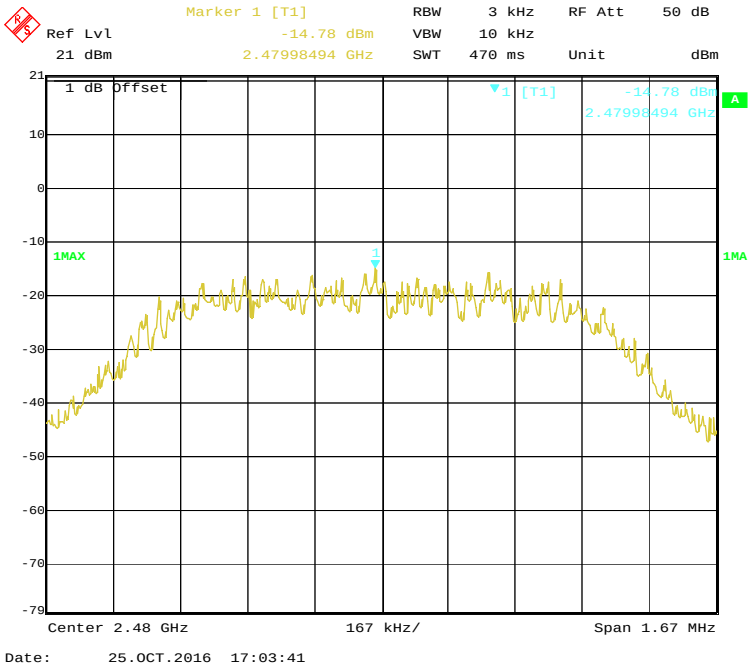


Date: 25.OCT.2016 17:02:17

Power Spectral Density , BLE Mode Middle Channel



Power Spectral Density , BLE Mode High Channel



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