



TESTING LABORATORY
CERTIFICATE #4820.01



FCC PART 15.247

TEST REPORT

For

Delta Electronics Incorporated

3 Tungyuan Road Chungli Industrial Zone Taoyuan County 32063, Taiwan

FCC ID: H79Z1H

Report Type: Original Report	Product Name: HD Pocket Projector
Report Number: RDG190705015-00C	
Report Date: 2019-08-06	
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TABLE OF CONTENTS

GENERAL INFORMATION.....	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY	4
MEASUREMENT UNCERTAINTY	5
TEST FACILITY	5
SYSTEM TEST CONFIGURATION.....	6
DESCRIPTION OF TEST CONFIGURATION	6
EUT EXERCISE SOFTWARE	6
EQUIPMENT MODIFICATIONS	11
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS	11
SUPPORT CABLE LIST AND DETAILS	11
BLOCK DIAGRAM OF TEST SETUP	11
SUMMARY OF TEST RESULTS	12
FCC §15.247 (i) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE).....	13
APPLICABLE STANDARD	13
FCC §15.203 - ANTENNA REQUIREMENT.....	15
APPLICABLE STANDARD	15
ANTENNA CONNECTOR CONSTRUCTION	15
FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS	16
APPLICABLE STANDARD	16
EUT SETUP	16
EMI TEST RECEIVER SETUP.....	16
TEST PROCEDURE	17
CORRECTED AMPLITUDE & MARGIN CALCULATION	17
TEST EQUIPMENT LIST AND DETAILS.....	17
TEST DATA	18
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS.....	21
APPLICABLE STANDARD	21
EUT SETUP	21
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	22
TEST PROCEDURE	22
CORRECTED AMPLITUDE & MARGIN CALCULATION	22
TEST EQUIPMENT LIST AND DETAILS.....	23
TEST DATA	23
FCC §15.247(a) (2)–6 dB EMISSION BANDWIDTH.....	34
APPLICABLE STANDARD	34
TEST PROCEDURE	34
TEST EQUIPMENT LIST AND DETAILS.....	34
TEST DATA	35
FCC §15.247(b) (3) - MAXIMUM PEAK CONDUCTED OUTPUT POWER.....	45
APPLICABLE STANDARD	45
TEST PROCEDURE	45
TEST EQUIPMENT LIST AND DETAILS.....	45

TEST DATA	45
FCC §15.247(d)– 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE.....	47
APPLICABLE STANDARD	47
TEST PROCEDURE	47
TEST EQUIPMENT LIST AND DETAILS.....	47
TEST DATA	48
FCC §15.247(e) - POWER SPECTRAL DENSITY	55
APPLICABLE STANDARD	55
TEST PROCEDURE	55
TEST EQUIPMENT LIST AND DETAILS.....	55
TEST DATA	55

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		HD Pocket Projector
EUT Model:		Z1H
Multiple Models:		Z1HC, Z1H+, Z1HB, Z1, Z1+
Operation Frequency:		Radio 1: 2412-2462 MHz(802.11b/g/n ht20) 2422-2452 MHz(802.11n ht40) 2402-2480 MHz(BLE) Radio 2: 2402-2480 MHz(BLE)
Maximum Peak Output Power (Conducted):		Radio 1:13.86dBm(802.11b/g/n ht20/n ht40), 3.63 dBm(BLE) Radio 2: -0.62 dBm(BLE)
Modulation Type:		DSSS, OFDM(802.11b/g/n ht20/n ht40) GFSK(BLE)
Rated Input Voltage:		DC 7.4V from battery or DV 12V charging from adapter
Adapter Information	Model Name:	ADP-36PH A
	Input:	100-240Vac
	Output:	12V 3A
External Dimension:		86x86x136mm
Serial Number:		190705015
EUT Received Date:		2019-07-05

Note: The series product model Z1HC, Z1H+, Z1HB, Z1, Z1+ is electrically identical with model Z1H, we selected Z1H for fully testing, the differences details was explained in the declaration letter.

Objective

This report is prepared on behalf of **Delta Electronics Incorporated** in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communications Commission's rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15C DSS submissions with FCC ID: H79Z1H

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 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	30M~200MHz: 4.55 dB, 200M~1GHz: 5.92 dB, 1G~6GHz: 4.98 dB, 6G~18GHz: 5.89 dB, 18G~26.5G: 5.47 dB, 26.5G~40G: 5.63 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1 °C
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

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 Industry Area, Tangxia, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in engineering mode. The device built in two Radio, Radio 1 employs Bluetooth and Wifi, Radio 2 employs Bluetooth only.

For **Radio 1** Wifi, total 11 channels are provided:

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 test with channel 1,6,11. For 802.11n ht40 mode was tested with channel 3, 6, 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 **Radio 1&Radio 2**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.

EUT Exercise Software

For Radio 1 Wifi:

The software “REALTEK 11n 8723BU USB WLAN NIC Massproduction Kit” was used for testing, which was provided by manufacturer. The maximum power was configured as below table, that provided by the manufacturer:

Mode	Channel	Frequency (MHz)	Data Rate	Power level
802.11b	Low	2412	1Mbps	43
	Middle	2437	1Mbps	43
	High	2462	1Mbps	42
802.11g	Low	2412	6Mbps	50
	Middle	2437	6Mbps	50
	High	2462	6Mbps	49
802.11n ht20	Low	2412	MCS0	46
	Middle	2437	MCS0	45
	High	2462	MCS0	45
802.11n ht40	Low	2422	MCS0	48
	Middle	2437	MCS0	48
	High	2452	MCS0	48

For Radio 1 BLE:

The software: 'RTLBTAPP' was used during test, which was provided by manufacturer. The maximum power level was configured by the software as below table:

Channel	Frequency (MHz)	Power Level Setting
Low	2402	5
Middle	2440	5
High	2480	5

For Radio 2 BLE:

The software: 'FCCAssist 2.4' was used during test, which was provided by manufacturer. The maximum power level was configured by the software as below table:

Channel	Frequency (MHz)	Power Level Setting
Low	2402	5
Middle	2440	5
High	2480	5

The maximum duty cycle as following table:

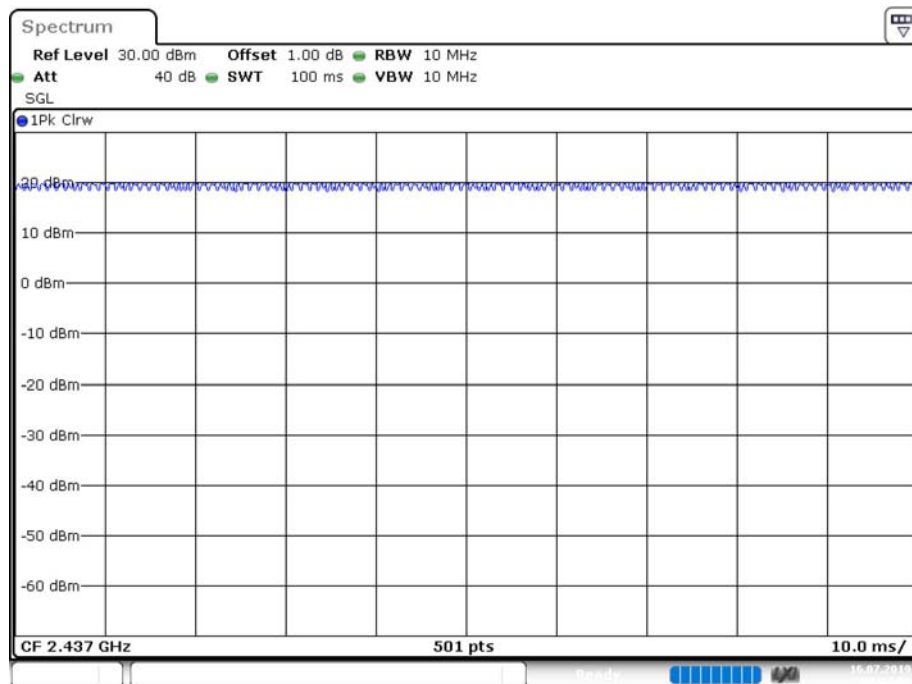
Test mode	T _{on} (ms)	T _{on+off} (ms)	Duty Cycle (%)
802.11b	100	100	100
802.11g	100	100	100
802.11n ht20	100	100	100
802.11n ht40	100	100	100
BLE(Radio 1)	100	100	100
BLE(Radio 2)	0.09	0.63	14.29

802.11b



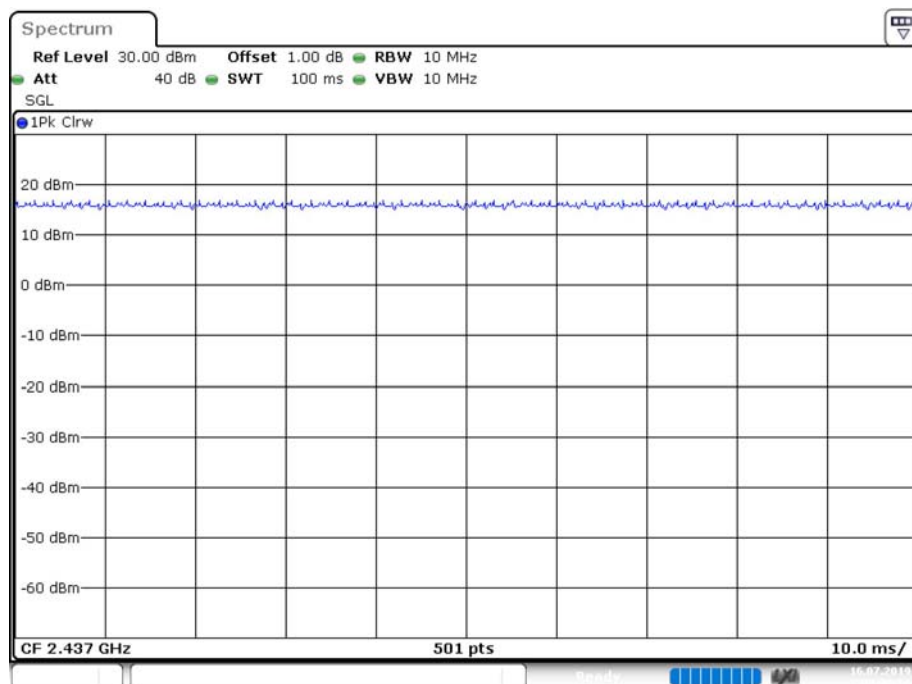
Date: 16.JUL.2019 09:33:41

802.11g



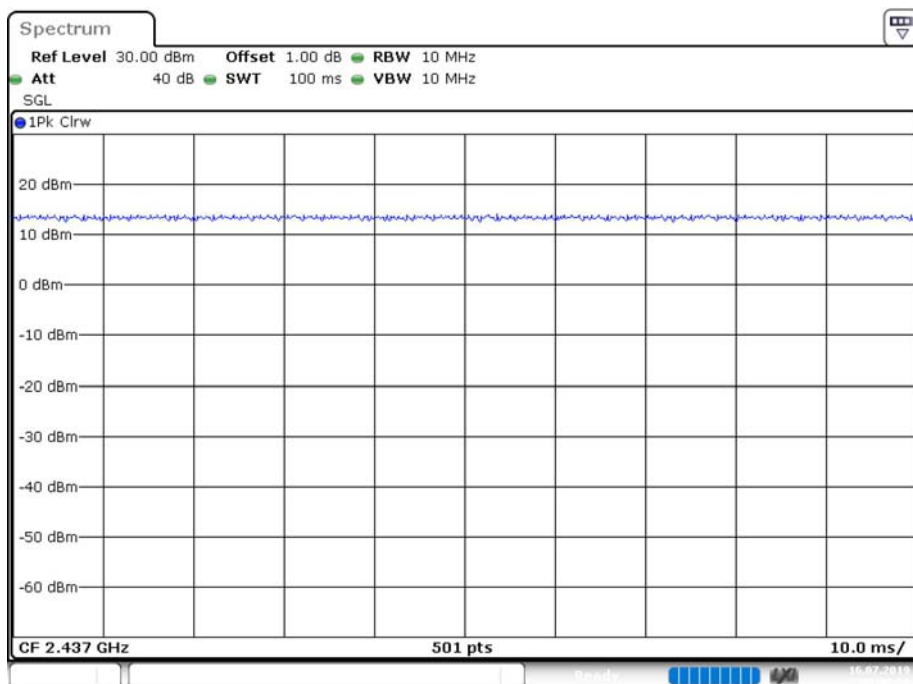
Date: 16.JUL.2019 09:34:06

802.11n ht20



Date: 16.JUL.2019 09:39:08

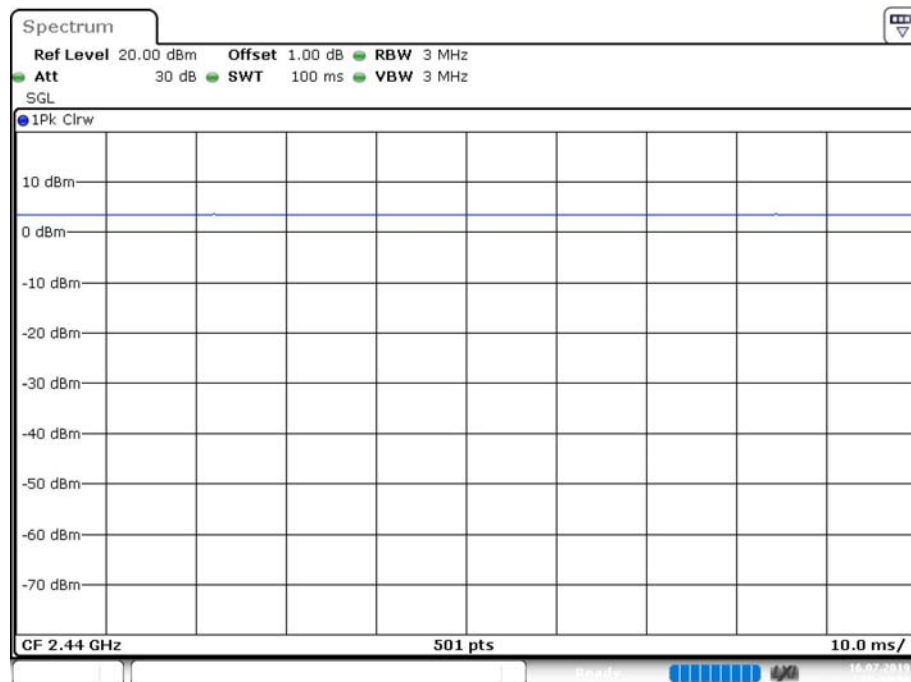
802.11n ht40



Date: 16.JUL.2019 09:39:38

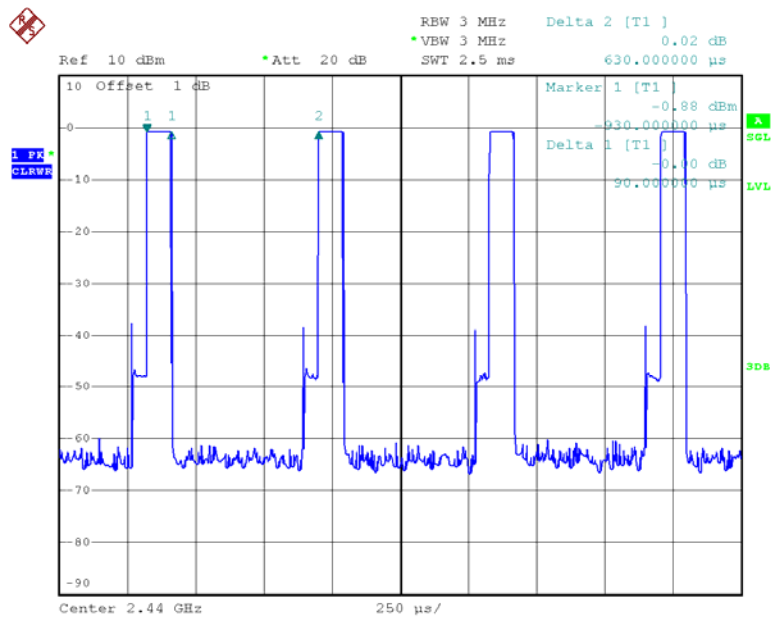
V

BLE(Radio 1)



Date: 16.JUL.2019 15:44:16

BLE(Radio 2)



Date: 16.JUL.2019 17:52:35

Equipment Modifications

No modification was made to the EUT.

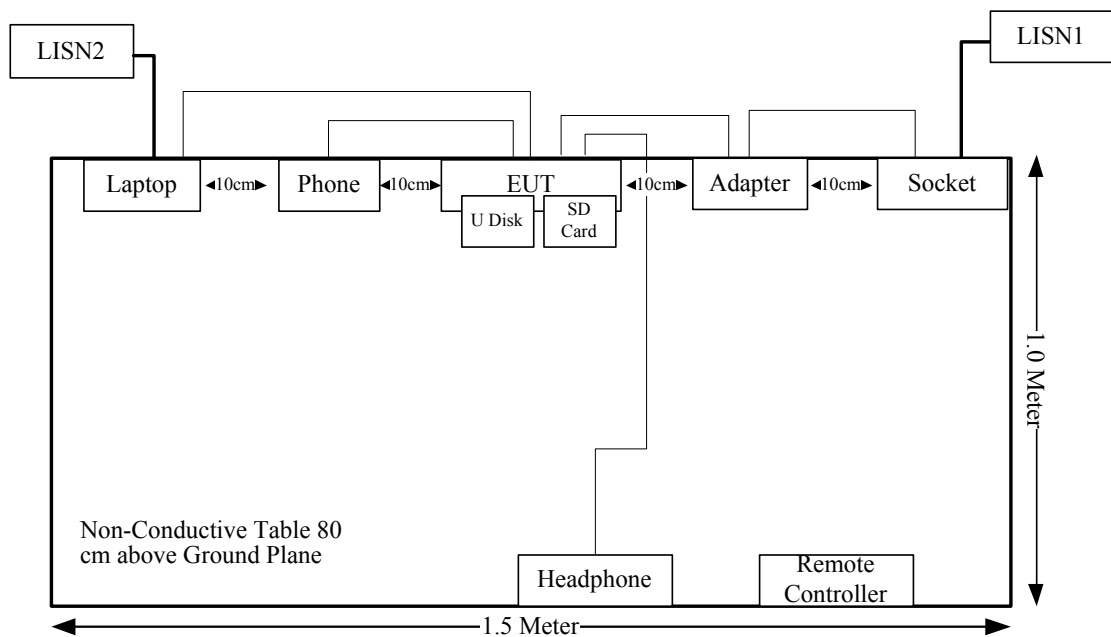
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	1CVM0C1
Kingston	U Disk	4G	/
Kingston	SD Card	16G	/
Huawei	Smartphone	EVR-AL00	A000009E3F501E
Ipro	Earphone	Black	/

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Earphone Cable	No	No	1.17	EUT	Earphone
HDMI Cable	Yes	No	1.2	Laptop	EUT
Type-C Cable	Yes	No	1.0	Smartphone	EUT
DC Cable	Yes	Yes	1.2	Adapter	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i) & §1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB 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.

Calculation formula:

Prediction of power density at the distance of the applicable MPE limit

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

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

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

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

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

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

Calculated Data:

Radio	Modes	Frequency (MHz)	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
			(dBi)	(numeric)	(dBm)	(mW)			
Radio 1	Wifi	2412-2462	0.5	1.12	14	25.12	20.00	0.0056	1.0
	BDR/EDR	2402-2480	0.5	1.12	5	3.16	20.00	0.0007	1.0
	BLE	2402-2480	0.5	1.12	4	2.51	20.00	0.0006	1.0
Radio 2	BDR/EDR	2402-2480	0.5	1.12	-2	0.63	20.00	0.0001	1.0
	BLE	2402-2480	0.5	1.12	0	1.00	20.00	0.0002	1.0

The Radio 1 and Radio 2 can transmit simultaneously:

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

$$= S_{Radio\ 1} / S_{limit-Radio\ 1} + S_{Radio\ 2} / S_{limit-Radio\ 2}$$

$$= 0.0056/1 + 0.0002/1$$

$$= 0.0058$$

$$< 1.0$$

Result: The device meet FCC MPE at 20 cm distance

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

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

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.
- c. 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 two internal antenna arrangement, fulfill the requirement of this section. Please refer to below information and the EUT photos:

Radio	Antenna Type	input impedance (Ohm)	Antenna Gain /Frequency Range
1	FPC	50	0.5 dBi/2.4~2.5GHz
2	FPC	50	0.5 dBi/2.4~2.5GHz

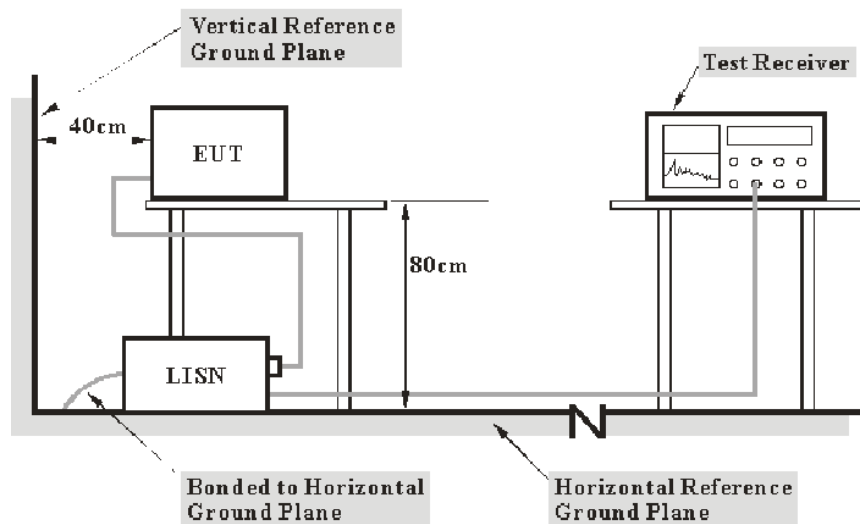
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207(a)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207.

The spacing between the peripherals was 10 cm.

The adapter was connected to the main lisn with a 120 V/60 Hz AC power source.

EMI Test Receiver Setup

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

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

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

Test Procedure

During the conducted emission test, the adapter was connected to the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

$$C_f = A_C + VDF$$

Herein,

V_C (cord. Reading): corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF: voltage division factor of AMN

C_f : Correction Factor

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2018-09-05	2019-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2018-12-10	2019-12-10
R&S	EMI Test Receiver	ESPI	100120	2019-05-09	2020-05-09
R&S	L.I.S.N	ESH2-Z5	892107/021	2018-09-19	2019-09-19

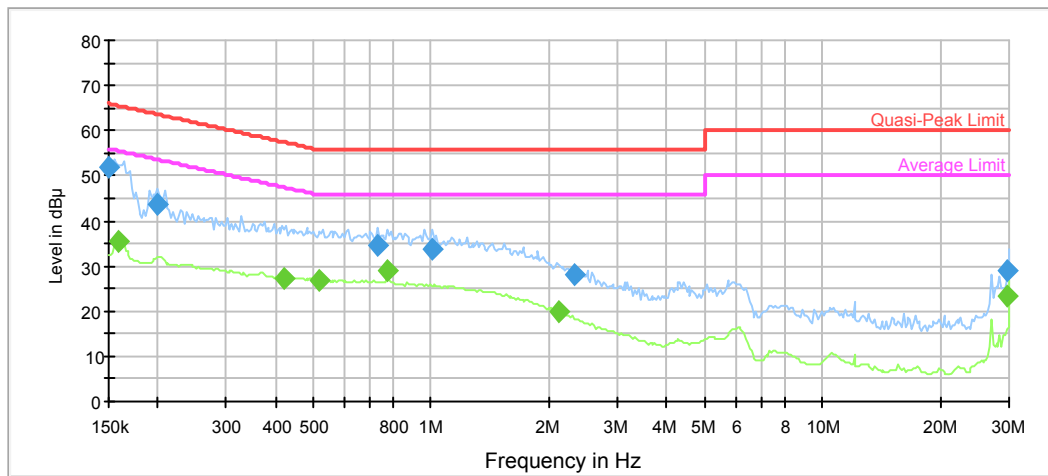
* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	28.7°C
Relative Humidity:	54 %
ATM Pressure:	100.1 kPa
Test Engineer:	Lily Xie
Test Date:	2019-07-16

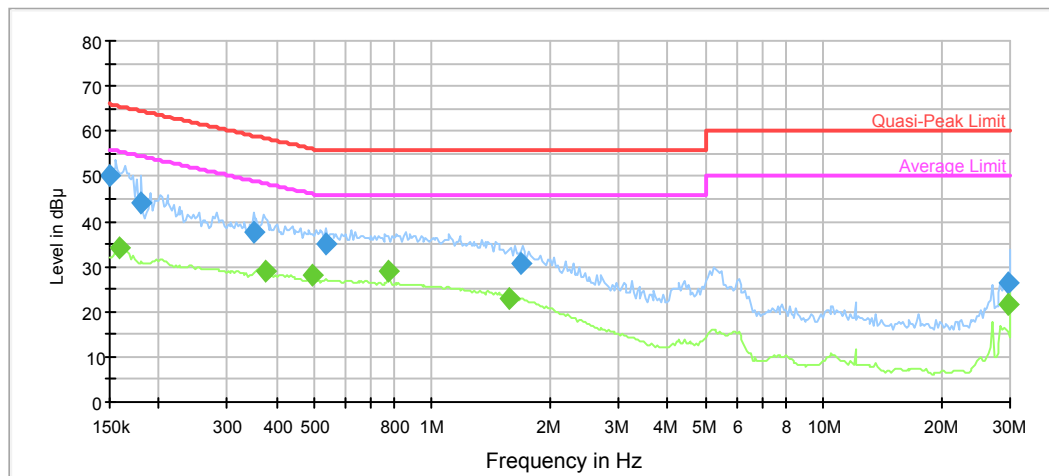
Test Result: Compliance

Test Mode: Transmitting (Radio 1 802.11b Low channel was the worst)

AC120 V, 60 Hz, Line:

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	51.8	9.000	L1	11.2	14.2	66.0
0.200176	43.7	9.000	L1	10.6	19.9	63.6
0.729777	34.4	9.000	L1	9.8	21.6	56.0
1.003400	33.7	9.000	L1	9.8	22.3	56.0
2.312457	28.3	9.000	L1	9.8	27.7	56.0
29.601974	28.8	9.000	L1	9.8	31.2	60.0

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.159000	35.6	9.000	L1	11.2	19.4	55.0
0.422196	27.3	9.000	L1	9.9	20.1	47.4
0.520311	27.0	9.000	L1	9.9	19.0	46.0
0.774673	28.8	9.000	L1	9.8	17.2	46.0
2.115745	19.9	9.000	L1	9.8	26.1	46.0
29.601974	23.5	9.000	L1	9.8	26.5	50.0

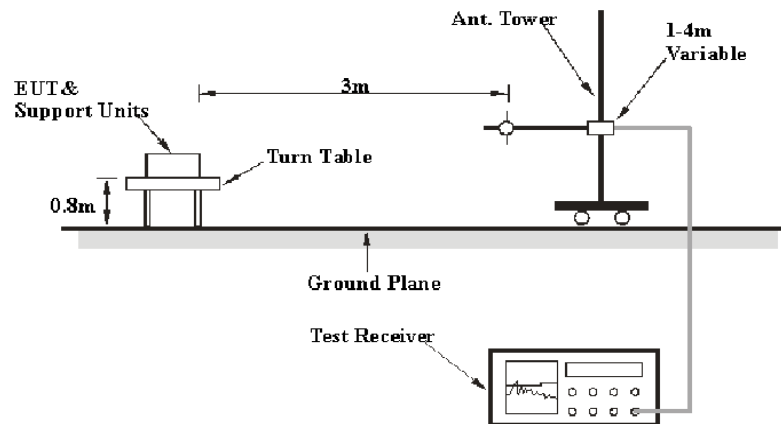
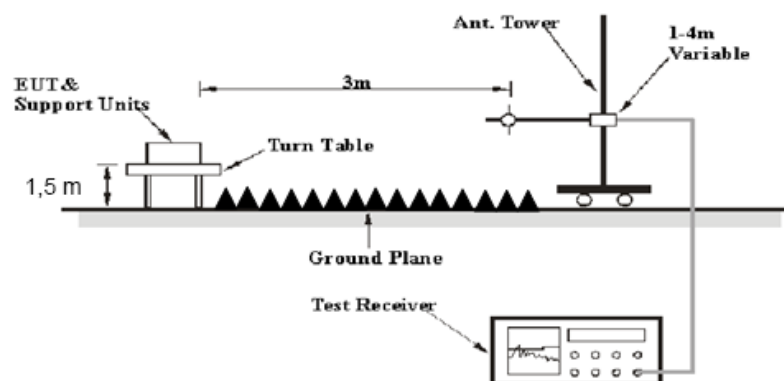
AC120 V, 60 Hz, Neutral:

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	50.3	9.000	N	11.2	15.7	66.0
0.181216	44.2	9.000	N	10.8	20.2	64.4
0.349469	37.5	9.000	N	10.0	21.5	59.0
0.536077	35.0	9.000	N	9.9	21.0	56.0
1.688254	30.9	9.000	N	9.8	25.1	56.0
29.695441	26.4	9.000	N	9.8	33.6	60.0

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.159000	34.3	9.000	N	11.2	20.7	55.0
0.374678	28.9	9.000	N	10.0	19.5	48.4
0.495058	28.0	9.000	N	9.9	18.0	46.1
0.774673	28.8	9.000	N	9.8	17.2	46.0
1.582434	22.8	9.000	N	9.8	23.2	46.0
29.601974	21.8	9.000	N	9.8	28.2	50.0

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

FCC §15.247 (d); §15.209; §15.205;

EUT Setup**Below 1GHz:****Above 1GHz:**

The radiated emission Below 1GHz tests were performed in the 3 meters chamber test site A, above 1GHz tests were performed in the 3 meters chamber test site B, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

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:

30MHz-1000MHz:

Measurement	RBW	Video B/W	IF B/W
QP	120 kHz	300 kHz	120kHz

1GHz- 25GHz:

Measurement	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
AV	>98%	1MHz	10 Hz
	<98%	1MHz	1/T

Note: T is minimum transmission duration

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

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

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

Corrected Amplitude & Margin Calculation

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

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

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESR3	102453	2019-06-26	2020-06-26
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2019-05-06	2020-05-06
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-05-09	2020-05-09
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2019-06-27	2020-06-27
MITEQ	Amplifier	AFS42-00101800- 25-S-42	2001271	2018-09-05	2019-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2019-06-27	2020-06-27
E-Microwave	Band-stop Filters	OBSF-2400-2483.5- S	OE01601525	2019-06-16	2020-06-16
Micro-tronics	High Pass Filter	HPM50111	S/N-G217	2019-06-16	2020-06-16

* **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**

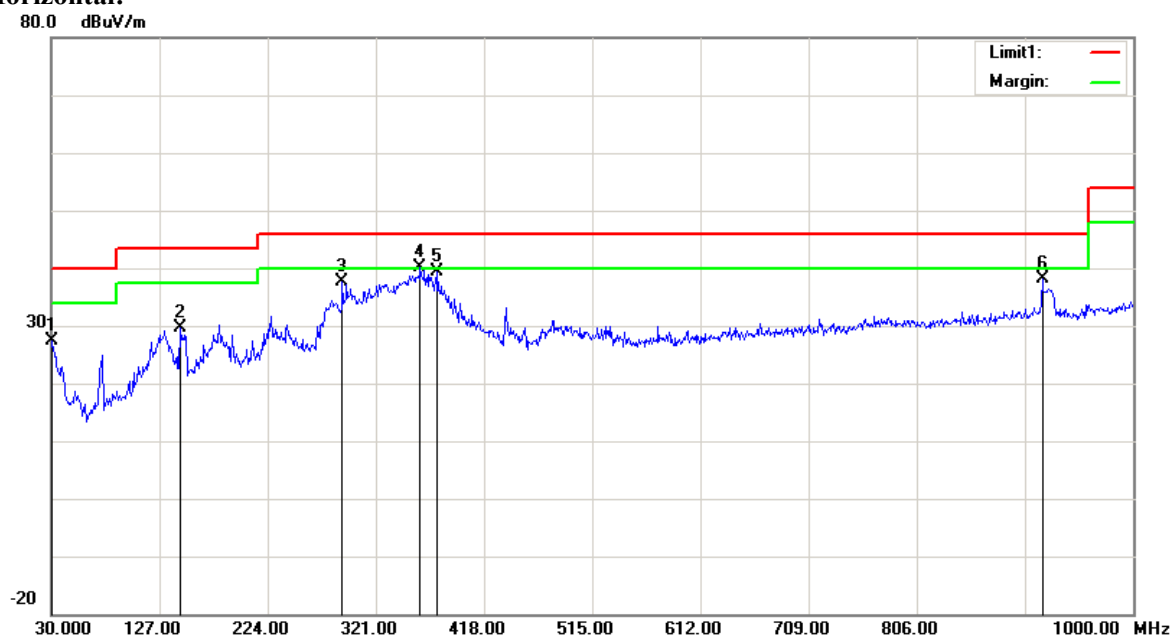
Test Items	Radiation Below 1GHz	Radiation Above 1GHz
Temperature:	28.7 °C	28.9 °C
Relative Humidity:	55%	68 %
ATM Pressure:	100.4 kPa	100.2 kPa
Tester:	Tyler Pan	Lucy Lu
Test Date:	2019-07-22	2019-07-18

Test Result: Compliance, please Refer to the following data

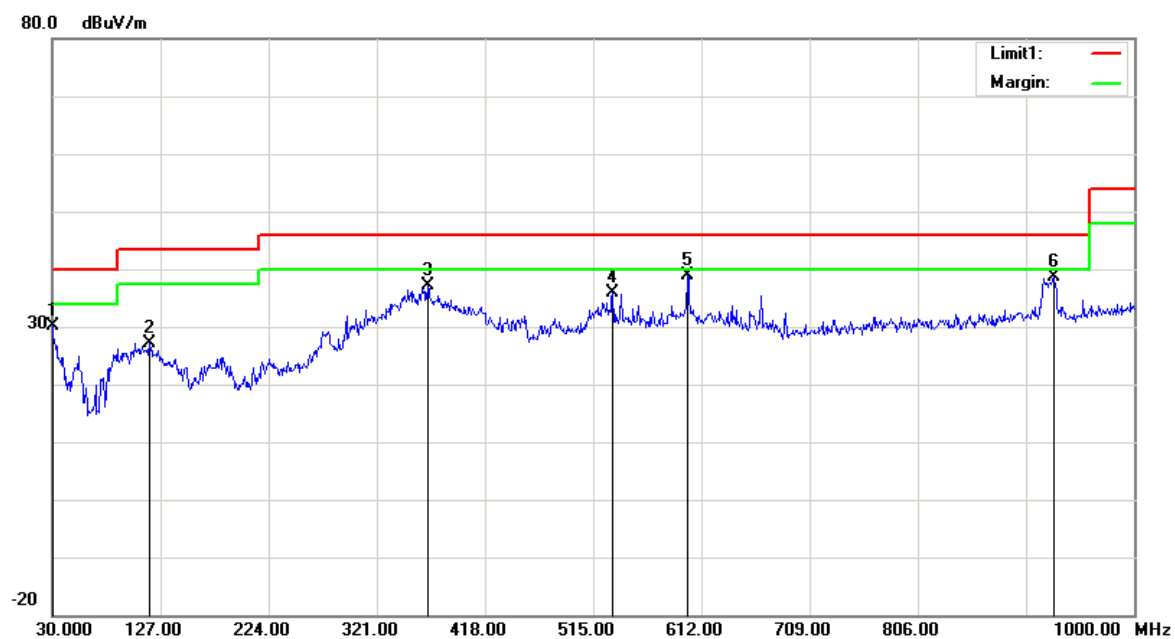
Test Mode: Transmitting

1) 30MHz-1GHz(Radio 1, 802.11b mode Low channel was the worst)

Horizontal:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.0000	25.75	peak	1.72	27.47	40.00	12.53
145.4300	35.55	peak	-6.01	29.54	43.50	13.96
290.9300	41.61	peak	-3.98	37.63	46.00	8.37
360.7700	42.85	peak	-2.80	40.05	46.00	5.95
376.2900	42.11	peak	-2.69	39.42	46.00	6.58
918.5200	37.85	peak	0.31	38.16	46.00	7.84

Vertical:

Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.0000	28.47	peak	1.72	30.19	40.00	9.81
117.3000	32.07	peak	-4.95	27.12	43.50	16.38
366.5900	40.04	peak	-2.80	37.24	46.00	8.76
532.4600	35.42	peak	0.37	35.79	46.00	10.21
599.3900	37.87	peak	1.00	38.87	46.00	7.13
928.2200	38.14	peak	0.54	38.68	46.00	7.32

2) 1-25GHz:**Radio 1:****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	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2412.00	71.67	PK	H	28.12	1.81	0.00	101.60	N/A	N/A
2412.00	67.60	AV	H	28.12	1.81	0.00	97.53	N/A	N/A
2412.00	70.20	PK	V	28.12	1.81	0.00	100.13	N/A	N/A
2412.00	66.07	AV	V	28.12	1.81	0.00	96.00	N/A	N/A
2390.00	26.36	PK	H	28.08	1.80	0.00	56.24	74.00	17.76
2390.00	13.83	AV	H	28.08	1.80	0.00	43.71	54.00	10.29
4824.00	48.34	PK	H	32.95	3.19	37.20	47.28	74.00	26.72
4824.00	34.71	AV	H	32.95	3.19	37.20	33.65	54.00	20.35
7236.00	45.15	PK	H	35.81	4.77	37.27	48.46	74.00	25.54
7236.00	32.78	AV	H	35.81	4.77	37.27	36.09	54.00	17.91
Middle Channel: 2437 MHz									
2437.00	72.25	PK	H	28.17	1.82	0.00	102.24	N/A	N/A
2437.00	68.34	AV	H	28.17	1.82	0.00	98.33	N/A	N/A
2437.00	70.58	PK	V	28.17	1.82	0.00	100.57	N/A	N/A
2437.00	66.82	AV	V	28.17	1.82	0.00	96.81	N/A	N/A
4874.00	48.25	PK	H	33.05	3.26	37.21	47.35	74.00	26.65
4874.00	34.58	AV	H	33.05	3.26	37.21	33.68	54.00	20.32
7311.00	45.27	PK	H	36.01	4.64	37.36	48.56	74.00	25.44
7311.00	32.83	AV	H	36.01	4.64	37.36	36.12	54.00	17.88
High Channel: 2462 MHz									
2462.00	72.80	PK	H	28.22	1.83	0.00	102.85	N/A	N/A
2462.00	69.15	AV	H	28.22	1.83	0.00	99.20	N/A	N/A
2462.00	71.93	PK	V	28.22	1.83	0.00	101.98	N/A	N/A
2462.00	48.09	AV	V	28.22	1.83	0.00	78.14	N/A	N/A
2483.50	28.11	PK	H	28.27	1.84	0.00	58.22	74.00	15.78
2483.50	16.94	AV	H	28.27	1.84	0.00	47.05	54.00	6.95
4924.00	49.54	PK	H	33.15	3.27	37.22	48.74	74.00	25.26
4924.00	35.46	AV	H	33.15	3.27	37.22	34.66	54.00	19.34
7386.00	45.55	PK	H	36.20	4.51	37.46	48.80	74.00	25.20
7386.00	33.62	AV	H	36.20	4.51	37.46	36.87	54.00	17.13

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	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2412.00	69.21	PK	H	28.12	1.81	0.00	99.14	N/A	N/A
2412.00	60.94	AV	H	28.12	1.81	0.00	90.87	N/A	N/A
2412.00	68.01	PK	V	28.12	1.81	0.00	97.94	N/A	N/A
2412.00	58.74	AV	V	28.12	1.81	0.00	88.67	N/A	N/A
2390.00	24.82	PK	H	28.08	1.80	0.00	54.70	74.00	19.30
2390.00	13.77	AV	H	28.08	1.80	0.00	43.65	54.00	10.35
4824.00	46.52	PK	H	32.95	3.19	37.20	45.46	74.00	28.54
4824.00	34.22	AV	H	32.95	3.19	37.20	33.16	54.00	20.84
7236.00	45.52	PK	H	35.81	4.77	37.27	48.83	74.00	25.17
7236.00	32.96	AV	H	35.81	4.77	37.27	36.27	54.00	17.73
Middle Channel: 2437 MHz									
2437.00	69.55	PK	H	28.17	1.82	0.00	99.54	N/A	N/A
2437.00	60.14	AV	H	28.17	1.82	0.00	90.13	N/A	N/A
2437.00	68.01	PK	V	28.17	1.82	0.00	98.00	N/A	N/A
2437.00	58.69	AV	V	28.17	1.82	0.00	88.68	N/A	N/A
4874.00	46.52	PK	H	33.05	3.26	37.21	45.62	74.00	28.38
4874.00	33.98	AV	H	33.05	3.26	37.21	33.08	54.00	20.92
7311.00	45.36	PK	H	36.01	4.64	37.36	48.65	74.00	25.35
7311.00	32.15	AV	H	36.01	4.64	37.36	35.44	54.00	18.56
High Channel: 2462 MHz									
2462.00	70.24	PK	H	28.22	1.83	0.00	100.29	N/A	N/A
2462.00	61.87	AV	H	28.22	1.83	0.00	91.92	N/A	N/A
2462.00	68.85	PK	V	28.22	1.83	0.00	98.90	N/A	N/A
2462.00	59.74	AV	V	28.22	1.83	0.00	89.79	N/A	N/A
2483.50	26.77	PK	H	28.27	1.84	0.00	56.88	74.00	17.12
2483.50	14.39	AV	H	28.27	1.84	0.00	44.50	54.00	9.50
4924.00	47.50	PK	H	33.15	3.27	37.22	46.70	74.00	27.30
4924.00	34.42	AV	H	33.15	3.27	37.22	33.62	54.00	20.38
7386.00	45.74	PK	H	36.20	4.51	37.46	48.99	74.00	25.01
7386.00	33.12	AV	H	36.20	4.51	37.46	36.37	54.00	17.63

802.11n 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	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2412.00	68.85	PK	H	28.12	1.81	0.00	98.78	N/A	N/A
2412.00	60.25	AV	H	28.12	1.81	0.00	90.18	N/A	N/A
2412.00	67.13	PK	V	28.12	1.81	0.00	97.06	N/A	N/A
2412.00	59.21	AV	V	28.12	1.81	0.00	89.14	N/A	N/A
2390.00	25.75	PK	H	28.08	1.80	0.00	55.63	74.00	18.37
2390.00	13.97	AV	H	28.08	1.80	0.00	43.85	54.00	10.15
4824.00	46.21	PK	H	32.95	3.19	37.20	45.15	74.00	28.85
4824.00	33.74	AV	H	32.95	3.19	37.20	32.68	54.00	21.32
7236.00	45.25	PK	H	35.81	4.77	37.27	48.56	74.00	25.44
7236.00	32.65	AV	H	35.81	4.77	37.27	35.96	54.00	18.04
Middle Channel: 2437 MHz									
2437.00	66.67	PK	H	28.17	1.82	0.00	96.66	N/A	N/A
2437.00	57.54	AV	H	28.17	1.82	0.00	87.53	N/A	N/A
2437.00	65.41	PK	V	28.17	1.82	0.00	95.40	N/A	N/A
2437.00	56.96	AV	V	28.17	1.82	0.00	86.95	N/A	N/A
4874.00	45.85	PK	H	33.05	3.26	37.21	44.95	74.00	29.05
4874.00	33.45	AV	H	33.05	3.26	37.21	32.55	54.00	21.45
7311.00	45.30	PK	H	36.01	4.64	37.36	48.59	74.00	25.41
7311.00	31.96	AV	H	36.01	4.64	37.36	35.25	54.00	18.75
High Channel: 2462 MHz									
2462.00	68.25	PK	H	28.22	1.83	0.00	98.30	N/A	N/A
2462.00	59.74	AV	H	28.22	1.83	0.00	89.79	N/A	N/A
2462.00	67.54	PK	V	28.22	1.83	0.00	97.59	N/A	N/A
2462.00	58.33	AV	V	28.22	1.83	0.00	88.38	N/A	N/A
2483.50	26.93	PK	H	28.27	1.84	0.00	57.04	74.00	16.96
2483.50	14.24	AV	H	28.27	1.84	0.00	44.35	54.00	9.65
4924.00	46.21	PK	H	33.15	3.27	37.22	45.41	74.00	28.59
4924.00	33.59	AV	H	33.15	3.27	37.22	32.79	54.00	21.21
7386.00	45.51	PK	H	36.20	4.51	37.46	48.76	74.00	25.24
7386.00	32.44	AV	H	36.20	4.51	37.46	35.69	54.00	18.31

802.11n 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	Polar (H/V)	Factor (dB/m)					
Low Channel: 2422 MHz									
2422.00	65.29	PK	H	28.14	1.81	0.00	95.24	N/A	N/A
2422.00	56.54	AV	H	28.14	1.81	0.00	86.49	N/A	N/A
2422.00	64.25	PK	V	28.14	1.81	0.00	94.20	N/A	N/A
2422.00	55.74	AV	V	28.14	1.81	0.00	85.69	N/A	N/A
2390.00	28.11	PK	H	28.08	1.80	0.00	57.99	74.00	16.01
2390.00	14.66	AV	H	28.08	1.80	0.00	44.54	54.00	9.46
4844.00	46.25	PK	H	32.99	3.22	37.20	45.26	74.00	28.74
4844.00	33.26	AV	H	32.99	3.22	37.20	32.27	54.00	21.73
7266.00	45.70	PK	H	35.89	4.72	37.31	49.00	74.00	25.00
7266.00	33.02	AV	H	35.89	4.72	37.31	36.32	54.00	17.68
Middle Channel: 2437 MHz									
2437.00	64.15	PK	H	28.17	1.82	0.00	94.14	N/A	N/A
2437.00	55.45	AV	H	28.17	1.82	0.00	85.44	N/A	N/A
2437.00	63.45	PK	V	28.17	1.82	0.00	93.44	N/A	N/A
2437.00	54.74	AV	V	28.17	1.82	0.00	84.73	N/A	N/A
4874.00	46.47	PK	H	33.05	3.26	37.21	45.57	74.00	28.43
4874.00	34.01	AV	H	33.05	3.26	37.21	33.11	54.00	20.89
7311.00	45.26	PK	H	36.01	4.64	37.36	48.55	74.00	25.45
7311.00	33.21	AV	H	36.01	4.64	37.36	36.50	54.00	17.50
High Channel: 2452 MHz									
2452.00	65.02	PK	H	28.20	1.83	0.00	95.05	N/A	N/A
2452.00	55.34	AV	H	28.20	1.83	0.00	85.37	N/A	N/A
2452.00	64.23	PK	V	28.20	1.83	0.00	94.26	N/A	N/A
2452.00	55.02	AV	V	28.20	1.83	0.00	85.05	N/A	N/A
2483.50	27.63	PK	H	28.27	1.84	0.00	57.74	74.00	16.26
2483.50	14.46	AV	H	28.27	1.84	0.00	44.57	54.00	9.43
4904.00	46.75	PK	H	33.11	3.30	37.21	45.95	74.00	28.05
4904.00	34.26	AV	H	33.11	3.30	37.21	33.46	54.00	20.54
7356.00	45.96	PK	H	36.13	4.56	37.42	49.23	74.00	24.77
7356.00	32.12	AV	H	36.13	4.56	37.42	35.39	54.00	18.61

BLE:

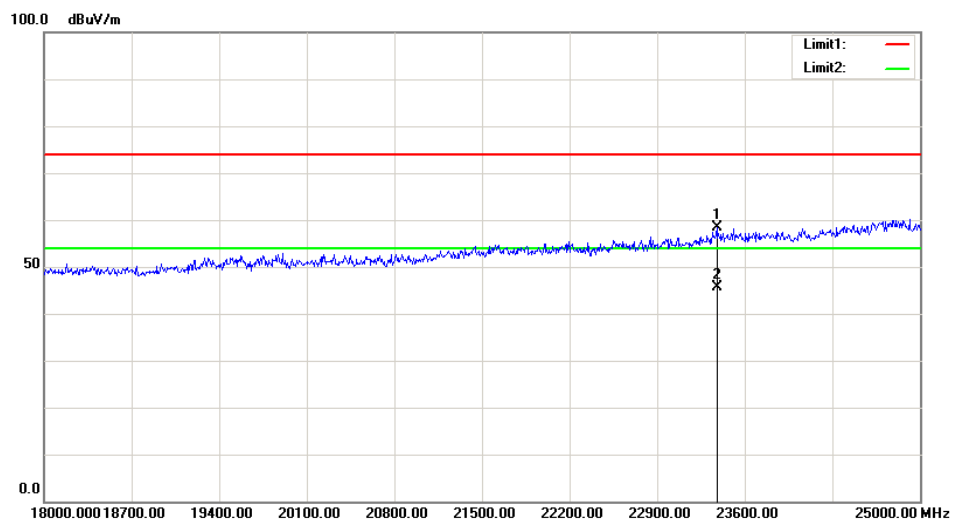
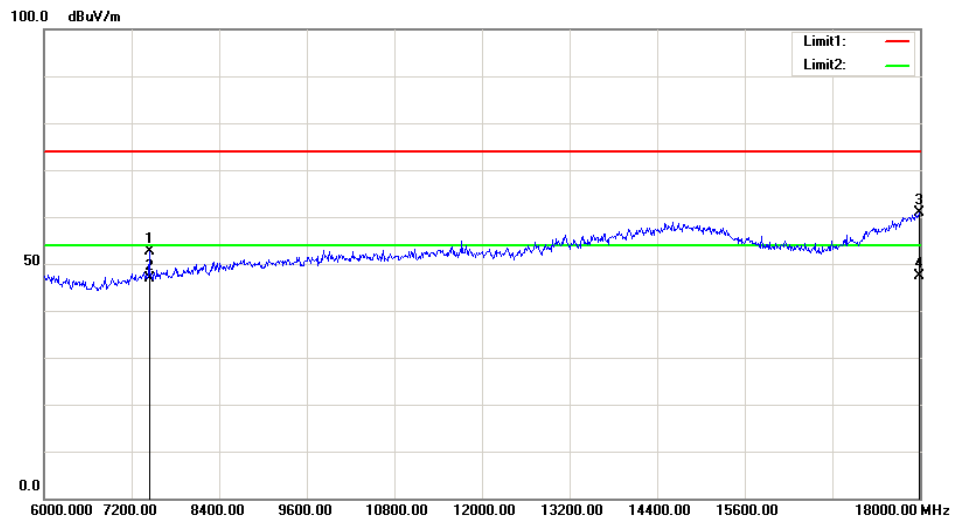
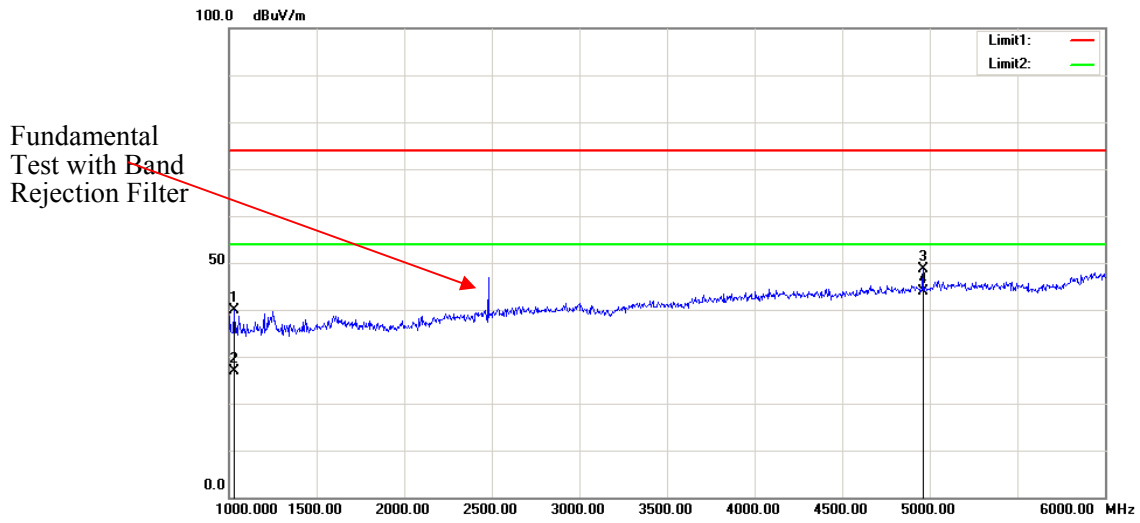
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2402 MHz									
2402.00	68.28	PK	H	28.10	1.80	0.00	98.18	N/A	N/A
2402.00	67.34	AV	H	28.10	1.80	0.00	97.24	N/A	N/A
2402.00	66.41	PK	V	28.10	1.80	0.00	96.31	N/A	N/A
2402.00	65.29	AV	V	28.10	1.80	0.00	95.19	N/A	N/A
2390.00	28.38	PK	H	28.08	1.80	0.00	58.26	74.00	15.74
2390.00	12.90	AV	H	28.08	1.80	0.00	42.78	54.00	11.22
4804.00	48.33	PK	H	32.91	3.17	37.20	47.21	74.00	26.79
4804.00	35.77	AV	H	32.91	3.17	37.20	34.65	54.00	19.35
7206.00	45.78	PK	H	35.74	4.82	37.23	49.11	74.00	24.89
7206.00	33.82	AV	H	35.74	4.82	37.23	37.15	54.00	16.85
Middle Channel: 2440 MHz									
2440.00	67.45	PK	H	28.18	1.82	0.00	97.45	N/A	N/A
2440.00	66.38	AV	H	28.18	1.82	0.00	96.38	N/A	N/A
2440.00	65.15	PK	V	28.18	1.82	0.00	95.15	N/A	N/A
2440.00	64.18	AV	V	28.18	1.82	0.00	94.18	N/A	N/A
4880.00	48.25	PK	H	33.06	3.27	37.21	47.37	74.00	26.64
4880.00	35.15	AV	H	33.06	3.27	37.21	34.27	54.00	19.73
7320.00	45.48	PK	H	36.03	4.62	37.37	48.76	74.00	25.24
7320.00	33.26	AV	H	36.03	4.62	37.37	36.54	54.00	17.46
High Channel: 2480 MHz									
2480.00	66.72	PK	H	28.26	1.84	0.00	96.82	N/A	N/A
2480.00	65.75	AV	H	28.26	1.84	0.00	95.85	N/A	N/A
2480.00	64.56	PK	V	28.26	1.84	0.00	94.66	N/A	N/A
2480.00	63.67	AV	V	28.26	1.84	0.00	93.77	N/A	N/A
2483.50	27.44	PK	H	28.27	1.84	0.00	57.55	74.00	16.45
2483.50	14.07	AV	H	28.27	1.84	0.00	44.18	54.00	9.82
4960.00	48.17	PK	H	33.22	3.23	37.25	47.37	74.00	26.63
4960.00	35.04	AV	H	33.22	3.23	37.25	34.24	54.00	19.76
7440.00	45.25	PK	H	36.34	4.41	37.52	48.48	74.00	25.52
7440.00	32.85	AV	H	36.34	4.41	37.52	36.08	54.00	17.92

Radio 2, BLE:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2402 MHz									
2402.00	58.49	PK	H	28.10	1.80	0.00	88.39	N/A	N/A
2402.00	57.82	AV	H	28.10	1.80	0.00	87.72	N/A	N/A
2402.00	60.38	PK	V	28.10	1.80	0.00	90.28	N/A	N/A
2402.00	59.63	AV	V	28.10	1.80	0.00	89.53	N/A	N/A
2390.00	26.25	PK	V	28.08	1.80	0.00	56.13	74.00	17.87
2390.00	13.97	AV	V	28.08	1.80	0.00	43.85	54.00	10.15
4804.00	52.04	PK	V	32.91	3.17	37.20	50.92	74.00	23.08
4804.00	47.13	AV	V	32.91	3.17	37.20	46.01	54.00	7.99
7206.00	48.92	PK	V	35.74	4.82	37.23	52.25	74.00	21.75
7206.00	43.26	AV	V	35.74	4.82	37.23	46.59	54.00	7.41
Middle Channel: 2440 MHz									
2440.00	58.46	PK	H	28.18	1.82	0.00	88.46	N/A	N/A
2440.00	57.69	AV	H	28.18	1.82	0.00	87.69	N/A	N/A
2440.00	60.52	PK	V	28.18	1.82	0.00	90.52	N/A	N/A
2440.00	58.84	AV	V	28.18	1.82	0.00	88.84	N/A	N/A
4880.00	52.16	PK	V	33.06	3.27	37.21	51.28	74.00	22.72
4880.00	47.58	AV	V	33.06	3.27	37.21	46.70	54.00	7.30
7320.00	49.17	PK	V	36.03	4.62	37.37	52.45	74.00	21.55
7320.00	43.62	AV	V	36.03	4.62	37.37	46.90	54.00	7.10
High Channel: 2480 MHz									
2480.00	58.68	PK	H	28.26	1.84	0.00	88.78	N/A	N/A
2480.00	57.71	AV	H	28.26	1.84	0.00	87.81	N/A	N/A
2480.00	60.78	PK	V	28.26	1.84	0.00	90.88	N/A	N/A
2480.00	59.96	AV	V	28.26	1.84	0.00	90.06	N/A	N/A
2483.50	27.42	PK	V	28.27	1.84	0.00	57.53	74.00	16.47
2483.50	17.68	AV	V	28.27	1.84	0.00	47.79	54.00	6.21
4960.00	52.47	PK	V	33.22	3.23	37.25	51.67	74.00	22.33
4960.00	47.93	AV	V	33.22	3.23	37.25	47.13	54.00	6.87
7440.00	49.58	PK	V	36.34	4.41	37.52	52.81	74.00	21.19
7440.00	43.99	AV	V	36.34	4.41	37.52	47.22	54.00	6.78

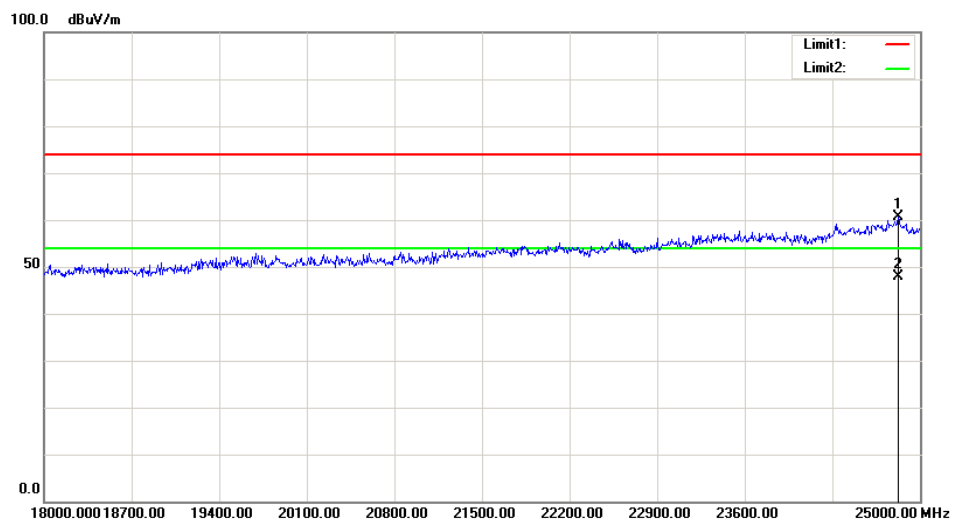
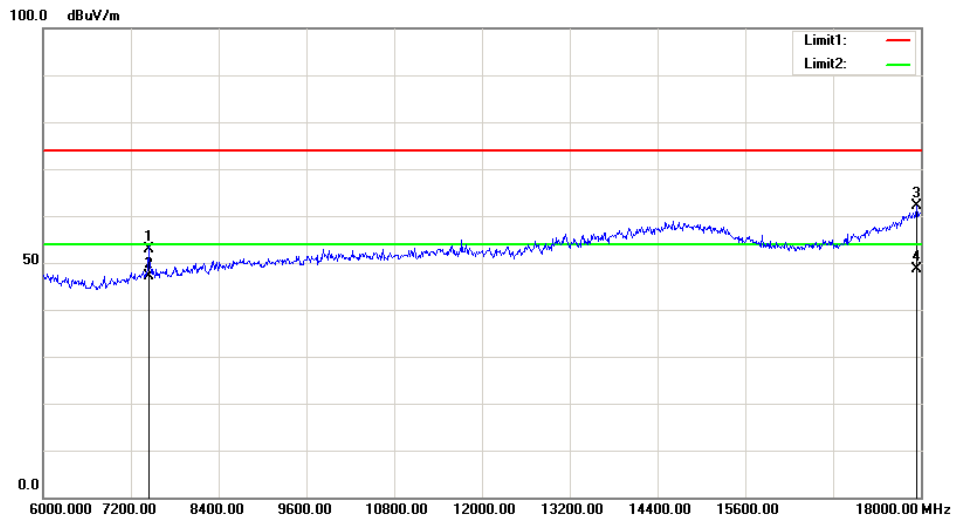
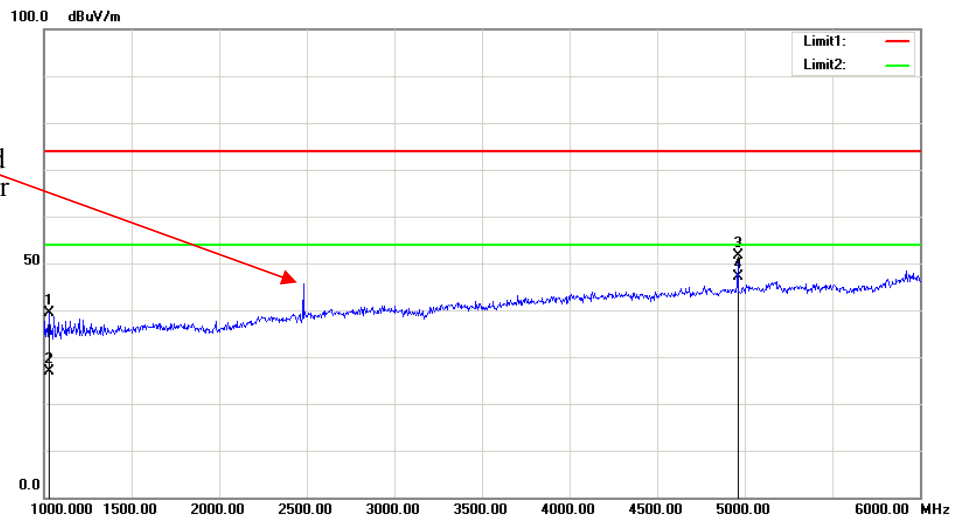
Worst plots (Radio 2, BLE High channel was the worst)

Horizontal



Vertical:

Fundamental
Test with Band
Rejection Filter



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

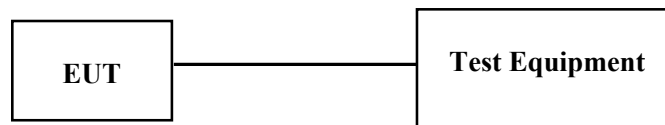
Applicable Standard

According to FCC §15.247(a) (2)

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

Test Procedure

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times \text{RBW}$.
- 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
R&S	Spectrum Analyzer	FSP 38	100478	2018-12-10	2019-12-10
R&S	Spectrum Analyzer	FSV40	101474	2019-01-09	2020-01-09
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	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 Data**Environmental Conditions**

Temperature:	29.9 °C
Relative Humidity:	57 %
ATM Pressure:	100.1 kPa
Tester:	Carrie He
Test Date:	2019-07-16

Test Mode: Transmitting

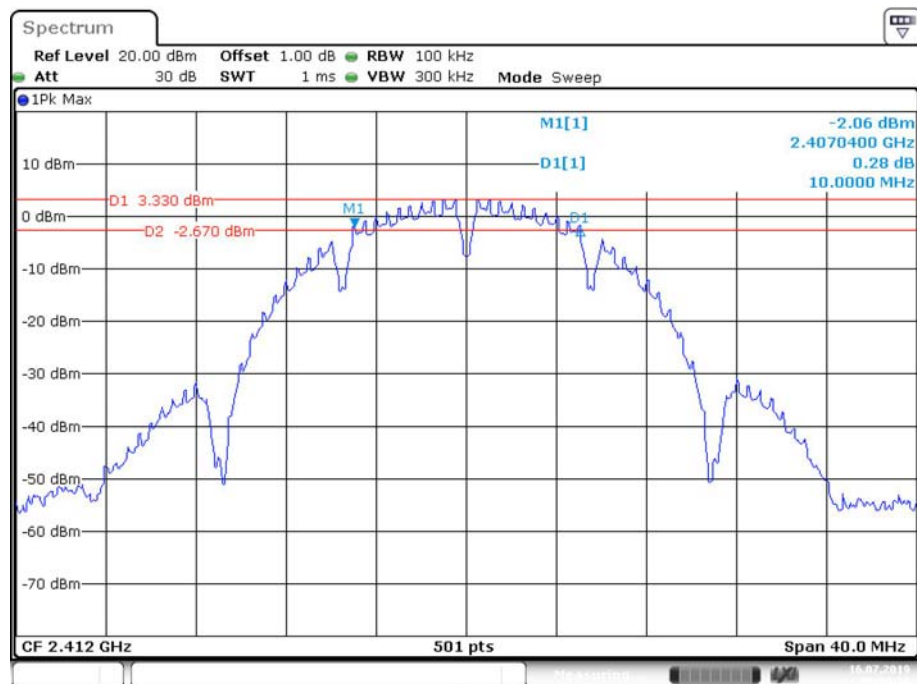
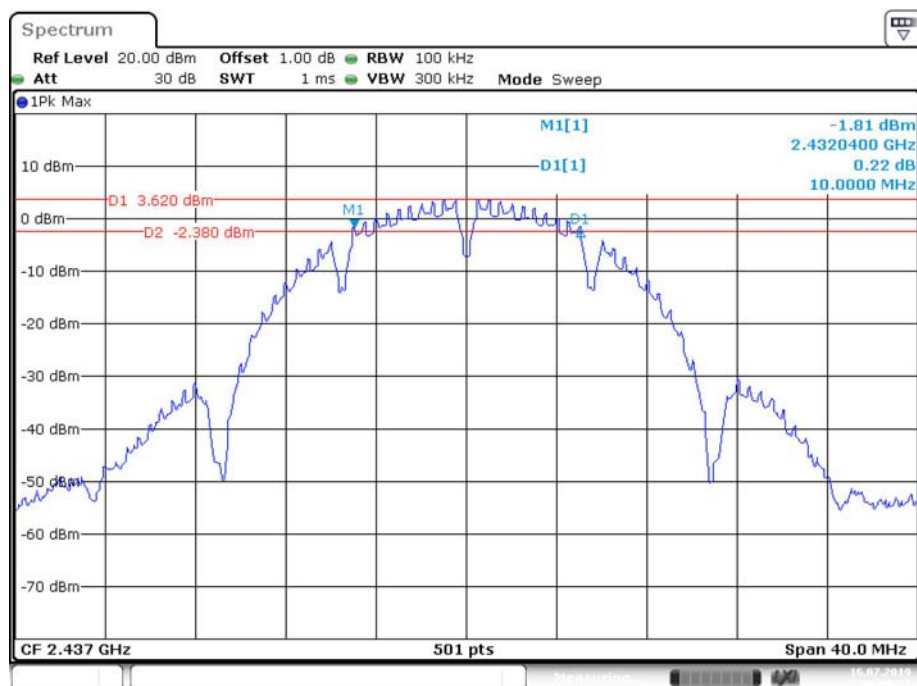
Test Result: Compliant. Please refer to the following table and plots.

Radio 1:

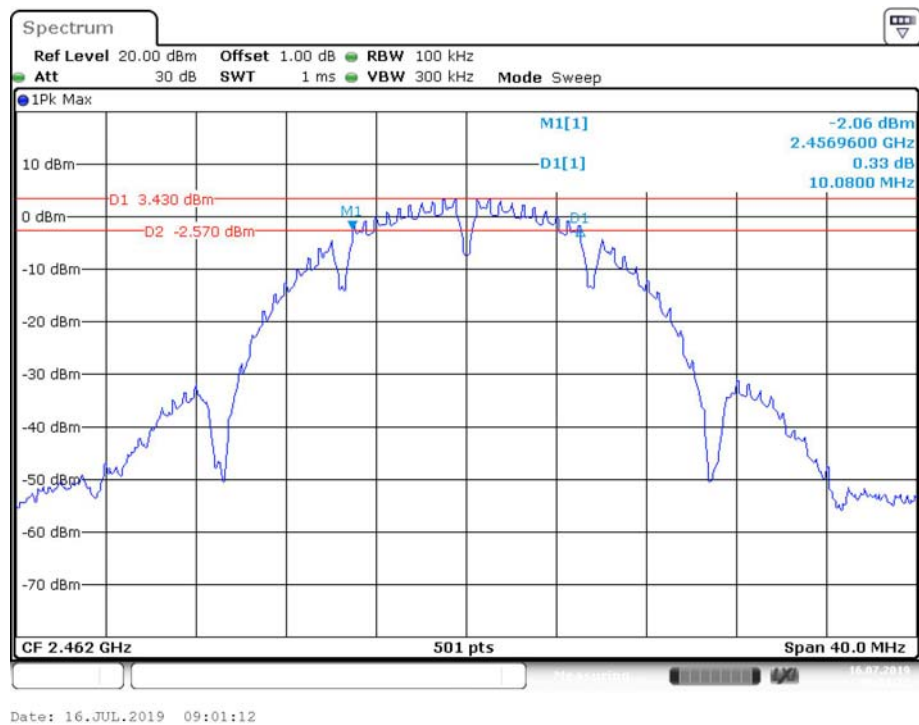
Test mode	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	10.000	≥ 0.5
	Middle	2437	10.000	≥ 0.5
	High	2462	10.080	≥ 0.5
802.11g	Low	2412	16.640	≥ 0.5
	Middle	2437	16.640	≥ 0.5
	High	2462	16.640	≥ 0.5
802.11n ht20	Low	2412	17.920	≥ 0.5
	Middle	2437	17.920	≥ 0.5
	High	2462	17.920	≥ 0.5
802.11n ht40	Low	2422	36.640	≥ 0.5
	Middle	2437	36.640	≥ 0.5
	High	2452	36.640	≥ 0.5
BLE	Low	2402	0.808	≥ 0.5
	Middle	2440	0.798	≥ 0.5
	High	2480	0.806	≥ 0.5

Radio 2:

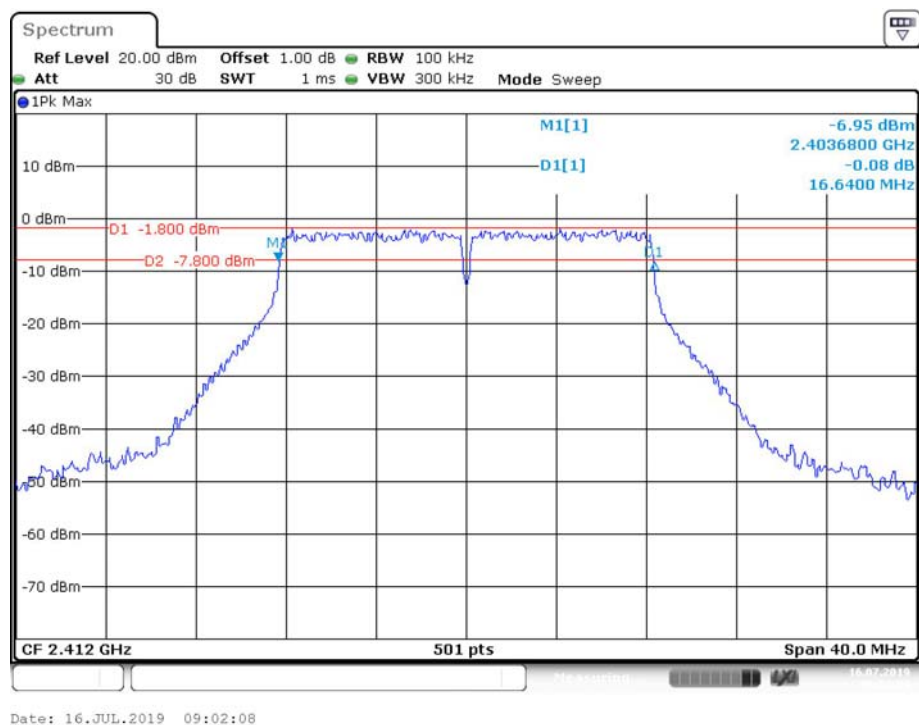
Test mode	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
BLE	Low	2402	0.504	≥ 0.5
	Middle	2440	0.504	≥ 0.5
	High	2480	0.504	≥ 0.5

Radio 1:**802.11b Low Channel****802.11b Middle Channel**

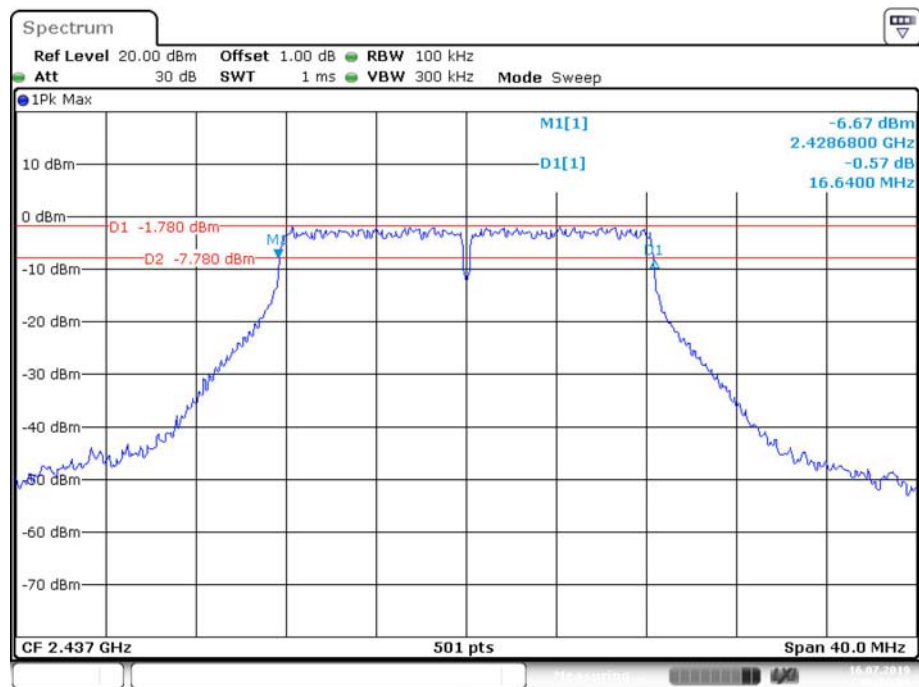
802.11b High Channel



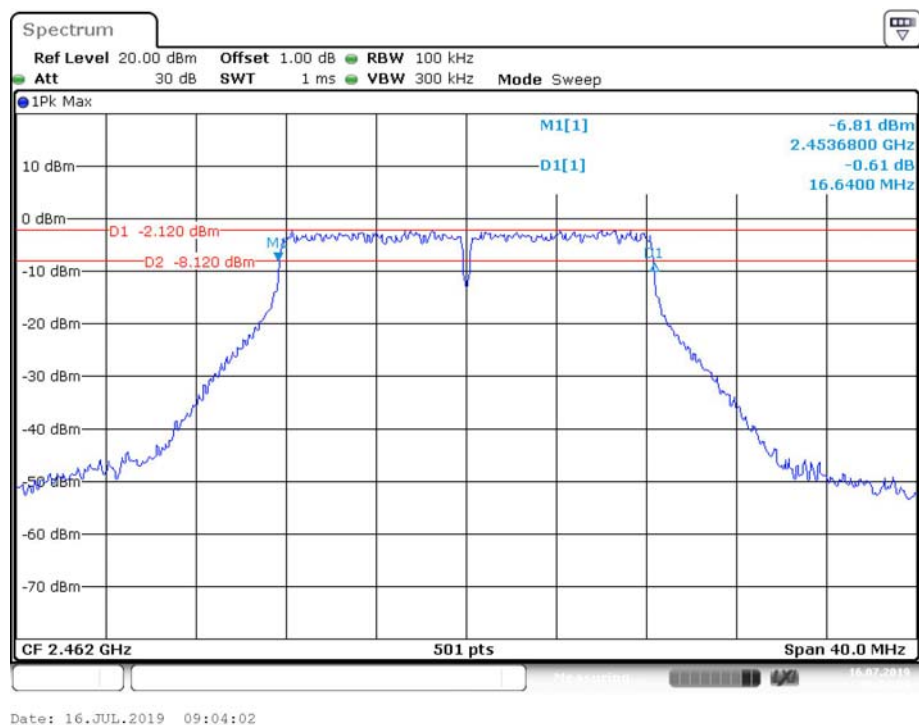
802.11g Low Channel



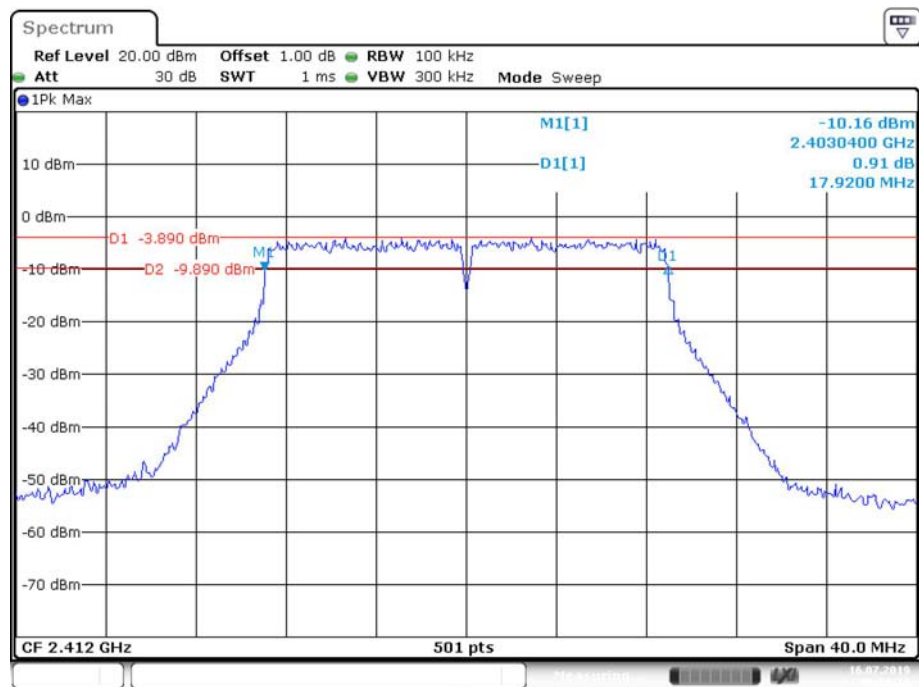
802.11g Middle Channel



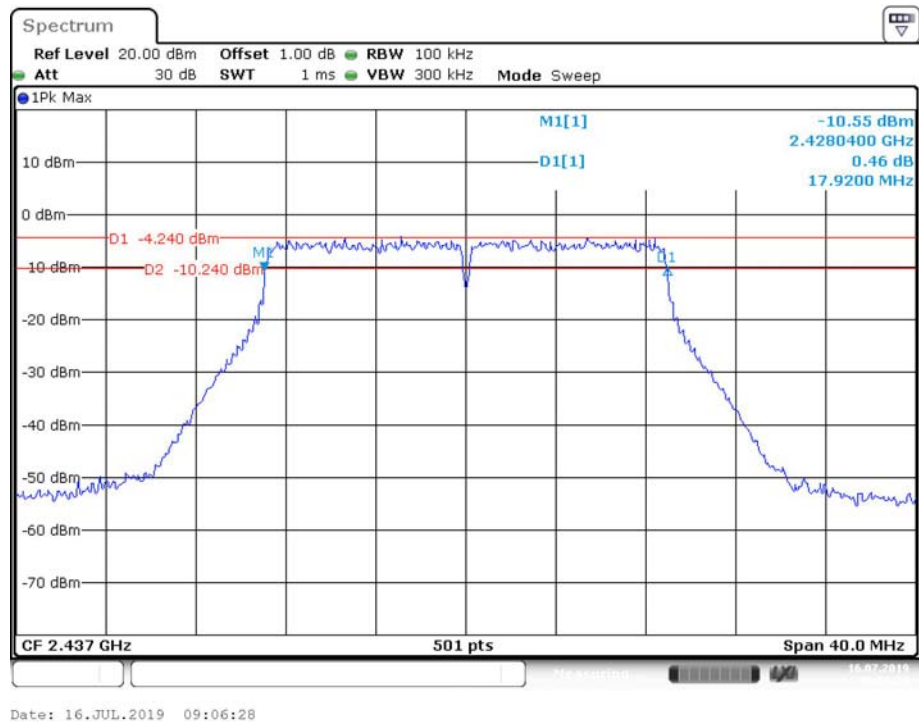
802.11g High Channel



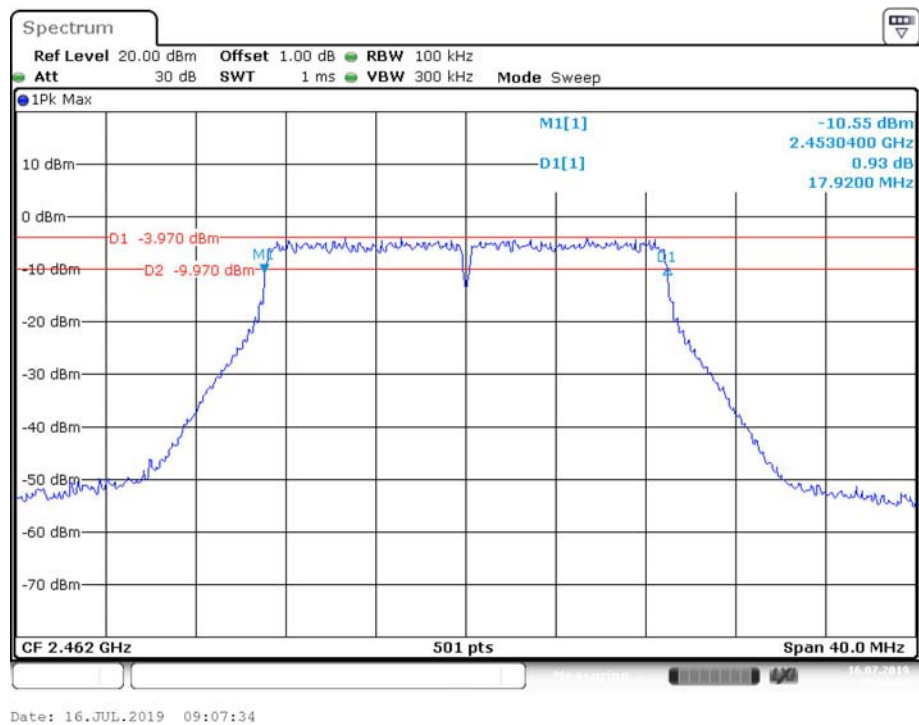
802.11n ht20 Low Channel



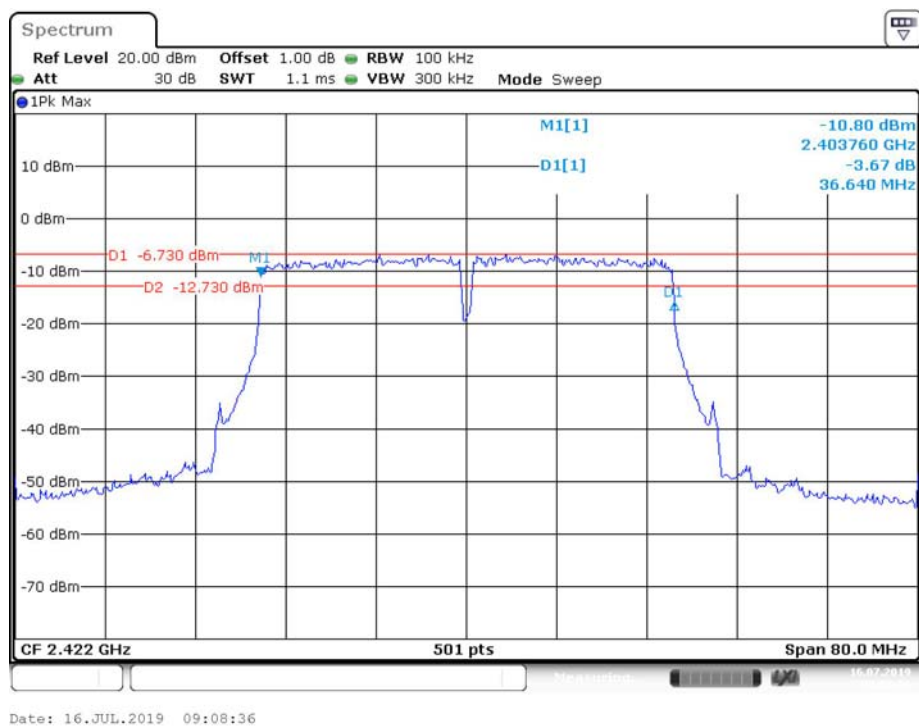
802.11n ht20 Middle Channel



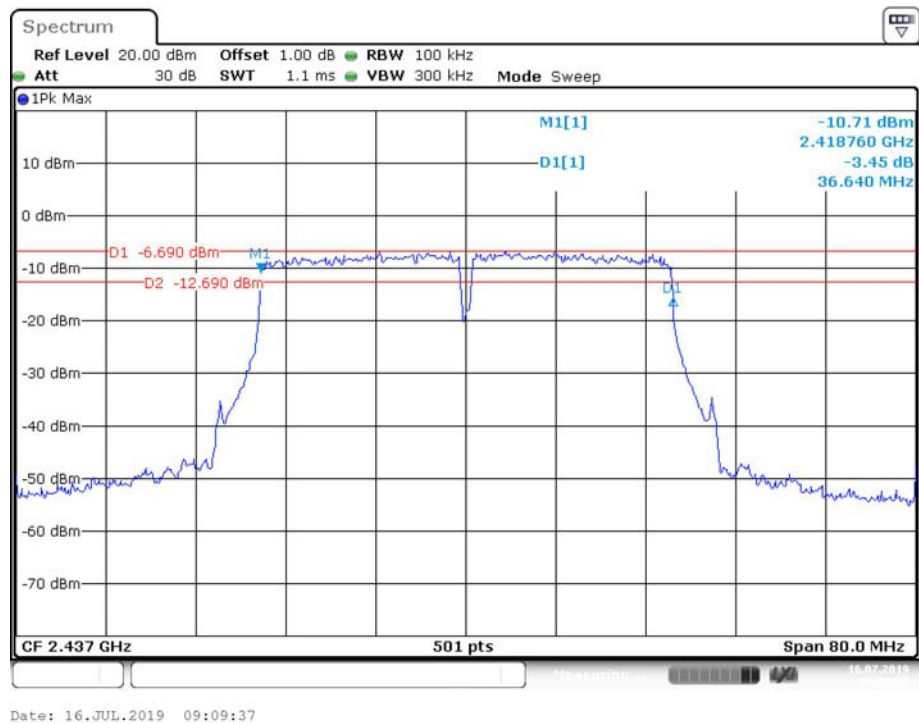
802.11n ht20 High Channel



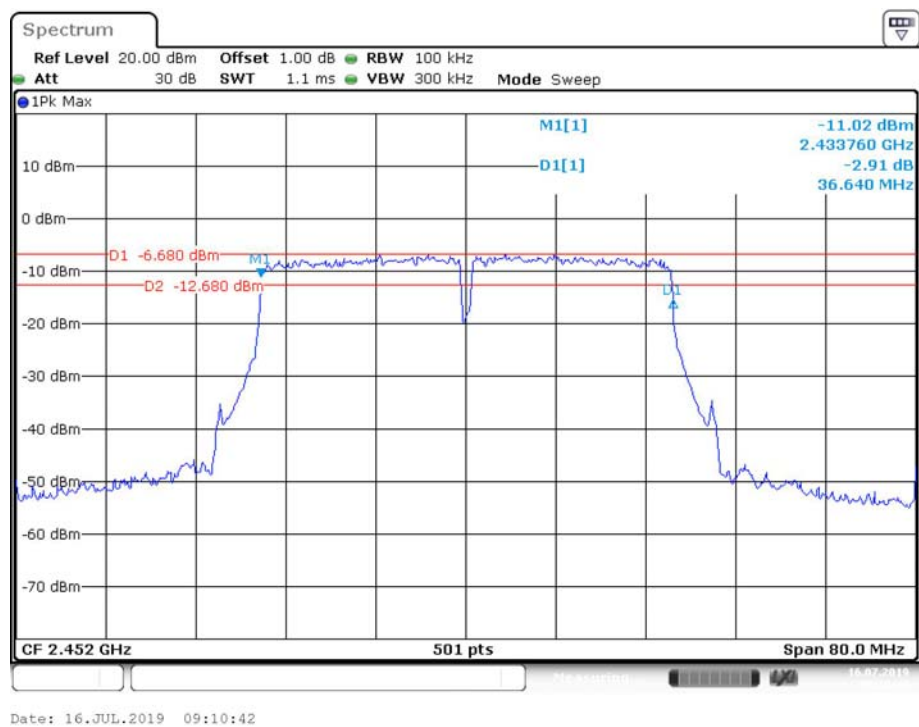
802.11n ht40 Low Channel



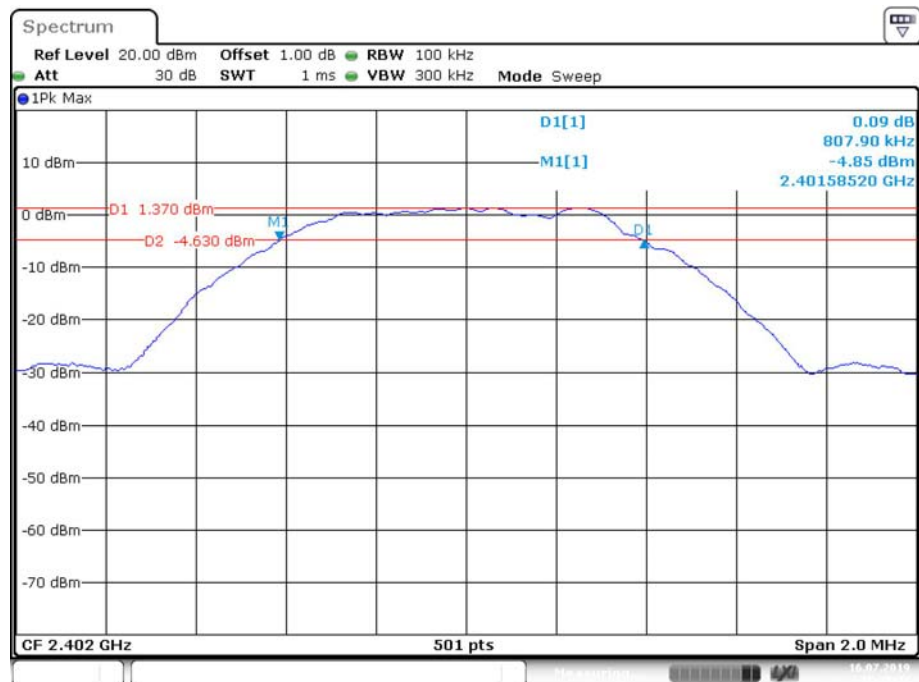
802.11n ht40 Middle Channel



802.11n ht40 High Channel

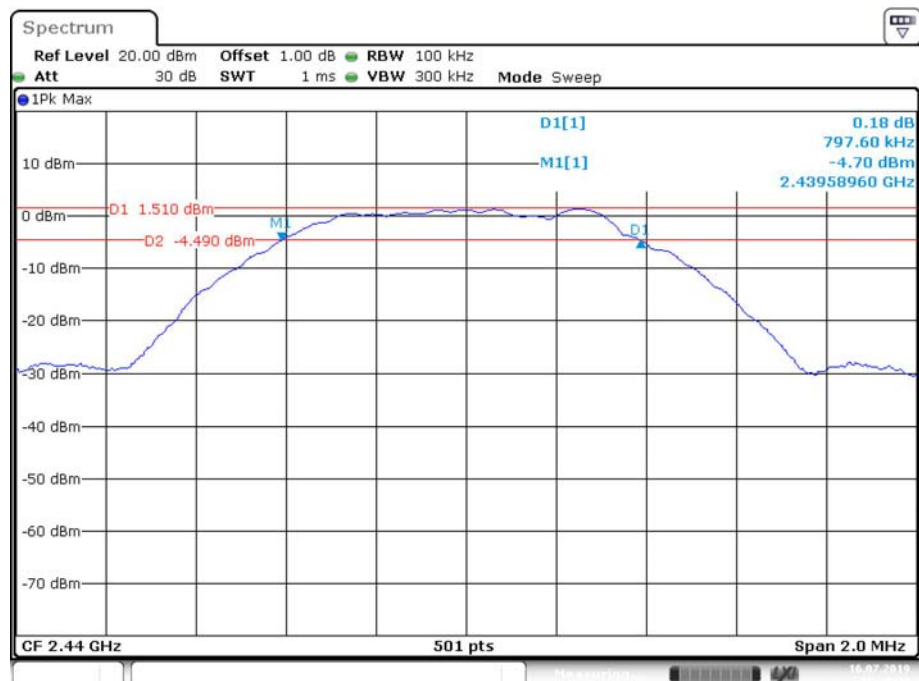


BLE Low Channel



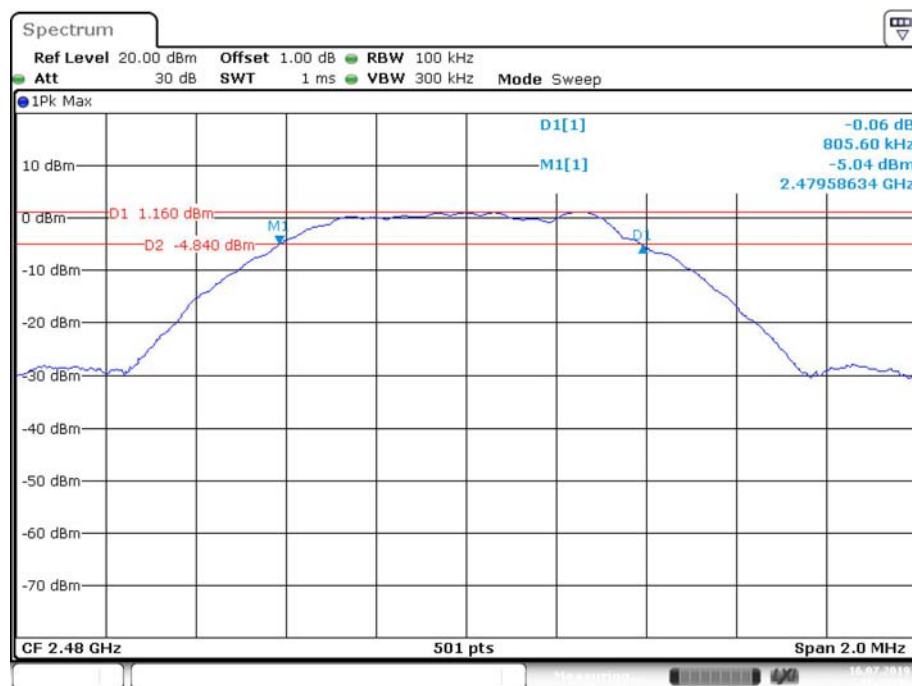
Date: 16.JUL.2019 15:35:47

BLE Middle Channel



Date: 16.JUL.2019 15:36:40

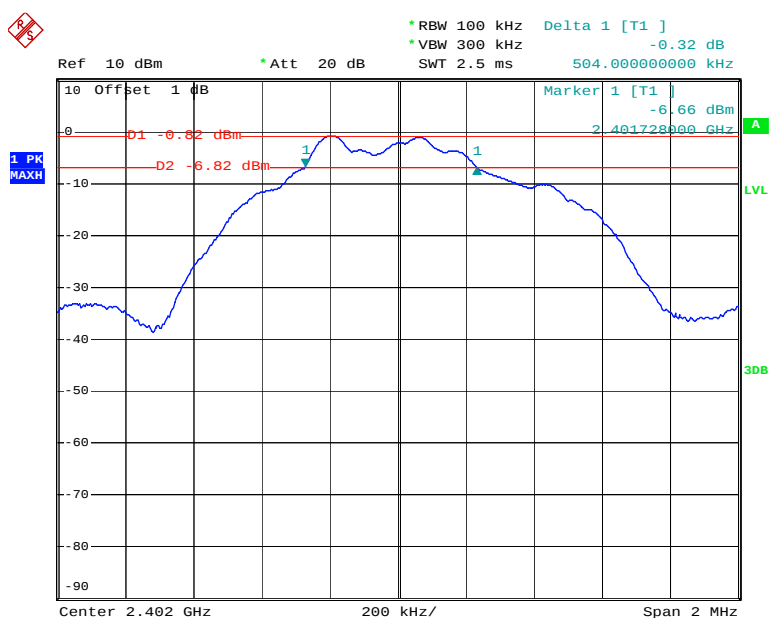
BLE High Channel



Date: 16.JUL.2019 15:37:27

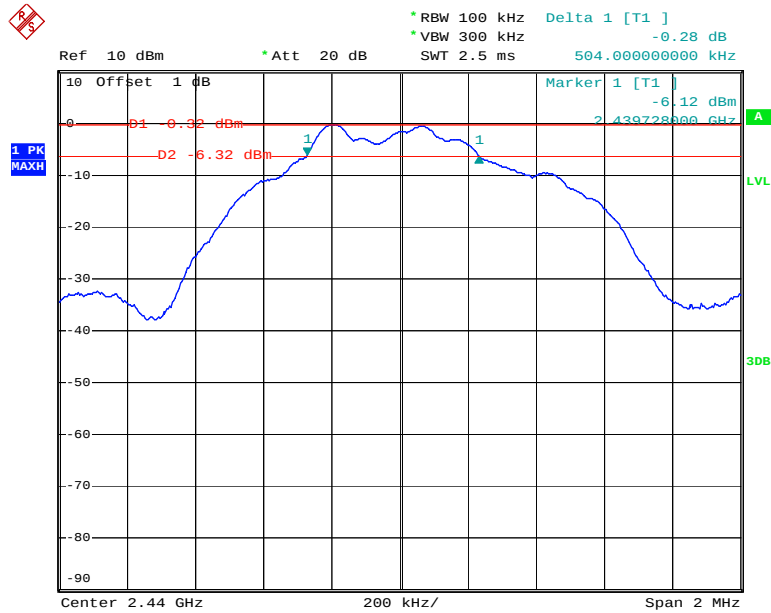
Radio 2:

BLE Low Channel



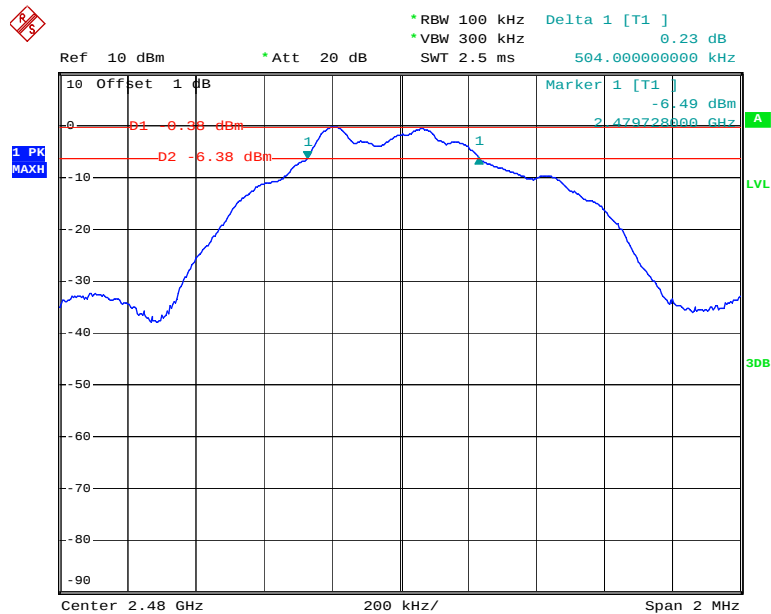
Date: 16.JUL.2019 17:46:26

BLE Middle Channel



Date: 16.JUL.2019 17:48:16

BLE High Channel



Date: 16.JUL.2019 17:49:26

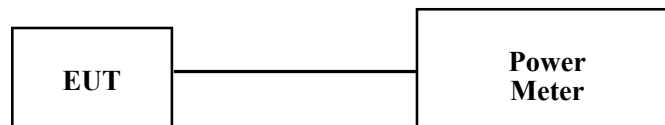
FCC §15.247(b) (3) - MAXIMUM PEAK CONDUCTED OUTPUT POWER

Applicable Standard

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

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to test equipment.
3. Add a correction factor to the display.
4. Set the power Meter to test Peak output power, record the result as peak power.
5. Set the power meter to test average output power, record the result as average power.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	USB Wideband Power Sensor	U2022XA	MY5417006	2018-12-10	2019-12-10
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	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 Data

Environmental Conditions

Temperature:	29.9 °C
Relative Humidity:	57 %
ATM Pressure:	100.1 kPa
Tester:	Carrie He
Test Date:	2019-07-16

Test Mode: Transmitting

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

Radio 1:

Test mode	Channel	Frequency (MHz)	Peak Conducted Output power (dBm)	Limit (dBm)
802.11b	Low	2412	13.38	30
	Middle	2437	13.86	30
	High	2462	13.68	30
802.11g	Low	2412	12.45	30
	Middle	2437	12.74	30
	High	2462	12.46	30
802.11n ht20	Low	2412	10.65	30
	Middle	2437	10.52	30
	High	2462	10.68	30
802.11n ht40	Low	2422	10.57	30
	Middle	2437	10.80	30
	High	2452	10.84	30
BLE	Low	2402	3.63	30
	Middle	2440	3.57	30
	High	2480	3.44	30

Radio 2:

Test mode	Channel	Frequency (MHz)	Peak Conducted Output power (dBm)	Limit (dBm)
BLE	Low	2402	-1.14	30
	Middle	2440	-0.62	30
	High	2480	-0.74	30

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

According to FCC§15.247(d):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

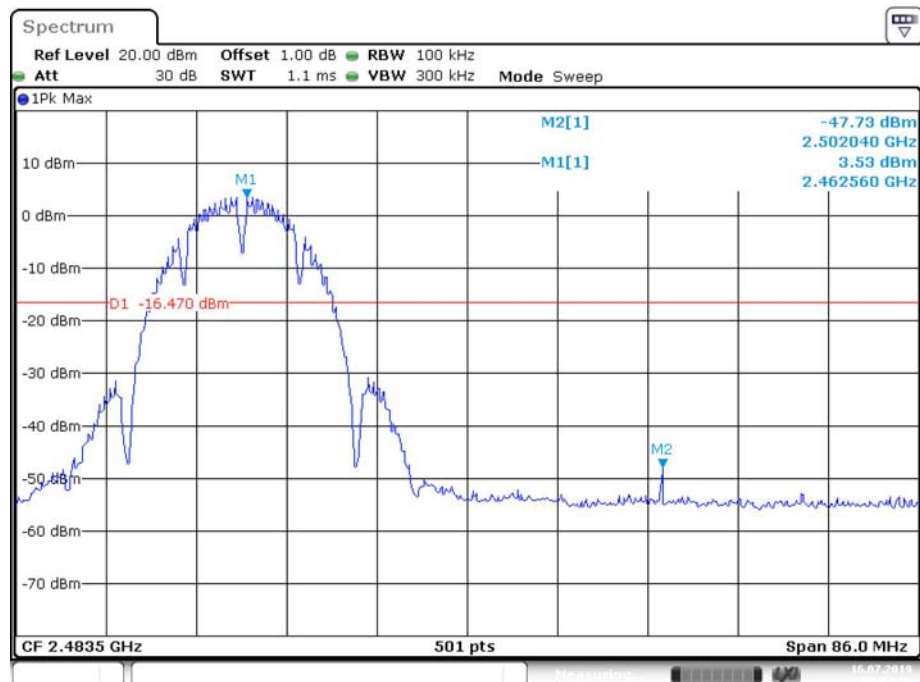
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then 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
R&S	Spectrum Analyzer	FSP 38	100478	2018-12-10	2019-12-10
R&S	Spectrum Analyzer	FSV40	101474	2019-01-09	2020-01-09
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

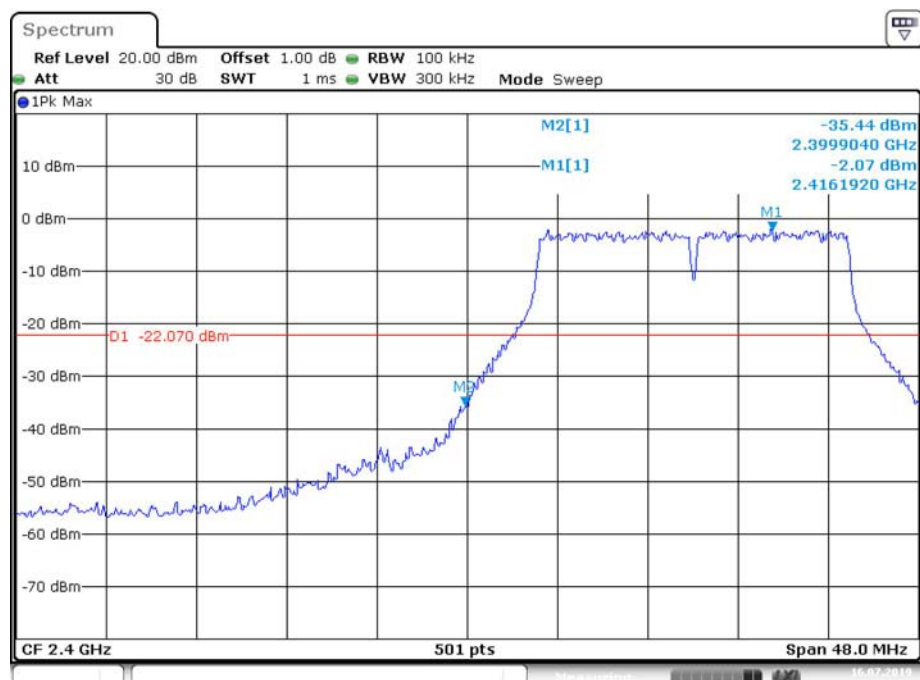
* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

802.11b: Band Edge, Right Side

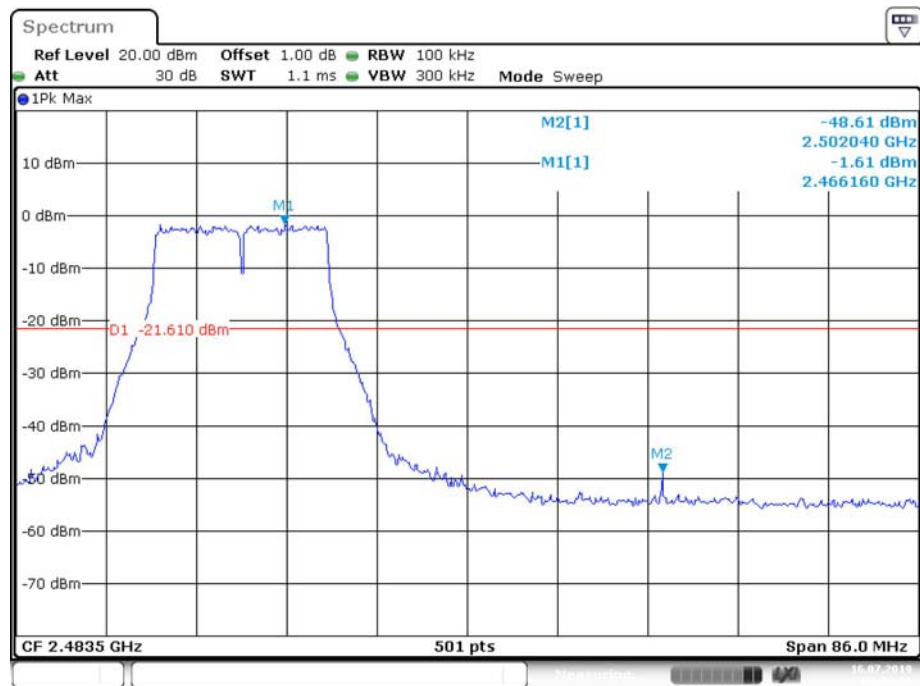


Date: 16.JUL.2019 09:32:24

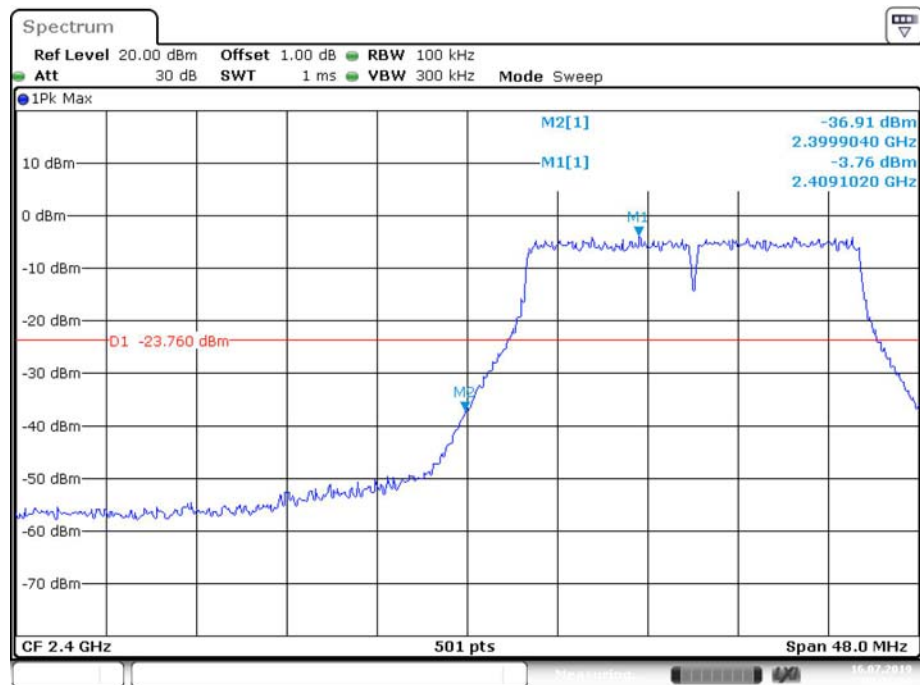
802.11g: Band Edge, Left Side



Date: 16.JUL.2019 09:29:38

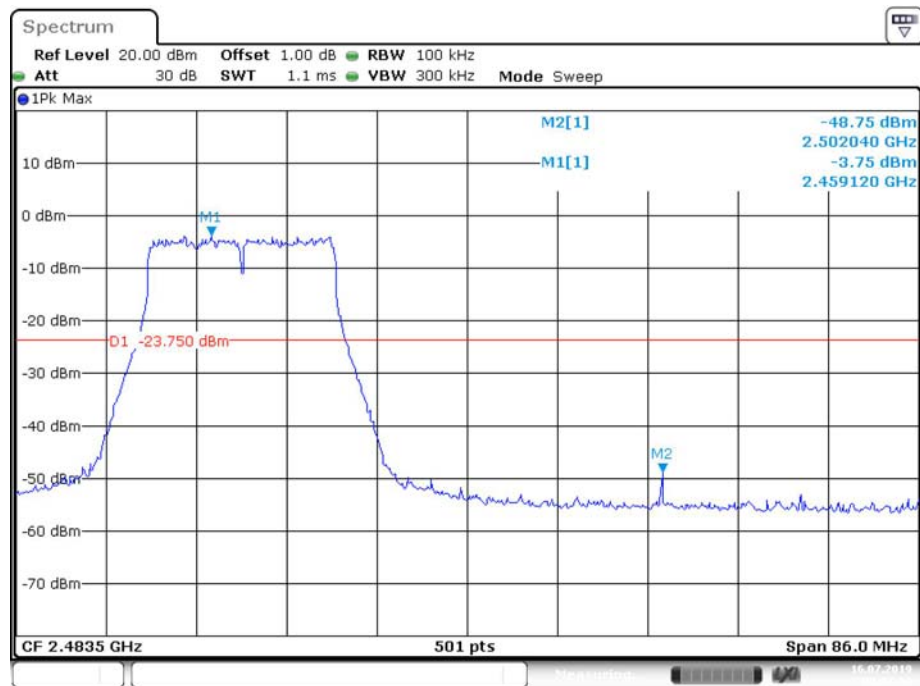
802.11g: Band Edge, Right Side

Date: 16.JUL.2019 09:28:05

802.11n ht20 Band Edge, Left Side

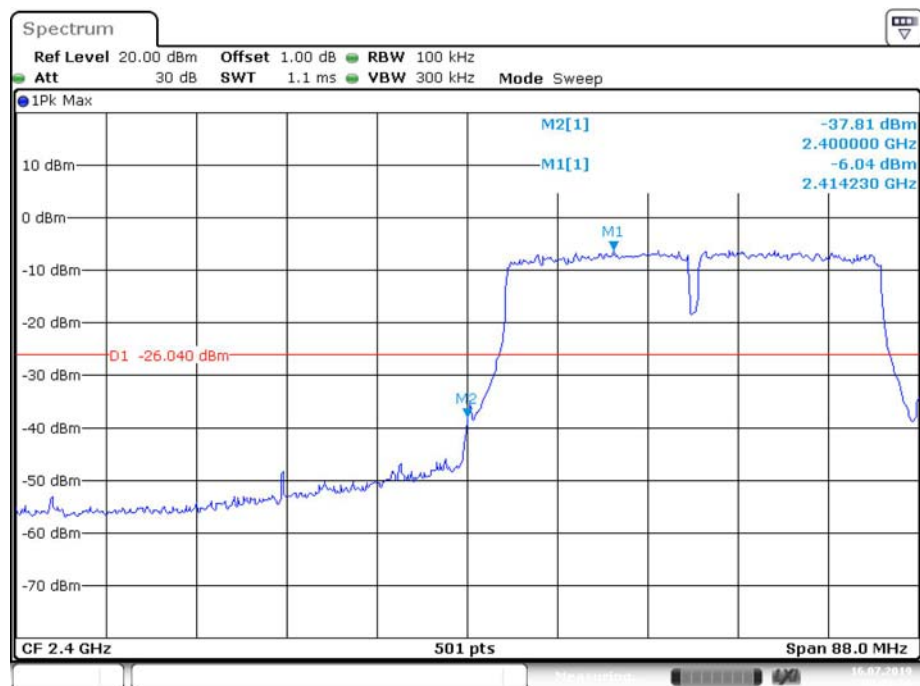
Date: 16.JUL.2019 09:26:02

802.11n ht20 Band Edge, Right Side

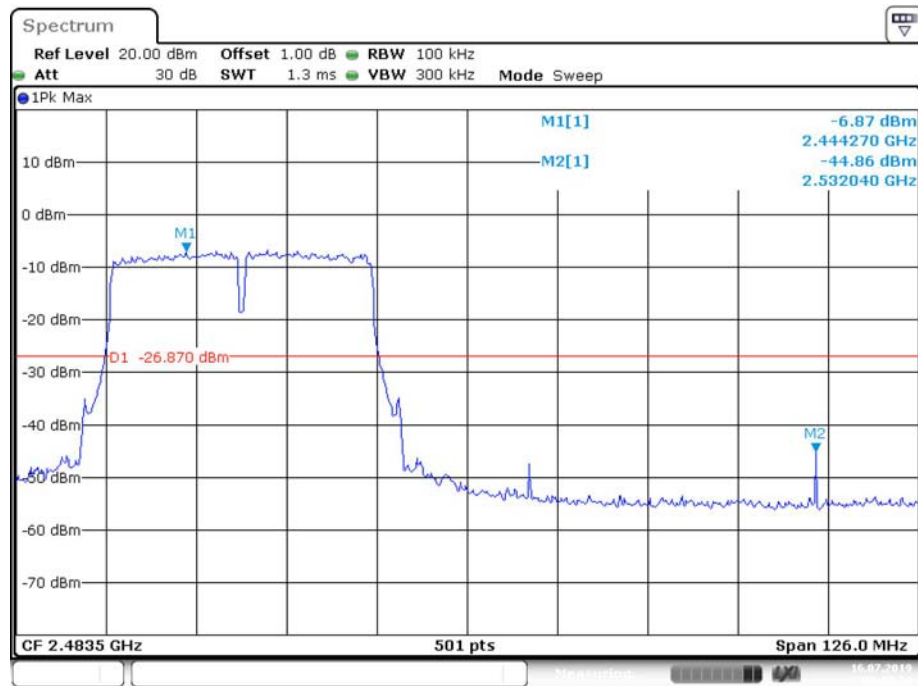


Date: 16.JUL.2019 09:27:13

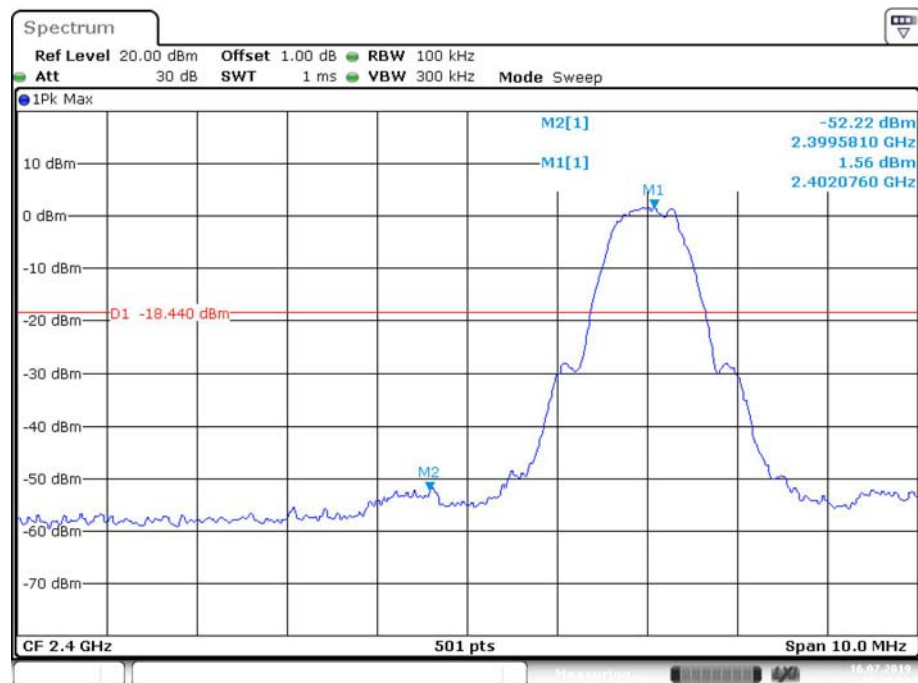
802.11n ht40: Band Edge, Left Side



Date: 16.JUL.2019 09:25:10

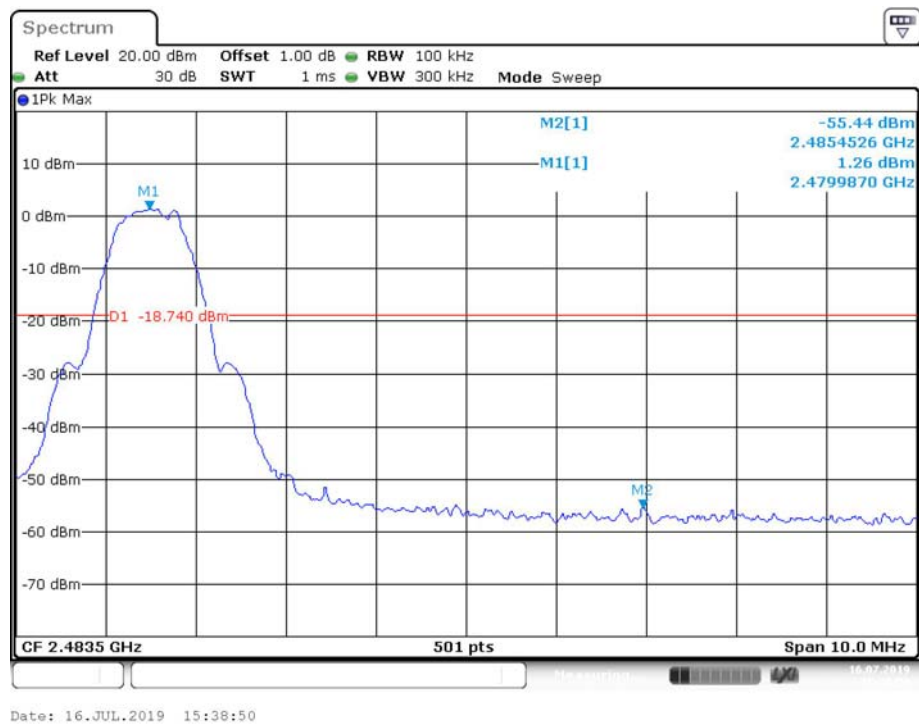
802.11n ht40 Band Edge, Right Side

Date: 16.JUL.2019 09:17:29

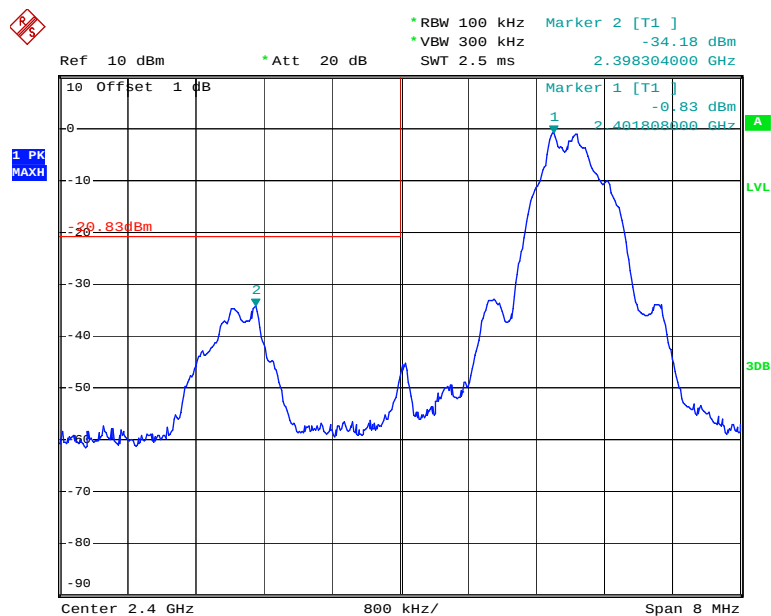
BLE, Band Edge, Left Side

Date: 16.JUL.2019 15:40:10

BLE, Band Edge, Right Side

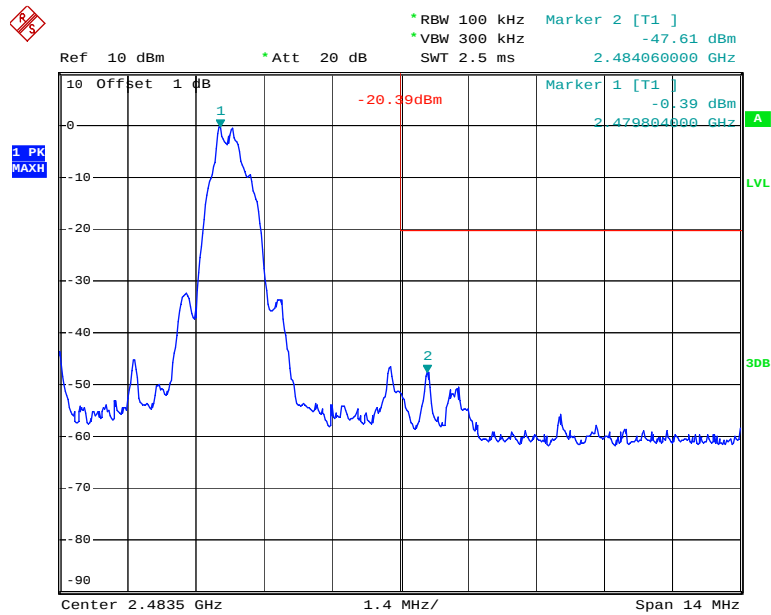


BLE, Band Edge, Left Side



Date: 16.JUL.2019 17:47:43

BLE,Band Edge, Right Side



Date: 16.JUL.2019 17:50:34

FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

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

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the RBW = 3 kHz, VBW = 10 kHz, Set the span to 1.5 times the DTS bandwidth.
4. Use the peak marker function to determine the maximum amplitude level.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2018-12-10	2019-12-10
R&S	Spectrum Analyzer	FSV40	101474	2019-01-09	2020-01-09
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	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 Data

Environmental Conditions

Temperature:	29.9 °C
Relative Humidity:	57 %
ATM Pressure:	100.1 kPa
Tester:	Carrie He
Test Date:	2019-07-16

Test Result: Compliance

Test Mode: Transmitting

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

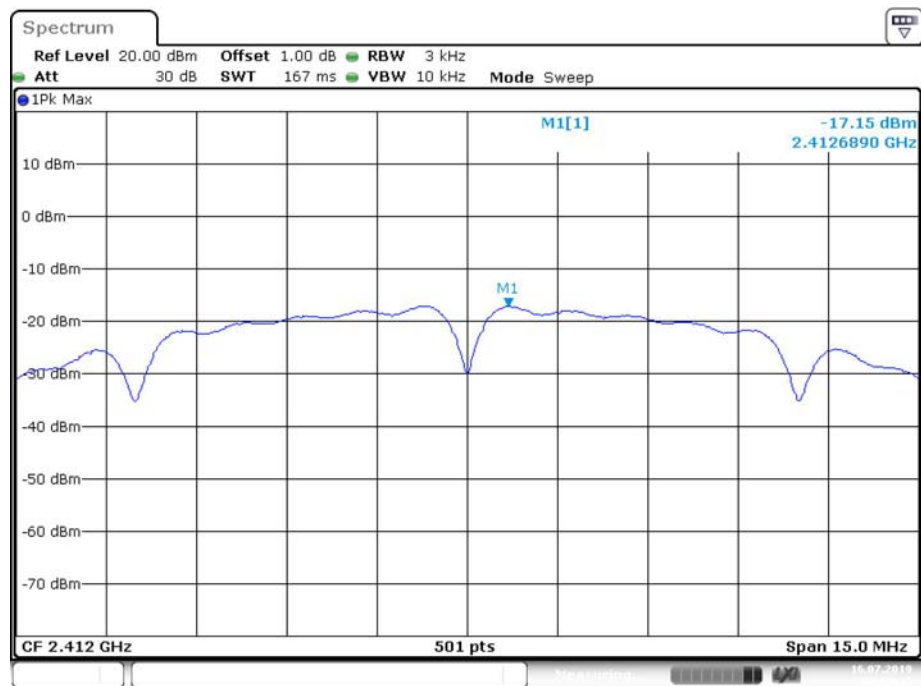
Radio 1:

Test mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	Low	2412	-17.15	≤8
	Middle	2437	-16.83	≤8
	High	2462	-17.01	≤8
802.11g	Low	2412	-16.70	≤8
	Middle	2437	-16.47	≤8
	High	2462	-16.73	≤8
802.11n ht20	Low	2412	-18.15	≤8
	Middle	2437	-18.41	≤8
	High	2462	-18.04	≤8
802.11n ht40	Low	2422	-18.28	≤8
	Middle	2437	-18.18	≤8
	High	2452	-18.35	≤8
BLE	Low	2402	-13.16	≤8
	Middle	2440	-13.22	≤8
	High	2480	-13.41	≤8

Radio 2:

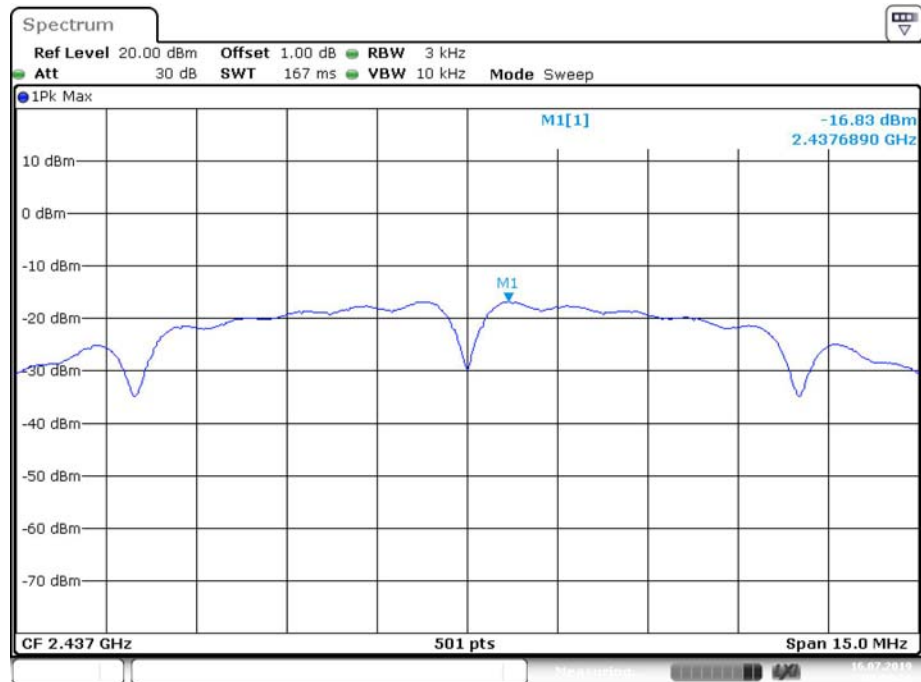
Test mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
BLE	Low	2402	-19.73	≤8
	Middle	2440	-19.18	≤8
	High	2480	-19.28	≤8

Power Spectral Density, 802.11b Low Channel

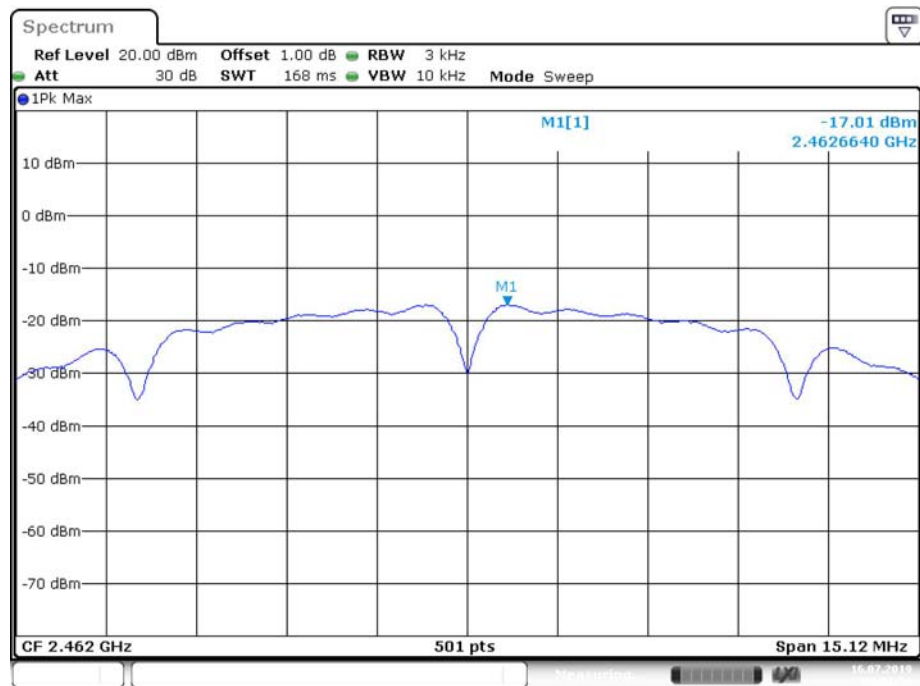


Date: 16.JUL.2019 08:59:44

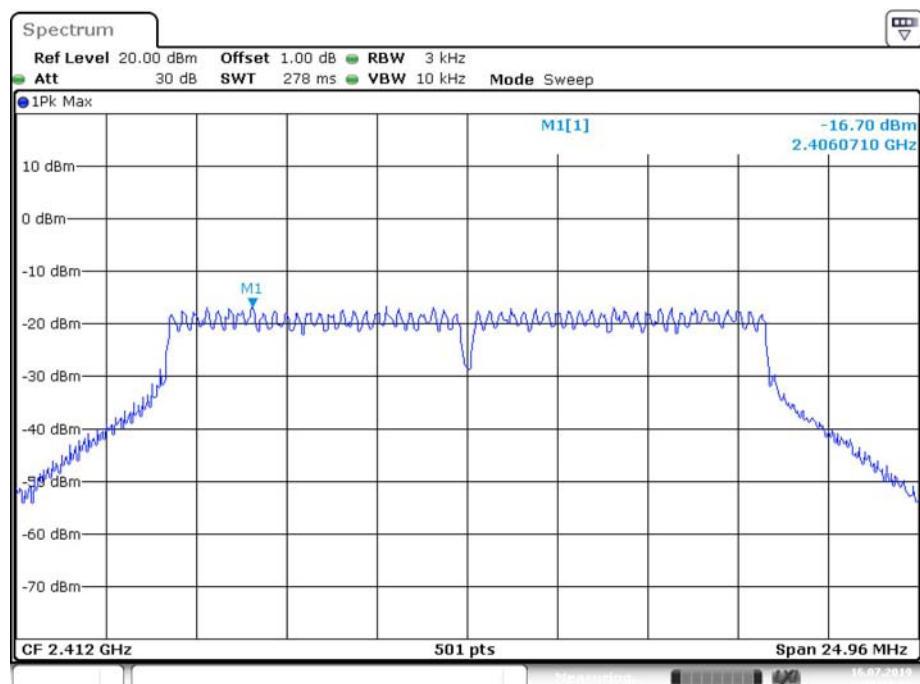
Power Spectral Density, 802.11b Middle Channel



Date: 16.JUL.2019 09:00:39

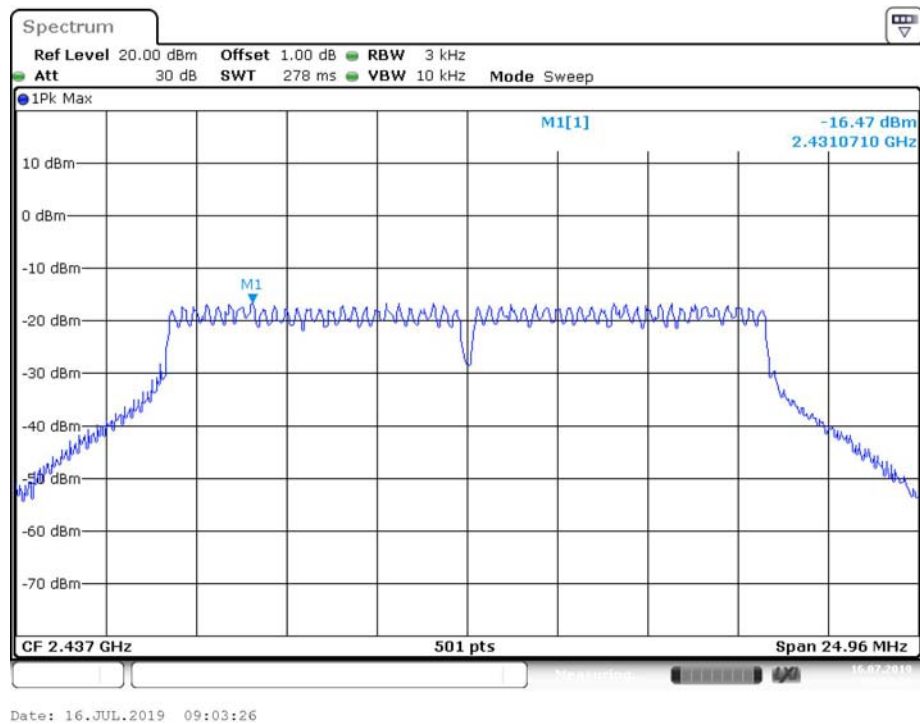
Power Spectral Density, 802.11b High Channel

Date: 16.JUL.2019 09:01:32

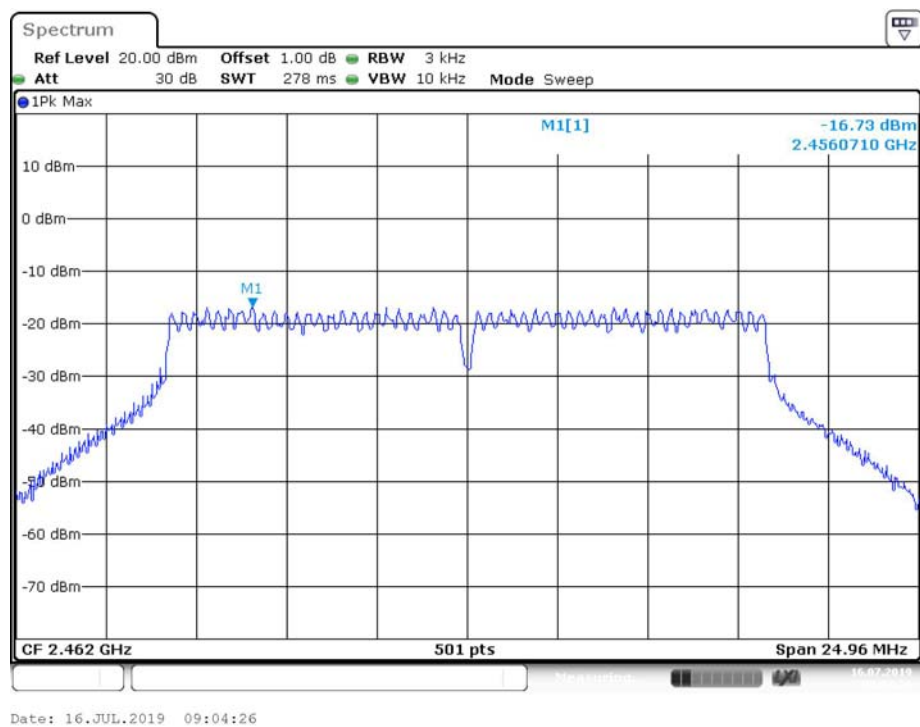
Power Spectral Density, 802.11g Low Channel

Date: 16.JUL.2019 09:02:29

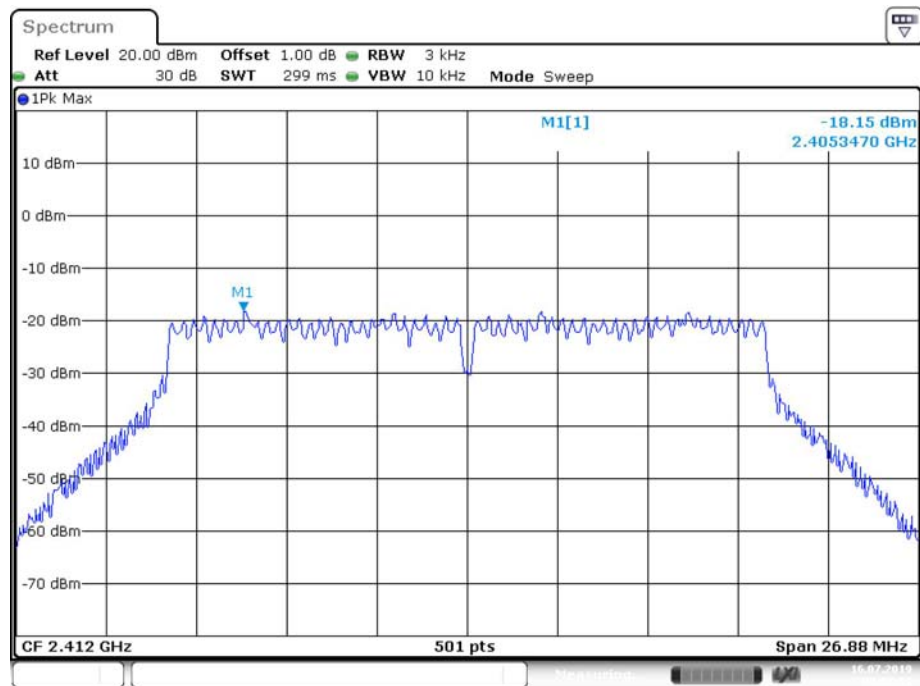
Power Spectral Density, 802.11g Middle Channel



Power Spectral Density, 802.11g High Channel

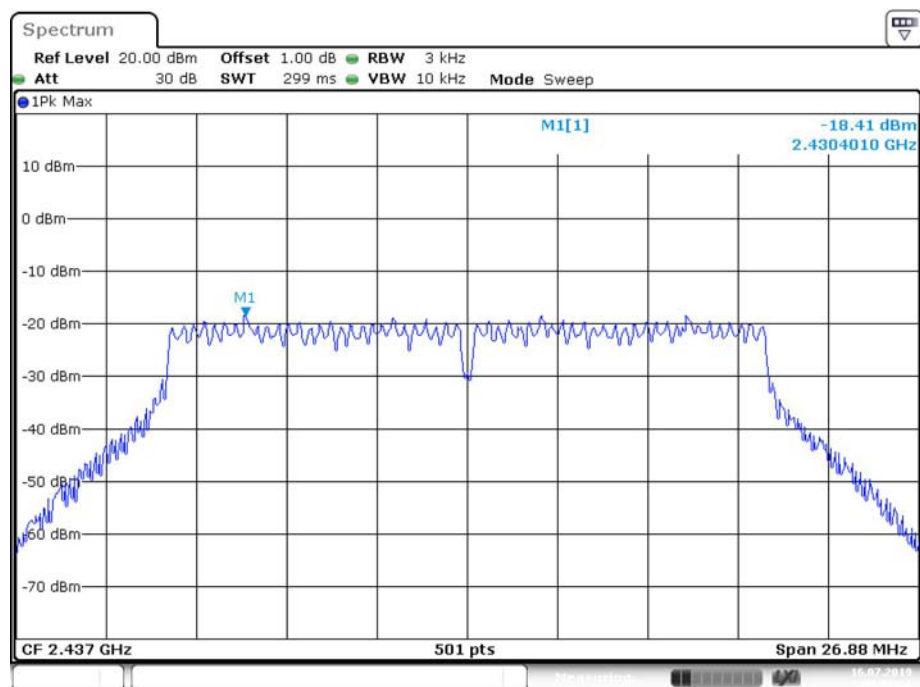


Power Spectral Density, 802.11n ht20 Low Channel



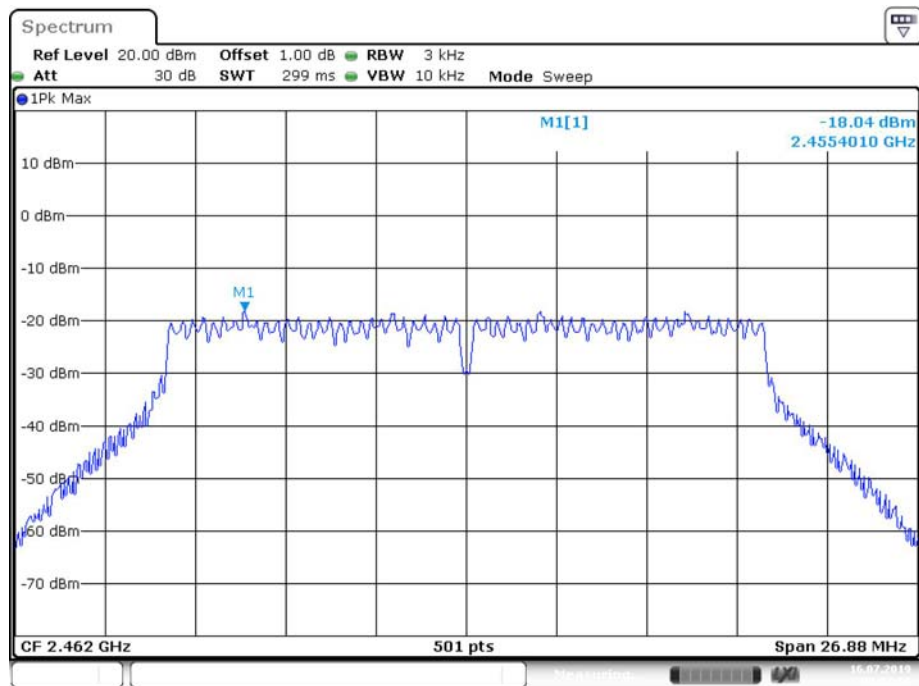
Date: 16.JUL.2019 09:05:50

Power Spectral Density, 802.11n ht20 Middle Channel



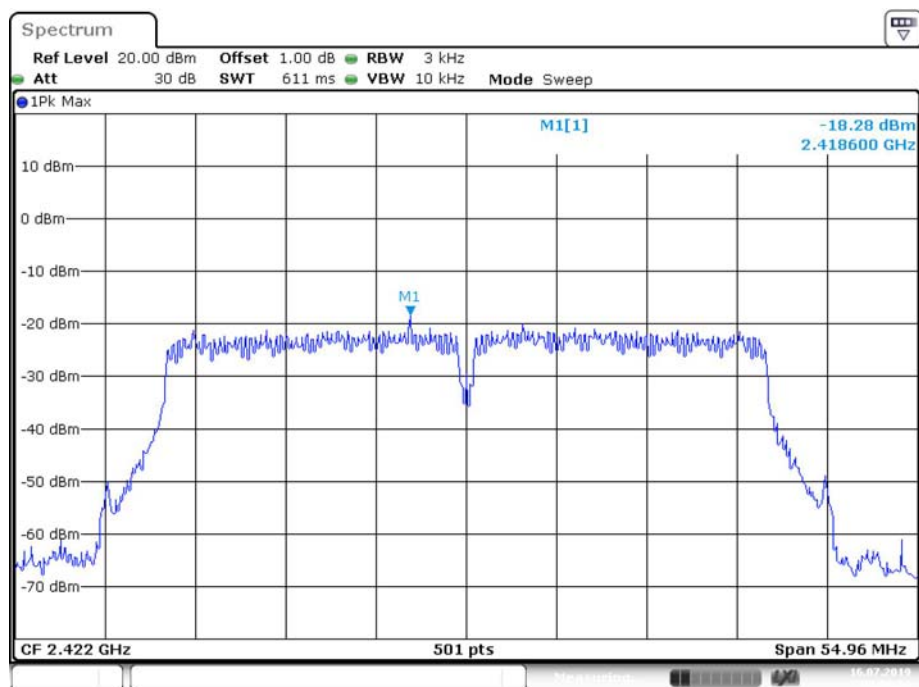
Date: 16.JUL.2019 09:06:58

Power Spectral Density, 802.11n ht20 High Channel

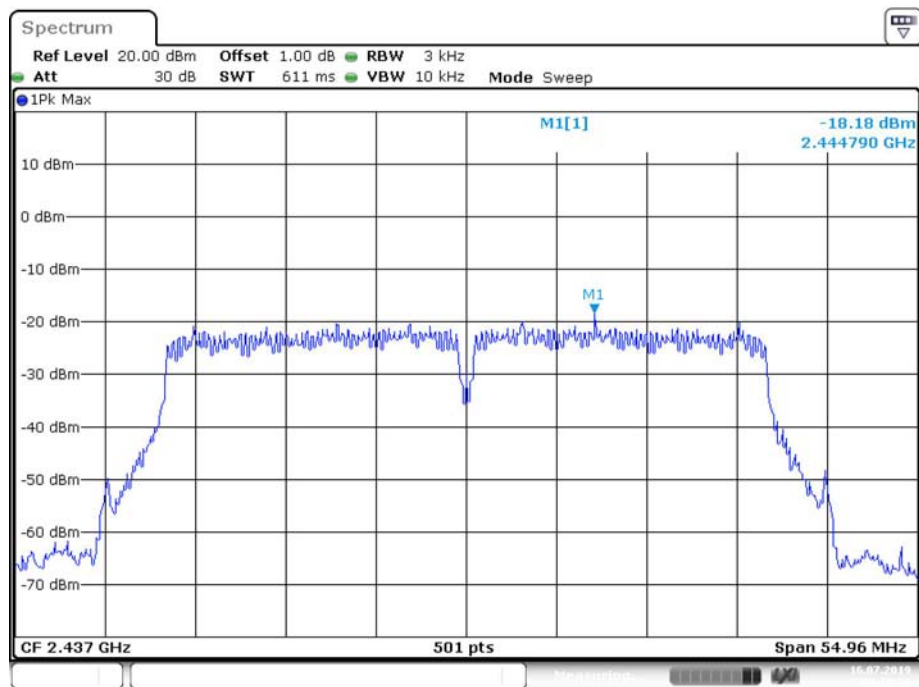
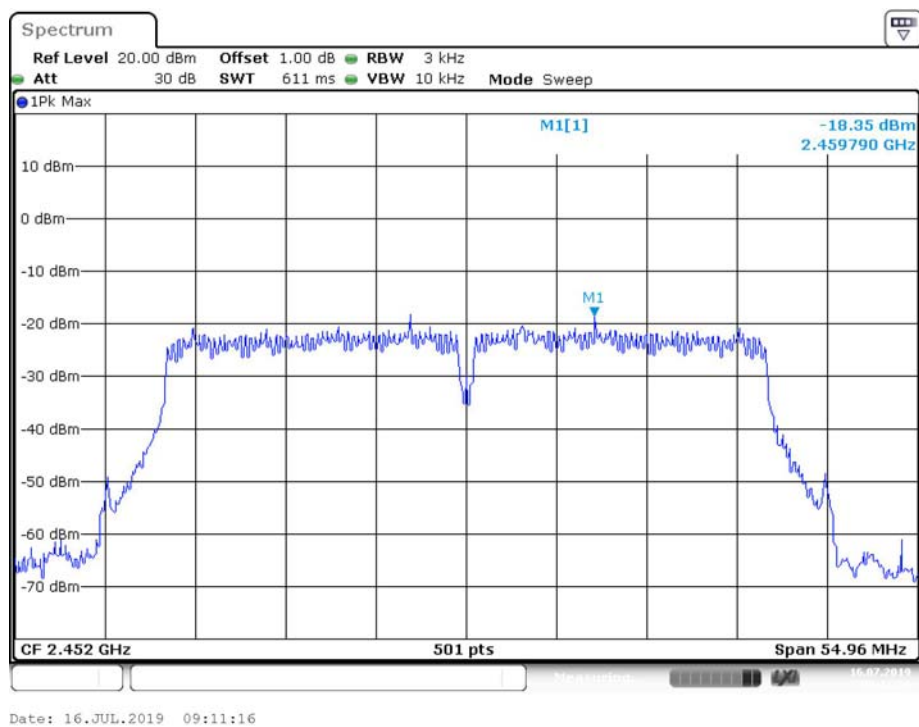


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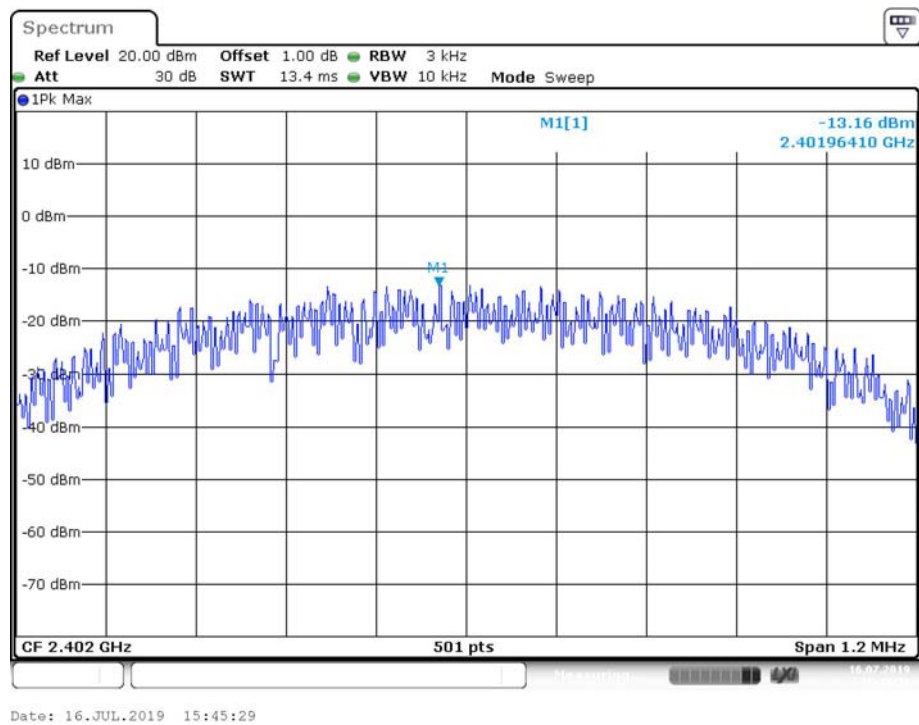
Power Spectral Density, 802.11n ht40 Low Channel



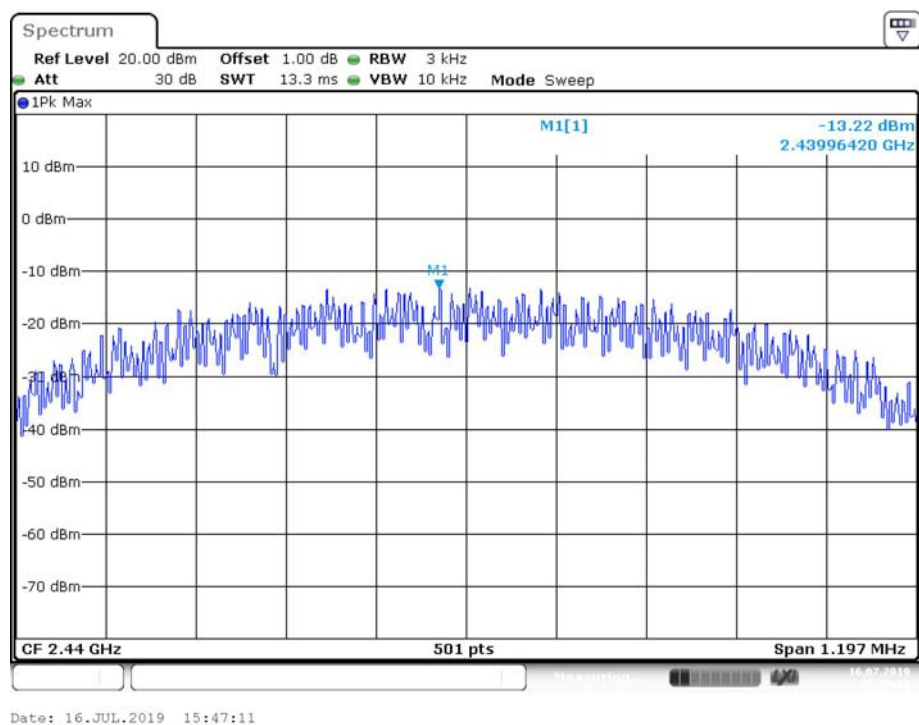
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Power Spectral Density, 802.11n ht40 Middle Channel**Power Spectral Density, 802.11n ht40 High Channel**

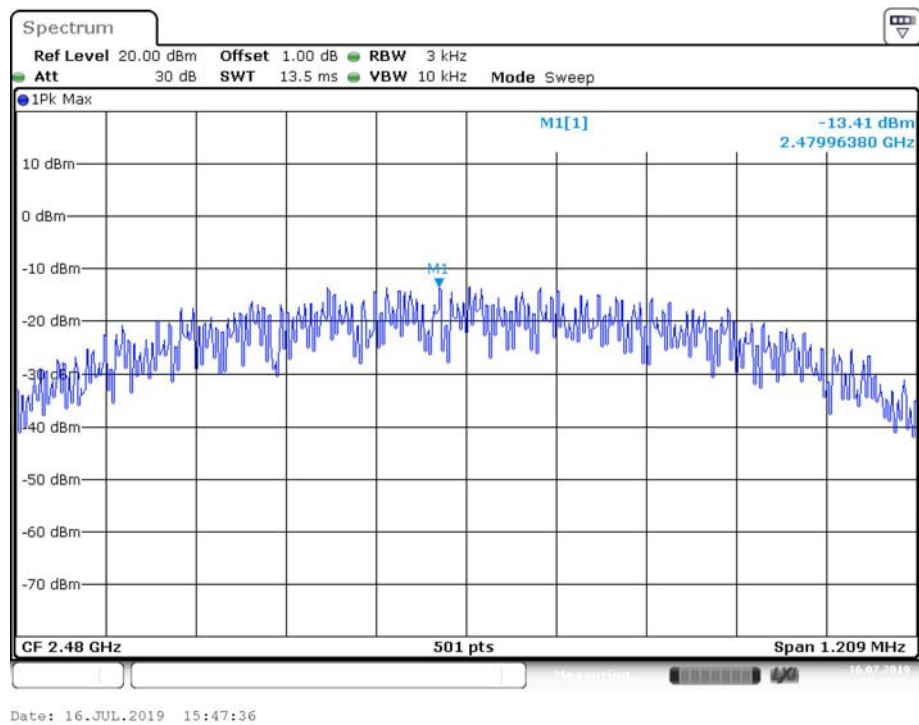
Power Spectral Density, BLE, Low Channel



Power Spectral Density, BLE, Middle Channel

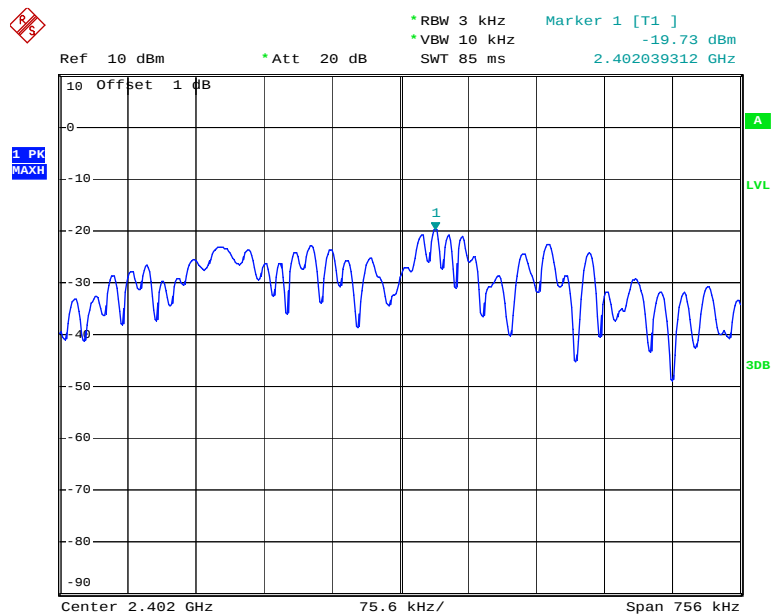


Power Spectral Density, BLE, High Channel



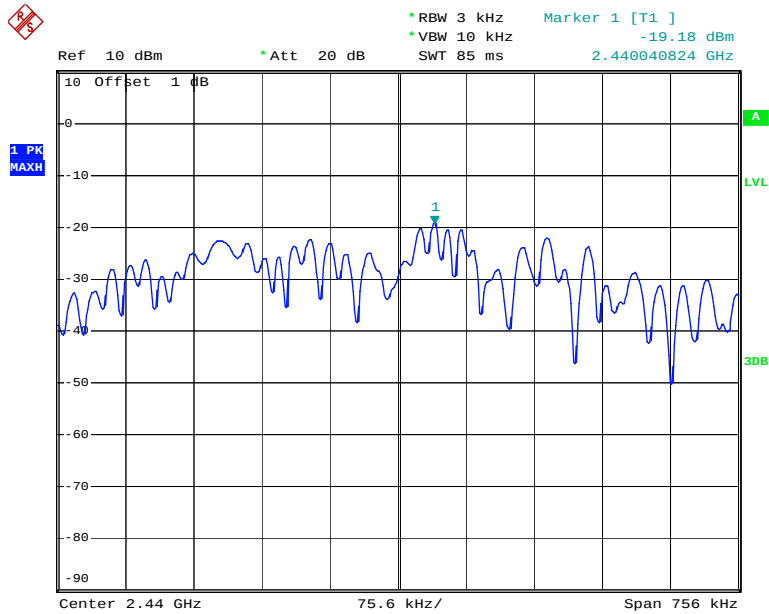
Radio 2:

Power Spectral Density, BLE, Low Channel



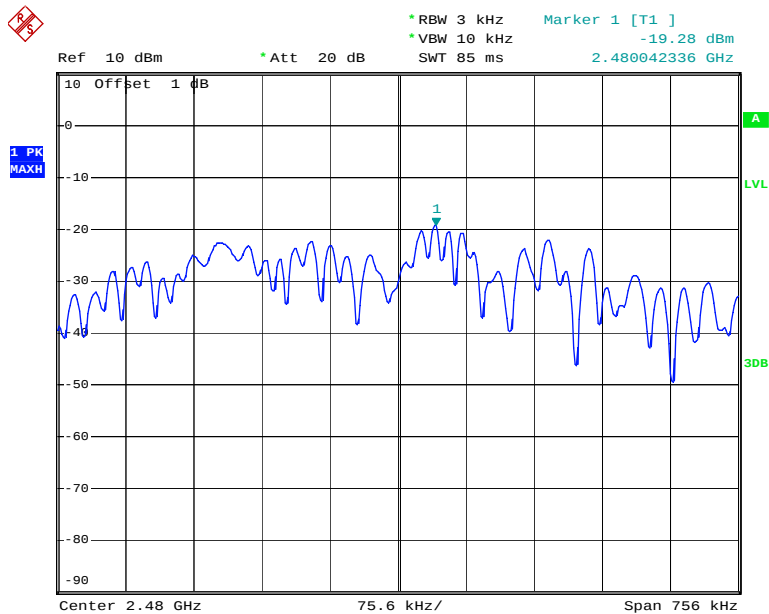
Date: 16.JUL.2019 17:47:11

Power Spectral Density, BLE, Middle Channel



Date: 16.JUL.2019 17:48:58

Power Spectral Density, BLE, High Channel



Date: 16.JUL.2019 17:50:11

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