FCC PART 15.247

TEST REPORT

For

Shanghai Huace Navigation Technology LTD.

Building C, 599 Gaojing Road, Qingpu District, Shanghai, China

FCC ID: SY4-B01008

Report Type:	Product Type:
Original Report	Data Collector

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Report Number:	RKS170217001-00D
Report Date:	2017-08-14
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Shanghai Huace Navigation Technology LTD.
Tested Model	LT600
Series Model	LT600 WXYZ (WXYZ= 0-9, a-z)
Product Type	Data Collector
Dimension	235 mm(L)×138 mm(W)×30 mm(H)
Power Supply	DC 3.8V from rechargeable battery or DC 5.0V from adapter

Adapter Information:
Model: EA1012AVRU-050
INPUT: 100-240Vac, 50/60Hz, 1.0A
OUTPUT: 5V, 2.4A

** Note: The difference between tested model and series model was explained in the declaration letter.*

**All measurement and test data in this report was gathered from production sample serial number: 20170122001. (Assigned by the BACL. The EUT supplied by the applicant was received on 2017-01-22)*

Objective

This report is prepared on behalf of Shanghai Huace Navigation Technology LTD. in accordance with Part 2-Subpart J, Part 15-Subparts A 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 15B JBP, Part 15.247 DSS, Part 22H/27 TNB submissions with FCC ID: SY4-B01008.

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 v04.

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

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19 dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Test Facility

The test site A 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 C63.4-2014.

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	/	/

EUT was tested with Channel 1, 6 and 11.

For 802.11n-HT40 mode, 7 channels are provided to testing

Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	8	2447
4	2427	9	2452
5	2432	/	/
6	2437	/	/
7	2442	/	/

EUT was tested with Channel 3, 6 and 9.

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

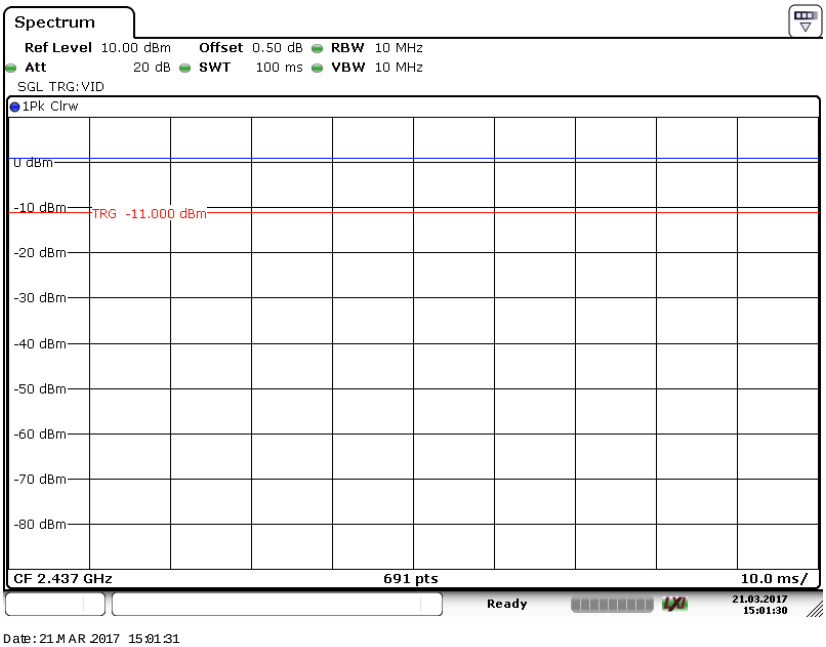
Wi-Fi & BLE tested in engineering mode.

Pre-scan with all the data rates, and the worst case was performed as below:

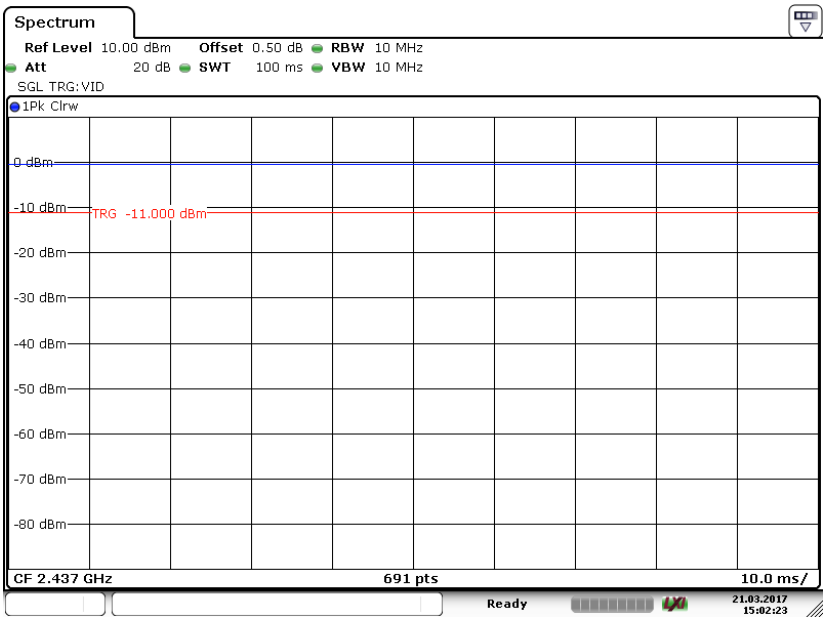
Mode	Data rate	Power level
802.11b	1 Mbps	17
802.11g	6 Mbps	17
802.11n-HT20	MCS0	17
802.11n-HT40	MCS0	17
BLE	1 Mbps	0

Duty Cycle:

802.11b Mode Middle Channel

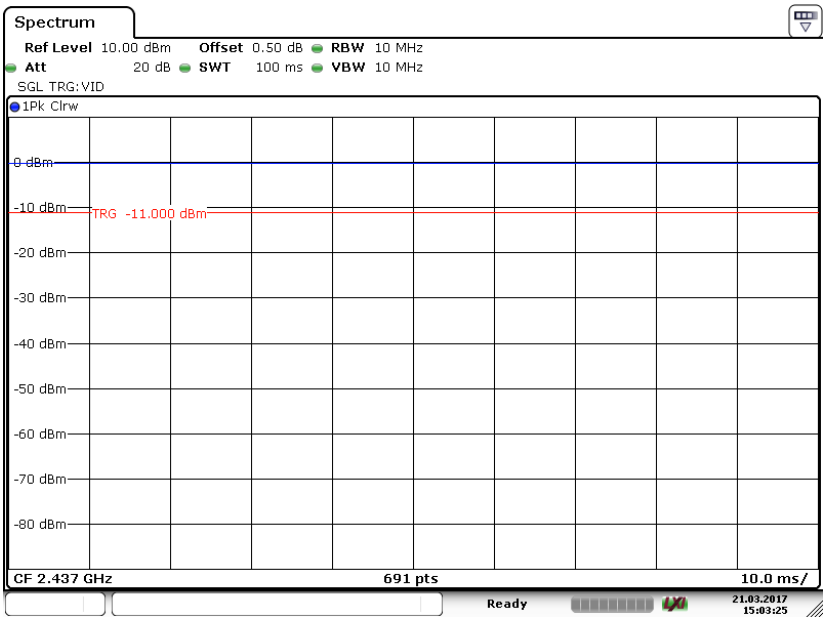


802.11g Mode Middle Channel



Date: 21.MAR.2017 15:02:23

802.11n20 Mode Middle Channel



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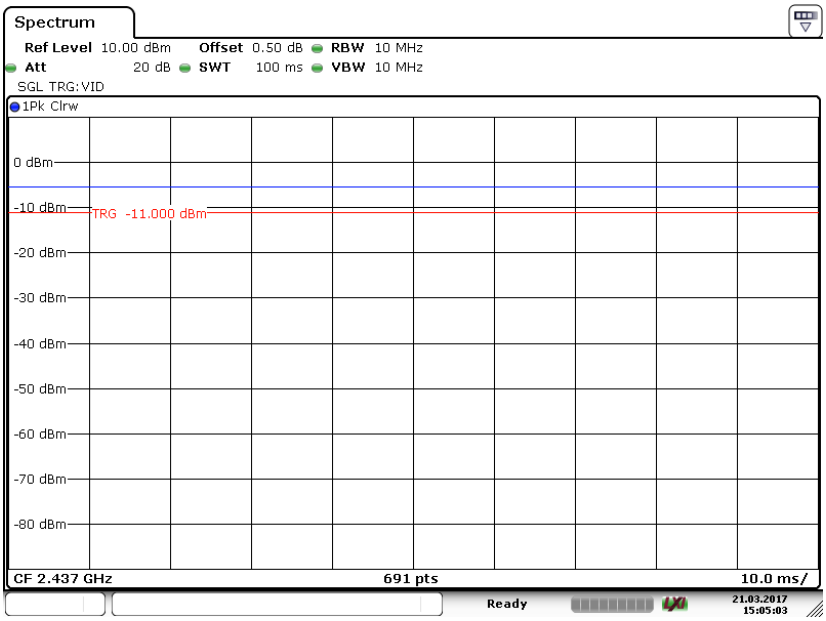
802.11n40 Mode Middle Channel



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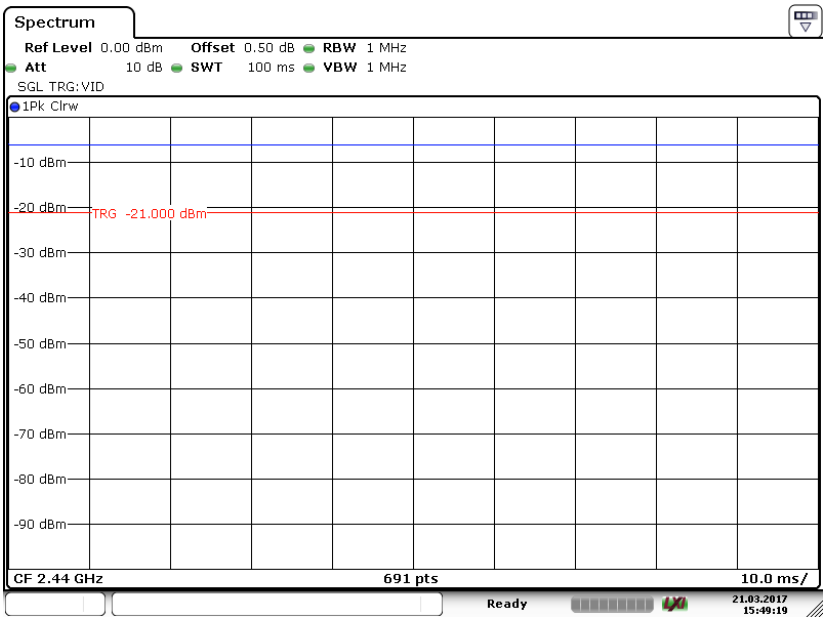
BLE Mode Middle Channel



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Band	Duty Cycle (%)	T(us)	1/T(kHz)	VBW Setting	10log(1/x)
802.11b	100	/	/	10Hz	0
802.11g	100	/	/	10Hz	0
802.11n-HT20	100	/	/	10Hz	0
802.11n-HT40	100	/	/	10Hz	0
BLE	100	/	/	10Hz	0

Support Equipment List and Details

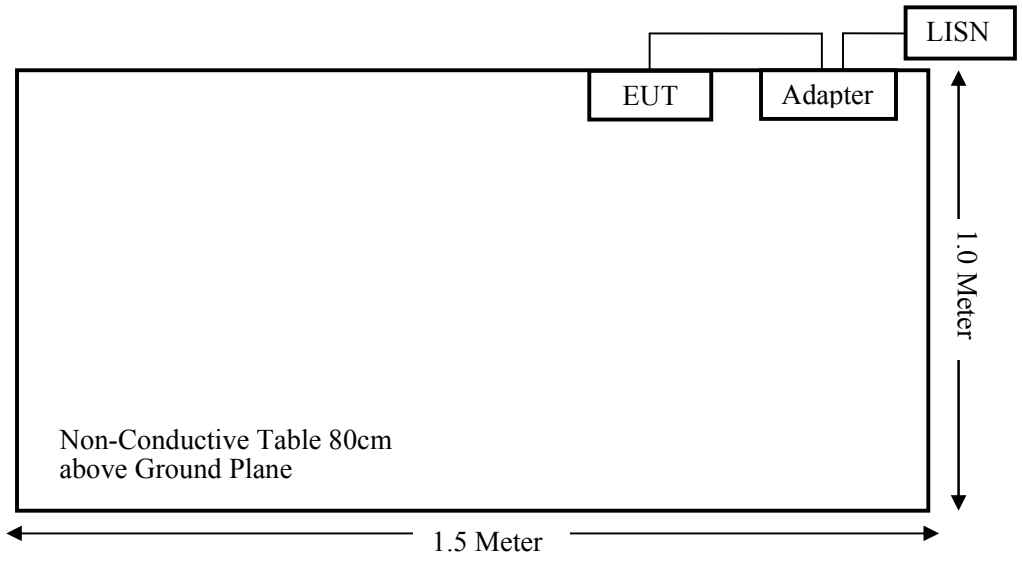
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

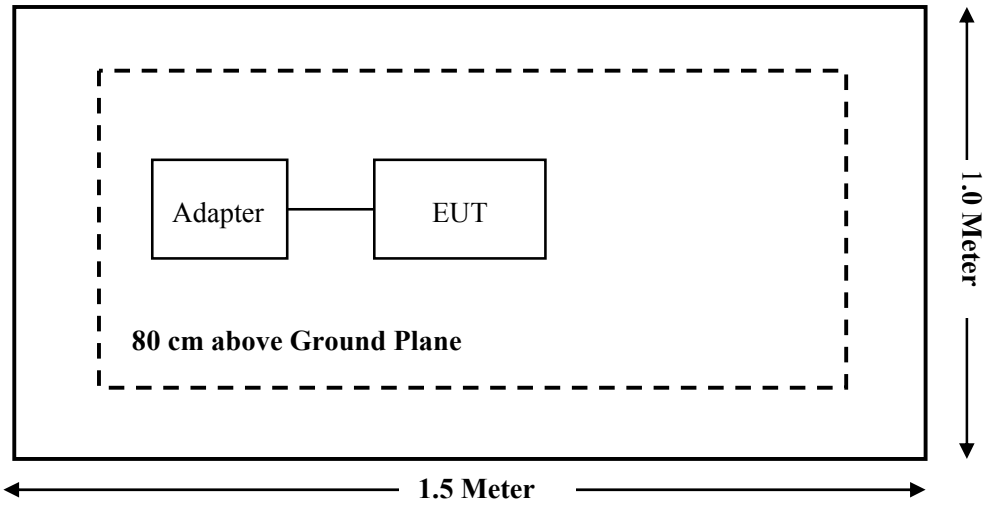
Cable Description	Shielding Type	Length (m)	From Port	To
USB Cable	Un-Shielding	0.8	EUT	Adapter

Block Diagram of Test Setup

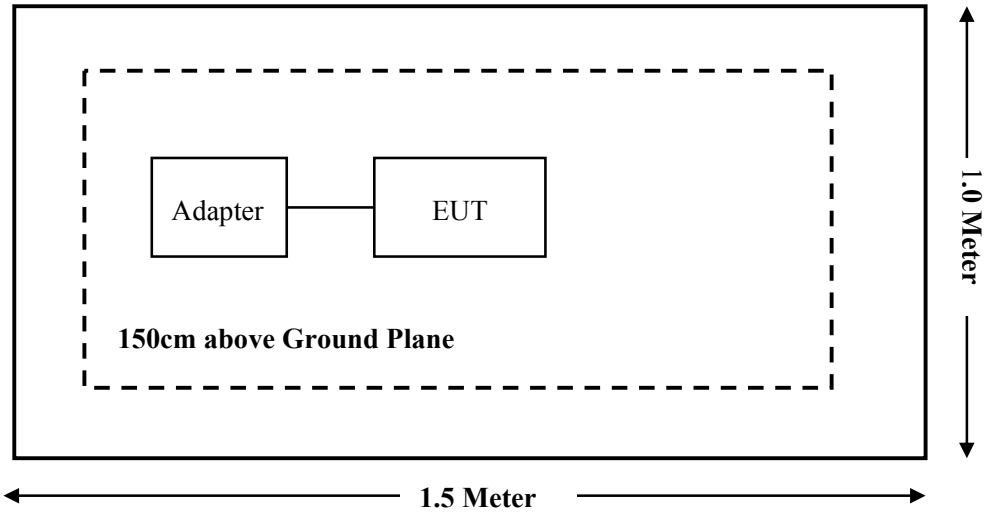
For Conducted Emissions:



For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i),§1.1310& §2.1093	RF EXPOSURE	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.247(d)	Spurious Emissions at Antenna Port	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Conducted Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-24
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
ETS	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
Sonoma Instrunent	Amplifier	330	171377	2016-12-12	2017-12-11
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
Heatsink Required	Amplifier	QLW-18405536-J0	15964001009	2016-12-12	2017-12-11
R&S	Auto test Software	EMC32	100361	/	/
Haojintech	Coaxial Cable	Cable-1	001	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-2	002	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-3	003	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-4	004	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-5	005	2016-12-12	2017-12-11
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2016-07-04	2017-07-03
Agilent	Power Meter	N1912A	MY5000492	2016-11-18	2017-11-17
Agilent	Power Sensor	N1921A	MY54210024	2016-11-18	2017-11-17
Picosecond	DC Block	5500A-110	131047	/	/
Huace	RF Cable	/	/	2017-02-14	2018-02-13
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCS30	834115/007	2016-11-25	2017-11-24
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2016-10-10	2017-10-09
ROHDE&SCHWARZ	LISN	ENV216	3560655016	2016-11-25	2017-11-24
Rohde & Schwarz	CE Test software	EMC 32	100357	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2016-09-08	2017-09-07

*** 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).

FCC§15.247 (i), §1.1310& §2.1093 –RF EXPOSURE

Applicable Standard

According to§2.1093and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB447498 D01 General RF Exposure Guidance v06:

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

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

Measurement Result

Mode	Frequency Range	Conducted Average power	Conducted Average power	Minimum test separation distance required for the exposure conditions
	(MHz)	(dBm)	(mW)	(mm)
802.11b	2412-2462	9.80	9.55	5.00
802.11g		9.80	9.55	5.00
802.11n-HT20		9.80	9.55	5.00
802.11n-HT40	2422-2452	9.80	9.55	5.00

Mode	Frequency Range	Conducted Peak Power	Conducted Peak Power	Minimum test separation distance required for the exposure conditions
	(MHz)	(dBm)	(mW)	(mm)
BLE	2402-2480	-6.00	0.25	5.00

Note: Turn up power: 802.11b: 8.8±1dBm
802.11g: 8.8±1dBm,
802.11n-HT20: 8.8±1dBm,
802.11n-HT40: 8.8±1dBm,
BLE: -7±1dBm,
which are declared by the manufacturer.

Result:

For 2.4G Wi-Fi mode: [(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] • [√ f(GHz)]=9.55/5* √ 2.462= **3.0**

For BLE mode: [(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] • [√ f(GHz)]=0.25/5* √ 2.48= **0.08<3.0**.

So no SAR test is needed.

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 FPCB antenna arrangement for Wi-Fi & BLE, which the antenna gain is 0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

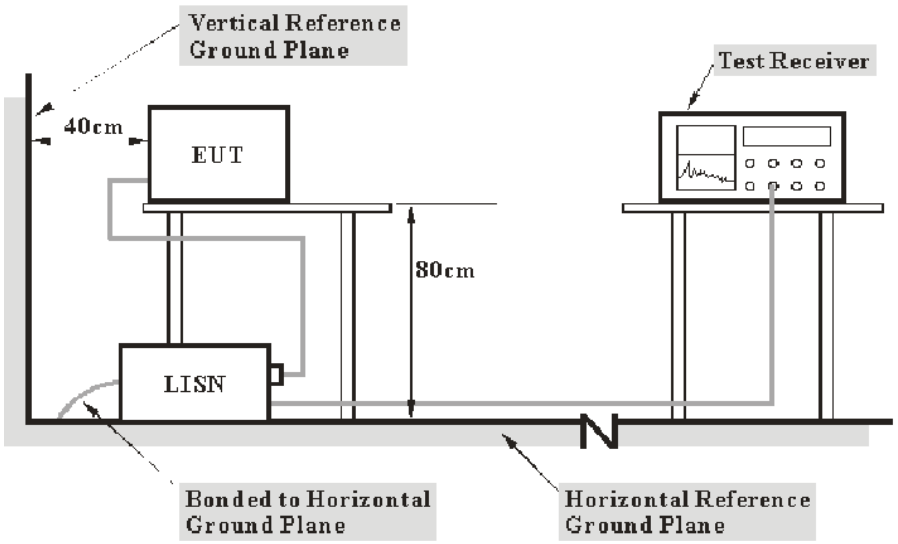
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

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.

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.

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.

Test Data

Environmental Conditions

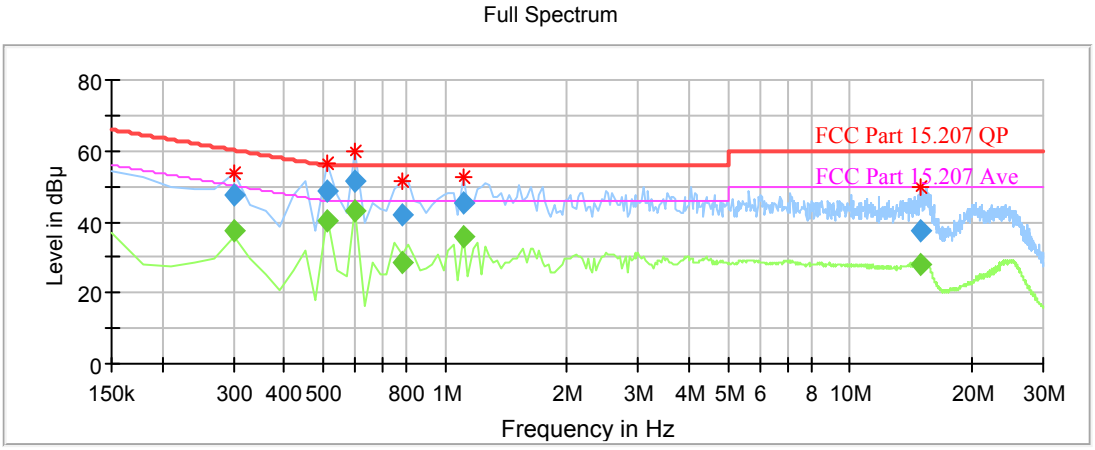
Temperature:	23 ℃
Relative Humidity:	55 %
ATM Pressure:	101.1kPa

The testing was performed by Chris Wang on 2017-03-23.

EUT operation mode: 802.11b High channel (worst case)

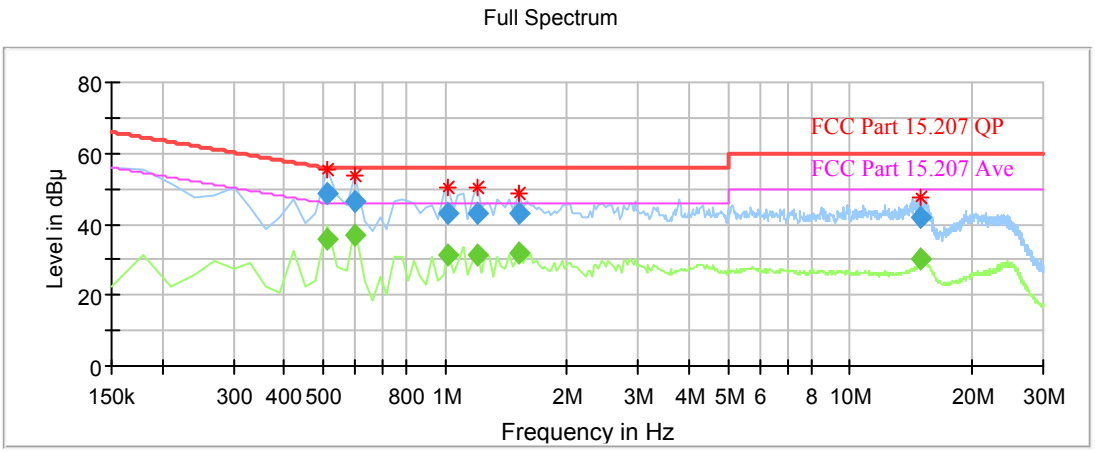
:

AC 120V/60 Hz, Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Limit (dBµV)	Margin (dB)	Corr. (dB)	Comment
0.300000	---	37.39	9.000	L1	50.24	12.85	10.0	Compliance
0.300000	47.48	---	9.000	L1	60.24	12.76	10.0	Compliance
0.510000	---	40.41	9.000	L1	46.00	5.59	10.1	Compliance
0.510000	48.66	---	9.000	L1	56.00	7.34	10.1	Compliance
0.600000	---	42.91	9.000	L1	46.00	3.09	10.0	Compliance
0.600000	51.26	---	9.000	L1	56.00	4.74	10.0	Compliance
0.780000	---	28.47	9.000	L1	46.00	17.53	9.9	Compliance
0.780000	41.98	---	9.000	L1	56.00	14.02	9.9	Compliance
1.110000	---	35.87	9.000	L1	46.00	10.13	9.9	Compliance
1.110000	45.15	---	9.000	L1	56.00	10.85	9.9	Compliance
14.880000	---	28.01	9.000	L1	50.00	21.99	10.2	Compliance
14.880000	37.65	---	9.000	L1	60.00	22.35	10.2	Compliance

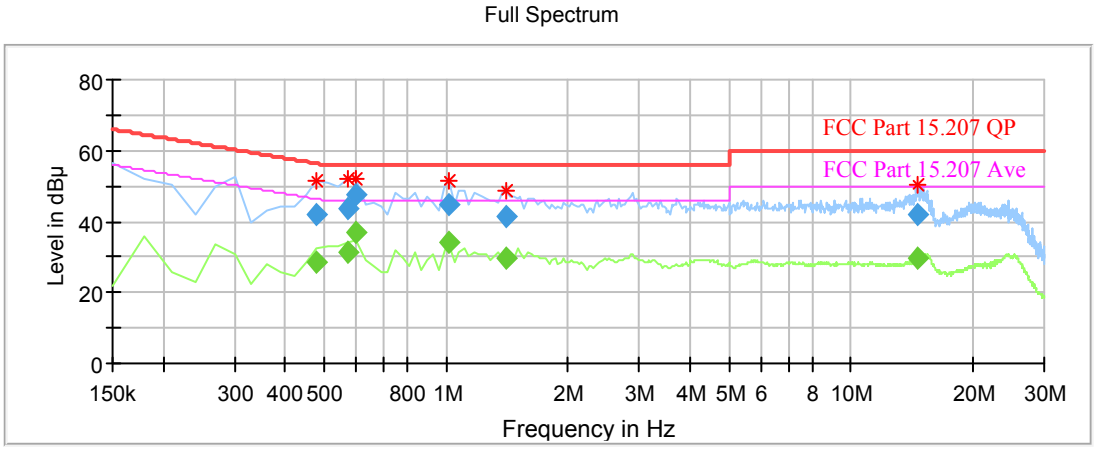
AC 120V/60 Hz, Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Bandwidth (kHz)	Line	Limit (dBµV)	Margin (dB)	Corr. (dB)	Comment
0.510000	48.69	---	9.000	N	56.00	7.31	10.1	Compliance
0.510000	---	35.62	9.000	N	46.00	10.38	10.1	Compliance
0.600000	46.30	---	9.000	N	56.00	9.70	10.0	Compliance
0.600000	---	36.95	9.000	N	46.00	9.05	10.0	Compliance
1.020000	---	31.31	9.000	N	46.00	14.69	9.9	Compliance
1.020000	42.84	---	9.000	N	56.00	13.16	9.9	Compliance
1.200000	---	31.19	9.000	N	46.00	14.81	9.9	Compliance
1.200000	43.22	---	9.000	N	56.00	12.78	9.9	Compliance
1.530000	---	31.95	9.000	N	46.00	14.05	9.9	Compliance
1.530000	42.88	---	9.000	N	56.00	13.12	9.9	Compliance
14.880000	---	30.20	9.000	N	50.00	19.80	10.0	Compliance
14.880000	41.83	---	9.000	N	60.00	18.17	10.0	Compliance

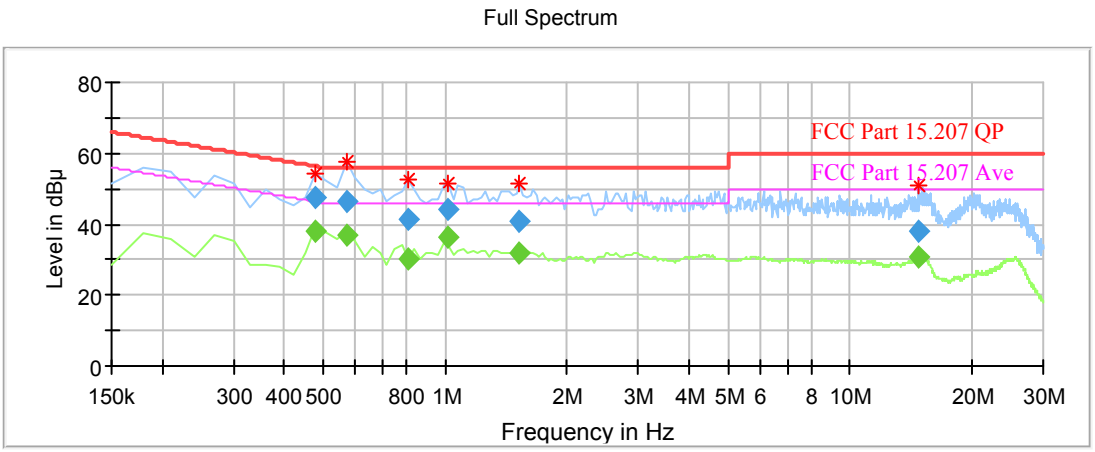
BLE Mode:

AC 120V/60 Hz, Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Limit (dBµV)	Margin (dB)	Corr. (dB)	Comment
0.480000	---	28.55	9.000	L1	46.34	17.79	10.1	Compliance
0.480000	42.04	---	9.000	L1	56.34	14.30	10.1	Compliance
0.570000	---	31.46	9.000	L1	46.00	14.54	10.0	Compliance
0.570000	43.63	---	9.000	L1	56.00	12.37	10.0	Compliance
0.600000	---	36.77	9.000	L1	46.00	9.23	10.0	Compliance
0.600000	47.67	---	9.000	L1	56.00	8.33	10.0	Compliance
1.020000	---	34.31	9.000	L1	46.00	11.69	9.9	Compliance
1.020000	44.62	---	9.000	L1	56.00	11.38	9.9	Compliance
1.410000	---	29.69	9.000	L1	46.00	16.31	9.9	Compliance
1.410000	41.19	---	9.000	L1	56.00	14.81	9.9	Compliance
14.610000	---	29.67	9.000	L1	50.00	20.33	10.2	Compliance
14.610000	42.16	---	9.000	L1	60.00	17.84	10.2	Compliance

AC 120V/60 Hz, Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Limit (dBµV)	Margin (dB)	Corr. (dB)	Comment
0.480000	---	38.14	9.000	N	46.34	8.20	10.1	Compliance
0.480000	47.62	---	9.000	N	56.34	8.72	10.1	Compliance
0.570000	---	37.03	9.000	N	46.00	8.97	10.1	Compliance
0.570000	46.37	---	9.000	N	56.00	9.63	10.1	Compliance
0.810000	---	30.24	9.000	N	46.00	15.76	10.0	Compliance
0.810000	41.67	---	9.000	N	56.00	14.33	10.0	Compliance
1.020000	---	36.19	9.000	N	46.00	9.81	9.9	Compliance
1.020000	44.44	---	9.000	N	56.00	11.56	9.9	Compliance
1.530000	---	31.87	9.000	N	46.00	14.13	9.9	Compliance
1.530000	40.97	---	9.000	N	56.00	15.03	9.9	Compliance
14.730000	---	30.49	9.000	N	50.00	19.51	10.0	Compliance
14.730000	38.32	---	9.000	N	60.00	21.68	10.0	Compliance

Note:

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

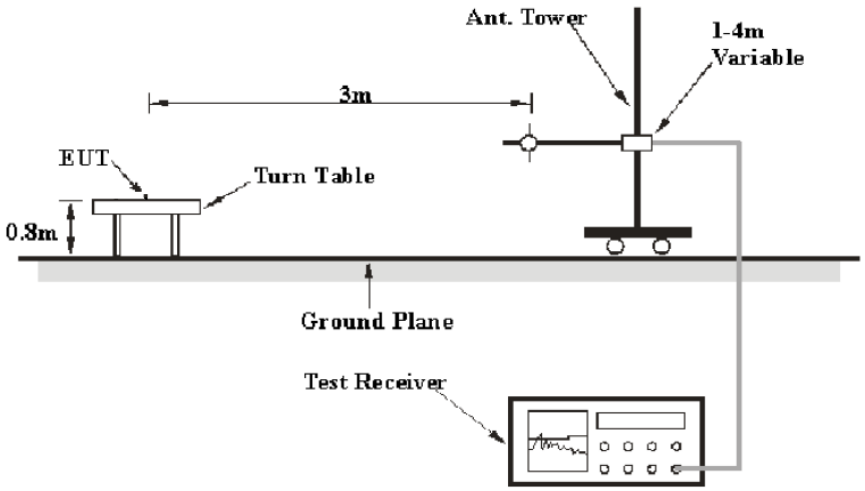
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

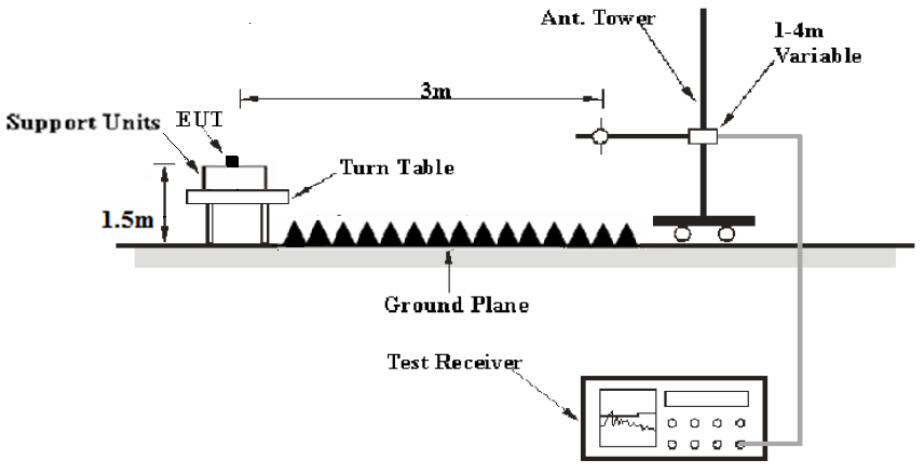
FCC §15.247 (d); §15.209; §15.205;

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.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

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

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

Frequency Range	RBW	Video B/W	Duty cycle	Detector
1GHz – 25GHz	1MHz	3 MHz	Any	PK
	1MHz	10 Hz	>98%	Ave.
	1MHz	1/T	<98%	

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:

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.

Test Data

Environmental Conditions

Temperature:	24.1 ℃
Relative Humidity:	54 %
ATM Pressure:	101.2kPa

The testing was performed by Chris Wang on 2017-03-21.

EUT operation mode: Transmitting

30MHz-25GHz

802.11b 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 (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
203.10	18.53	QP	254	122	H	-12.50	6.03	43.50	37.47
2412.00	107.97	PK	296	133	V	-6.17	101.80	/	/
2412.00	102.15	Ave	296	133	V	-6.17	95.98	/	/
2412.00	101.12	PK	236	158	H	-6.17	94.95	/	/
2412.00	95.55	Ave	236	158	H	-6.17	89.38	/	/
2390.00	44.54	PK	280	219	V	-6.22	38.32	74.00	35.68
2390.00	31.26	Ave	280	219	V	-6.22	25.04	54.00	28.96
2400.00	66.13	PK	204	218	V	-6.19	59.94	74.00	14.06
2400.00	58.87	Ave	204	218	V	-6.19	52.68	54.00	1.32
1372.27	45.37	PK	214	213	V	-10.22	35.15	74.00	38.85
1372.27	31.70	Ave	214	213	V	-10.22	21.48	54.00	32.52
4824.00	46.36	PK	253	175	V	1.66	48.02	74.00	25.98
4824.00	38.95	Ave	253	175	V	1.66	40.61	54.00	13.39
7236.00	39.06	PK	38	157	V	7.58	46.64	74.00	27.36
7236.00	25.89	Ave	38	157	V	7.58	33.47	54.00	20.53

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 (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
203.10	18.62	QP	251	238	H	-12.50	6.12	43.50	37.38
2437.00	108.12	PK	40	171	V	-6.11	102.01	/	/
2437.00	102.15	Ave	40	171	V	-6.11	96.04	/	/
2437.00	102.62	PK	150	178	H	-6.11	96.51	/	/
2437.00	97.12	Ave	150	178	H	-6.11	91.01	/	/
1535.32	44.97	PK	194	236	V	-9.29	35.68	74.00	38.32
1535.32	31.56	Ave	194	236	V	-9.29	22.27	54.00	31.73
3330.91	44.50	PK	27	190	H	-2.38	42.12	74.00	31.88
3330.91	30.98	Ave	27	190	H	-2.38	28.60	54.00	25.40
4874.00	48.11	PK	312	186	V	1.77	49.88	74.00	24.12
4874.00	42.09	Ave	312	186	V	1.77	43.86	54.00	10.14
6679.74	43.46	PK	117	201	H	6.42	49.88	74.00	24.12
6679.74	29.90	Ave	117	201	H	6.42	36.32	54.00	17.68
7311.00	38.52	PK	222	228	V	7.66	46.18	74.00	27.82
7311.00	25.30	Ave	222	228	V	7.66	32.96	54.00	21.04

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 (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
203.10	18.55	QP	125	149	H	-12.50	6.05	43.50	37.45
2462.00	107.81	PK	68	141	V	-6.06	101.75	/	/
2462.00	102.36	Ave	68	141	V	-6.06	96.30	/	/
2462.00	102.98	PK	295	158	H	-6.06	96.92	/	/
2462.00	97.61	Ave	295	158	H	-6.06	91.55	/	/
2483.50	54.04	PK	52	117	V	-6.01	48.03	74.00	25.97
2483.50	45.59	Ave	52	117	V	-6.01	39.58	54.00	14.42
1304.76	44.65	PK	119	229	V	-10.63	34.02	74.00	39.98
1304.76	32.09	Ave	119	229	V	-10.63	21.46	54.00	32.54
4924.00	47.32	PK	51	142	V	1.89	49.21	74.00	24.79
4924.00	40.74	Ave	51	142	V	1.89	42.63	54.00	11.37
6092.18	42.87	PK	230	167	H	4.41	47.28	74.00	26.72
6092.18	29.57	Ave	230	167	H	4.41	33.98	54.00	20.02
7386.00	38.33	PK	149	119	V	7.73	46.06	74.00	27.94
7386.00	25.24	Ave	149	119	V	7.73	32.97	54.00	21.03

802.11g 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 (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
203.10	18.66	QP	280	159	H	-12.50	6.16	43.50	37.34
2412.00	102.71	PK	257	191	V	-6.17	96.54	/	/
2412.00	94.45	Ave	257	191	V	-6.17	88.28	/	/
2412.00	101.19	PK	223	162	H	-6.17	95.02	/	/
2412.00	92.87	Ave	223	162	H	-6.17	86.70	/	/
2390.00	65.80	PK	142	161	V	-6.22	59.58	74.00	14.42
2390.00	52.71	Ave	142	161	V	-6.22	46.49	54.00	7.51
2400.00	67.68	PK	313	137	V	-6.19	61.49	74.00	12.51
2400.00	54.63	Ave	313	137	V	-6.19	48.44	54.00	5.56
1120.59	44.13	PK	6	208	H	-11.73	32.40	74.00	41.60
1120.59	31.54	Ave	6	208	H	-11.73	19.81	54.00	34.19
4824.00	44.09	PK	213	193	V	1.66	45.75	74.00	28.25
4824.00	31.06	Ave	213	193	V	1.66	32.72	54.00	21.28
7236.00	39.03	PK	12	122	V	7.58	46.61	74.00	27.39
7236.00	25.89	Ave	12	122	V	7.58	33.47	54.00	20.53

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 (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
203.10	18.70	QP	92	221	H	-12.50	6.20	43.50	37.30
2437.00	102.24	PK	7	134	V	-6.11	96.13	/	/
2437.00	93.84	Ave	7	134	V	-6.11	87.73	/	/
2437.00	101.66	PK	305	248	H	-6.11	95.55	/	/
2437.00	93.37	Ave	305	248	H	-6.11	87.26	/	/
1476.95	44.22	PK	336	173	H	-9.60	34.62	74.00	39.38
1476.95	31.73	Ave	336	173	H	-9.60	22.13	54.00	31.87
3327.03	43.96	PK	112	110	H	-2.39	41.57	74.00	32.43
3327.03	30.89	Ave	112	110	H	-2.39	28.50	54.00	25.50
4874.00	44.92	PK	298	164	V	1.77	46.69	74.00	27.31
4874.00	32.34	Ave	298	164	V	1.77	34.11	54.00	19.89
6300.98	42.35	PK	248	126	V	5.18	47.53	74.00	26.47
6300.98	29.87	Ave	248	126	V	5.18	35.05	54.00	18.95
7311.00	38.48	PK	183	210	V	7.66	46.14	74.00	27.86
7311.00	25.24	Ave	183	210	V	7.66	32.90	54.00	21.10

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 (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
203.10	18.68	QP	108	229	H	-12.50	6.18	43.50	37.32
2462.00	102.27	PK	170	226	V	-6.06	96.21	/	/
2462.00	93.85	Ave	170	226	V	-6.06	87.79	/	/
2462.00	102.07	PK	59	182	H	-6.06	96.01	/	/
2462.00	93.77	Ave	59	182	H	-6.06	87.71	/	/
2483.50	67.43	PK	243	222	V	-6.01	61.42	74.00	12.58
2483.50	50.38	Ave	243	222	V	-6.01	44.37	54.00	9.63
1322.65	44.67	PK	23	222	V	-10.52	34.15	74.00	39.85
1322.65	31.88	Ave	23	222	V	-10.52	21.36	54.00	32.64
4924.00	45.22	PK	153	250	V	1.89	47.11	74.00	26.89
4924.00	31.48	Ave	153	250	V	1.89	33.37	54.00	20.63
6933.87	43.06	PK	71	134	H	7.15	50.21	74.00	23.79
6933.87	29.18	Ave	71	134	H	7.15	36.33	54.00	17.67
7386.00	38.60	PK	25	244	V	7.73	46.33	74.00	27.67
7386.00	25.13	Ave	25	244	V	7.73	32.86	54.00	21.14

802.11n-HT20 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 (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
203.10	18.72	QP	68	118	H	-12.50	6.22	43.50	37.28
2412.00	102.65	PK	206	106	V	-6.17	96.48	/	/
2412.00	93.54	Ave	206	106	V	-6.17	87.37	/	/
2412.00	101.15	PK	238	154	H	-6.17	94.98	/	/
2412.00	92.73	Ave	238	154	H	-6.17	86.56	/	/
2390.00	65.11	PK	339	106	V	-6.22	58.89	74.00	15.11
2390.00	52.52	Ave	339	106	V	-6.22	46.30	54.00	7.70
2400.00	67.48	PK	97	124	V	-6.19	61.29	74.00	12.71
2400.00	54.24	Ave	97	124	V	-6.19	48.05	54.00	5.95
1120.59	44.43	PK	18	134	H	-11.73	32.70	74.00	41.30
1120.59	31.10	Ave	18	134	H	-11.73	19.37	54.00	34.63
4824.00	44.41	PK	57	237	V	1.66	46.07	74.00	27.93
4824.00	31.05	Ave	57	237	V	1.66	32.71	54.00	21.29
7236.00	38.83	PK	294	113	V	7.58	46.41	74.00	27.59
7236.00	25.54	Ave	294	113	V	7.58	33.12	54.00	20.88

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 (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
203.10	18.71	QP	247	127	H	-12.50	6.21	43.50	37.29
2437.00	102.05	PK	20	233	V	-6.11	95.94	/	/
2437.00	93.89	Ave	20	233	V	-6.11	87.78	/	/
2437.00	101.34	PK	115	236	H	-6.11	95.23	/	/
2437.00	93.28	Ave	115	236	H	-6.11	87.17	/	/
1476.95	44.48	PK	94	205	H	-9.60	34.88	74.00	39.12
1476.95	31.79	Ave	94	205	H	-9.60	22.19	54.00	31.81
3327.03	43.44	PK	218	173	V	-2.39	41.05	74.00	32.95
3327.03	31.09	Ave	218	173	V	-2.39	28.70	54.00	25.30
4874.00	44.39	PK	154	213	V	1.77	46.16	74.00	27.84
4874.00	32.11	Ave	154	213	V	1.77	33.88	54.00	20.12
6300.98	42.29	PK	139	200	V	5.18	47.47	74.00	26.53
6300.98	28.96	Ave	139	200	V	5.18	34.14	54.00	19.86
7311.00	38.81	PK	12	111	V	7.66	46.47	74.00	27.53
7311.00	25.52	Ave	12	111	V	7.66	33.18	54.00	20.82

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 (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
203.10	18.69	QP	12	235	H	-12.50	6.19	43.50	37.31
2462.00	102.72	PK	115	150	V	-6.06	96.66	/	/
2462.00	93.71	Ave	115	150	V	-6.06	87.65	/	/
2462.00	102.41	PK	43	116	H	-6.06	96.35	/	/
2462.00	93.36	Ave	43	116	H	-6.06	87.30	/	/
2483.50	67.90	PK	156	217	V	-6.01	61.89	74.00	12.11
2483.50	50.52	Ave	156	217	V	-6.01	44.51	54.00	9.49
1322.65	44.51	PK	101	145	H	-10.52	33.99	74.00	40.01
1322.65	31.19	Ave	101	145	H	-10.52	20.67	54.00	33.33
4924.00	45.24	PK	213	116	V	1.89	47.13	74.00	26.87
4924.00	31.98	Ave	213	116	V	1.89	33.87	54.00	20.13
6933.87	43.26	PK	180	142	V	7.15	50.41	74.00	23.59
6933.87	28.97	Ave	180	142	V	7.15	36.12	54.00	17.88
7386.00	38.83	PK	320	117	V	7.73	46.56	74.00	27.44
7386.00	25.53	Ave	320	117	V	7.73	33.26	54.00	20.74

802.11n-HT40 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 (dBμV/m)	Margin (dB)
Low Channel (2422 MHz)									
203.10	18.75	QP	152	228	H	-12.50	6.25	43.50	37.25
2422.00	98.58	PK	155	217	V	-6.14	92.44	/	/
2422.00	87.47	Ave	155	217	V	-6.14	81.33	/	/
2422.00	97.38	PK	302	206	H	-6.14	91.24	/	/
2422.00	86.18	Ave	302	206	H	-6.14	80.04	/	/
2390.00	66.19	PK	214	167	V	-6.22	59.97	74.00	14.03
2390.00	50.24	Ave	214	167	V	-6.22	44.02	54.00	9.98
2400.00	69.84	PK	74	232	V	-6.19	63.65	74.00	10.35
2400.00	54.49	Ave	74	232	V	-6.19	48.30	54.00	5.70
1110.60	44.30	PK	66	202	H	-11.79	32.51	74.00	41.49
1110.60	31.03	Ave	66	202	H	-11.79	19.24	54.00	34.76
4844.00	44.13	PK	174	129	V	1.70	45.83	74.00	28.17
4844.00	30.53	Ave	174	129	V	1.70	32.23	54.00	21.77
7266.00	38.35	PK	340	127	V	7.61	45.96	74.00	28.04
7266.00	25.41	Ave	340	127	V	7.61	33.02	54.00	20.98

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 (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
203.10	18.79	QP	135	249	H	-12.50	6.29	43.50	37.21
2437.00	98.52	PK	180	187	V	-6.11	92.41	/	/
2437.00	86.98	Ave	180	187	V	-6.11	80.87	/	/
2437.00	98.42	PK	346	241	H	-6.11	92.31	/	/
2437.00	87.89	Ave	346	241	H	-6.11	81.78	/	/
1142.54	44.81	PK	355	173	V	-11.60	33.21	74.00	40.79
1142.54	32.39	Ave	355	173	V	-11.60	20.79	54.00	33.21
3341.06	44.44	PK	265	241	H	-2.35	42.09	74.00	31.91
3341.06	30.98	Ave	265	241	H	-2.35	28.63	54.00	25.37
4874.00	43.93	PK	201	232	V	1.77	45.70	74.00	28.30
4874.00	31.15	Ave	201	232	V	1.77	32.92	54.00	21.08
6679.74	42.98	PK	324	202	H	6.42	49.40	74.00	24.60
6679.74	29.87	Ave	324	202	H	6.42	36.29	54.00	17.71
7311.00	38.15	PK	117	114	V	7.66	45.81	74.00	28.19
7311.00	25.24	Ave	117	114	V	7.66	32.90	54.00	21.10

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 (dBμV/m)	Margin (dB)
High Channel (2452 MHz)									
203.10	18.71	QP	177	120	H	-12.50	6.21	43.50	37.29
2452.00	98.11	PK	258	119	V	-6.08	92.03	/	/
2452.00	87.62	Ave	258	119	V	-6.08	81.54	/	/
2452.00	97.29	PK	342	185	H	-6.08	91.21	/	/
2452.00	87.15	Ave	342	185	H	-6.08	81.07	/	/
2483.50	69.03	PK	206	240	V	-6.01	63.02	74.00	10.98
2483.50	55.20	Ave	206	240	V	-6.01	49.19	54.00	4.81
1294.59	45.14	PK	102	189	V	-10.69	34.45	74.00	39.55
1294.59	31.99	Ave	102	189	V	-10.69	21.30	54.00	32.70
4904.00	42.46	PK	311	245	V	1.84	44.30	74.00	29.70
4904.00	29.87	Ave	311	245	V	1.84	31.71	54.00	22.29
6639.28	42.66	PK	338	156	H	6.31	48.97	74.00	25.03
6639.28	29.77	Ave	338	156	H	6.31	36.08	54.00	17.92
7356.00	38.39	PK	309	127	V	7.70	46.09	74.00	27.91
7356.00	25.30	Ave	309	127	V	7.70	33.00	54.00	21.00

BLE Mode:

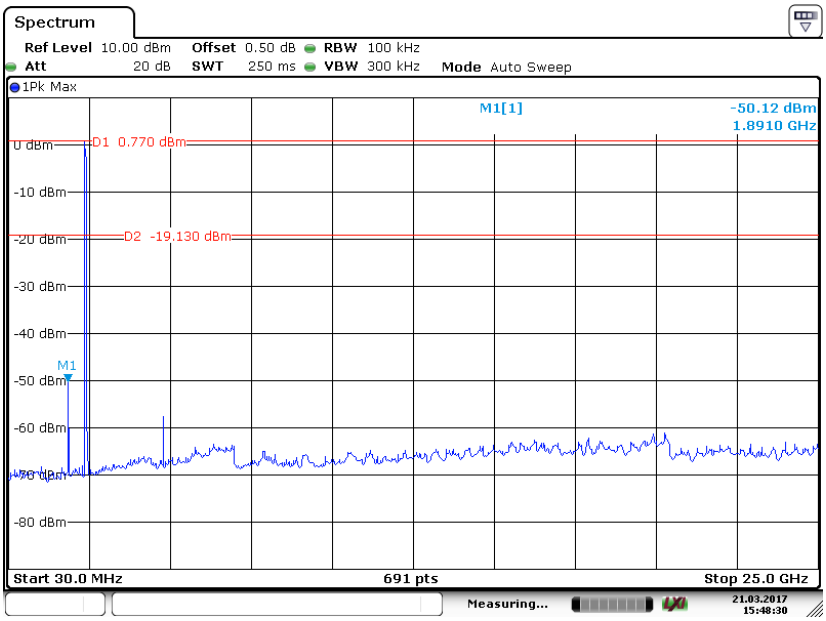
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2402 MHz)									
201.27	20.68	QP	28	246	H	-12.51	8.17	43.50	35.33
2402.00	93.88	PK	246	186	V	-6.19	87.69	/	/
2402.00	88.85	Ave	246	186	V	-6.19	82.66	/	/
2402.00	96.86	PK	285	140	H	-6.19	90.67	/	/
2402.00	91.69	Ave	285	140	H	-6.19	85.50	/	/
2390.00	45.09	PK	194	230	H	-6.22	38.87	74.00	35.13
2390.00	31.43	Ave	194	230	H	-6.22	25.21	54.00	28.79
2400.00	71.73	PK	160	224	H	-6.19	65.54	74.00	8.46
2400.00	56.51	Ave	160	224	H	-6.19	50.32	54.00	3.68
1210.42	44.50	PK	188	106	V	-11.19	33.31	74.00	40.69
1210.42	31.35	Ave	188	106	V	-11.19	20.16	54.00	33.84
4804.00	42.97	PK	105	196	H	1.61	44.58	74.00	29.42
4804.00	29.60	Ave	105	196	H	1.61	31.21	54.00	22.79
7206.00	38.65	PK	229	239	H	7.55	46.20	74.00	27.80
7206.00	25.59	Ave	229	239	H	7.55	33.14	54.00	20.86

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 (dBμV/m)	Margin (dB)
Middle Channel (2440 MHz)									
201.27	20.72	QP	177	237	H	-12.51	8.21	43.50	35.29
2440.00	92.99	PK	353	172	V	-6.17	86.82	/	/
2440.00	86.97	Ave	353	172	V	-6.17	80.80	/	/
2440.00	99.20	PK	189	170	H	-6.17	93.03	/	/
2440.00	94.21	Ave	189	170	H	-6.17	88.04	/	/
1210.42	44.45	PK	234	233	H	-11.19	33.26	74.00	40.74
1210.42	31.35	Ave	234	233	H	-11.19	20.16	54.00	33.84
3525.05	43.93	PK	60	183	V	-1.86	42.07	74.00	31.93
3525.05	30.62	Ave	60	183	V	-1.86	28.76	54.00	25.24
4880.00	43.37	PK	290	167	H	1.79	45.16	74.00	28.84
4880.00	30.42	Ave	290	167	H	1.79	32.21	54.00	21.79
6667.33	43.57	PK	81	165	V	6.39	49.96	74.00	24.04
6667.33	30.12	Ave	81	165	V	6.39	36.51	54.00	17.49
7320.00	38.56	PK	354	208	H	7.67	46.23	74.00	27.77
7320.00	25.59	Ave	354	208	H	7.67	33.26	54.00	20.74

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit	Margin
						(dB)	(dBμV/m)	(dBμV/m)	(dB)
High Channel (2480MHz)									
201.27	20.73	QP	30	100	H	-12.51	8.22	43.50	35.28
2480.00	89.81	PK	164	140	V	-6.01	83.80	/	/
2480.00	84.63	Ave	164	140	V	-6.01	78.62	/	/
2480.00	98.77	PK	308	162	H	-6.01	92.76	/	/
2480.00	93.99	Ave	308	162	H	-6.01	87.98	/	/
2483.50	58.51	PK	173	126	H	-6.01	52.50	74.00	21.50
2483.50	43.26	Ave	173	126	H	-6.01	37.25	54.00	16.75
1210.42	45.12	PK	292	249	V	-11.19	33.93	74.00	40.07
1210.42	31.35	Ave	292	249	V	-11.19	20.16	54.00	33.84
4960.00	43.73	PK	19	208	H	1.97	45.70	74.00	28.30
4960.00	30.23	Ave	19	208	H	1.97	32.20	54.00	21.80
6695.39	42.73	PK	84	174	H	6.47	49.20	74.00	24.80
6695.39	29.39	Ave	84	174	H	6.47	35.86	54.00	18.14
7440.00	39.23	PK	188	237	H	7.79	47.02	74.00	26.98
7440.00	25.75	Ave	188	237	H	7.79	33.54	54.00	20.46

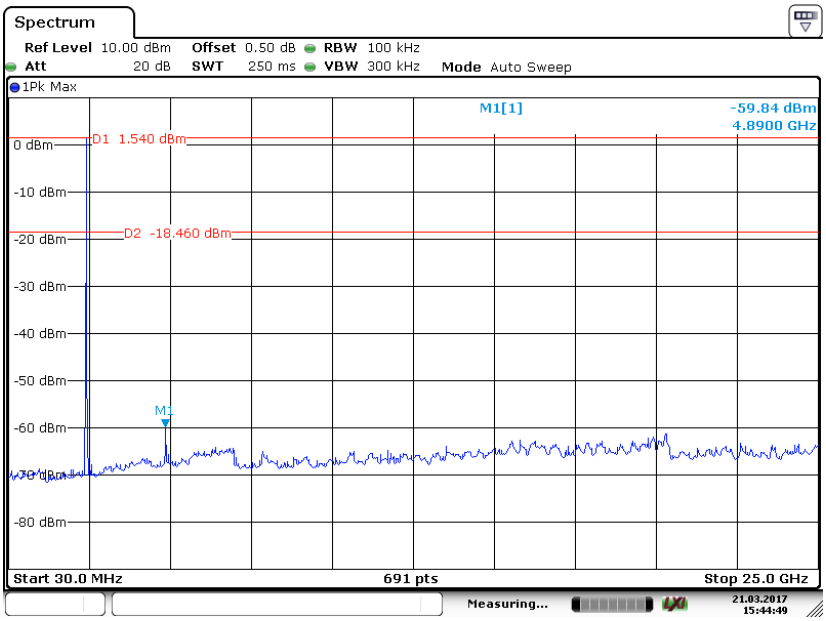
Conducted Spurious Emissions at Antenna Port

802.11b Low Channel



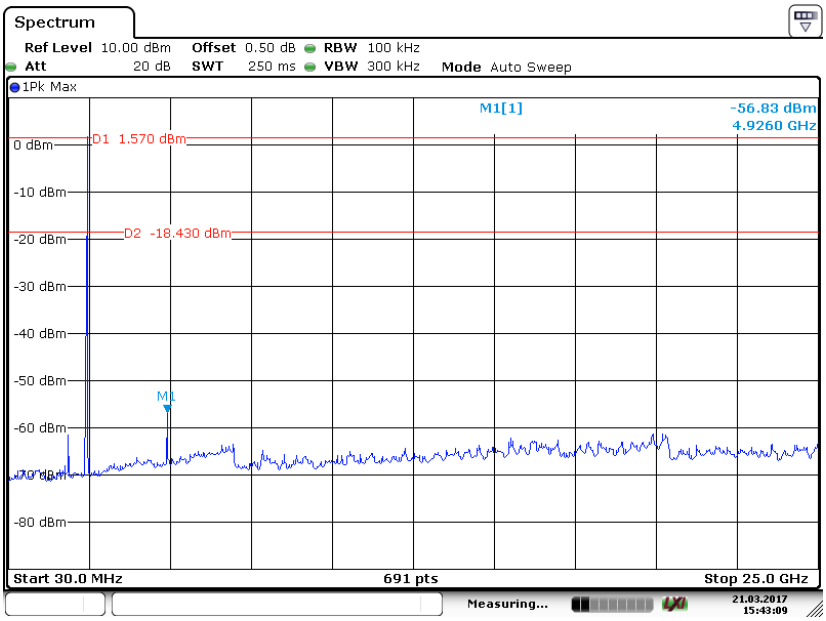
Date: 21.MAR.2017 15:48:31

802.11b Middle Channel



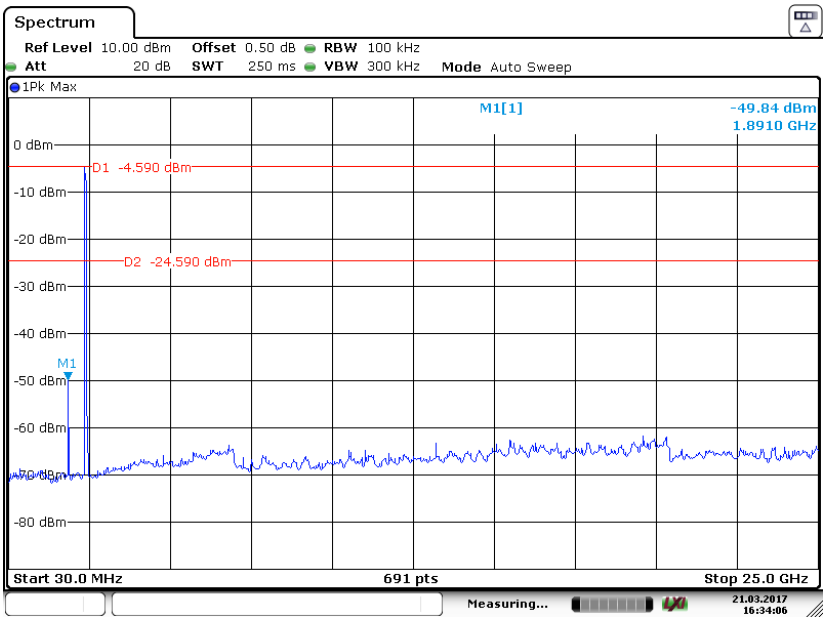
Date: 21.MAR.2017 15:44:49

802.11b High Channel



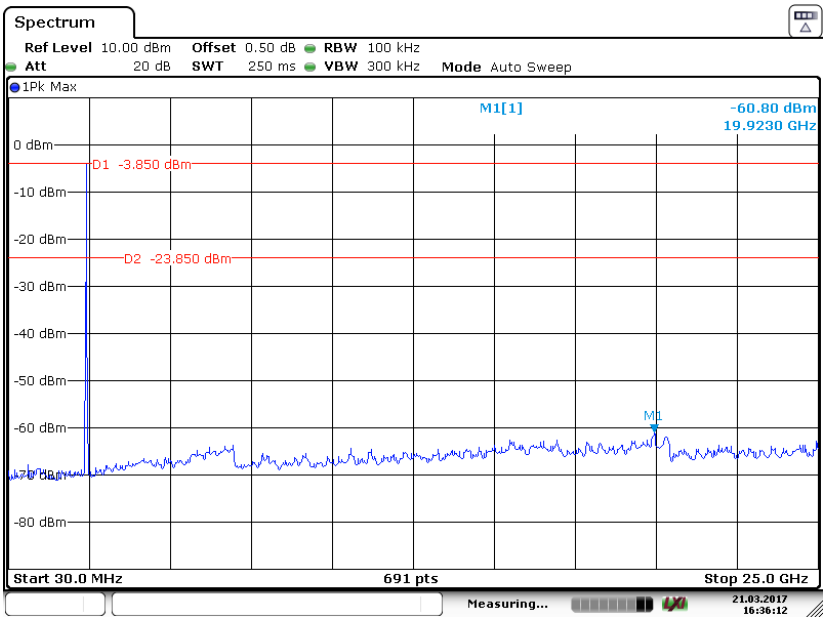
Date: 21.MAR.2017 15:43:09

802.11g Low Channel



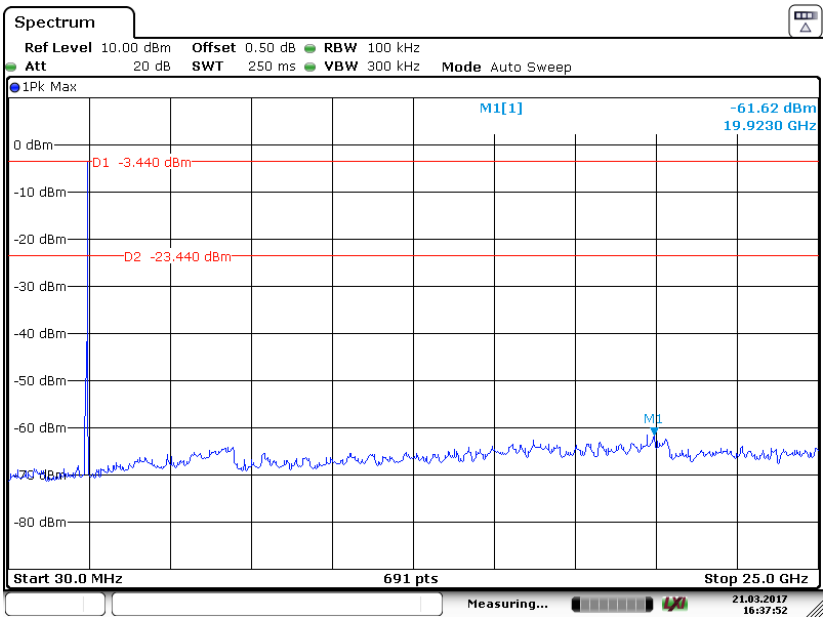
Date: 21.MAR.2017 16:34:07

802.11g Middle Channel



Date: 21.MAR.2017 16:36:12

802.11g High Channel



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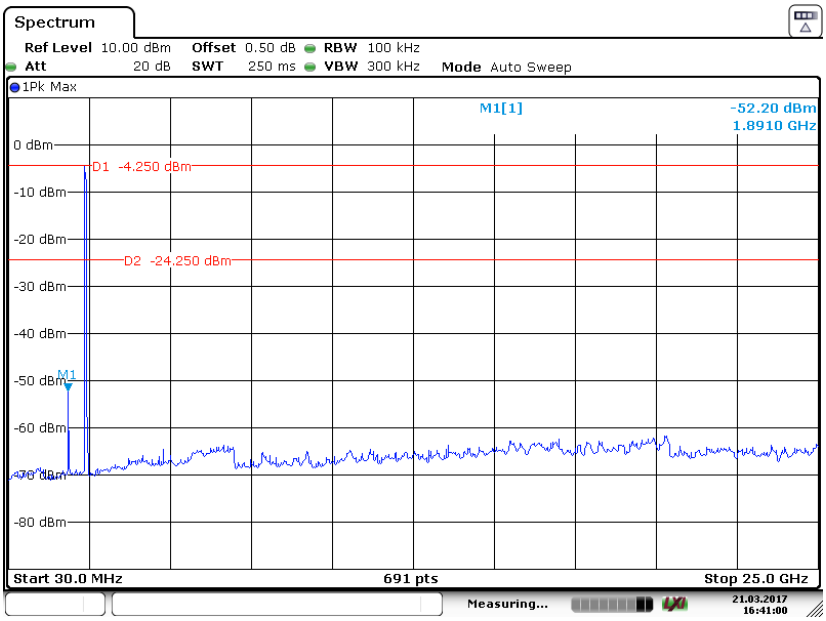
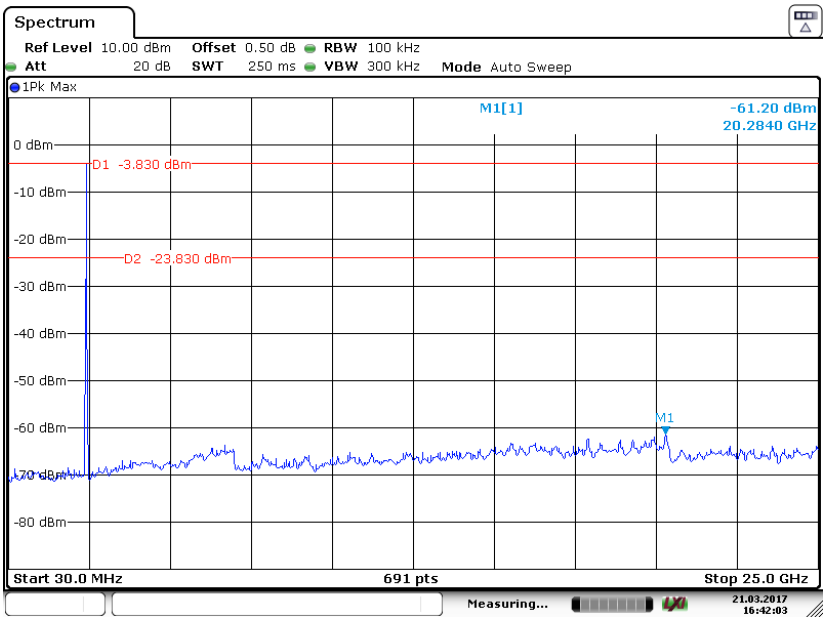
802.11n-HT20 Low Channel



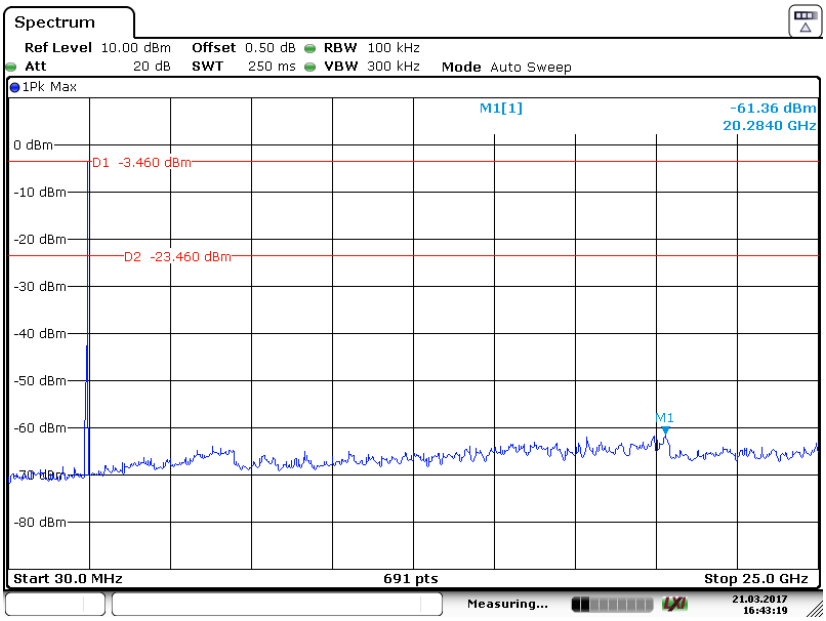
Date: 21.MAR.2017 16:41:00

802.11n-HT20 Middle Channel



Date: 21.MAR.2017 16:42:03

802.11n-HT20 High Channel



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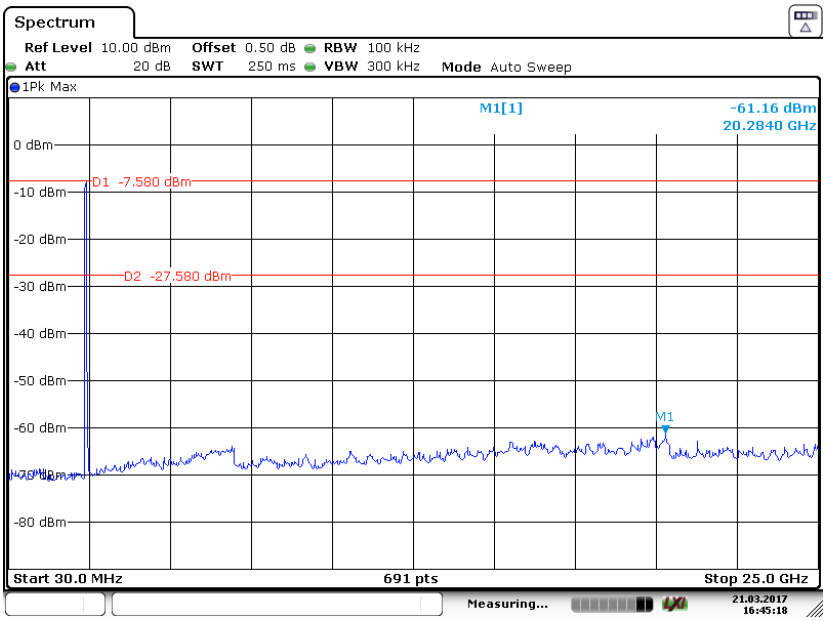
802.11n-HT40 Low Channel



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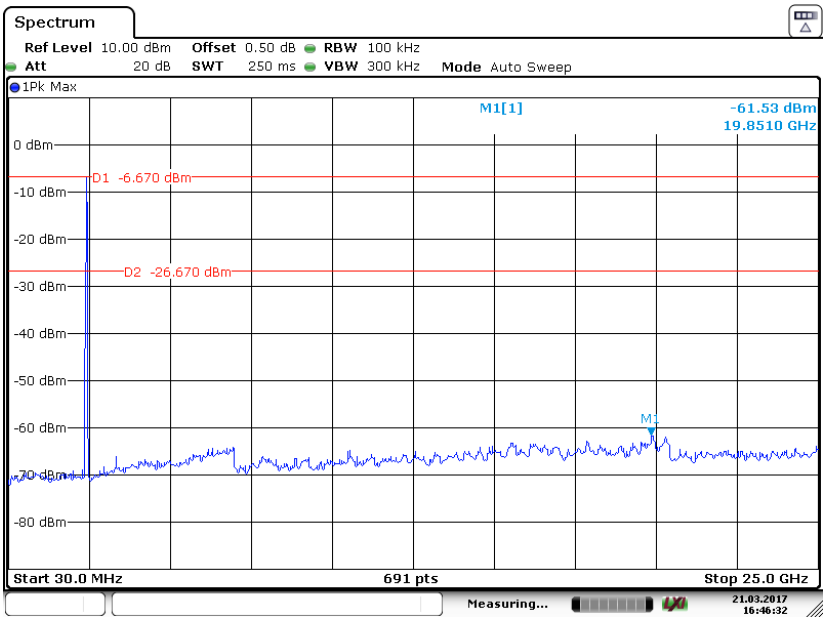
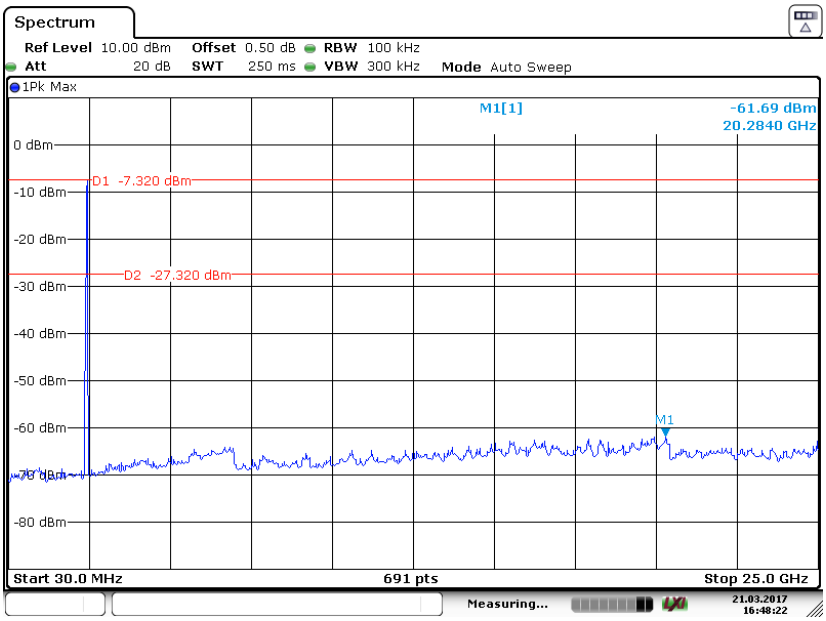
802.11n-HT40 Middle Channel



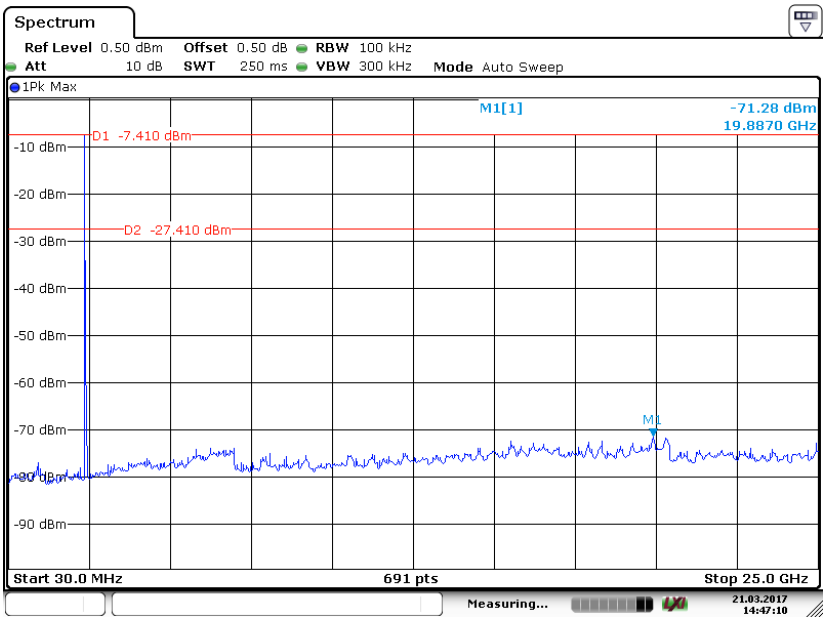
Date: 21.MAR.2017 16:46:33

802.11n-HT40 High Channel



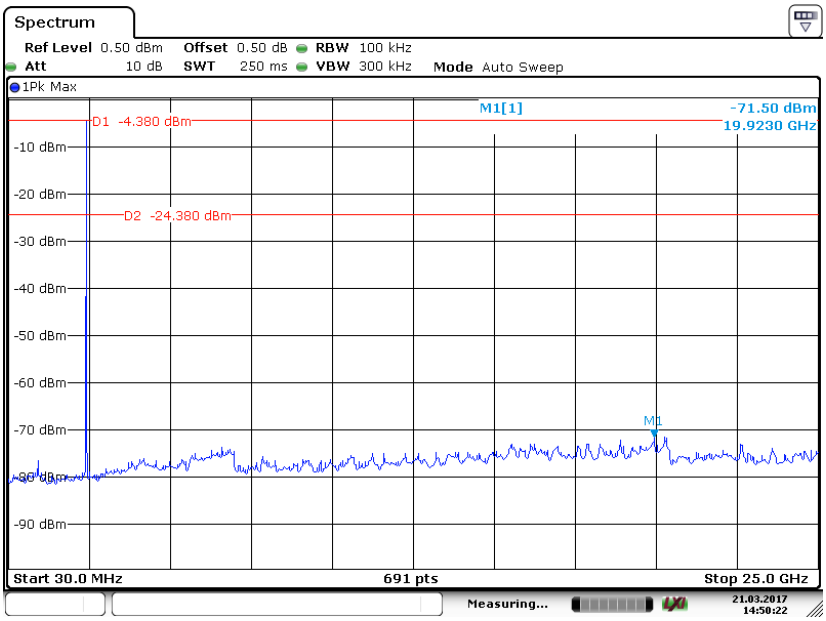
Date: 21.MAR.2017 16:48:22

BLE Mode Low Channel



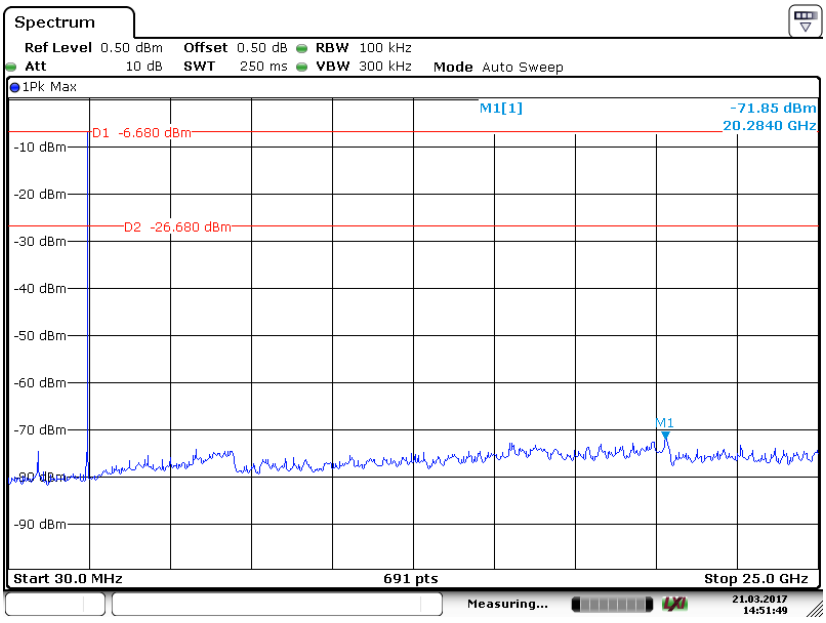
Date: 21.MAR.2017 14:47:10

BLE Mode Middle Channel



Date: 21.MAR.2017 14:50:22

BLE Mode High Channel



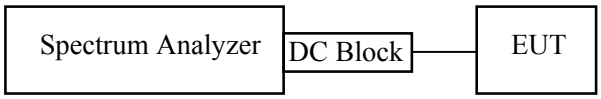
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

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 Data

Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Chris Wang on 2017-03-21.

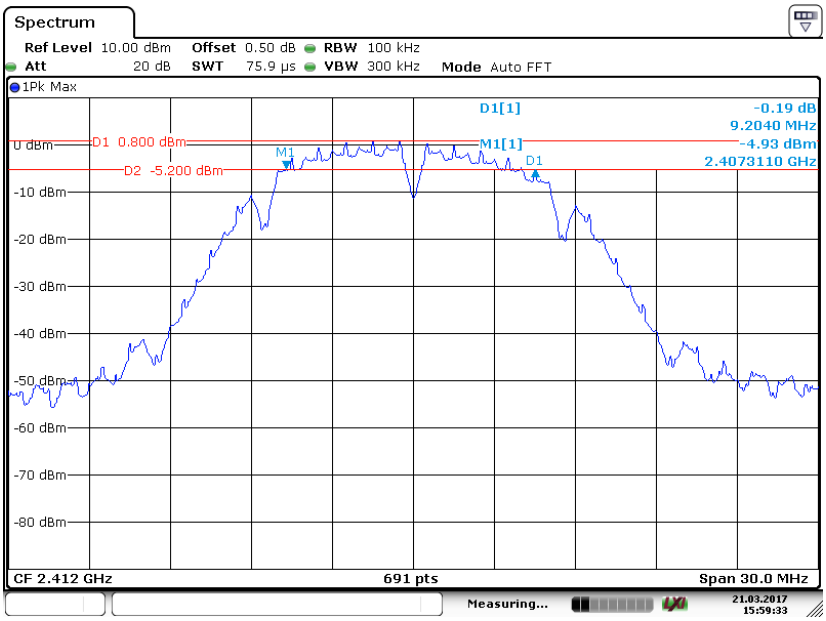
Test Result: Pass.

Please refer to the following tables and plots.

EUT operation mode: Transmitting

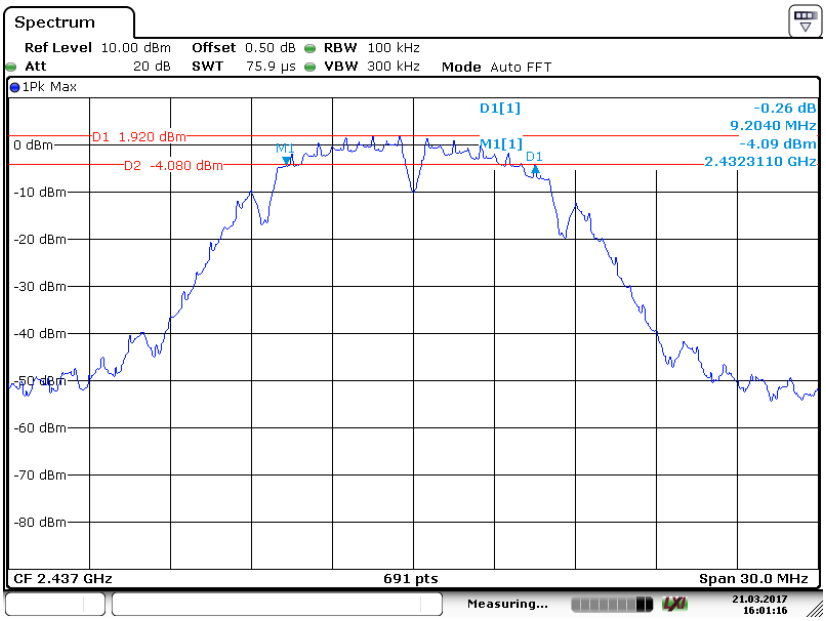
Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b mode			
Low	2412	9.204	≥0.5
Middle	2437	9.204	≥0.5
High	2462	9.117	≥0.5
802.11g mode			
Low	2412	16.020	≥0.5
Middle	2437	15.412	≥0.5
High	2462	15.152	≥0.5
802.11n-HT20 mode			
Low	2412	16.932	≥0.5
Middle	2437	17.149	≥0.5
High	2462	16.758	≥0.5
802.11n-HT40 mode			
Low	2422	36.035	≥0.5
Middle	2437	35.427	≥0.5
High	2452	35.861	≥0.5
BLE mode			
Low	2402	0.703	≥0.5
Middle	2440	0.703	≥0.5
High	2480	0.703	≥0.5

802.11b Low Channel



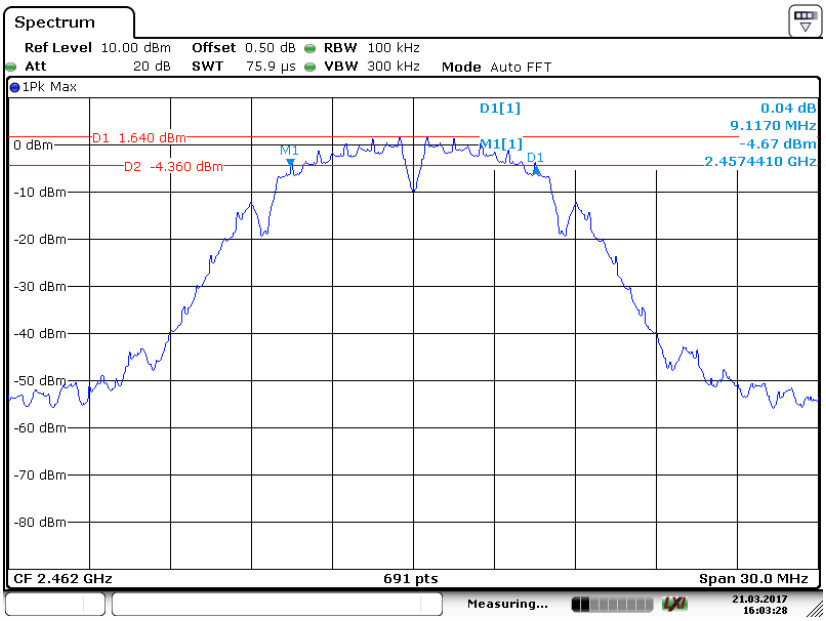
Date: 21.MAR.2017 15:59:34

802.11b Middle Channel



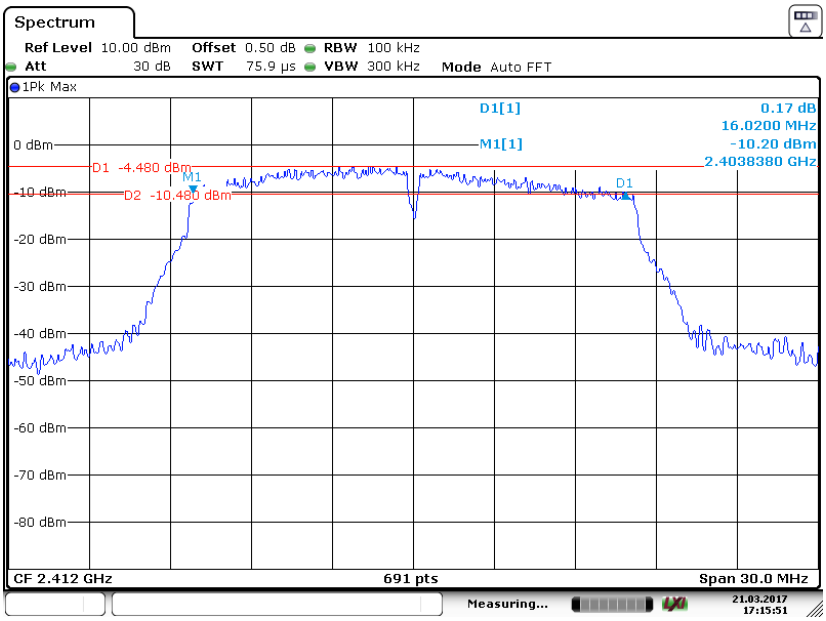
Date: 21.MAR.2017 16:01:16

802.11b High Channel



Date: 21.MAR.2017 16:03:28

802.11g Low Channel



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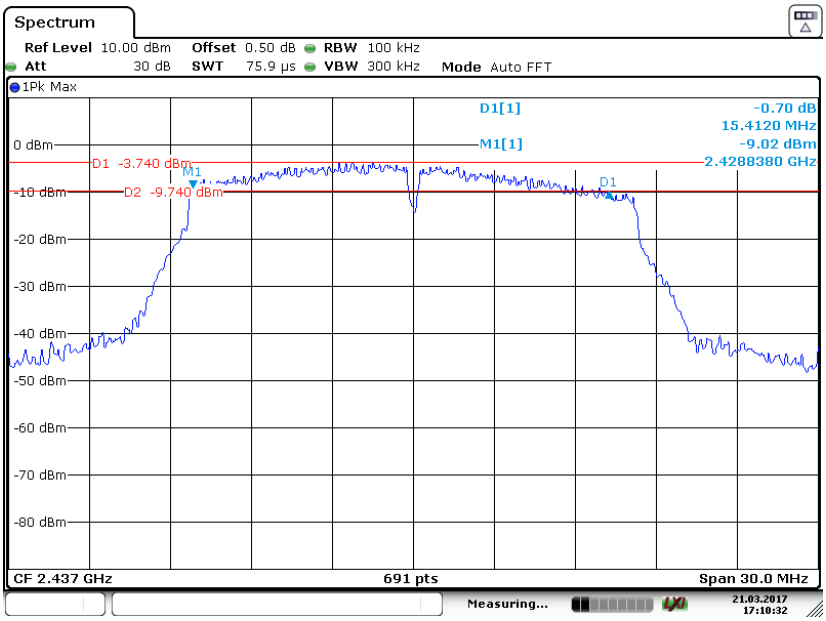
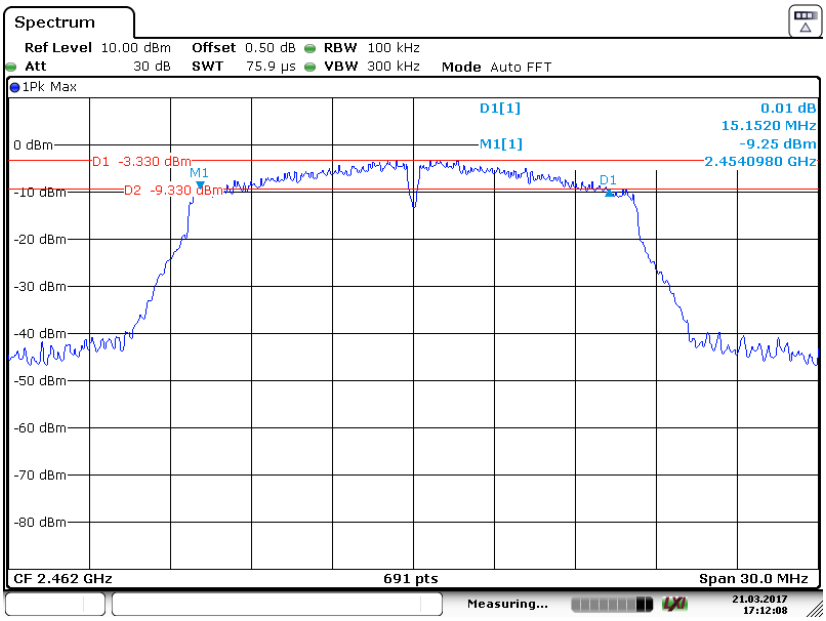
802.11g Middle Channel



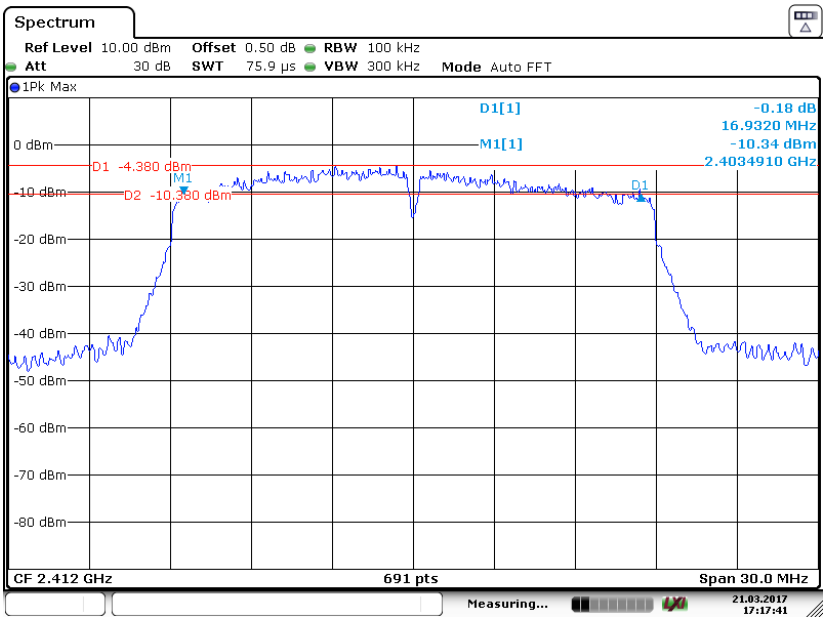
Date: 21.MAR.2017 17:10:32

802.11g High Channel



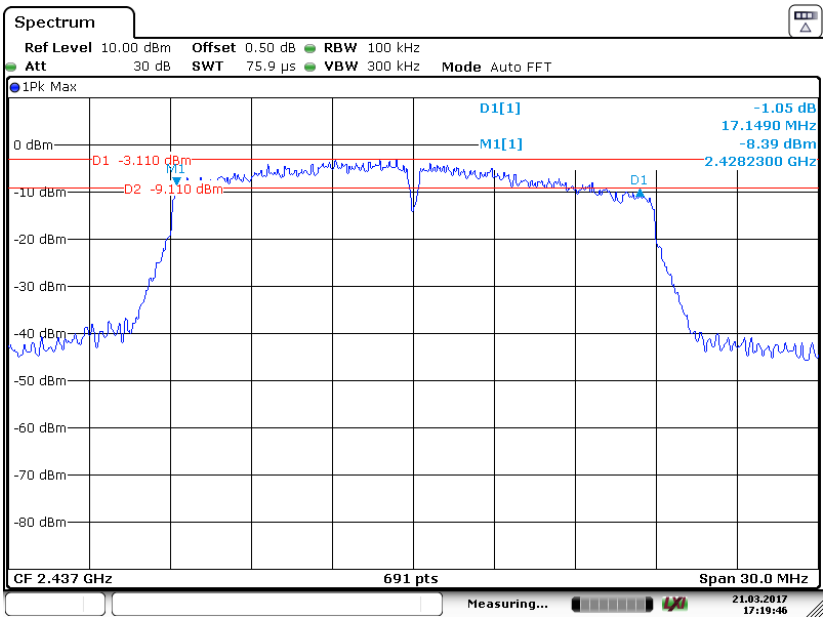
Date: 21.MAR.2017 17:12:08

802.11n-HT20 Low Channel



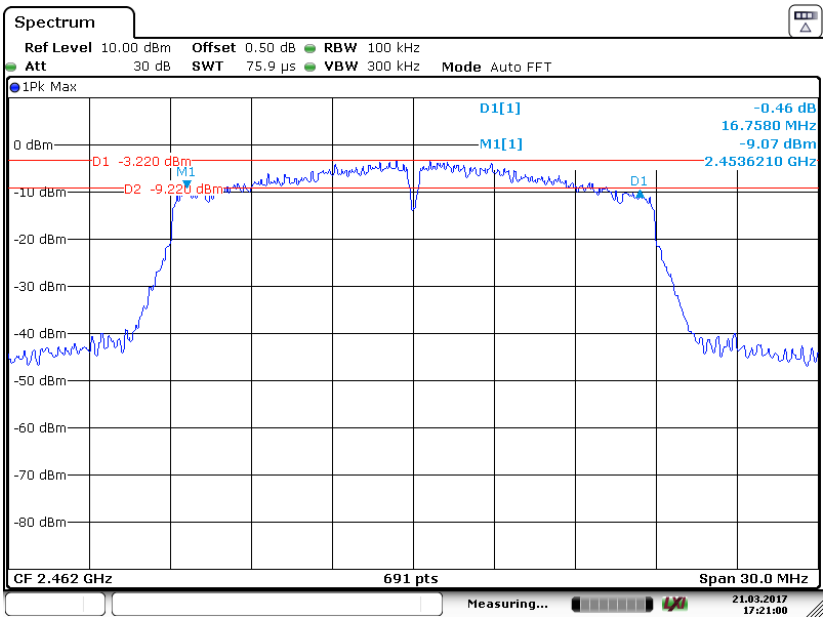
Date: 21.MAR.2017 17:17:42

802.11n-HT20 Middle Channel



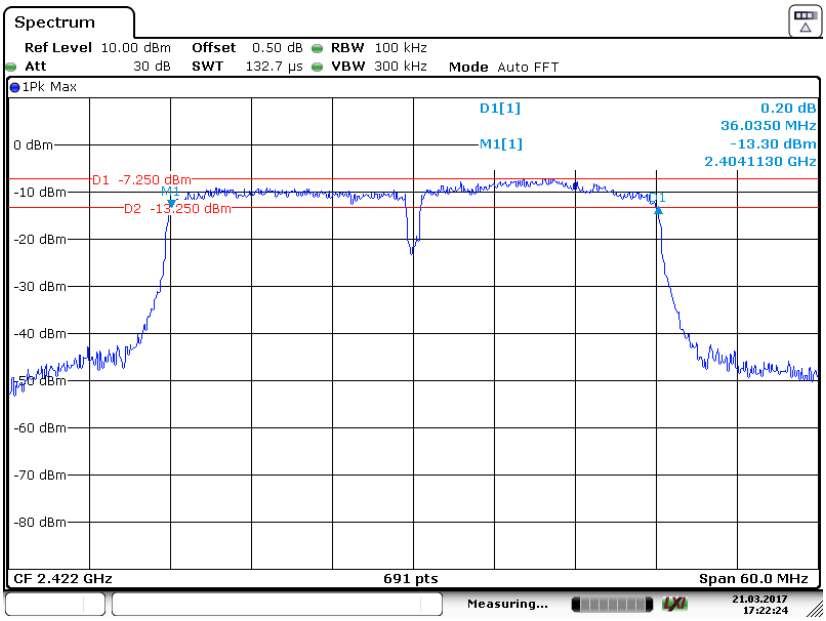
Date: 21.MAR.2017 17:19:46

802.11n-HT20 High Channel



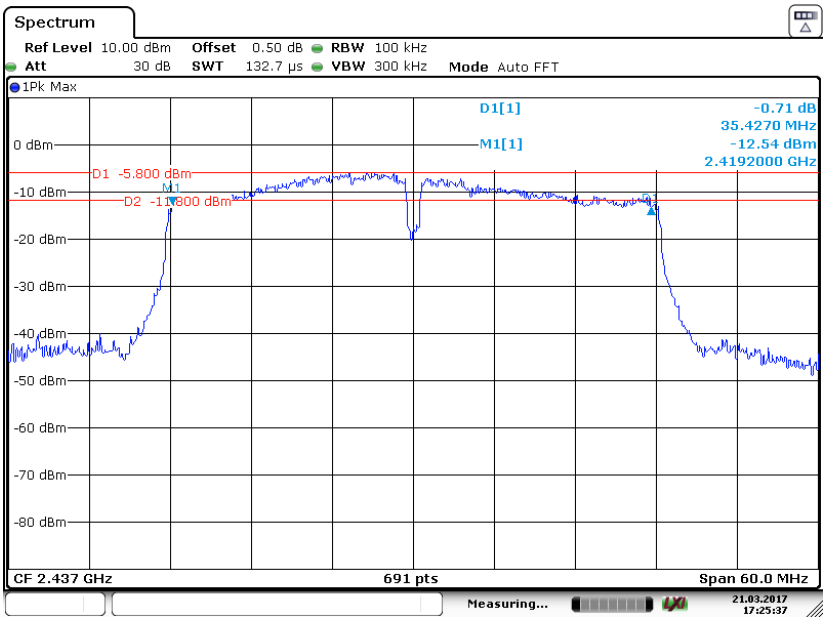
Date: 21.MAR.2017 17:21:00

802.11n-HT40 Low Channel



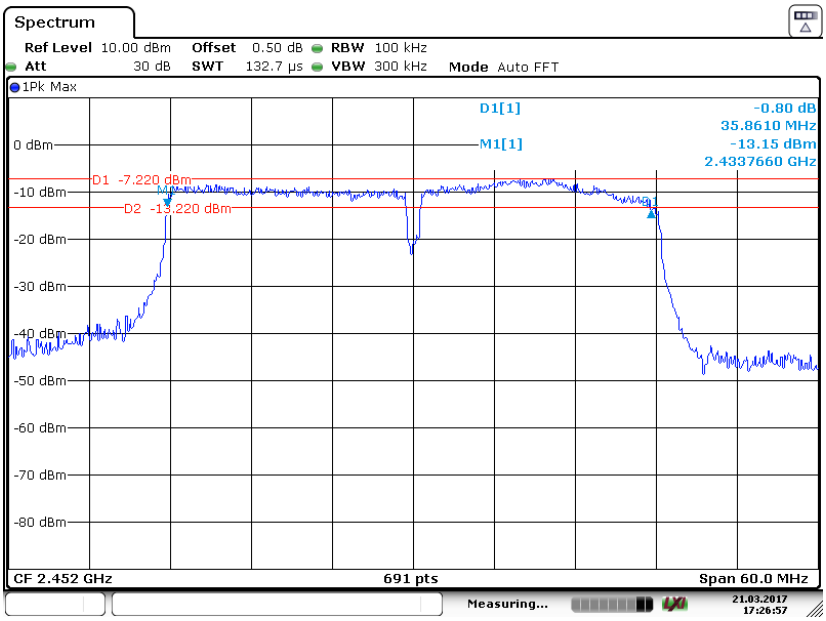
Date: 21.MAR.2017 17:22:25

802.11n-HT40 Middle Channel



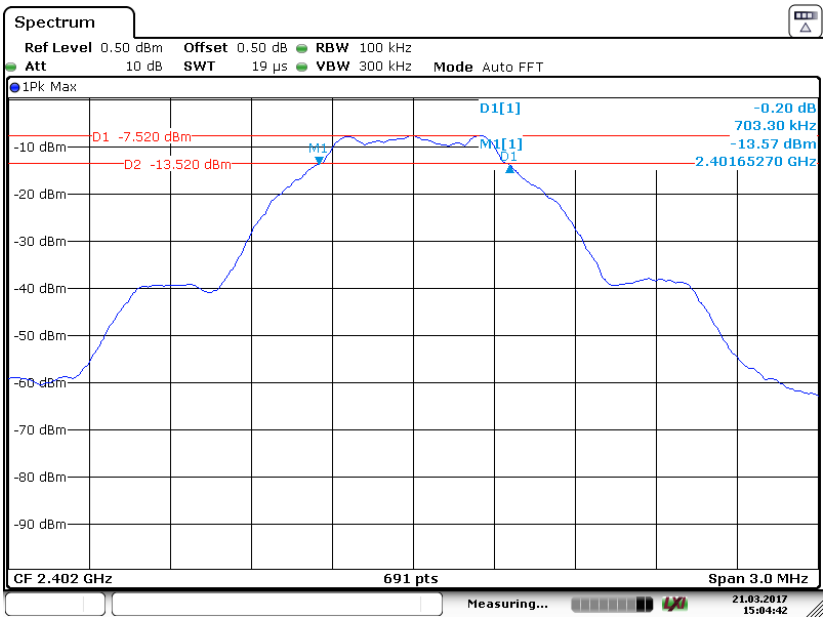
Date: 21.MAR.2017 17:25:37

802.11n-HT40 High Channel



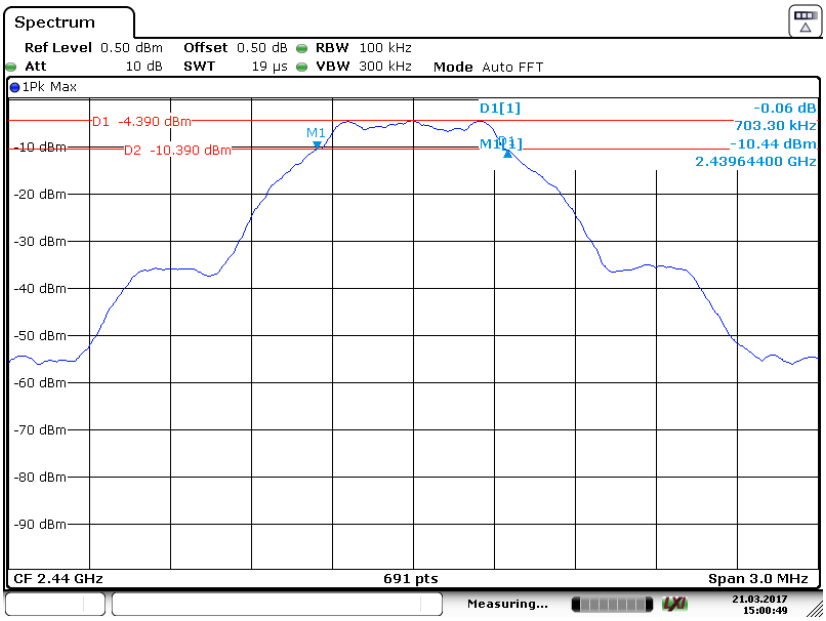
Date: 21.MAR.2017 17:26:57

BLE Mode Low Channel



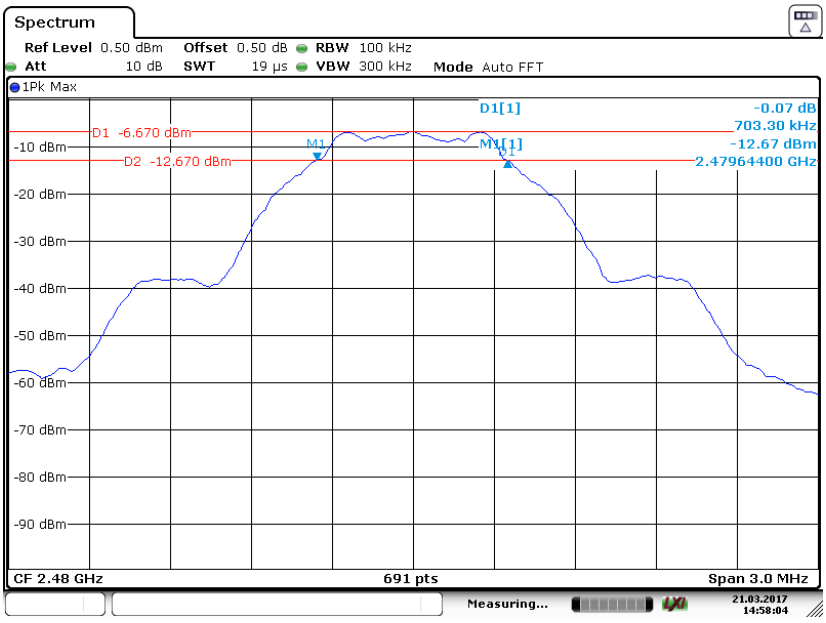
Date: 21.MAR.2017 15:04:42

BLE Mode Middle Channel



Date: 21.MAR.2017 15:00:49

BLE Mode High Channel



Date: 21.MAR.2017 14:58:05

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.

Note: Signal Analyzer is used for peak power test and power meter is used for average power test.

Test Data

Environmental Conditions

Temperature:	23.8℃
Relative Humidity:	54 %
ATM Pressure:	101.2 kPa

The testing was performed by Chris Wang on 2017-03-21.

EUT operation mode: Transmitting

Mode	Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Max Conducted Average Output Power (dBm)	Limit (dBm)	Result
802.11b	Low	2412	13.80	9.21	30	Pass
	Middle	2437	14.81	9.67	30	Pass
	High	2462	14.46	9.50	30	Pass
802.11g	Low	2412	16.52	8.57	30	Pass
	Middle	2437	17.48	9.73	30	Pass
	High	2462	17.21	9.69	30	Pass
802.11 n-HT20	Low	2412	16.41	8.64	30	Pass
	Middle	2437	17.59	9.65	30	Pass
	High	2462	17.15	9.37	30	Pass
802.11 n-HT40	Low	2422	16.97	9.35	30	Pass
	Middle	2437	17.68	9.64	30	Pass
	High	2452	17.18	9.36	30	Pass
BLE	Low	2402	-7.31	/	30	Pass
	Middle	2440	-6.24	/	30	Pass
	High	2480	-6.46	/	30	Pass

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 Data

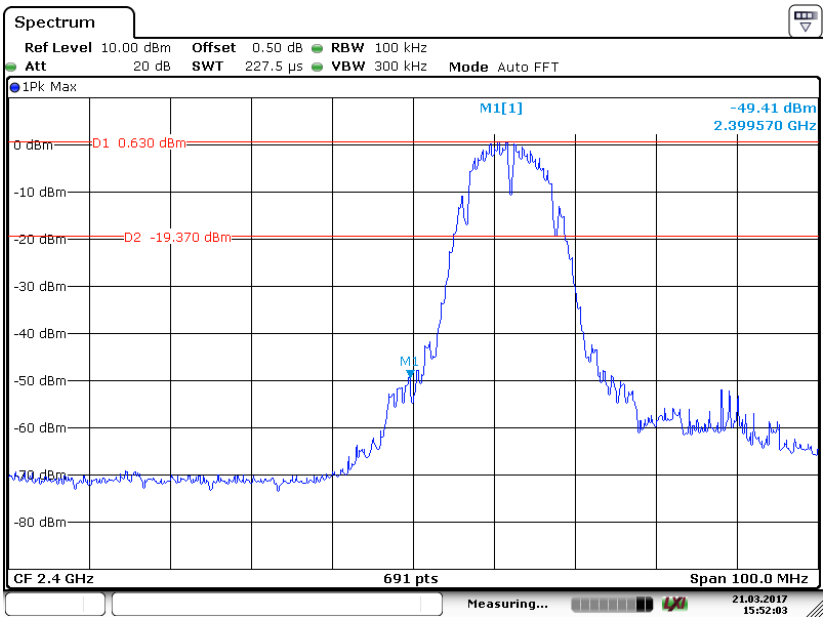
Environmental Conditions

Temperature:	24.3 ℃
Relative Humidity:	55 %
ATM Pressure:	101.3 kPa

The testing was performed by Chris Wang on 2017-03-21.

Test Result: *Compliance*

802.11b: Band Edge, Left Side



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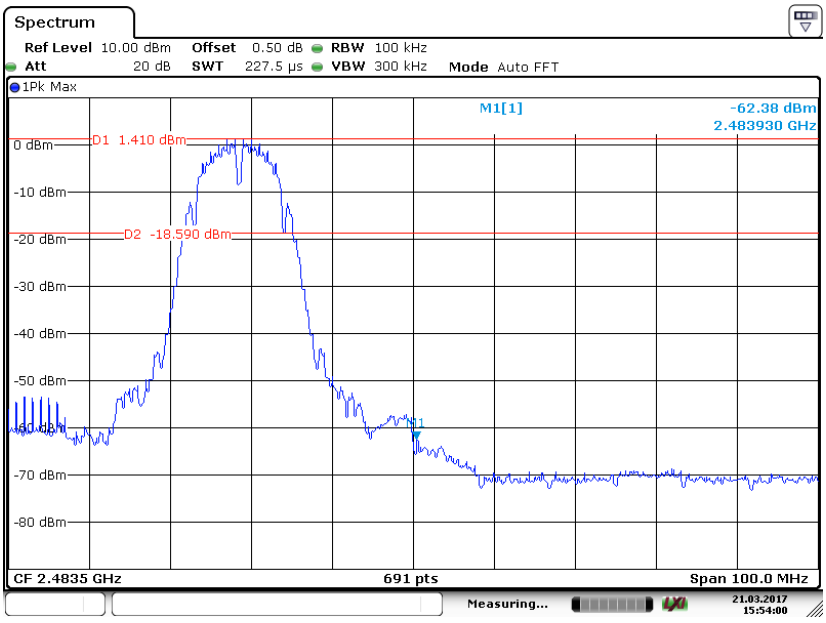
802.11b: Band Edge, Right Side



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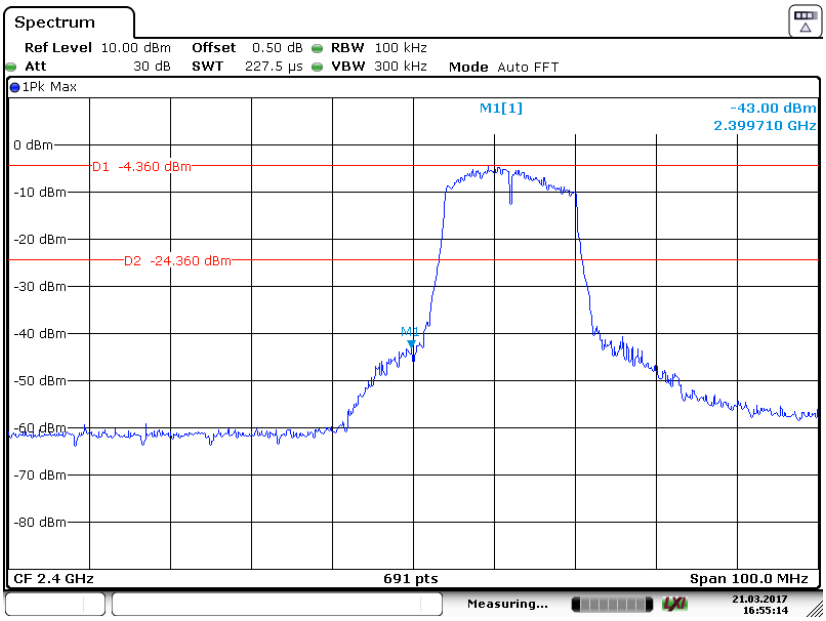
802.11g: Band Edge, Left Side



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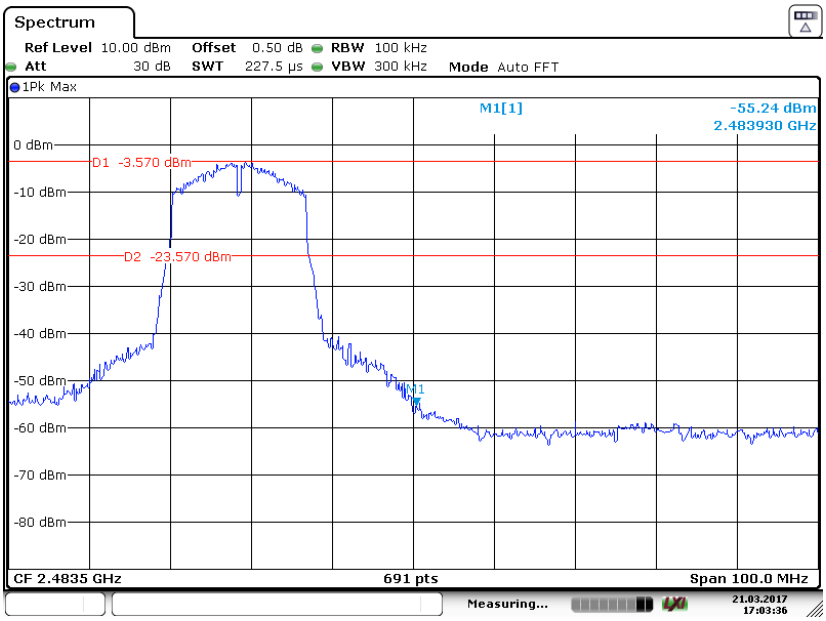
802.11g: Band Edge, Right Side



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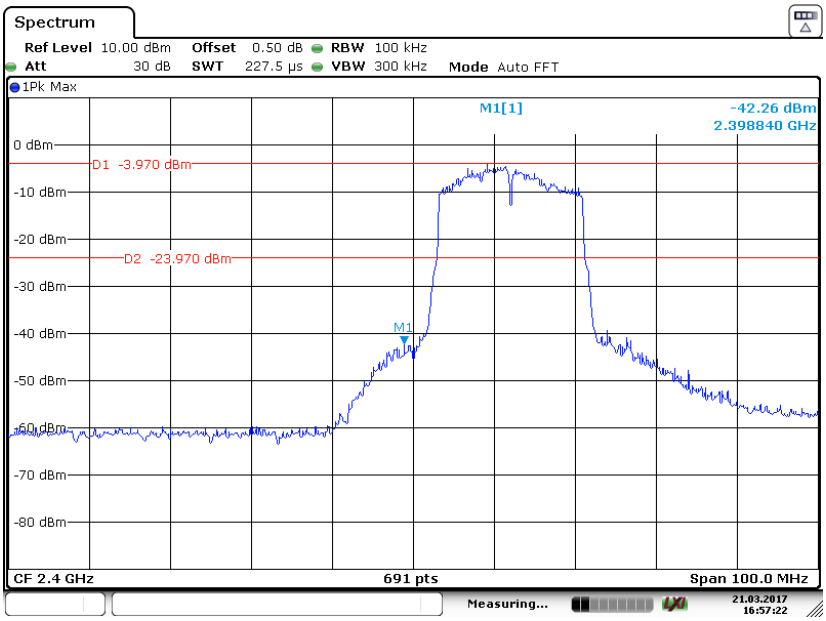
802.11n-HT20: Band Edge, Left Side



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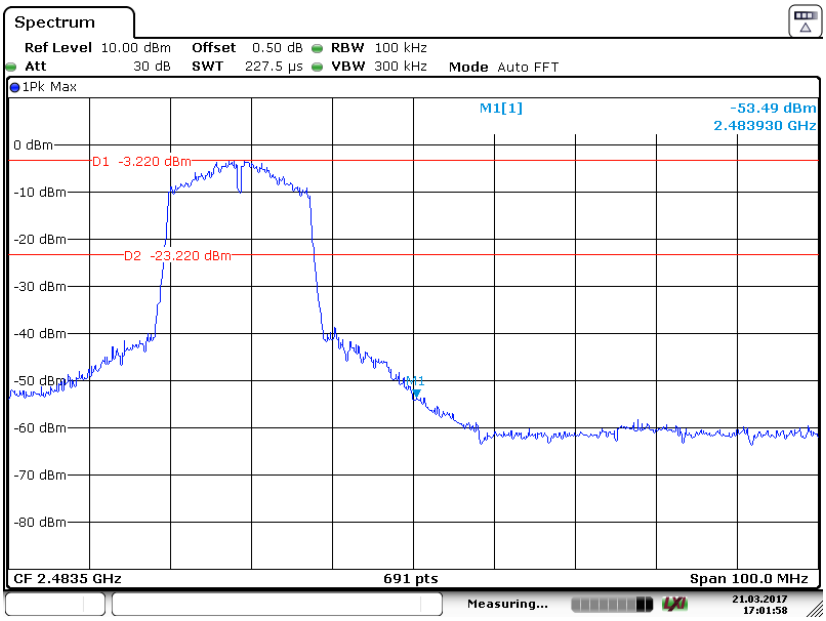
802.11n-HT20: Band Edge, Right Side



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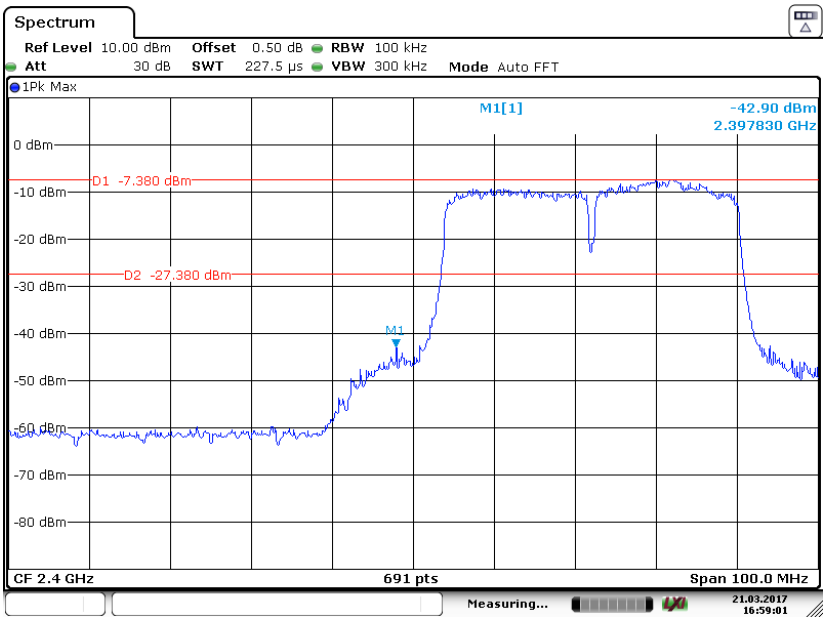
802.11n-HT40: Band Edge, Left Side



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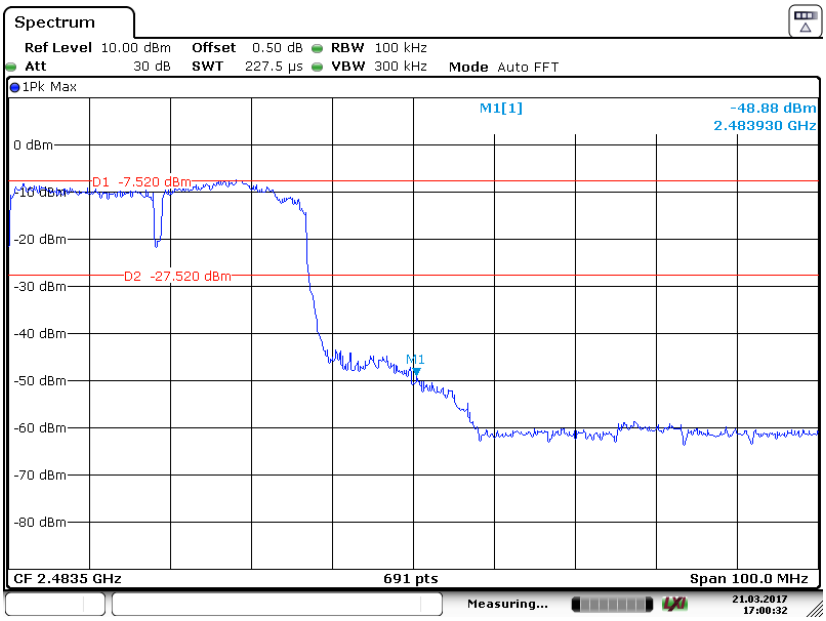
802.11n-HT40: Band Edge, Right Side



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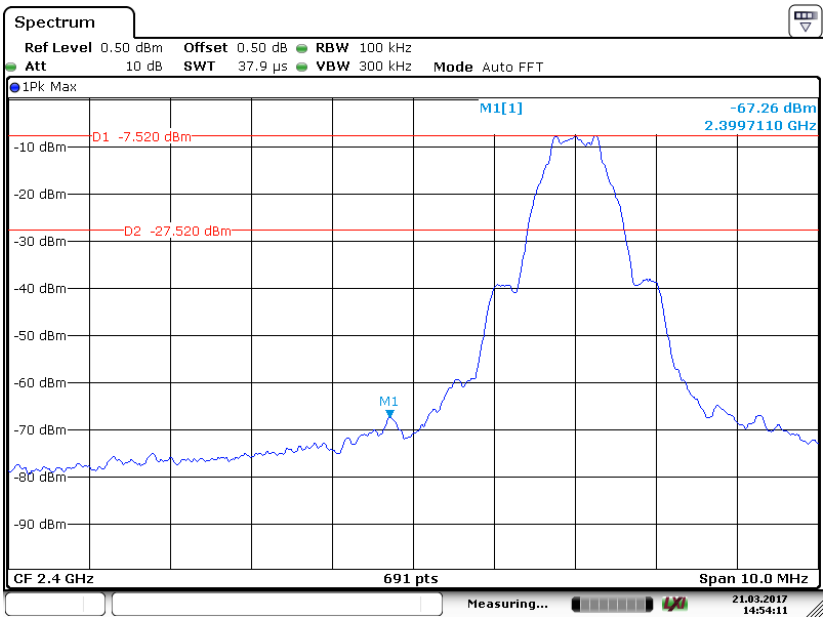
BLE: Band Edge, Left Side



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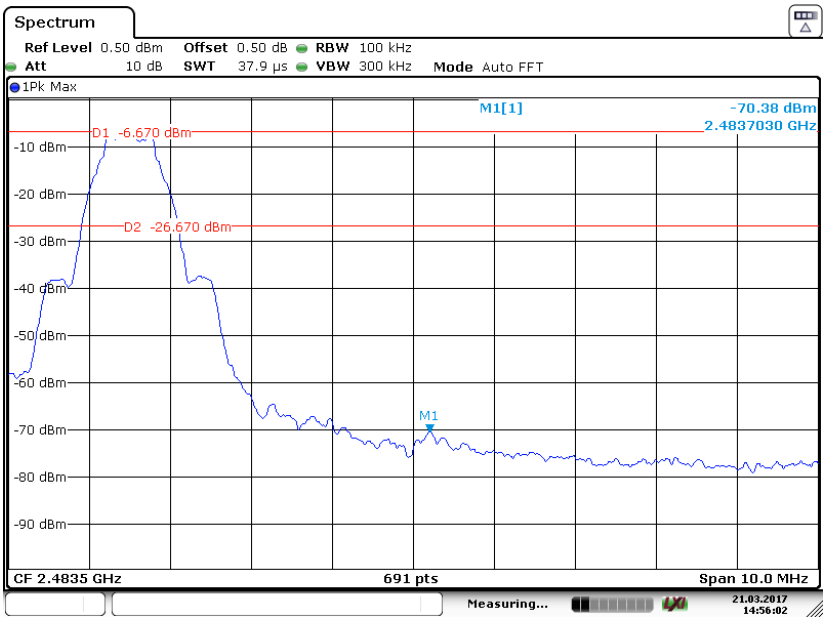
BLE: Band Edge, Right Side



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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 v04.

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 Data

Environmental Conditions

Temperature:	24.1 ℃
Relative Humidity:	54 %
ATM Pressure:	101.3 kPa

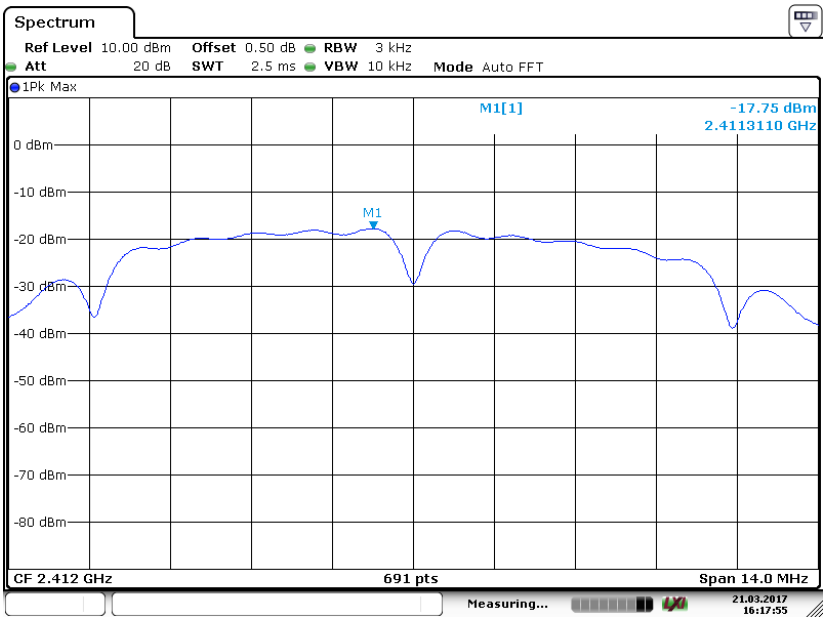
The testing was performed by Chris Wang on 2017-03-21.

EUT operation mode: Transmitting

Test Result: Pass

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b mode			
Low	2412	-17.75	≤8
Middle	2437	-16.56	≤8
High	2462	-16.76	≤8
802.11g mode			
Low	2412	-18.86	≤8
Middle	2437	-17.47	≤8
High	2462	-17.64	≤8
802.11n-HT20 mode			
Low	2412	-17.81	≤8
Middle	2437	-17.73	≤8
High	2462	-17.29	≤8
802.11n-HT40 mode			
Low	2422	-18.81	≤8
Middle	2437	-17.83	≤8
High	2452	-20.33	≤8
BLE mode			
Low	2402	-22.44	≤8
Middle	2440	-19.33	≤8
High	2480	-21.54	≤8

Power Spectral Density , 802.11b Low Channel



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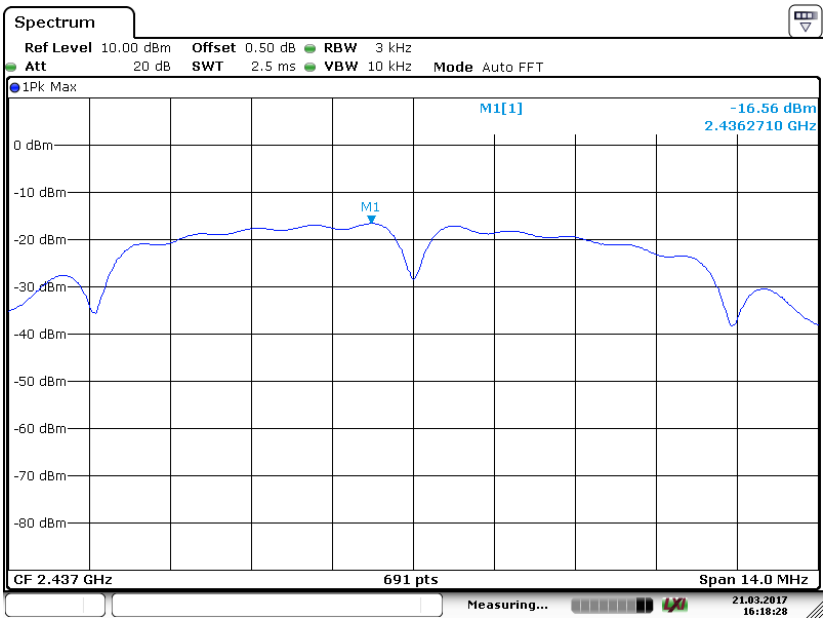
Power Spectral Density , 802.11b Middle Channel



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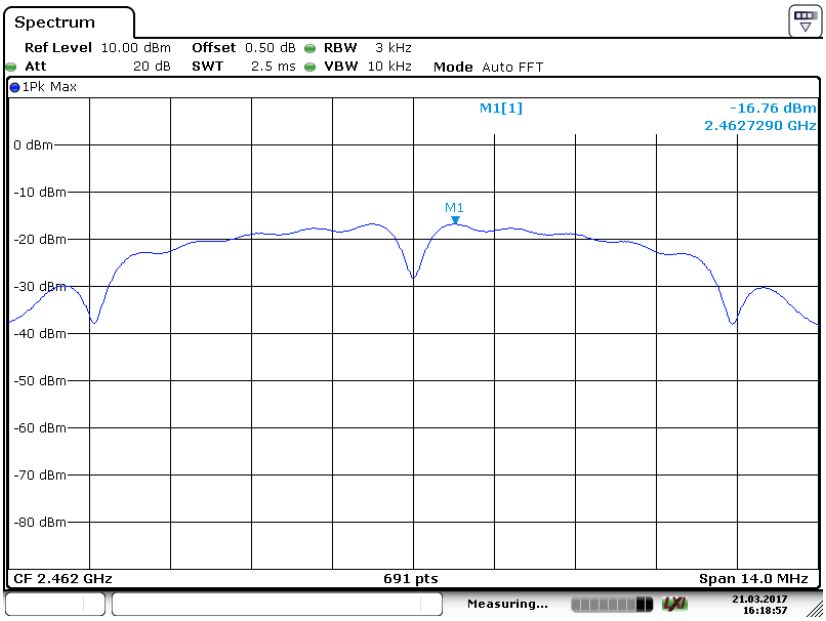
Power Spectral Density , 802.11b High Channel



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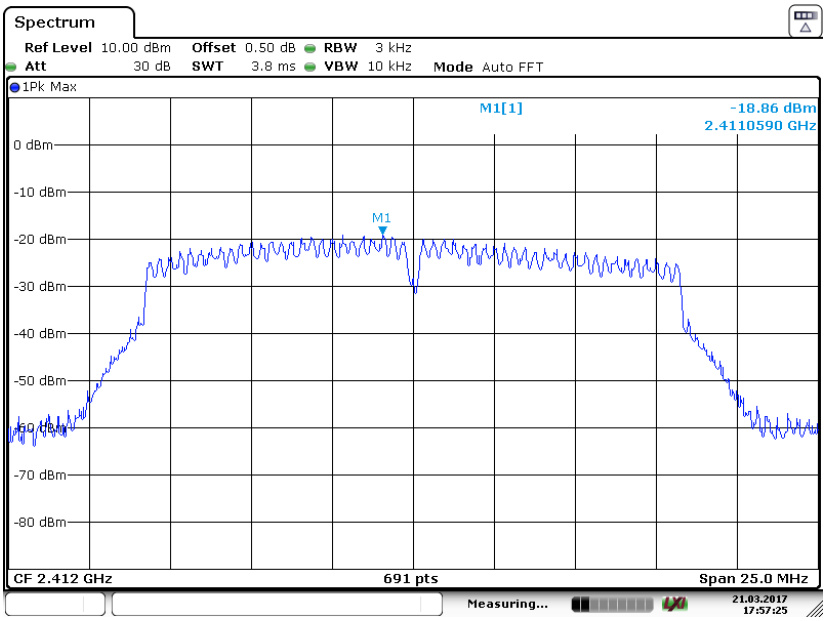
Power Spectral Density , 802.11g Low Channel



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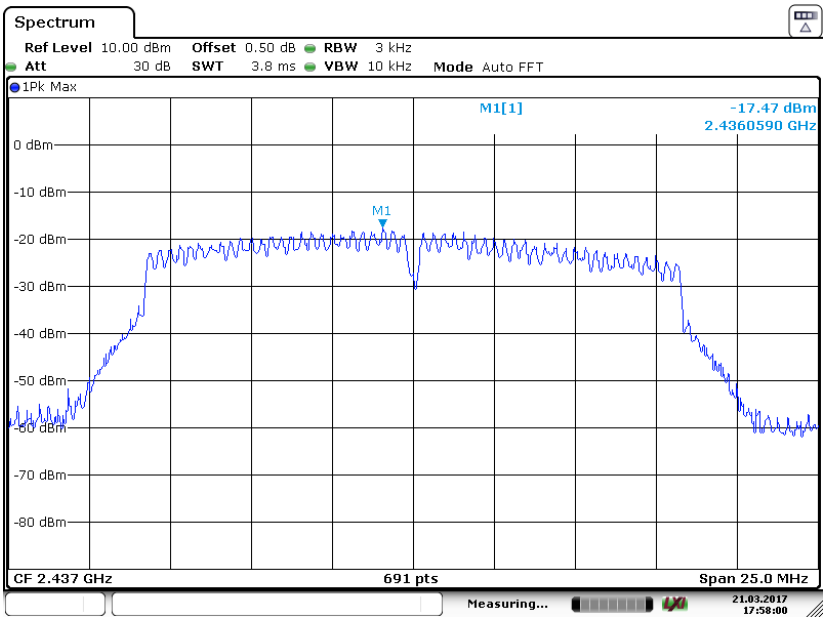
Power Spectral Density , 802.11g Middle Channel



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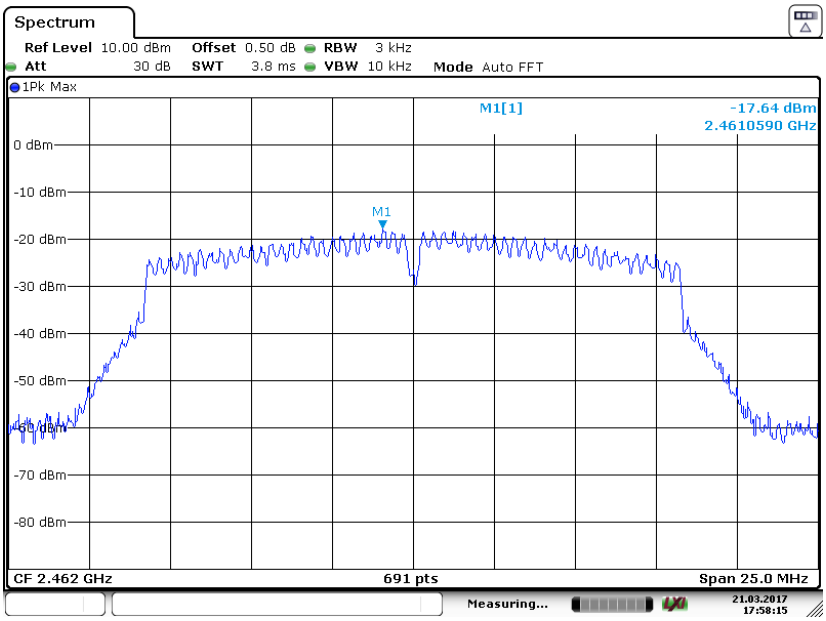
Power Spectral Density , 802.11g High Channel



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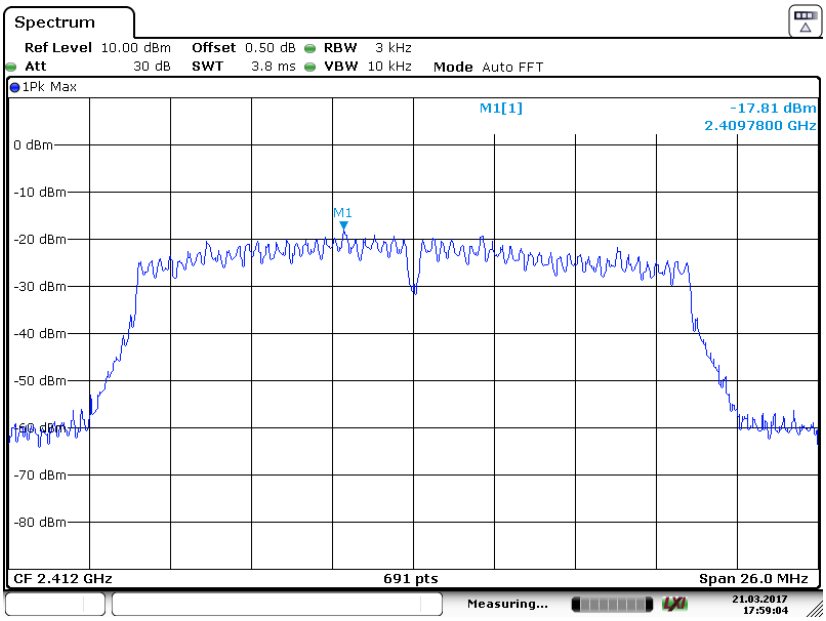
Power Spectral Density , 802.11n-HT20 Low Channel



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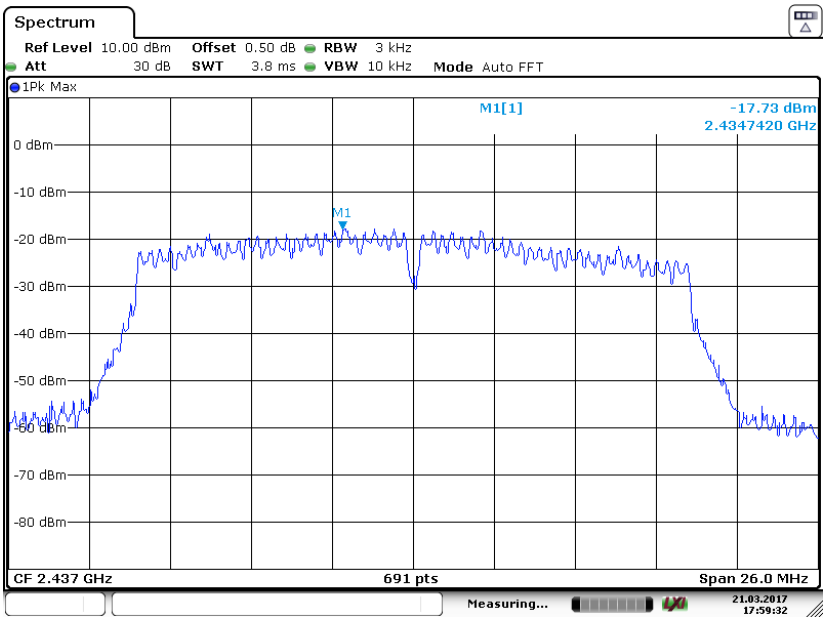
Power Spectral Density , 802.11n-HT20 Middle Channel



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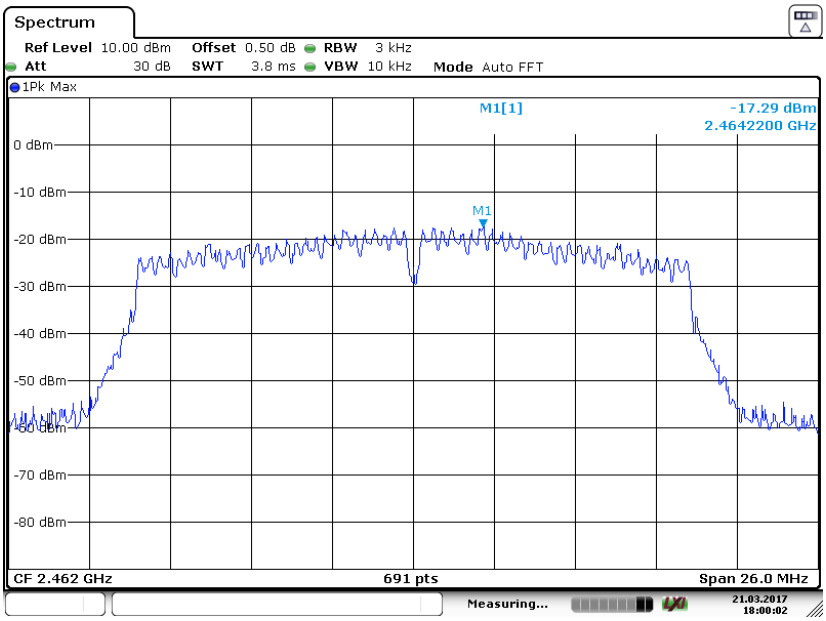
Power Spectral Density , 802.11n-HT20 High Channel



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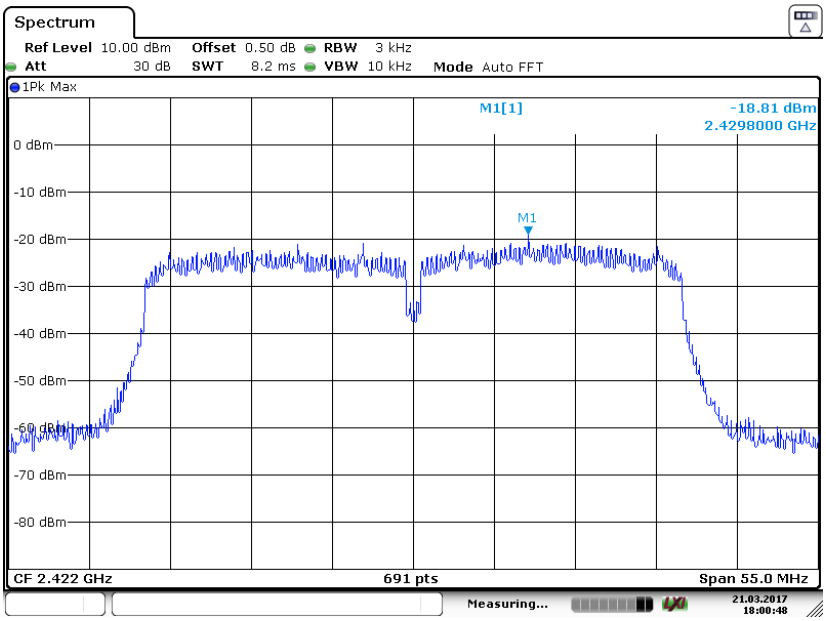
Power Spectral Density , 802.11n-HT40 Low Channel



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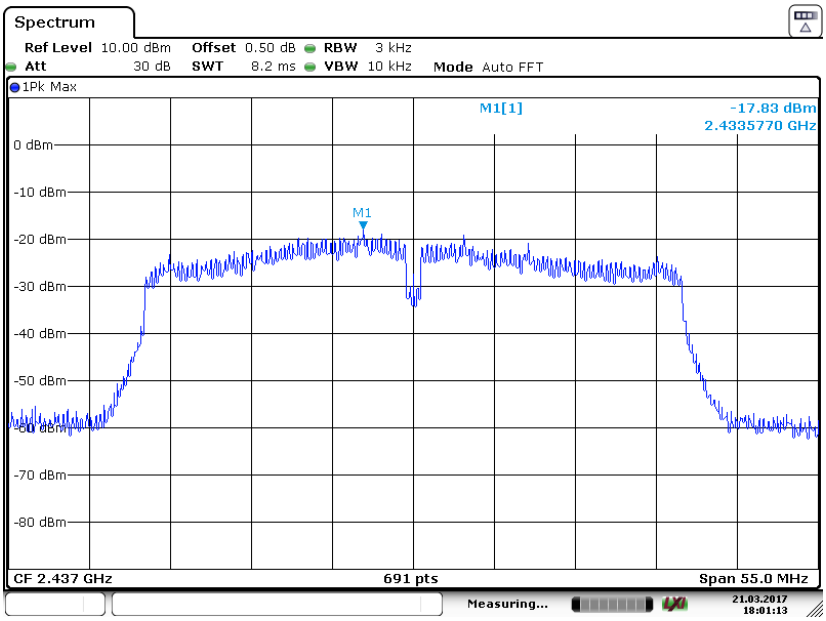
Power Spectral Density , 802.11n-HT40 Middle Channel



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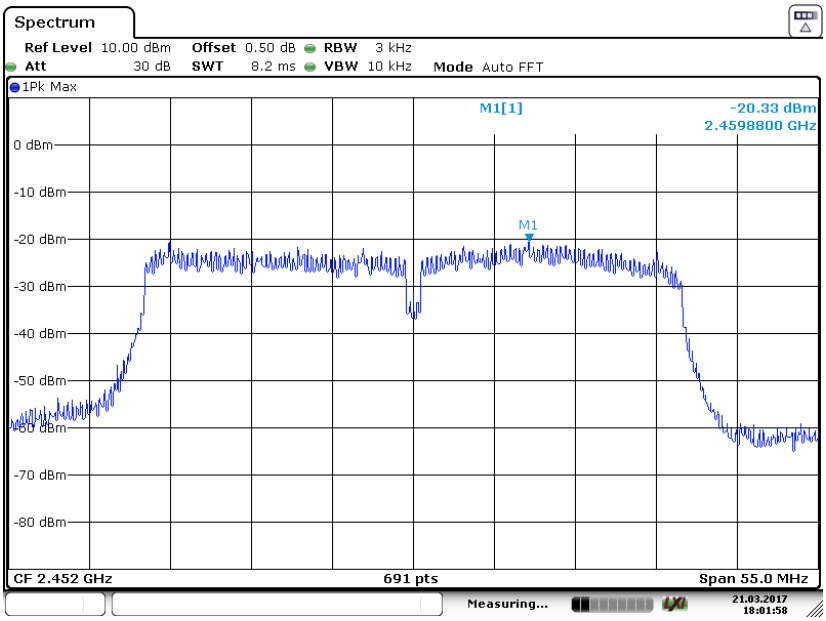
Power Spectral Density , 802.11n-HT40 High Channel



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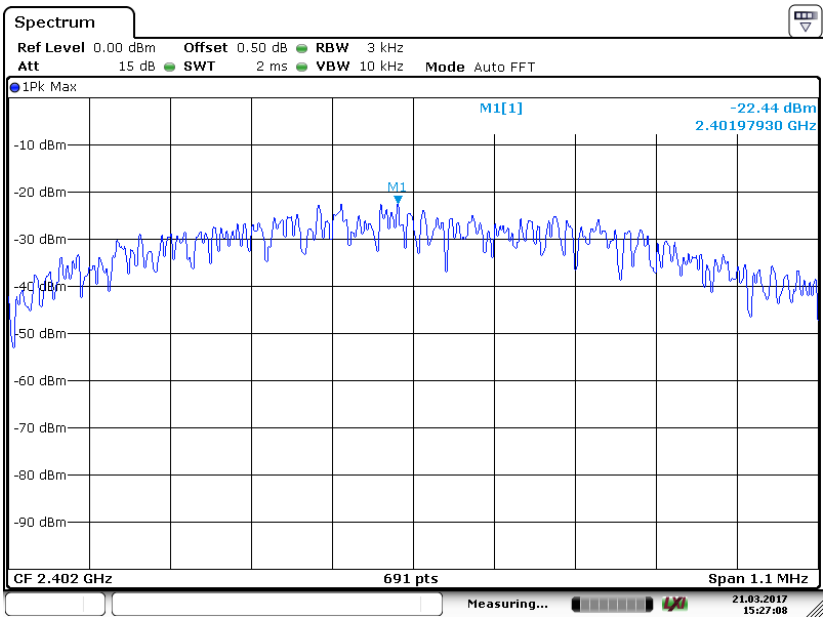
Power Spectral Density , BLE Mode Low Channel



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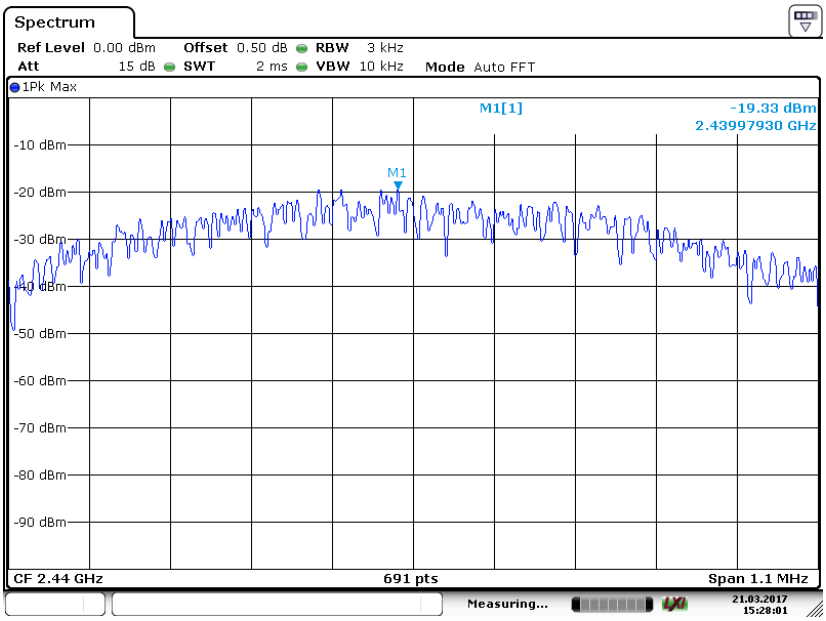
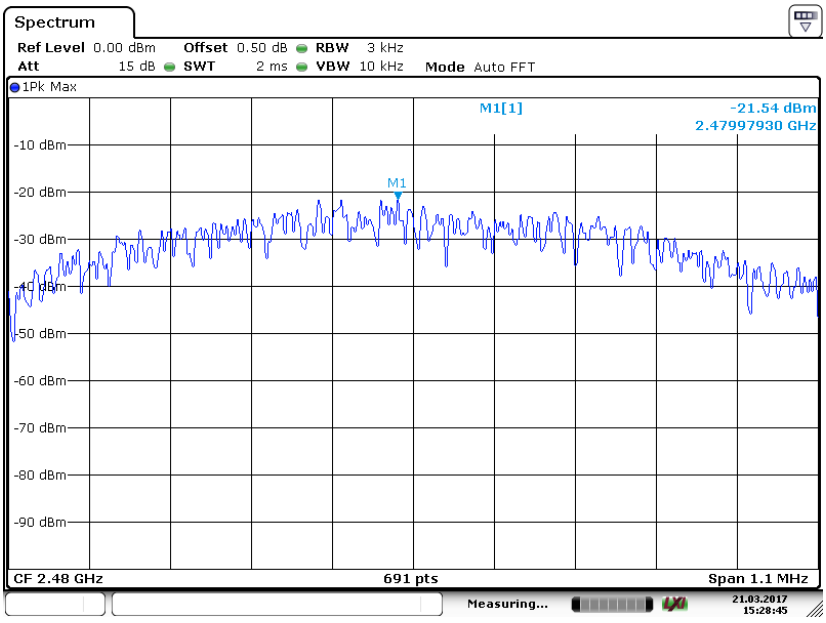
Power Spectral Density , BLE Mode Middle Channel



Date: 21.MAR.2017 15:28:01

Power Spectral Density , BLE Mode High Channel



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