TESTING LABORATORY
CERTIFICATE#4323.01

FCC PART 15.247

TEST REPORT

For

Shanghai Sunmi Technology Co.,Ltd.

Room 605, Block 7, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai 200433 China

FCC ID: 2AH25T6920

Report Type:	**Product Type:**
Original Report	Smart POS system

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Report Number:	RKSA190719002-00D
Report Date:	2019-09-04
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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
EQUIPMENT MODIFICATIONS 6
EUT EXERCISE SOFTWARE 7
SUPPORT EQUIPMENT LIST AND DETAILS 10
EXTERNAL I/O CABLE 10
BLOCK DIAGRAM OF TEST SETUP 10
SUMMARY OF TEST RESULTS **12**
TEST EQUIPMENT LIST **13**
FCC §15.247 (I) & §1.1310 & §2.1093 - RF EXPOSURE **15**
MEASUREMENT RESULT 15
FCC §15.203 - ANTENNA REQUIREMENT **16**
APPLICABLE STANDARD 16
ANTENNA CONNECTOR CONSTRUCTION 16
FCC §15.207 (a) - AC LINE CONDUCTED EMISSIONS **17**
APPLICABLE STANDARD 17
EUT SETUP 17
EMI TEST RECEIVER SETUP 17
TEST PROCEDURE 17
FACTOR & OVER LIMIT CALCULATION 18
TEST RESULTS SUMMARY 18
TEST DATA 18
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS **23**
APPLICABLE STANDARD 23
EUT SETUP 23
EMI TEST RECEIVER SETUP 24
TEST PROCEDURE 24
FACTOR & OVER LIMIT & CORRECTED AMPLITUDE & MARGIN CALCULATION 24
TEST RESULTS SUMMARY 24
TEST DATA 25
FCC §15.247(a) (2) - 6 dB EMISSION BANDWIDTH **57**
APPLICABLE STANDARD 57
TEST PROCEDURE 57
TEST DATA 57
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER **67**
APPLICABLE STANDARD 67
TEST PROCEDURE 67
TEST DATA 67
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE **71**
APPLICABLE STANDARD 71

TEST PROCEDURE 71
TEST DATA 71

FCC §15.247(e) - POWER SPECTRAL DENSITY 77

APPLICABLE STANDARD 77
TEST PROCEDURE 77
TEST DATA 77

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Shanghai Sunmi Technology Co.,Ltd.
Tested Model	T6920
Product Type	Smart POS system
Dimension	219.1mm(L)* 80mm(W)* 17.8mm(H)
Power Supply	DC 5V from adapter and DC 7.6V from battery

Adapter information:
Model: TPA-23A050200UU01
Input: AC 100-240V, 50/60Hz 0.3A
Output: DC 5V, 2A

**All measurement and test data in this report was gathered from production sample serial number: 20190719002. (Assigned by the BACL. The EUT supplied by the applicant was received on 2019-07-19)*

Objective

This report is prepared on behalf of *Shanghai Sunmi Technology Co.,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 Compliant with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS, Part 22H/24E/27/90 PCB, Part 15.225 DXX and Part 15.407 NII submissions with FCC ID: 2AH25T6920.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliant Testing of Unlicensed Wireless Devices and FCC 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Bay Area Compliant 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		3.19dB
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
	18GHz~40GHz	5.65dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

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

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

Test channel list is as below:

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

For 802.11n-HT40 mode, EUT was tested with Channel 3, 6 and 9.

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 BLE mode, EUT was tested with channel 0, 19 and 39.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	…	…
…	…	…	…
…	…	…	…
18	2438	38	2478
19	2440	39	2480

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

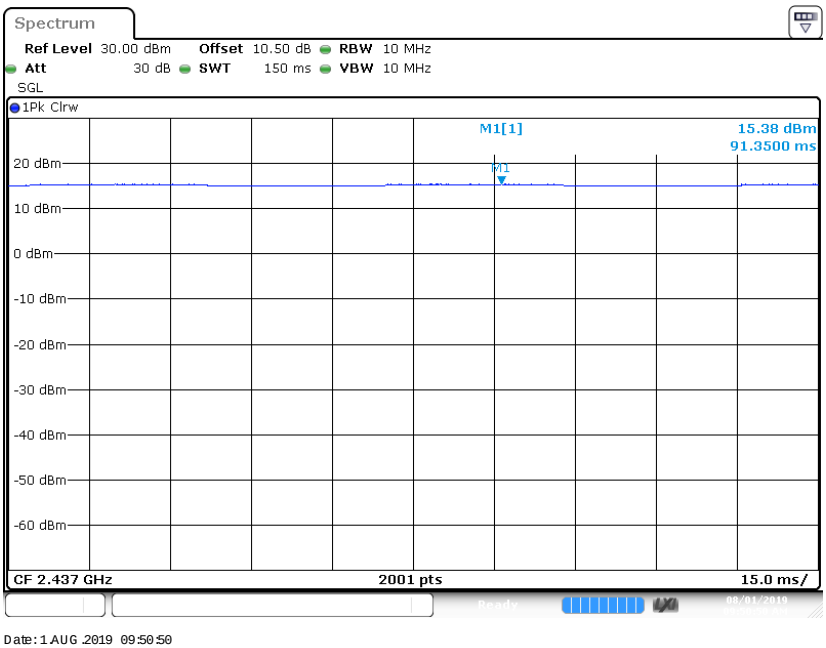
RF test tool: QRCT

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

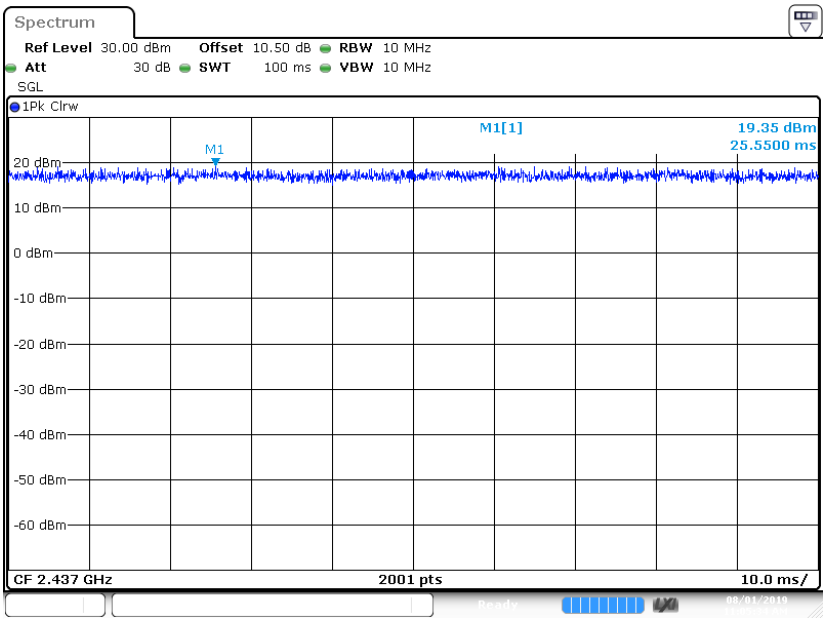
Mode	Data Rate	Channel	Power Setting
802.11b	1Mbps	Low	12
		Middle	12
		High	13
802.11g	6 Mbps	Low	10
		Middle	10
		High	11
802.11n-HT20	MCS0	Low	11
		Middle	9
		High	10
802.11n-HT40	MCS0	Low	10
		Middle	10
		High	11
BLE	1Mbps	/	Default

Duty Cycle:

802.11b Mode Middle Channel

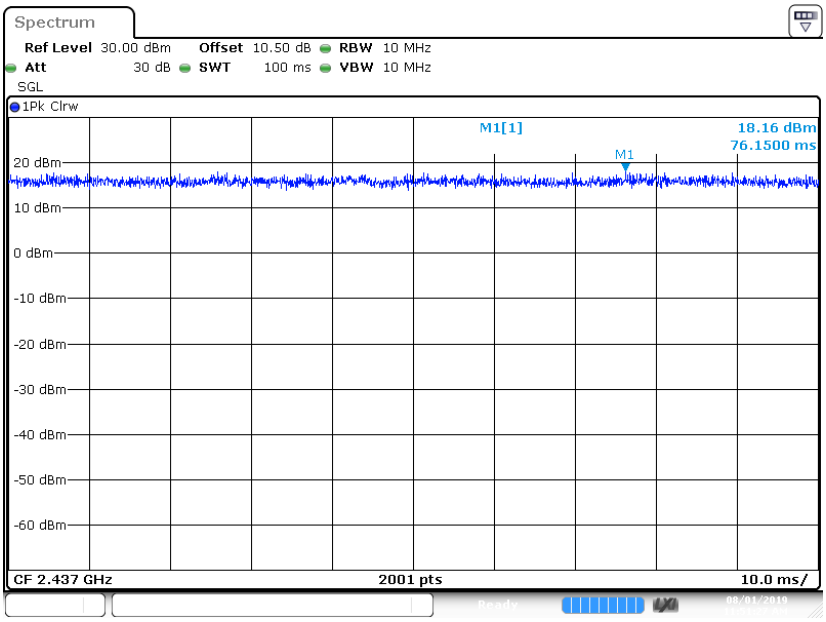


802.11g Mode Middle Channel



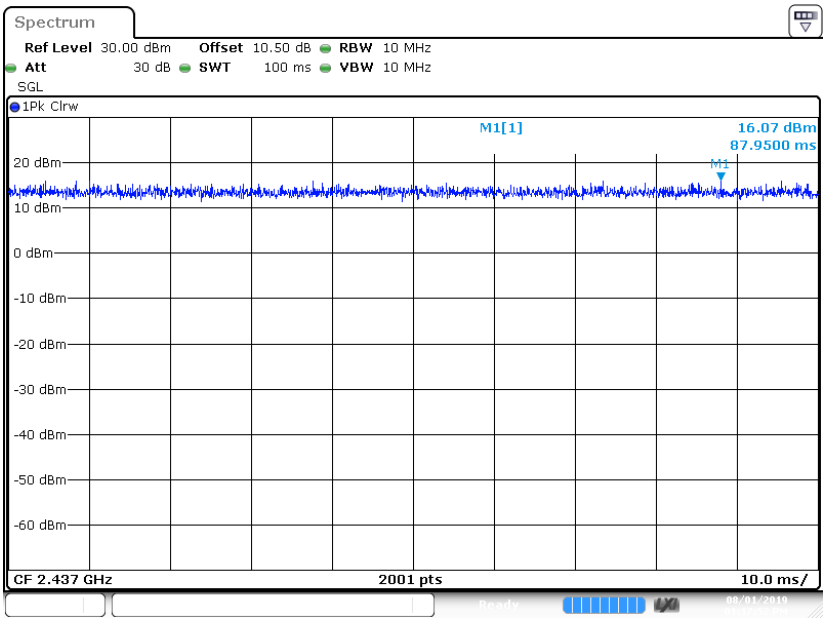
Date: 1.AUG.2019 11:05:34

802.11n-HT20 Mode Middle Channel



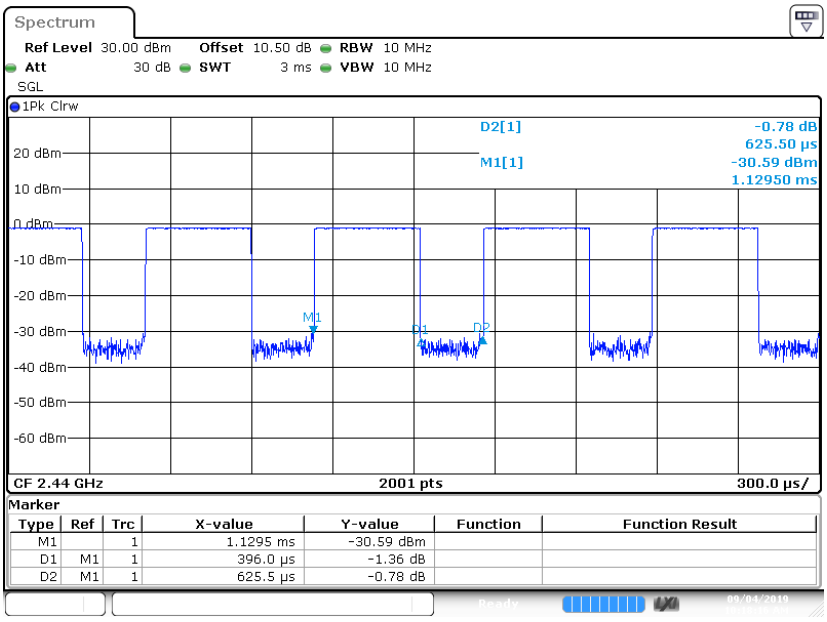
Date: 1.AUG.2019 11:51:28

802.11n-HT40 Mode Middle Channel



Date: 1.AUG.2019 13:17:53

BLE Mode Middle Channel



Date: 4.SEP.2019 10:18:17

Mode	Duty Cycle (%)	T(ms)	1/T(kHz)	10log(1/x)
802.11b	100	/	/	0
802.11g	100	/	/	0
802.11n-HT20	100	/	/	0
802.11n-HT40	100	/	/	0
BLE	63.31	0.396	2.53	1.99

Note: "x" means the Duty Cycle.

Support Equipment List and Details

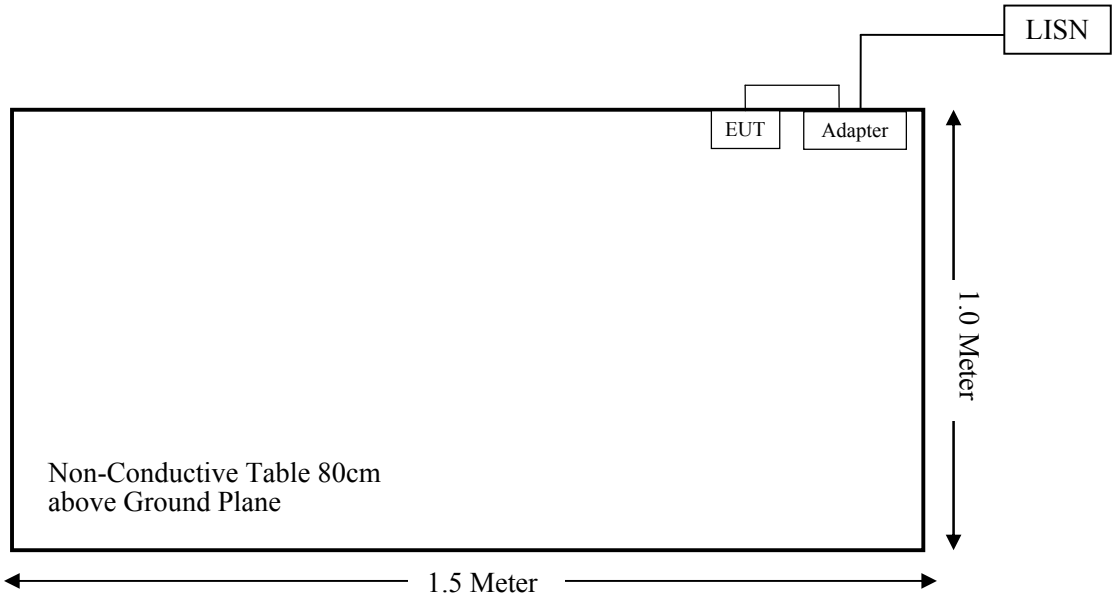
Manufacturer	Description	Model	Serial Number
DELL	Notebook	GX620	D65874152
DELL	Adapter1	LA65NS0-00	DF263

External I/O Cable

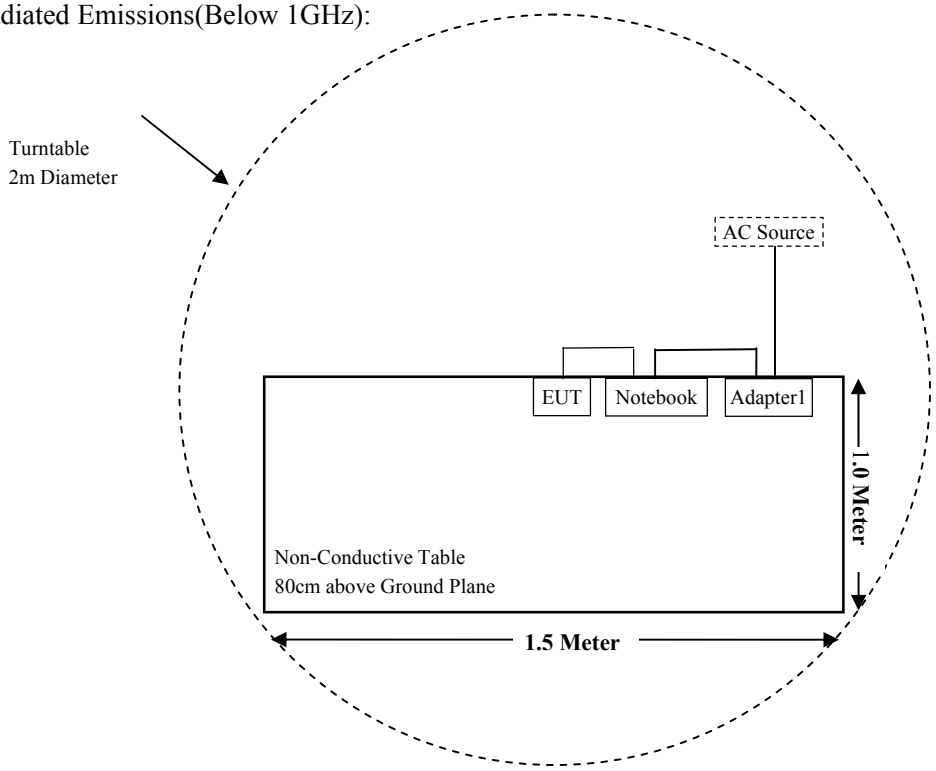
Cable Description	Length (m)	From Port	To
Power Cable	1.0	EUT	Adapter

Block Diagram of Test Setup

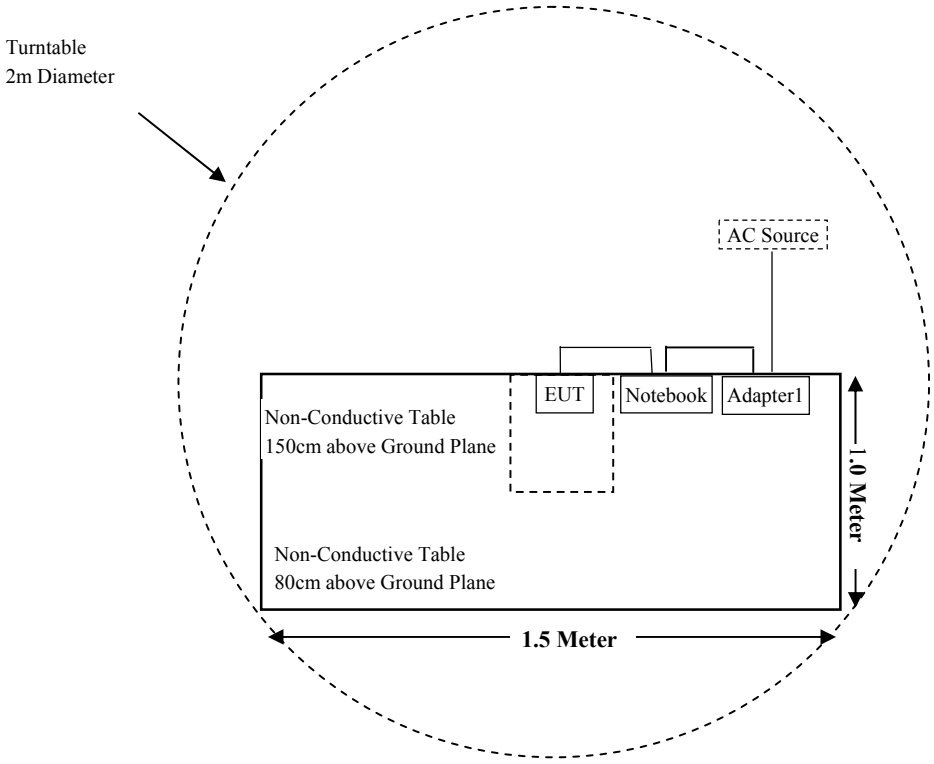
For Conducted Emissions:



For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



SUMMARY OF TEST RESULTS

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

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test（Chamber 1#）					
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	2019-07-11	2020-07-10
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2016-12-26	2019-12-25
Sonoma Instrument	Pre-amplifier	310N	171205	2018-08-14	2019-08-13
Sonoma Instrunent	Pre-amplifier	310N	171205	2019-08-14	2020-08-13
Audix	Test Software	e3	V9	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-8	008	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-8	008	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2019-08-15	2020-08-14
Radiated Emission Test（Chamber 2#）					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2018-08-27	2019-08-26
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2019-08-27	2020-08-26
ETS-LINDGREN	Horn Antenna	3115	9207-3900	2017-07-15	2020-07-14
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-12-12	2019-12-11
A.H.Systems, inc	Amplifier	2641-1	491	2019-02-20	2020-02-19
SELECTOR	Amplifier	EM18G40G	060726	2019-03-22	2020-03-21
MICRO-TRONICS	Band Reject Filter	BRM50702	G024	2018-08-05	2019-08-04
MICRO-TRONICS	Band Reject Filter	BRM50702	G024	2019-08-05	2020-08-04
Narda	Attenuator	10dB	010	2018-08-15	2019-08-14
Narda	Attenuator	10dB	010	2019-08-15	2020-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-6	006	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-6	006	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2019-08-15	2020-08-14

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2019-07-23	2020-07-22
Agilent	Power Meter	N1912A	MY5000492	2018-11-18	2019-11-17
Agilent	Power Sensor	N1921A	MY54210024	2018-11-18	2019-11-17
Narda	Attenuator	10dB	010	2018-08-15	2019-08-14
Narda	Attenuator	10dB	010	2019-08-15	2020-08-14
Sunmi	RF Cable	Sunmi C01	C01	Each Time	N/A
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	2019-07-11	2020-07-10
Rohde & Schwarz	LISN	ENV216	3560655016	2018-11-30	2019-11-29
Audix	Test Software	e3	V9	--	--
Narda	Attenuator/6dB	10690812-2	26850-6	2019-01-10	2020-01-09
MICRO-COAX	Coaxial Cable	Cable-15	015	2019-08-15	2020-08-14

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

According to KDB447498 D01 General RF Exposure Guidance v06:

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

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

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

Measurement Result

For Wi-Fi:

Please refer to SAR Report: RKS190719052-20.

For BLE:

Mode	Frequency Range (MHz)	Max Tune-up Conducted Power		Calculated Distance (mm)	Calculated Value	Threshold (1-g SAR)	SAR Test Exclusion
		(dBm)	(mW)				
BLE	2402-2480	-1.00	0.79	5.0	0.2	3.0	Yes

Result: So the standalone SAR evaluation is not necessary.

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 Compliant 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 an FPC antenna for Bluetooth, and the antenna gain is 3.08 dBi, which is permanently attached to the unit, fulfill the requirement of this section. Please refer to the EUT photos.

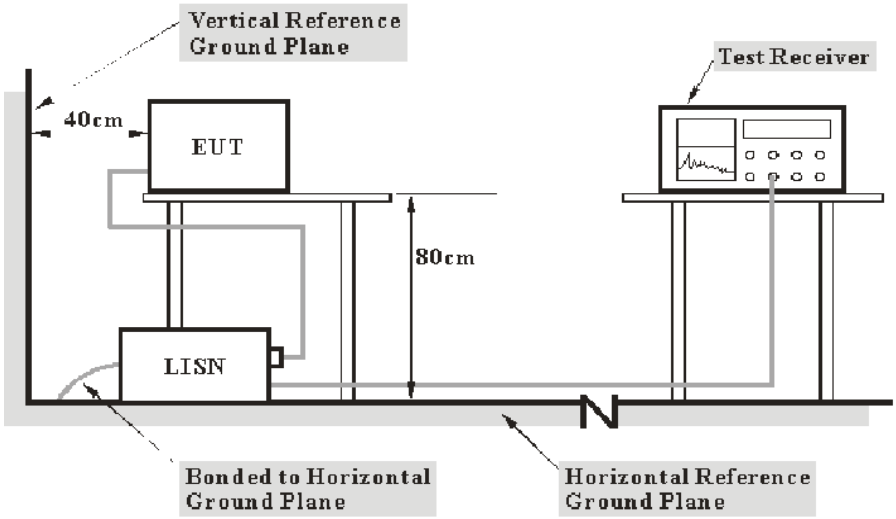
Result: Compliant.

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 measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

The spacing between the peripherals was 10 cm.

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

ANSI C63.10-2013 clause 6.2

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

Factor & Over Limit Calculation

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

Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)

The "**Over Limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit of 7 dB means the emission is 7 dB above the limit. The equation for Over Limit calculation is as follows:

Over Limit (dB) = Read level (dBμV) + Factor (dB) - Limit (dBμV)

Test Results Summary

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

Test Data

Environmental Conditions

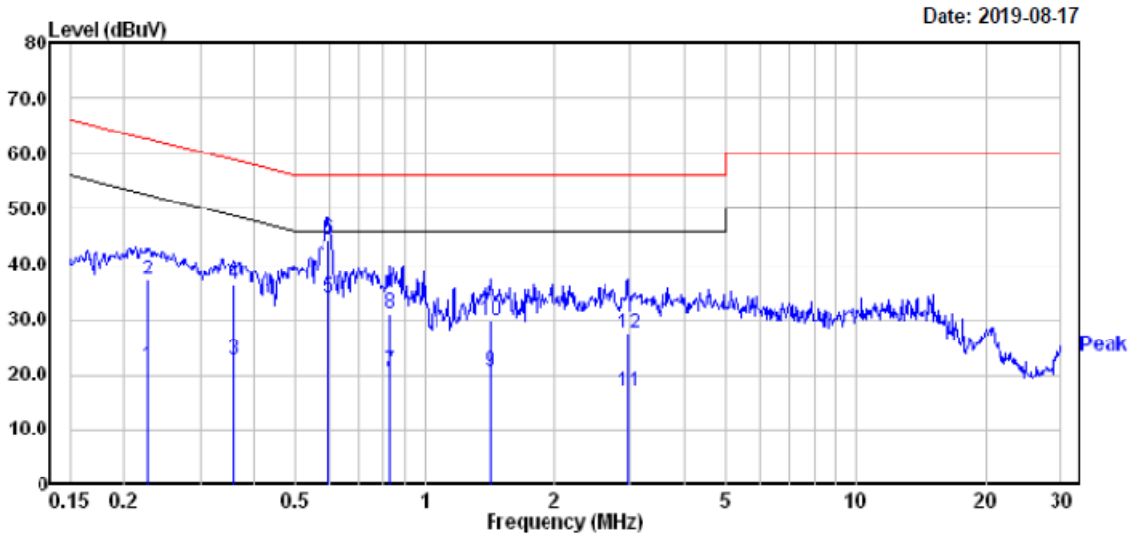
Temperature:	20.2 ℃
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

The testing was performed by Sam Ye on 2019-08-17.

EUT operation mode: Transmitting in 802.11n-HT20 mode low channel (worst case)

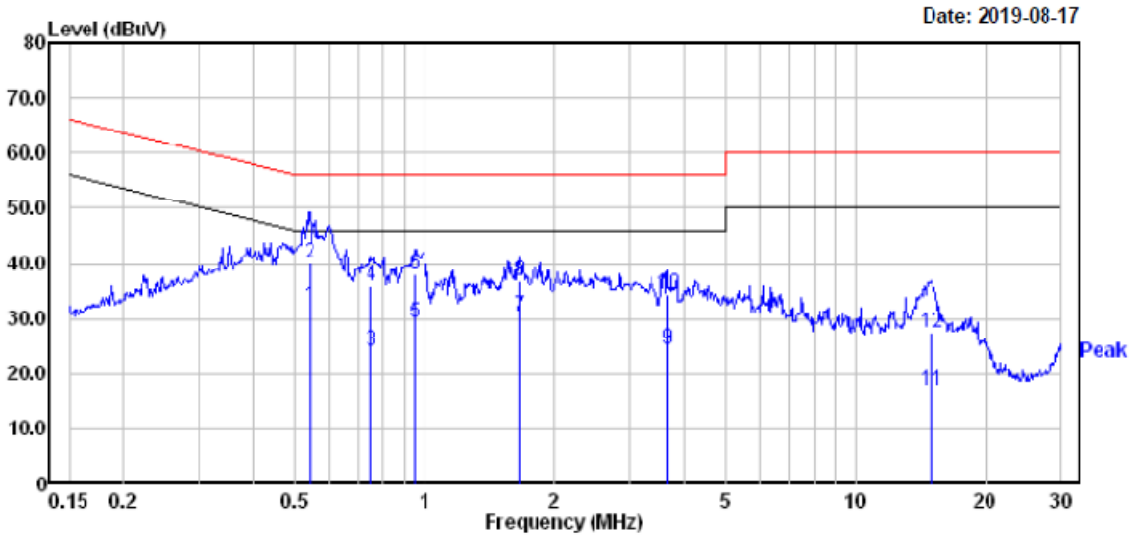
For Wi-Fi Mode:

AC 120V/60 Hz, Line



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.227	1.70	19.65	21.35	52.57	-31.22	Average
2	0.227	17.40	19.65	37.05	62.57	-25.52	QP
3	0.360	3.00	19.66	22.66	48.74	-26.08	Average
4	0.360	16.60	19.66	36.26	58.74	-22.48	QP
5	0.595	14.19	19.68	33.87	46.00	-12.13	Average
6	0.595	24.59	19.68	44.27	56.00	-11.73	QP
7	0.826	0.80	19.68	20.48	46.00	-25.52	Average
8	0.826	11.40	19.68	31.08	56.00	-24.92	QP
9	1.418	0.70	19.73	20.43	46.00	-25.57	Average
10	1.418	10.20	19.73	29.93	56.00	-26.07	QP
11	2.962	-2.80	19.79	16.99	46.00	-29.01	Average
12	2.962	7.80	19.79	27.59	56.00	-28.41	QP

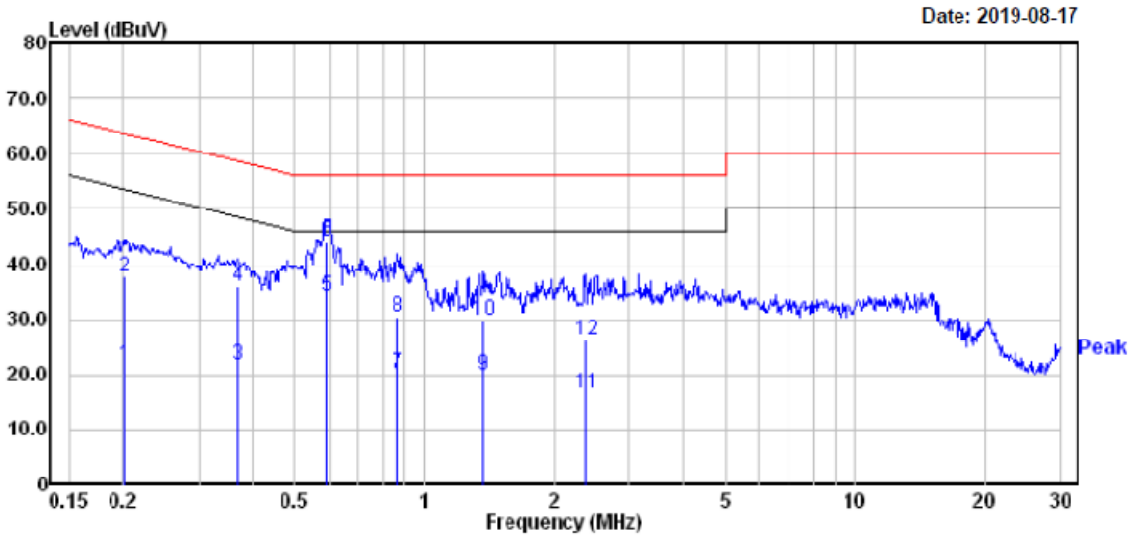
AC 120V/60 Hz, Neutral



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.541	12.60	19.67	32.27	46.00	-13.73	Average
2	0.541	20.60	19.67	40.27	56.00	-15.73	QP
3	0.751	4.60	19.67	24.27	46.00	-21.73	Average
4	0.751	16.20	19.67	35.87	56.00	-20.13	QP
5	0.948	9.49	19.70	29.19	46.00	-16.81	Average
6	0.948	18.29	19.70	37.99	56.00	-18.01	QP
7	1.662	10.79	19.75	30.54	46.00	-15.46	Average
8	1.662	16.99	19.75	36.74	56.00	-19.26	QP
9	3.661	4.69	19.83	24.52	46.00	-21.48	Average
10	3.661	14.59	19.83	34.42	56.00	-21.58	QP
11	14.986	-3.20	20.17	16.97	50.00	-33.03	Average
12	14.986	7.20	20.17	27.37	60.00	-32.63	QP

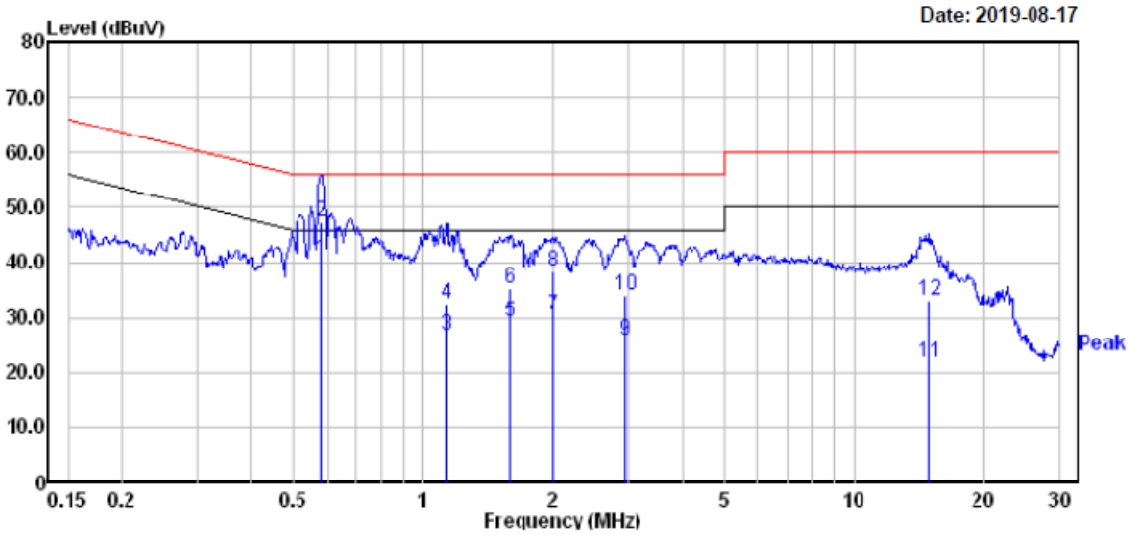
For BLE Mode:

AC 120V/60 Hz, Line



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.202	2.00	19.65	21.65	53.54	-31.89	Average
2	0.202	18.10	19.65	37.75	63.54	-25.79	QP
3	0.369	2.10	19.66	21.76	48.52	-26.76	Average
4	0.369	16.30	19.66	35.96	58.52	-22.56	QP
5	0.592	14.39	19.68	34.07	46.00	-11.93	Average
6	0.592	24.49	19.68	44.17	56.00	-11.83	QP
7	0.866	0.50	19.69	20.19	46.00	-25.81	Average
8	0.866	10.90	19.69	30.59	56.00	-25.41	QP
9	1.367	0.11	19.72	19.83	46.00	-26.17	Average
10	1.367	10.11	19.72	29.83	56.00	-26.17	QP
11	2.371	-3.30	19.77	16.47	46.00	-29.53	Average
12	2.371	6.40	19.77	26.17	56.00	-29.83	QP

AC 120V/60 Hz, Neutral



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.579	20.99	19.68	40.67	46.00	-5.33	Average
2	0.579	27.59	19.68	47.27	56.00	-8.73	QP
3	1.135	7.10	19.71	26.81	46.00	-19.19	Average
4	1.135	12.90	19.71	32.61	56.00	-23.39	QP
5	1.593	9.50	19.74	29.24	46.00	-16.76	Average
6	1.593	15.70	19.74	35.44	56.00	-20.56	QP
7	2.001	10.70	19.76	30.46	46.00	-15.54	Average
8	2.001	18.50	19.76	38.26	56.00	-17.74	QP
9	2.931	6.20	19.79	25.99	46.00	-20.01	Average
10	2.931	14.30	19.79	34.09	56.00	-21.91	QP
11	14.986	2.00	20.17	22.17	50.00	-27.83	Average
12	14.986	12.90	20.17	33.07	60.00	-26.93	QP

Note:

1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
2) Over Limit (dB) = Read level (dBµV) + Factor (dB) - Limit (dBµV)

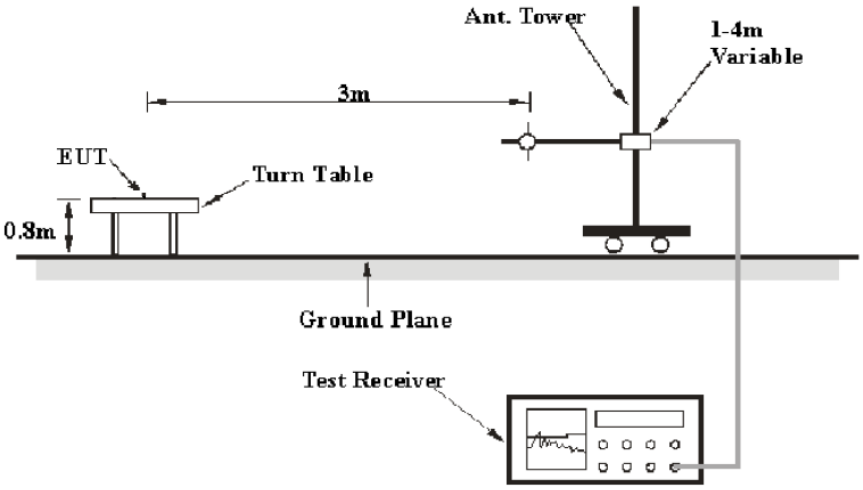
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

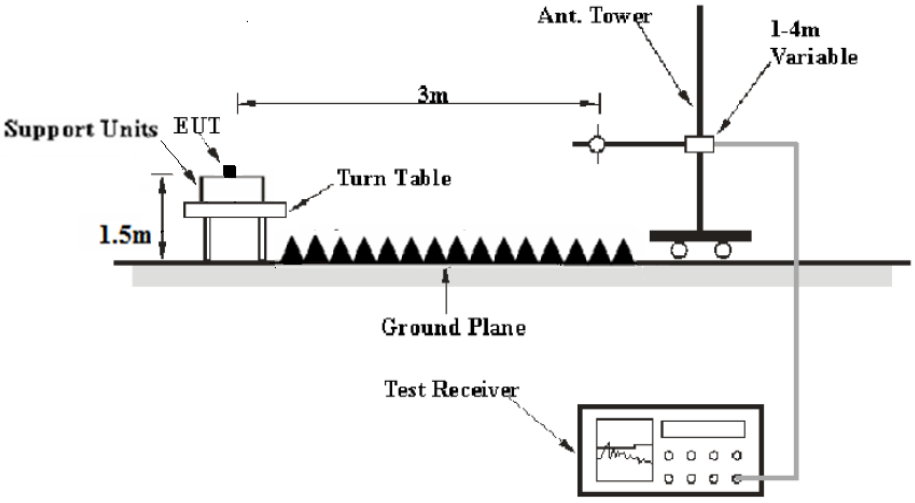
FCC §15.247 (d); §15.209; §15.205;

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 Setup

The system was investigated from 30 MHz to 25 GHz.

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

Frequency Range	RBW	VBW	Detector	Duty Cycle	Measurement method
30 MHz - 1000 MHz	120 kHz	/	QP	/	QP
Above 1GHz	1MHz	3 MHz	PK	/	PK
	1MHz	3 MHz	RMS	≥98%	Ave
	1MHz	1/T	PK	＜98%	Ave

Test Procedure

According to ANSI C63.10-2013 clause 6.5, 6.6 and 6.7.

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 30MHz - 1GHz, peak and Average detection mode for frequencies above 1 GHz.

Factor & Over Limit & Corrected Amplitude & Margin Calculation

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

Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)

The "**Over Limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit of 7dB means the emission is 7 dB above the limit. The equation for Over Limit calculation is as follows:

Over Limit (dB) = Read level (dBμV) + Factor (dB) - Limit (dBμV)

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 (dBμV /m) = Meter Reading (dBμV) + Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)

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 (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV /m)

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:	21.6~25.2 ℃
Relative Humidity:	48~51 %
ATM Pressure:	101.1~101.2kPa

The testing was performed by Sam Ye from 2019-07-31 to 2019-08-28.

EUT operation mode: Transmitting

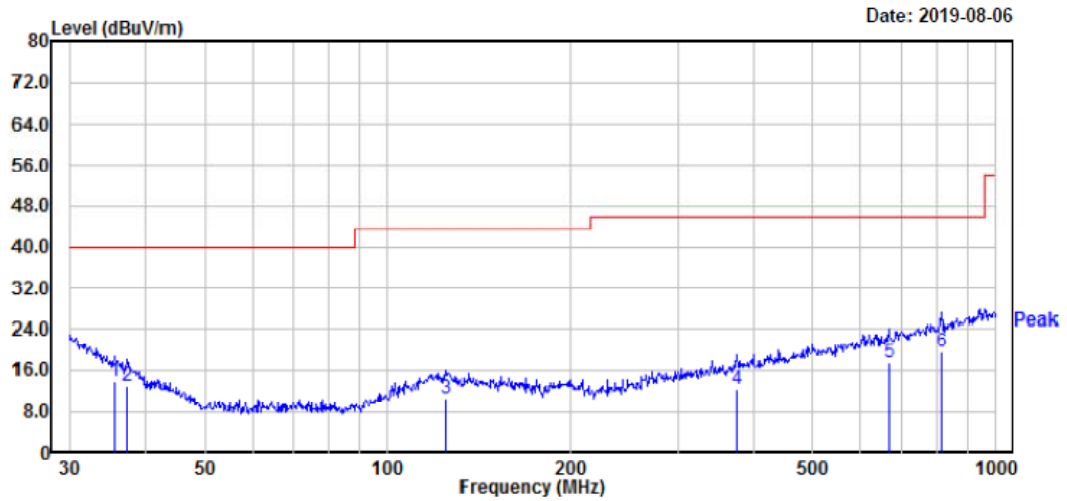
For Wi-Fi Mode:

Spurious Emission Test:

30MHz-1GHz:

Horizontal:

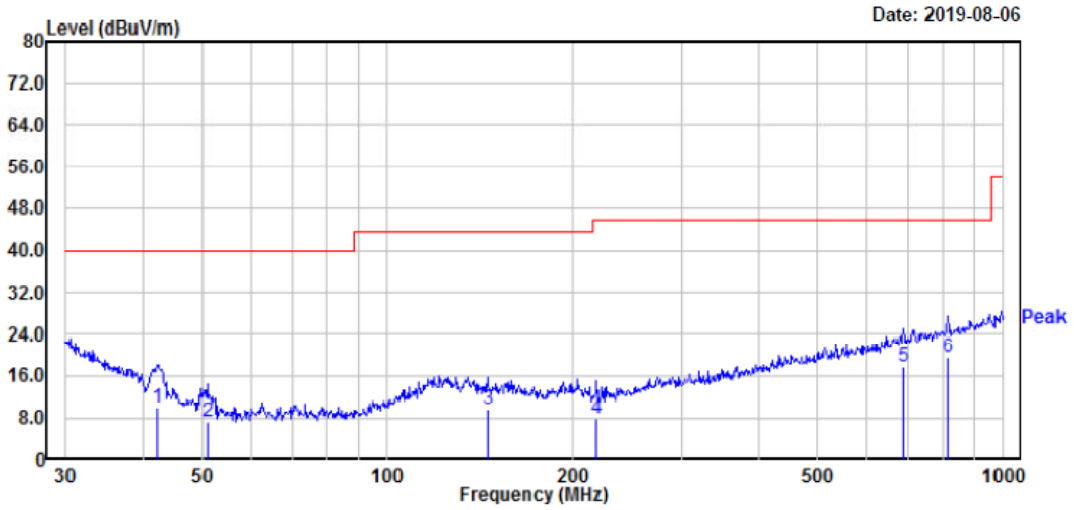
Pre-scan with 802.11b, 802.11g, 802.11n-HT20 and 802.11n-HT40 modes of operation in the X,Y and Z axes of orientation, the worst case ***low channel of 802.11n-HT20 mode in Y-axis of orientation*** *was recorded*



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	35.62	21.70	-7.81	13.89	40.00	-26.11	100	73	QP
2	37.42	22.21	-9.31	12.90	40.00	-27.10	200	1	QP
3	124.57	21.39	-10.91	10.48	43.50	-33.02	100	354	QP
4	375.94	20.79	-8.35	12.44	46.00	-33.56	200	210	QP
5	668.14	20.10	-2.71	17.39	46.00	-28.61	200	143	QP
6	813.11	20.10	-0.57	19.53	46.00	-26.47	100	233	QP

Vertical:

Pre-scan with 802.11b, 802.11g, 802.11n-HT20 and 802.11n-HT40 modes of operation in the X,Y and Z axes of orientation, the worst case ***low channel of 802.11n-HT20 mode in Y-axis of orientation*** *was recorded*



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	42.15	22.59	-12.62	9.97	40.00	-30.03	100	349	QP
2	50.94	24.11	-17.01	7.10	40.00	-32.90	100	134	QP
3	145.35	21.50	-11.83	9.67	43.50	-33.83	100	91	QP
4	219.08	21.10	-13.38	7.72	46.00	-38.28	100	244	QP
5	689.56	20.20	-2.28	17.92	46.00	-28.08	100	348	QP
6	813.11	20.10	-0.57	19.53	46.00	-26.47	200	42	QP

Note:

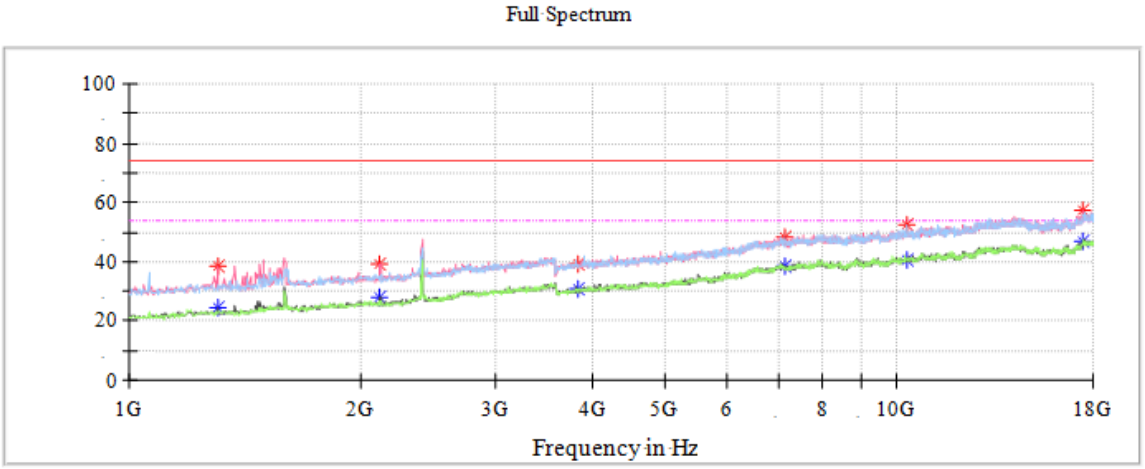
1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
2) Over Limit (dB) = Read level (dBμV) + Factor (dB) - Limit (dBμV)

1GHz-18GHz:

802.11b Mode:
*(Pre-scan in the X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded)*

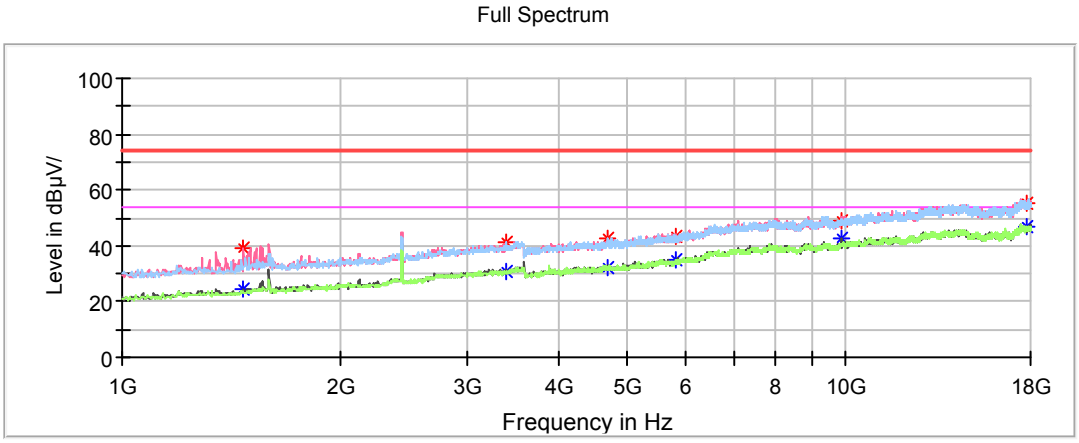
Note:
1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
   Corrected Amplitude (dBμV /m) = Corrected Factor (dB/m) + Reading (dBμV)
   Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV /m)

Low Channel: 2412MHz



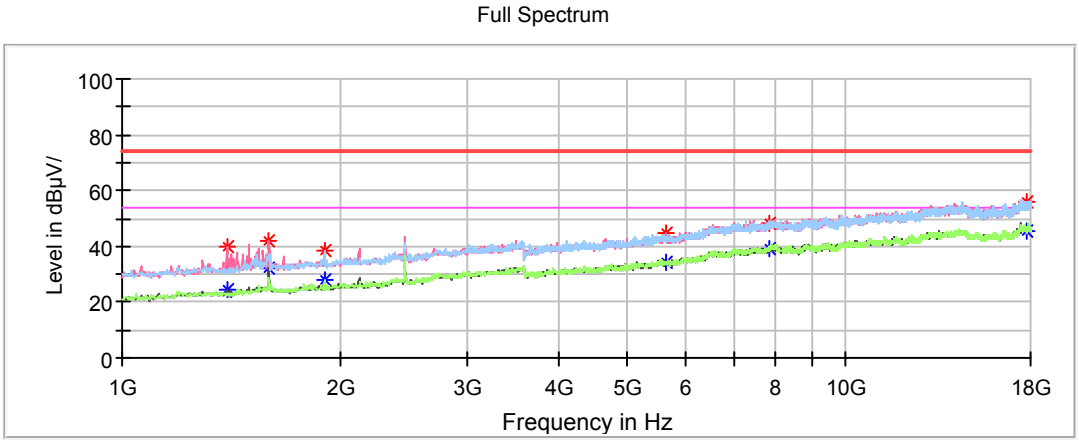
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1306.00	---	24.40	150	V	265	-11.0	54.00	29.60
1306.00	38.72	---	150	V	265	-11.0	74.00	35.28
2122.00	---	27.65	200	V	265	-7.9	54.00	26.35
2122.00	39.39	---	200	V	265	-7.9	74.00	34.61
3852.60	---	30.50	100	H	173	-2.4	54.00	23.50
3852.60	39.47	---	100	H	173	-2.4	74.00	34.53
7140.40	---	38.14	150	H	289	5.6	54.00	15.86
7140.40	48.05	---	150	H	289	5.6	74.00	25.95
10275.20	---	40.58	100	H	320	8.6	54.00	13.42
10275.20	52.22	---	100	H	320	8.6	74.00	21.78
17486.60	---	46.68	150	V	183	14.2	54.00	7.32
17486.60	57.03	---	150	V	183	14.2	74.00	16.97

Middle Channel: 2437MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1472.60	39.45	---	250	V	7	-10.1	74.00	34.55
1472.60	---	24.77	250	V	7	-10.1	54.00	29.23
3397.00	---	30.69	200	H	66	-3.7	54.00	23.31
3397.00	41.60	---	200	H	66	-3.7	74.00	32.40
4682.20	---	32.40	250	H	0	-0.7	54.00	21.60
4682.20	42.31	---	250	H	0	-0.7	74.00	31.69
5817.80	---	34.82	250	H	357	2.0	54.00	19.18
5817.80	43.41	---	250	H	357	2.0	74.00	30.59
9846.80	49.29	---	200	V	259	8.0	74.00	24.71
9846.80	---	42.38	200	V	259	8.0	54.00	11.62
17728.00	55.24	---	200	V	224	13.9	74.00	18.76
17738.20	---	46.59	200	V	224	13.9	54.00	7.41

High Channel: 2462MHz

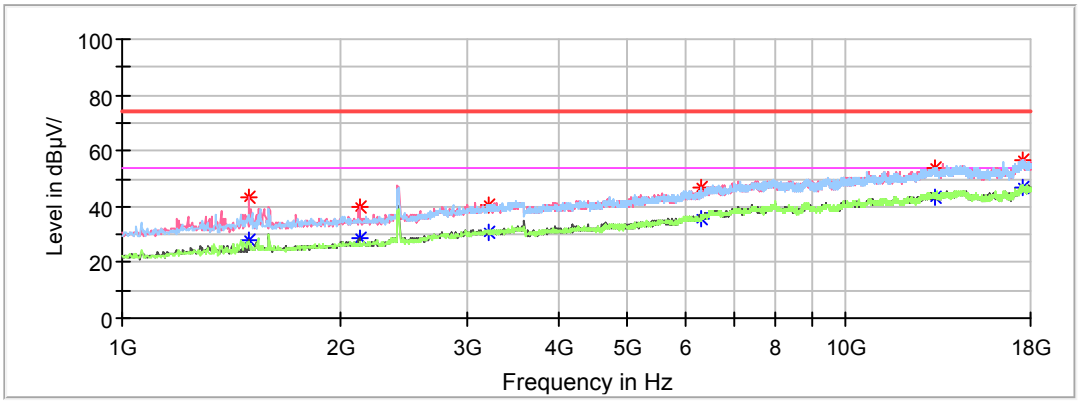


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1394.40	---	24.81	200	V	257	-10.5	54.00	29.19
1394.40	39.73	---	200	V	257	-10.5	74.00	34.27
1591.60	---	32.06	250	V	265	-9.6	54.00	21.94
1591.60	41.87	---	250	V	265	-9.6	74.00	32.13
1901.00	---	28.04	150	H	242	-8.6	54.00	25.96
1901.00	38.70	---	150	H	242	-8.6	74.00	35.30
5627.40	---	34.60	100	V	272	1.6	54.00	19.40
5627.40	44.68	---	100	V	272	1.6	74.00	29.32
7817.00	---	39.21	250	H	317	6.7	54.00	14.79
7817.00	48.56	---	250	H	317	6.7	74.00	25.44
17748.40	---	45.76	100	V	25	13.9	54.00	8.24
17748.40	55.61	---	100	V	25	13.9	74.00	18.39

802.11g Mode:
*(Pre-scan in the X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded)*

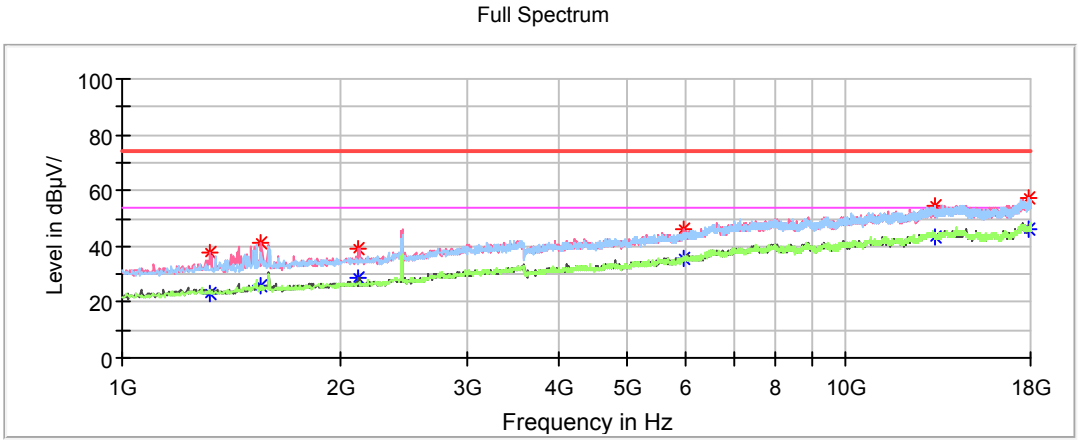
Note:
1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
   Corrected Amplitude (dBμV /m) = Corrected Factor (dB/m) + Reading (dBμV)
   Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV /m)

Low Channel: 2412MHz



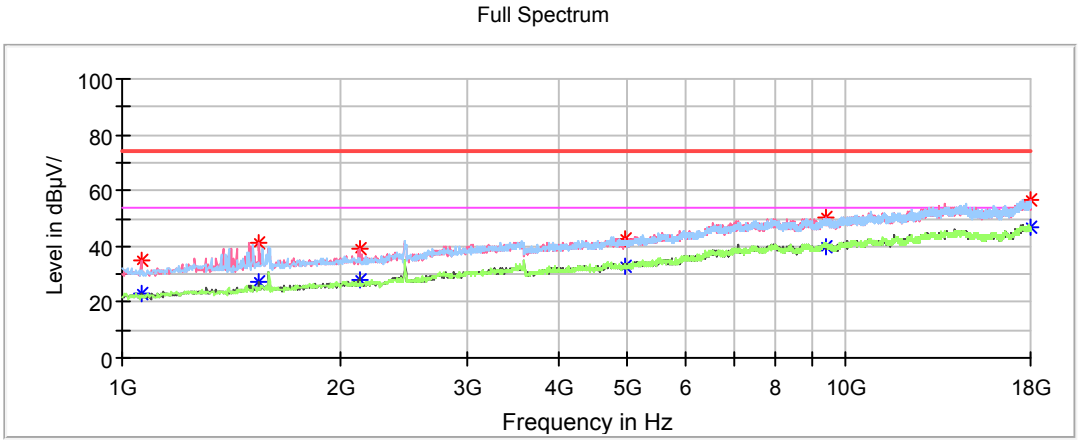
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1496.40	43.32	---	200	V	139	-9.9	74.00	30.68
1496.40	---	28.00	200	V	139	-9.9	54.00	26.00
2128.80	39.96	---	200	V	93	-7.9	74.00	34.04
2128.80	---	28.88	200	V	93	-7.9	54.00	25.12
3213.40	40.55	---	150	H	0	-4.0	74.00	33.45
3213.40	---	31.07	150	H	0	-4.0	54.00	22.93
6317.60	---	35.61	150	H	9	3.6	54.00	18.39
6317.60	46.68	---	150	H	9	3.6	74.00	27.32
13277.40	---	43.49	150	H	111	12.0	54.00	10.51
13277.40	54.15	---	150	H	111	12.0	74.00	19.85
17551.20	---	46.89	150	H	99	14.2	54.00	7.11
17551.20	56.96	---	150	H	99	14.2	74.00	17.04

Middle Channel: 2437MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1323.00	---	23.36	150	H	199	-10.9	54.00	30.64
1323.00	37.96	---	150	H	199	-10.9	74.00	36.04
1557.60	---	26.20	150	V	115	-9.7	54.00	27.80
1557.60	41.35	---	150	V	115	-9.7	74.00	32.65
2122.00	---	28.75	200	V	162	-7.9	54.00	25.25
2122.00	39.40	---	200	V	162	-7.9	74.00	34.60
5974.20	---	35.69	200	H	14	2.2	54.00	18.31
5974.20	46.35	---	200	H	14	2.2	74.00	27.65
13274.00	---	43.46	150	H	13	12.0	54.00	10.54
13274.00	54.38	---	150	H	13	12.0	74.00	19.62
17928.60	---	46.23	150	V	0	13.6	54.00	7.77
17928.60	57.35	---	150	V	0	13.6	74.00	16.65

High Channel: 2462MHz

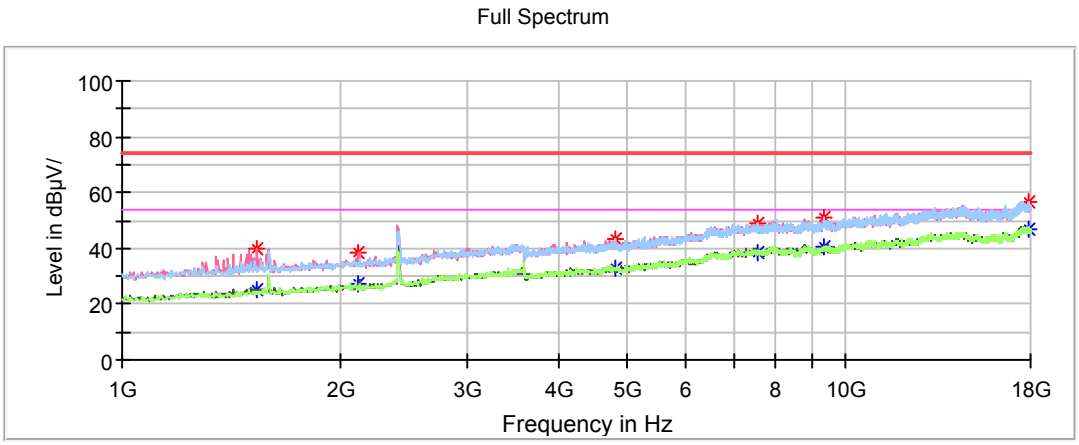


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1061.20	---	23.30	150	V	93	-12.3	54.00	30.70
1061.20	34.84	---	150	V	93	-12.3	74.00	39.16
1547.40	---	27.37	200	V	67	-9.8	54.00	26.63
1547.40	41.41	---	200	V	67	-9.8	74.00	32.59
2125.40	---	28.23	150	V	0	-7.9	54.00	25.77
2125.40	39.12	---	150	V	0	-7.9	74.00	34.88
4924.00	---	33.09	200	V	246	-0.3	54.00	20.91
4924.00	42.99	---	200	V	246	-0.3	74.00	31.01
9387.80	---	39.86	150	V	139	7.7	54.00	14.14
9387.80	50.20	---	150	V	139	7.7	74.00	23.80
17972.80	---	46.60	150	V	34	13.5	54.00	7.40
17972.80	56.78	---	150	V	34	13.5	74.00	17.22

802.11n-HT20 Mode:
*(Pre-scan in the X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded)*

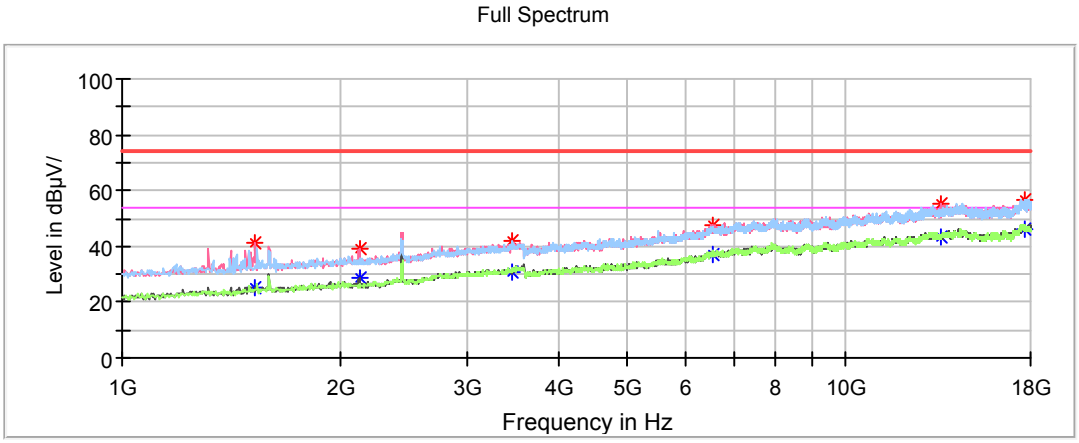
Note:
1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
   Corrected Amplitude (dBµV /m) = Corrected Factor (dB/m) + Reading (dBµV)
   Margin (dB) = Limit (dBµV/m) – Corrected Amplitude (dBµV /m)

Low Channel : 2412MHz



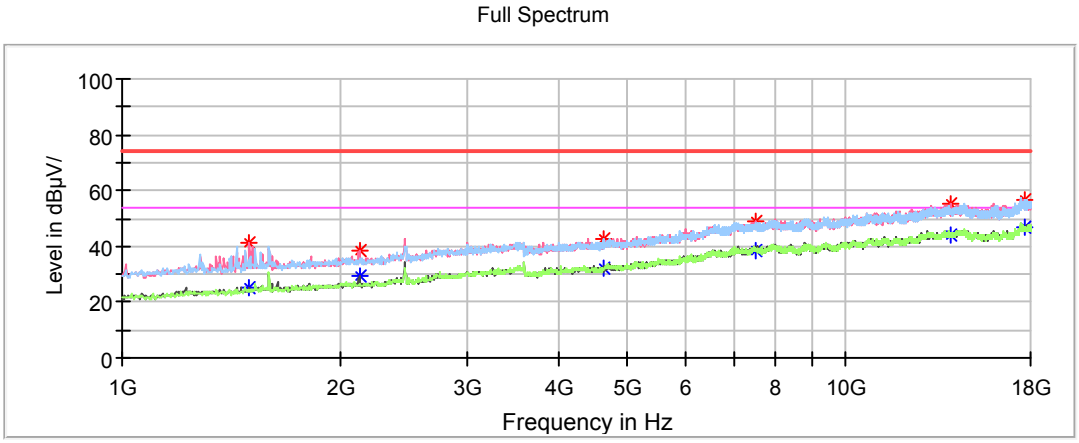
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1533.80	39.73	---	200	V	150	-9.8	74.00	34.27
1533.80	---	25.38	200	V	150	-9.8	54.00	28.62
2122.00	---	27.40	150	V	349	-7.9	54.00	26.60
2122.00	38.41	---	150	V	349	-7.9	74.00	35.59
4824.00	---	32.69	150	H	54	-0.6	54.00	21.31
4824.00	43.07	---	150	H	54	-0.6	74.00	30.93
7558.60	---	38.35	150	H	54	6.2	54.00	15.65
7558.60	49.25	---	150	H	54	6.2	74.00	24.75
9347.00	---	40.37	200	H	354	7.7	54.00	13.63
9347.00	50.74	---	200	H	354	7.7	74.00	23.26
17921.80	---	46.82	150	H	125	13.6	54.00	7.18
17921.80	56.90	---	150	H	125	13.6	74.00	17.10

Middle Channel: 2437MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1527.00	41.07	---	200	V	135	-9.8	74.00	32.93
1527.00	---	25.40	200	V	135	-9.8	54.00	28.60
2125.40	---	28.41	200	V	0	-7.9	54.00	25.59
2125.40	39.19	---	200	V	0	-7.9	74.00	34.81
3465.00	---	30.63	200	H	208	-3.6	54.00	23.37
3465.00	42.03	---	200	H	208	-3.6	74.00	31.97
6555.60	---	37.22	200	V	0	4.5	54.00	16.78
6555.60	47.53	---	200	V	0	4.5	74.00	26.47
13535.80	---	43.19	150	V	288	12.0	54.00	10.81
13535.80	54.98	---	150	V	288	12.0	74.00	19.02
17656.60	---	46.44	200	H	319	14.0	54.00	7.56
17656.60	56.68	---	200	H	319	14.0	74.00	17.32

High Channel : 2462MHz

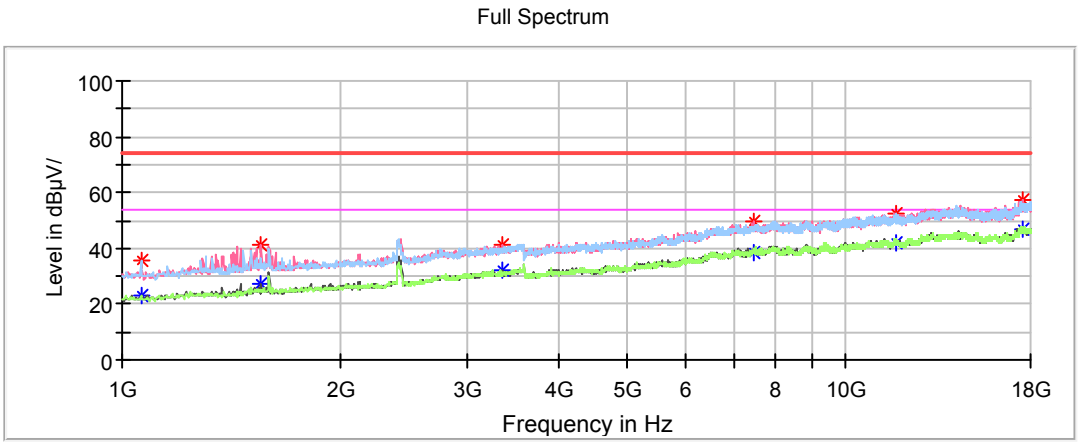


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1499.80	40.92	---	200	V	121	-9.9	74.00	33.08
1499.80	---	25.43	200	V	121	-9.9	54.00	28.57
2125.40	38.80	---	200	V	2	-7.9	74.00	35.20
2125.40	---	29.22	200	V	2	-7.9	54.00	24.78
4638.00	42.81	---	150	H	173	-0.8	74.00	31.19
4638.00	---	32.19	150	H	173	-0.8	54.00	21.81
7504.20	48.87	---	150	V	352	6.1	74.00	25.13
7504.20	---	38.51	150	V	352	6.1	54.00	15.49
13964.20	55.40	---	150	V	42	12.5	74.00	18.60
13964.20	---	44.04	150	V	42	12.5	54.00	9.96
17636.20	---	46.56	200	V	168	14.1	54.00	7.44
17636.20	56.44	---	200	V	168	14.1	74.00	17.56

802.11n-HT40 Mode:
*(Pre-scan in the X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded)*

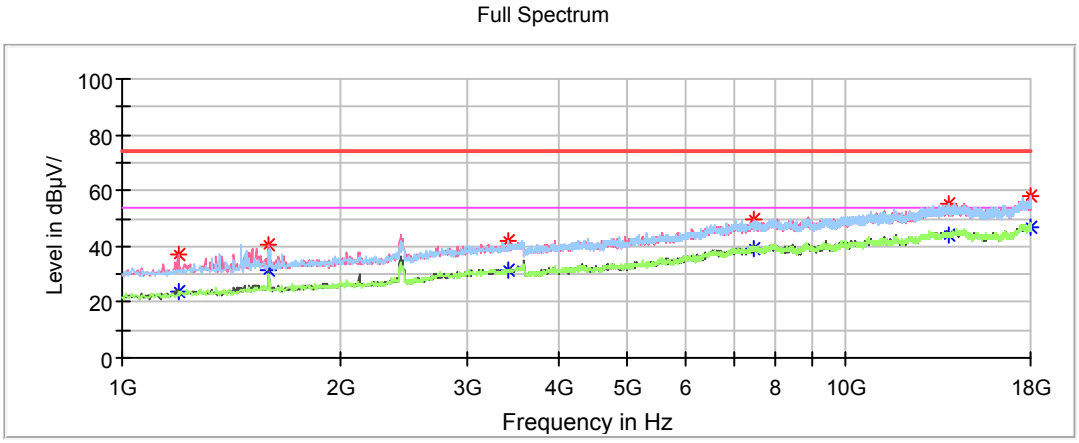
Note:
1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
   Corrected Amplitude (dBμV /m) = Corrected Factor (dB/m) + Reading (dBμV)
   Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV /m)

Low Channel : 2422MHz



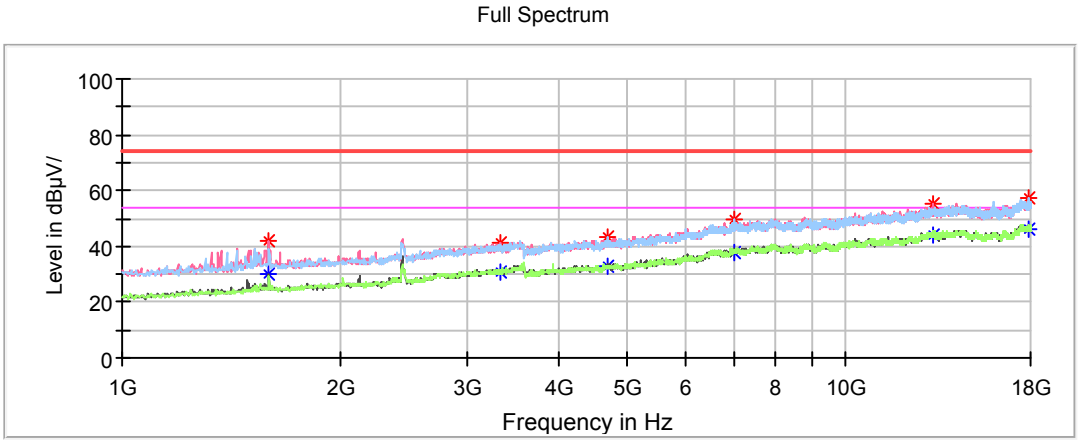
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1061.20	35.44	---	200	H	14	-12.3	74.00	38.56
1061.20	---	22.75	200	H	14	-12.3	54.00	31.25
1557.60	41.48	---	200	V	338	-9.7	74.00	32.52
1557.60	---	27.06	200	V	338	-9.7	54.00	26.94
3359.60	41.10	---	200	V	2	-3.8	74.00	32.90
3359.60	---	32.04	200	V	2	-3.8	54.00	21.96
7473.60	---	38.80	150	V	0	6.1	54.00	15.20
7473.60	49.65	---	150	V	0	6.1	74.00	24.35
11740.60	---	41.82	150	H	232	9.9	54.00	12.18
11740.60	52.73	---	150	H	232	9.9	74.00	21.27
17554.60	---	46.74	150	V	341	14.2	54.00	7.26
17554.60	57.04	---	150	V	341	14.2	74.00	16.96

Middle Channel: 2437MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1193.80	---	23.95	200	V	353	-11.6	54.00	30.05
1193.80	36.85	---	200	V	353	-11.6	74.00	37.15
1595.00	---	31.16	200	V	339	-9.6	54.00	22.84
1595.00	40.50	---	200	V	339	-9.6	74.00	33.50
3414.00	---	31.66	200	H	348	-3.7	54.00	22.34
3414.00	41.73	---	200	H	348	-3.7	74.00	32.27
7477.00	---	39.40	150	H	231	6.1	54.00	14.60
7477.00	49.75	---	150	H	231	6.1	74.00	24.25
13875.80	---	44.19	200	H	359	12.4	54.00	9.81
13875.80	55.16	---	200	H	359	12.4	74.00	18.84
17966.00	---	46.69	200	H	315	13.5	54.00	7.31
17966.00	57.92	---	200	H	315	13.5	74.00	16.08

High Channel : 2452MHz

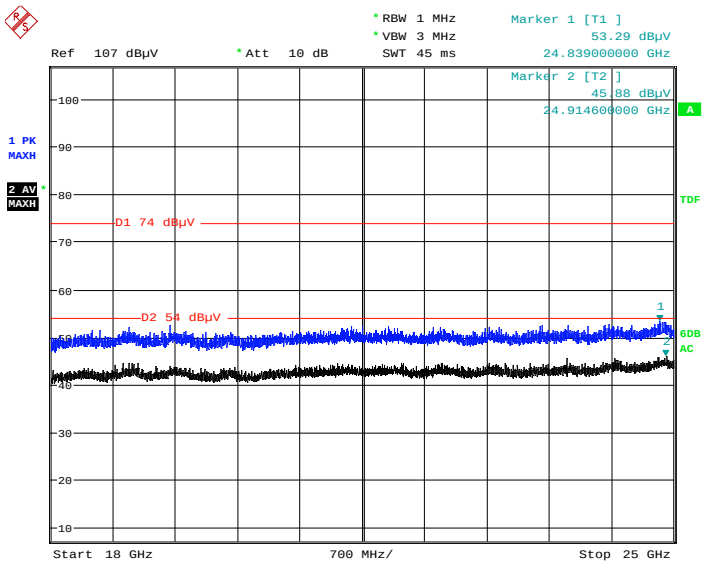


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1595.00	---	30.36	200	V	149	-9.6	54.00	23.64
1595.00	41.63	---	200	V	149	-9.6	74.00	32.37
3335.80	---	30.52	150	V	346	-3.8	54.00	23.48
3335.80	41.29	---	150	V	346	-3.8	74.00	32.71
4675.40	---	32.87	200	H	118	-0.7	54.00	21.13
4675.40	43.14	---	200	H	118	-0.7	74.00	30.86
7028.20	---	37.84	150	H	15	5.4	54.00	16.16
7028.20	49.31	---	150	H	15	5.4	74.00	24.69
13185.60	---	43.97	200	V	88	12.0	54.00	10.03
13185.60	54.90	---	200	V	88	12.0	74.00	19.10
17847.00	---	46.41	200	H	326	13.7	54.00	7.59
17847.00	57.52	---	200	H	326	13.7	74.00	16.48

18GHz-25GHz:

Pre-scan with 802.11b, 802.11g, 802.11n-HT20 and 802.11n-HT40 modes of operation in the X,Y and Z axes of orientation, the worst case ***low channel of 802.11n-HT20 mode in Y-axis of orientation*** *was recorded*

Vertical



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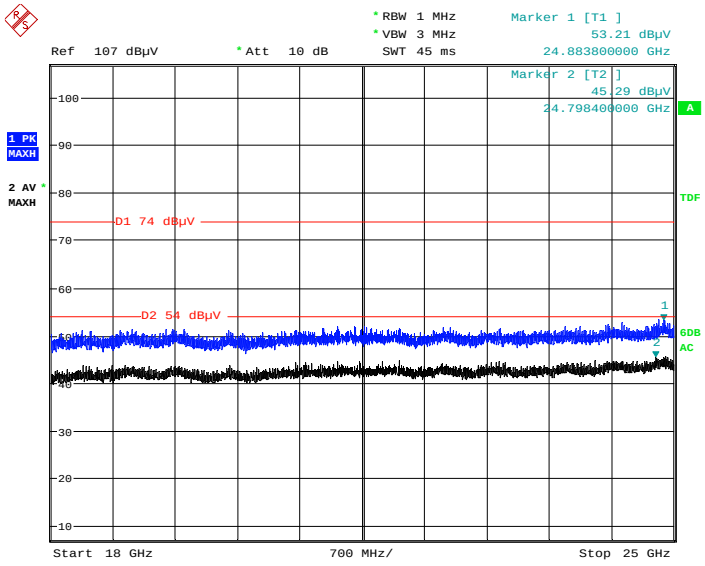
Horizontal



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Restricted Bands Emissions Test:

Note:
1. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
   Corrected Amplitude (dBμV /m) = Corrected Factor (dB/m) + Reading (dBμV)
   Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV /m)

802.11b Mode: *(Pre-scan in the X, Y and Z axes of orientation, the worst case Y-axis of orientation was recorded)*

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2412MHz								
2390.00	50.83	---	150.0	H	197.0	2.8	74.00	23.17
2390.00	---	40.92	150.0	H	197.0	2.8	54.00	13.08
2390.00	49.66	---	200.0	V	50.0	2.8	74.00	24.34
2390.00	---	39.24	200.0	V	50.0	2.8	54.00	14.76
High Channel: 2462MHz								
2483.50	---	40.63	150.0	H	359.0	3.0	54.00	13.37
2483.50	50.86	---	150.0	H	359.0	3.0	74.00	23.14
2483.50	---	39.35	150.0	V	298.0	3.0	54.00	14.65
2483.50	49.29	---	150.0	V	298.0	3.0	74.00	24.71

802.11g Mode: *(Pre-scan in the X,Y and Z axes of orientation, the worst case Y-axis of orientation was recorded)*

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2412MHz								
2390.00	---	40.47	100.0	V	342.0	2.8	54.00	13.53
2390.00	50.69	---	100.0	V	342.0	2.8	74.00	23.31
2390.00	---	39.34	200.0	H	139.0	2.8	54.00	14.66
2390.00	49.52	---	200.0	H	139.0	2.8	74.00	24.48
High Channel: 2462MHz								
2483.50	---	42.28	100.0	V	275.0	3.0	54.00	11.72
2483.50	52.59	---	100.0	V	275.0	3.0	74.00	21.41
2483.50	---	40.98	100.0	H	265.0	3.0	54.00	13.02
2483.50	51.28	---	100.0	H	265.0	3.0	74.00	22.72

802.11n-HT20 Mode: *(Pre-scan in the X,Y and Z axes of orientation, the worst case Y-axis of orientation was recorded)*

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2412MHz								
2390.00	52.67	---	150.0	V	290.0	2.8	74.00	21.33
2390.00	---	41.69	150.0	V	290.0	2.8	54.00	12.31
2390.00	51.30	---	150.0	H	262.0	2.8	74.00	22.70
2390.00	---	40.28	150.0	H	262.0	2.8	54.00	13.72
High Channel: 2462MHz								
2483.50	---	42.33	200.0	V	331.0	3.0	54.00	11.67
2483.50	51.89	---	200.0	V	331.0	3.0	74.00	22.11
2483.50	---	40.82	200.0	H	142.0	3.0	54.00	13.18
2483.50	50.15	---	200.0	H	142.0	3.0	74.00	23.85

802.11n-HT40 Mode: *(Pre-scan in the X,Y and Z axes of orientation, the worst case Y-axis of orientation was recorded)*

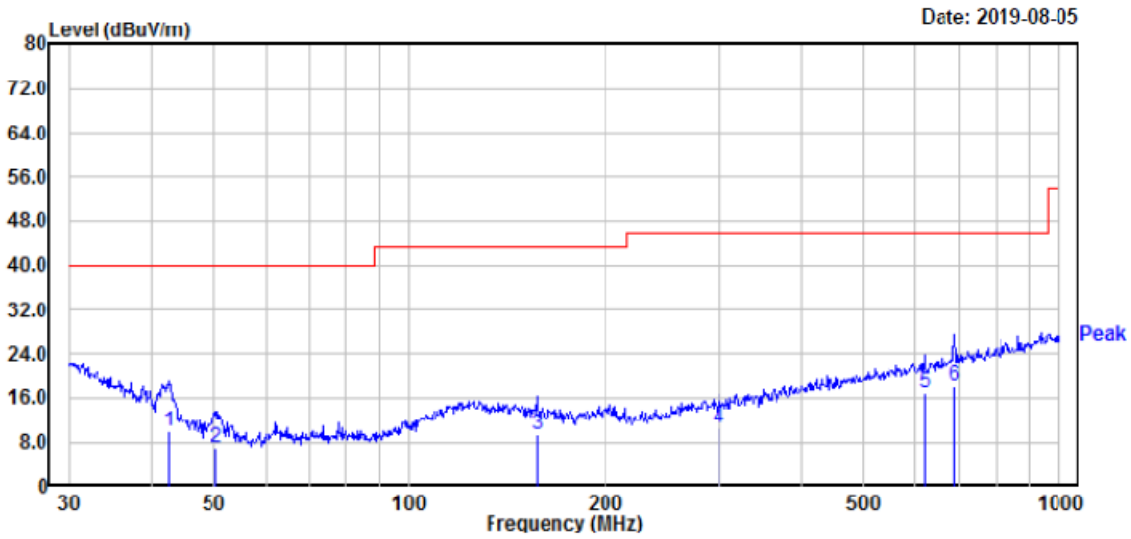
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2422MHz								
2390.00	55.63	---	150.0	V	273.0	2.8	74.00	18.37
2390.00	---	42.53	150.0	V	273.0	2.8	54.00	11.47
2390.00	54.05	---	150.0	H	242.0	2.8	74.00	19.95
2390.00	---	41.32	150.0	H	242.0	2.8	54.00	12.68
High Channel: 2452MHz								
2483.50	54.31	---	150.0	V	269.0	3.0	74.00	19.69
2483.50	---	43.91	150.0	V	269.0	3.0	54.00	10.09
2483.50	52.88	---	150.0	H	82.0	3.0	74.00	21.12
2483.50	---	42.12	150.0	H	82.0	3.0	54.00	11.88

For BLE Mode:

Spurious Emission Test:

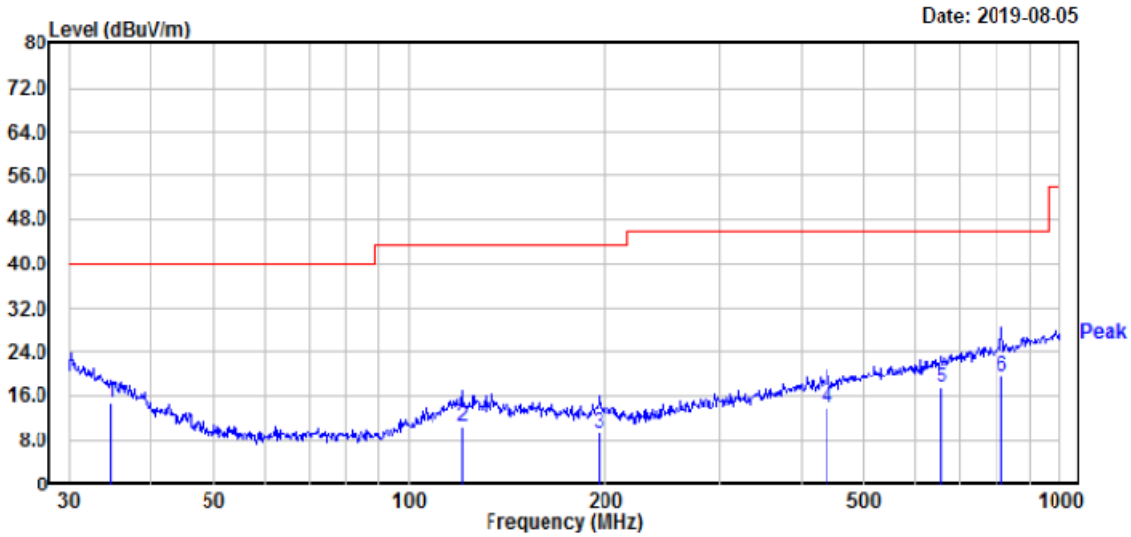
30MHz-1GHz

Horizontal:
*(The worst case **of operation in the Y axis of orientation** was recorded)*



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	42.75	22.89	-12.95	9.94	40.00	-30.06	100	37	QP
2	50.41	23.90	-16.97	6.93	40.00	-33.07	100	153	QP
3	157.01	21.50	-11.99	9.51	43.50	-33.99	200	348	QP
4	299.32	20.90	-10.29	10.61	46.00	-35.39	200	17	QP
5	618.54	20.59	-3.64	16.95	46.00	-29.05	200	177	QP
6	689.56	20.40	-2.28	18.12	46.00	-27.88	100	318	QP

Vertical:
*(The worst case **of operation in the Y axis of orientation** was recorded)*



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	34.76	21.80	-7.09	14.71	40.00	-25.29	200	78	QP
2	120.28	21.20	-10.67	10.53	43.50	-32.97	103	371	QP
3	195.82	21.30	-11.90	9.40	43.50	-34.10	100	348	QP
4	438.66	20.61	-6.85	13.76	46.00	-32.24	188	371	QP
5	658.84	20.50	-2.89	17.61	46.00	-28.39	200	250	QP
6	813.11	20.20	-0.57	19.63	46.00	-26.37	100	24	QP

Note:

1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
2) Over Limit (dB) = Read level (dBµV) + Factor (dB) - Limit (dBµV)

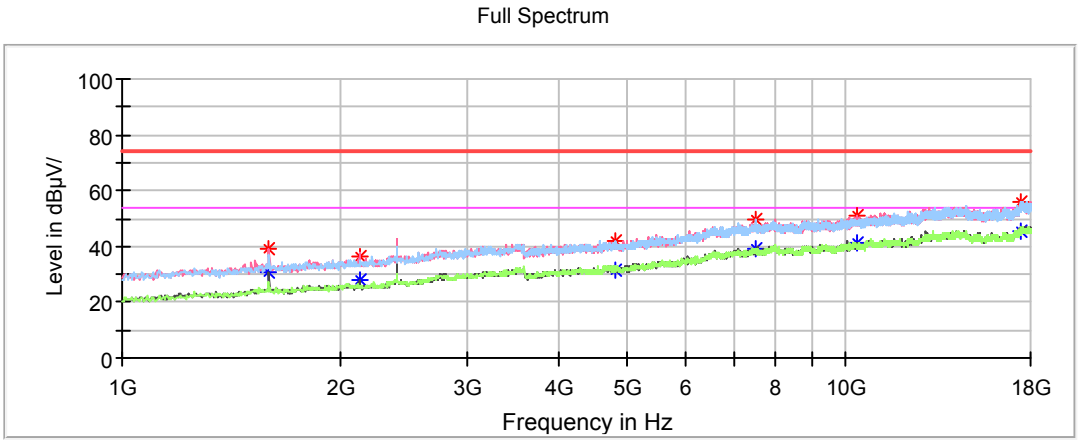
1GHz-18GHz:

*(Pre-scan in the X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded)*

Note:

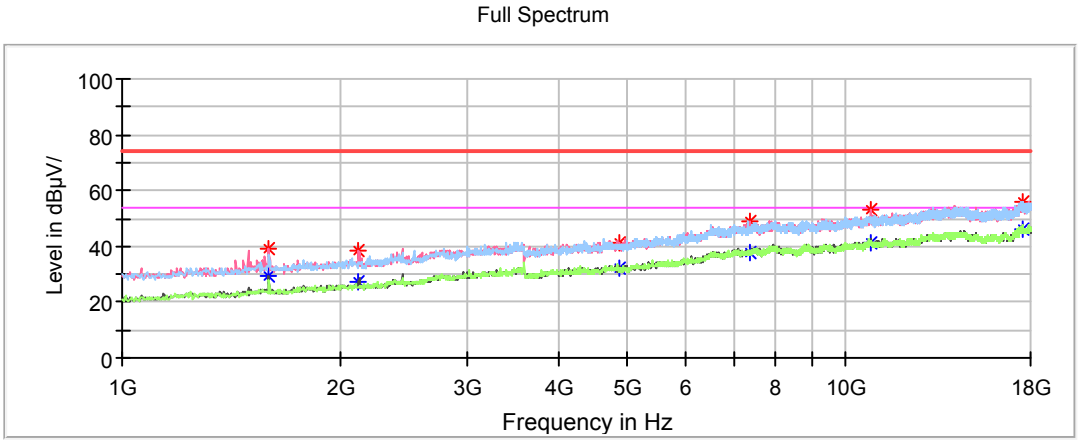
1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
   Corrected Amplitude (dBµV /m) = Corrected Factor (dB/m) + Reading (dBµV)
   Margin (dB) = Limit (dBµV/m) – Corrected Amplitude (dBµV /m)

Low Channel: 2402MHz



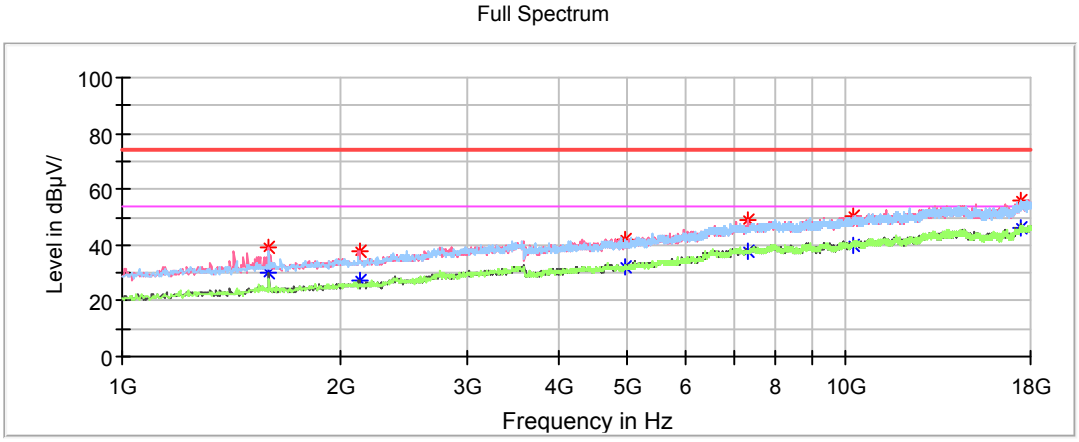
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1595.00	---	30.54	150	V	254	-9.6	54.00	23.46
1595.00	39.01	---	150	V	254	-9.6	74.00	34.99
2125.40	---	27.77	150	V	254	-7.9	54.00	26.23
2125.40	36.69	---	150	V	254	-7.9	74.00	37.31
4804.00	---	31.57	150	H	269	-0.5	54.00	22.43
4804.00	42.03	---	150	H	269	-0.5	74.00	31.97
7487.20	---	39.25	150	H	5	6.1	54.00	14.75
7487.20	49.45	---	150	H	5	6.1	74.00	24.55
10384.00	---	41.26	150	V	324	8.8	54.00	12.74
10384.00	50.86	---	150	V	324	8.8	74.00	23.14
17479.80	---	45.70	150	H	93	14.2	54.00	8.30
17479.80	56.21	---	150	H	93	14.2	74.00	17.79

Middle Channel: 2440MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1591.60	---	29.45	150	V	253	-9.6	54.00	24.55
1591.60	39.14	---	150	V	253	-9.6	74.00	34.86
2122.00	---	27.34	150	V	253	-7.9	54.00	26.66
2122.00	38.21	---	150	V	253	-7.9	74.00	35.79
4880.00	---	32.02	150	V	335	-0.5	54.00	21.98
4880.00	41.47	---	150	V	335	-0.5	74.00	32.53
7320.00	---	37.99	150	V	288	6.0	54.00	16.01
7320.00	48.99	---	150	V	288	6.0	74.00	25.01
10829.40	---	41.21	150	V	65	9.5	54.00	12.79
10829.40	52.82	---	150	V	65	9.5	74.00	21.18
17575.00	---	46.33	150	V	0	14.2	54.00	7.67
17575.00	56.16	---	150	V	0	14.2	74.00	17.84

High Channel: 2480MHz

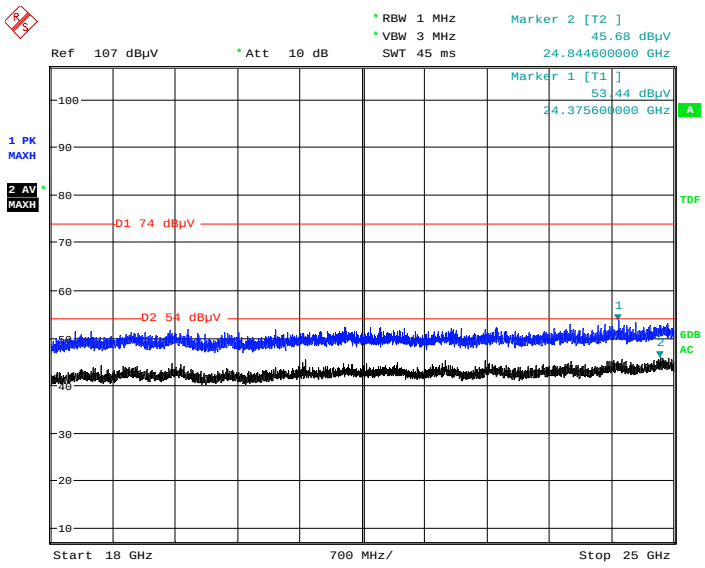


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1595.00	---	29.92	150	V	258	-9.6	54.00	24.08
1595.00	39.06	---	150	V	258	-9.6	74.00	34.94
2125.40	---	27.02	150	V	270	-7.9	54.00	26.98
2125.40	37.98	---	150	V	270	-7.9	74.00	36.02
4960.00	---	32.50	150	V	136	-0.3	54.00	21.50
4960.00	41.66	---	150	V	136	-0.3	74.00	32.34
7320.60	---	37.79	150	V	200	5.8	54.00	16.21
7320.60	48.83	---	150	V	200	5.8	74.00	25.17
10258.20	---	40.17	150	V	282	8.6	54.00	13.83
10258.20	50.41	---	150	V	282	8.6	74.00	23.59
17449.20	---	45.82	150	H	306	14.0	54.00	8.18
17449.20	56.13	---	150	H	306	14.0	74.00	17.87

18GHz-25GHz

*(The worst case **low channel of operation in the Y axis of orientation** was recorded)*

Horizontal



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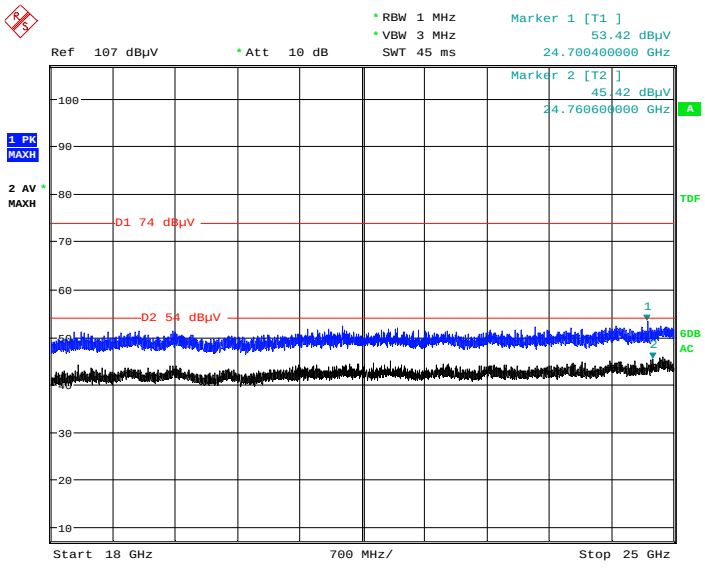
Vertical



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Restricted Bands Emissions Test:

*(Pre-scan in the X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded)*

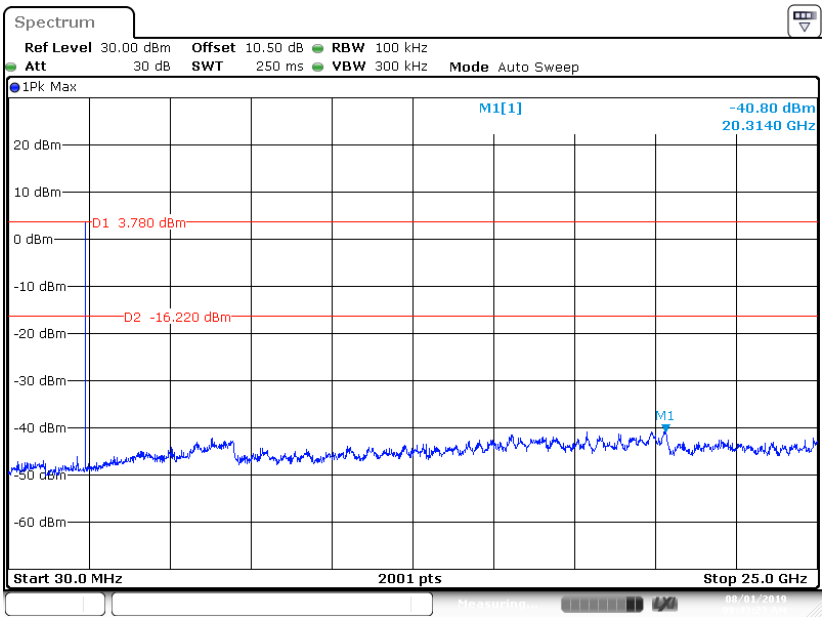
Note:

1. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
   Corrected Amplitude (dBμV /m) = Corrected Factor (dB/m) + Reading (dBμV)
   Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV /m)

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2402MHz								
2390.00	51.10	---	200.0	V	197.0	2.8	74.00	22.90
2390.00	---	41.40	200.0	V	197.0	2.8	54.00	12.60
2390.00	50.07	---	200.0	H	289.0	2.8	74.00	23.93
2390.00	---	40.88	200.0	H	289.0	2.8	54.00	13.12
High Channel: 2480MHz								
2483.50	---	41.40	150.0	V	59.0	3.0	54.00	12.60
2483.50	50.93	---	150.0	V	59.0	3.0	74.00	23.07
2483.50	---	40.15	150.0	H	272.0	3.0	54.00	13.85
2483.50	49.22	---	150.0	H	272.0	3.0	74.00	24.78

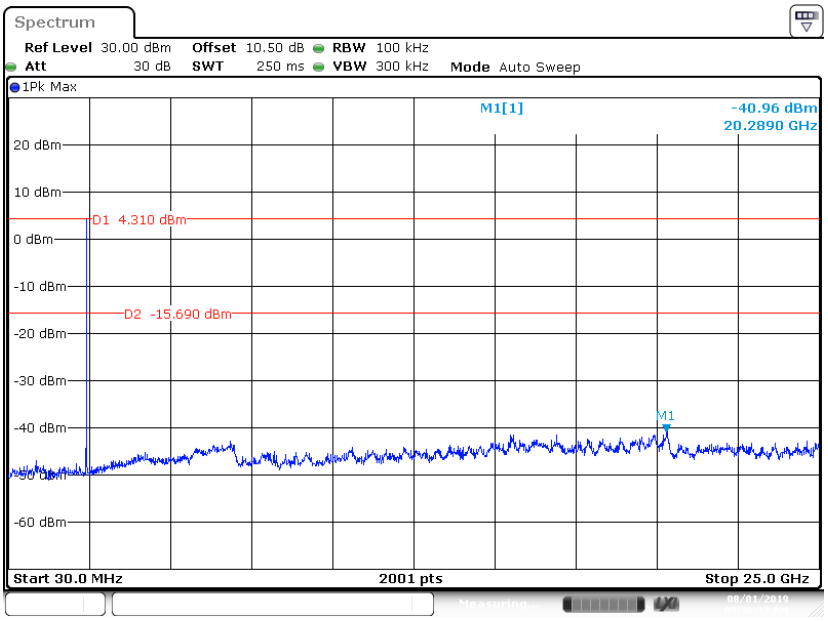
Conducted Spurious Emissions at Antenna Port

802.11b Mode Low Channel



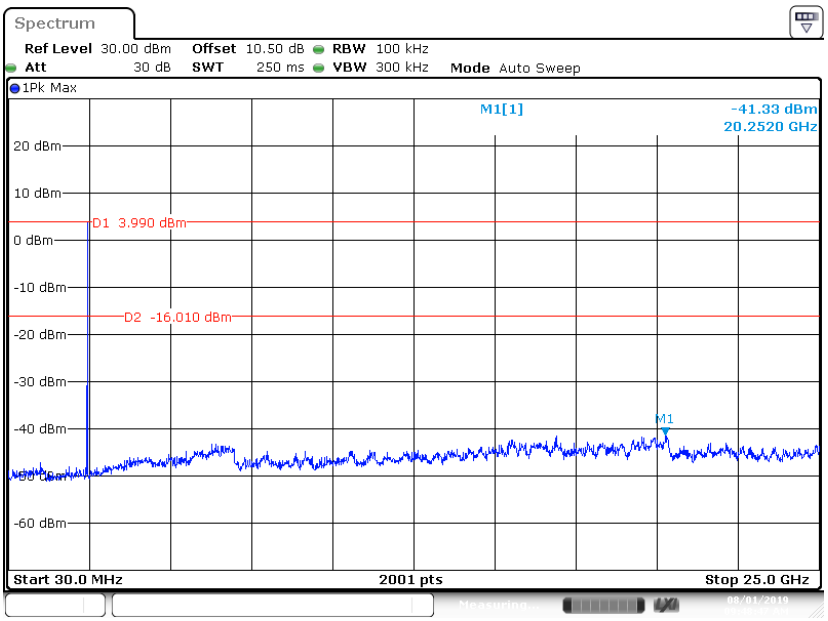
Date: 1.AUG.2019 09:43:23

802.11b Mode Middle Channel



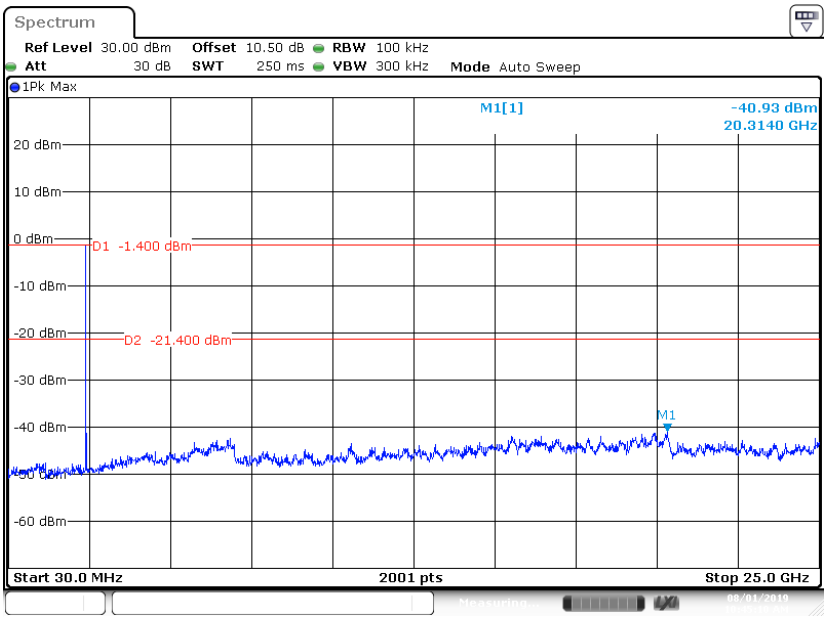
Date: 1.AUG.2019 09:46:33

802.11b Mode High Channel



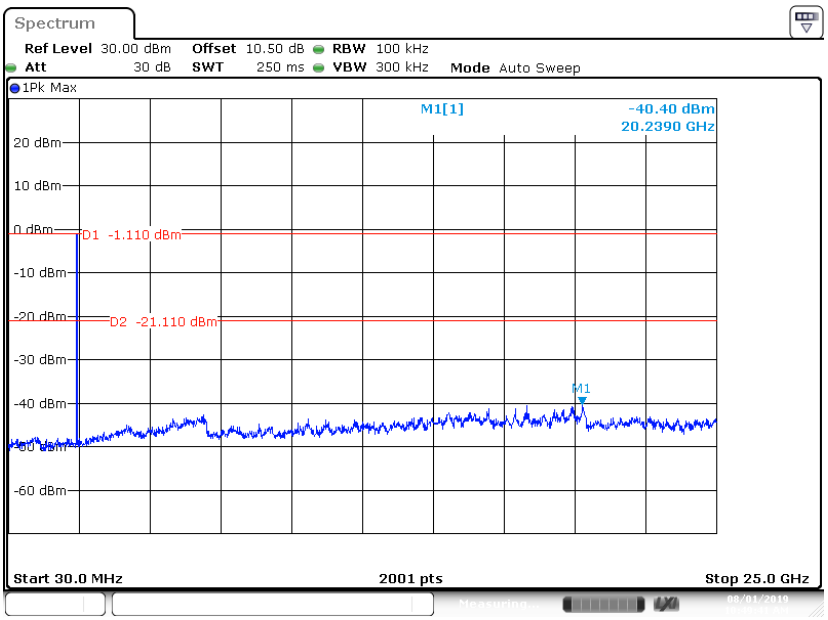
Date: 1.AUG.2019 09:48:47

802.11g Mode Low Channel



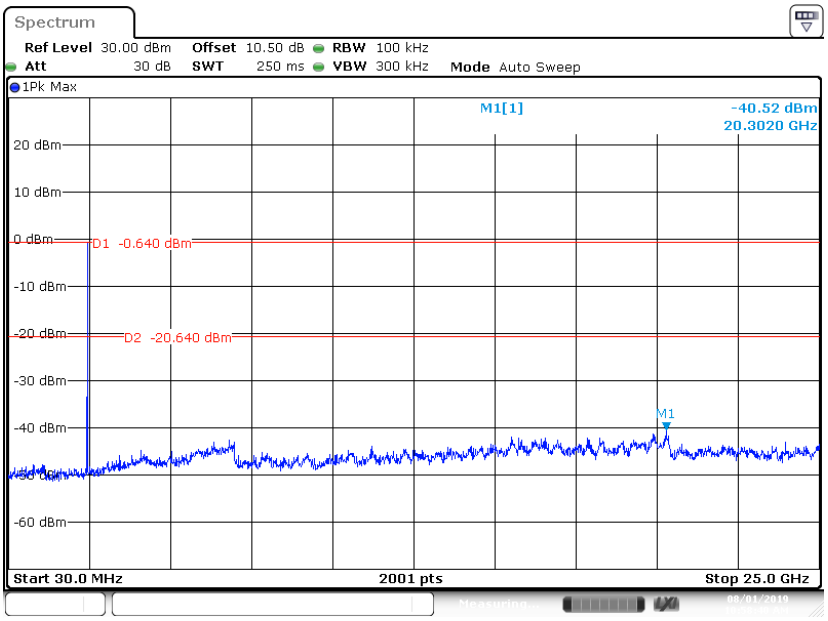
Date: 1.AUG.2019 10:45:11

802.11g Mode Middle Channel



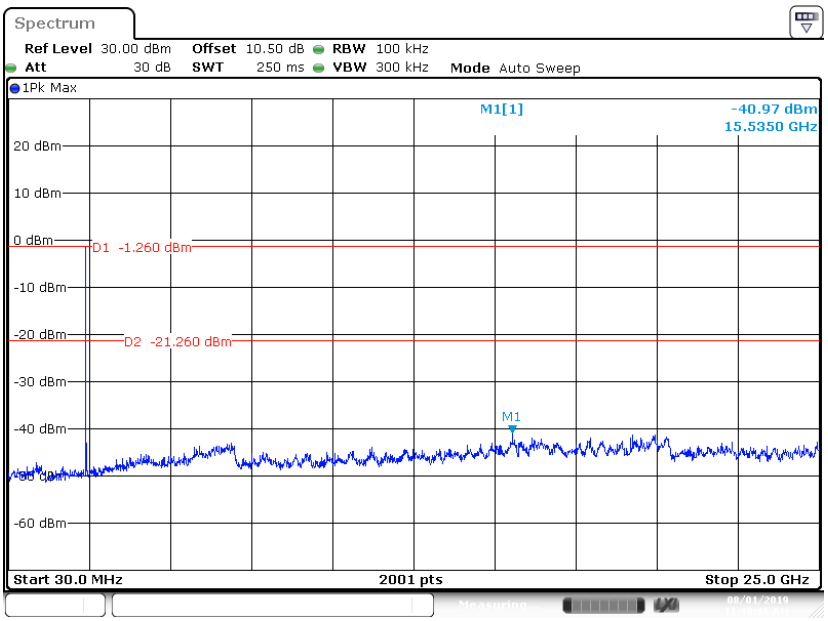
Date: 1.AUG.2019 10:49:42

802.11g Mode High Channel



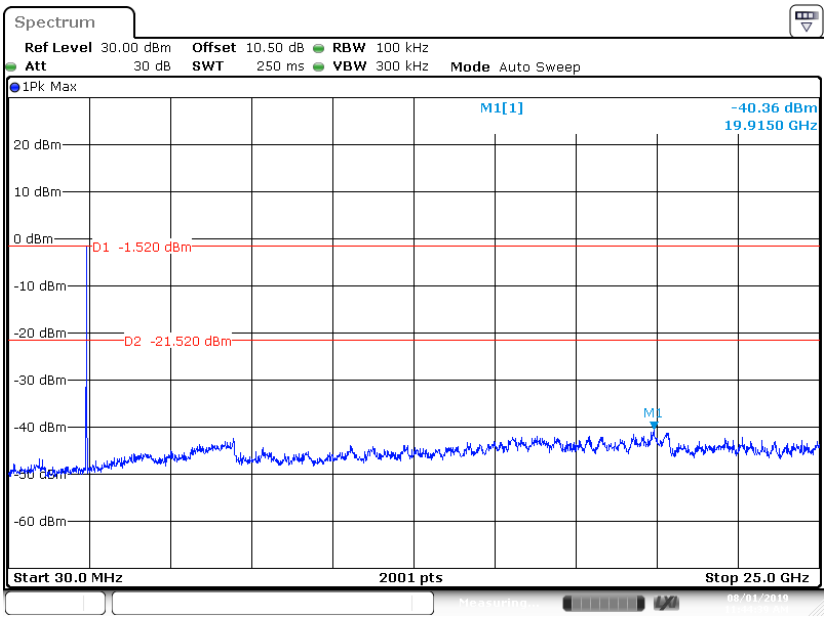
Date: 1.AUG.2019 10:58:40

802.11n-HT20 Mode Low Channel



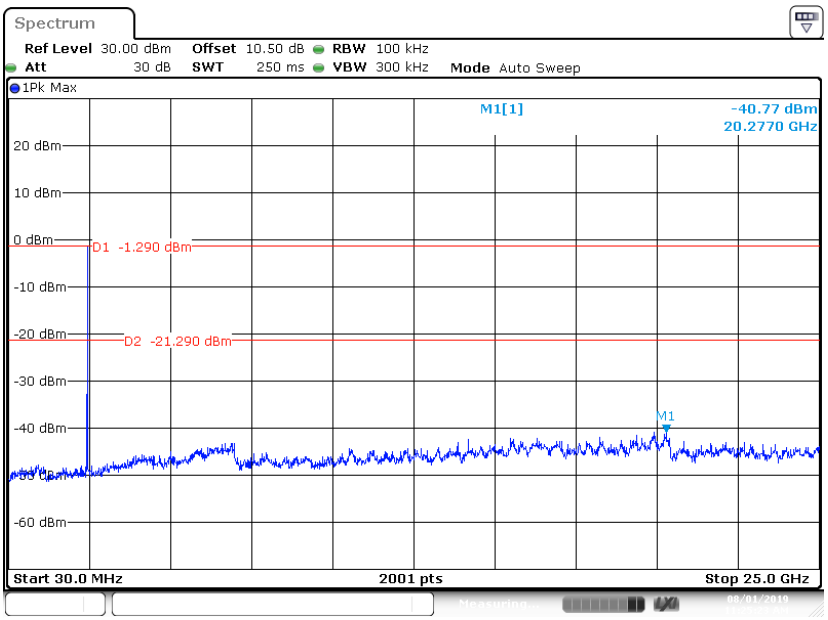
Date: 1.AUG.2019 11:30:16

802.11n-HT20 Mode Middle Channel



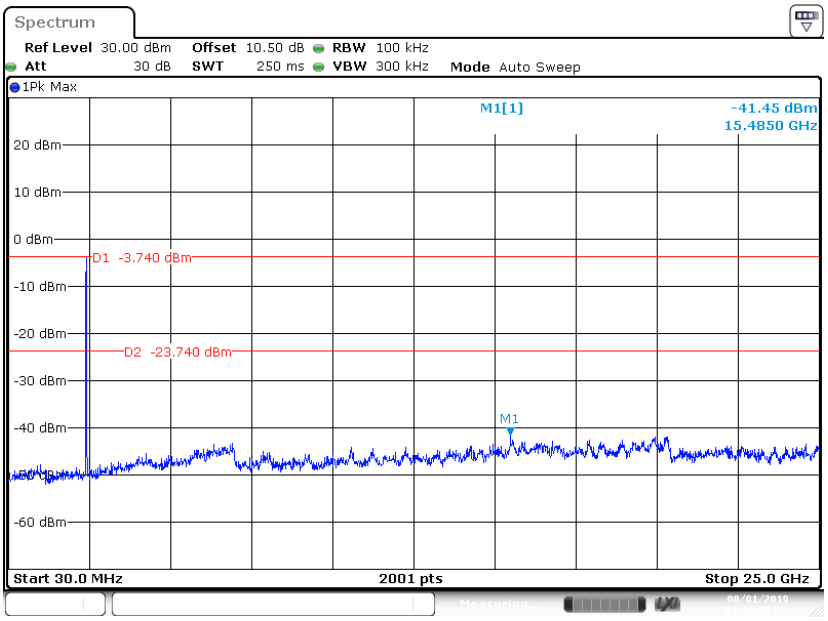
Date: 1.AUG.2019 11:44:39

802.11n-HT20 Mode High Channel



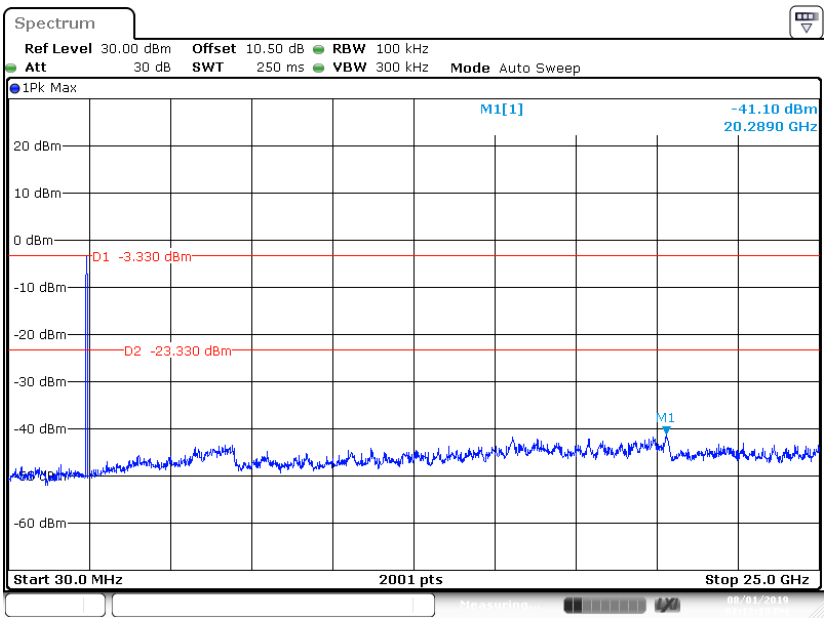
Date: 1.AUG.2019 11:25:22

802.11n-HT40 Mode Low Channel



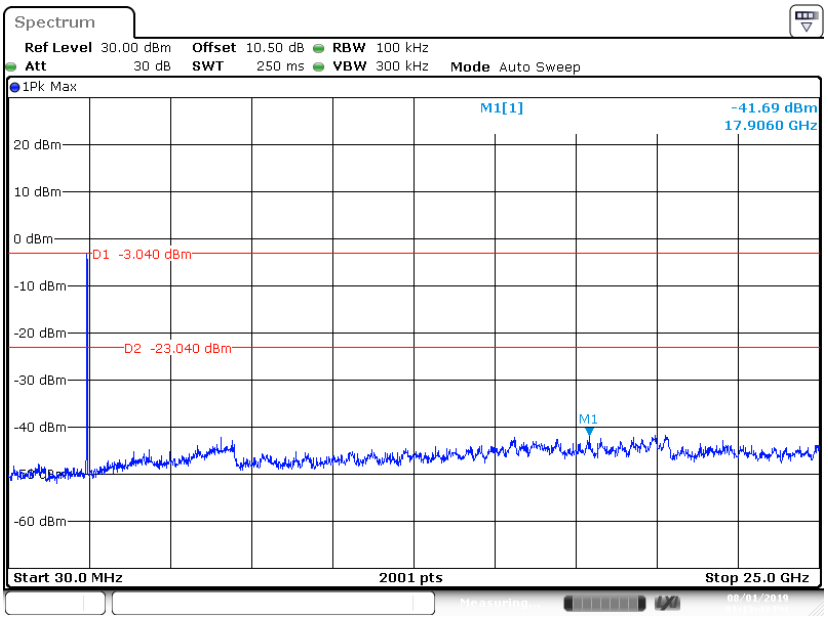
Date: 1.AUG.2019 13:10:04

802.11n-HT40 Mode Middle Channel



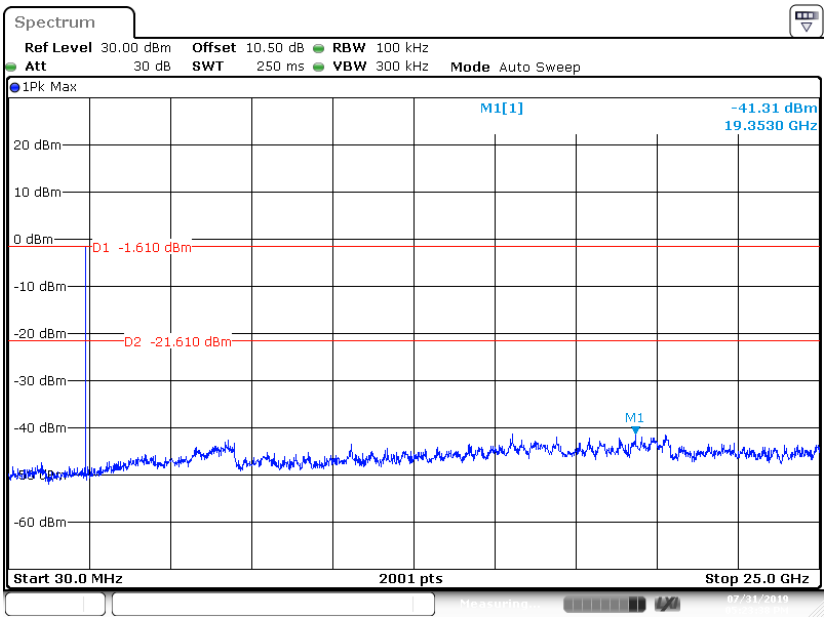
Date: 1.AUG.2019 13:12:19

802.11n-HT40 Mode High Channel



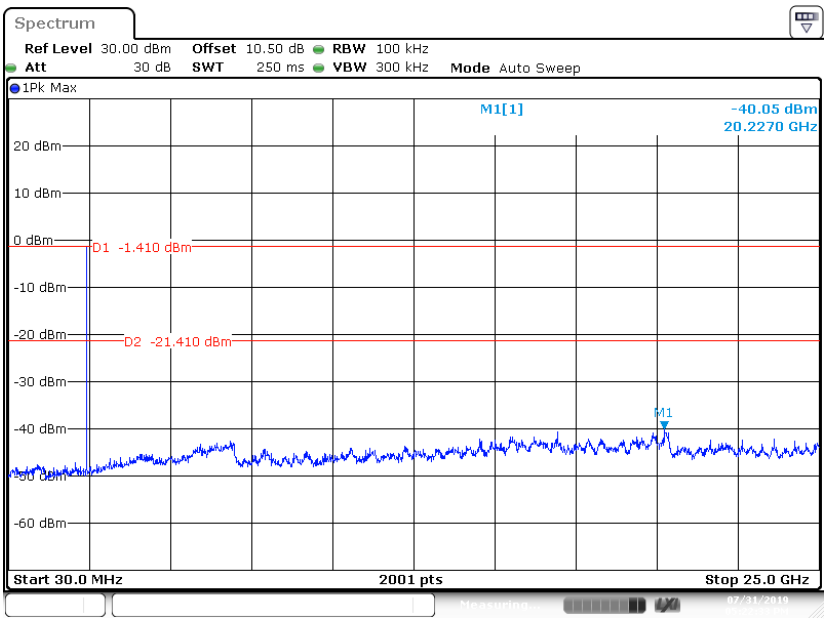
Date: 1.AUG.2019 13:13:42

BLE Mode Low Channel



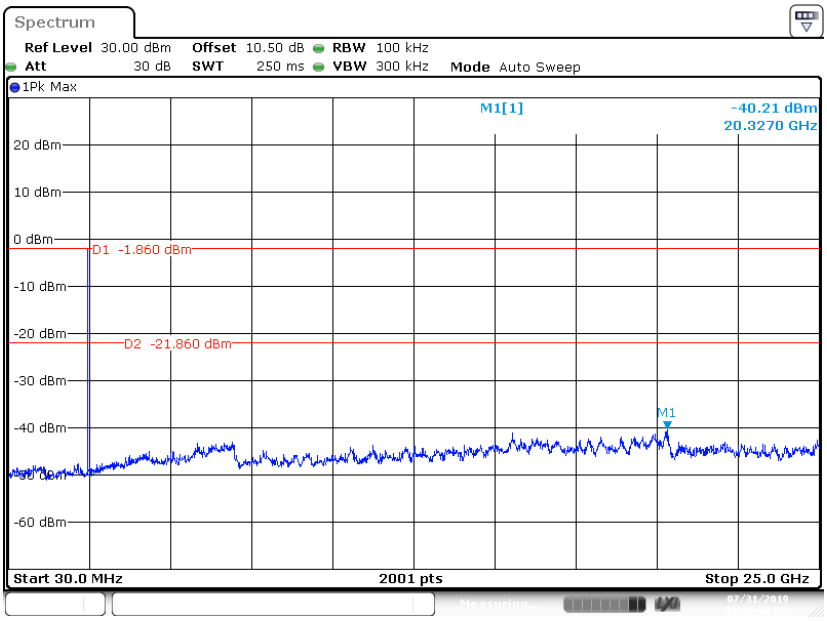
Date: 31.JUL.2019 17:23:38

BLE Mode Middle Channel



Date: 31.JUL.2019 17:22:33

BLE Mode High Channel



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

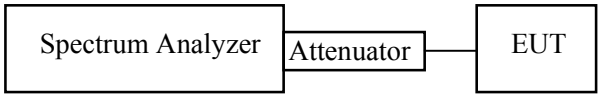
Applicable Standard

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

According to ANSI C63.10-2013 sub-clause 11.8.1

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 * RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. 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 Data

Environmental Conditions

Temperature:	23.2~24 ℃
Relative Humidity:	48~51 %
ATM Pressure:	101.1~101.3 kPa

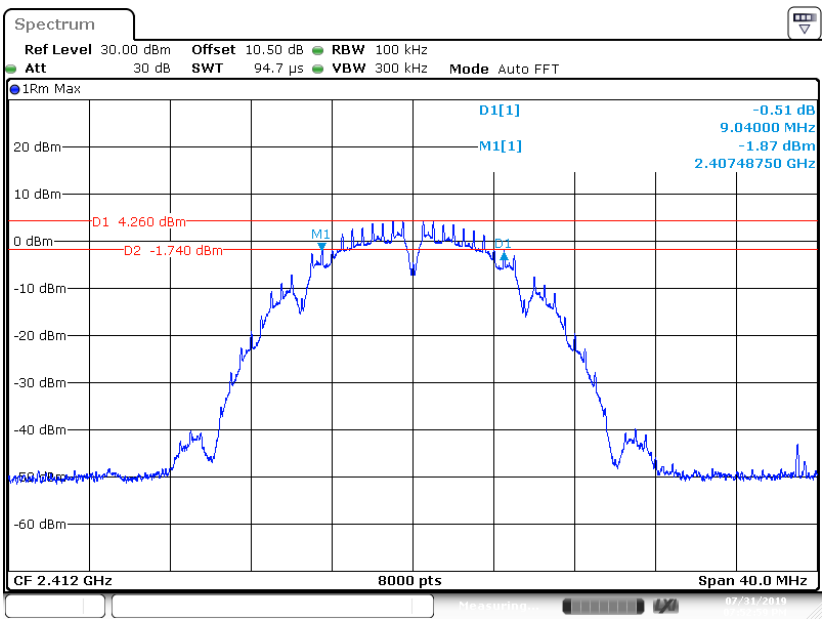
The testing was performed by Sam Ye from 2019-07-31 to 2019-08-01.

EUT operation mode: Transmitting

Test Result: Pass

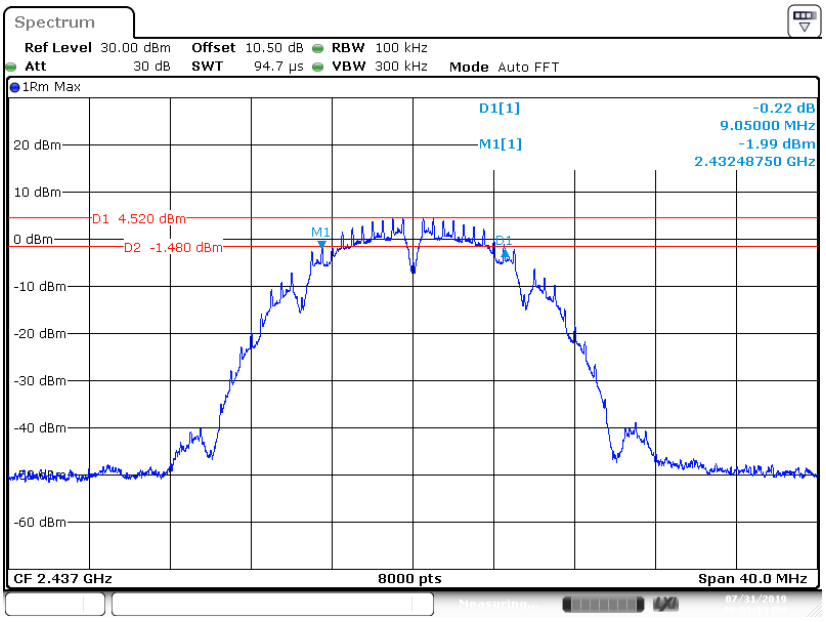
Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b Mode			
Low	2412	9.040	≥ 0.5
Middle	2437	9.050	≥ 0.5
High	2462	8.095	≥ 0.5
802.11g Mode			
Low	2412	16.412	≥ 0.5
Middle	2437	16.439	≥ 0.5
High	2462	16.472	≥ 0.5
802.11n-HT20 Mode			
Low	2412	17.611	≥ 0.5
Middle	2437	17.431	≥ 0.5
High	2462	17.591	≥ 0.5
802.11n-HT40 Mode			
Low	2422	35.795	≥ 0.5
Middle	2437	35.510	≥ 0.5
High	2452	35.226	≥ 0.5
BLE Mode			
Low	2402	0.670	≥0.5
Middle	2440	0.673	≥0.5
High	2480	0.679	≥0.5

802.11b Mode Low Channel



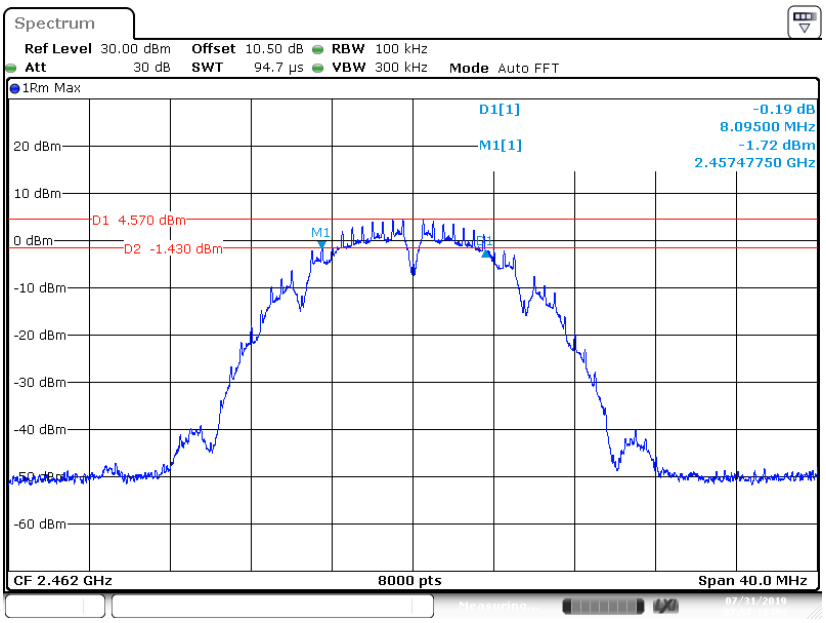
Date: 31.JUL.2019 19:52:58

802.11b Mode Middle Channel



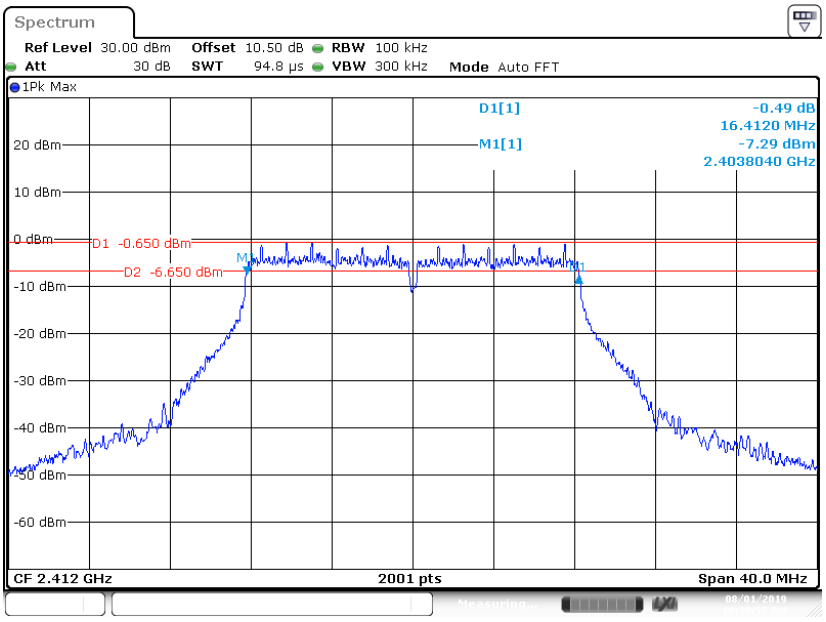
Date: 31.JUL.2019 20:02:13

802.11b Mode High Channel



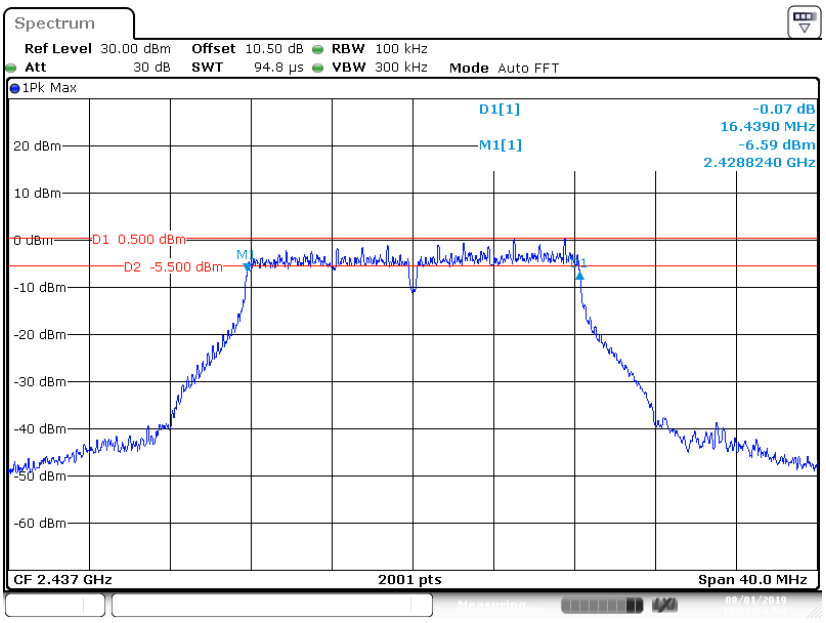
Date: 31.JUL.2019 19:57:12

802.11g Mode Low Channel



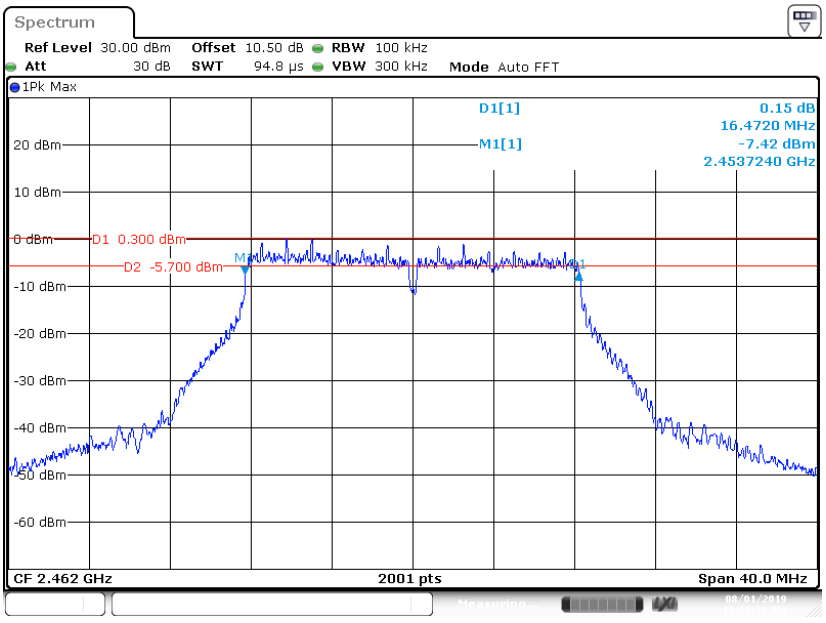
Date: 1.AUG.2019 10:19:56

802.11g Mode Middle Channel



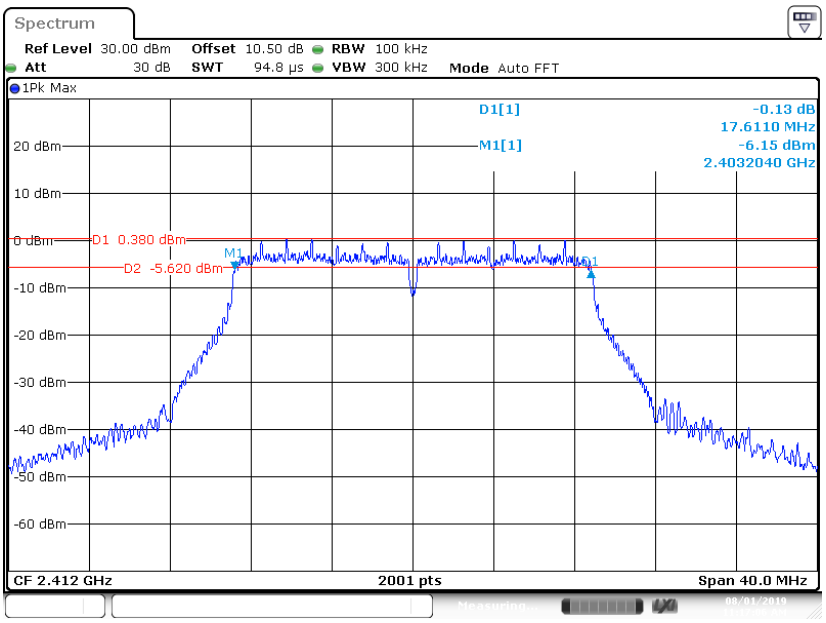
Date: 1.AUG.2019 10:21:24

802.11g Mode High Channel



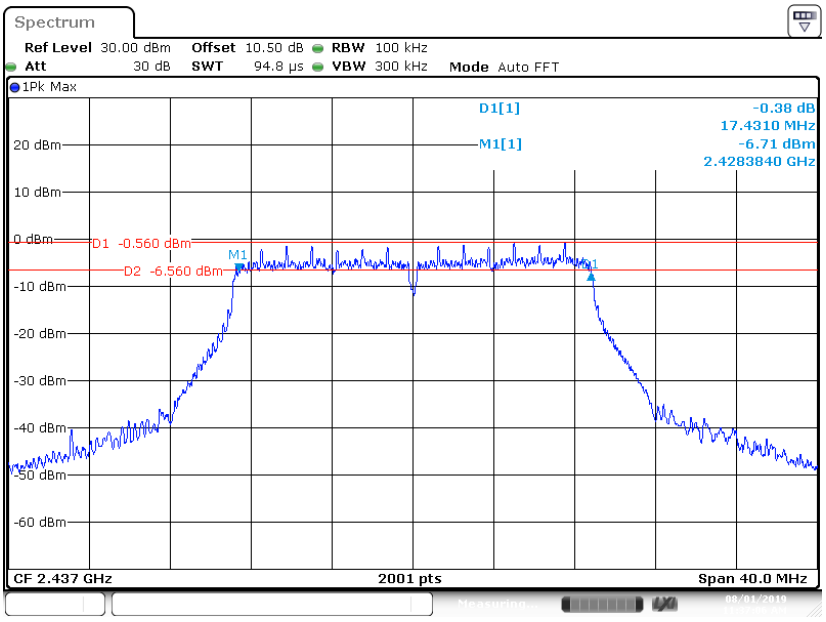
Date: 1.AUG.2019 10:23:19

802.11n-HT20 Mode Low Channel



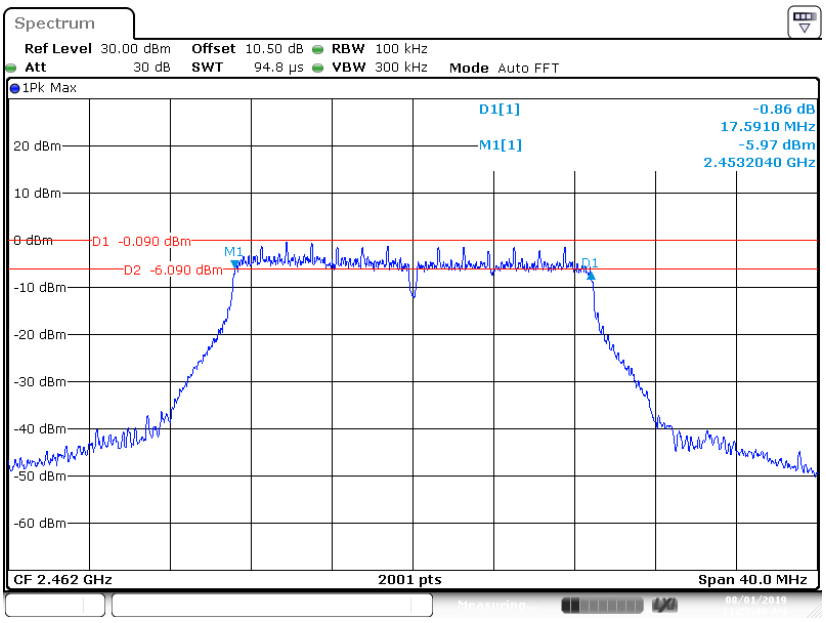
Date: 1.AUG.2019 11:17:06

802.11n-HT20 Mode Middle Channel



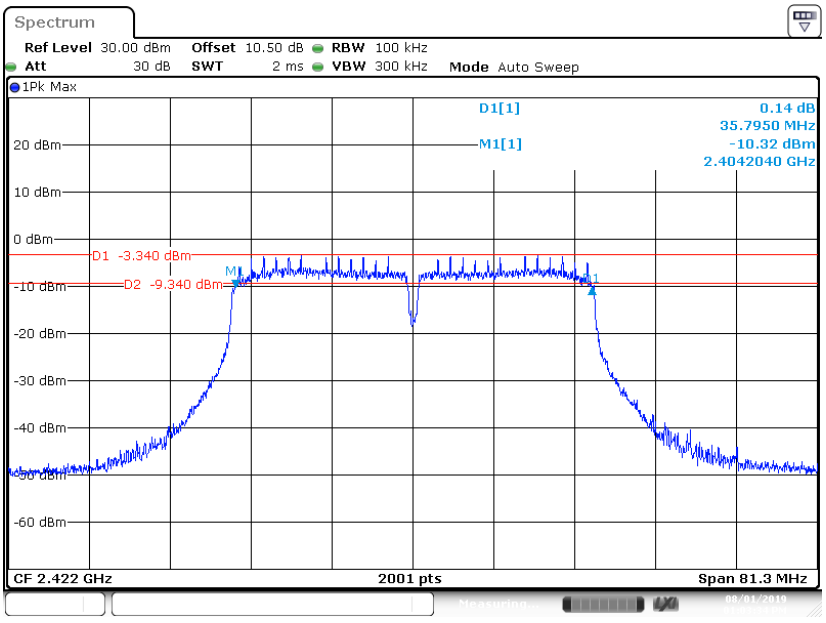
Date: 1.AUG.2019 11:37:06

802.11n-HT20 Mode High Channel



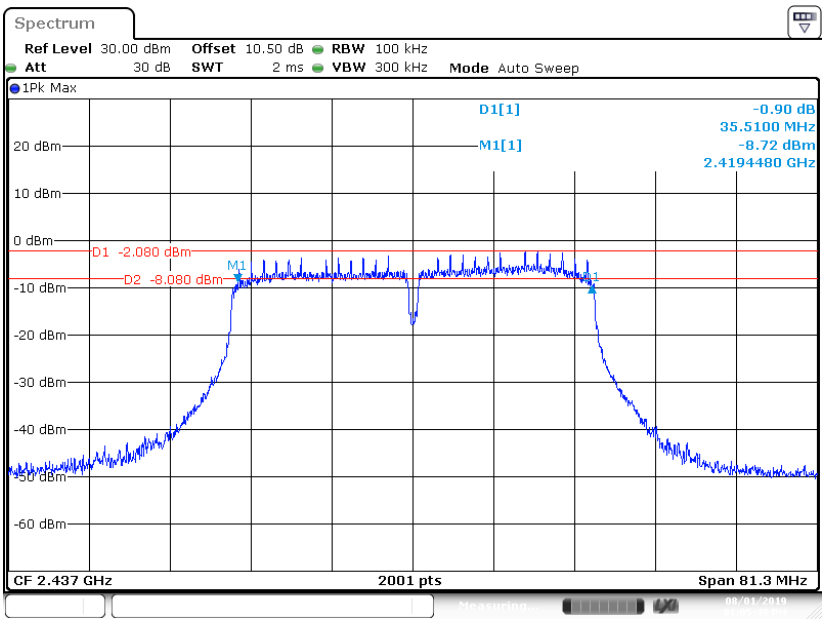
Date: 1.AUG.2019 11:22:37

802.11n-HT40 Mode Low Channel



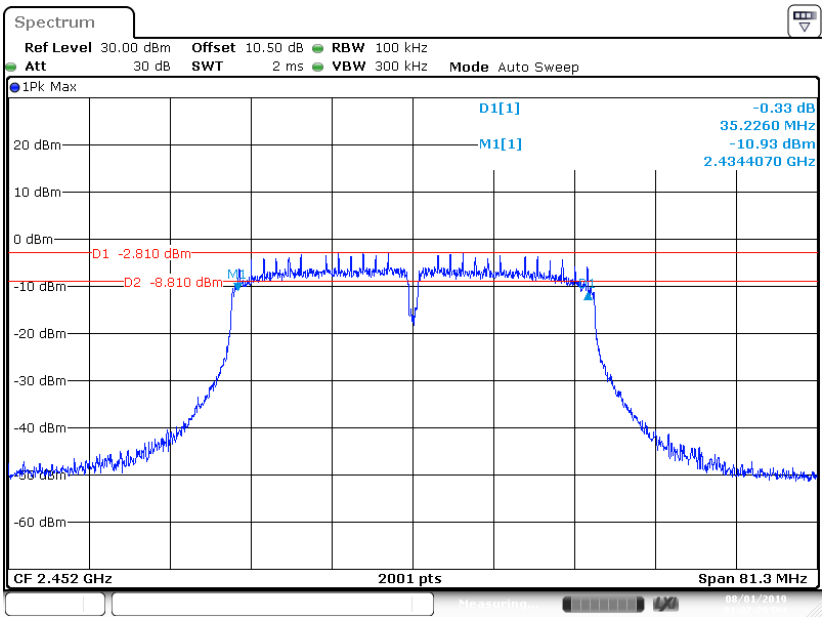
Date: 1.AUG.2019 13:03:34

802.11n-HT40 Mode Middle Channel



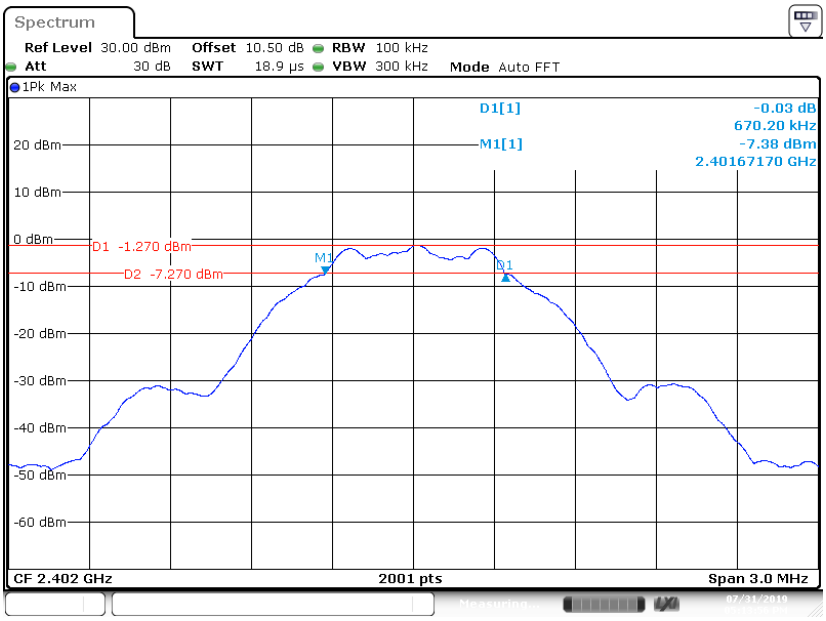
Date: 1.AUG.2019 13:05:49

802.11n-HT40 Mode High Channel



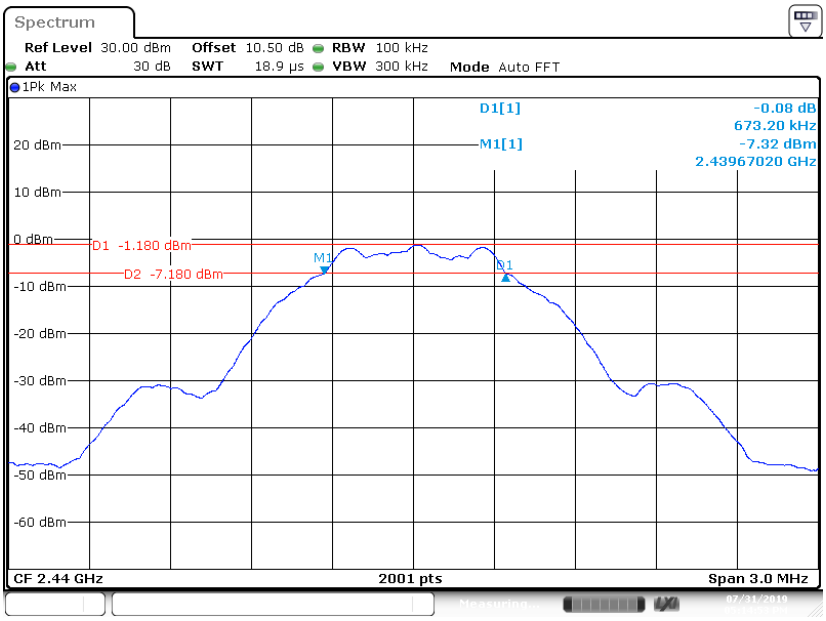
Date: 1.AUG.2019 13:07:28

BLE Mode Low Channel



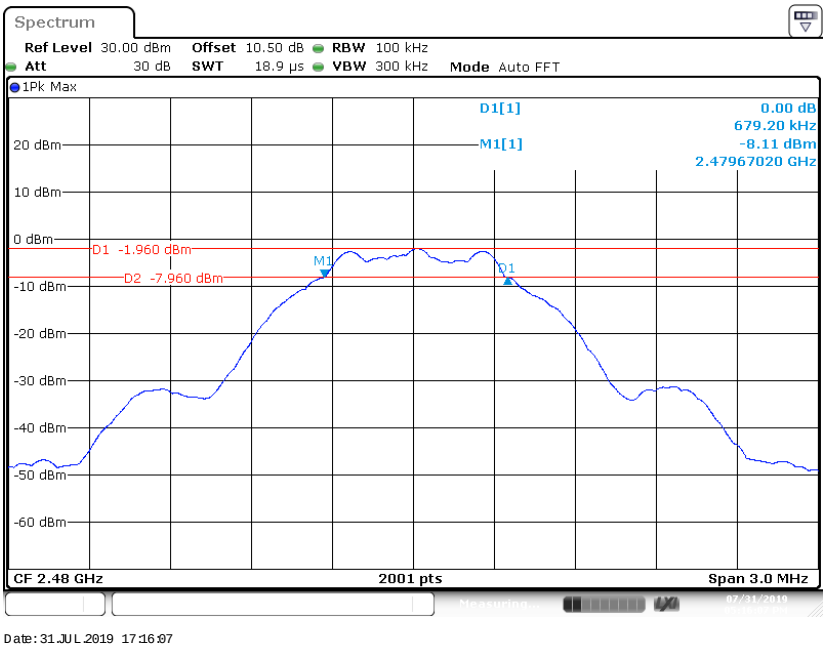
Date: 31.JUL.2019 17:13:56

BLE Mode Middle Channel



Date: 31.JUL.2019 17:14:53

BLE Mode High Channel



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

Applicable Standard

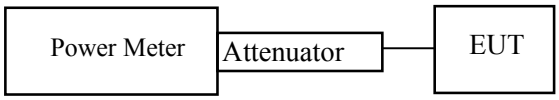
According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, Compliant with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted 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

According to ANSI C63.10-2013 sub-clause 11.9.1.3

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

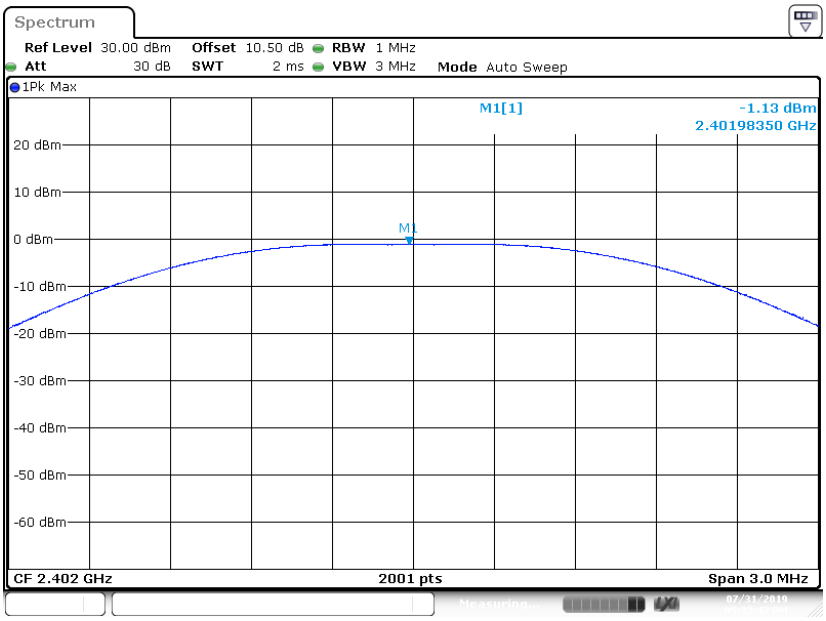
Temperature:	23.8℃
Relative Humidity:	54 %
ATM Pressure:	101.2 kPa

The testing was performed by Sam Ye on 2019-07-31.

EUT operation mode: Transmitting

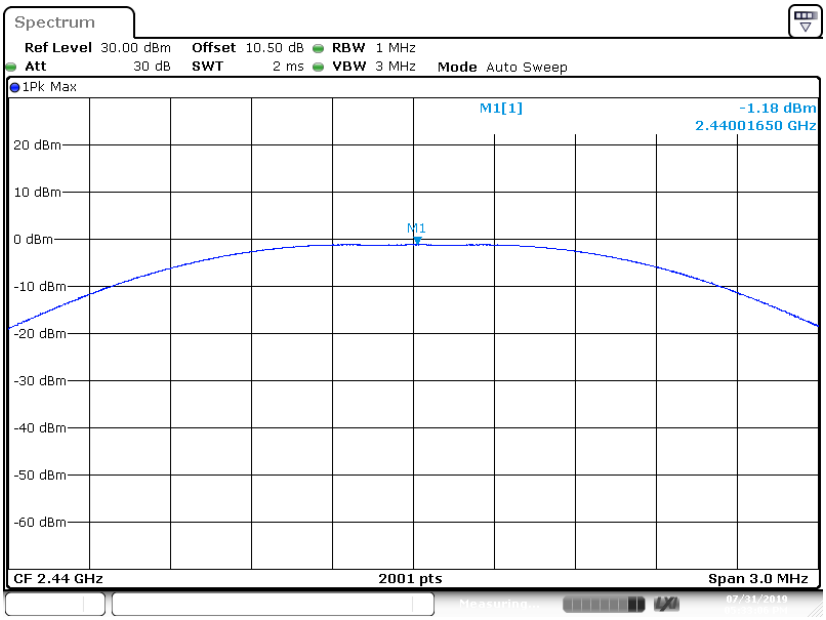
Test mode	Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Average Conducted Output Power (dBm)	Limit (dBm)	Result
802.11b	Low	2412	16.18	13.11	30	Pass
	Middle	2437	16.69	13.37	30	Pass
	High	2462	16.37	13.15	30	Pass
802.11g	Low	2412	18.97	12.30	30	Pass
	Middle	2437	19.74	12.74	30	Pass
	High	2462	19.30	12.35	30	Pass
802.11n-HT20	Low	2412	20.06	12.31	30	Pass
	Middle	2437	18.76	11.94	30	Pass
	High	2462	18.95	12.06	30	Pass
802.11n-HT40	Low	2422	18.91	11.91	30	Pass
	Middle	2437	19.36	12.38	30	Pass
	High	2452	19.24	12.06	30	Pass
BLE	Low	2402	-1.13	/	30	Pass
	Middle	2440	-1.18	/	30	Pass
	High	2480	-1.57	/	30	Pass

BLE Mode Low Channel



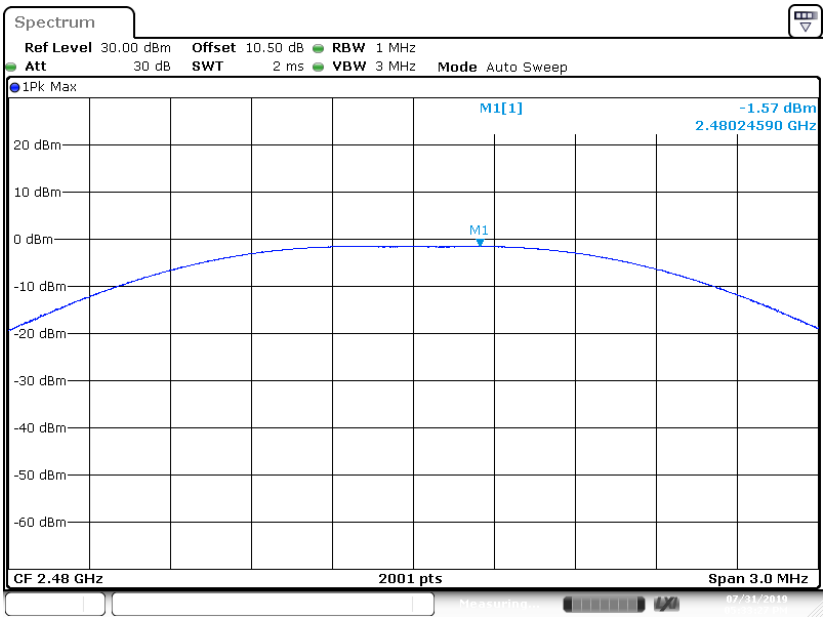
Date: 31.JUL.2019 17:32:42

BLE Mode Middle Channel



Date: 31.JUL.2019 17:33:06

BLE Mode High Channel



Date: 31.JUL.2019 17:33:27

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 Compliant 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

According to ANSI C63.10-2013 sub-clause 6.10.

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

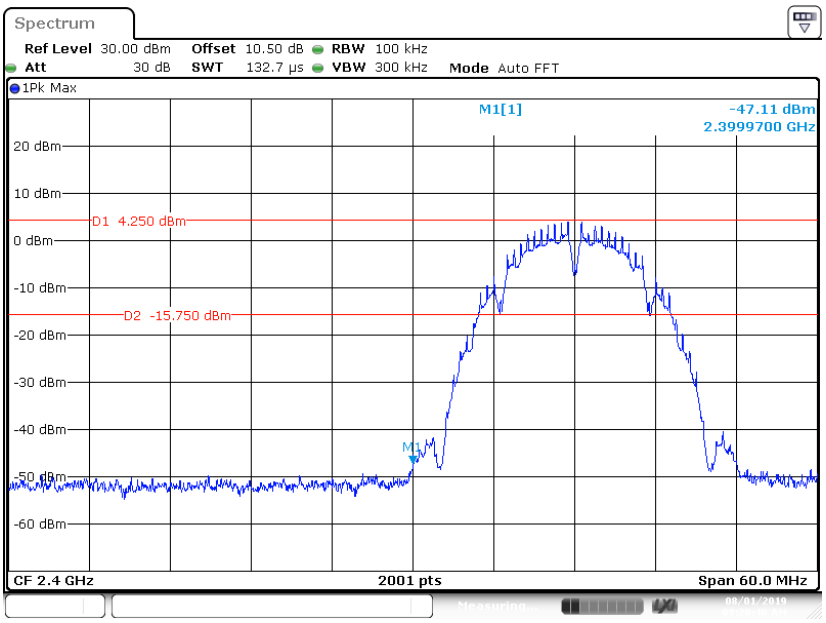
Temperature:	24.3~25.2 ℃
Relative Humidity:	48~50 %
ATM Pressure:	101.1~101.3 kPa

The testing was performed by Sam Ye from 2019-07-31 to 2019-08-01.

EUT operation mode: Transmitting

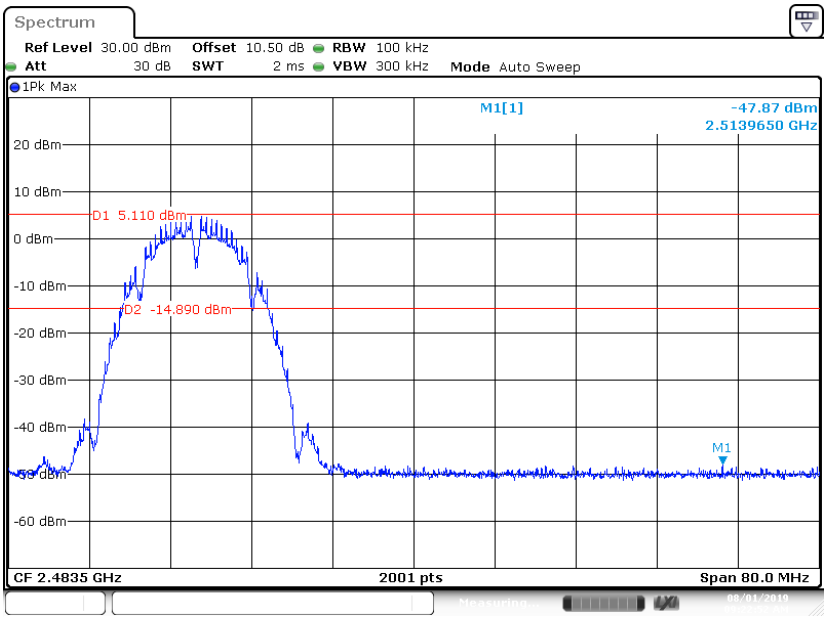
Test Result: Compliant

802.11b Mode Left Side



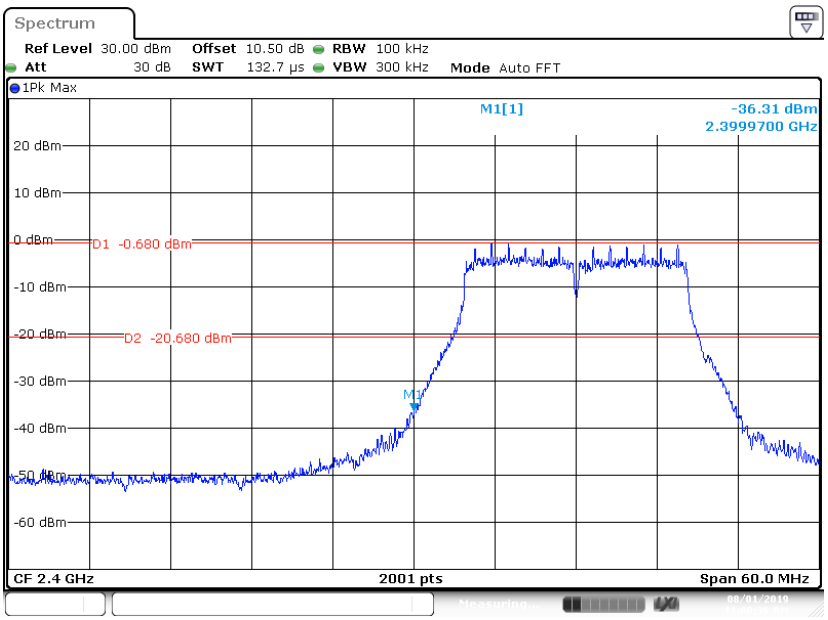
Date: 1.AUG .2019 09:20:40

802.11b Mode Right Side



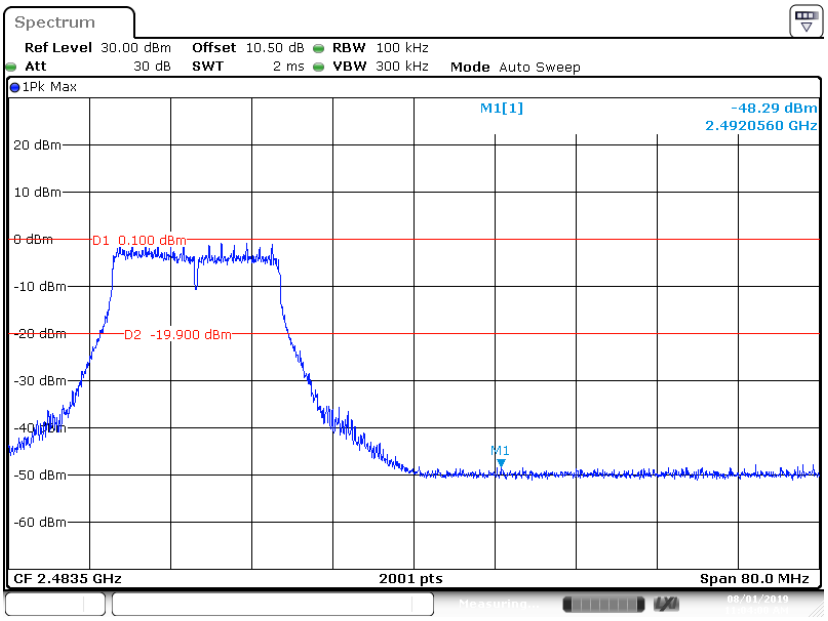
Date: 1.AUG .2019 09:22:52

802.11g Mode Left Side



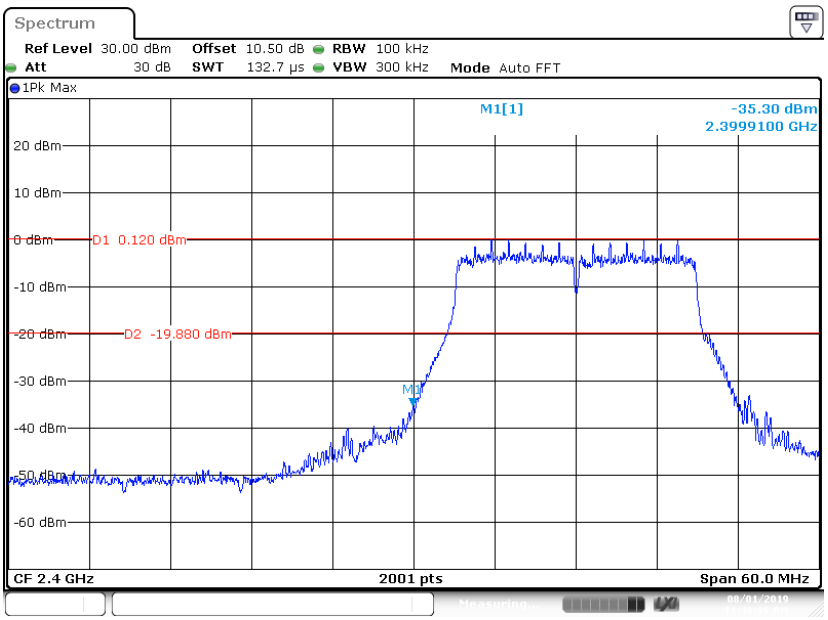
Date: 1.AUG.2019 11:00:37

802.11g Mode Right Side



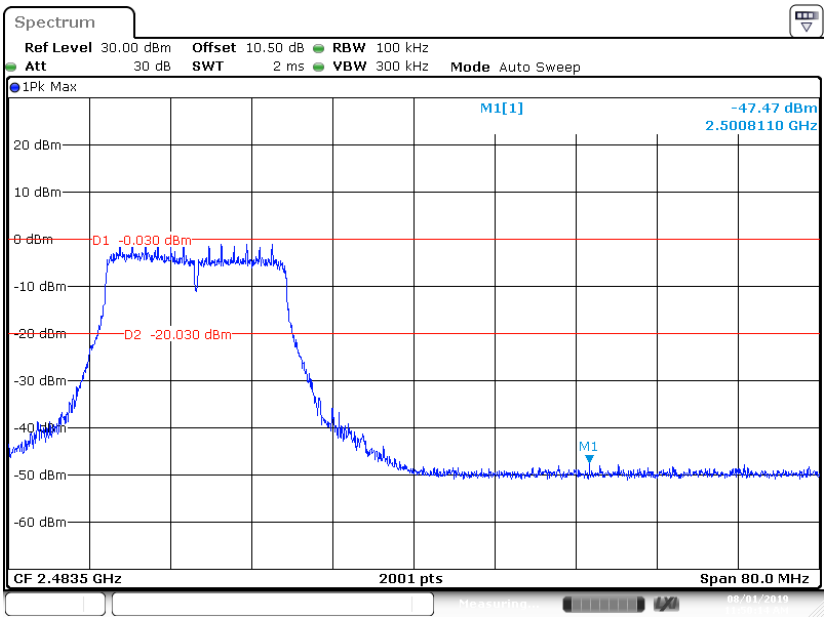
Date: 1.AUG.2019 11:04:01

802.11n-HT20 Mode Left Side



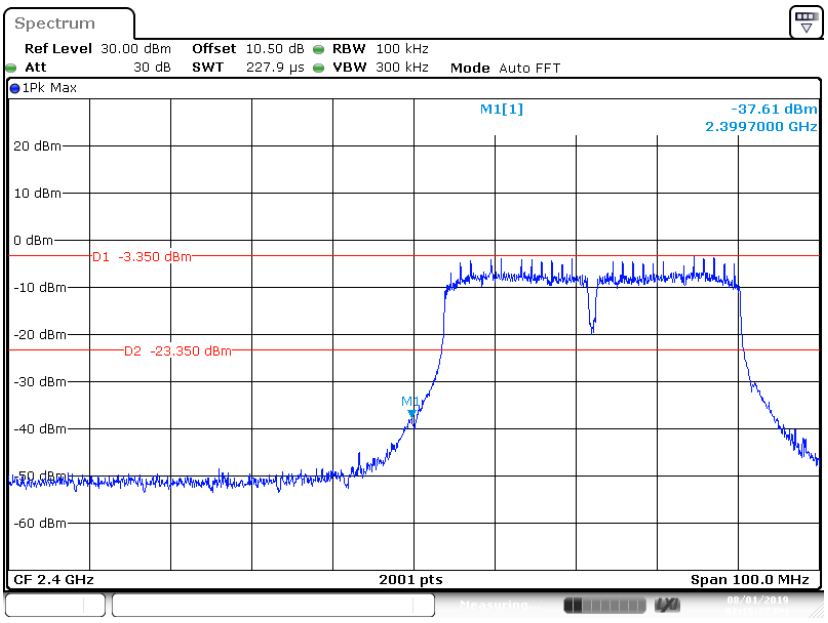
Date: 1.AUG.2019 11:48:16

802.11n-HT20 Mode Right Side



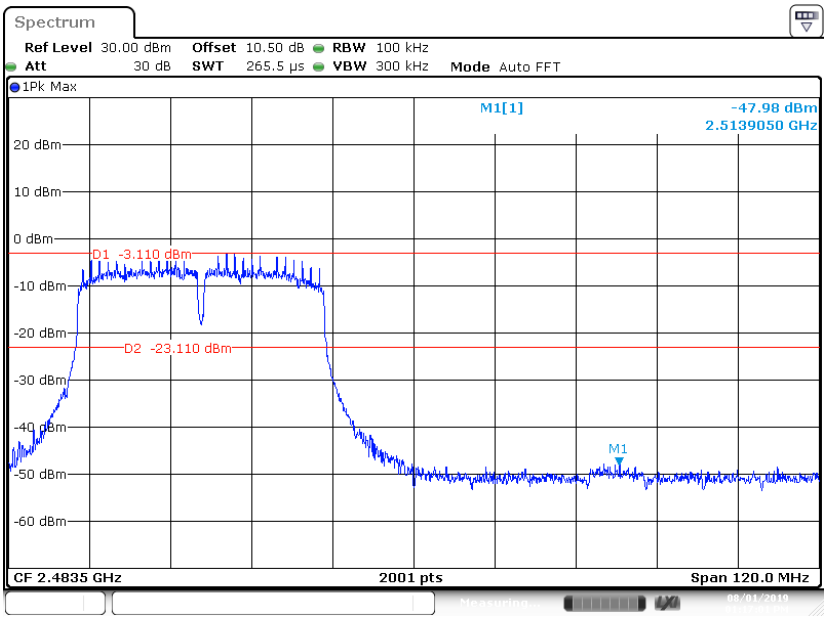
Date: 1.AUG.2019 11:50:15

802.11n-HT40 Mode Left Side



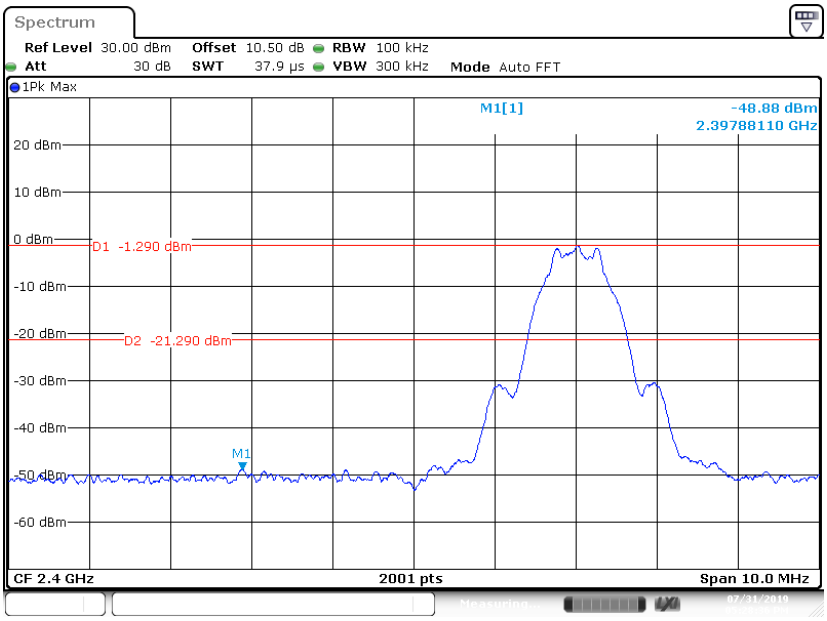
Date: 1.AUG.2019 13:15:37

802.11n-HT40 Mode Right Side



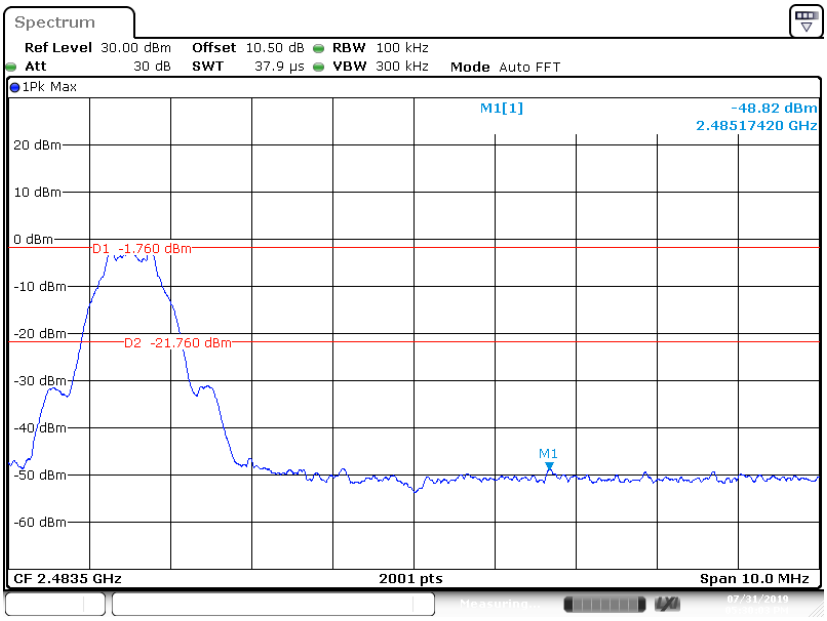
Date: 1.AUG.2019 13:17:01

BLE Mode Left Side



Date: 31.JUL.2019 17:28:36

BLE Mode Right Side



Date: 31.JUL.2019 17:30:04

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 ANSI C63.10-2013 sub-clause 11.10.2

The following procedure shall be used if maximum peak conducted output power was used to determine Compliant, and it is optional if the maximum conducted (average) output power was used to determine Compliant:

1. Set the RBW to: 3 kHz≤ RBW≤100 kHz.
2. Set the VBW ≥ 3xRBW.
3. Set the span to 1.5 times the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level within the RBW.
9. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Data

Environmental Conditions

Temperature:	24.1~24.3 ℃
Relative Humidity:	50~52 %
ATM Pressure:	101.3~101.5 kPa

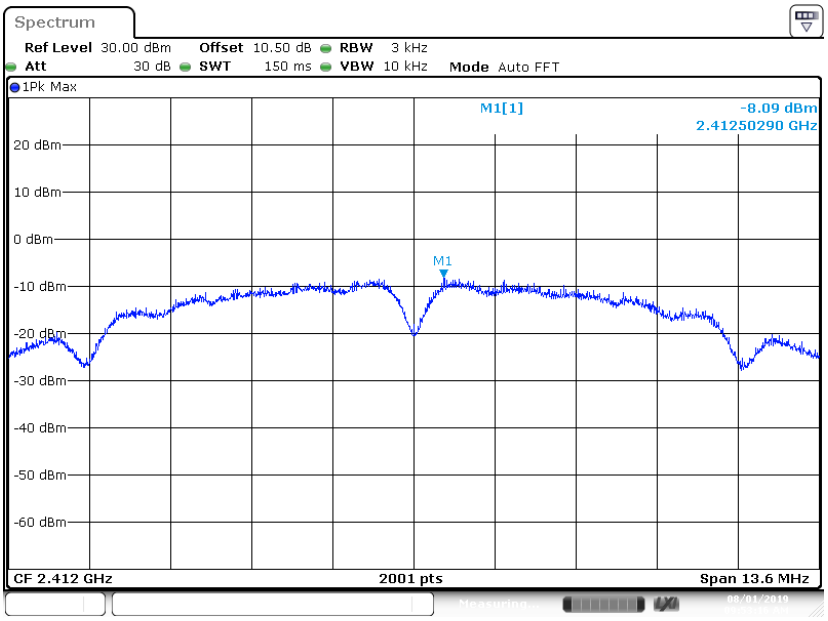
The testing was performed by Sam Ye from 2019-07-31 to 2019-08-01.

EUT operation mode: Transmitting

Test Result: Pass

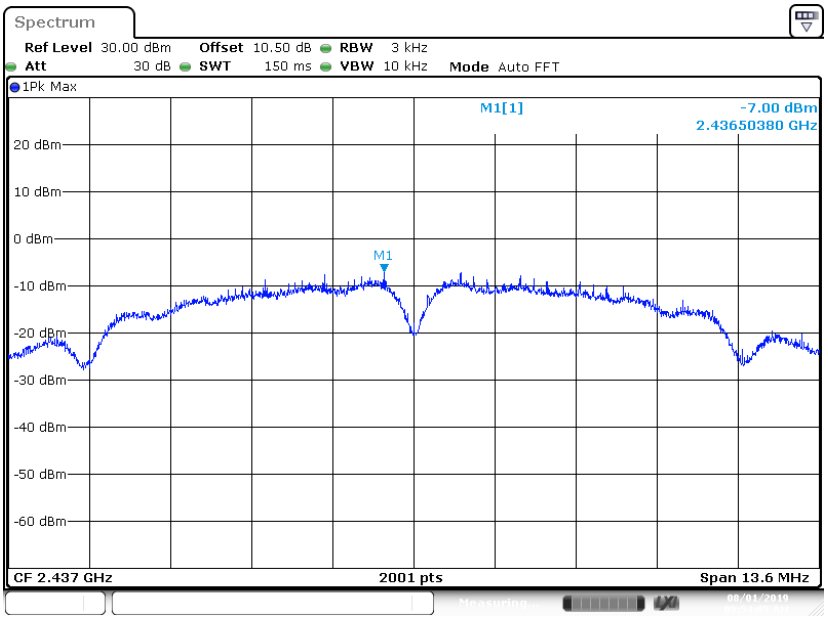
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b mode			
Low	2412	-8.09	≤8
Middle	2437	-7.00	≤8
High	2462	-8.79	≤8
802.11g mode			
Low	2412	-12.47	≤8
Middle	2437	-12.43	≤8
High	2462	-12.29	≤8
802.11n-HT20 mode			
Low	2412	-12.62	≤8
Middle	2437	-13.69	≤8
High	2462	-13.34	≤8
802.11n-HT40 mode			
Low	2422	-15.79	≤8
Middle	2437	-15.26	≤8
High	2452	-15.75	≤8
BLE Mode			
Low	2402	-16.28	≤8
Middle	2440	-16.32	≤8
High	2480	-16.88	≤8

802.11b Mode Low Channel



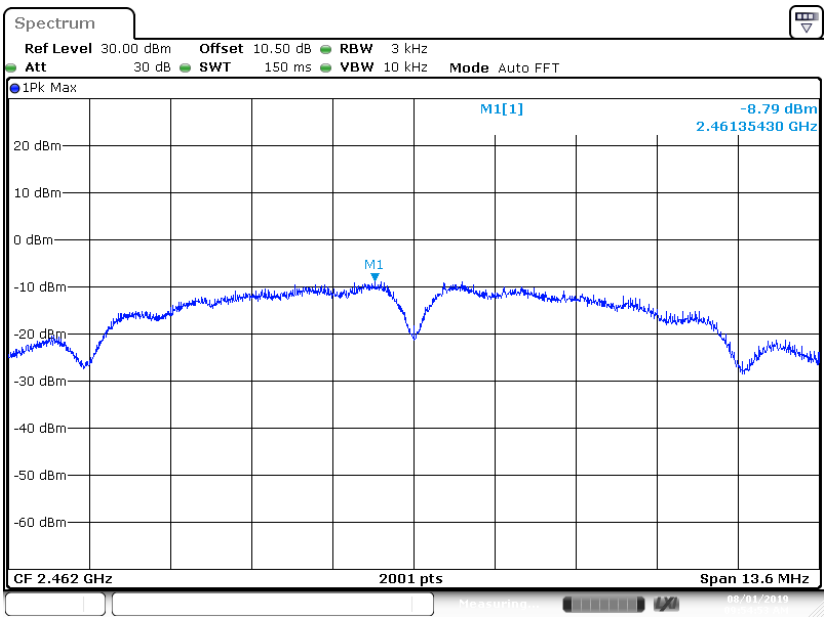
Date: 1.AUG.2019 09:53:16

802.11b Mode Middle Channel



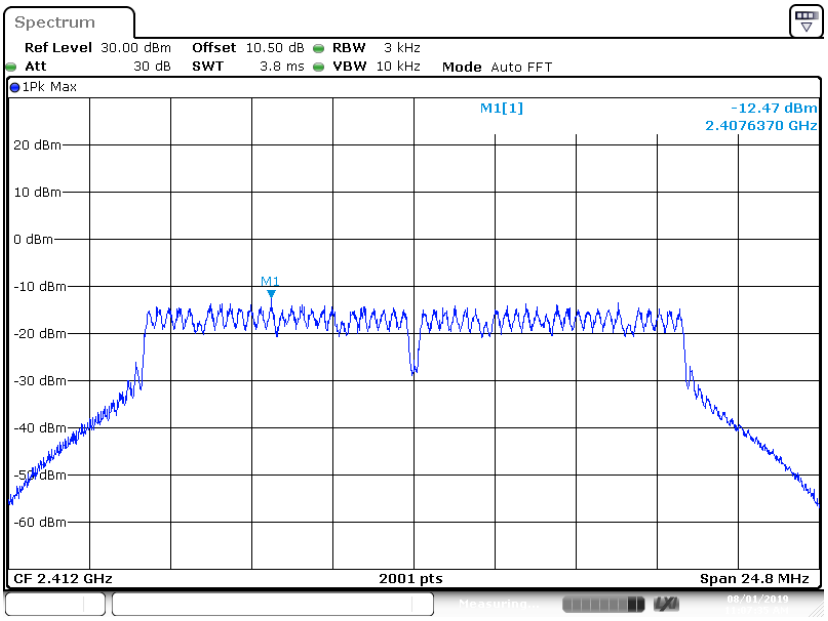
Date: 1.AUG.2019 09:54:05

802.11b Mode High Channel



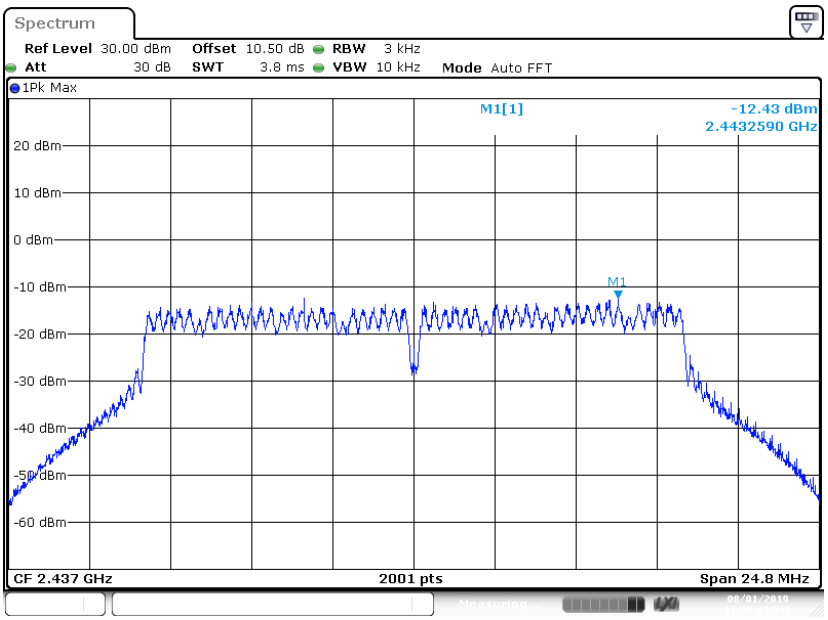
Date: 1.AUG.2019 09:54:53

802.11g Mode Low Channel



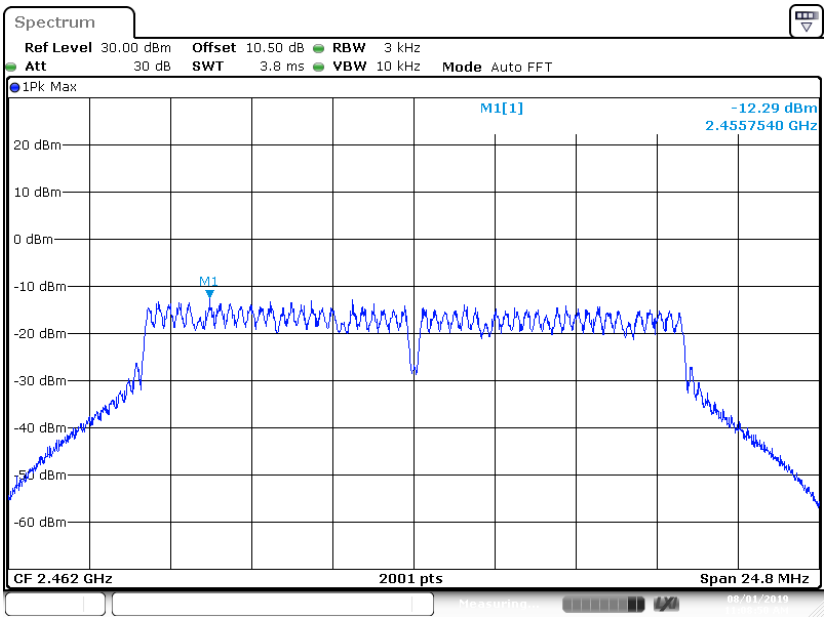
Date: 1.AUG.2019 11:07:35

802.11g Mode Middle Channel



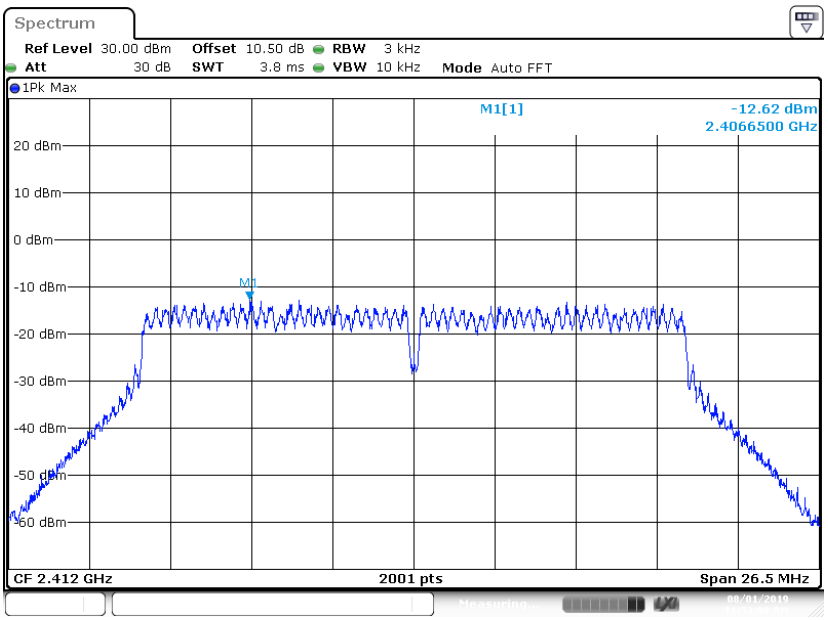
Date: 1.AUG.2019 11:08:12

802.11g Mode High Channel



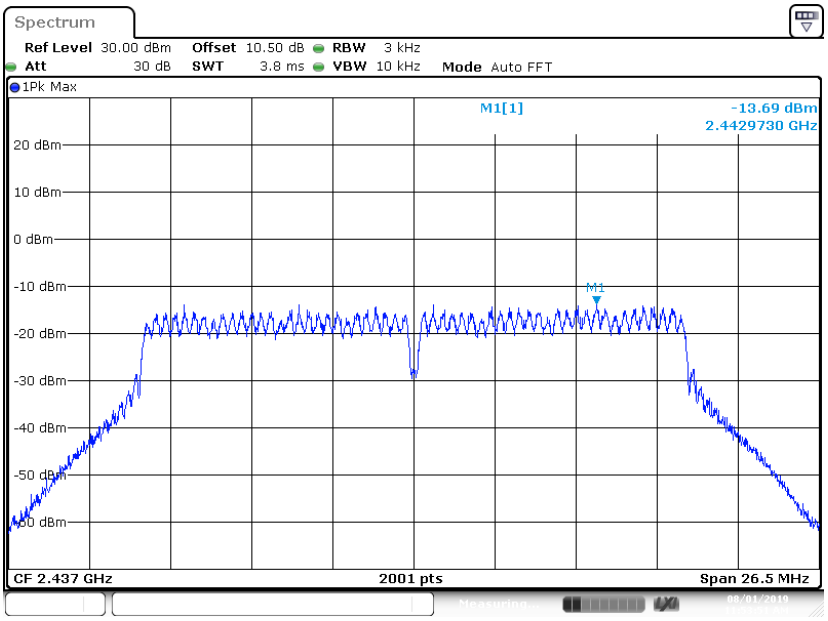
Date: 1.AUG.2019 11:08:50

802.11n-HT20 Mode Low Channel



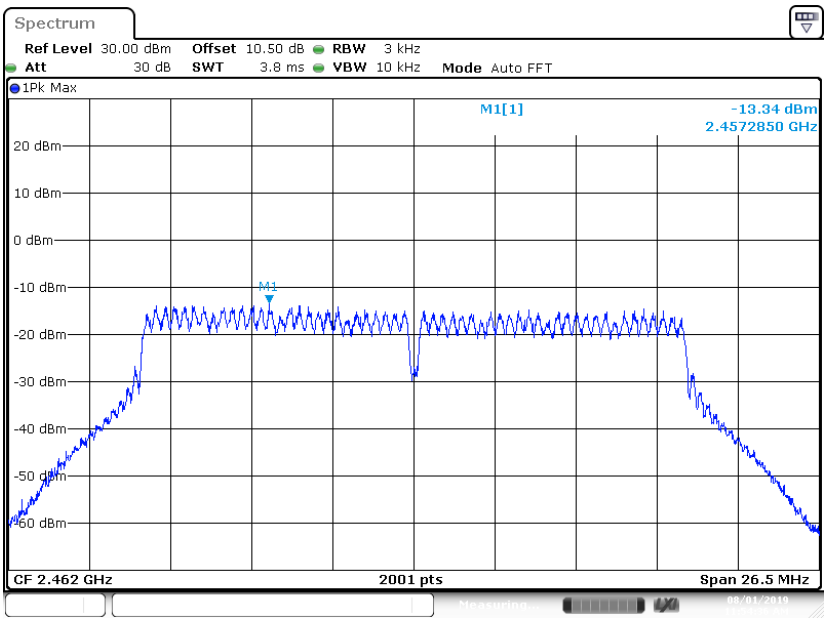
Date: 1.AUG.2019 11:53:00

802.11n-HT20 Mode Middle Channel



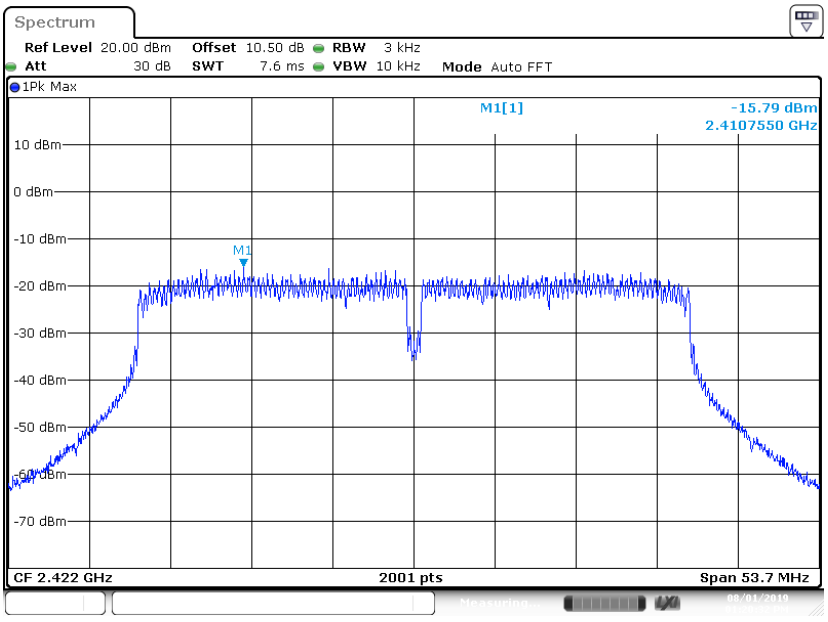
Date: 1.AUG.2019 11:53:52

802.11n-HT20 Mode High Channel



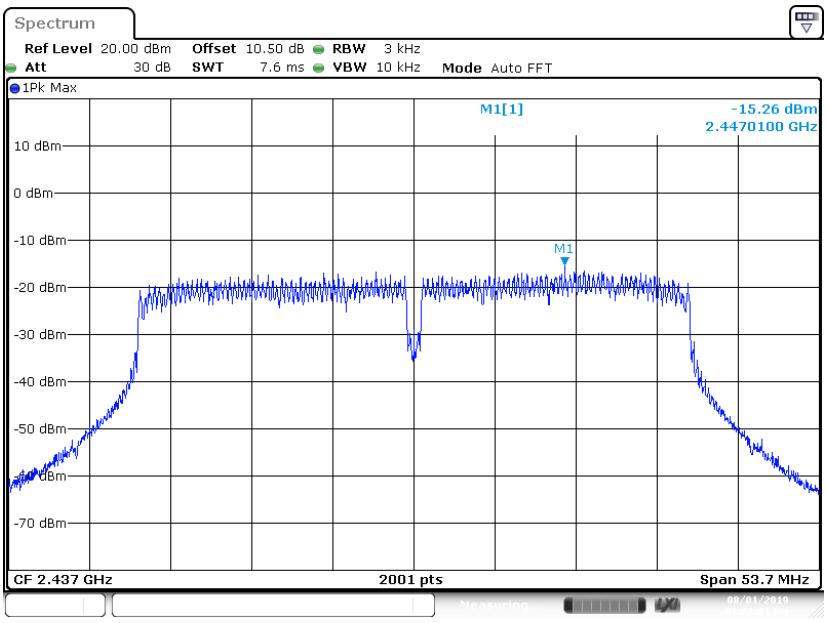
Date: 1.AUG.2019 11:54:37

802.11n-HT40 Mode Low Channel



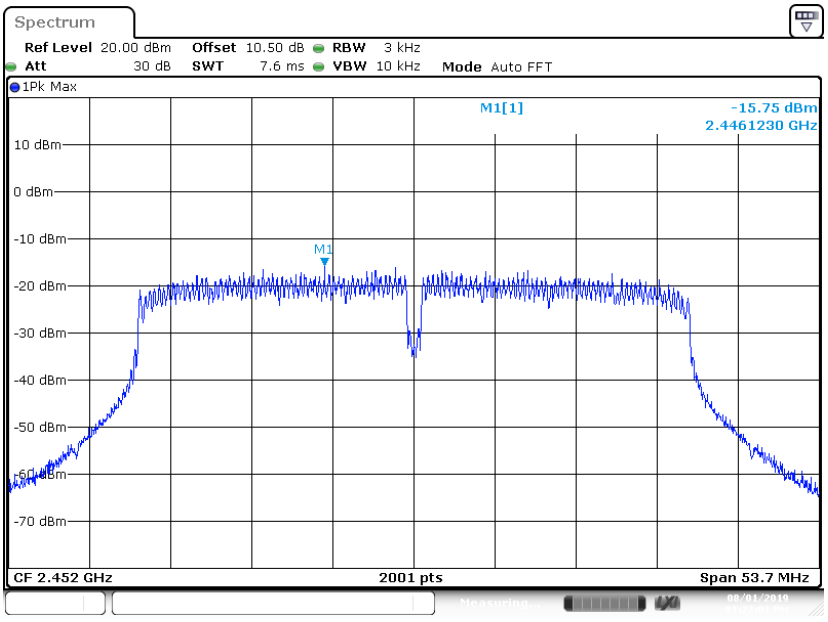
Date: 1.AUG.2019 13:20:32

802.11n-HT40 Mode Middle Channel



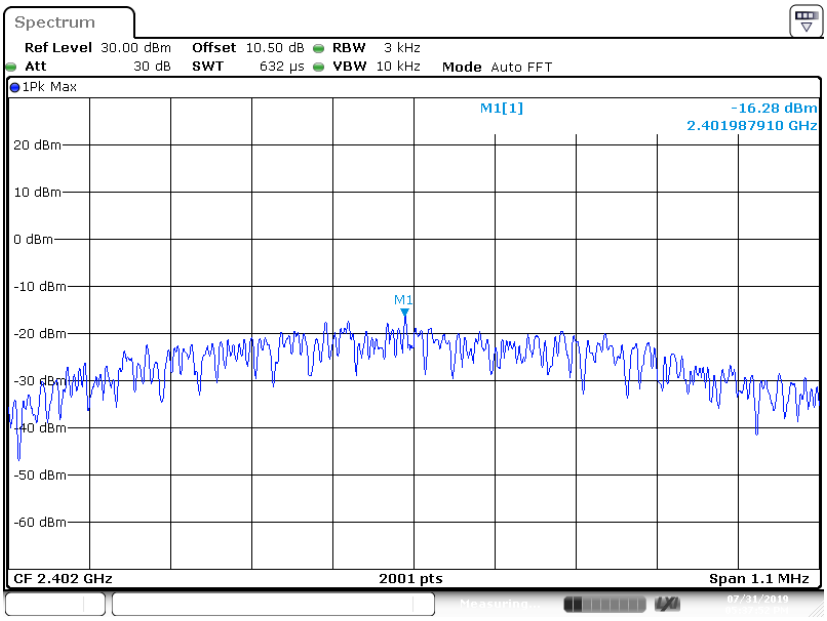
Date: 1.AUG.2019 13:21:21

802.11n-HT40 Mode High Channel



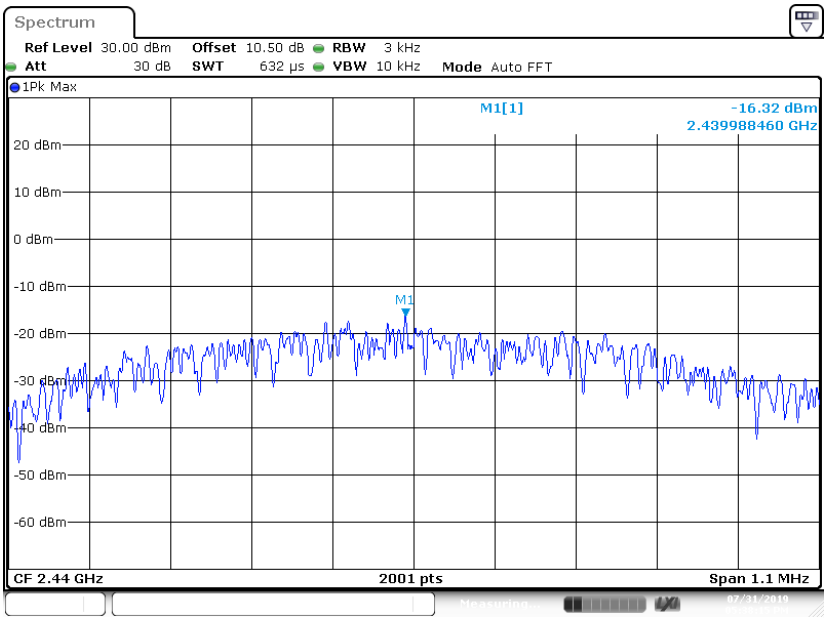
Date: 1.AUG.2019 13:22:02

BLE Mode Low Channel



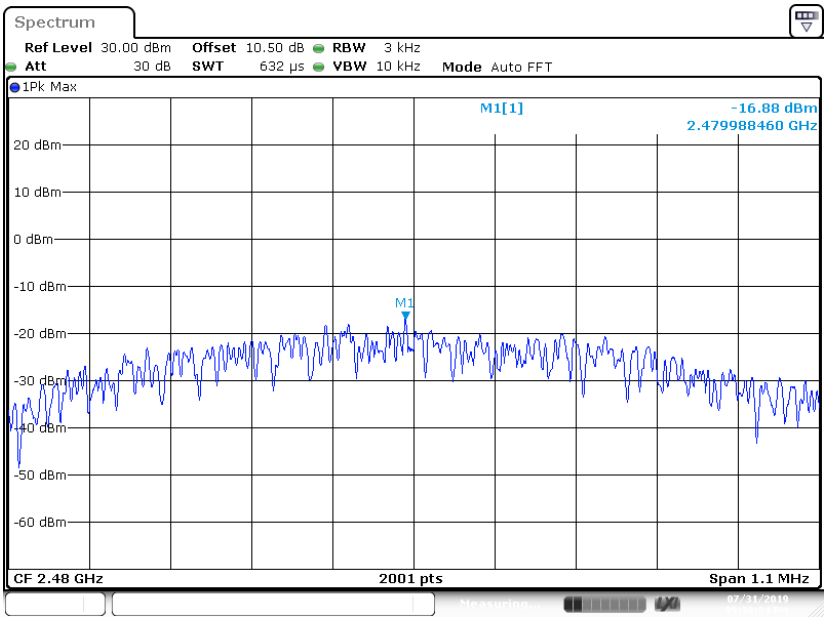
Date: 31.JUL.2019 17:37:51

BLE Mode Middle Channel



Date: 31.JUL.2019 17:38:15

BLE Mode High Channel



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