FCC PART 15.247

TEST REPORT

For

Chengdu Vantron Technology, Ltd.

No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China 610045

FCC ID: 2AAGE5081G

Report Type:	**Product Name:**
Original Report	Tablet

Report Number:	RSC191025001-0C
Date of Report Issue:	2019-12-12
Reviewed By:	Sula Huang
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China Tel: +86-28-65525123 Fax: +86-28-65525125 www.baclcorp.com

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Chengdu Vantron Technology, Ltd.
Product	Tablet
Tested Model	VT-TABLET-5081G
FCC ID	2AAGE5081G
Voltage Range	DC 3.8V rechargeable Li-ion battery or DC5V from adapter
Measure approximately	246 mm (L) x 151 mm (W) x 23.5 mm (H)
Frequency	2.4G WiFi: 2412-2462MHz (802.11b/g/n20) Bluetooth LE: 2402-2480MHz
Modulation Type:	802.11b: DSSS 802.11g/n20: OFDM Bluetooth LE: GFSK
Sample serial number	191025001/01 (assigned by the BACL, Chengdu)
Sample/EUT Status	The test sample was in good condition and received:2019-10-25

Note: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Objective

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

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

Related Submittal(s)/Grant(s)

FCC Part 15C DXX submissions with FCC ID: 2AAGE5081G
FCC Part 15C DSS submissions with FCC ID: 2AAGE5081G
FCC Part 15E NII submissions with FCC ID: 2AAGE5081G

Measurement Uncertainty

Item			Uncertainty
AC power line conducted emission			2.24 dB
Radiated Emission(Field Strength)	30MHz-200MHz	H	4.47 dB
		V	4.73 dB
	200MHz-1GHz	H	4.87 dB
		V	5.93 dB
	1GHz-6GHz		4.51 dB
	6GHz-18GHz		4.49 dB
	18GHz-40GHz		5.48 dB
Conducted RF Power			±0.61dB
Power Spectrum Density			±0.61dB
Occupied Bandwidth			±5%
Conducted Emission			±1.5dB
Humidity			±5%
Temperature			±1℃

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the corresponding inclusion factor K when the inclusion probability is about 95%.

Test Methodology

All measurements contained in this report were conducted with:

1. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

2. KDB558074 D01 DTS Meas Guidance v05r02.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Chengdu) to collect test data is located No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Bay Area Compliance Laboratories Corp. (Chengdu) lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4324.01) and the FCC designation No. CN1186 under the FCC KDB 974614 D01. 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

The system was configured in testing mode, which was provided by manufacturer.

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

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

EUT were tested with Channel 1, 6 and 11.

802.11b/g supports SISO, 802.11n20 supports SISO and MIMO mode. For Radiated Emission, according to pretest, the worst case for 802.11n20 is MIMO mode. So 802.11b/g SISO and 802.11n20 MIMO mode test data were recorded in the report.

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

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

EUT was tested with channel 0, 19 and 39.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

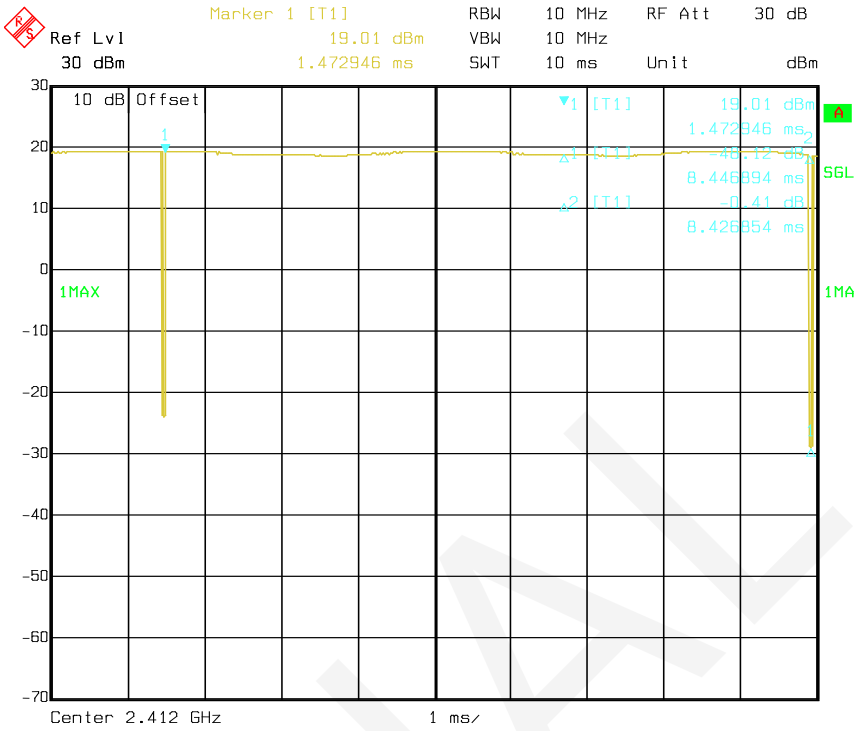
The worst condition (maximum power with maximum duty cycle) was setting by the software as following table:

Test Mode	Test Software Version	RF test tool					
802.11b	Test Frequency	2412MHz		2437MHz		2462MHz	
	Chain	0	1	0	1	0	1
	Data Rate	CCK 1M		CCK 1M		CCK 1M	
	Power Level Setting	Default		Default		Default	
802.11g	Test Frequency	2412MHz		2437MHz		2462MHz	
	Chain	0	1	0	1	0	1
	Data Rate	OFDM 6M		OFDM 6M		OFDM 6M	
	Power Level Setting	Default		Default		Default	
802.11n20	Test Frequency	2412MHz		2437MHz		2462MHz	
	Chain	0	1	0	1	0	1
	Data Rate	MCS0		MCS0		MCS0	
	Power Level Setting	Default		Default		Default	
BLE	Test Frequency	2402MHz		2440MHz		2480MHz	
	Chain	0		0		0	
	Data Rate	Default		Default		Default	
	Power Level Setting	Default		Default		Default	

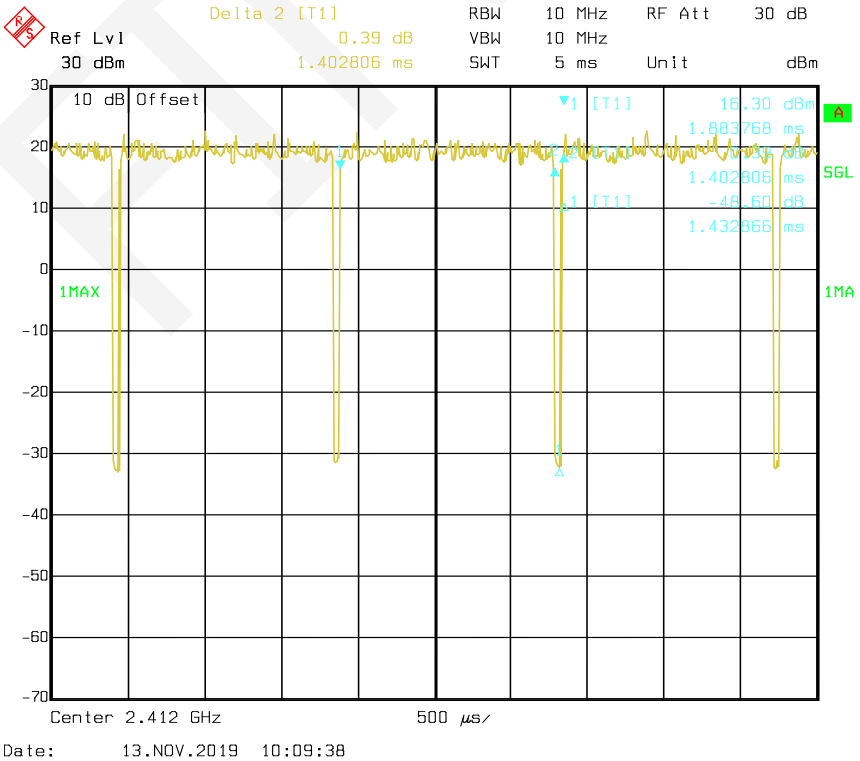
Duty Cycle information is below:

Mode	T_{on} (ms)	T_p (ms)	Duty Cycle (%)	Duty Cycle Factor(dB)
802.11b	8.426	8.447	99.75	0.01
802.11g	1.406	1.432	98.18	0.08
802.11n-HT20	1.352	1.382	97.83	0.10
BLE	0.49	0.62	78.71	1.04

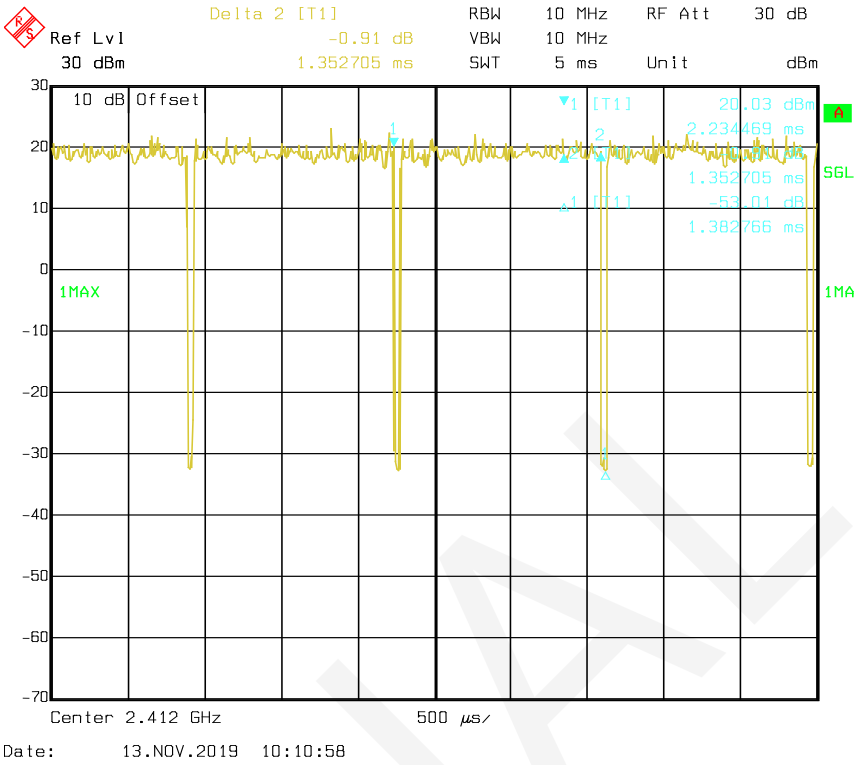
802.11b



802.11g



802.11n-HT20



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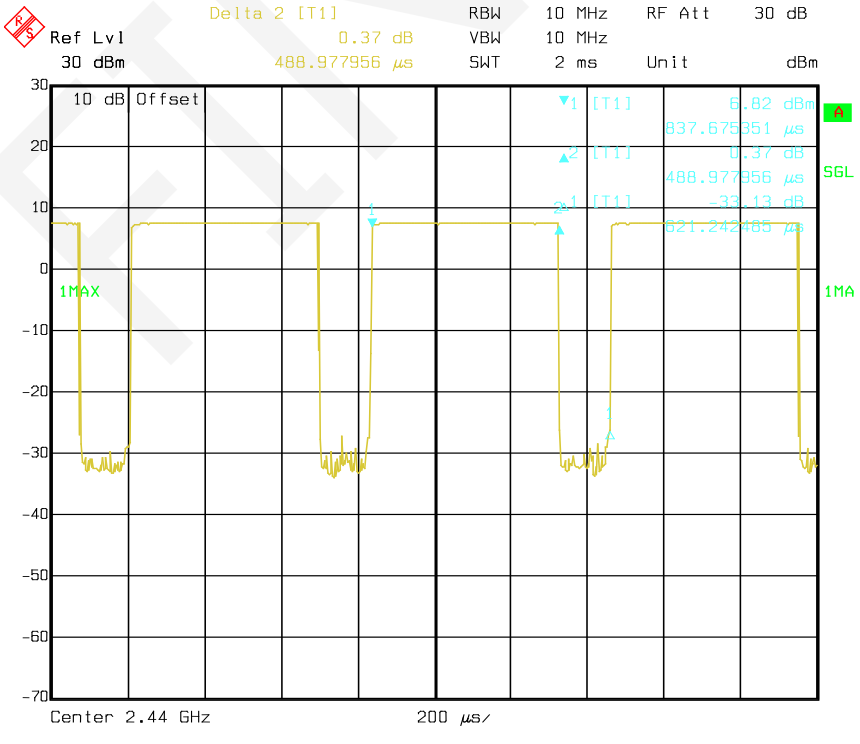
BLE mode



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Support Equipment List and Details

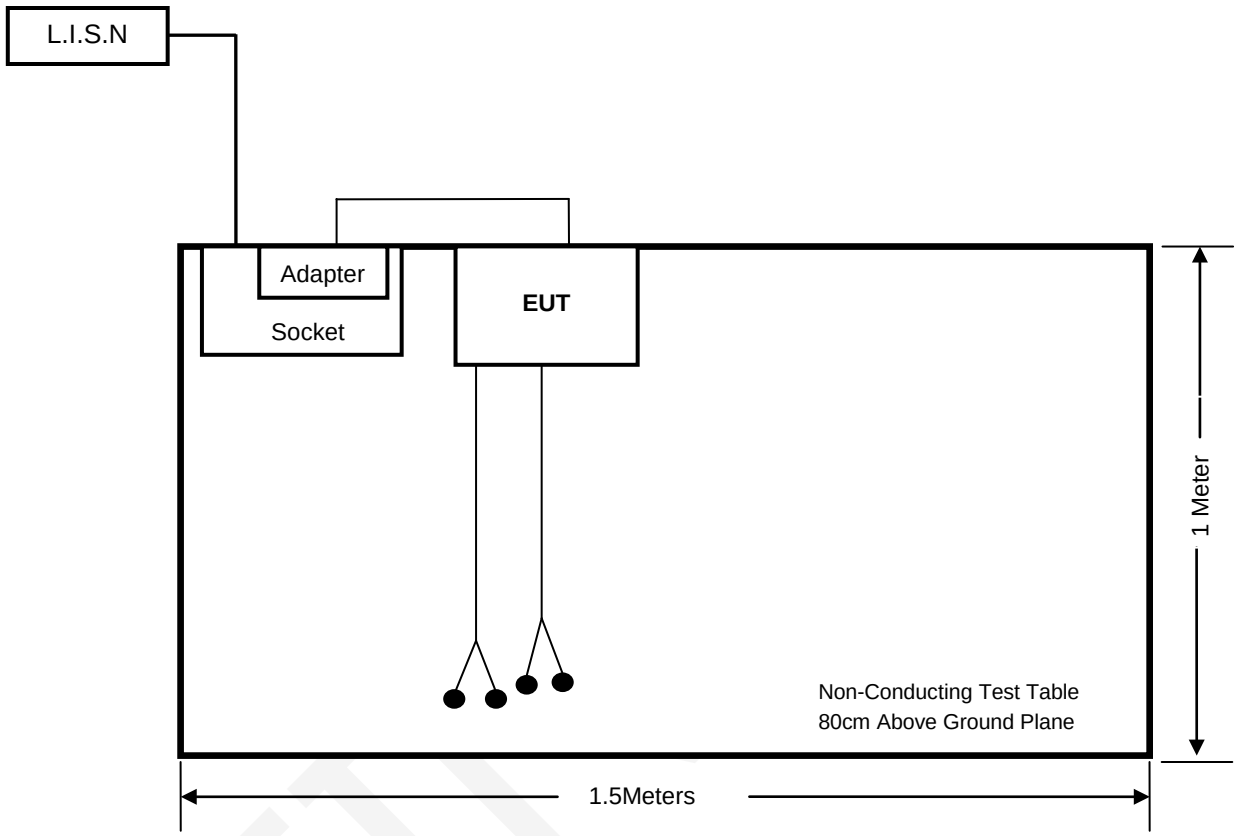
Manufacturer	Description	Model	Serial Number
XIAOMI	Adapter Input: 100-240VAC, 50/60Hz,0.5A Output:5V,2A/9V,1.2A/ 12V,1A	MD3-03-EB	14102116834
Huawei	Earphone	Unknown	Unknown
SS	Earphone	Unknown	Unknown

External I/O Cable

Cable Description	Length (m)	From	To
Unshielded Power Cable	1.8	Adapter	EUT
Unshielded Earphone Cable*2	1.5	EUT	Earphone

Block Diagram of Test Setup

Conducted Emissions



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 & §1.1310 & §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB 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

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

TEST EQUIPMENTS LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emission					
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2019-04-15	2020-04-14
ROHDE&SCHWARZ	L.I.S.N.	ENV216	3560.6550.16	2019-02-25	2020-02-24
HP	RF Limiter	11947A	3107A01270	2019-10-18	2020-10-17
Unknown	Conducted Cable	L-E003	000003	2019-08-05	2020-08-04
Rohde & Schwarz	EMC32	EMC32	V 8.52.0	NCR	NCR
Radiated Emission					
EMCT	Semi-Anechoic Chamber	966	001	2017-05-18	2020-05-17
SONOMA INSTRUMENT	Amplifier	310 N	186684	2019-09-06	2020-09-05
SUNOL SCIENCES	Broadband Antenna	JB3	A121808	2017-05-19	2020-05-18
INMET	Attenuator	18N-6dB	N/A	2019-10-17	2020-10-16
Rohde & Schwarz	EMI Test Receiver	ESR3	102456	2019-04-15	2020-04-14
Rohde & Schwarz	Spectrum Analyzer	FSU26	200835	2019-04-15	2020-04-14
EMCO	Horn Antenna	3115	2192	2019-09-25	2021-09-24
A.H. Systems, Inc	Amplifier	PAM-0118P	467	2019-08-30	2020-08-29
EM Electronics	RF Pre-Amplifier	EM18G40	060725	2019-07-24	2020-07-23
Rohde & Schwarz	EMI Test Receiver	ESIB 40	100215	2019-04-15	2020-04-14
A.H. Systems, Inc	Horn Antenna	SAS-574	510	2019-09-02	2021-09-01
Sinoscite.,Co Ltd	Reject Band Filter	BSF 2402-2480MN	0898-005	2019-11-10	2020-11-09
MICRO-TRONICS	High Pass Filter	HPM50111	G216	2019-11-10	2020-11-09
Unknown	RF Cable (Below 1GHz)	L-E005	000005	2019-09-06	2020-09-05
Unknown	RF Cable (Below 1GHz)	T-E128	000128	2019-10-17	2020-10-16
MICRO-COAX	Flexible microwave cable	T-E237	233522-001	2019-07-19	2020-07-18
Unknown	RF Cable (Above 1GHz)	T-E069	000069	2019-07-24	2020-07-23
Micro-coax	RF Cable (Above 1GHz)	T-E209	MFR 64639 2310	2019-07-19	2020-07-18
Rohde & Schwarz	EMC32	EMC32	V9.10.00	NCR	NCR

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2019-04-15	2020-04-14
WEINSCHEL ENGINEERING	Attenuator	1A 10dB	AB1165	2019-08-05	2020-08-04
E-Microwave	DC Block	EMDCB-00036	OE01304225	2019-08-05	2020-08-04
Agilent	USB Wideband Power Sensor	U2021XA	MY53320008	2019-01-17	2020-01-16
Unknown	RF Cable	Unknown	000007	Each Time	Each Time

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 2.4 G Wi-Fi mode

Please refer to the SAR report: RSC191207001-20.

For BLE mode

The max conducted power including tune-up tolerance is 8.0 dBm (6.31mW).
[(max. power of channel, mW)/(min. test separation distance, mm)][√f(GHz)]
= 6.31/5*(√2.48) = 2.0 < 3.0

So the stand-alone 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 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.

The EUT has one WIFI antenna, one WIFI/Bluetooth antenna, four 4G antennas and one NFC antenna, which are permanently attached and fulfill the requirement of this section. Please refer to the table below and EUT photos.

Antenna	Manufacturer	Antenna Model Number	Max. Antenna Gain	Antenna Type
2.4G/5G WIFI; Bluetooth Antenna (Chain 0)	Dongguan Yijia Electronics communication Technology Co.,Ltd	YJS01.042.002.305C	2.4G:1.1dBi 5G: 4.6dBi	FPC Antenna
2.4G/5G WIFI Antenna (Chain 1)		YJS01.042.002.306C	2.4G: 0.7dBi 5G: 2.7dBi	
4G Antenna (Diversity)	Dongguan Yijia Electronics communication Technology Co.,Ltd	YJS01.042.002.301C	1.9dBi	FPC Antenna
4G Antenna (Main)		YJS01.042.002.302C	2.1dBi	
4G Antenna (Diversity)		YJS01.042.002.303C	1.9dBi	
4G Antenna (Diversity)		YJS01.042.002.304C	1.9dBi	
NFC Antenna	SHENZHEN SUNSHINE GOOD ELECTRONICS CO.,LTD	P134FQ2137A0	0dBi	FPC Antenna

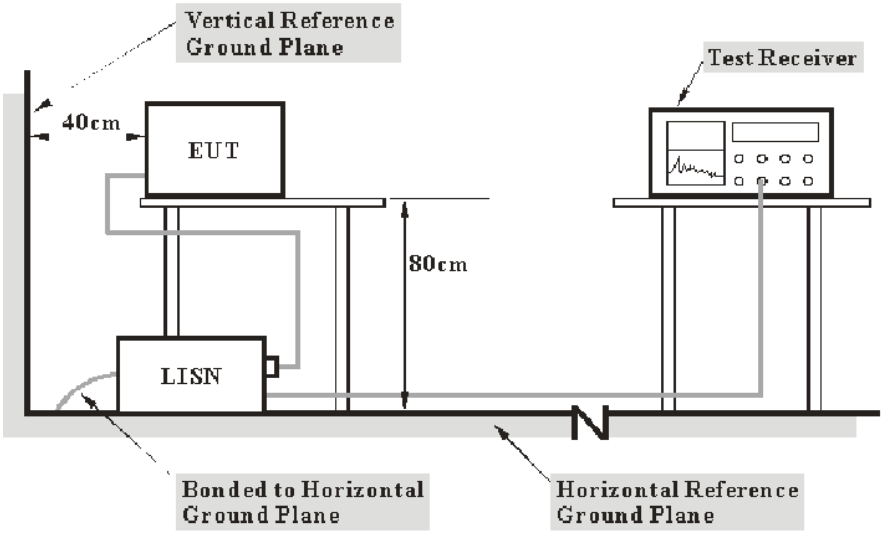
Result: Compliance.

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.

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

During the conducted emission test, the adapter was connected to the first L.I.S.N.

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

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

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$
$C_f = A_C + VDF$

Herein,
V_C (cord. Reading): corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN
C_f: Correction Factor

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

Margin = Limit – Corrected Amplitude

Test Data

Test Environment Conditions

Temperature:	18 °C
Relative Humidity:	63 %
ATM Pressure:	93.8 kPa

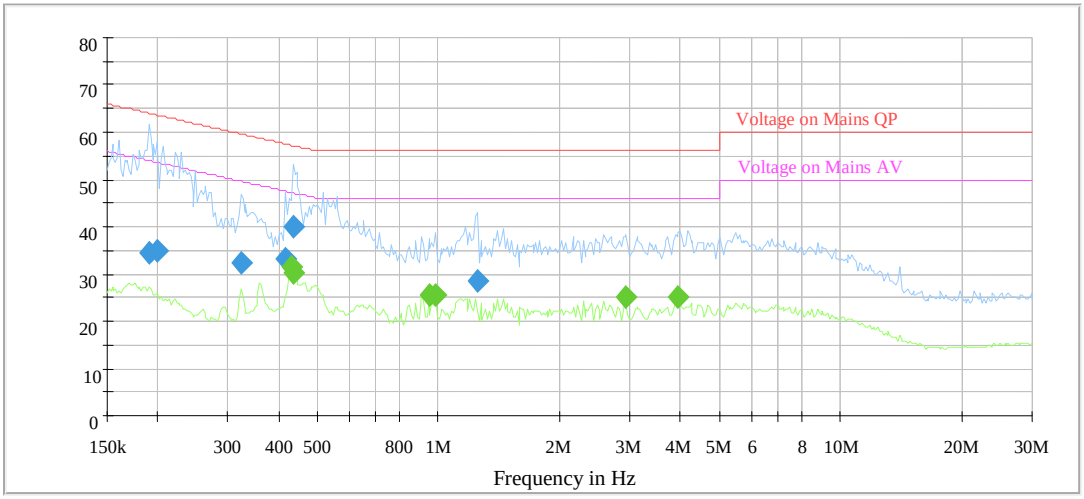
The testing was performed by Eric Xiao on 2019-11-24.

Test Mode: Transmitting

Wi-Fi Mode:

(802.11b)-Worst Case

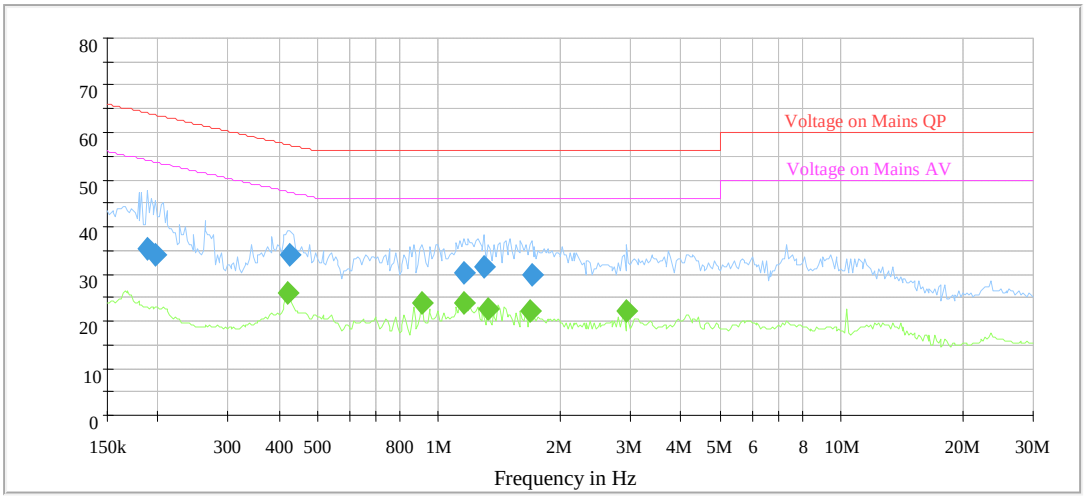
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190460	34.5	200.0	9.000	L1	19.6	29.5	64.0
0.200176	34.9	200.0	9.000	L1	19.6	28.7	63.6
0.322729	32.3	200.0	9.000	L1	19.6	27.3	59.6
0.418016	33.3	200.0	9.000	L1	19.6	24.2	57.5
0.434989	39.8	200.0	9.000	L1	19.6	17.3	57.2
1.248947	28.6	200.0	9.000	L1	19.6	27.4	56.0

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.430682	31.5	200.0	9.000	L1	19.6	15.7	47.2
0.434989	30.3	200.0	9.000	L1	19.6	16.9	47.2
0.945248	25.7	200.0	9.000	L1	19.6	20.3	46.0
0.983629	25.4	200.0	9.000	L1	19.6	20.6	46.0
2.909785	25.3	200.0	9.000	L1	19.6	20.7	46.0
3.921951	25.0	200.0	9.000	L1	19.6	21.0	46.0

AC120 V, 60 Hz, Neutral:

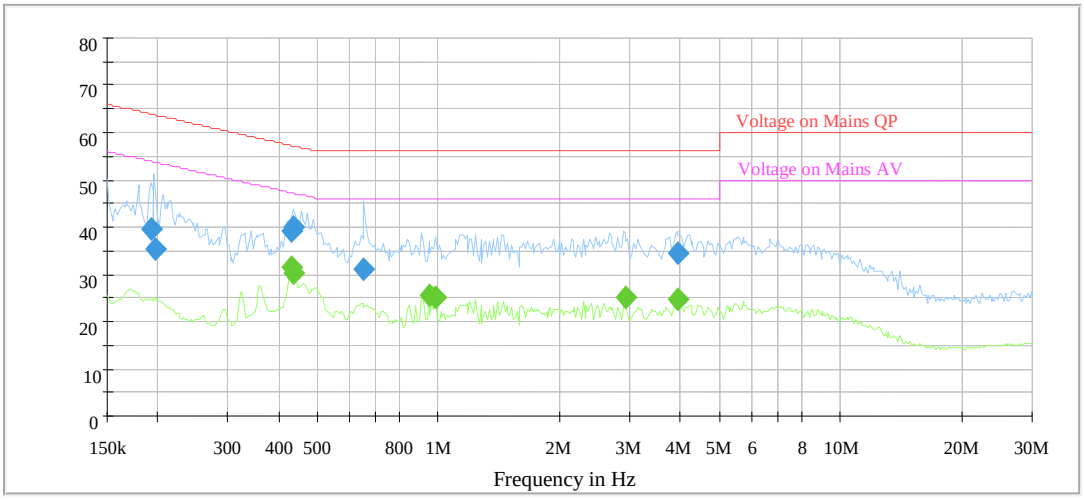


Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.188575	35.4	200.0	9.000	N	19.6	28.7	64.1
0.198194	33.9	200.0	9.000	N	19.6	29.8	63.7
0.426418	33.9	200.0	9.000	N	19.6	23.4	57.3
1.153382	30.3	200.0	9.000	N	19.7	25.7	56.0
1.299660	31.4	200.0	9.000	N	19.7	24.6	56.0
1.700226	29.7	200.0	9.000	N	19.6	26.3	56.0

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.422196	26.0	200.0	9.000	N	19.6	21.4	47.4
0.908365	24.0	200.0	9.000	N	19.6	22.0	46.0
1.153382	23.7	200.0	9.000	N	19.7	22.3	46.0
1.325783	22.4	200.0	9.000	N	19.7	23.6	46.0
1.683392	21.9	200.0	9.000	N	19.6	24.1	46.0
2.938883	22.1	200.0	9.000	N	19.7	23.9	46.0

BLE Mode:

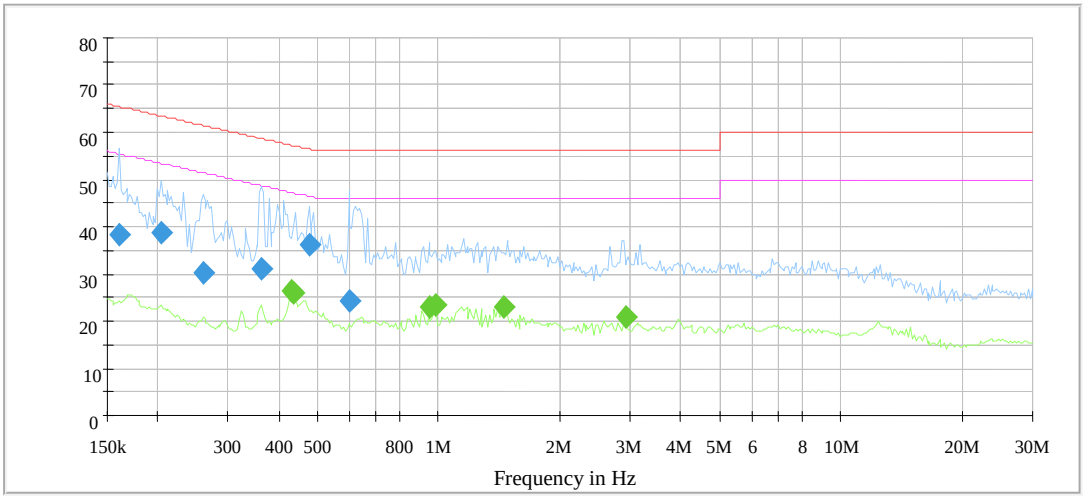
(Low channel)-worst case



Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.192365	39.7	200.0	9.000	L1	19.6	24.2	63.9
0.198194	35.5	200.0	9.000	L1	19.6	28.2	63.7
0.430682	39.2	200.0	9.000	L1	19.6	18.1	57.2
0.434989	40.0	200.0	9.000	L1	19.6	17.2	57.2
0.654116	31.2	200.0	9.000	L1	19.6	24.8	56.0
3.921951	34.3	200.0	9.000	L1	19.6	21.7	56.0

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.430682	31.5	200.0	9.000	L1	19.6	15.7	47.2
0.434989	30.3	200.0	9.000	L1	19.6	16.8	47.2
0.945248	25.6	200.0	9.000	L1	19.6	20.4	46.0
0.983629	25.3	200.0	9.000	L1	19.6	20.7	46.0
2.909785	25.0	200.0	9.000	L1	19.6	21.0	46.0
3.921951	24.8	200.0	9.000	L1	19.6	21.2	46.0

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.160820	38.3	200.0	9.000	N	19.6	27.1	65.4
0.204199	38.8	200.0	9.000	N	19.6	24.6	63.4
0.259279	30.2	200.0	9.000	N	19.6	31.3	61.5
0.363659	31.1	200.0	9.000	N	19.6	27.6	58.6
0.475741	36.2	200.0	9.000	N	19.6	20.2	56.4
0.598084	24.5	200.0	9.000	N	19.6	31.5	56.0

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.430682	26.5	200.0	9.000	N	19.6	20.8	47.2
0.434989	25.8	200.0	9.000	N	19.6	21.4	47.2
0.945248	23.0	200.0	9.000	N	19.6	23.0	46.0
0.983629	23.3	200.0	9.000	N	19.6	22.7	46.0
1.449989	22.9	200.0	9.000	N	19.6	23.1	46.0
2.909785	21.0	200.0	9.000	N	19.7	25.0	46.0

Note:
1) Correction Factor =LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
The corrected factor has been input into the transducer of the test software.
2) Corrected Amplitude = Reading + Correction Factor
3) Margin = Limit – Corrected Amplitude

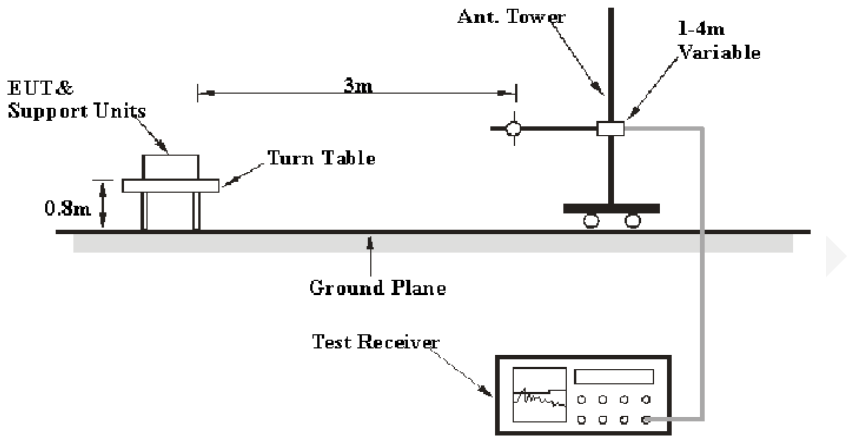
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

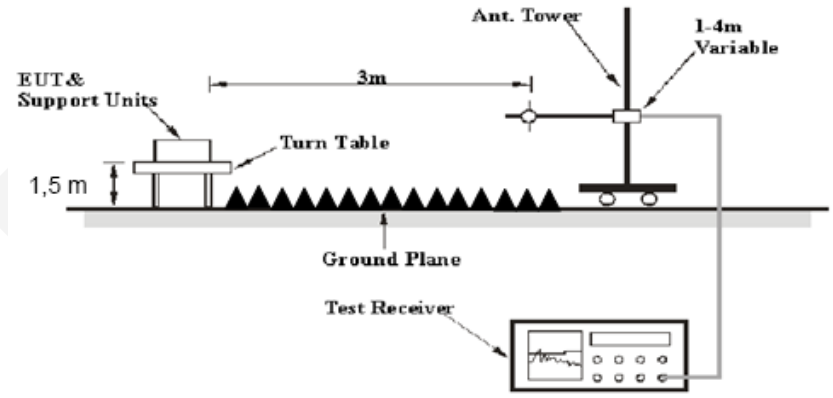
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1GHz:



Above 1GHz:



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

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

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

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

Frequency Range	RBW	Video B/W	Duty Cycle	Measurement
Above 1 GHz	1MHz	3 MHz	Any	PK
	1MHz	10Hz	>98%	AV
	1MHz	1/T	<98%	AV

Note: T is Transmission Duration

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

Test Procedure

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

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

Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Meter Reading + Antenna Loss + Cable Loss - Amplifier Gain

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

Margin = Limit –Corrected Amplitude

Test Data

Test Environment Conditions

Temperature:	21°C
Relative Humidity:	65 %
ATM Pressure:	95.3 kPa

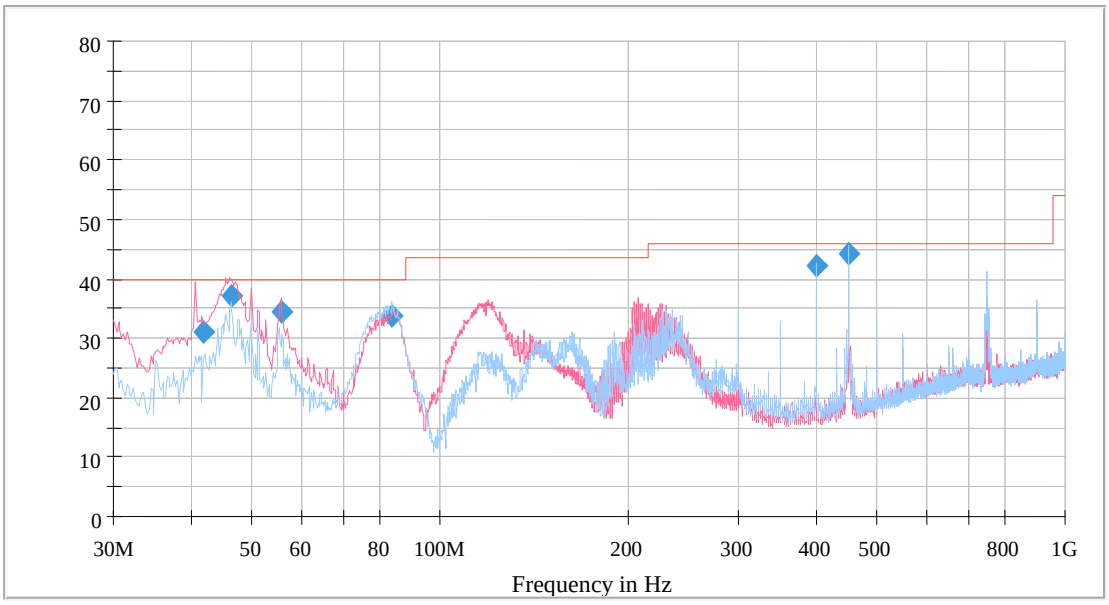
The testing was performed by Eric Xiao on 2019-11-24

Test Mode: Transmitting

Wi-Fi Mode

1) 30 MHz to 1 GHz

802.11b-Low channel - Worst Case



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
41.770200	31.17	40.00	8.83	200.0	120.000	103.0	V	356.0	-12.1
46.216000	37.11	40.00	2.89	200.0	120.000	104.0	V	33.0	-14.8
55.739400	34.53	40.00	5.47	200.0	120.000	103.0	V	45.0	-17.4
83.819000	33.65	40.00	6.35	200.0	120.000	124.0	H	304.0	-17.1
400.017700	42.14	46.00	3.86	200.0	120.000	108.0	H	296.0	-8.7
450.030400	44.18	46.00	1.82	200.0	120.000	112.0	H	286.0	-8.2

2) Above 1GHz
Chain 0
802.11b Mode

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBµV	PK/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
frequency:2412 MHz									
2412	70.18	PK	H	29.12	3.55	0.00	102.85	N/A	N/A
2412	66.17	AV	H	29.12	3.55	0.00	98.84	N/A	N/A
2390	28.13	PK	H	29.15	3.54	0.00	60.82	74.00	13.18
2390	14.32	AV	H	29.15	3.54	0.00	47.01	54.00	6.99
2700	62.87	PK	H	29.48	3.76	42.14	53.97	74.00	20.03
2700	44.32	AV	H	29.48	3.76	42.14	35.42	54.00	18.58
2850	62.24	PK	V	29.84	3.87	42.17	53.78	74.00	20.22
2850	43.69	AV	V	29.84	3.87	42.17	35.23	54.00	18.77
4824	40.18	PK	V	33.04	5.06	42.89	35.39	74.00	38.61
4824	31.27	AV	V	33.04	5.06	42.89	26.48	54.00	27.52
7236	38.37	PK	V	35.82	6.44	43.55	37.08	74.00	36.92
7236	30.58	AV	V	35.82	6.44	43.55	29.29	54.00	24.71
frequency:2437 MHz									
2437	71.53	PK	H	29.09	3.57	0.00	104.19	N/A	N/A
2437	67.48	AV	H	29.09	3.57	0.00	100.14	N/A	N/A
2700	62.04	PK	H	29.48	3.76	42.14	53.14	74.00	20.86
2700	44.69	AV	H	29.48	3.76	42.14	35.79	54.00	18.21
2850	61.94	PK	V	29.84	3.87	42.17	53.48	74.00	20.52
2850	43.18	AV	V	29.84	3.87	42.17	34.72	54.00	19.28
4874	41.02	AV	V	33.17	5.09	42.92	36.36	54.00	17.64
4874	39.28	PK	V	33.17	5.09	42.92	34.62	74.00	39.38
7311	38.49	AV	V	35.98	6.48	43.56	37.39	54.00	16.61
7311	30.62	AV	V	35.98	6.48	43.56	29.52	54.00	24.48
frequency:2462 MHz									
2462	70.65	PK	H	29.05	3.59	0.00	103.29	N/A	N/A
2462	66.63	AV	H	29.05	3.59	0.00	99.27	N/A	N/A
2483.5	29.17	PK	H	29.02	3.61	0.00	61.80	74.00	12.20
2483.5	16.49	AV	H	29.02	3.61	0.00	49.12	54.00	4.88
2700	62.49	PK	H	29.48	3.76	42.14	53.59	74.00	20.41
2700	45.05	AV	H	29.48	3.76	42.14	36.15	54.00	17.85
2850	63.21	PK	V	29.84	3.87	42.17	54.75	74.00	19.25
2850	43.18	AV	V	29.84	3.87	42.17	34.72	54.00	19.28
4924	40.33	PK	V	33.30	5.12	42.95	35.80	74.00	38.20
4924	31.33	AV	V	33.30	5.12	42.95	26.80	54.00	27.20
7386	38.69	PK	V	36.15	6.52	43.58	37.78	74.00	36.22
7386	31.26	AV	V	36.15	6.52	43.58	30.35	54.00	23.65

802.11g Mode

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBµV	PK/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
frequency:2412 MHz									
2412	71.96	PK	H	29.12	3.55	0.00	104.63	N/A	N/A
2412	59.92	AV	H	29.12	3.55	0.00	92.59	N/A	N/A
2390	30.27	PK	H	29.15	3.54	0.00	62.96	74.00	11.04
2390	17.03	AV	H	29.15	3.54	0.00	49.72	54.00	4.28
2700	63.87	PK	H	29.48	3.76	42.14	54.97	74.00	19.03
2700	43.43	AV	H	29.48	3.76	42.14	34.53	54.00	19.47
2850	62.95	PK	V	29.84	3.87	42.17	54.49	74.00	19.51
2850	43.48	AV	V	29.84	3.87	42.17	35.02	54.00	18.98
4824	40.17	PK	V	33.04	5.06	42.89	35.38	74.00	38.62
4824	32.13	AV	V	33.04	5.06	42.89	27.34	54.00	26.66
7236	38.99	PK	V	35.82	6.44	43.55	37.70	74.00	36.30
7236	31.38	AV	V	35.82	6.44	43.55	30.09	54.00	23.91
frequency:2437 MHz									
2437	72.88	PK	H	29.09	3.57	0.00	105.54	N/A	N/A
2437	61.03	AV	H	29.09	3.57	0.00	93.69	N/A	N/A
2700	62.70	PK	H	29.48	3.76	42.14	53.80	74.00	20.20
2700	44.01	AV	H	29.48	3.76	42.14	35.11	54.00	18.89
2850	63.13	PK	V	29.84	3.87	42.17	54.67	74.00	19.33
2850	43.52	AV	V	29.84	3.87	42.17	35.06	54.00	18.94
4874	40.72	AV	V	33.17	5.09	42.92	36.06	54.00	17.94
4874	31.77	PK	V	33.17	5.09	42.92	27.11	74.00	46.89
7311	38.98	AV	V	35.98	6.48	43.56	37.88	54.00	16.12
7311	30.92	AV	V	35.98	6.48	43.56	29.82	54.00	24.18
frequency:2462 MHz									
2462	72.29	PK	H	29.05	3.59	0.00	104.93	N/A	N/A
2462	60.20	AV	H	29.05	3.59	0.00	92.84	N/A	N/A
2483.5	30.49	PK	H	29.02	3.61	0.00	63.12	74.00	10.88
2483.5	16.12	AV	H	29.02	3.61	0.00	48.75	54.00	5.25
2700	63.44	PK	H	29.48	3.76	42.14	54.54	74.00	19.46
2700	43.66	AV	H	29.48	3.76	42.14	34.76	54.00	19.24
2850	62.21	PK	V	29.84	3.87	42.17	53.75	74.00	20.25
2850	44.49	AV	V	29.84	3.87	42.17	36.03	54.00	17.97
4924	41.57	PK	V	33.30	5.12	42.95	37.04	74.00	36.96
4924	31.78	AV	V	33.30	5.12	42.95	27.25	54.00	26.75
7386	39.18	PK	V	36.15	6.52	43.58	38.27	74.00	35.73
7386	30.75	AV	V	36.15	6.52	43.58	29.84	54.00	24.16

Chain 1

802.11b Mode

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBµV	PK/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
frequency:2412 MHz									
2412	70.52	PK	H	29.12	3.55	0.00	103.19	N/A	N/A
2412	66.34	AV	H	29.12	3.55	0.00	99.01	N/A	N/A
2390	29.52	PK	H	29.15	3.54	0.00	62.21	74.00	11.79
2390	15.14	AV	H	29.15	3.54	0.00	47.83	54.00	6.17
2700	62.05	PK	H	29.48	3.76	42.14	53.15	74.00	20.85
2700	43.32	AV	H	29.48	3.76	42.14	34.42	54.00	19.58
2850	61.62	PK	V	29.84	3.87	42.17	53.16	74.00	20.84
2850	42.78	AV	V	29.84	3.87	42.17	34.32	54.00	19.68
4824	40.37	PK	V	33.04	5.06	42.89	35.58	74.00	38.42
4824	31.78	AV	V	33.04	5.06	42.89	26.99	54.00	27.01
7236	38.71	PK	V	35.82	6.44	43.55	37.42	74.00	36.58
7236	31.51	AV	V	35.82	6.44	43.55	30.22	54.00	23.78
frequency:2437 MHz									
2437	72.15	PK	H	29.09	3.57	0.00	104.81	N/A	N/A
2437	68.94	AV	H	29.09	3.57	0.00	101.60	N/A	N/A
2700	63.69	PK	H	29.48	3.76	42.14	54.79	74.00	19.21
2700	44.73	AV	H	29.48	3.76	42.14	35.83	54.00	18.17
2850	62.89	PK	V	29.84	3.87	42.17	54.43	74.00	19.57
2850	44.28	AV	V	29.84	3.87	42.17	35.82	54.00	18.18
4874	41.45	PK	V	33.17	5.09	42.92	36.79	74.00	37.21
4874	31.19	AV	V	33.17	5.09	42.92	26.53	54.00	27.47
7311	39.37	PK	V	35.98	6.48	43.56	38.27	74.00	35.73
7311	31.14	AV	V	35.98	6.48	43.56	30.04	54.00	23.96
frequency:2462 MHz									
2462	70.32	PK	H	29.05	3.59	0.00	102.96	N/A	N/A
2462	66.24	AV	H	29.05	3.59	0.00	98.88	N/A	N/A
2483.5	30.04	PK	H	29.02	3.61	0.00	62.67	74.00	11.33
2483.5	17.21	AV	H	29.02	3.61	0.00	49.84	54.00	4.16
2700	63.19	PK	H	29.48	3.76	42.14	54.29	74.00	19.71
2700	45.02	AV	H	29.48	3.76	42.14	36.12	54.00	17.88
2850	61.73	PK	V	29.84	3.87	42.17	53.27	74.00	20.73
2850	42.77	AV	V	29.84	3.87	42.17	34.31	54.00	19.69
4924	40.75	PK	V	33.30	5.12	42.95	36.22	74.00	37.78
4924	31.24	AV	V	33.30	5.12	42.95	26.71	54.00	27.29
7386	38.94	PK	V	36.15	6.52	43.58	38.03	74.00	35.97
7386	30.68	AV	V	36.15	6.52	43.58	29.77	54.00	24.23

802.11g Mode

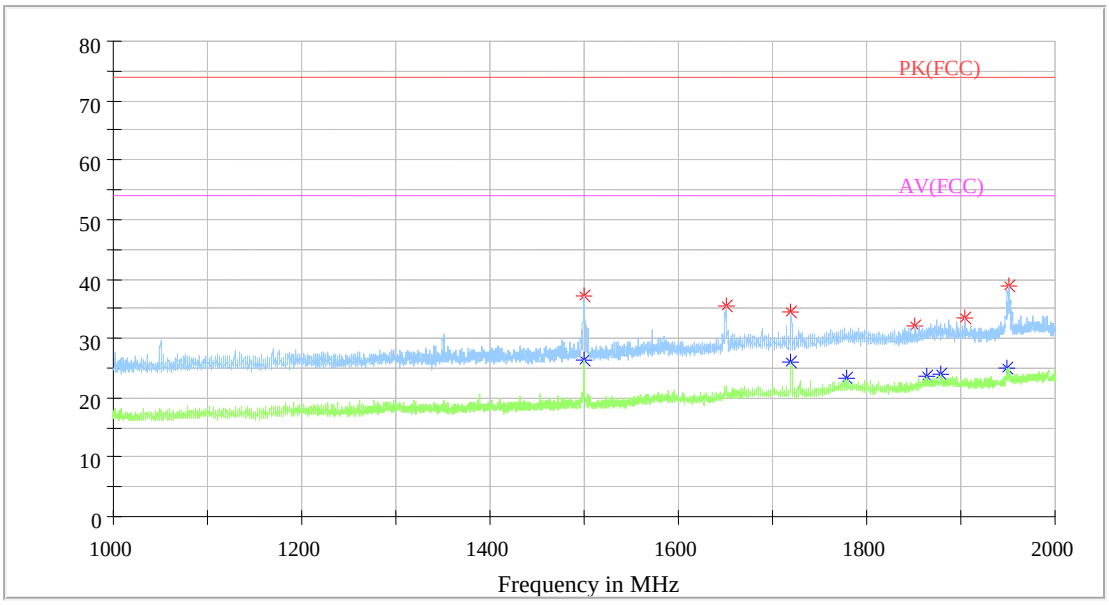
Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBµV	PK/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
frequency:2412 MHz									
2412	71.56	PK	H	29.12	3.55	0.00	104.23	N/A	N/A
2412	59.14	AV	H	29.12	3.55	0.00	91.81	N/A	N/A
2390	29.08	PK	H	29.15	3.54	0.00	61.77	74.00	12.23
2390	17.24	AV	H	29.15	3.54	0.00	49.93	54.00	4.07
2700	63.13	PK	H	29.48	3.76	42.14	54.23	74.00	19.77
2700	43.35	AV	H	29.48	3.76	42.14	34.45	54.00	19.55
2850	63.12	PK	V	29.84	3.87	42.17	54.66	74.00	19.34
2850	43.65	AV	V	29.84	3.87	42.17	35.19	54.00	18.81
4824	40.41	PK	V	33.04	5.06	42.89	35.62	74.00	38.38
4824	31.47	AV	V	33.04	5.06	42.89	26.68	54.00	27.32
7236	38.38	PK	V	35.82	6.44	43.55	37.09	74.00	36.91
7236	30.98	AV	V	35.82	6.44	43.55	29.69	54.00	24.31
frequency:2437 MHz									
2437	72.68	PK	H	29.09	3.57	0.00	105.34	N/A	N/A
2437	60.57	AV	H	29.09	3.57	0.00	93.23	N/A	N/A
2700	63.29	PK	H	29.48	3.76	42.14	54.39	74.00	19.61
2700	43.50	AV	H	29.48	3.76	42.14	34.60	54.00	19.40
2850	62.88	PK	V	29.84	3.87	42.17	54.42	74.00	19.58
2850	44.60	AV	V	29.84	3.87	42.17	36.14	54.00	17.86
4874	40.92	PK	V	33.17	5.09	42.92	36.26	74.00	37.74
4874	31.87	AV	V	33.17	5.09	42.92	27.21	54.00	26.79
7311	39.23	PK	V	35.98	6.48	43.56	38.13	74.00	35.87
7311	30.62	AV	V	35.98	6.48	43.56	29.52	54.00	24.48
frequency:2462 MHz									
2462	72.58	PK	H	29.05	3.59	0.00	105.22	N/A	N/A
2462	60.34	AV	H	29.05	3.59	0.00	92.98	N/A	N/A
2483.5	29.83	PK	H	29.02	3.61	0.00	62.46	74.00	11.54
2483.5	16.85	AV	H	29.02	3.61	0.00	49.48	54.00	4.52
2700	63.59	PK	H	29.48	3.76	42.14	54.69	74.00	19.31
2700	44.17	AV	H	29.48	3.76	42.14	35.27	54.00	18.73
2850	61.41	PK	V	29.84	3.87	42.17	52.95	74.00	21.05
2850	43.03	AV	V	29.84	3.87	42.17	34.57	54.00	19.43
4924	42.09	PK	V	33.30	5.12	42.95	37.56	74.00	36.44
4924	31.71	AV	V	33.30	5.12	42.95	27.18	54.00	26.82
7386	39.18	PK	V	36.15	6.52	43.58	38.27	74.00	35.73
7386	31.24	AV	V	36.15	6.52	43.58	30.33	54.00	23.67

802.11n-HT20 Mode (MIMO)-Chain0+Chain1

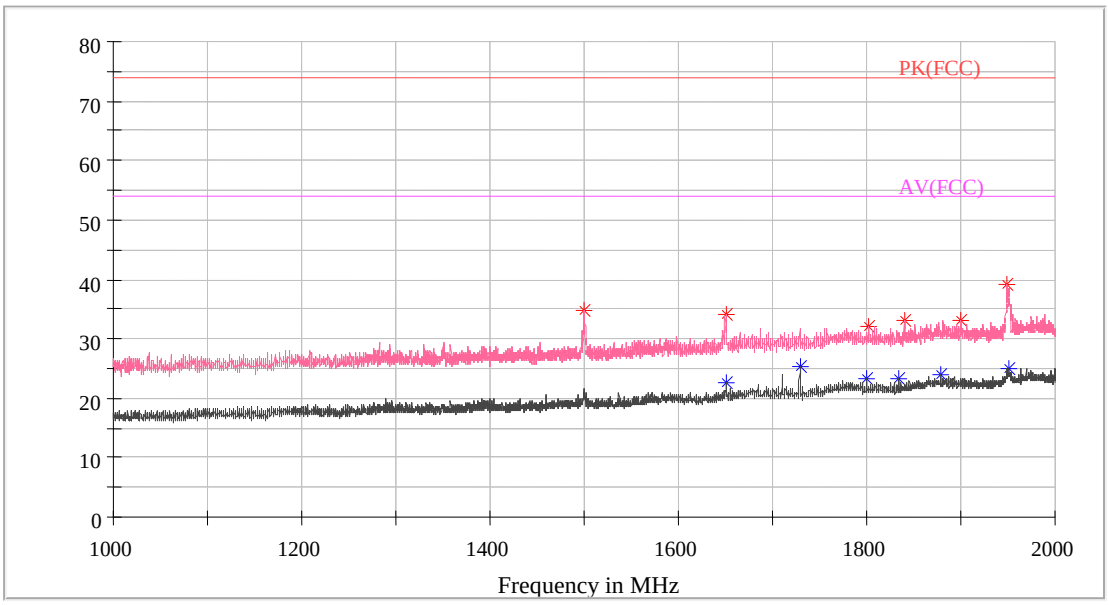
Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBµV	PK/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
			frequency:	2412	MHz				
2412	73.45	PK	H	29.12	3.55	0.00	106.12	N/A	N/A
2412	63.34	AV	H	29.12	3.55	0.00	96.01	N/A	N/A
2390	31.27	PK	H	29.15	3.54	0.00	63.96	74.00	10.04
2390	16.18	AV	H	29.15	3.54	0.00	48.87	54.00	5.13
2700	63.60	PK	H	29.48	3.76	42.14	54.70	74.00	19.30
2700	43.79	AV	H	29.48	3.76	42.14	34.89	54.00	19.11
2850	62.44	PK	V	29.84	3.87	42.17	53.98	74.00	20.02
2850	44.27	AV	V	29.84	3.87	42.17	35.81	54.00	18.19
4824	39.99	PK	V	33.04	5.06	42.89	35.20	74.00	38.80
4824	31.44	AV	V	33.04	5.06	42.89	26.65	54.00	27.35
7236	39.27	PK	V	35.82	6.44	43.55	37.98	74.00	36.02
7236	31.32	AV	V	35.82	6.44	43.55	30.03	54.00	23.97
			frequency:	2437	MHz				
2437	72.66	PK	H	29.09	3.57	0.00	105.32	N/A	N/A
2437	60.48	AV	H	29.09	3.57	0.00	93.14	N/A	N/A
2700	62.84	PK	H	29.48	3.76	42.14	53.94	74.00	20.06
2700	43.91	AV	H	29.48	3.76	42.14	35.01	54.00	18.99
2850	61.91	PK	V	29.84	3.87	42.17	53.45	74.00	20.55
2850	42.72	AV	V	29.84	3.87	42.17	34.26	54.00	19.74
4874	40.67	PK	V	33.17	5.09	42.92	36.01	74.00	37.99
4874	31.02	AV	V	33.17	5.09	42.92	26.36	54.00	27.64
7311	39.11	PK	V	35.98	6.48	43.56	38.01	74.00	35.99
7311	30.90	AV	V	35.98	6.48	43.56	29.80	54.00	24.20
			frequency:	2462	MHz				
2462	72.65	PK	H	29.05	3.59	0.00	105.29	N/A	N/A
2462	59.50	AV	H	29.05	3.59	0.00	92.14	N/A	N/A
2483.5	34.95	PK	H	29.02	3.61	0.00	67.58	74.00	6.42
2483.5	19.68	AV	H	29.02	3.61	0.00	52.31	54.00	1.69
2700	63.09	PK	H	29.48	3.76	42.14	54.19	74.00	19.81
2700	44.03	AV	H	29.48	3.76	42.14	35.13	54.00	18.87
2850	62.59	PK	V	29.84	3.87	42.17	54.13	74.00	19.87
2850	43.30	AV	V	29.84	3.87	42.17	34.84	54.00	19.16
4924	40.61	PK	V	33.30	5.12	42.95	36.08	74.00	37.92
4924	31.26	AV	V	33.30	5.12	42.95	26.73	54.00	27.27
7386	39.18	PK	V	36.15	6.52	43.58	38.27	74.00	35.73
7386	31.40	AV	V	36.15	6.52	43.58	30.49	54.00	23.51

Please refer to the below pre-scan plot of worst case:

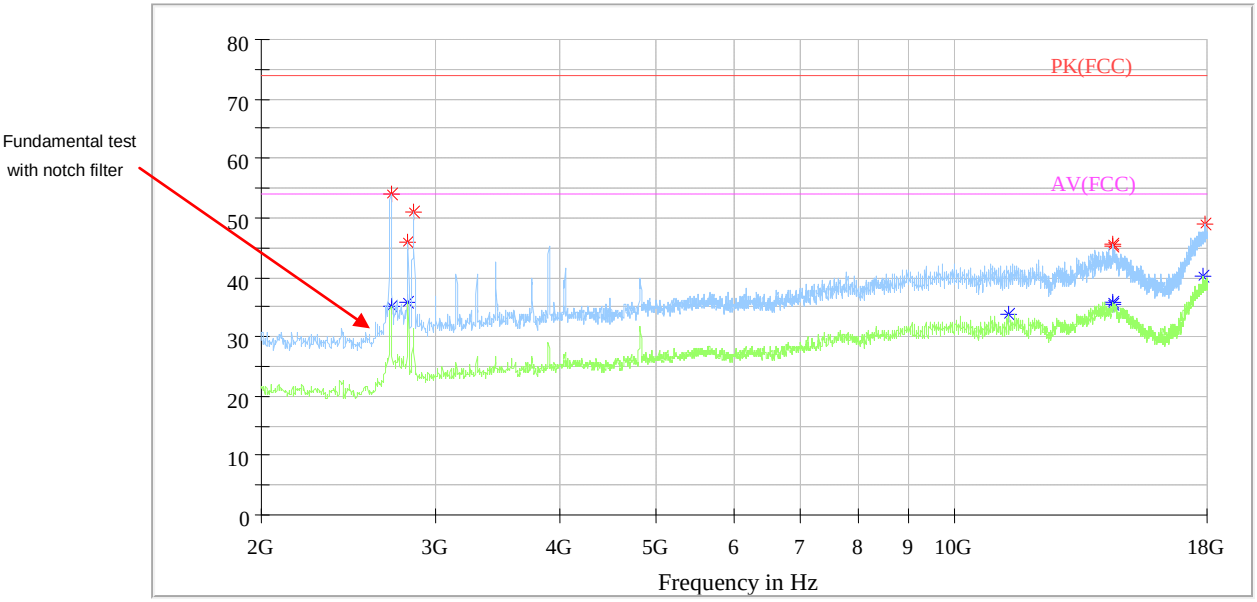
802.11n20 Mode: High Channel_Horizontal_1GHz-2GHz



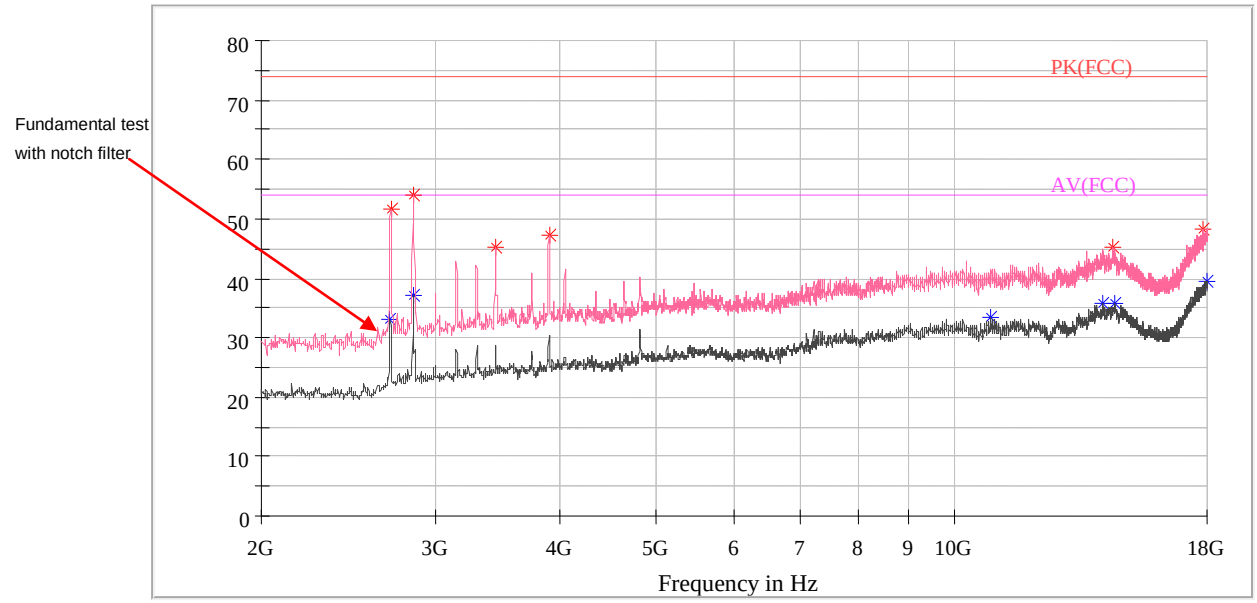
802.11n20 Mode: High Channel_Vertical_1GHz-2GHz



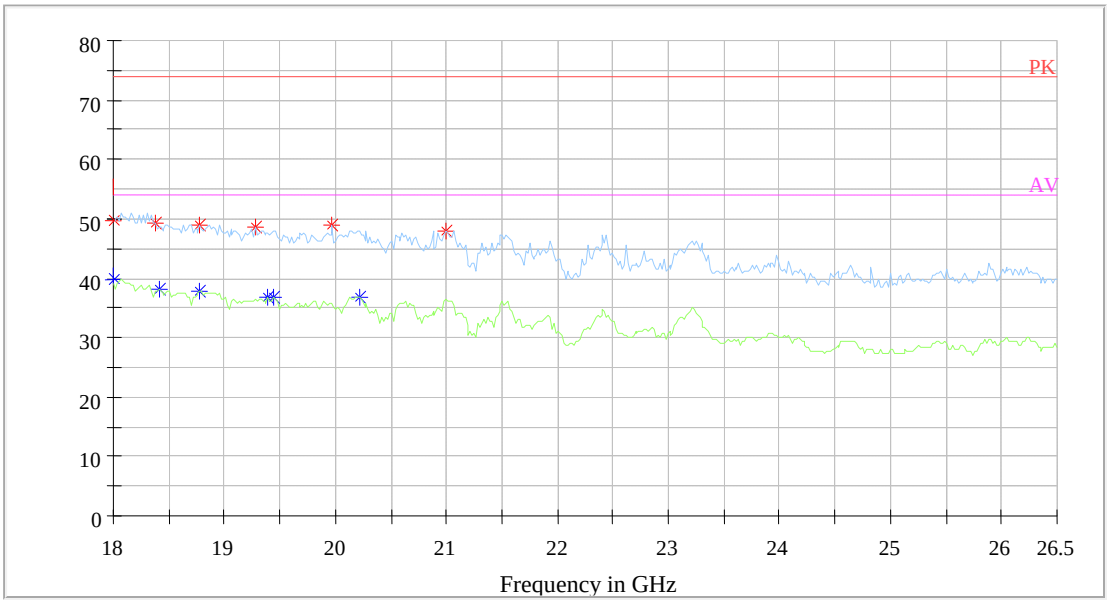
802.11n20 Mode: High Channel_Horizontal_2GHz-18GHz



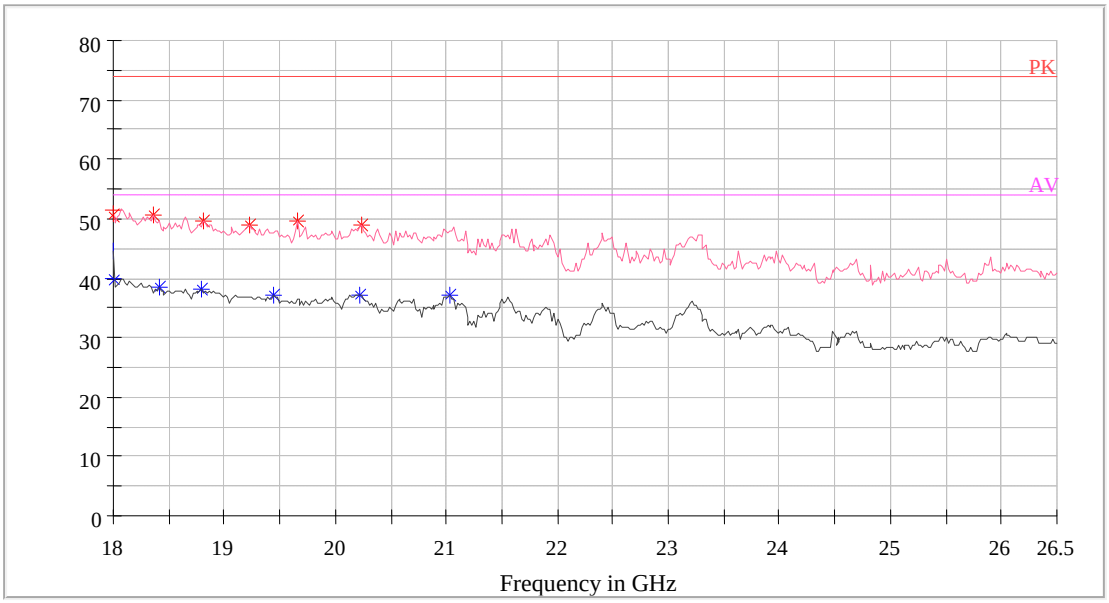
802.11n20 Mode: High Channel_Vertical_2GHz-18GHz



802.11n20 Mode: High Channel_Horizontal_18GHz-26.5GHz



802.11n20 Mode: High Channel_Vertical_18GHz-26.5GHz

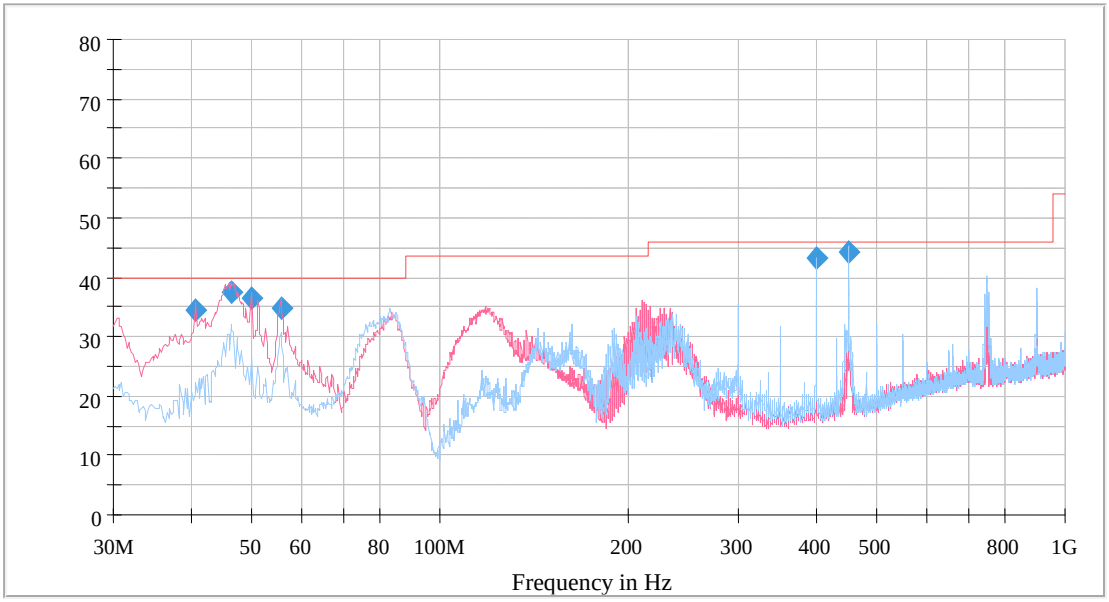


Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor
Margin = Limit- Corr. Amplitude
Spurious emissions more than 20 dB below the limit were not reported.

BLE Mode

1) 30 MHz to 1 GHz

Low channel-worst case



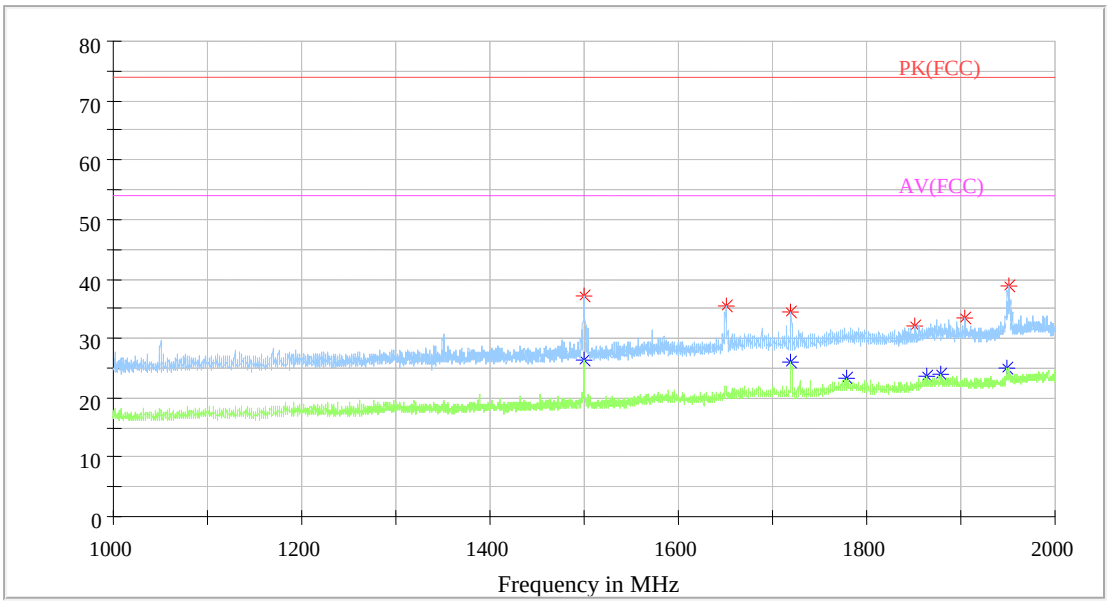
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
40.677500	34.35	40.00	5.65	200.0	120.000	105.0	V	99.0	-11.5
46.223600	37.47	40.00	2.53	200.0	120.000	107.0	V	0.0	-14.8
49.982900	36.49	40.00	3.51	200.0	120.000	109.0	V	21.0	-16.8
55.766700	34.80	40.00	5.20	200.0	120.000	103.0	V	48.0	-17.4
400.009900	43.20	46.00	2.80	200.0	120.000	104.0	H	65.0	-8.7
449.996800	44.38	46.00	1.62	200.0	120.000	102.0	H	122.0	-8.2

2) Above 1 GHz

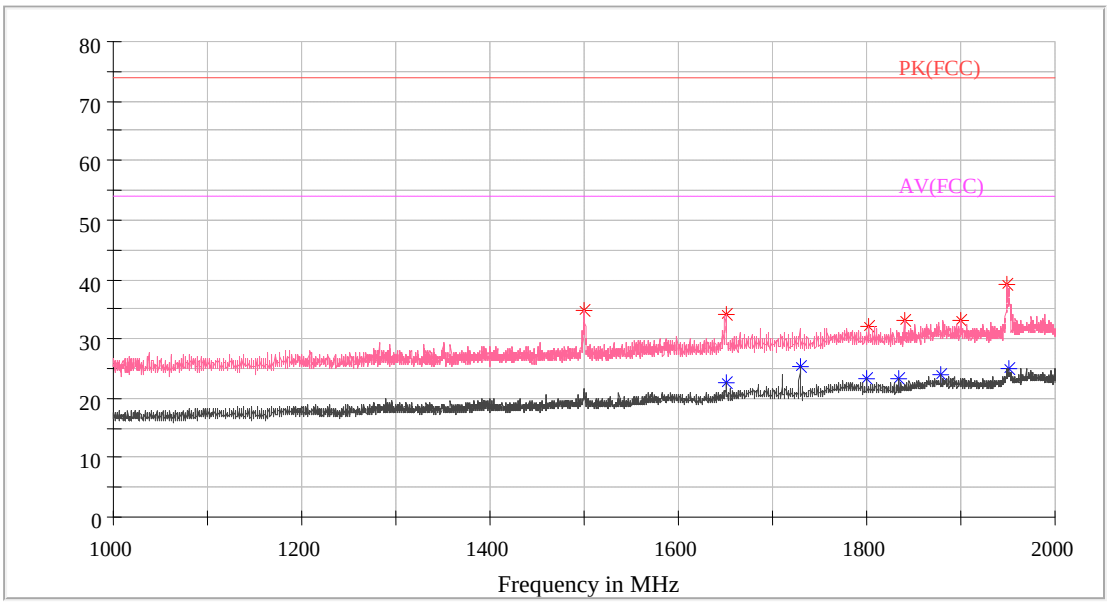
Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBµV	PK/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
frequency:2402 MHz									
2402	70.19	PK	H	28.71	3.55	0.00	102.45	N/A	N/A
2402	48.13	AV	H	28.71	3.55	0.00	80.39	N/A	N/A
2390	26.13	PK	V	28.67	3.54	0.00	58.34	74.00	15.66
2390	12.56	AV	V	28.67	3.54	0.00	44.77	54.00	9.23
2700	58.94	PK	V	29.64	3.76	42.14	50.20	74.00	23.80
2700	35.36	AV	V	29.64	3.76	42.14	26.62	54.00	27.38
2850	62.86	PK	V	30.12	3.87	42.17	54.68	74.00	19.32
2850	42.04	AV	V	30.12	3.87	42.17	33.86	54.00	20.14
4804	40.37	PK	V	33.85	5.05	42.88	36.39	74.00	37.61
4804	33.21	AV	V	33.85	5.05	42.88	29.23	54.00	24.77
7206	38.56	PK	V	36.39	6.43	43.54	37.84	74.00	36.16
7206	29.34	AV	V	36.39	6.43	43.54	28.62	54.00	25.38
frequency:2440 MHz									
2440	70.13	PK	H	28.82	3.58	0.00	102.53	N/A	N/A
2440	49.35	AV	H	28.82	3.58	0.00	81.75	N/A	N/A
2700	58.68	PK	V	29.64	3.76	42.14	49.94	74.00	24.06
2700	35.08	AV	V	29.64	3.76	42.14	26.34	54.00	27.66
2850	62.15	PK	V	30.12	3.87	42.17	53.97	74.00	20.03
2850	42.01	AV	V	30.12	3.87	42.17	33.83	54.00	20.17
4880	39.46	PK	V	34.06	5.09	42.93	35.68	74.00	38.32
4880	32.88	AV	V	34.06	5.09	42.93	29.10	54.00	24.90
7320	36.57	PK	V	36.55	6.49	43.56	36.05	74.00	37.95
7320	28.87	AV	V	36.55	6.49	43.56	28.35	54.00	25.65
frequency:2480 MHz									
2480	70.27	PK	H	28.94	3.61	0.00	102.82	N/A	N/A
2480	48.44	AV	H	28.94	3.61	0.00	80.99	N/A	N/A
2483.5	27.43	PK	V	28.95	3.61	0.00	59.99	74.00	14.01
2483.5	13.56	AV	V	28.95	3.61	0.00	46.12	54.00	7.88
2700	57.63	PK	V	29.64	3.76	42.14	48.89	74.00	25.11
2700	34.88	AV	V	29.64	3.76	42.14	26.14	54.00	27.86
2850	62.13	PK	V	30.12	3.87	42.17	53.95	74.00	20.05
2850	41.34	AV	V	30.12	3.87	42.17	33.16	54.00	20.84
4960	40.38	PK	V	34.29	5.14	42.98	36.83	74.00	37.17
4960	33.31	AV	V	34.29	5.14	42.98	29.76	54.00	24.24
7440	37.25	PK	V	36.72	6.55	43.59	36.93	74.00	37.07
7440	29.04	AV	V	36.72	6.55	43.59	28.72	54.00	25.28

Please refer to the below pre-scan plot of worst case:

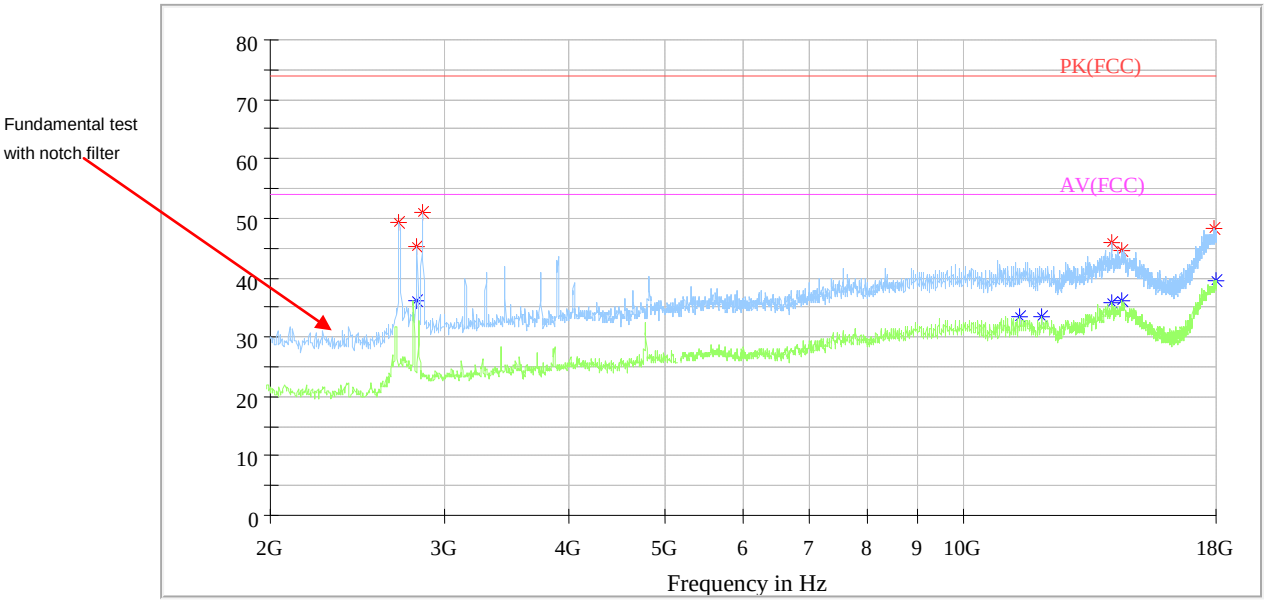
High Channel_Horizontal_1GHz-2GHz



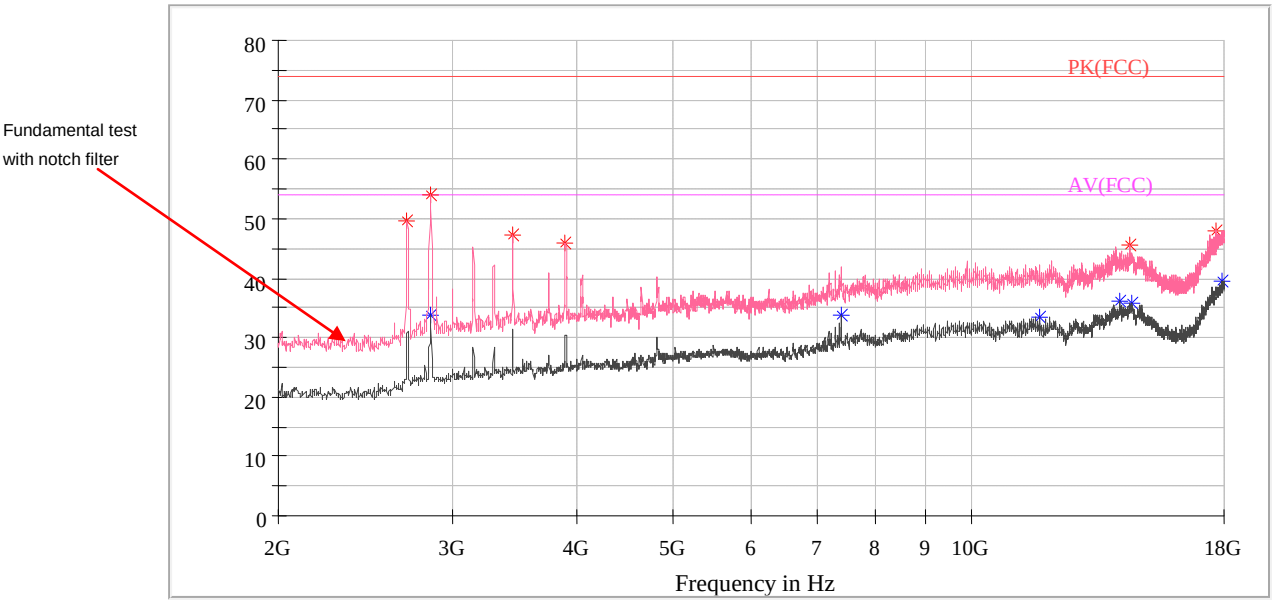
High Channel_Vertical_1GHz-2GHz



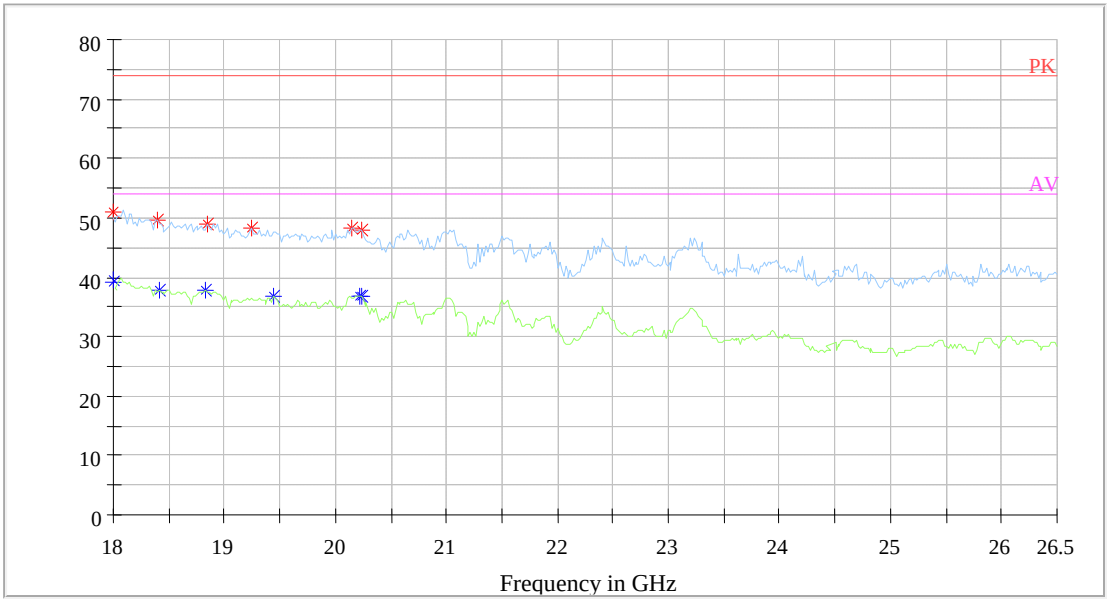
High Channel_Horizontal_2GHz-18GHz



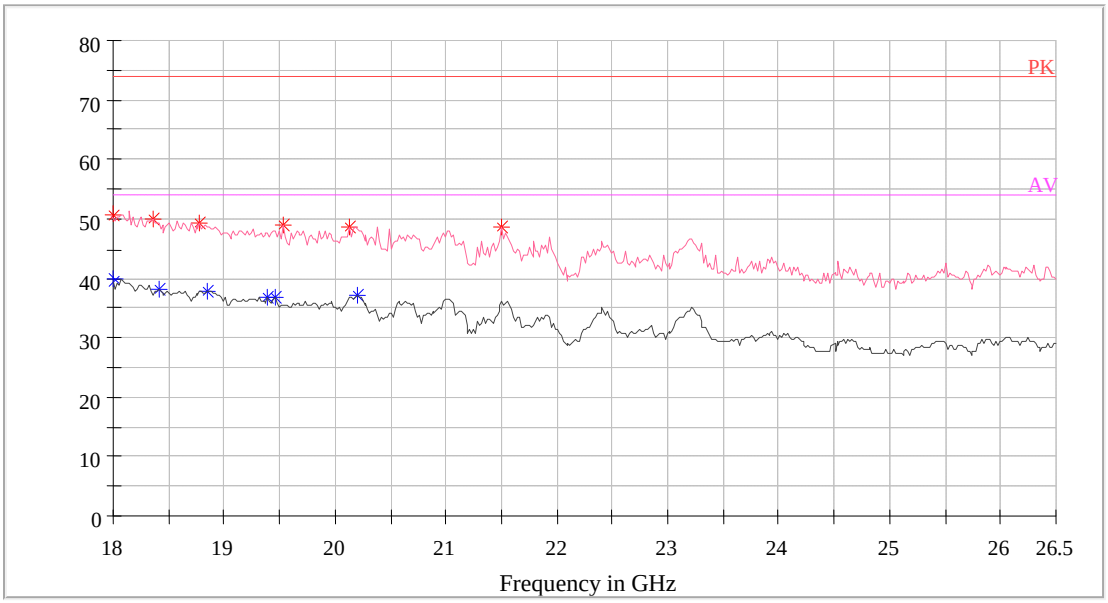
High Channel_Vertical_2GHz-18GHz



High Channel_Horizontal_18GHz-26.5GHz



High Channel_Vertical_18GHz-26.5GHz



Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor
Margin = Limit- Corr. Amplitude

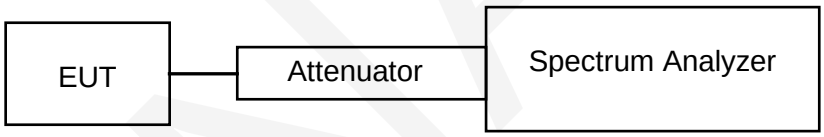
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

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

Test Procedure

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3×RBW
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Data

Environmental Conditions

Temperature:	21 °C
Relative Humidity:	67~69 %
ATM Pressure:	95.3 kPa

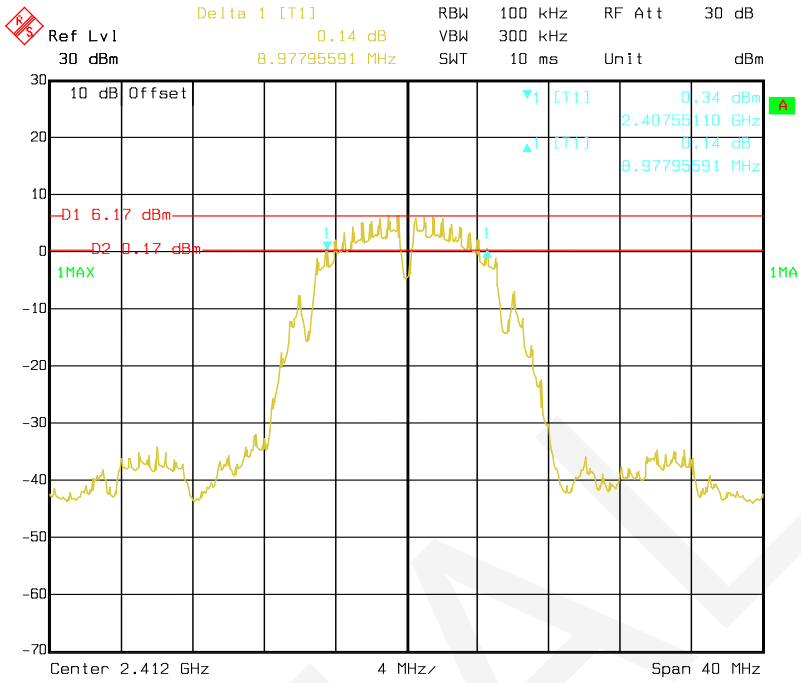
The testing was performed by Eric Xiao on 2019-11-14 & 2019-11-18.

Test Mode: Transmitting

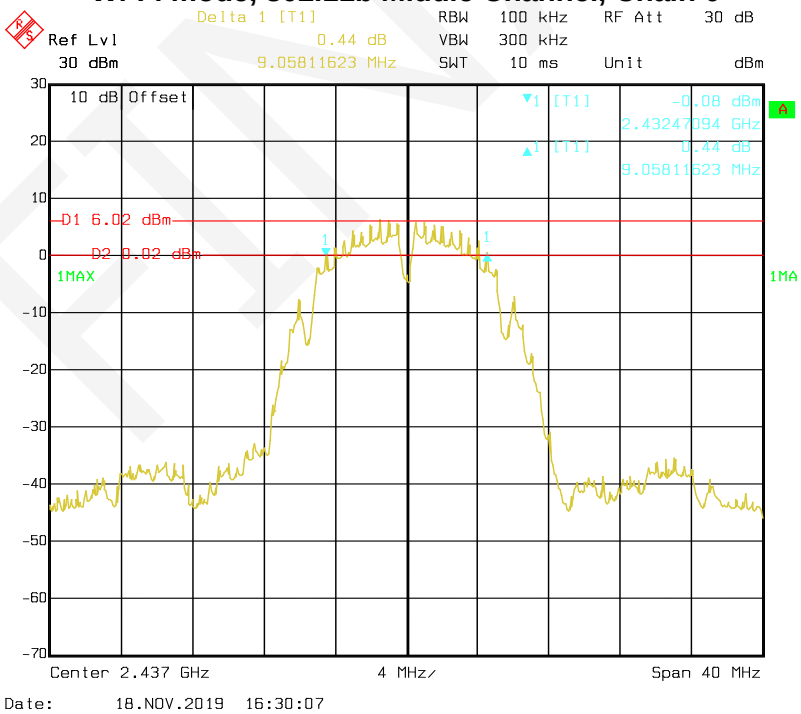
Test Result: Compliance. Please refer to the following table and plots.

Mode	Channel	Frequency (MHz)	6dB Emission Bandwidth (MHz)		Limit (MHz)
			Chain 0	Chain 1	
802.11b	Low	2412	8.98	9.06	≥0.50
	Middle	2437	9.06	9.06	≥0.50
	High	2462	8.98	9.06	≥0.50
802.11g	Low	2412	16.43	16.51	≥0.50
	Middle	2437	16.43	16.51	≥0.50
	High	2462	16.43	16.43	≥0.50
802.11n20	Low	2412	17.64	17.64	≥0.50
	Middle	2437	17.72	17.64	≥0.50
	High	2462	17.64	17.72	≥0.50
BLE	Low	2402	0.75	/	≥0.50
	Middle	2440	0.74	/	≥0.50
	High	2480	0.75	/	≥0.50

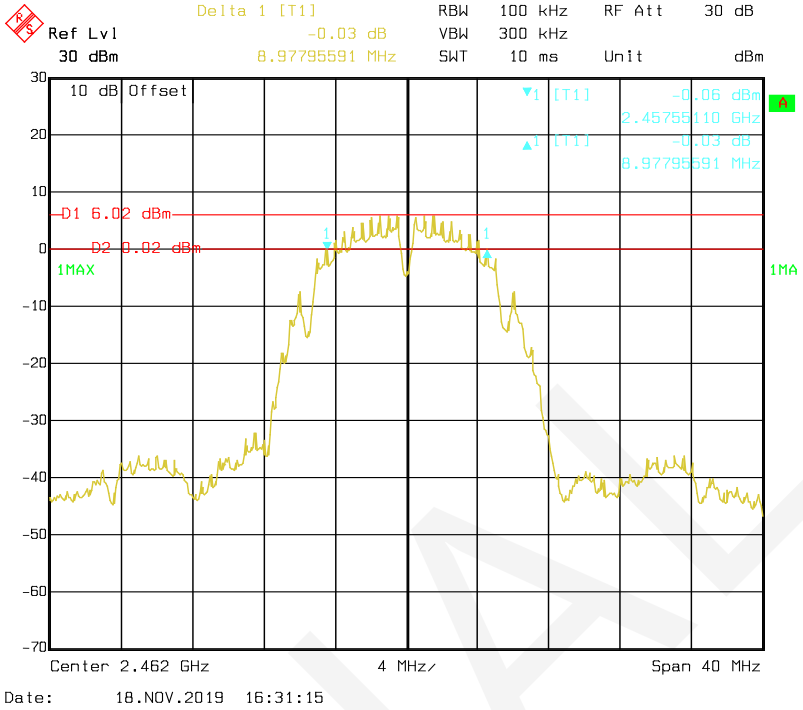
Wi-Fi mode, 802.11b Low Channel, Chain 0



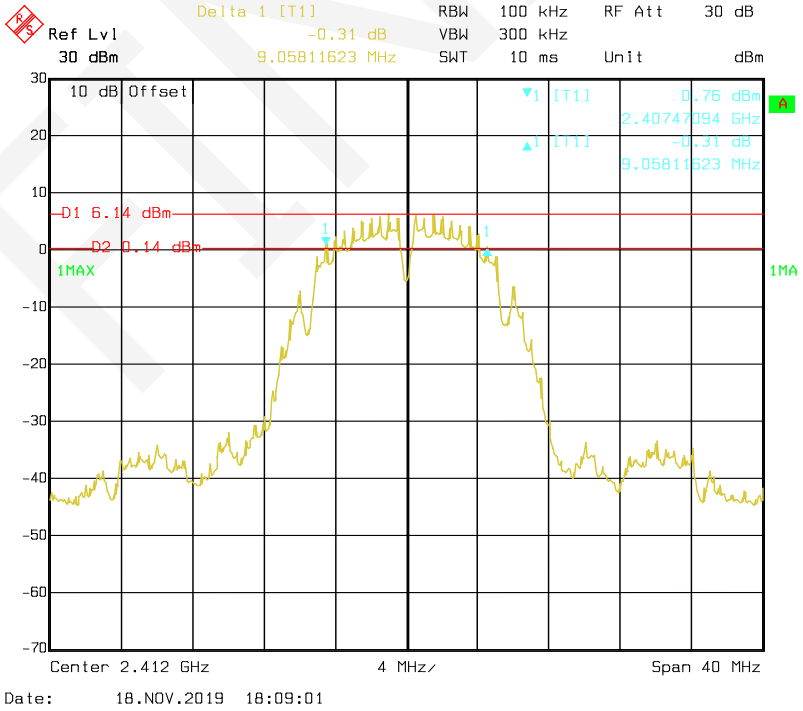
Wi-Fi mode, 802.11b Middle Channel, Chain 0



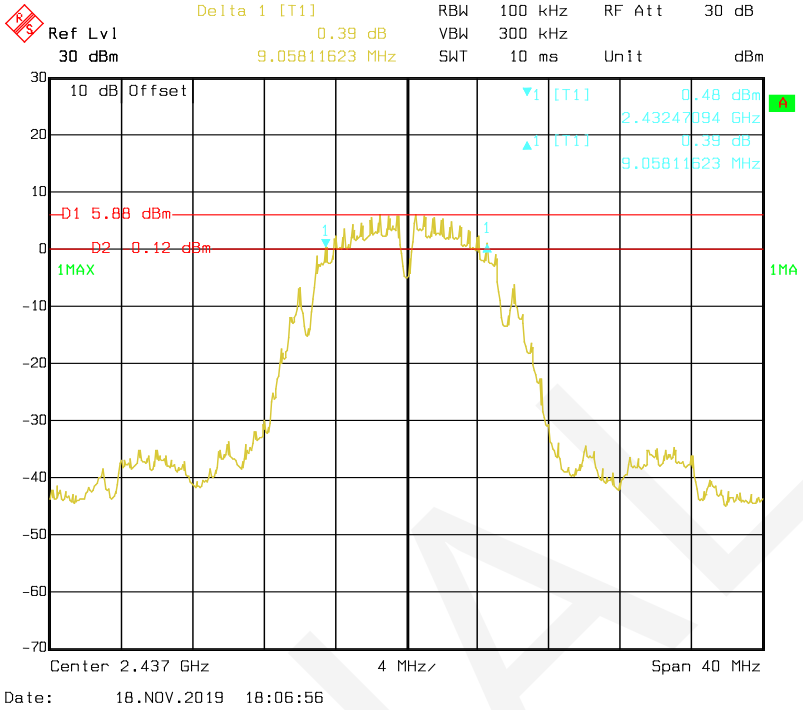
Wi-Fi mode, 802.11b High Channel, Chain 0



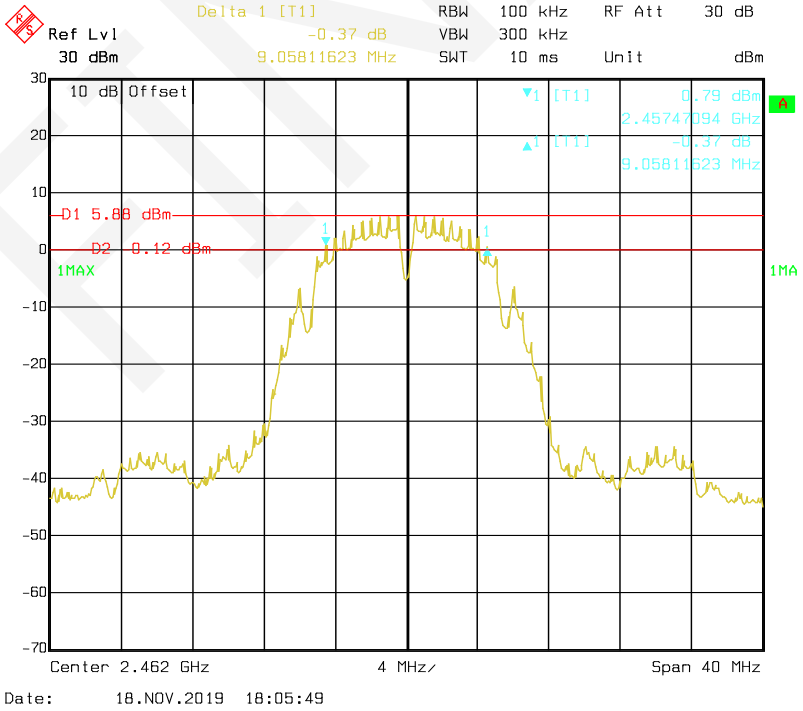
Wi-Fi mode, 802.11b Low Channel, Chain 1



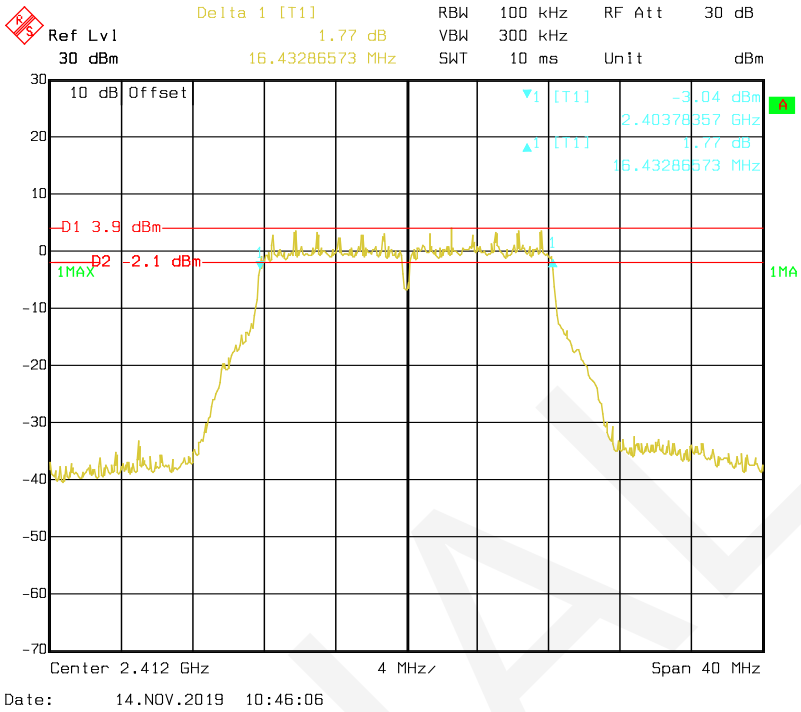
Wi-Fi mode, 802.11b Middle Channel, Chain 1



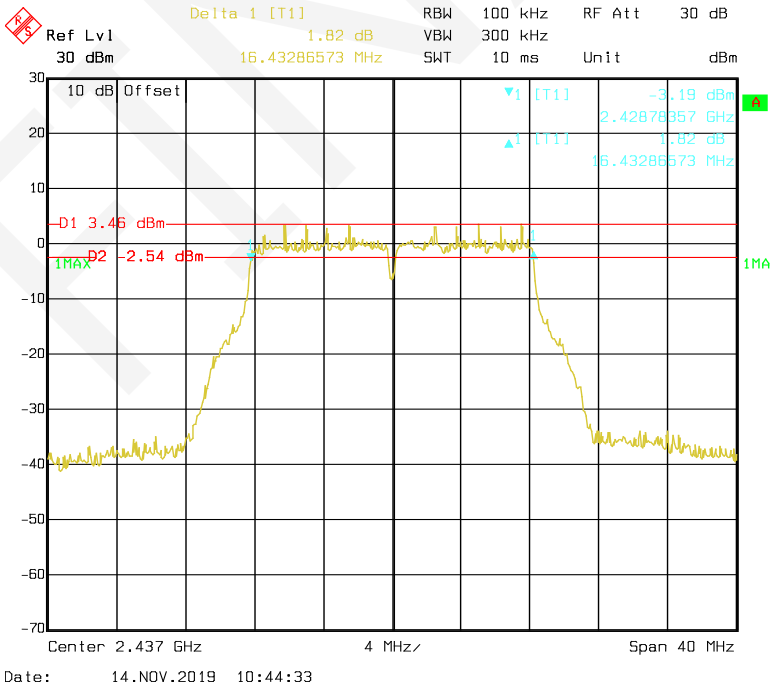
Wi-Fi mode, 802.11b High Channel, Chain 1



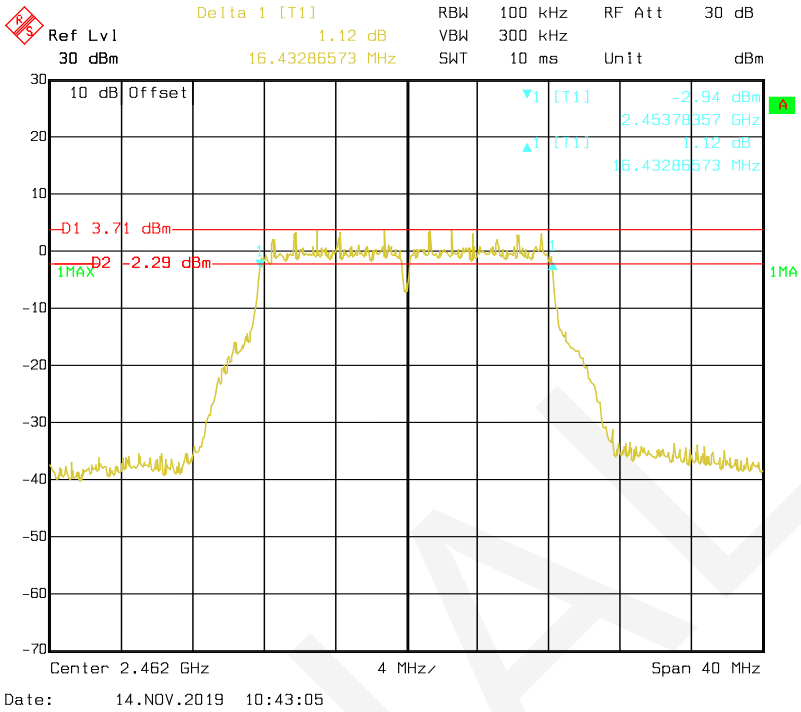
Wi-Fi mode, 802.11g Low Channel, Chain 0



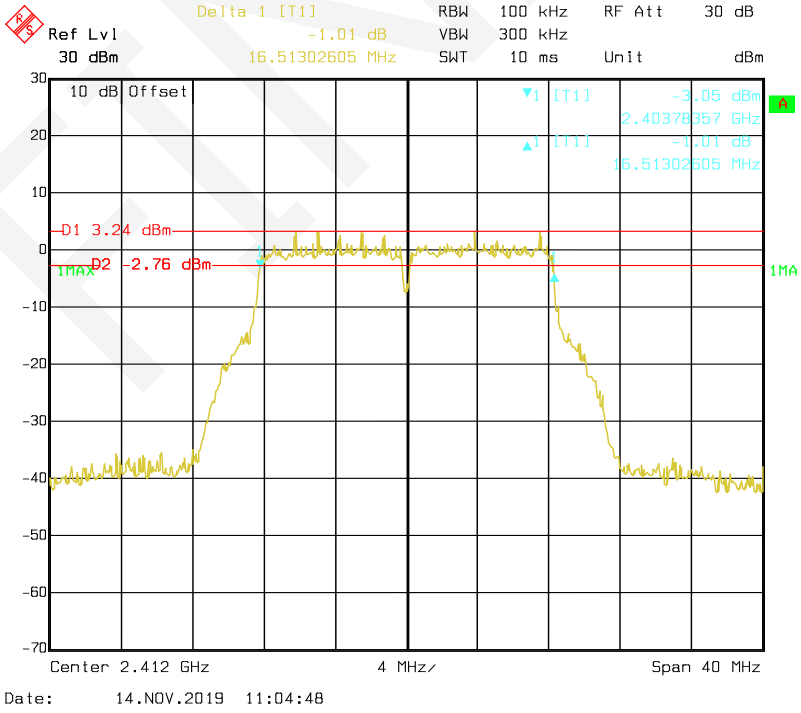
Wi-Fi mode, 802.11g Middle Channel, Chain 0



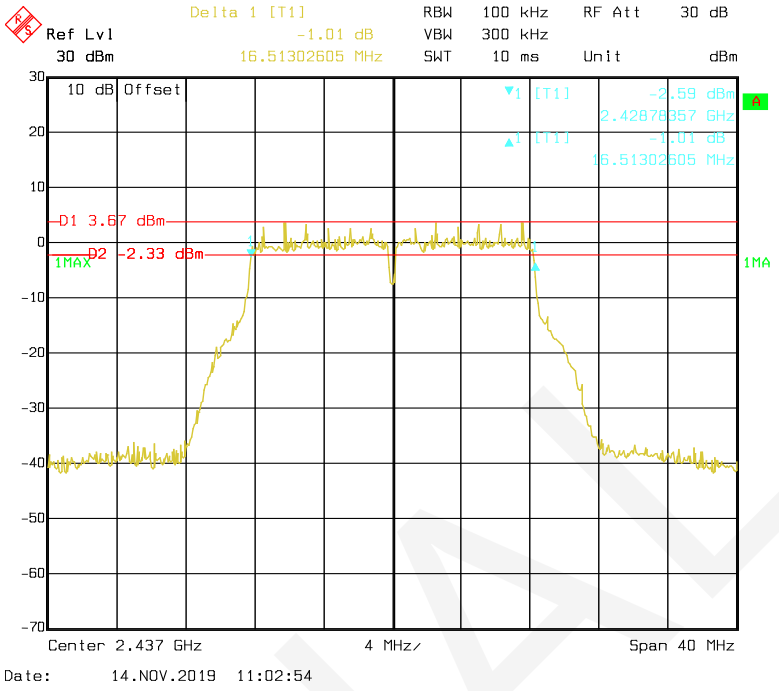
Wi-Fi mode, 802.11g High Channel, Chain 0



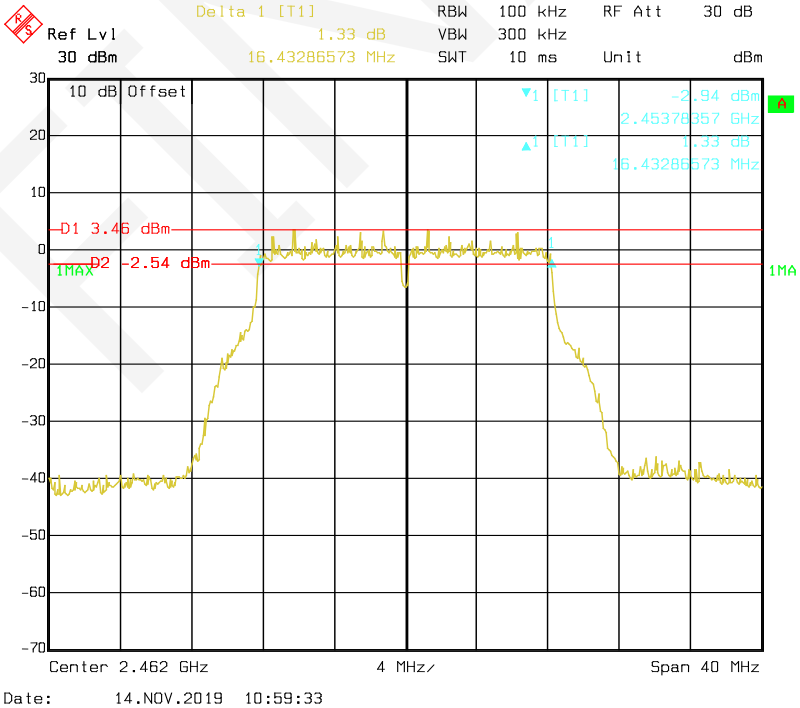
Wi-Fi mode, 802.11g Low Channel, Chain 1



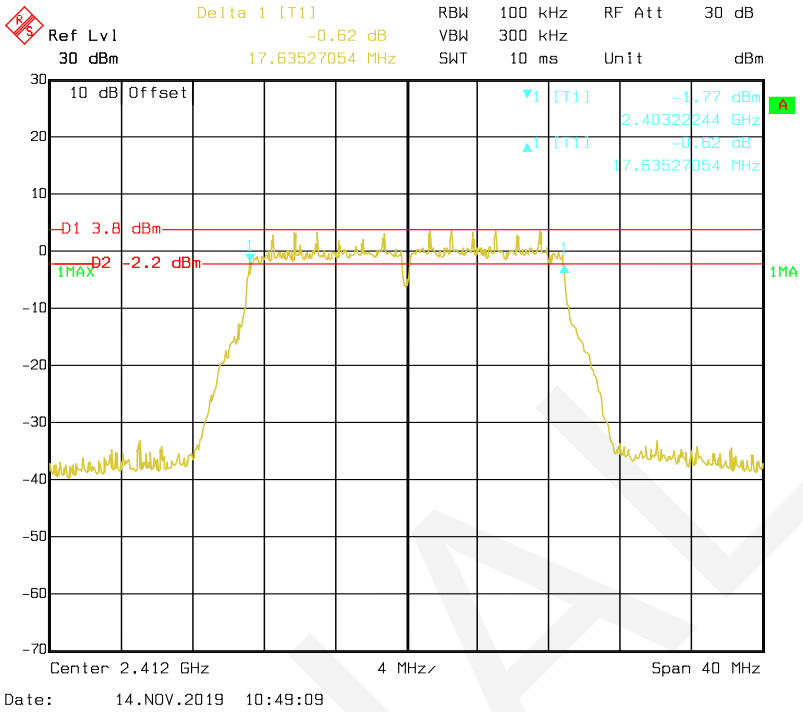
Wi-Fi mode, 802.11g Middle Channel, Chain 1



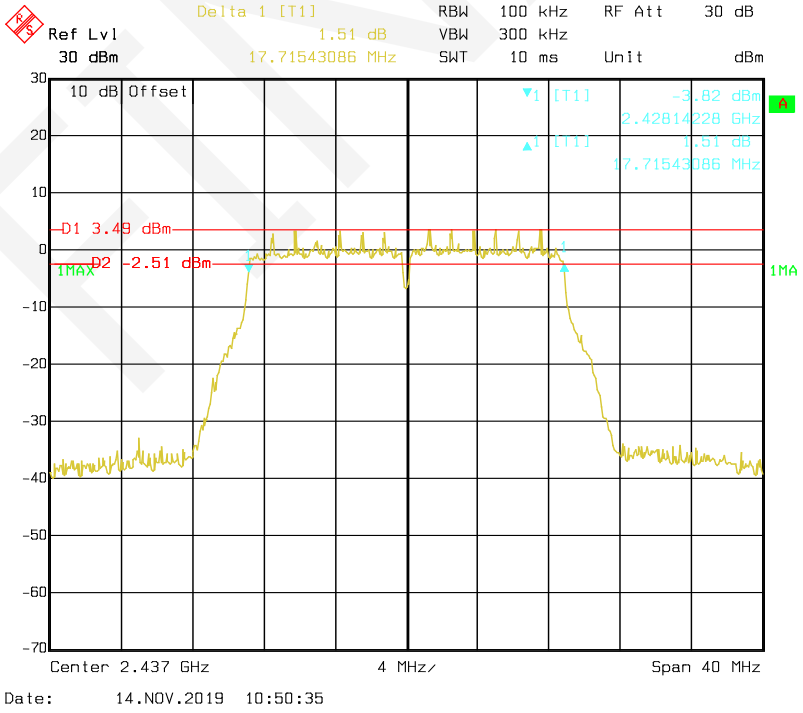
Wi-Fi mode, 802.11g High Channel, Chain 1



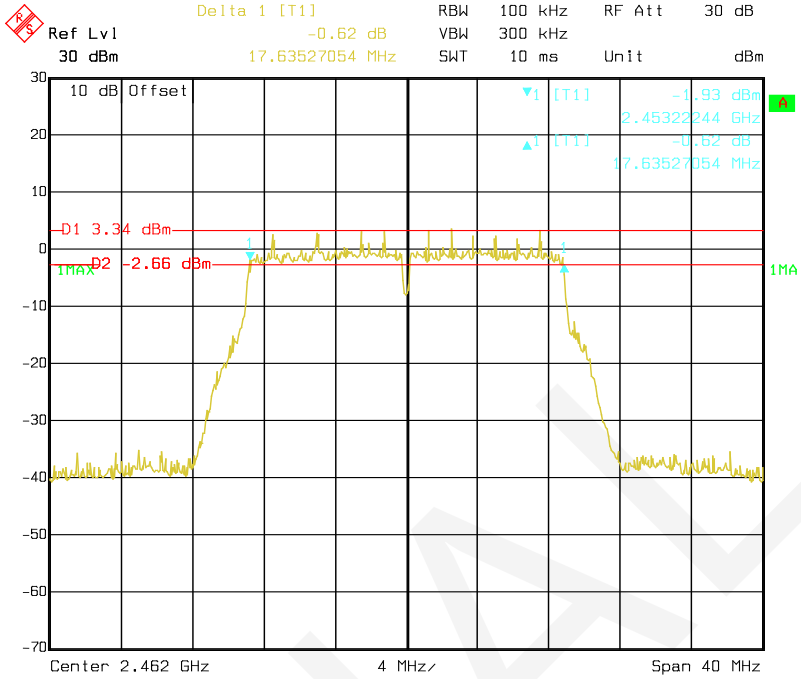
Wi-Fi mode, 802.11n-HT20 Low Channel, Chain 0



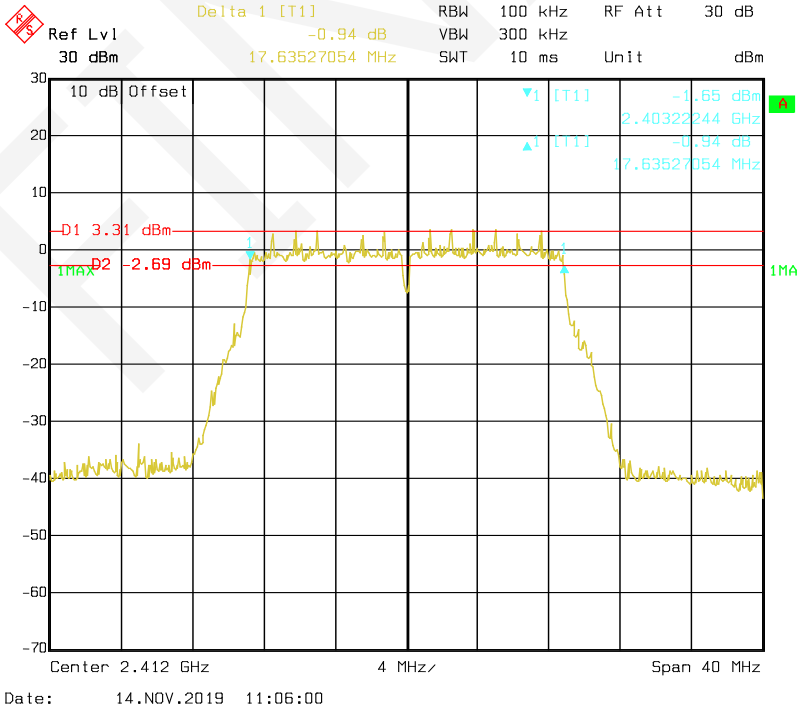
Wi-Fi mode, 802.11n-HT20 Middle Channel, Chain 0



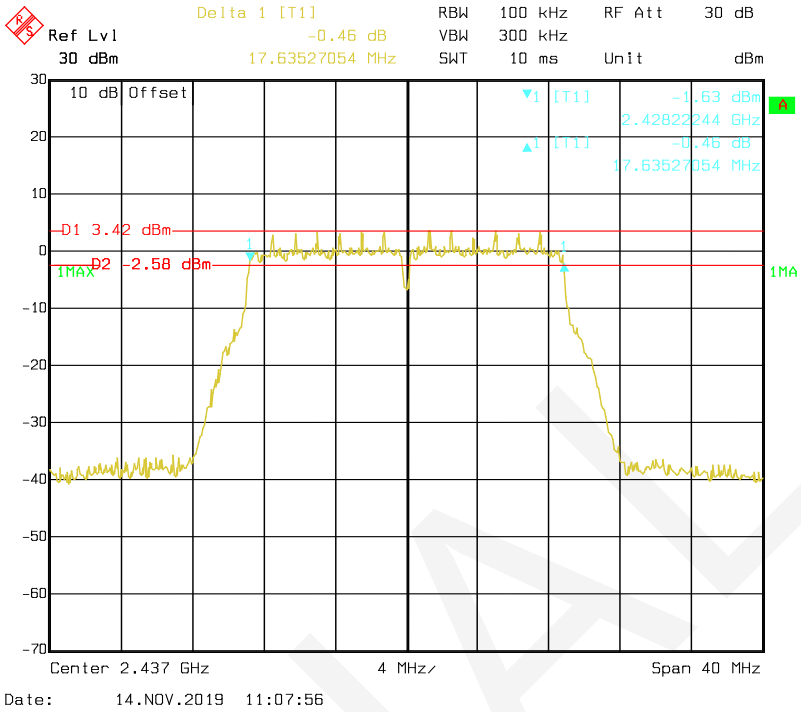
Wi-Fi mode, 802.11n-HT20 High Channel, Chain 0



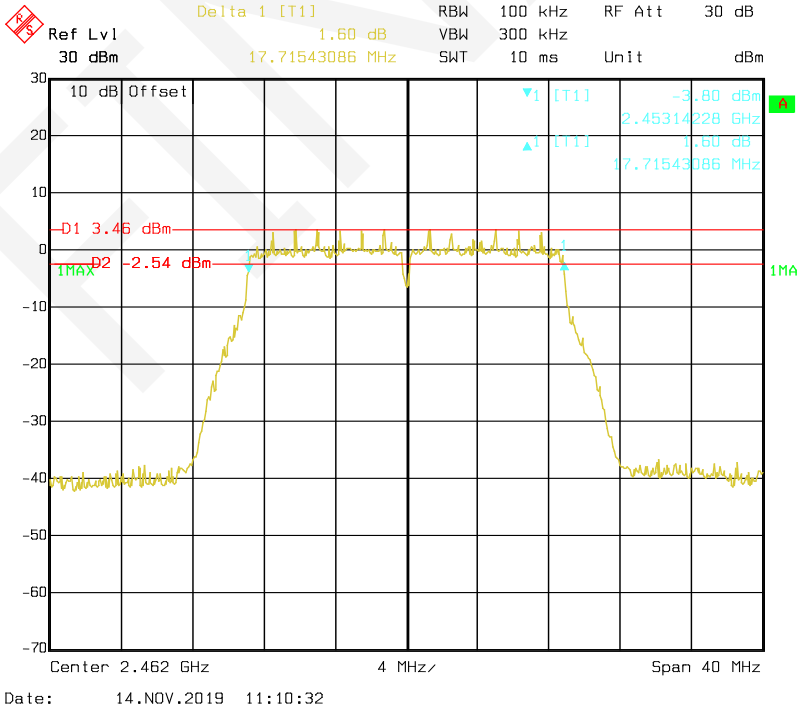
Wi-Fi mode, 802.11n-HT20 Low Channel, Chain 1



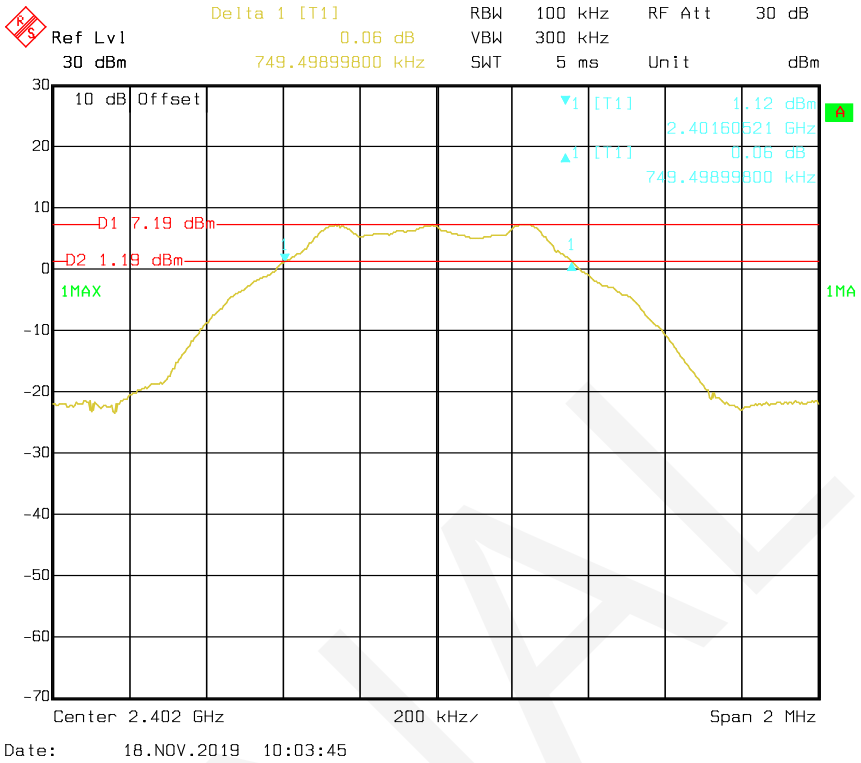
Wi-Fi mode, 802.11n-HT20 Middle Channel, Chain 1



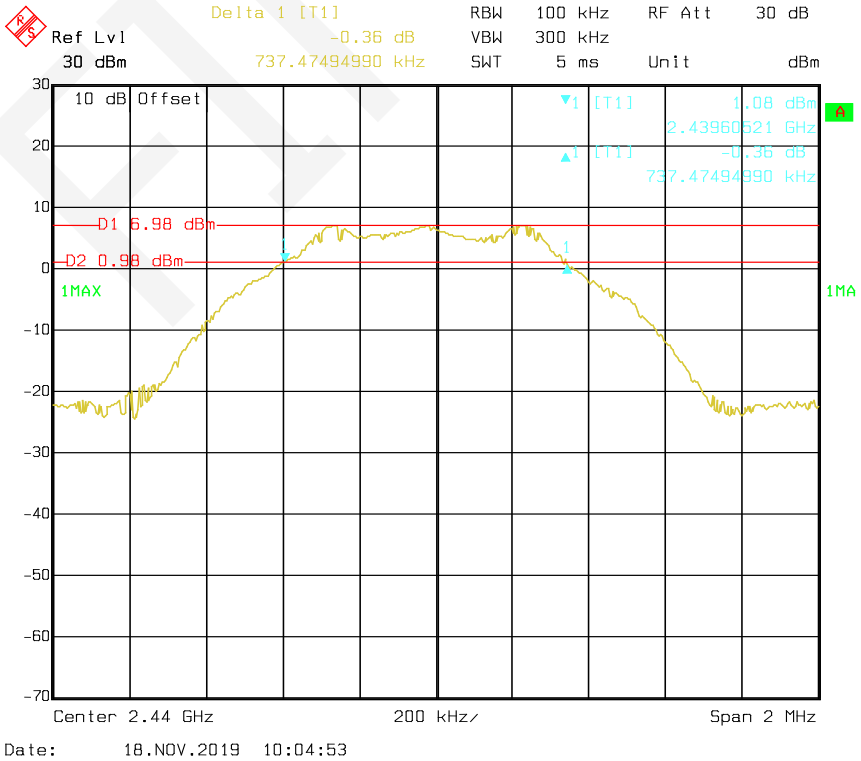
Wi-Fi mode, 802.11n-HT20 High Channel, Chain 1



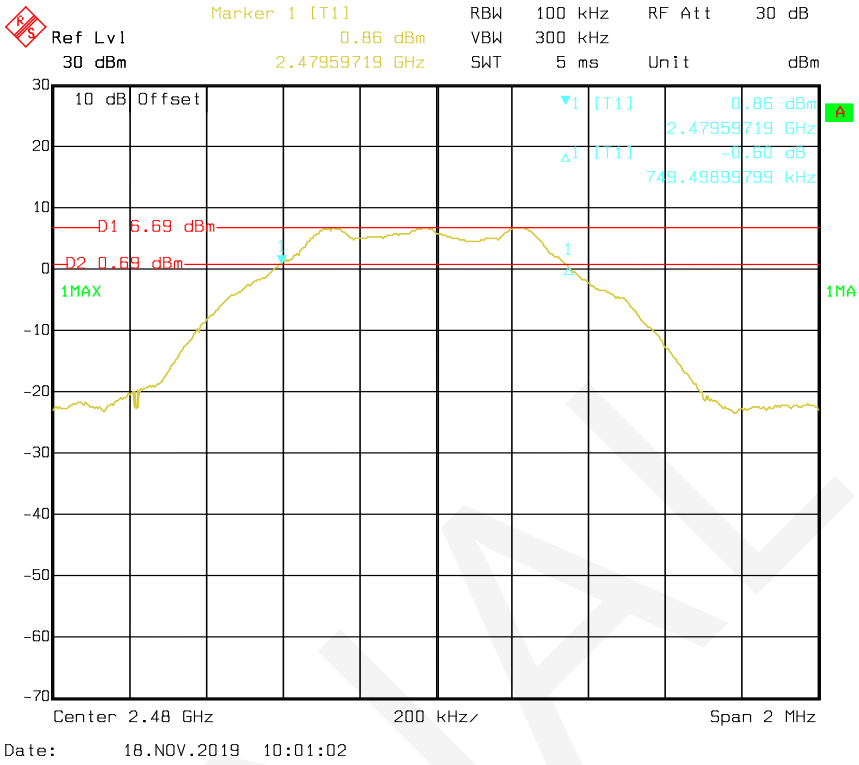
BLE mode, Low Channel



BLE mode, Middle Channel



BLE mode, High Channel



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

Applicable Standard

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

Test Procedure

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

Test Data

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	68 %
ATM Pressure:	95.5 kPa

The testing was performed by Eric Xiao on 2019-11-20.

Test Mode: Transmitting

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

Mode	Channel	Frequency (MHz)	Max Peak Conducted Output Power (dBm)		Total (dBm)	Limit (dBm)
			Chain 0	Chain 1		
802.11b	Low	2412	17.05	16.74	/	30
	Middle	2437	17.13	16.85	/	30
	High	2462	17.34	17.07	/	30
802.11g	Low	2412	19.58	19.71	/	30
	Middle	2437	19.83	19.68	/	30
	High	2462	19.92	19.95	/	30
802.11n-HT20	Low	2412	19.43	19.52	22.49	30
	Middle	2437	19.58	19.43	22.52	30
	High	2462	19.73	19.58	22.67	30
BLE	Low	2402	7.78	/	/	30
	Middle	2440	7.54	/	/	30
	High	2480	7.19	/	/	30

Mode	Channel	Frequency (MHz)	Max Average Conducted Output Power (dBm)		Total (dBm)	Limit (dBm)
			Chain 0	Chain 1		
802.11b	Low	2412	13.97	13.74	/	30
	Middle	2437	14.05	14.01	/	30
	High	2462	14.13	13.95	/	30
802.11g	Low	2412	14.10	13.70	/	30
	Middle	2437	14.23	14.05	/	30
	High	2462	14.31	14.12	/	30
802.11n-HT20	Low	2412	13.79	13.74	16.78	30
	Middle	2437	13.86	14.03	16.96	30
	High	2462	13.98	14.12	17.06	30

Note:
1. The max antenna gain is 1.1dBi.
2. The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices:

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

So:

Directional gain = GANT + Array Gain =1.1dBi < 6dBi

No power limit was reduced in MIMO mode.

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:	23 °C	21 °C
Relative Humidity:	70 %	68 %
ATM Pressure:	95.1 kPa	95.5 kPa

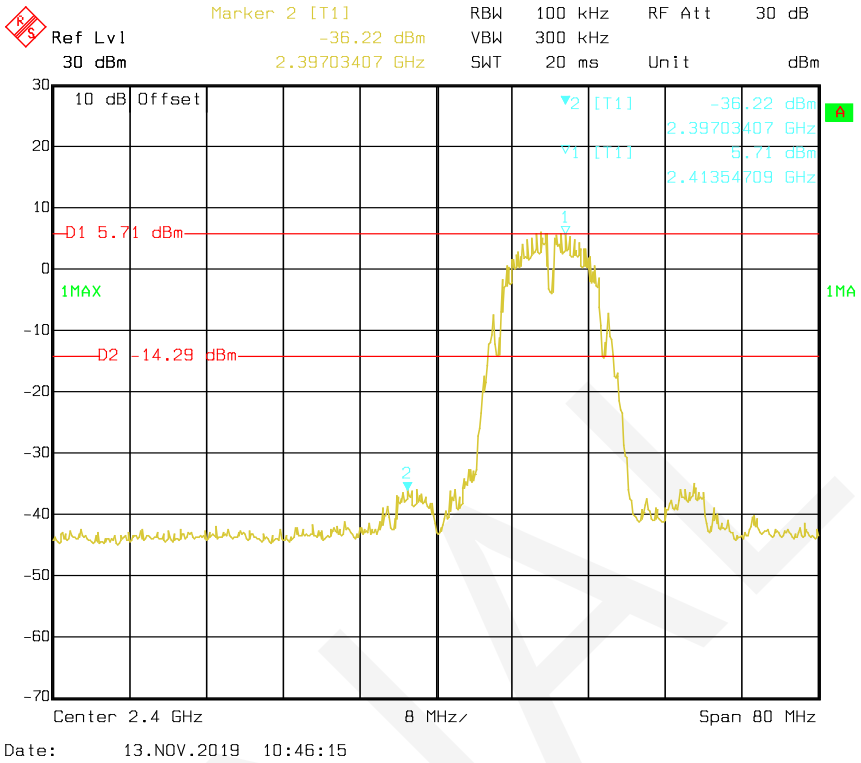
The testing was performed by Eric Xiao on 2019-11-13 &2019-11-18.

Test mode: Transmitting

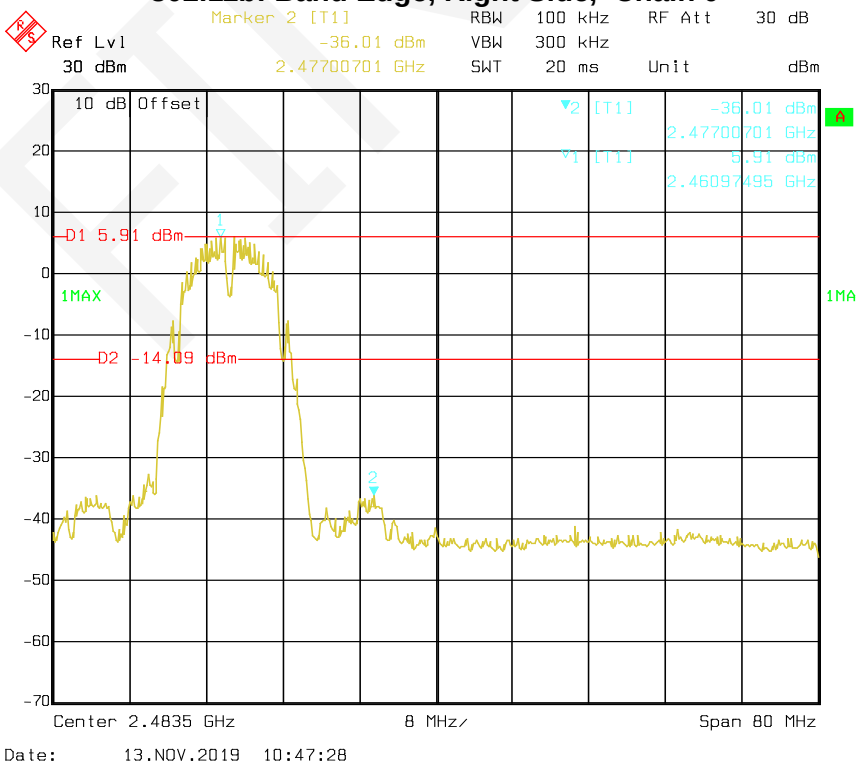
Test Result: Compliance. Please refer to following plots.

Wi-Fi mode

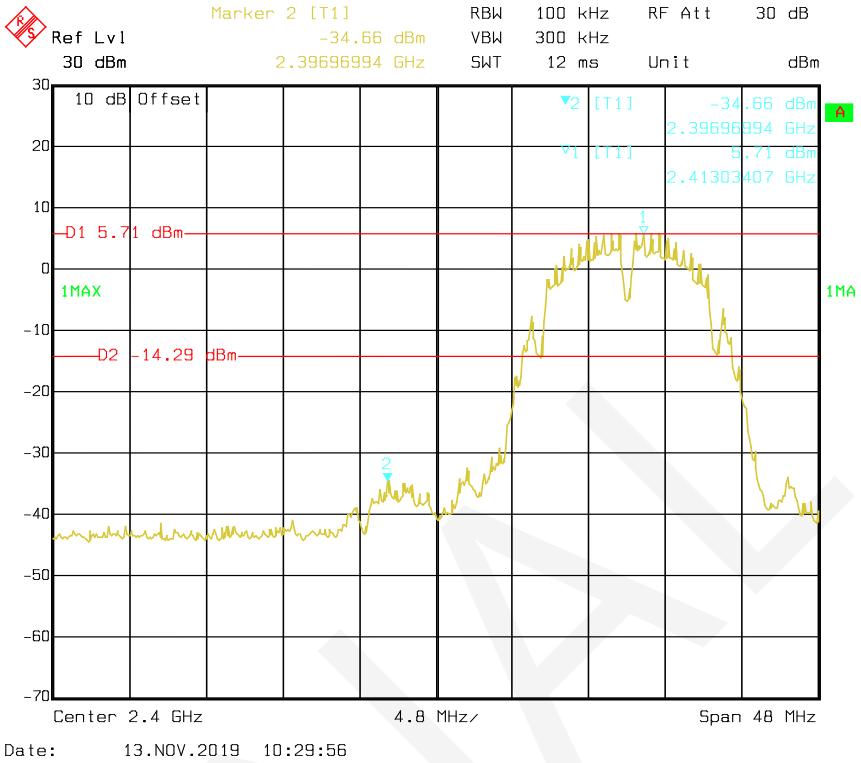
802.11b: Band Edge, Left Side, Chain 0



802.11b: Band Edge, Right Side, Chain 0

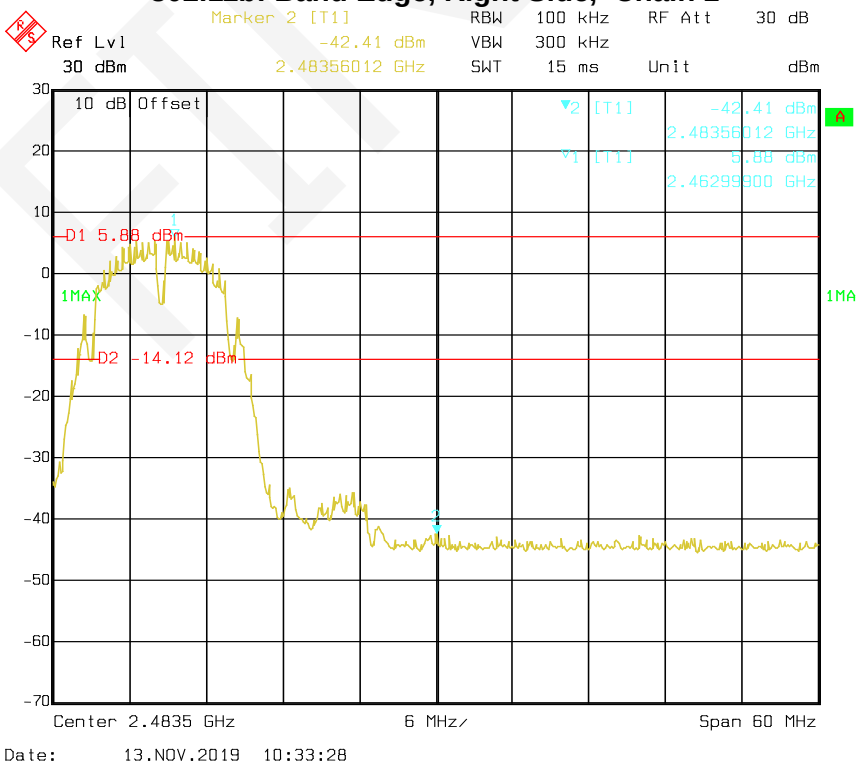


802.11b: Band Edge, Left Side, Chain 1



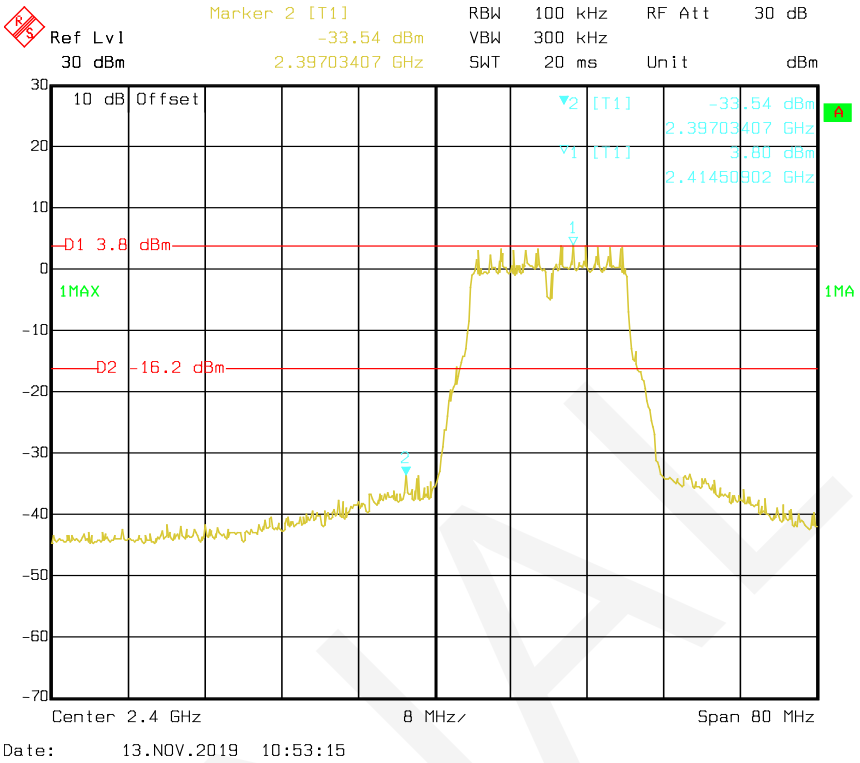
Date: 13.NOV.2019 10:29:56

802.11b: Band Edge, Right Side, Chain 1

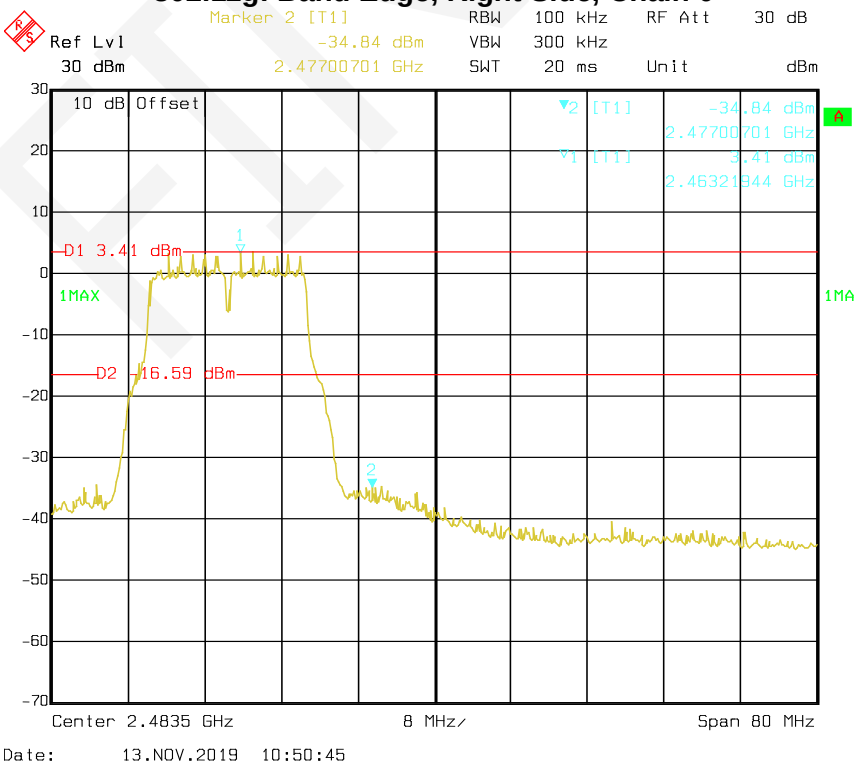


Date: 13.NOV.2019 10:33:28

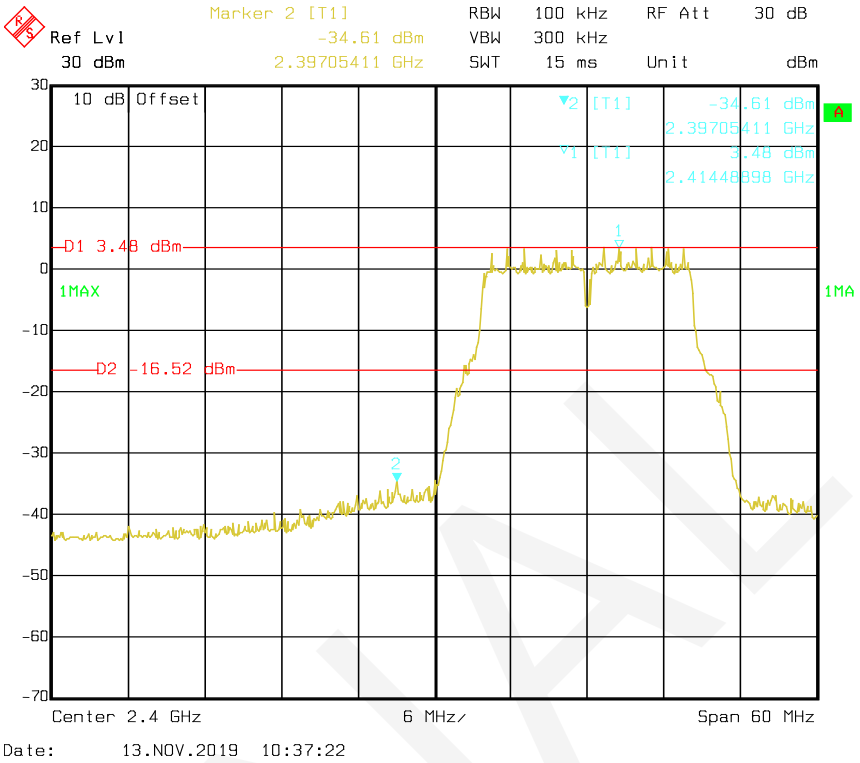
802.11g: Band Edge, Left Side, Chain 0



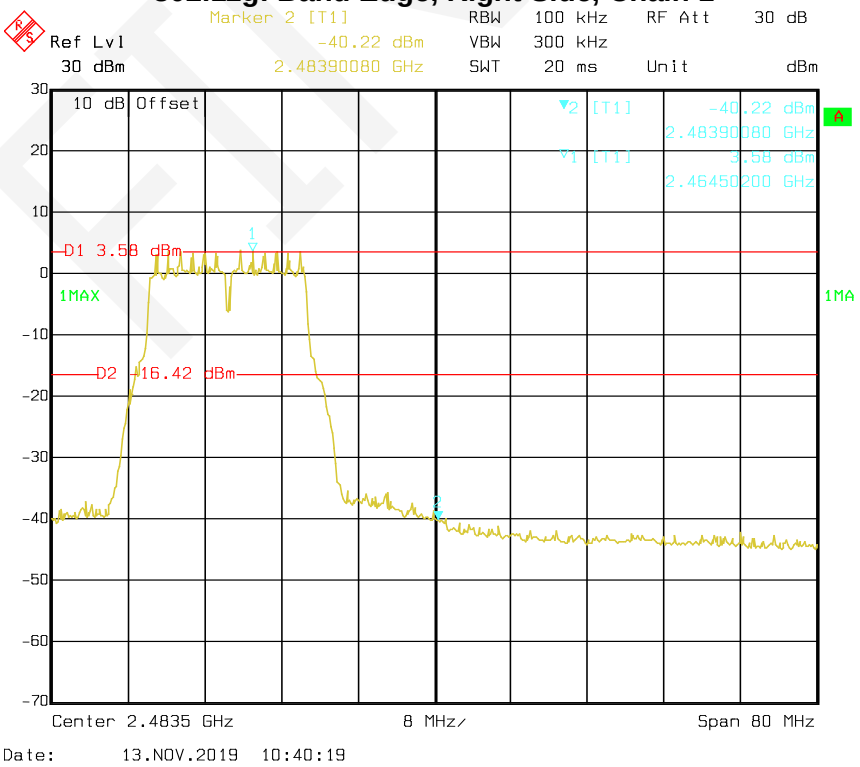
802.11g: Band Edge, Right Side, Chain 0



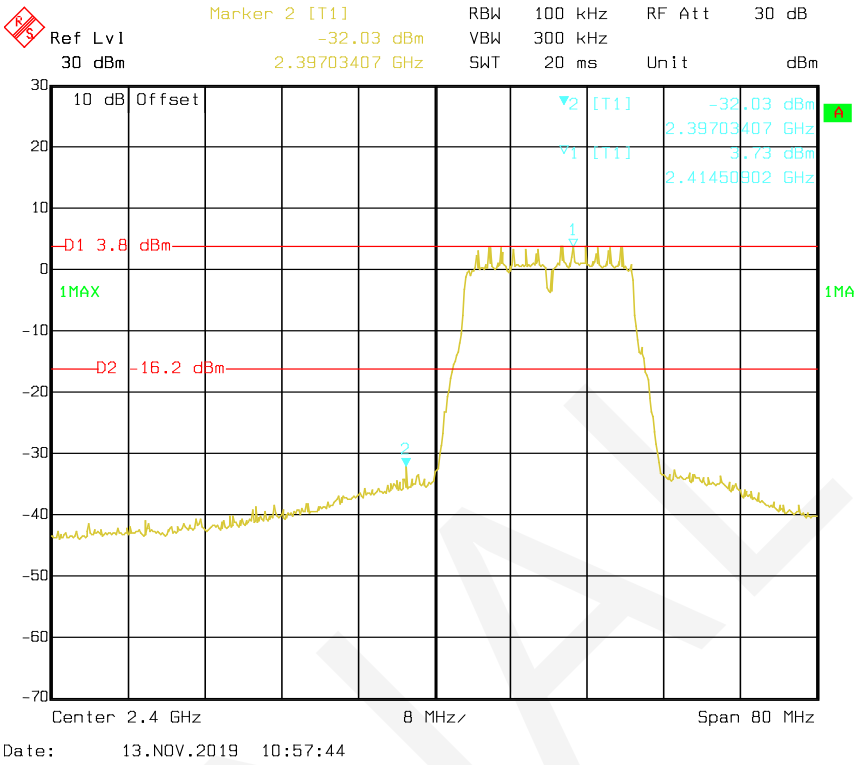
802.11g: Band Edge, Left Side, Chain 1



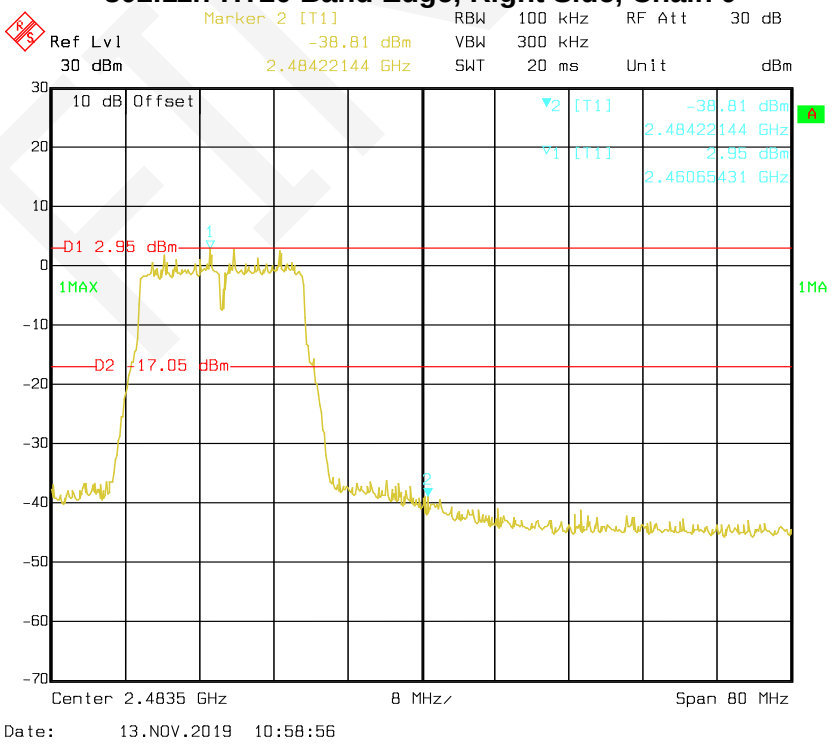
802.11g: Band Edge, Right Side, Chain 1



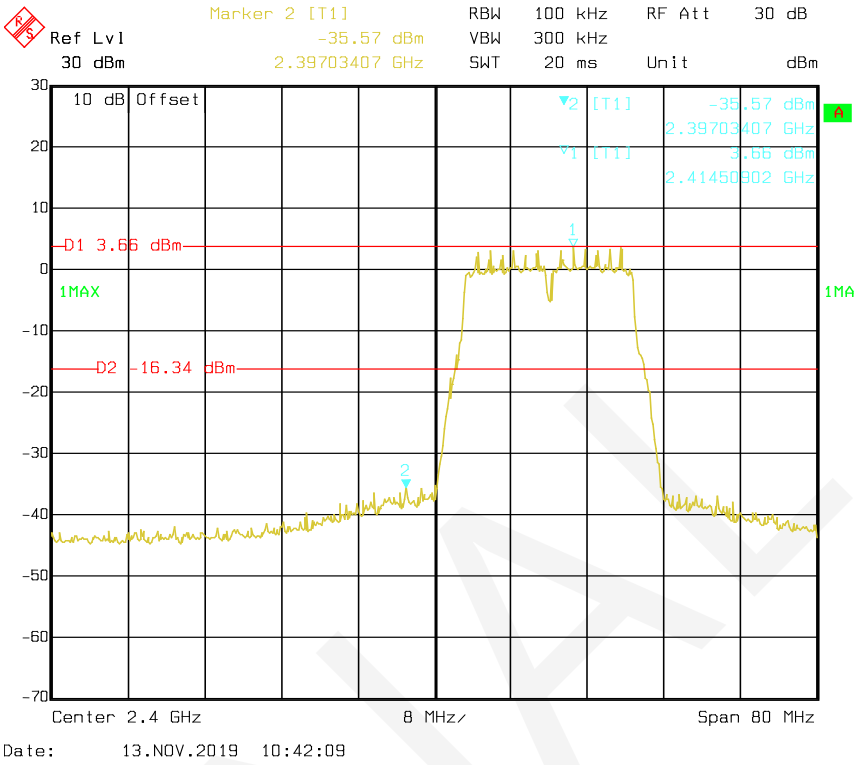
802.11n-HT20 Band Edge, Left Side, Chain 0



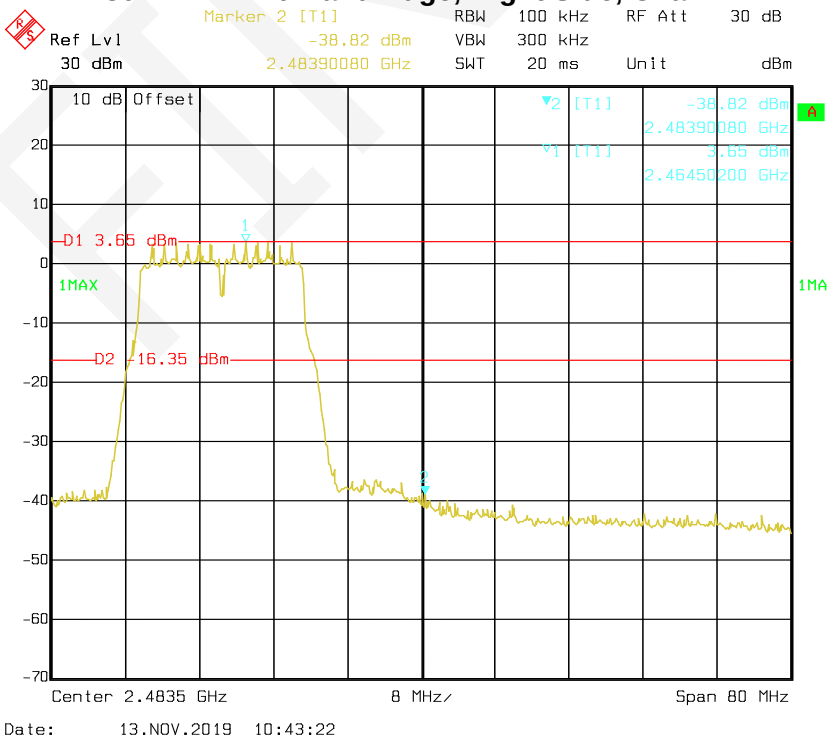
802.11n-HT20 Band Edge, Right Side, Chain 0



802.11n-HT20 Band Edge, Left Side, Chain 1

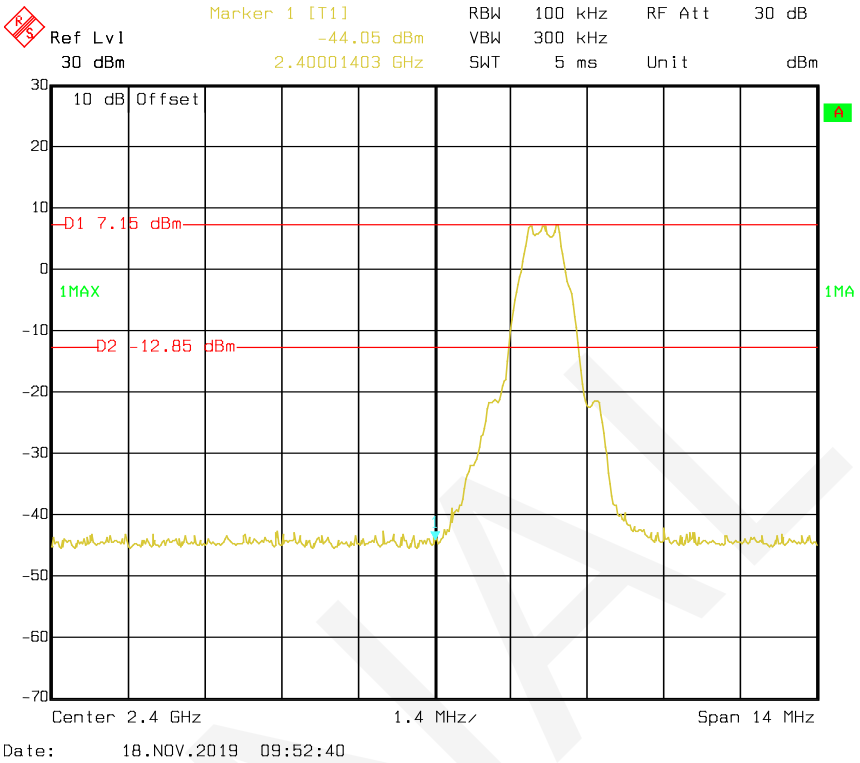


802.11n-HT20 Band Edge, Right Side, Chain 1

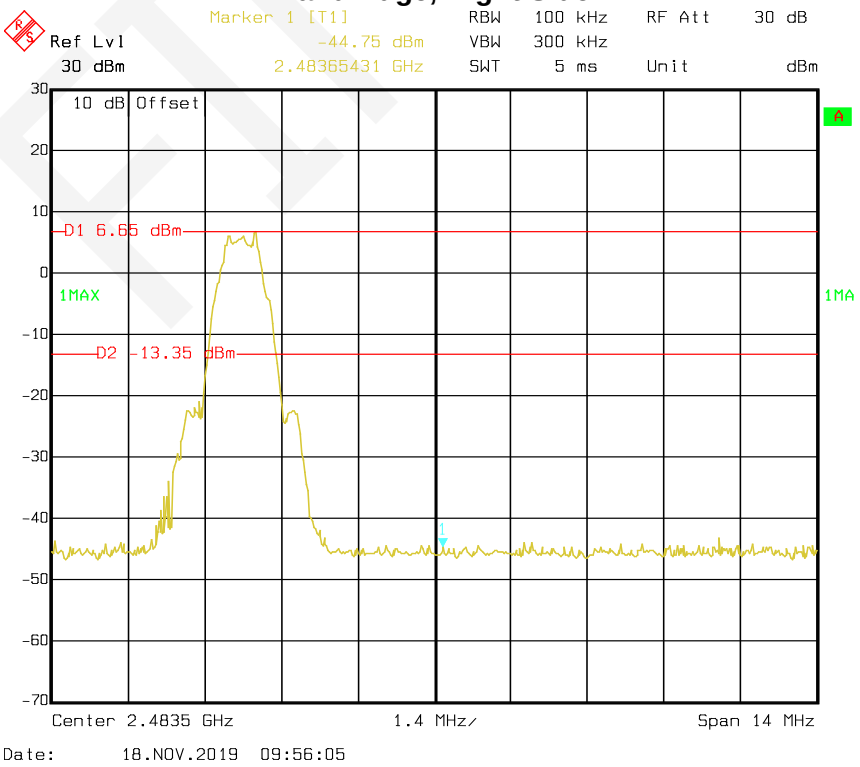


BLE mode

Band Edge, Left Side



Band Edge, Right Side



FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

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

Test Procedure

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3×RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Data

Environmental Conditions

Temperature:	23 °C	21°C
Relative Humidity:	70 %	67 %
ATM Pressure:	95.1 kPa	95.3 kPa

The testing was performed by Eric Xiao on 2019-11-13 and 2019-11-18.

Test Mode: Transmitting

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

Mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)		Total (dBm/3kHz)	Limit (dBm/3kHz)
			Chain 0	Chain 1		
802.11b	Low	2412	-7.79	-8.85	/	8
	Middle	2437	-8.34	-8.05	/	8
	High	2462	-8.56	-7.59	/	8
802.11g	Low	2412	-10.34	-10.90	/	8
	Middle	2437	-11.87	-11.25	/	8
	High	2462	-12.13	-11.16	/	8
802.11n-HT20	Low	2412	-10.80	-10.97	-7.87	8
	Middle	2437	-10.61	-11.32	-7.94	8
	High	2462	-11.45	-9.80	-7.54	8
BLE mode	Low	2402	-6.65	/	/	8
	Middle	2440	-7.00	/	/	8
	High	2480	-7.32	/	/	8

Note:
1. The max antenna gain is 1.1dBi.
2. The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density measurements on IEEE 802.11 devices:

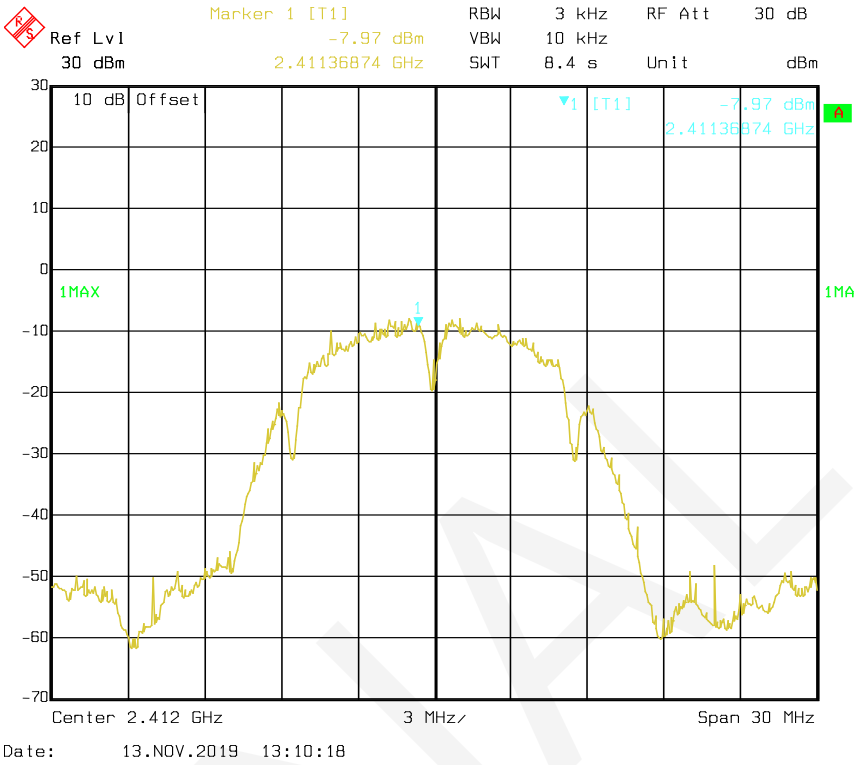
Array Gain = 10*log(NANT/NSS)dB

So:

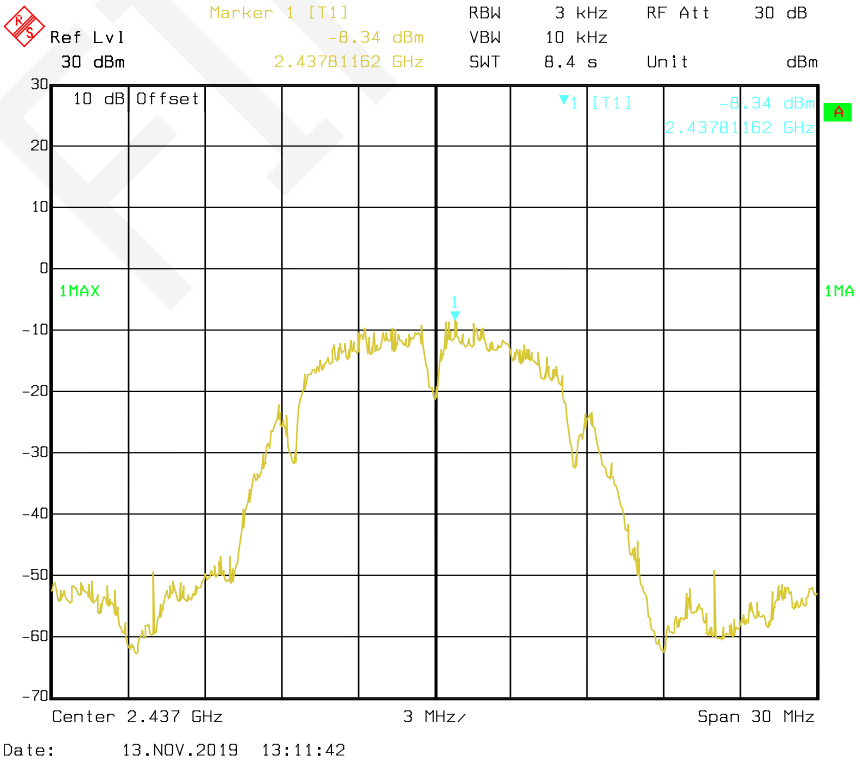
Directional gain = GANT + Array Gain = 1.1+10*log(2)= 4.1 dBi＜6dBi
No power density Limit was reduced to MIMO mode.

Wi-Fi mode

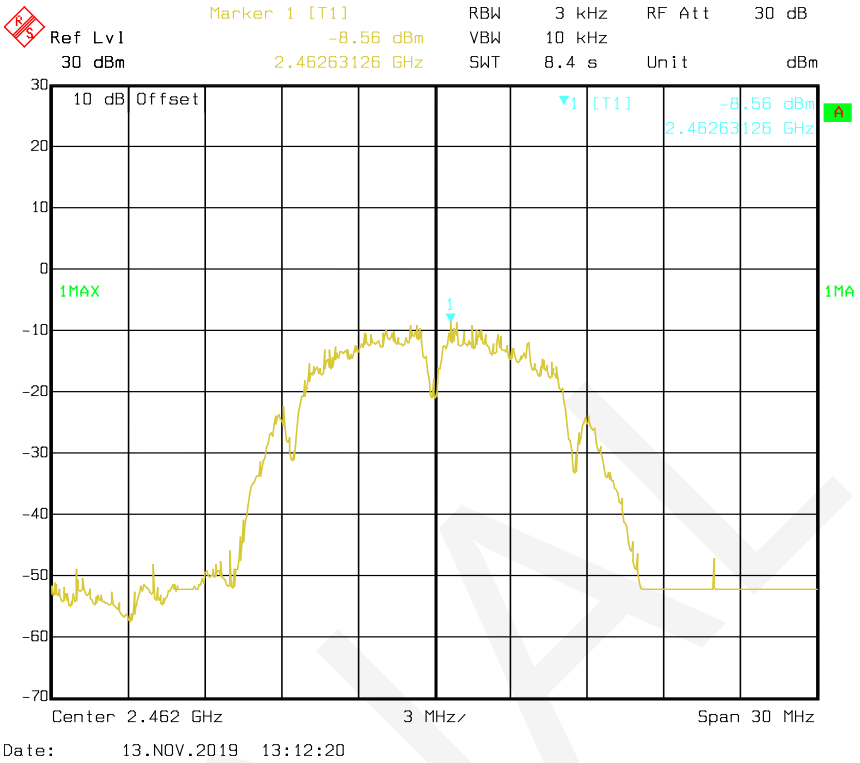
Power Spectral Density, 802.11b Low Channel, Chain 0



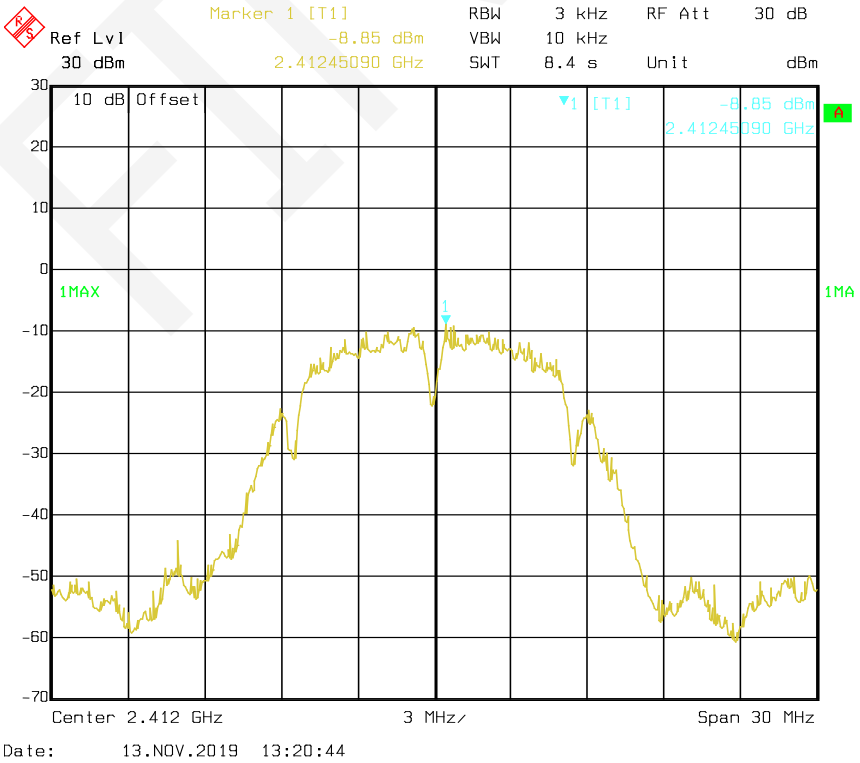
Power Spectral Density, 802.11b Middle Channel, Chain 0



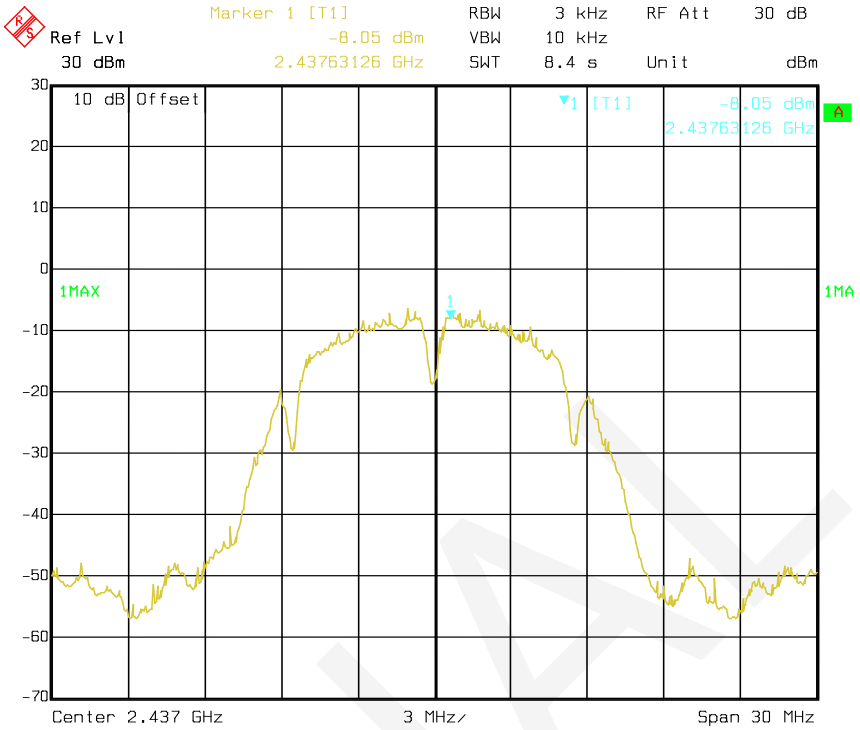
Power Spectral Density, 802.11b High Channel, Chain 0



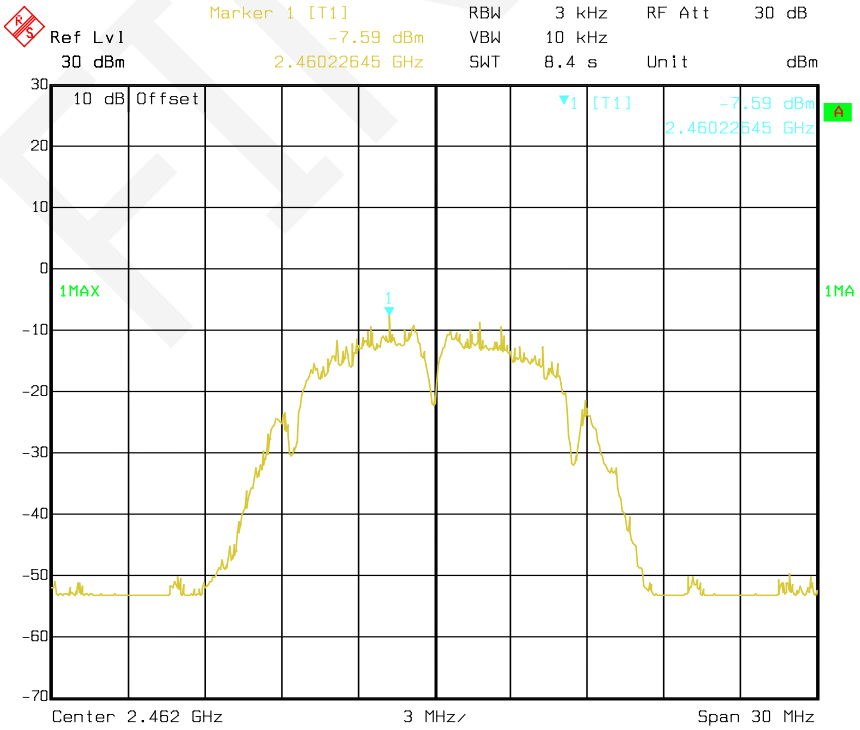
Power Spectral Density, 802.11b Low Channel, Chain 1



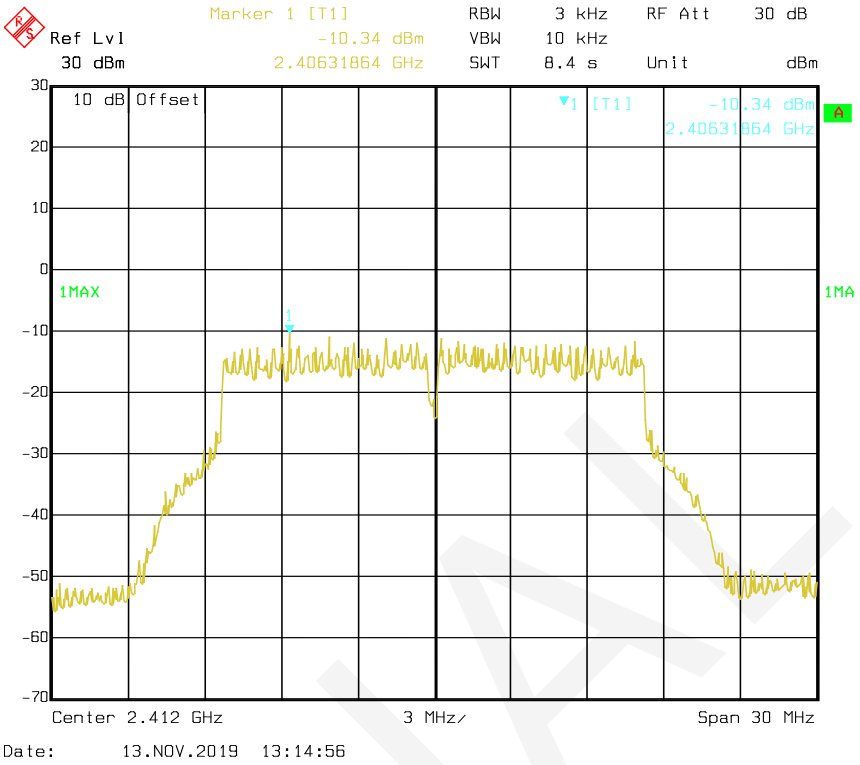
Power Spectral Density, 802.11b Middle Channel, Chain 1



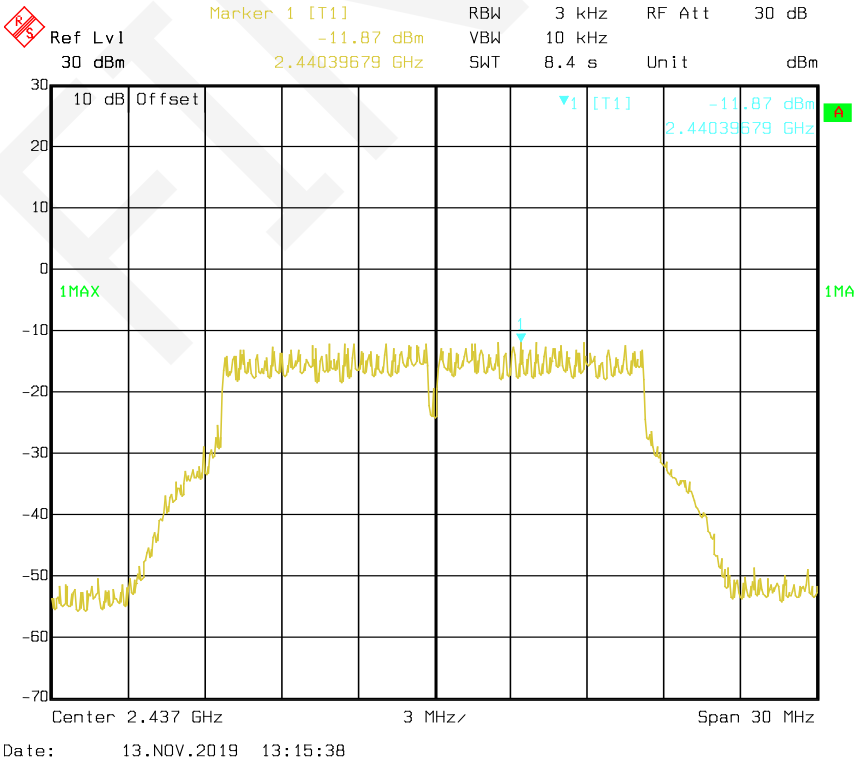
Power Spectral Density, 802.11b High Channel, Chain 1



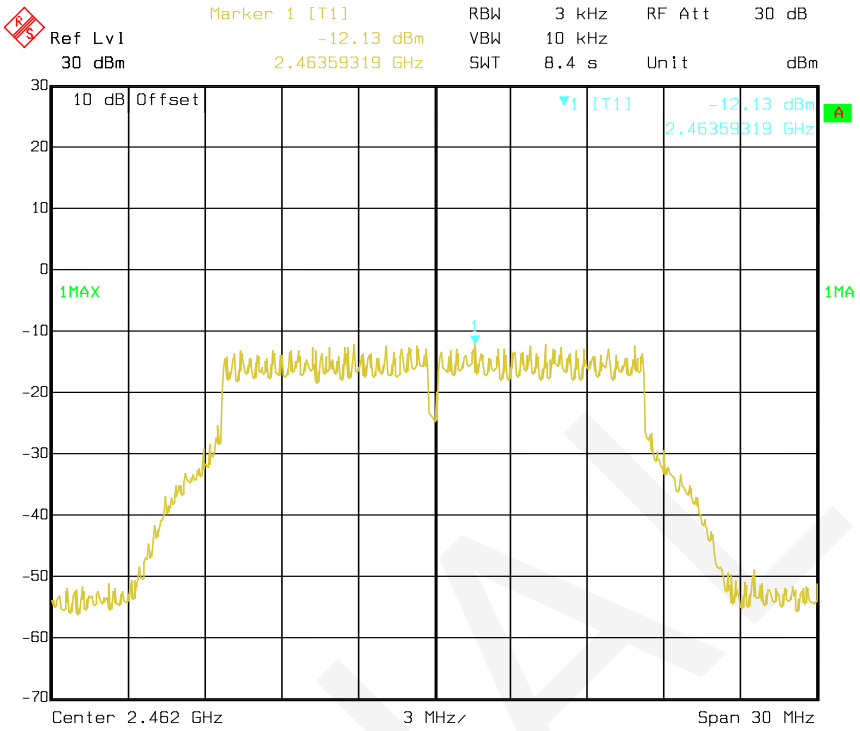
Power Spectral Density, 802.11g Low Channel, Chain 0



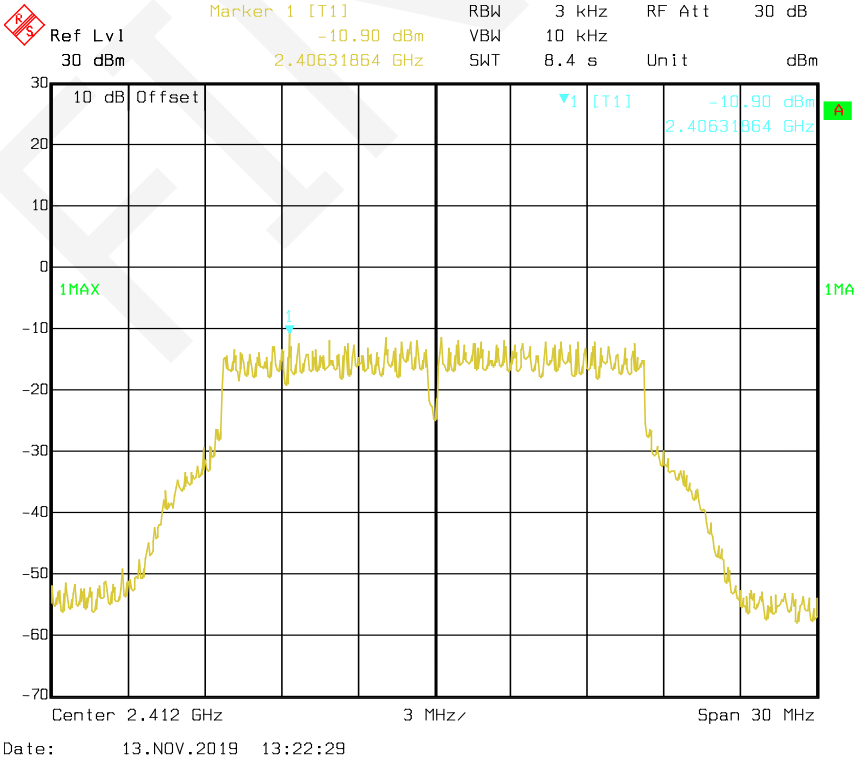
Power Spectral Density, 802.11g Middle Channel, Chain 0



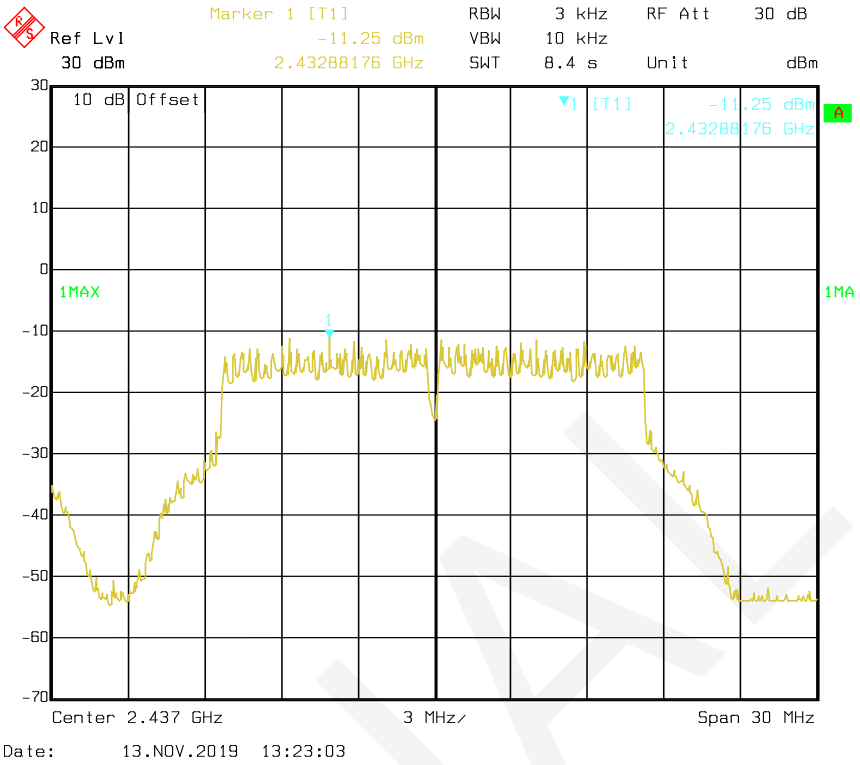
Power Spectral Density, 802.11g High Channel, Chain 0



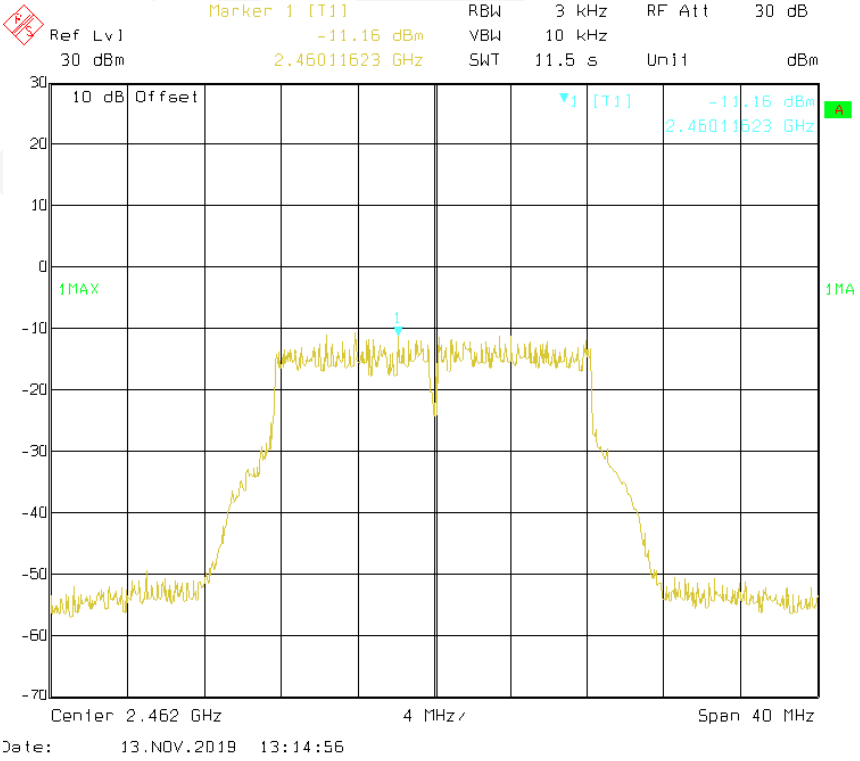
Power Spectral Density, 802.11g Low Channel, Chain 1



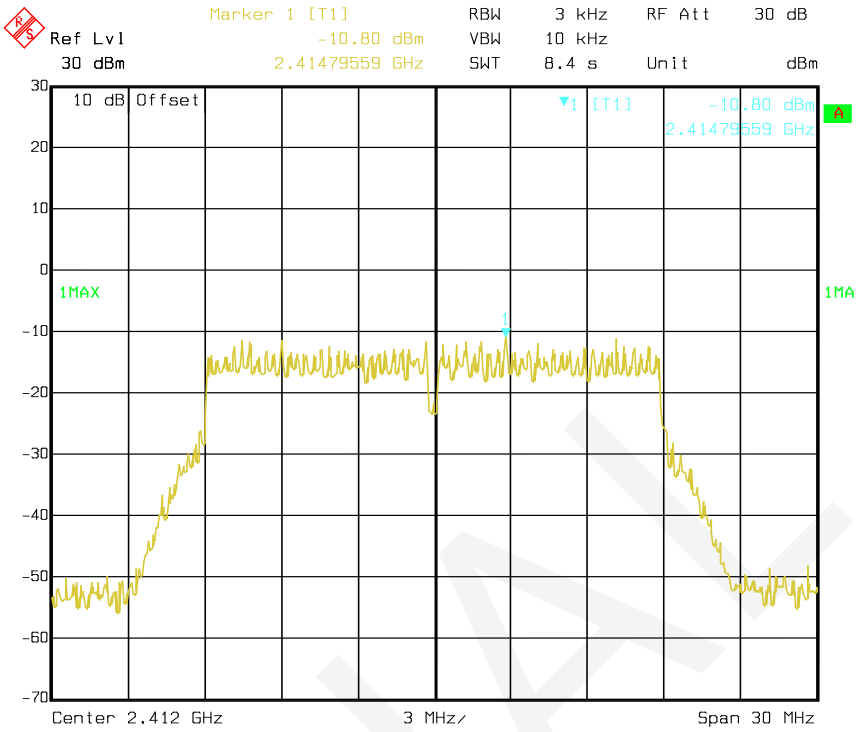
Power Spectral Density, 802.11g Middle Channel, Chain 1



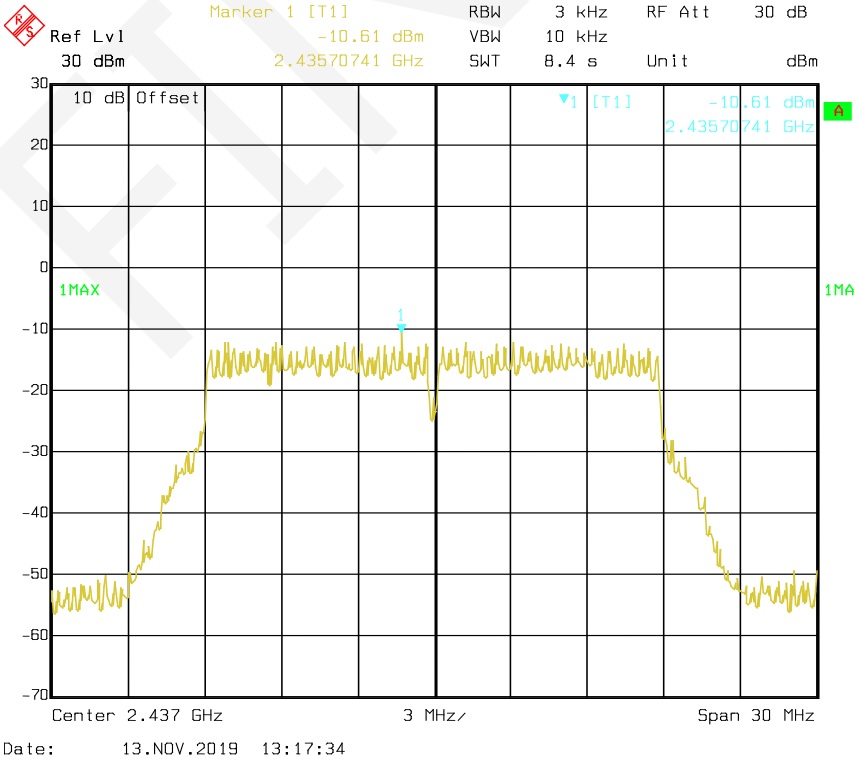
Power Spectral Density, 802.11g High Channel, Chain 1



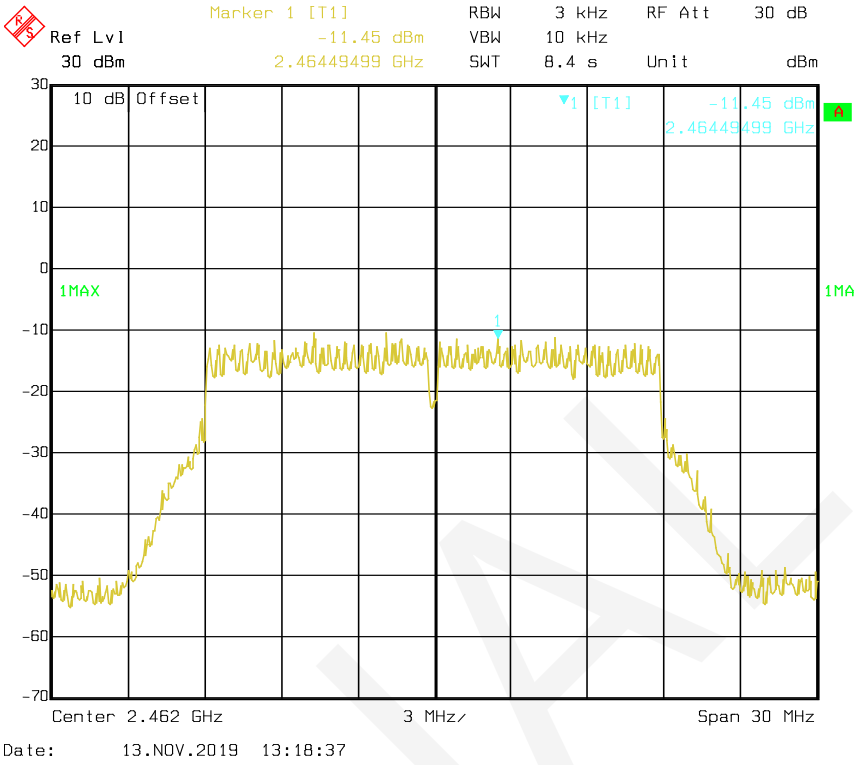
Power Spectral Density, 802.11n-HT20 Low Channel, Chain 0



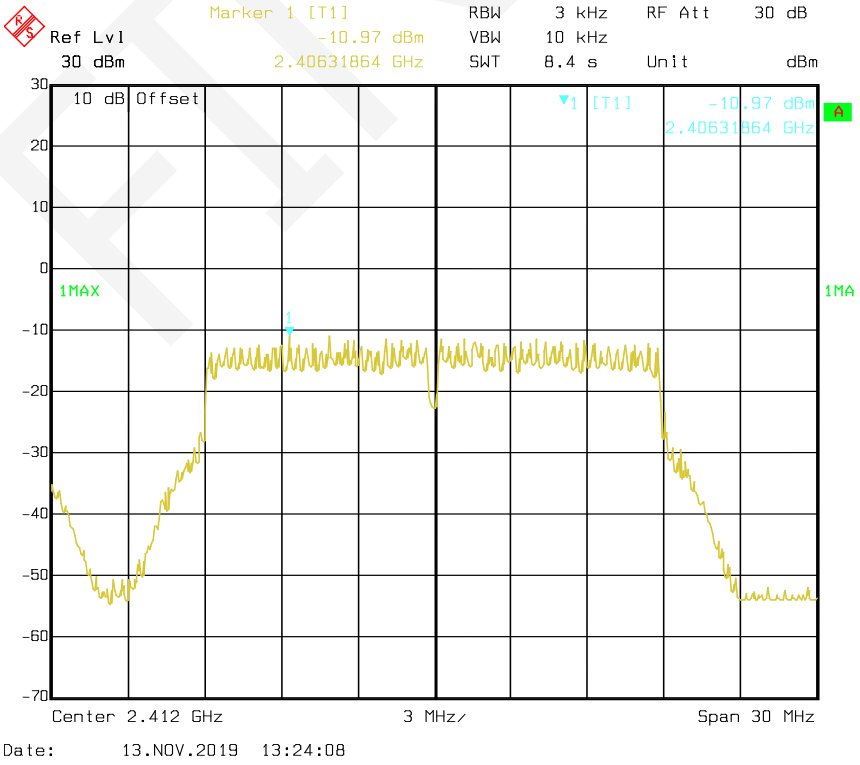
Power Spectral Density, 802.11n-HT20 Middle Channel, Chain 0



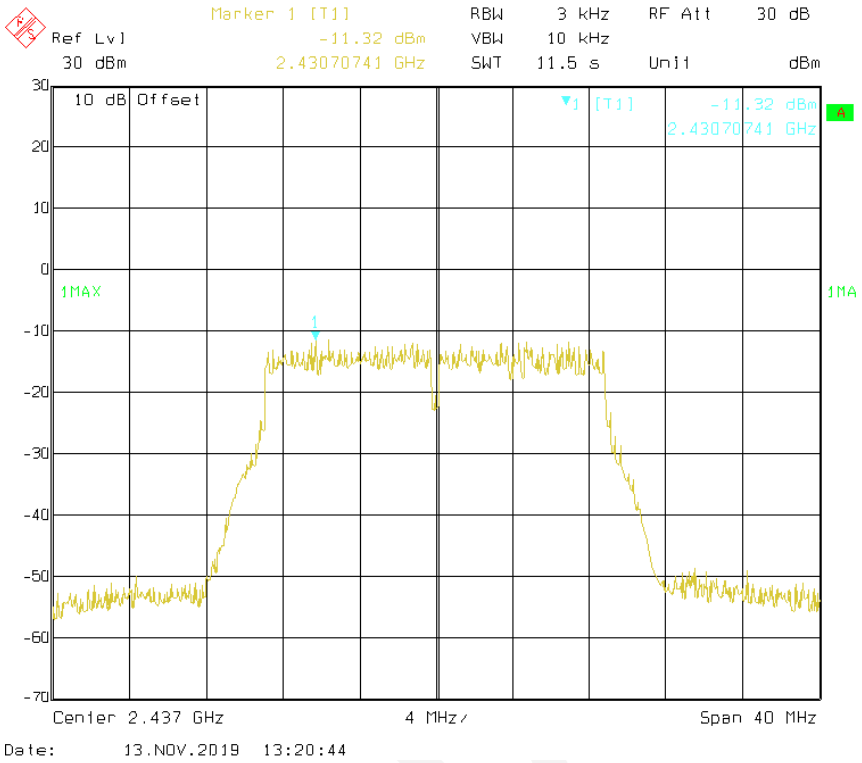
Power Spectral Density, 802.11n-HT20 High Channel, Chain 0



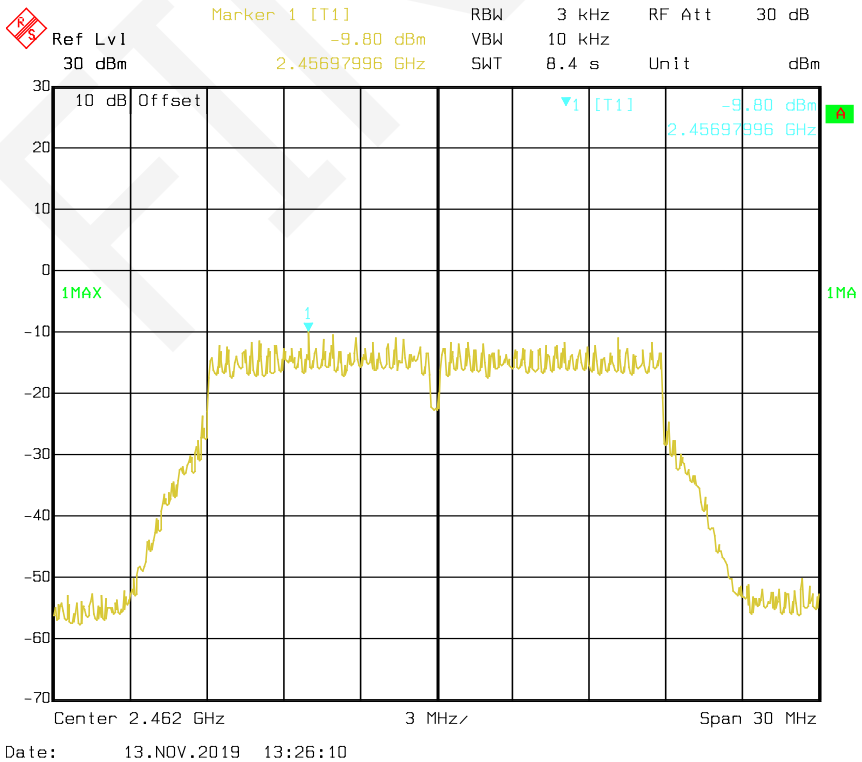
Power Spectral Density, 802.11n-HT20 Low Channel, Chain 1



Power Spectral Density, 802.11n-HT20 Middle Channel, Chain 1

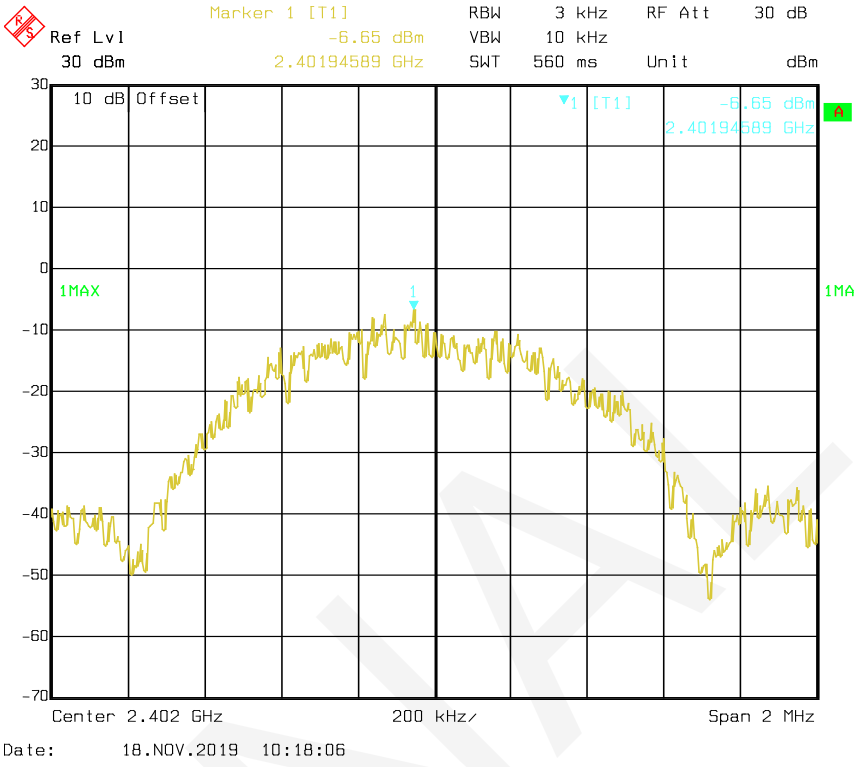


Power Spectral Density, 802.11n-HT20 High Channel, Chain 1

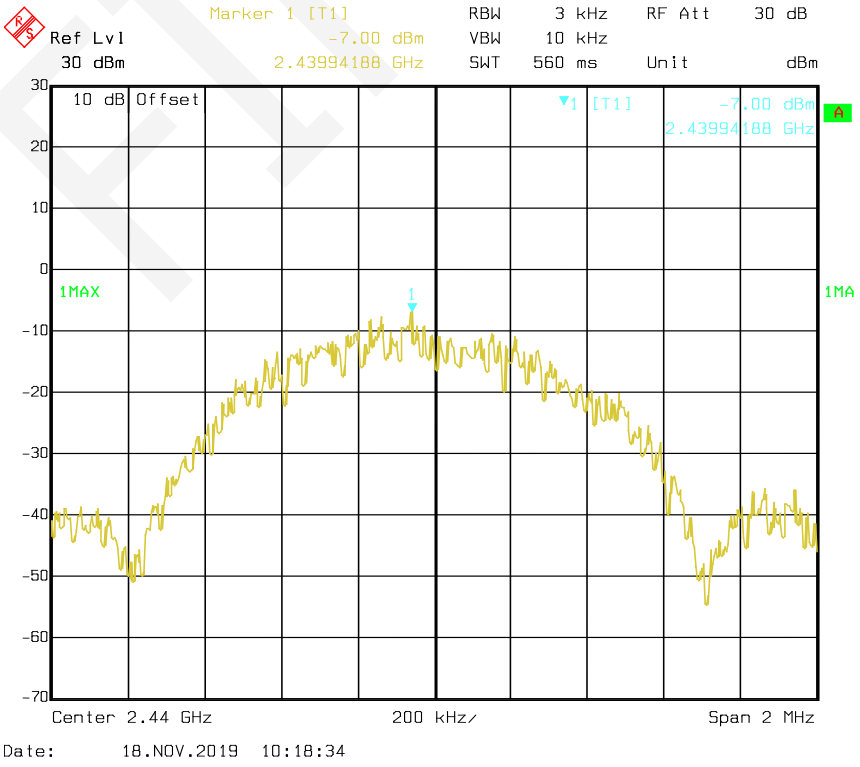


BLE mode

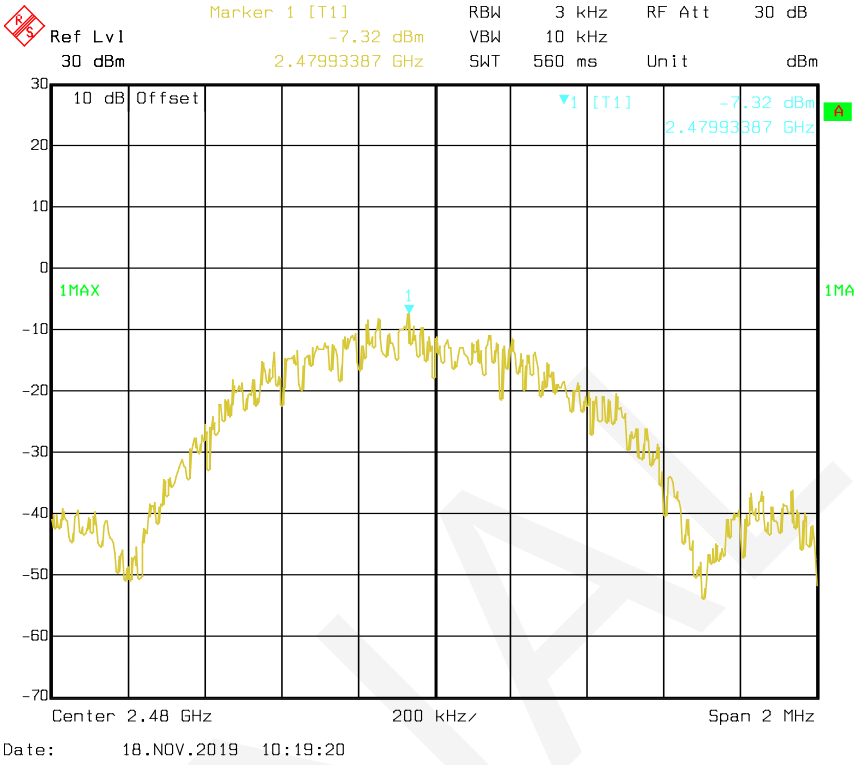
Power Spectral Density, Low Channel



Power Spectral Density, Middle Channel



Power Spectral Density, High Channel



END OF REPORT