TESTING LABORATORY
CERTIFICATE#4323.01

FCC PART 15.247

TEST REPORT

For

Micron Electronics LLC.

1001 Yamato Road, Suite 400, Boca Raton, Florida 33431 United States

FCC ID: ZKQ-AGPS4GA

Report Type:	Product Type:
Original Report	Tracker

Test Engineer:	Matt yao
Report Number:	RSHA190517002-00B
Report Date:	2019-08-15
Reviewed By:	Oscar Ye RF Leader
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road,Kunshan,Jiangsu province,China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Micron Electronics LLC.
Tested Model	AGPS 1000
Product Type	Tracker
Dimension	78mm(L)*45mm(W)*22.5mm(H)
Power Supply	DC 3.8V from Battery and DC 5V charging by Adapter

Adapter Information:
Model: JT-H050200
Input: AC100-240V ~50/60Hz 0.5A
Output: DC 5V, 2A

**All measurement and test data in this report was gathered from production sample serial number: 20190517002. (Assigned by the BACL. The EUT supplied by the applicant was received on 2019-05-17)*

Objective

This report is prepared on behalf of *Micron Electronics LLC.* in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15B JAB Submittal with FCC ID: ZKQ-AGPS4GA

Test Methodology

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

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

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19dB
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

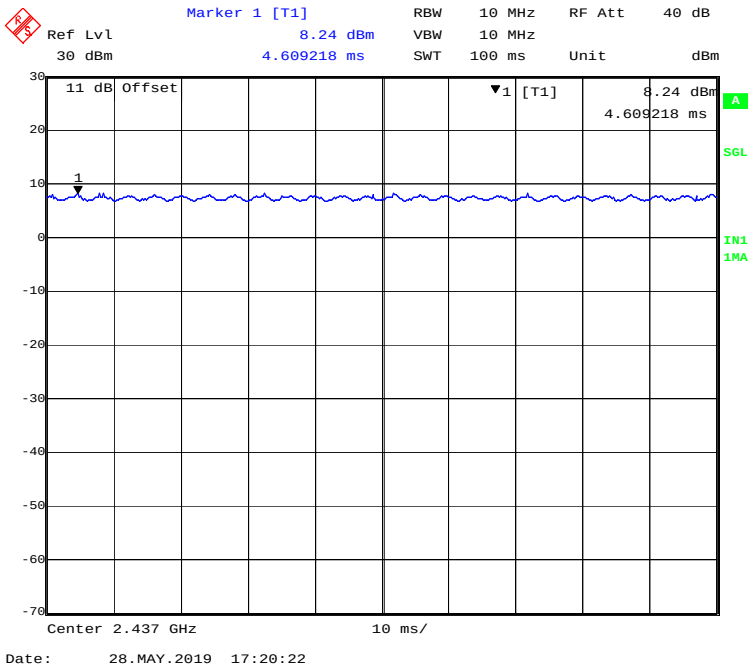
RF test tool: secure CRT

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

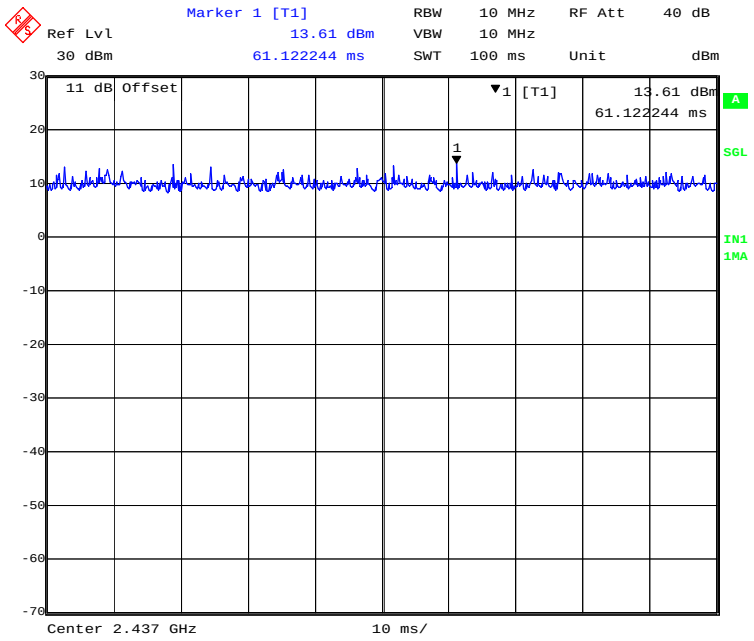
Mode	Data Rate	Power Level
802.11b	1 Mbps	17
802.11g	6 Mbps	10
802.11n-HT20	MCS0	10
802.11n-HT40	MCS0	10
BLE	1Mbps	0

Duty Cycle:

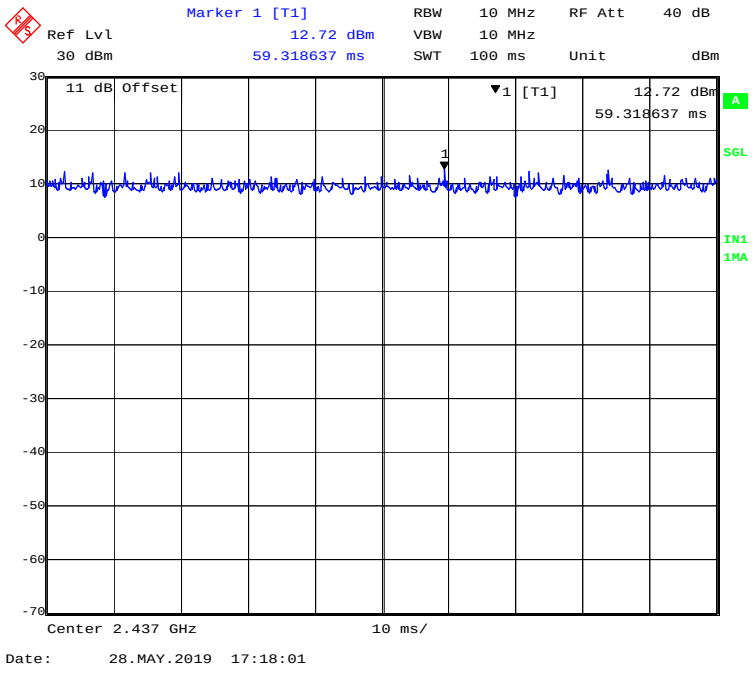
802.11b Mode Middle Channel



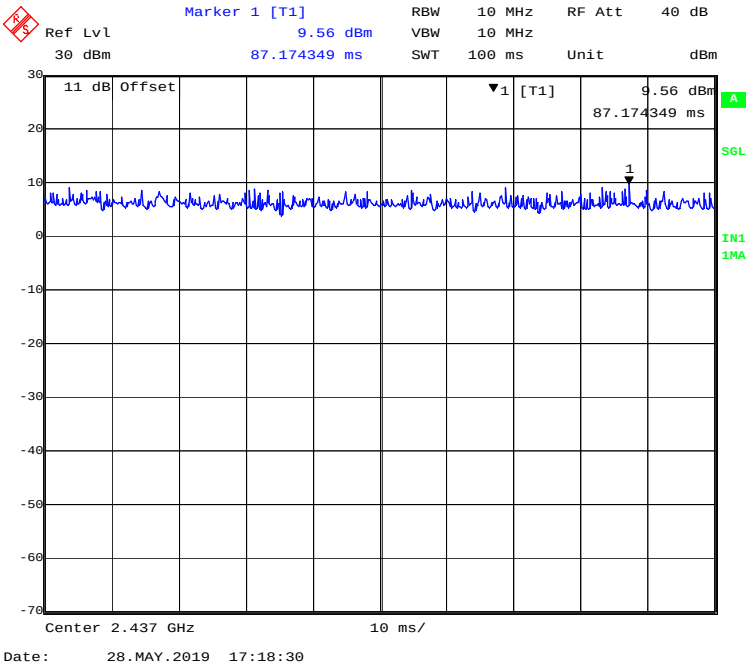
802.11g Mode Middle Channel



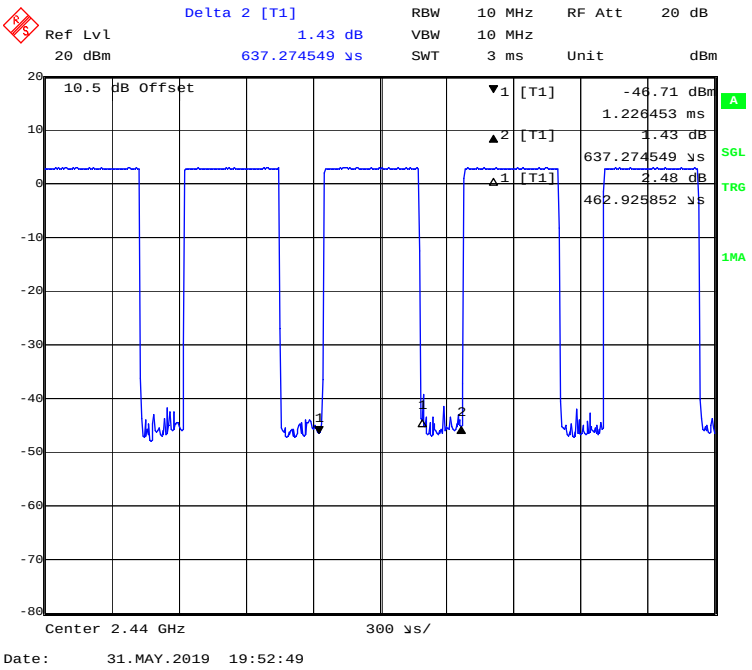
802.11n-HT20 Mode Middle Channel



802.11n-HT40 Mode Middle Channel



BLE Mode Middle Channel



Mode	Duty Cycle (%)	T(ms)	1/T(kHz)	10log(1/x)
802.11b	100.00	/	/	0.00
802.11g	100.00	/	/	0.00
802.11n-HT20	100.00	/	/	0.00
802.11n-HT40	100.00	/	/	0.00
BLE	72.68	0.463	2.160	1.386

Note: "x" means the Duty Cycle.

Support Equipment List and Details

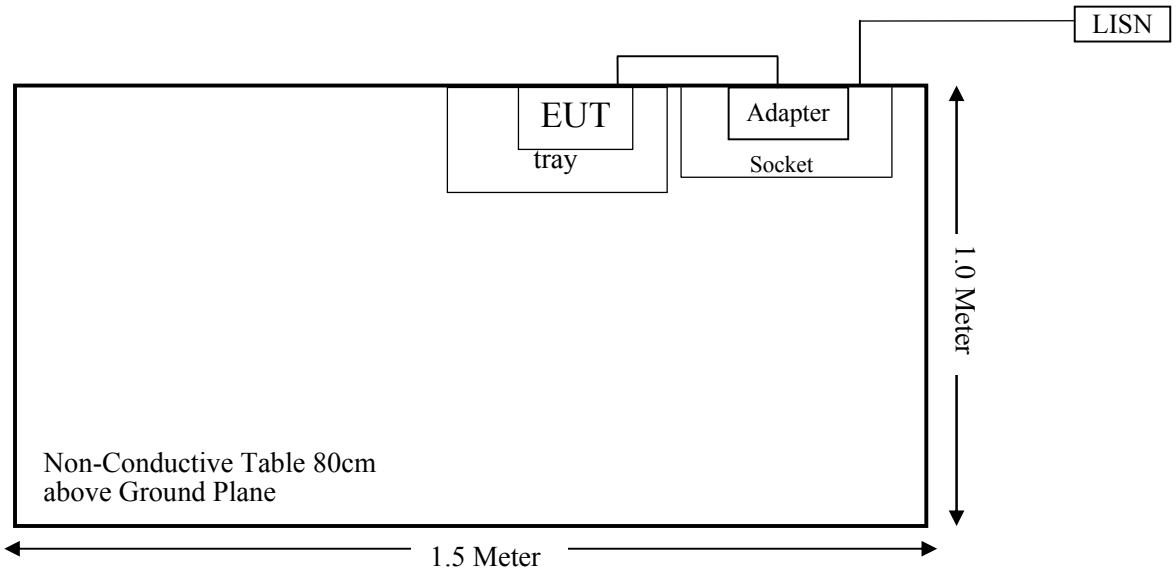
Manufacturer	Description	Model	Serial Number
/	Socket	/	/

External I/O Cable

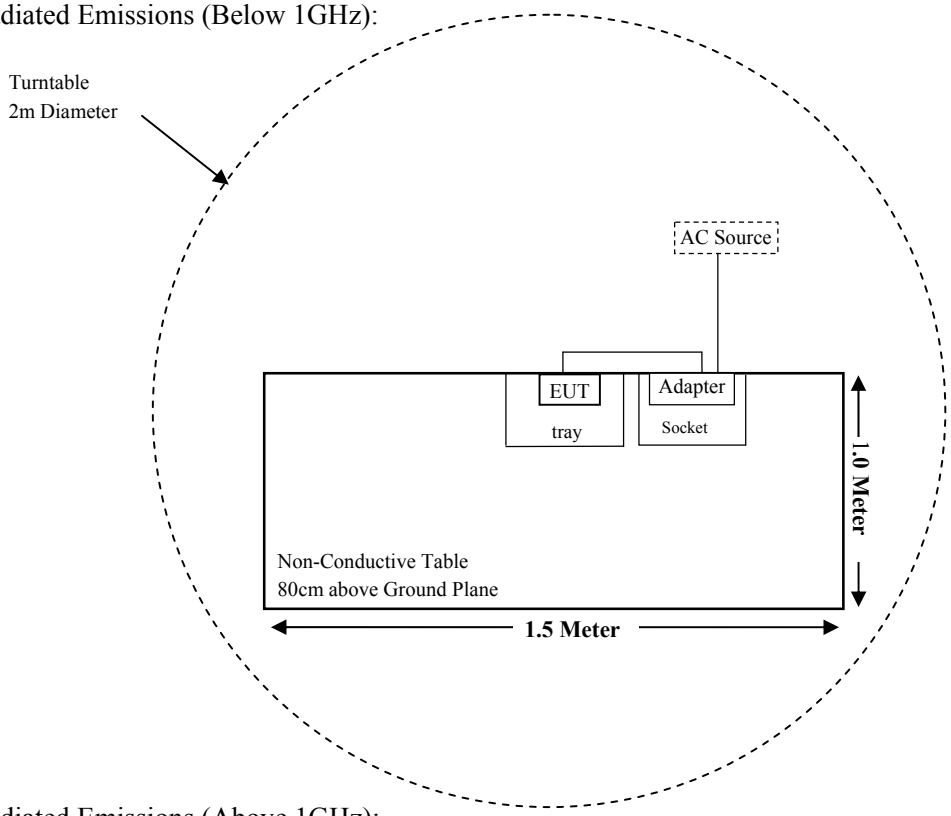
Cable Description	Length (m)	From Port	To
USB cable	1.0	EUT	Adapter

Block Diagram of Test Setup

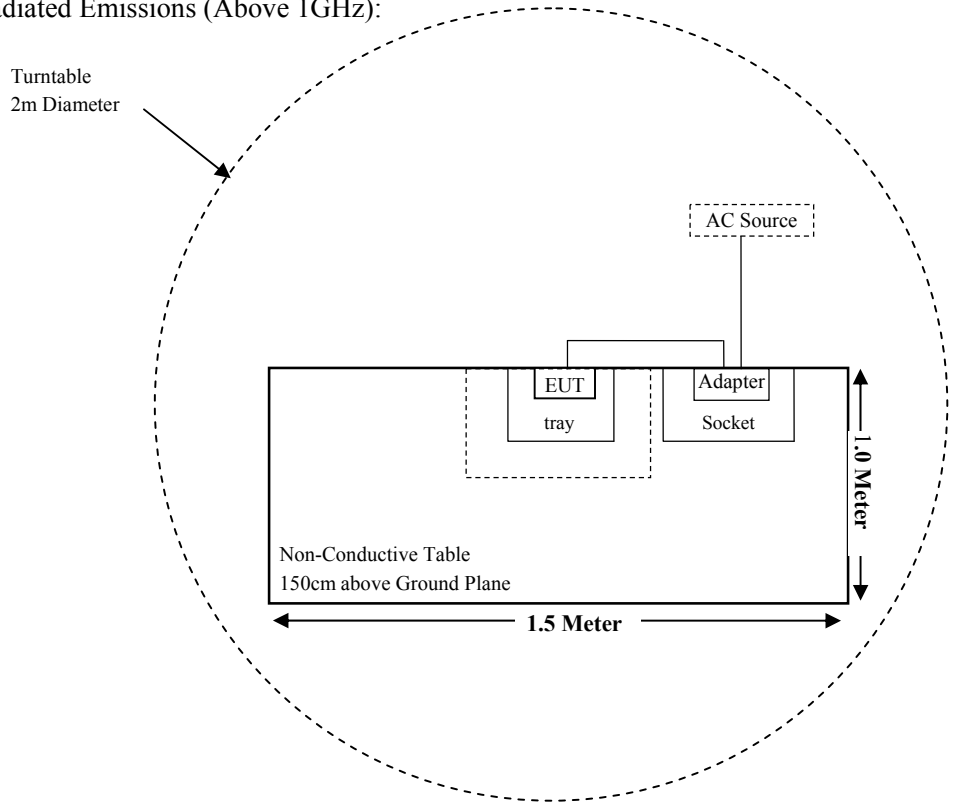
For Conducted Emissions:



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)	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	ESCI	100195	2018-11-30	2019-11-29
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
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2018-08-15	2019-08-14
Radiated Emission Test（Chamber 2#）					
Rohde & Schwarz	EMI Test Receiver	FSV40	101116	2018-11-30	2019-11-29
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
EM Electronics Corporation	Amplifier	EM18G40G	060726	2019-03-22	2020-03-21
MICRO-TRONICS	Band Reject Filter	BRM50702	G024	2018-08-05	2019-08-04
Narda	Attenuator	10dB	010	2018-08-15	2019-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2018-08-15	2019-08-14
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048/027	2018-11-30	2019-11-30
Rohde & Schwarz	EMI Test Receiver	ESIB26	100146	2018-11-30	2019-11-29
Narda	Attenuator/6dB	6dB	006	2019-01-10	2020-01-09
Micron Electronics LLC.	RF Cable	Micron Electronics LLC.01	C01	Each Time	/
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCS30	834115/007	2018-11-30	2019-11-29
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	2018-08-15	2019-08-14

*** 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 §1.1310 & §2.1093 – RF EXPOSURE

Applicable Standard

According to§1.1310 and §2.1093, 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.

Calculated Data (worst case):

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	3.50	2.24	5	0.7	3.0	Yes

Note:
(1) The tune-up power is declared by the Manufacturer.
So the stand-alone SAR evaluation is not necessary for BLE.

For Wi-Fi and LTE:
Result: Compliant. please refer to the SAR report: RSHA190517002-20A

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

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

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has an FPC antenna for Wi-Fi and an FPC antenna for Bluetooth, and all the antenna gain is 0.5dBi, which is permanently attached to the unit, fulfill the requirement of this section. Please refer to the EUT photos.

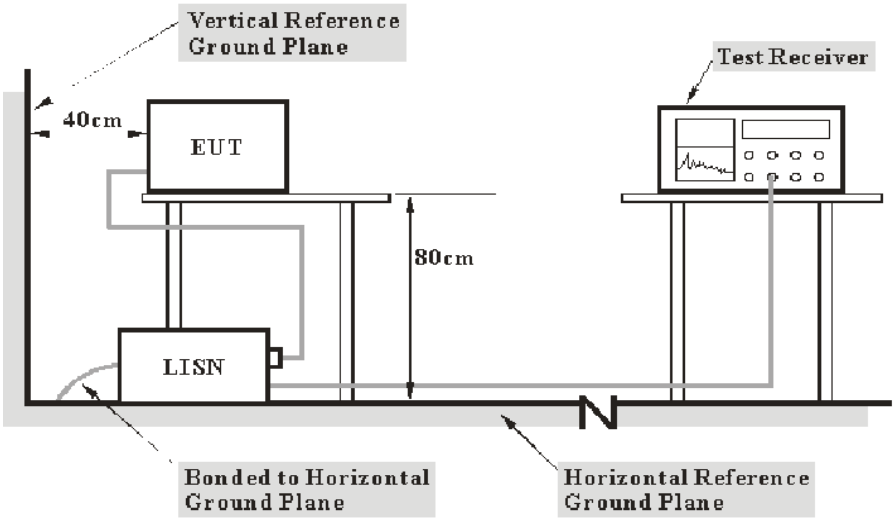
Result: Compliant.

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.

Corrected Factor & Over Limit Calculation

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

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)

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:	24~25℃
Relative Humidity:	48~50 %
ATM Pressure:	101.2~101.5kPa

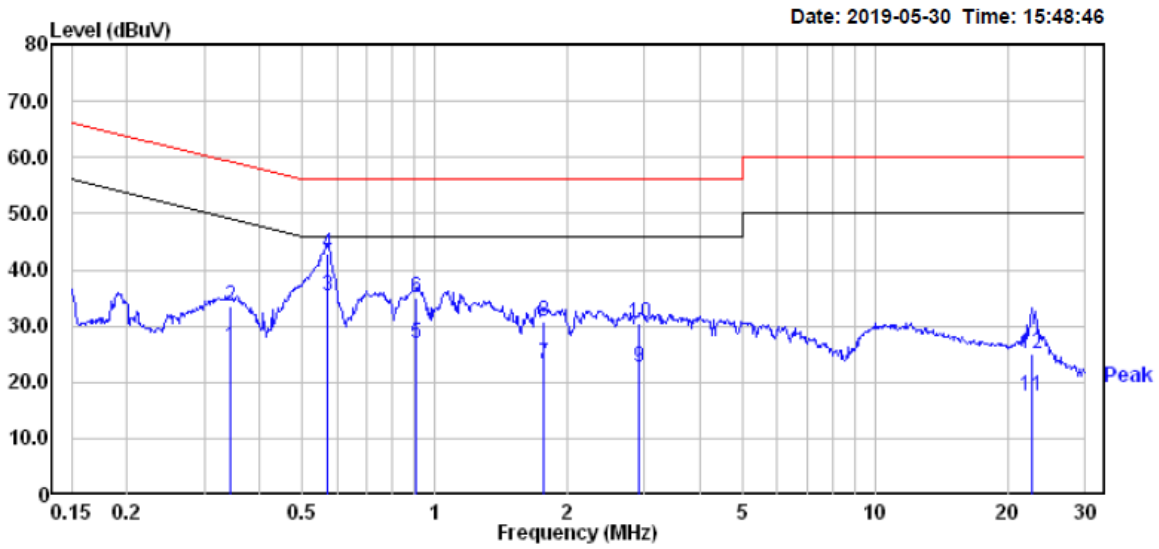
The testing was performed by Matt yao from 2019-05-30 to 2019-06-14.

Test Result: Compliant.

For Wi-Fi Mode:

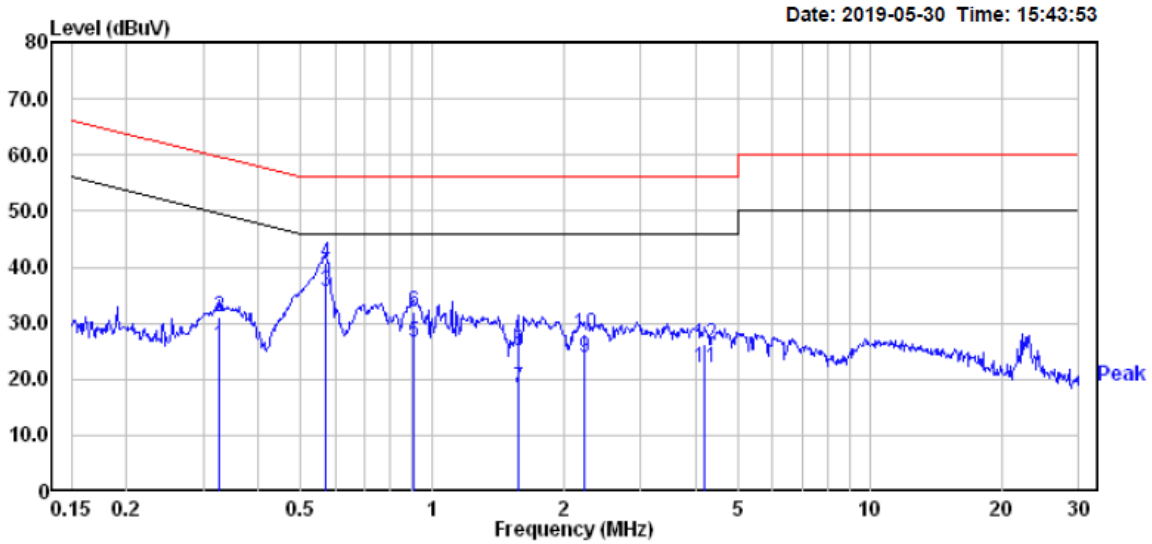
EUT operation mode: Transmitting in 802.11b mode high channel (worst case)

AC 120V/60 Hz, Line



	Freq	Read Level	Cable Loss	LISN Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.343	10.30	6.13	9.94	26.37	49.13	-22.76	Average
2	0.343	17.50	6.13	9.94	33.57	59.13	-25.56	QP
3	0.573	19.40	6.13	9.88	35.41	46.00	-10.59	Average
4	0.573	26.80	6.13	9.88	42.81	56.00	-13.19	QP
5	0.909	10.80	6.13	9.85	26.78	46.00	-19.22	Average
6	0.909	19.00	6.13	9.85	34.98	56.00	-21.02	QP
7	1.772	7.20	6.14	9.94	23.28	46.00	-22.72	Average
8	1.772	14.70	6.14	9.94	30.78	56.00	-25.22	QP
9	2.915	6.80	6.15	9.55	22.50	46.00	-23.50	Average
10	2.915	14.80	6.15	9.55	30.50	56.00	-25.50	QP
11	22.655	1.39	6.26	9.72	17.37	50.00	-32.63	Average
12	22.655	8.99	6.26	9.72	24.97	60.00	-35.03	QP

AC 120V/60 Hz, Neutral



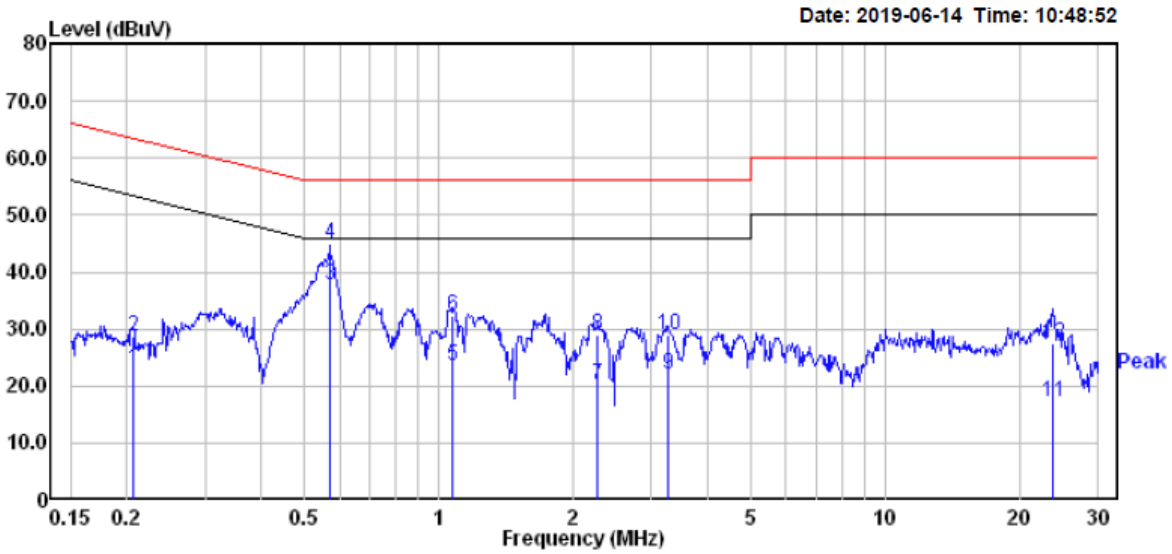
	Freq	Read Level	Cable Loss	LISN Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.325	10.00	6.13	9.95	26.08	49.57	-23.49	Average
2	0.325	14.90	6.13	9.95	30.98	59.57	-28.59	QP
3	0.570	19.50	6.13	9.88	35.51	46.00	-10.49	Average
4	0.570	24.60	6.13	9.88	40.61	56.00	-15.39	QP
5	0.904	10.71	6.13	9.84	26.68	46.00	-19.32	Average
6	0.904	16.11	6.13	9.84	32.08	56.00	-23.92	QP
7	1.568	2.19	6.14	9.95	18.28	46.00	-27.72	Average
8	1.568	8.89	6.14	9.95	24.98	56.00	-31.02	QP
9	2.225	7.90	6.14	9.76	23.80	46.00	-22.20	Average
10	2.225	12.20	6.14	9.76	28.10	56.00	-27.90	QP
11	4.180	6.40	6.15	9.55	22.10	46.00	-23.90	Average
12	4.180	10.70	6.15	9.55	26.40	56.00	-29.60	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)

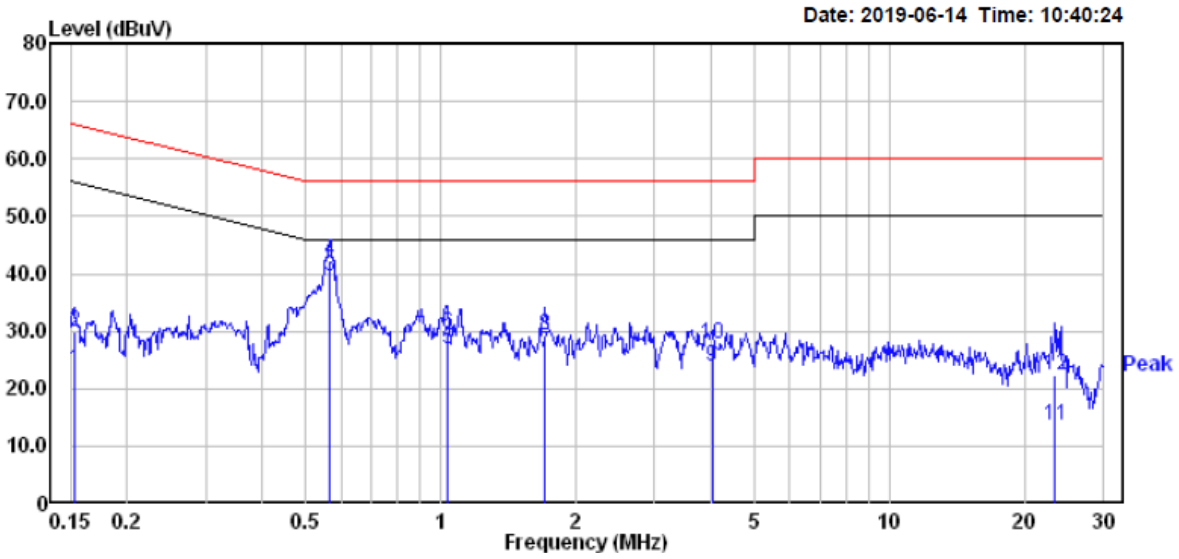
***(The worst case LTE Band 12 （5M BW） High Channel ,high channel of 802.11b and middle channel of BLE mode transmitting simultaneously** was recorded)*

AC 120V/60 Hz, Line



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.207	6.90	16.09	22.99	53.32	-30.33	Average
2	0.207	12.60	16.09	28.69	63.32	-34.63	QP
3	0.573	21.60	16.01	37.61	46.00	-8.39	Average
4	0.573	29.10	16.01	45.11	56.00	-10.89	QP
5	1.071	7.39	16.07	23.46	46.00	-22.54	Average
6	1.071	16.09	16.07	32.16	56.00	-23.84	QP
7	2.273	4.31	15.86	20.17	46.00	-25.83	Average
8	2.273	13.01	15.86	28.87	56.00	-27.13	QP
9	3.258	6.40	15.70	22.10	46.00	-23.90	Average
10	3.258	13.30	15.70	29.00	56.00	-27.00	QP
11	23.762	1.31	15.91	17.22	50.00	-32.78	Average
12	23.762	11.61	15.91	27.52	60.00	-32.48	QP

AC 120V/60 Hz, Neutral



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.152	7.10	16.09	23.19	55.87	-32.68	Average
2	0.152	13.80	16.09	29.89	65.87	-35.98	QP
3	0.567	23.40	16.01	39.41	46.00	-6.59	Average
4	0.567	26.20	16.01	42.21	56.00	-13.79	QP
5	1.032	10.79	16.07	26.86	46.00	-19.14	Average
6	1.032	13.39	16.07	29.46	56.00	-26.54	QP
7	1.707	10.30	16.08	26.38	46.00	-19.62	Average
8	1.707	13.30	16.08	29.38	56.00	-26.62	QP
9	4.027	8.20	15.70	23.90	46.00	-22.10	Average
10	4.027	12.10	15.70	27.80	56.00	-28.20	QP
11	23.387	-2.20	15.93	13.73	50.00	-36.27	Average
12	23.387	6.40	15.93	22.33	60.00	-37.67	QP

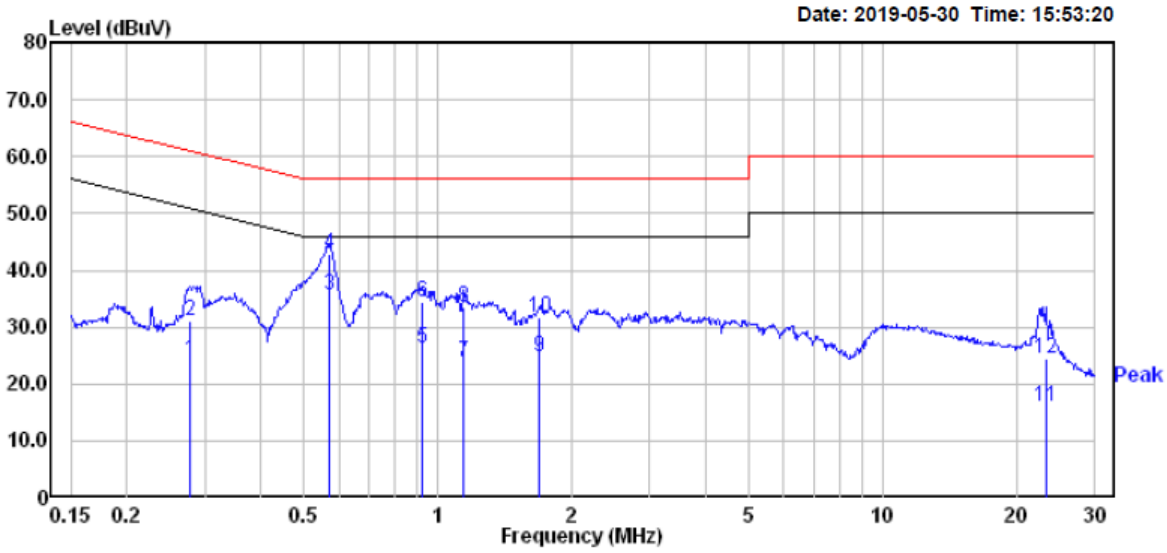
Note:

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

For BLE Mode:

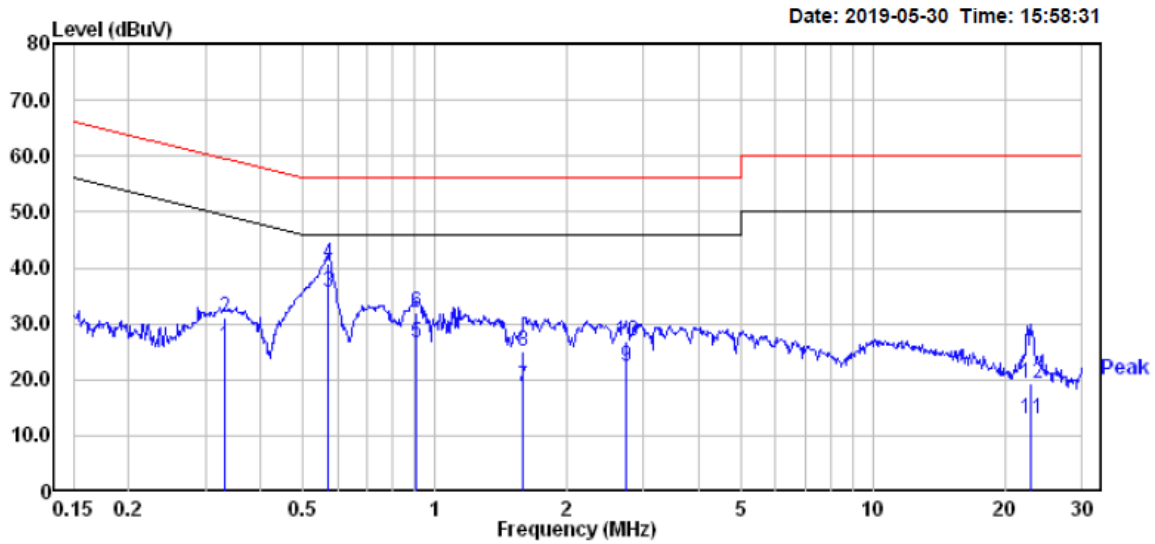
EUT operation mode: Transmitting in middle channel (worst case)

AC 120V/60 Hz, Line



	Freq	Read Level	Cable Loss	LISN Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.277	8.10	6.13	9.96	24.19	50.90	-26.71	Average
2	0.277	15.00	6.13	9.96	31.09	60.90	-29.81	QP
3	0.570	19.50	6.13	9.88	35.51	46.00	-10.49	Average
4	0.570	26.80	6.13	9.88	42.81	56.00	-13.19	QP
5	0.923	10.21	6.13	9.86	26.20	46.00	-19.80	Average
6	0.923	18.41	6.13	9.86	34.40	56.00	-21.60	QP
7	1.147	7.80	6.14	9.92	23.86	46.00	-22.14	Average
8	1.147	17.50	6.14	9.92	33.56	56.00	-22.44	QP
9	1.698	8.60	6.14	9.94	24.68	46.00	-21.32	Average
10	1.698	15.70	6.14	9.94	31.78	56.00	-24.22	QP
11	23.263	0.10	6.26	9.68	16.04	50.00	-33.96	Average
12	23.263	8.50	6.26	9.68	24.44	60.00	-35.56	QP

AC 120V/60 Hz, Neutral



	Freq	Read Level	Cable Loss	LISN Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.330	10.00	6.13	9.95	26.08	49.44	-23.36	Average
2	0.330	15.00	6.13	9.95	31.08	59.44	-28.36	QP
3	0.573	19.50	6.13	9.88	35.51	46.00	-10.49	Average
4	0.573	24.60	6.13	9.88	40.61	56.00	-15.39	QP
5	0.909	10.60	6.13	9.85	26.58	46.00	-19.42	Average
6	0.909	16.10	6.13	9.85	32.08	56.00	-23.92	QP
7	1.593	2.69	6.14	9.95	18.78	46.00	-27.22	Average
8	1.593	9.09	6.14	9.95	25.18	56.00	-30.82	QP
9	2.736	6.70	6.14	9.56	22.40	46.00	-23.60	Average
10	2.736	11.20	6.14	9.56	26.90	56.00	-29.10	QP
11	22.896	-2.90	6.26	9.70	13.06	50.00	-36.94	Average
12	22.896	3.30	6.26	9.70	19.26	50.00	-30.74	Average

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)

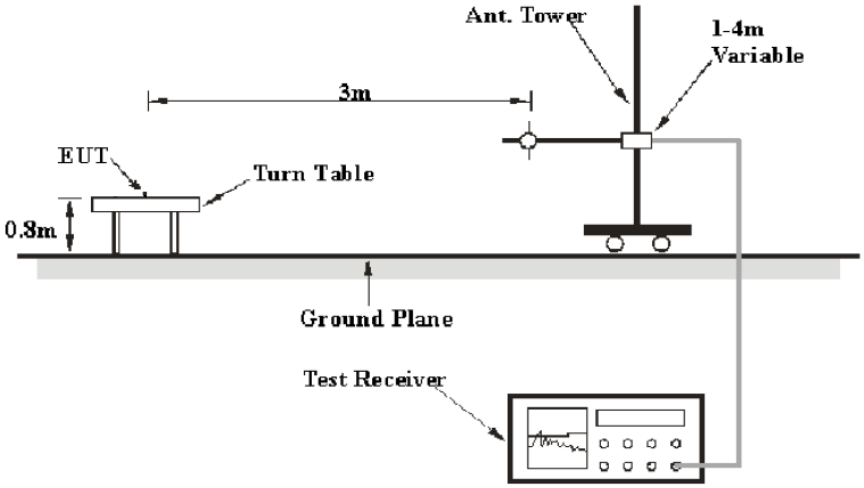
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

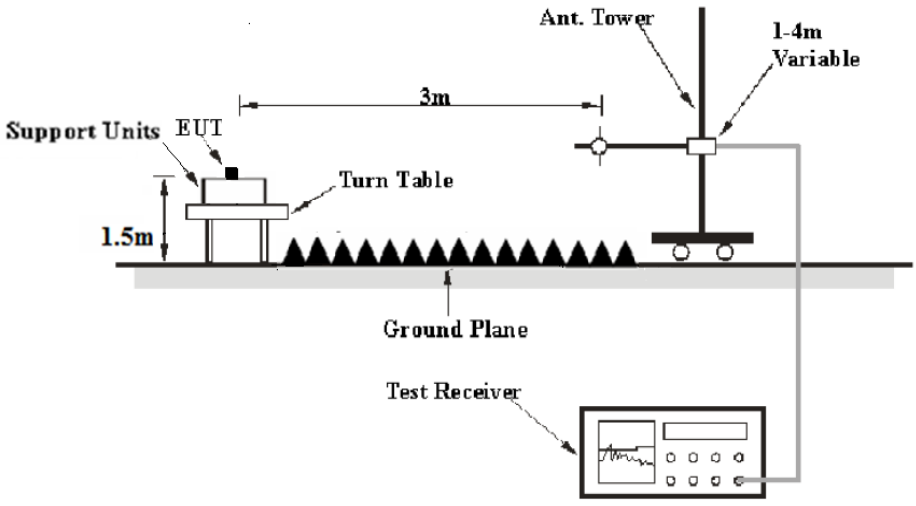
FCC §15.247 (d); §15.209; §15.205;

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	Video B/W	IF B/W	Detector
30 MHz - 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1GHz	1MHz	3 MHz	/	PK
	1MHz	3 MHz	/	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 30 MHz-1 GHz, peak and Average detection mode for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

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

Corrected Amplitude (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:	24.1 ℃~24.5℃
Relative Humidity:	50 %~52 %
ATM Pressure:	101.2kPa~101.5kPa

The testing was performed by Matt yao from 2019-05-28 to 2019-06-15.

Test Result: Compliant.

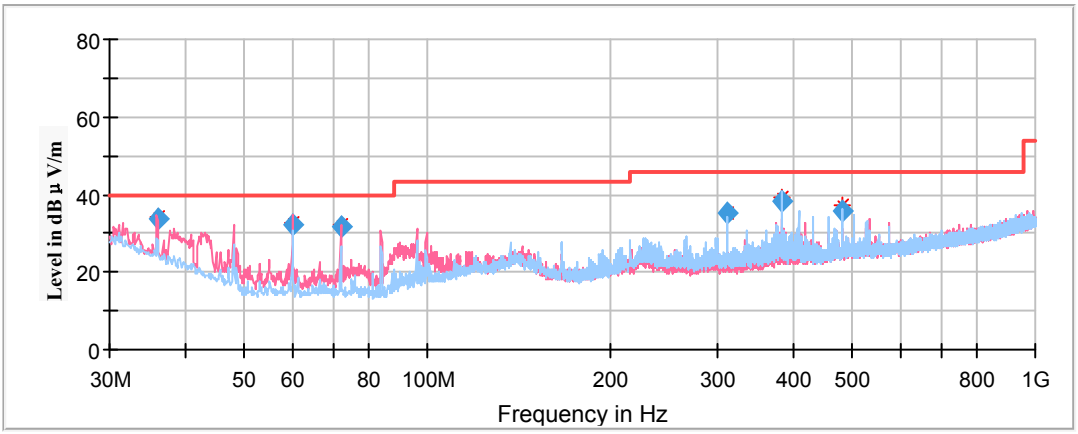
EUT operation mode: Transmitting

For Wi-Fi Mode:

Spurious Emission Test:

30MHz-1GHz:

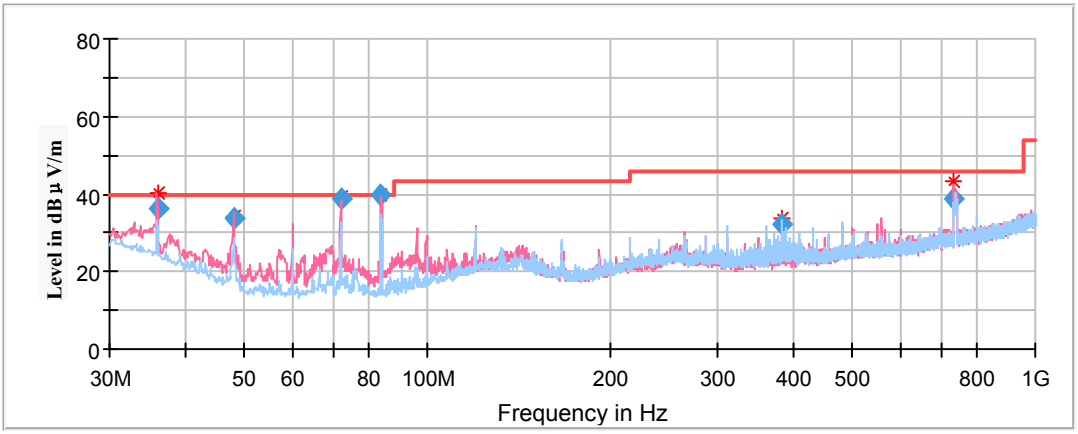
Pre-scan with 802.11b, 802.11g, 802.11n-HT20 and 802.11n-HT40 modes of operation in the X,Y and Z axes of orientation, the worst case ***high channel of 802.11b mode in X-axis of orientation*** *was recorded*



Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	QuasiPeak (dBµV/m)	Height (cm)	Polar (H/V)				
35.993150	33.46	101.0	V	75.0	-8.0	40.00	6.54
59.992550	32.45	101.0	V	2.0	-17.9	40.00	7.55
72.002600	31.73	101.0	V	75.0	-17.4	40.00	8.27
312.014000	35.12	101.0	H	39.0	-10.2	46.00	10.88
383.985800	38.18	101.0	H	186.0	-8.5	46.00	7.82
480.012500	35.89	101.0	H	170.0	-6.7	46.00	10.11

30MHz-1GHz:

***(The worst case LTE Band 12 （5M BW） High Channel ,high channel of 802.11b and middle channel of BLE mode transmitting simultaneously** was recorded)*



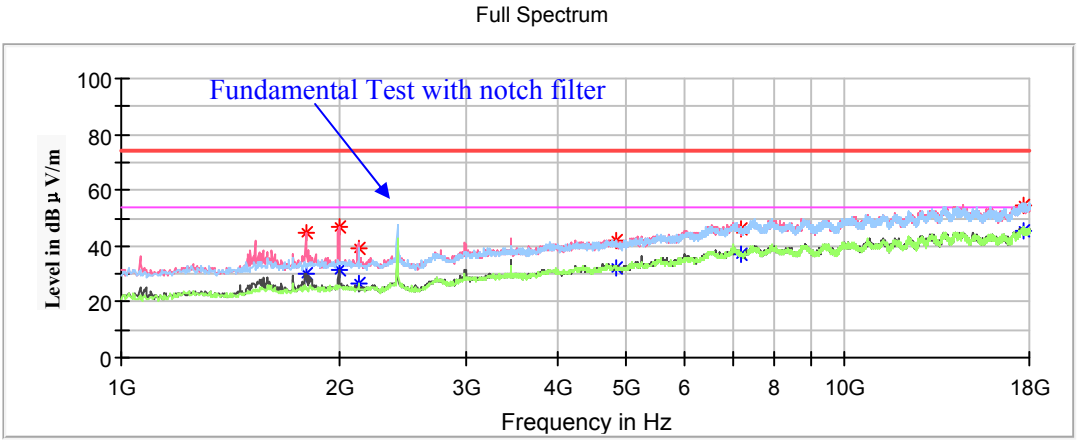
Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	QuasiPeak (dBµV/m)	Height (cm)	Polar (H/V)				
35.989550	36.30	101.0	V	129.0	-8.0	40.00	3.70
48.017300	33.71	101.0	V	35.0	-16.2	40.00	6.29
71.996900	38.61	101.0	V	82.0	-17.4	40.00	1.39
83.994950	39.64	101.0	V	61.0	-17.7	40.00	0.36
384.023600	32.12	101.0	H	119.0	-8.5	46.00	13.88
735.512050	38.68	101.0	V	224.0	-2.7	46.00	7.32

1GHz-18GHz:

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

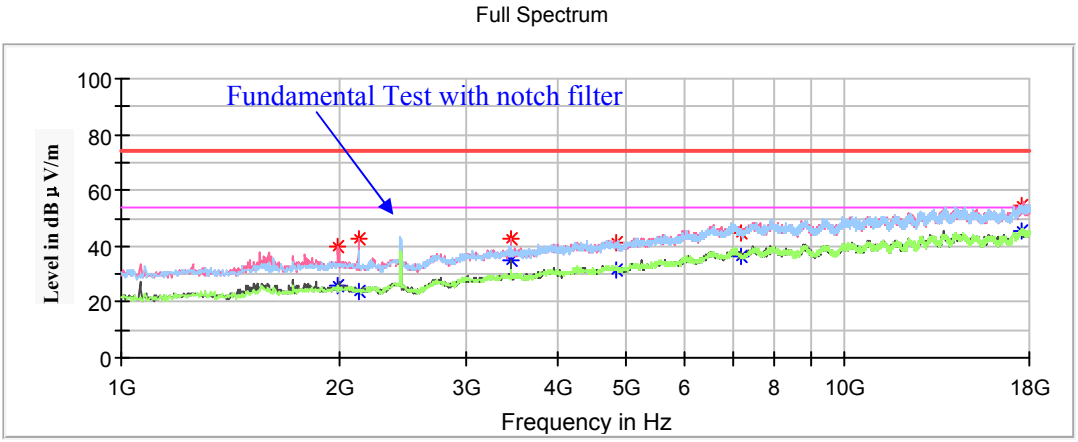
Note:
1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
   Corrected Amplitude (dBμV/m) = Corrected Factor (dB/m) + Reading (dBμV)
   Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV/m)

Low Channel: 2412MHz



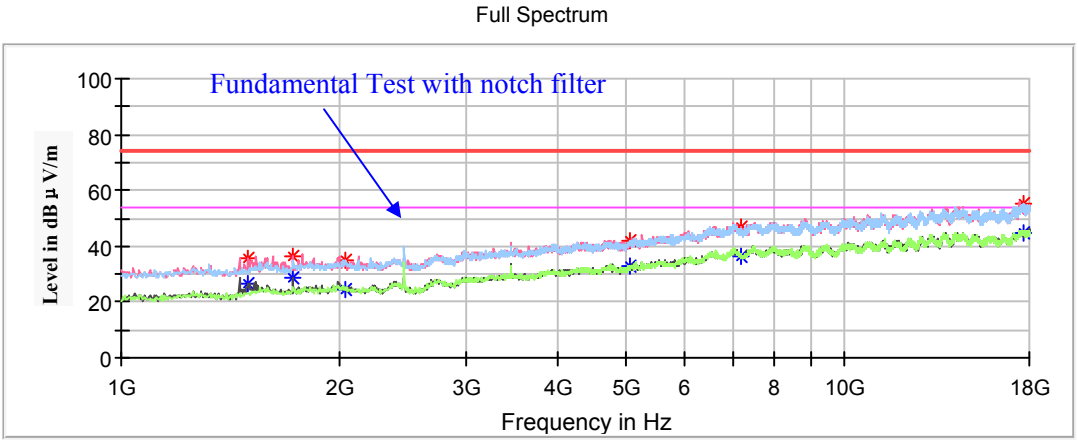
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1799.000000	---	29.74	100.0	V	76.0	-8.9	54.00	24.26
1799.000000	44.85	---	100.0	V	76.0	-8.9	74.00	29.15
1999.600000	---	31.73	150.0	V	264.0	-8.2	54.00	22.27
1999.600000	46.65	---	150.0	V	264.0	-8.2	74.00	27.35
2128.800000	---	26.25	250.0	H	29.0	-7.9	54.00	27.75
2128.800000	39.36	---	250.0	H	29.0	-7.9	74.00	34.64
4824.000000	---	32.44	250.0	H	269.0	-0.5	54.00	21.56
4824.000000	41.65	---	250.0	H	269.0	-0.5	74.00	32.35
7236.000000	---	37.33	250.0	H	29.0	5.6	54.00	16.67
7236.000000	46.46	---	250.0	H	29.0	5.6	74.00	27.54
17687.200000	---	45.20	200.0	V	30.0	14.0	54.00	8.80
17687.200000	54.39	---	200.0	V	30.0	14.0	74.00	19.61

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)				
1996.200000	---	25.56	200.0	V	238.0	-8.3	54.00	28.44
1996.200000	39.69	---	200.0	V	238.0	-8.3	74.00	34.31
2132.200000	---	24.00	200.0	V	331.0	-7.9	54.00	30.00
2132.200000	42.51	---	200.0	V	331.0	-7.9	74.00	31.49
3454.800000	---	34.74	150.0	V	239.0	-3.6	54.00	19.26
3454.800000	42.66	---	150.0	V	239.0	-3.6	74.00	31.34
4874.000000	---	31.38	200.0	H	320.0	-0.5	54.00	22.62
4874.000000	41.00	---	200.0	H	320.0	-0.5	74.00	33.00
7311.000000	---	36.29	150.0	H	355.0	5.7	54.00	17.71
7311.000000	45.05	---	150.0	H	355.0	5.7	74.00	28.95
17568.200000	---	45.40	150.0	H	139.0	14.2	54.00	8.60
17568.200000	54.26	---	150.0	H	139.0	14.2	74.00	19.74

High Channel: 2462MHz

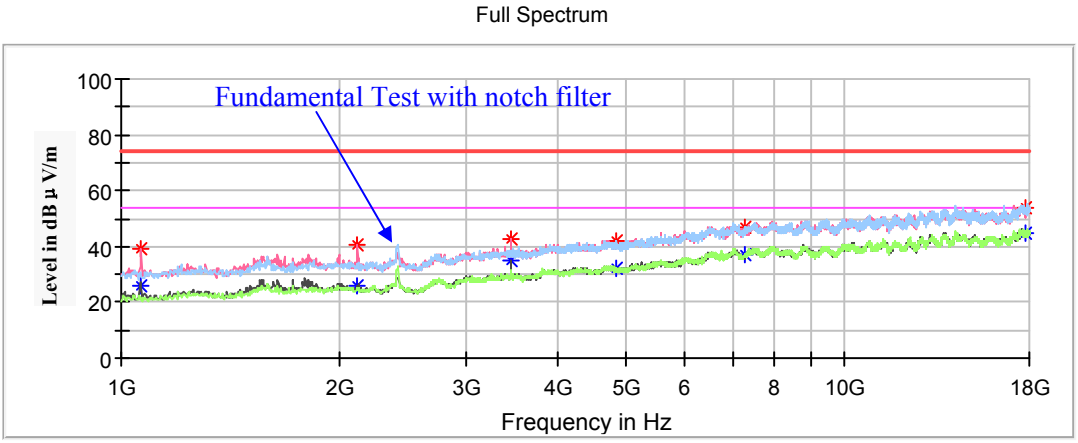


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1499.800000	35.82	---	200.0	V	160.0	-9.9	74.00	38.18
1499.800000	---	26.45	200.0	V	160.0	-9.9	54.00	27.55
1727.600000	36.71	---	150.0	V	59.0	-9.2	74.00	37.29
1727.600000	---	28.57	150.0	V	59.0	-9.2	54.00	25.43
2043.800000	35.09	---	150.0	H	227.0	-8.1	74.00	38.91
2043.800000	---	24.66	150.0	H	227.0	-8.1	54.00	29.34
4924.000000	41.96	---	150.0	H	336.0	-0.1	74.00	32.04
4924.000000	---	32.71	150.0	H	336.0	-0.1	54.00	21.29
7386.000000	---	36.70	150.0	V	47.0	5.6	54.00	17.30
7386.000000	47.04	---	150.0	V	47.0	5.6	74.00	26.96
17663.400000	---	44.44	150.0	H	159.0	14.0	54.00	9.56
17663.400000	54.91	---	150.0	H	159.0	14.0	74.00	19.09

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

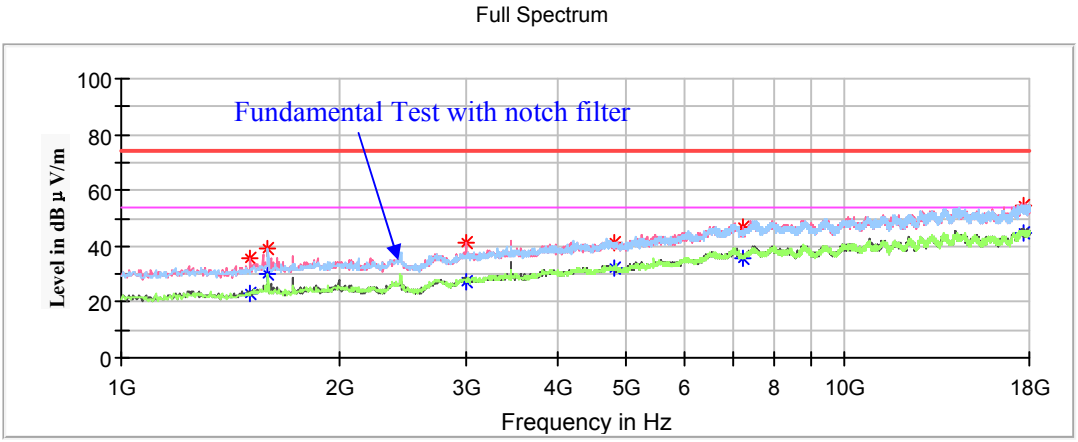
Note:
1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
   Corrected Amplitude (dBµV /m) = Corrected Factor (dB/m) + Reading (dBµV)
   Margin (dB) = Limit (dBµV/m) – Corrected Amplitude (dBµV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

Low Channel: 2412MHz



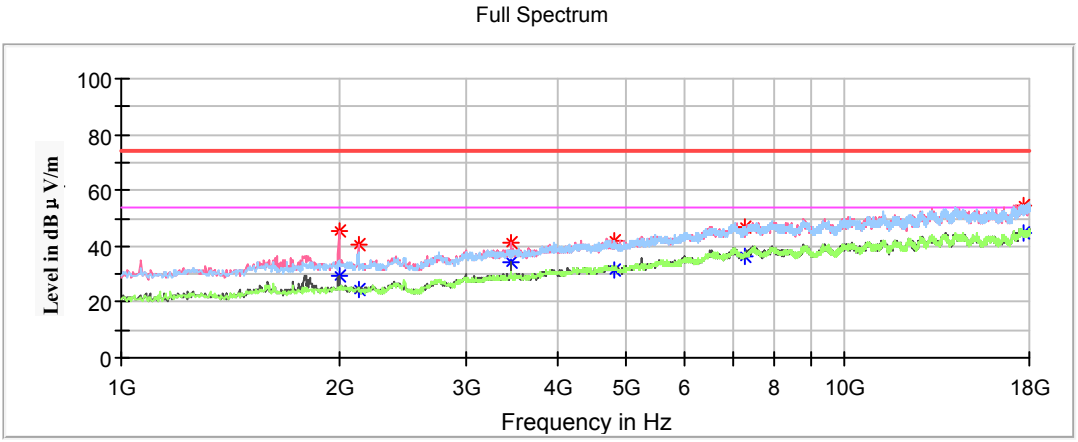
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1064.600000	---	25.77	200.0	V	188.0	-12.3	54.00	28.23
1064.600000	39.42	---	200.0	V	188.0	-12.3	74.00	34.58
2122.000000	---	26.02	150.0	V	347.0	-7.9	54.00	27.98
2122.000000	40.25	---	150.0	V	347.0	-7.9	74.00	33.75
3454.800000	---	34.68	200.0	V	232.0	-3.6	54.00	19.32
3454.800000	42.53	---	200.0	V	232.0	-3.6	74.00	31.47
4824.000000	---	32.43	200.0	H	109.0	-0.5	54.00	21.57
4824.000000	41.64	---	200.0	H	109.0	-0.5	74.00	32.36
7236.000000	---	37.06	150.0	H	11.0	5.8	54.00	16.94
7236.000000	46.81	---	150.0	H	11.0	5.8	74.00	27.19
17796.000000	---	44.99	200.0	H	156.0	13.8	54.00	9.01
17796.000000	54.11	---	200.0	H	156.0	13.8	74.00	19.89

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)				
1510.000000	---	23.11	150.0	V	197.0	-9.9	54.00	30.89
1510.000000	35.91	---	150.0	V	197.0	-9.9	74.00	38.09
1595.000000	---	29.83	200.0	H	151.0	-9.6	54.00	24.17
1595.000000	39.35	---	200.0	H	151.0	-9.6	74.00	34.65
2992.400000	---	27.40	200.0	V	359.0	-4.4	54.00	26.60
2992.400000	40.96	---	200.0	V	359.0	-4.4	74.00	33.04
4874.000000	---	32.06	150.0	H	0.0	-0.5	54.00	21.94
4874.000000	41.57	---	150.0	H	0.0	-0.5	74.00	32.43
7311.000000	---	35.99	200.0	V	345.0	5.7	54.00	18.01
7311.000000	46.58	---	200.0	V	345.0	5.7	74.00	27.42
17643.000000	---	44.99	150.0	H	251.0	14.1	54.00	9.01
17643.000000	54.87	---	150.0	H	251.0	14.1	74.00	19.13

High Channel: 2462MHz

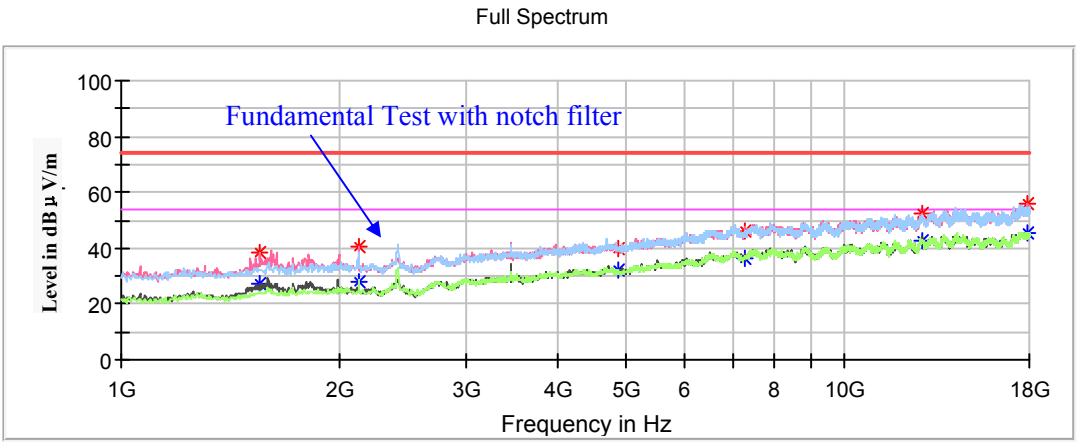


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1999.600000	---	29.47	200.0	V	255.0	-8.2	54.00	24.53
1999.600000	45.25	---	200.0	V	255.0	-8.2	74.00	28.75
2125.400000	---	24.60	150.0	V	325.0	-7.9	54.00	29.40
2125.400000	40.39	---	150.0	V	325.0	-7.9	74.00	33.61
3454.800000	---	33.97	200.0	V	232.0	-3.6	54.00	20.03
3454.800000	41.37	---	200.0	V	232.0	-3.6	74.00	32.63
4924.000000	---	31.63	100.0	H	109.0	-0.6	54.00	22.37
4924.000000	41.98	---	100.0	H	109.0	-0.6	74.00	32.02
7386.000000	---	36.71	200.0	H	51.0	5.8	54.00	17.29
7386.000000	47.19	---	200.0	H	51.0	5.8	74.00	26.81
17629.400000	---	44.90	200.0	H	227.0	14.1	54.00	9.10
17629.400000	54.61	---	200.0	H	227.0	14.1	74.00	19.39

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

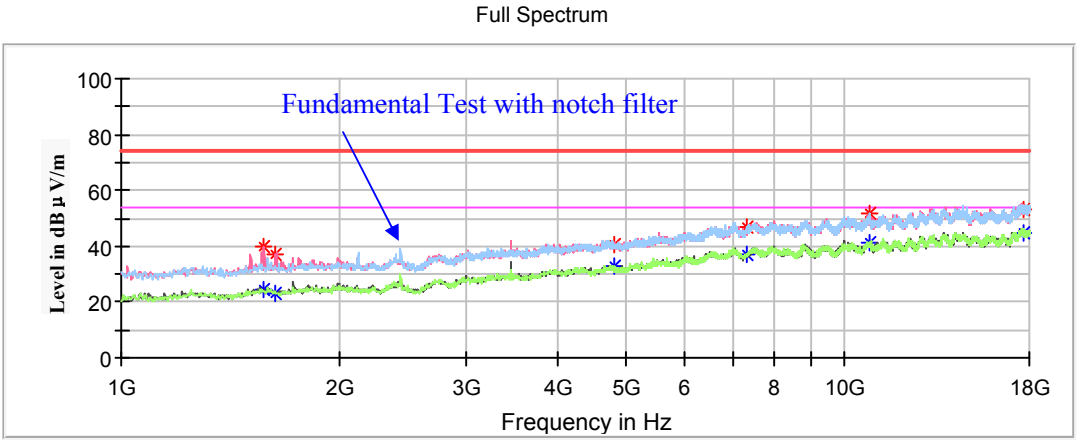
Note:
1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
   Corrected Amplitude (dBμV /m) = Corrected Factor (dB/m) + Reading (dBμV)
   Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV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

Low Channel: 2412MHz



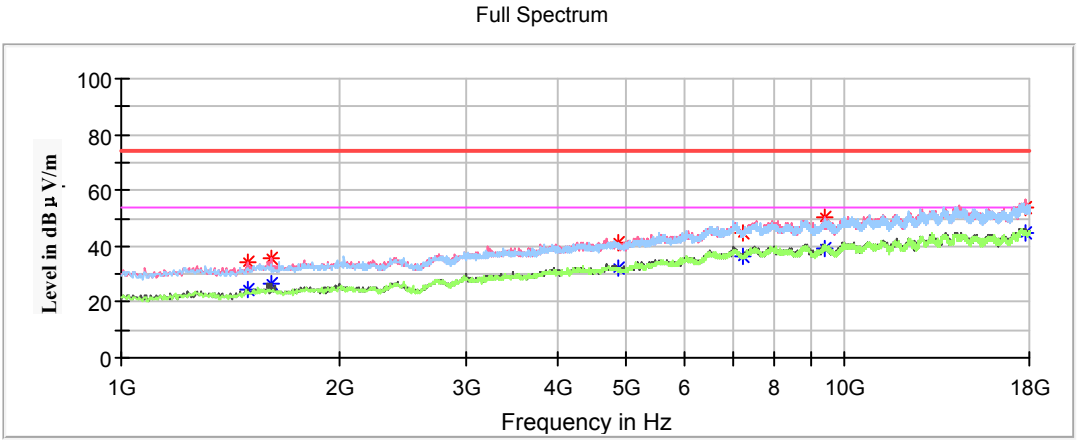
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
1557.600000	---	26.97	150.0	V	203.0	-9.7	54.00	27.03
1557.600000	38.75	---	150.0	V	203.0	-9.7	74.00	35.25
2128.800000	---	27.83	200.0	V	359.0	-7.9	54.00	26.17
2128.800000	40.90	---	200.0	V	359.0	-7.9	74.00	33.10
4824.000000	---	32.09	200.0	H	196.0	-0.5	54.00	21.91
4824.000000	40.07	---	200.0	H	196.0	-0.5	74.00	33.93
7236.000000	---	36.31	150.0	H	66.0	5.8	54.00	17.69
7236.000000	46.37	---	150.0	H	66.0	5.8	74.00	27.63
12760.600000	---	42.44	200.0	V	333.0	11.2	54.00	11.56
12760.600000	52.18	---	200.0	V	333.0	11.2	74.00	21.82
17935.400000	55.98	---	150.0	V	316.0	13.6	74.00	18.02
17935.400000	---	45.66	150.0	V	316.0	13.6	54.00	8.34

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)				
1574.600000	---	24.73	150.0	V	197.0	-9.7	54.00	29.27
1574.600000	39.74	---	150.0	V	197.0	-9.7	74.00	34.26
1632.400000	---	23.40	200.0	V	186.0	-9.5	54.00	30.60
1632.400000	36.83	---	200.0	V	186.0	-9.5	74.00	37.17
4874.000000	---	32.98	150.0	H	180.0	-0.5	54.00	21.02
4874.000000	40.85	---	150.0	H	180.0	-0.5	74.00	33.15
7311.000000	---	36.93	200.0	H	161.0	5.9	54.00	17.07
7311.000000	46.92	---	200.0	H	161.0	5.9	74.00	27.08
10832.800000	---	41.25	150.0	H	296.0	9.5	54.00	12.75
10832.800000	51.76	---	150.0	H	296.0	9.5	74.00	22.24
17717.800000	---	44.72	150.0	V	185.0	13.9	54.00	9.28
17717.800000	52.90	---	150.0	V	185.0	13.9	74.00	21.10

High Channel: 2462MHz

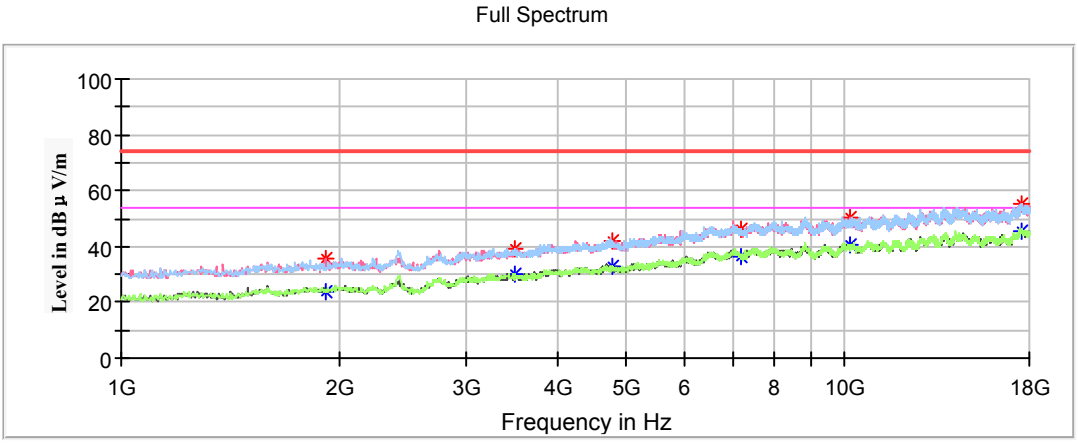


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1493.000000	34.09	---	150.0	V	116.0	-10.0	74.00	39.91
1493.000000	---	24.79	150.0	V	116.0	-10.0	54.00	29.21
1612.000000	35.64	---	200.0	V	296.0	-9.6	74.00	38.36
1612.000000	---	26.85	200.0	V	296.0	-9.6	54.00	27.15
4924.000000	41.23	---	150.0	H	356.0	-0.5	74.00	32.77
4924.000000	---	31.85	150.0	H	356.0	-0.5	54.00	22.15
7386.000000	45.09	---	200.0	H	133.0	5.7	74.00	28.91
7386.000000	---	36.10	200.0	H	133.0	5.7	54.00	17.90
9401.400000	50.30	---	200.0	V	215.0	7.7	74.00	23.70
9401.400000	---	39.13	200.0	V	215.0	7.7	54.00	14.87
17738.200000	---	44.54	150.0	H	287.0	13.9	54.00	9.46
17738.200000	54.12	---	150.0	H	287.0	13.9	74.00	19.88

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

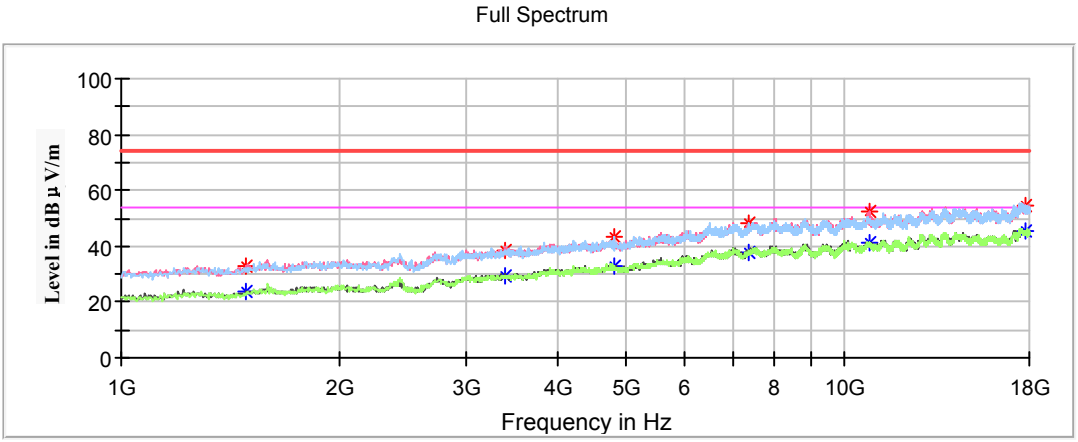
Note:
1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
   Corrected Amplitude (dBμV/m) = Corrected Factor (dB/m) + Reading (dBμV)
   Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV/m)

Low Channel: 2422MHz



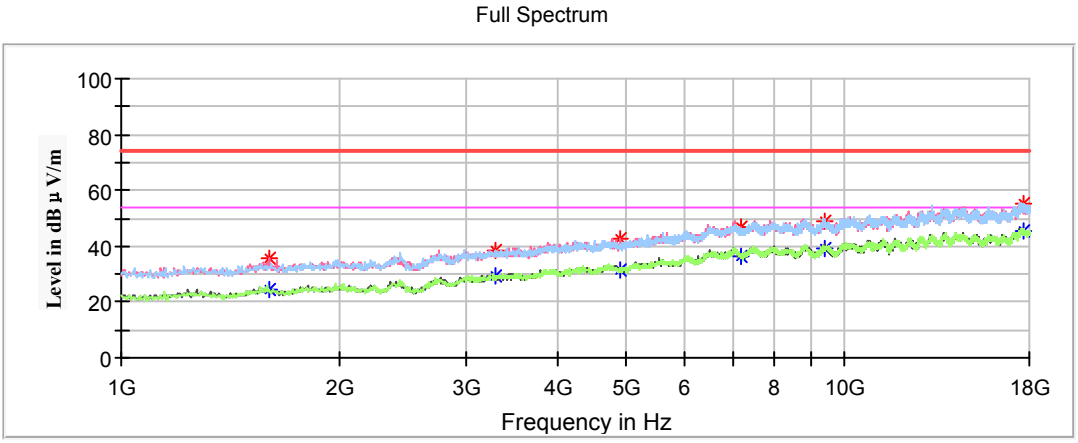
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1914.600000	---	23.90	200.0	V	159.0	-8.5	54.00	30.10
1914.600000	35.44	---	200.0	V	159.0	-8.5	74.00	38.56
3505.800000	---	30.03	150.0	H	177.0	-3.5	54.00	23.97
3505.800000	39.34	---	150.0	H	177.0	-3.5	74.00	34.66
4844.000000	---	32.78	200.0	H	56.0	-0.6	54.00	21.22
4844.000000	41.78	---	200.0	H	56.0	-0.6	74.00	32.22
7266.000000	---	36.45	150.0	H	6.0	5.6	54.00	17.55
7266.000000	45.91	---	150.0	H	6.0	5.6	74.00	28.09
10186.800000	---	40.47	200.0	V	264.0	8.5	54.00	13.53
10186.800000	50.54	---	200.0	V	264.0	8.5	74.00	23.46
17575.000000	---	45.67	200.0	V	333.0	14.2	54.00	8.33
17575.000000	55.26	---	200.0	V	333.0	14.2	74.00	18.74

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)				
1486.200000	---	23.76	200.0	V	199.0	-10.0	54.00	30.24
1486.200000	32.97	---	200.0	V	199.0	-10.0	74.00	41.03
3393.600000	---	29.21	150.0	H	2.0	-3.7	54.00	24.79
3393.600000	38.38	---	150.0	H	2.0	-3.7	74.00	35.62
4874.000000	---	32.75	150.0	H	317.0	-0.6	54.00	21.25
4874.000000	43.13	---	150.0	H	317.0	-0.6	74.00	30.87
7311.000000	---	37.97	150.0	H	6.0	5.9	54.00	16.03
7311.000000	48.27	---	150.0	H	6.0	5.9	74.00	25.73
10846.400000	---	40.98	200.0	V	352.0	9.5	54.00	13.02
10846.400000	52.44	---	200.0	V	352.0	9.5	74.00	21.56
17748.400000	---	45.66	150.0	V	247.0	13.9	54.00	8.34
17748.400000	54.60	---	150.0	V	247.0	13.9	74.00	19.40

High Channel: 2452MHz

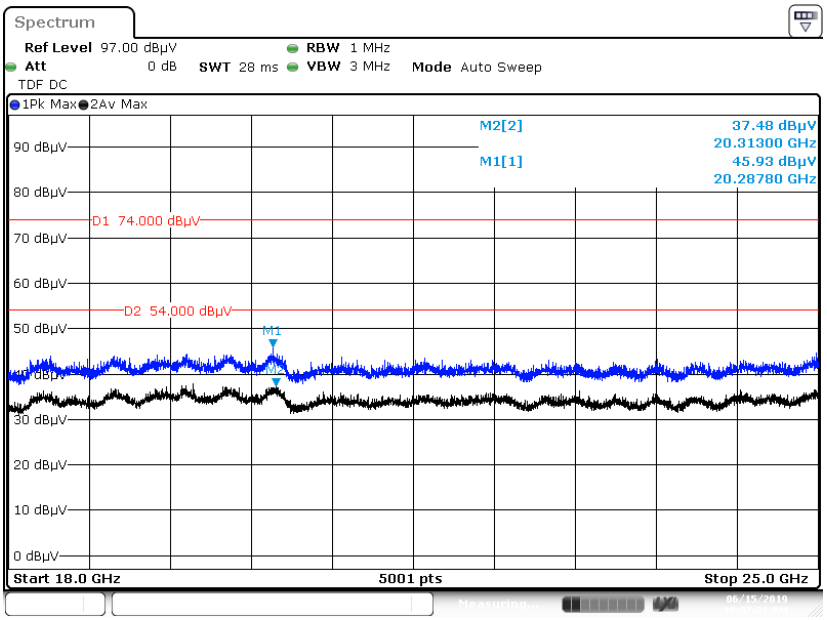


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1601.800000	---	24.19	200.0	V	246.0	-9.6	54.00	29.81
1601.800000	35.69	---	200.0	V	246.0	-9.6	74.00	38.31
3291.600000	---	29.17	150.0	H	346.0	-3.9	54.00	24.83
3291.600000	38.75	---	150.0	H	346.0	-3.9	74.00	35.25
4904.000000	---	31.73	150.0	V	103.0	-0.4	54.00	22.27
4904.000000	42.81	---	150.0	V	103.0	-0.4	74.00	31.19
7356.000000	---	36.53	200.0	V	270.0	5.6	54.00	17.47
7356.000000	47.04	---	200.0	V	270.0	5.6	74.00	26.96
9374.200000	---	39.41	150.0	H	197.0	7.7	54.00	14.59
9374.200000	49.05	---	150.0	H	197.0	7.7	74.00	24.95
17622.600000	---	45.63	200.0	H	43.0	14.1	54.00	8.37
17622.600000	55.31	---	200.0	H	43.0	14.1	74.00	18.69

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 ***high channel of 802.11b mode in X-axis of orientation*** *was recorded*

Horizontal



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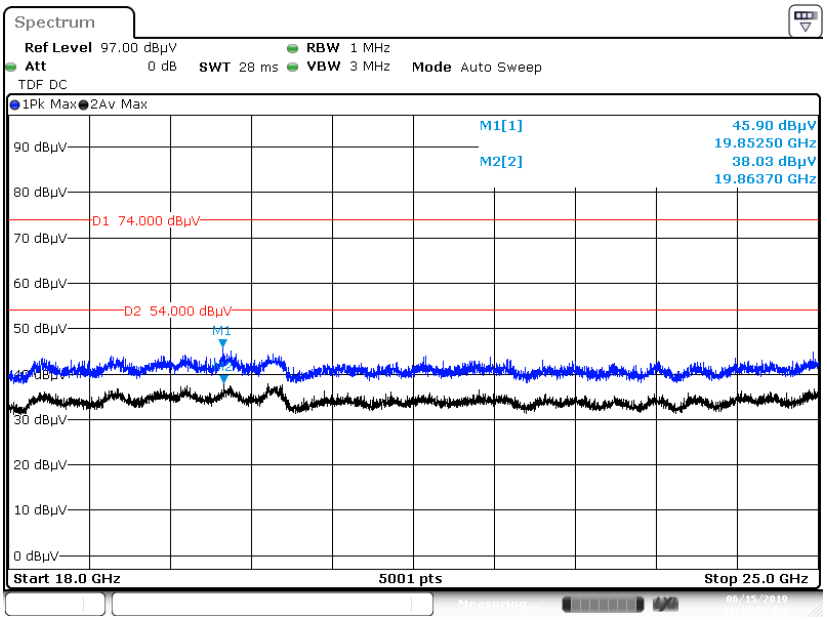
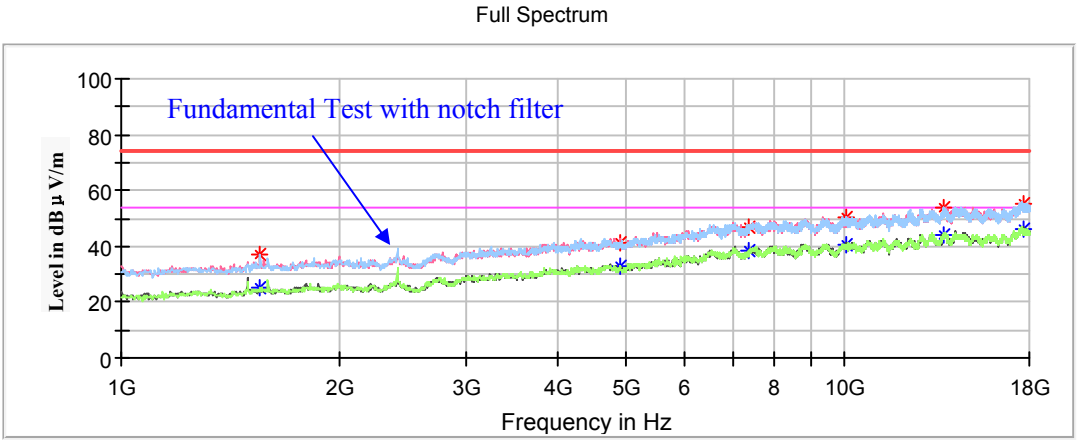
Vertical



Date:15.JUN.2019 11:19:55

1GHz-18GHz:

***(The worst case LTE Band 12 （5M BW） High Channel ,high channel of 802.11b and middle channel of BLE mode transmitting simultaneously** was recorded)*

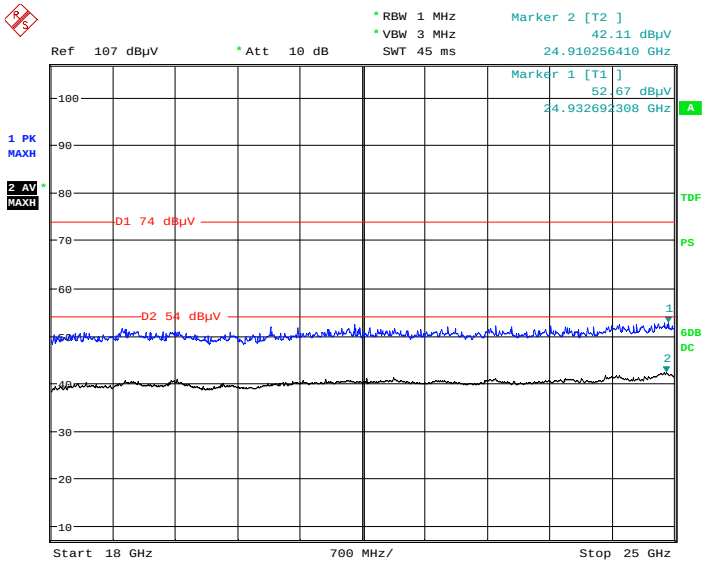


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1557.600000	36.81	---	250.0	H	270.0	-9.7	74.00	37.19
1557.600000	---	25.11	250.0	H	270.0	-9.7	54.00	28.89
4882.800000	41.40	---	200.0	V	109.0	-0.4	74.00	32.60
4882.800000	---	33.02	200.0	V	109.0	-0.4	54.00	20.98
7385.200000	47.06	---	150.0	V	335.0	5.9	74.00	26.94
7385.200000	---	38.45	150.0	V	335.0	5.9	54.00	15.55
10037.200000	50.44	---	150.0	H	290.0	8.3	74.00	23.56
10037.200000	---	40.59	150.0	H	290.0	8.3	54.00	13.41
13712.600000	---	43.87	200.0	H	104.0	12.2	54.00	10.13
13712.600000	53.63	---	200.0	H	104.0	12.2	74.00	20.37
17615.800000	---	46.11	100.0	V	216.0	14.1	54.00	7.89
17615.800000	55.36	---	100.0	V	216.0	14.1	74.00	18.64

18GHz-25GHz:

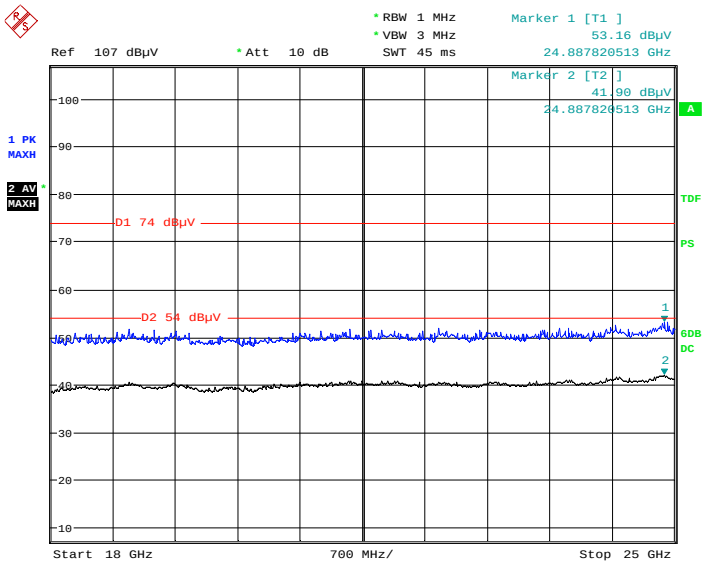
***(The worst case LTE Band 12 （5M BW） High Channel ,high channel of 802.11b and middle channel of BLE mode transmitting simultaneously** was recorded)*

Horizontal



Date: 6.AUG.2019 14:31:46

Vertical



Date: 6.AUG.2019 14:52:35

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 X-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								
2390.000000	---	41.80	200.0	H	59.0	2.8	54.00	12.20
2390.000000	52.74	---	200.0	H	59.0	2.8	74.00	21.26
High Channel: 2462MHz								
2483.500000	---	41.20	150.0	H	159.0	3.0	54.00	12.80
2483.500000	51.45	---	150.0	H	159.0	3.0	74.00	22.55

802.11g Mode: *(Pre-scan in the X,Y and Z axes of orientation, the worst case X-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								
2390.000000	---	40.83	100.0	V	344.0	2.8	54.00	13.17
2390.000000	49.92	---	100.0	V	344.0	2.8	74.00	24.08
High Channel: 2462MHz								
2483.500000	---	40.93	150.0	H	42.0	3.0	54.00	13.07
2483.500000	50.71	---	150.0	H	42.0	3.0	74.00	23.29

802.11n-HT20 Mode: *(Pre-scan in the X,Y and Z axes of orientation, the worst case X-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								
2390.000000	---	40.91	150.0	H	148.0	2.8	54.00	13.09
2390.000000	53.47	---	150.0	H	148.0	2.8	74.00	20.53
High Channel: 2462MHz								
2483.500000	---	40.50	100.0	V	272.0	3.0	54.00	13.50
2483.500000	50.65	---	100.0	V	272.0	3.0	74.00	23.35

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

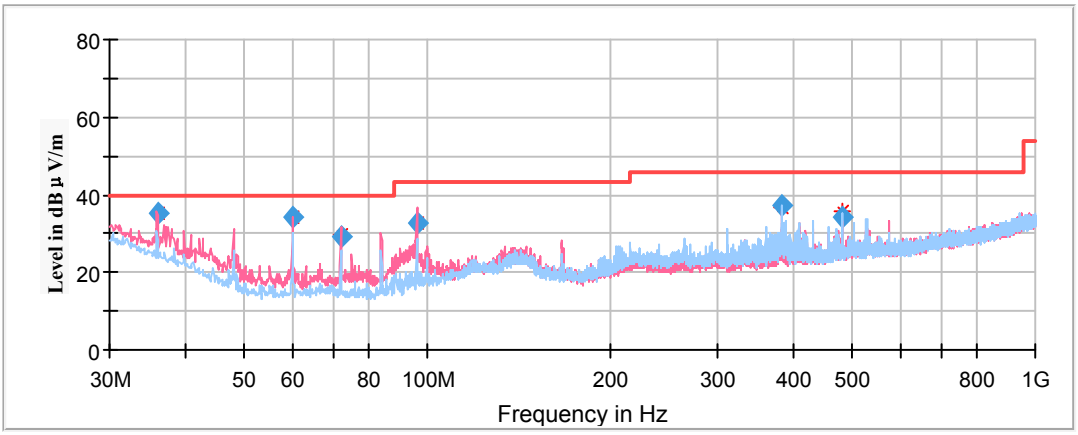
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)				
Low Channel: 2422MHz								
2390.000000	51.52	---	200.0	H	149.0	2.8	74.00	22.48
2390.000000	---	42.48	200.0	H	149.0	2.8	54.00	11.52
High Channel: 2452MHz								
2483.500000	---	40.89	100.0	V	275.0	3.0	54.00	13.11
2483.500000	51.00	---	100.0	V	275.0	3.0	74.00	23.00

For BLE Mode:

Spurious Emission Test:

30MHz-1GHz

*(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **middle channel of operation in the X axis of orientation** was recorded)*



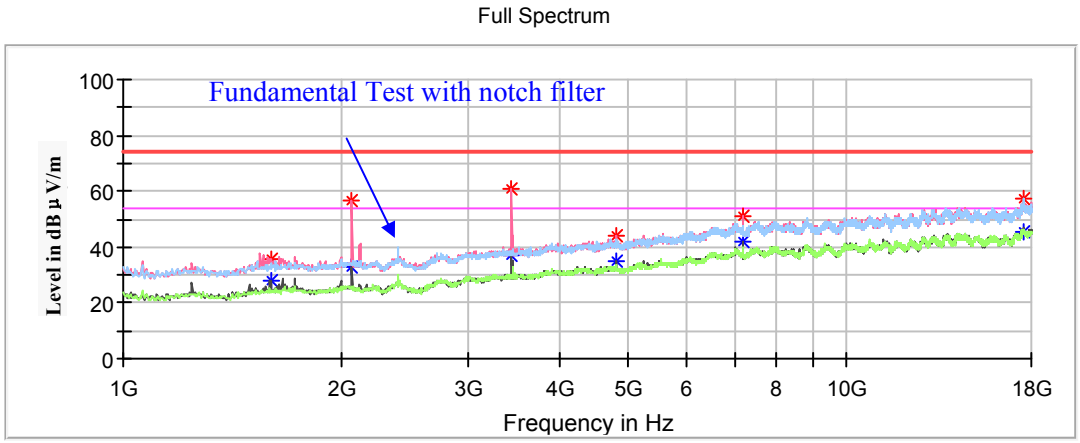
Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	QuasiPeak (dBµV/m)	Height (cm)	Polar (H/V)				
35.972150	35.41	101.0	V	18.0	-8.0	40.00	4.59
60.001850	33.98	101.0	V	44.0	-17.9	40.00	6.02
71.991800	29.25	101.0	V	39.0	-17.4	40.00	10.75
95.987300	32.63	101.0	V	18.0	-15.9	43.50	10.87
384.006200	37.30	101.0	H	129.0	-8.5	46.00	8.70
480.008300	34.43	101.0	H	346.0	-6.7	46.00	11.57

1GHz-18GHz

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

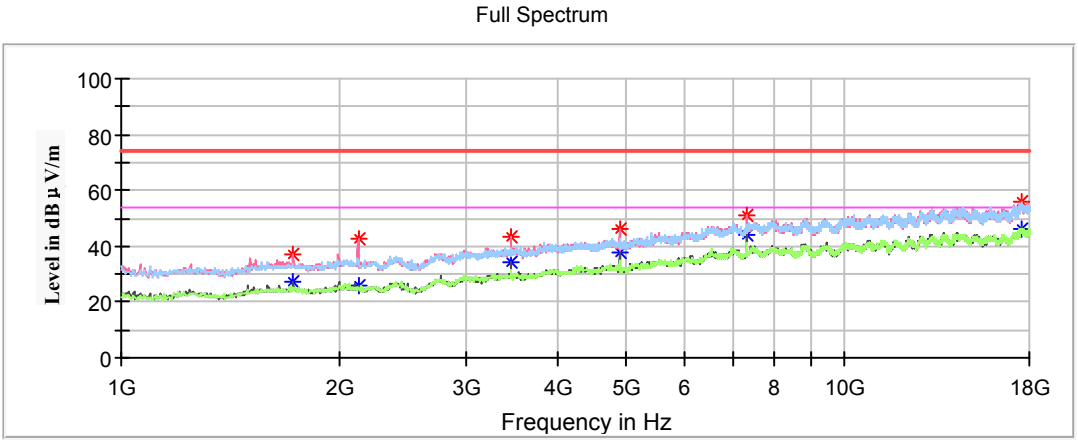
Note:
1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
   Corrected Amplitude (dBμV/m) = Corrected Factor (dB/m) + Reading (dBμV)
   Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV/m)

Low Channel: 2402MHz



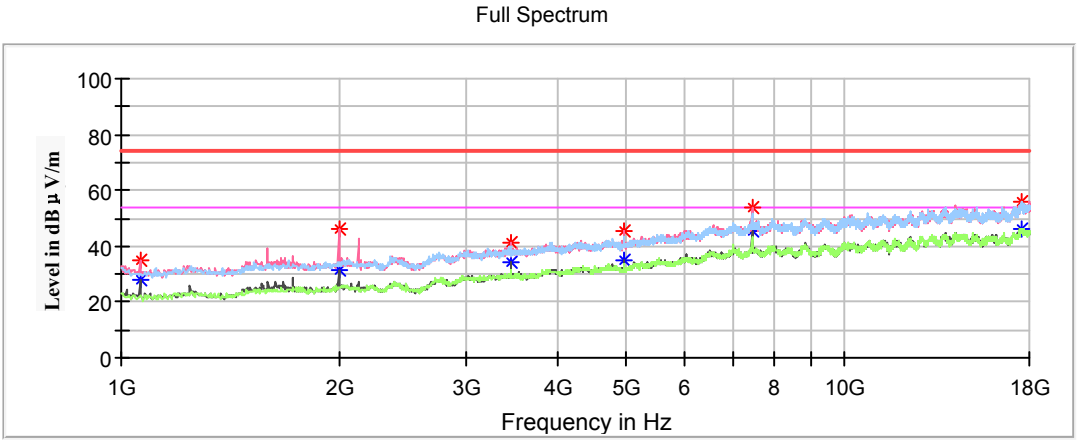
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1598.400000	35.87	---	150.0	V	223.0	-9.6	74.00	38.13
1598.400000	---	27.87	150.0	V	223.0	-9.6	54.00	26.13
2071.000000	---	32.56	150.0	V	214.0	-8.1	54.00	21.44
2071.000000	56.83	---	150.0	V	214.0	-8.1	74.00	17.17
3444.600000	---	36.82	150.0	V	214.0	-3.6	54.00	17.18
3444.600000	60.85	---	150.0	V	214.0	-3.6	74.00	13.15
4804.000000	---	35.18	100.0	V	0.0	-0.6	54.00	18.82
4804.000000	43.77	---	100.0	V	0.0	-0.6	74.00	30.23
7206.000000	---	41.99	100.0	V	225.0	5.7	54.00	12.01
7206.000000	50.70	---	100.0	V	225.0	5.7	74.00	23.30
17564.800000	---	45.28	250.0	H	1.0	14.2	54.00	8.72
17564.800000	57.01	---	250.0	H	1.0	14.2	74.00	16.99

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)				
1999.600000	---	28.66	200.0	V	253.0	-8.2	54.00	25.34
1999.600000	43.58	---	200.0	V	253.0	-8.2	74.00	30.42
2125.400000	---	26.50	200.0	V	353.0	-7.9	54.00	27.50
2125.400000	41.98	---	200.0	V	353.0	-7.9	74.00	32.02
3454.800000	---	35.04	200.0	V	232.0	-3.6	54.00	18.96
3454.800000	42.15	---	200.0	V	232.0	-3.6	74.00	31.85
4880.000000	---	37.98	100.0	V	331.0	-0.4	54.00	16.02
4880.000000	44.75	---	100.0	V	331.0	-0.4	74.00	29.25
7320.000000	---	43.49	100.0	V	220.0	5.8	54.00	10.51
7320.000000	50.80	---	100.0	V	220.0	5.8	74.00	23.20
17496.800000	---	45.28	150.0	V	159.0	14.3	54.00	8.72
17496.800000	55.81	---	150.0	V	159.0	14.3	74.00	18.19

High Channel: 2480MHz

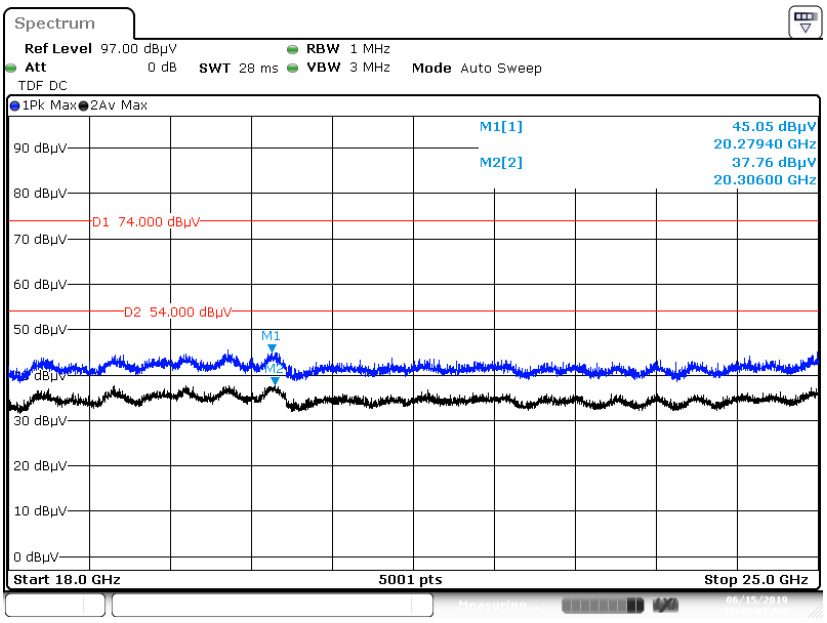


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1061.200000	---	27.67	200.0	V	108.0	-12.3	54.00	26.33
1061.200000	34.79	---	200.0	V	108.0	-12.3	74.00	39.21
1999.600000	---	31.66	150.0	V	268.0	-8.2	54.00	22.34
1999.600000	46.37	---	150.0	V	268.0	-8.2	74.00	27.63
3454.800000	---	34.54	200.0	V	69.0	-3.6	54.00	19.46
3454.800000	41.46	---	200.0	V	69.0	-3.6	74.00	32.54
4960.000000	---	35.23	100.0	V	358.0	-0.3	54.00	18.77
4960.000000	45.59	---	100.0	V	358.0	-0.3	74.00	28.41
7440.000000	---	45.17	150.0	V	239.0	6.0	54.00	8.83
7440.000000	53.77	---	150.0	V	239.0	6.0	74.00	20.23
17564.800000	---	46.05	200.0	H	80.0	14.2	54.00	7.95
17564.800000	56.21	---	200.0	H	80.0	14.2	74.00	17.79

18GHz-25GHz

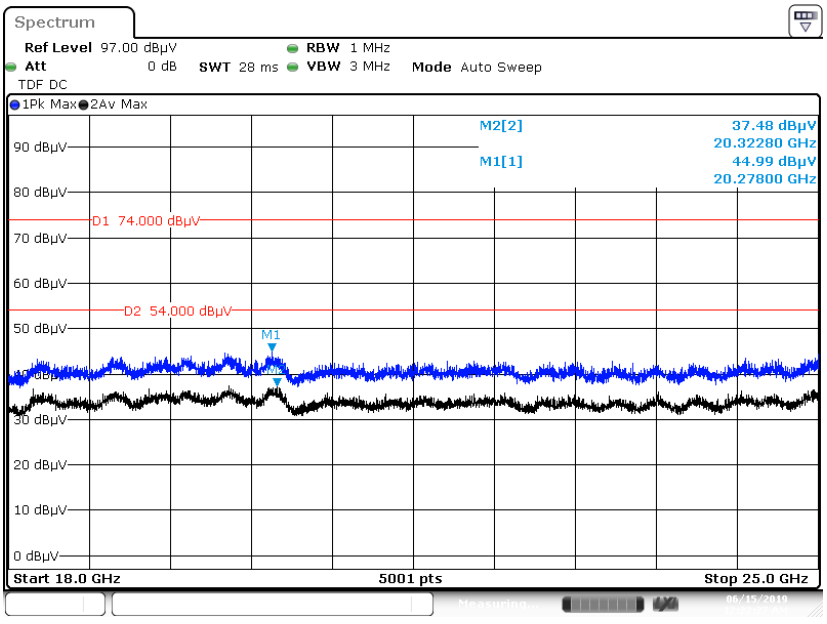
*(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **middle channel of operation in the X axis of orientation** was recorded)*

Horizontal



Date:15.JUN.2019 11:48:02

Vertical



Date:15.JUN.2019 00:22:27

Restricted Bands Emissions Test:

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

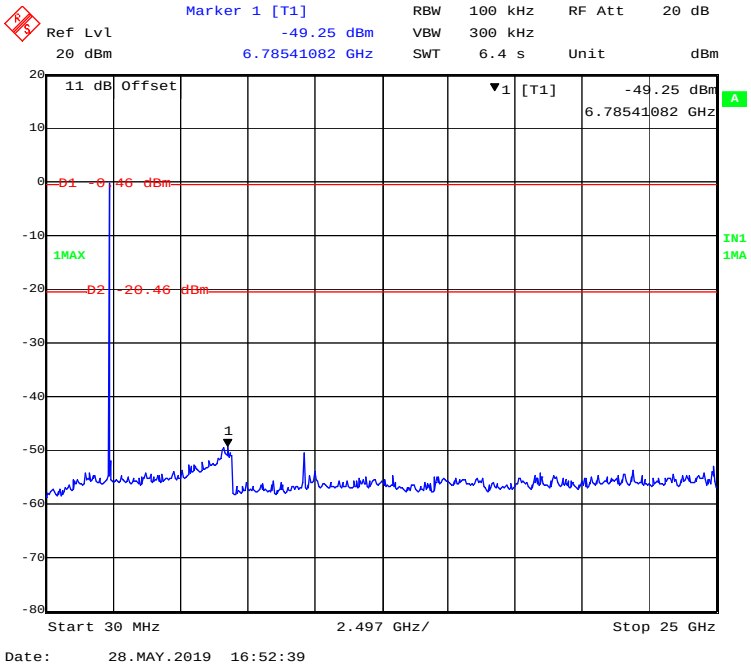
Note:

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 (dBμ /m)

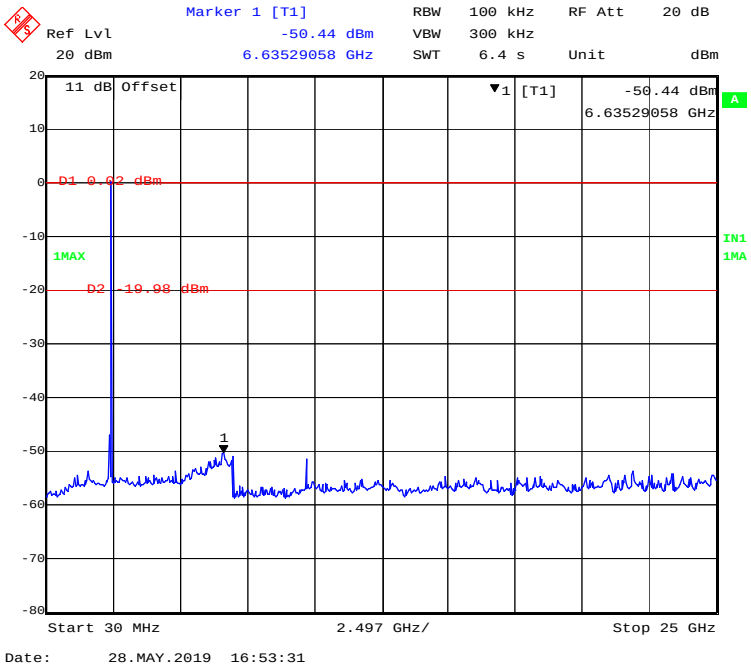
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2402MHz								
2390.000000	47.47	---	150.0	V	75.0	2.8	74.00	26.53
2390.000000	---	39.38	150.0	V	75.0	2.8	54.00	14.62
High Channel: 2480MHz								
2483.500000	48.25	---	150.0	H	142.0	3.1	74.00	25.75
2483.500000	---	40.85	150.0	H	142.0	3.1	54.00	13.15

Conducted Spurious Emissions at Antenna Port

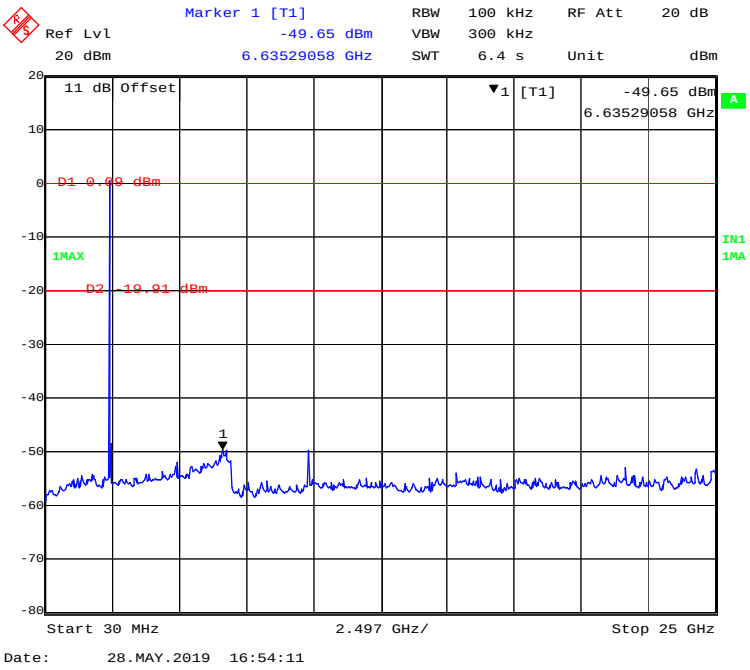
802.11b Mode Low Channel



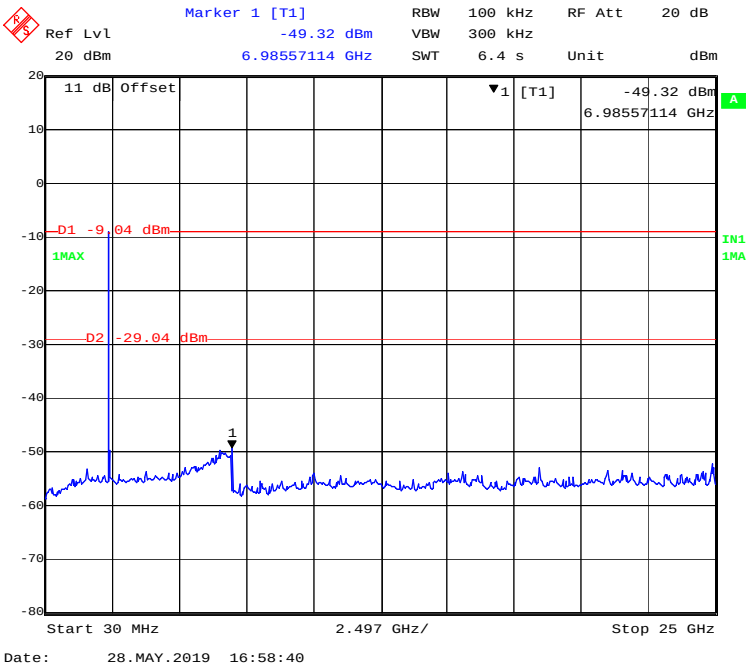
802.11b Mode Middle Channel



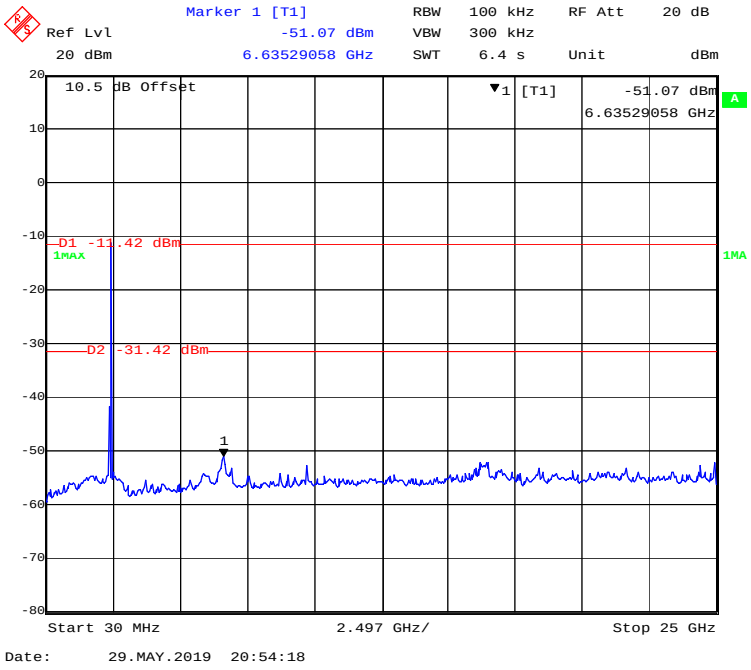
802.11b Mode High Channel



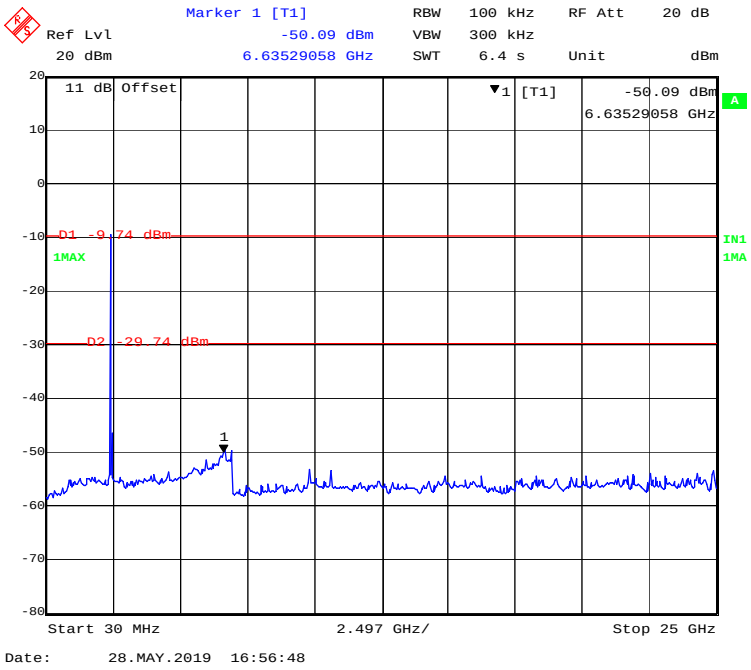
802.11g Mode Low Channel



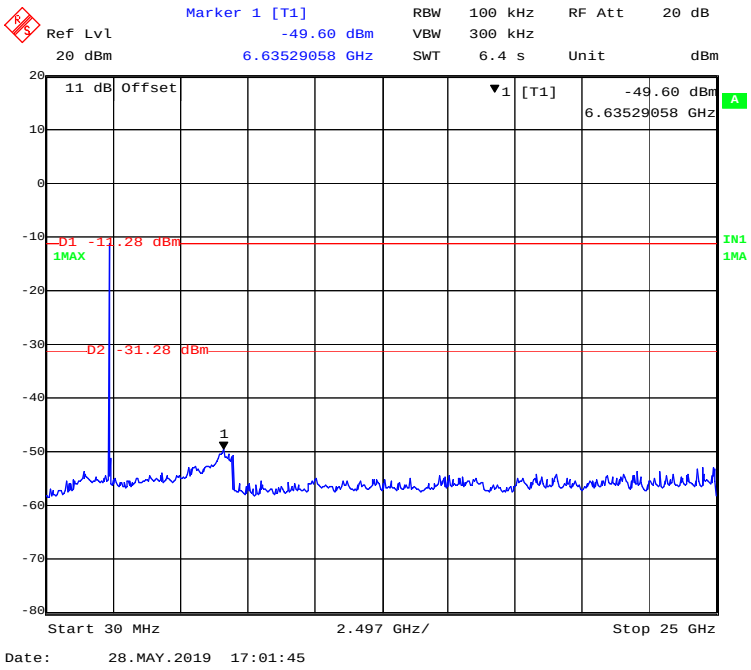
802.11g Mode Middle Channel



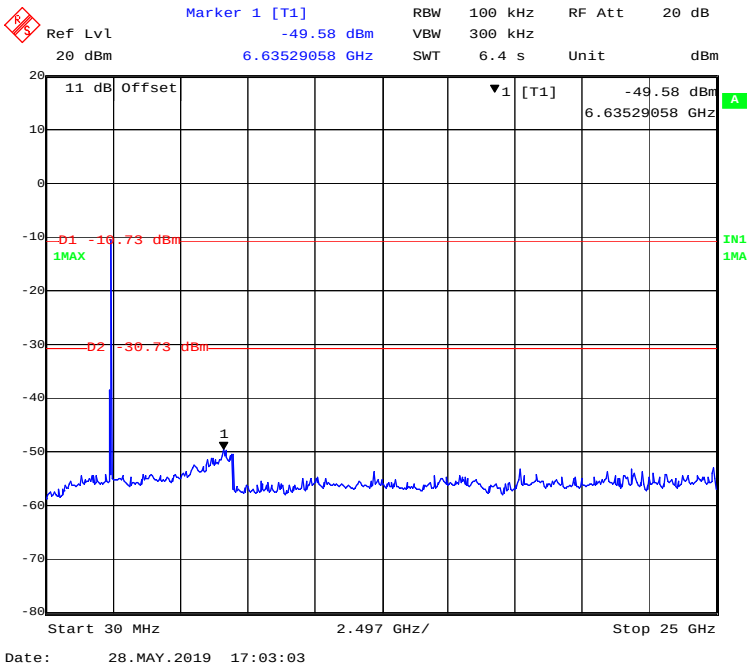
802.11g Mode High Channel



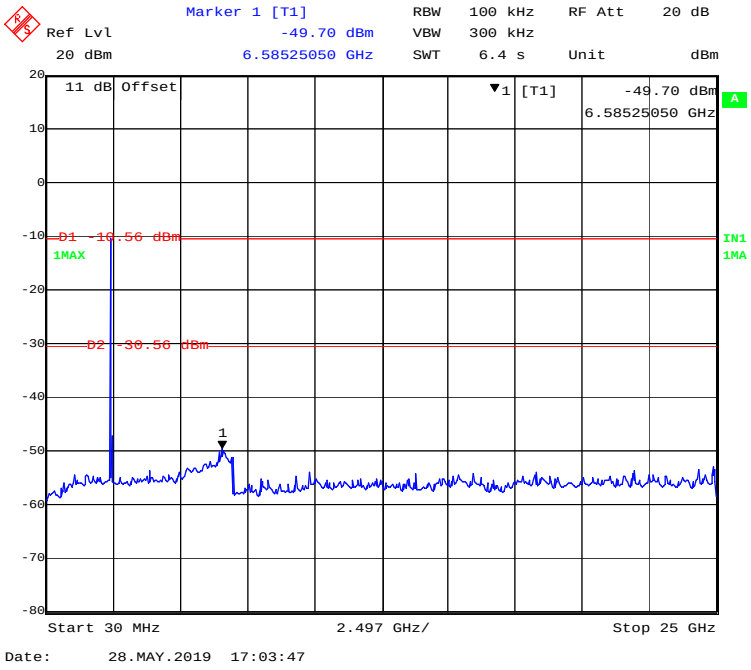
802.11n-HT20 Mode Low Channel



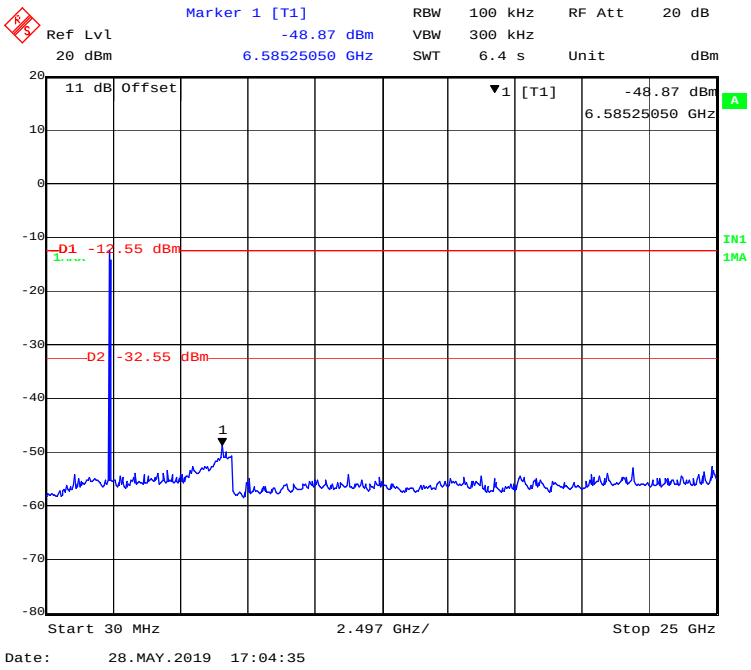
802.11n-HT20 Mode Middle Channel



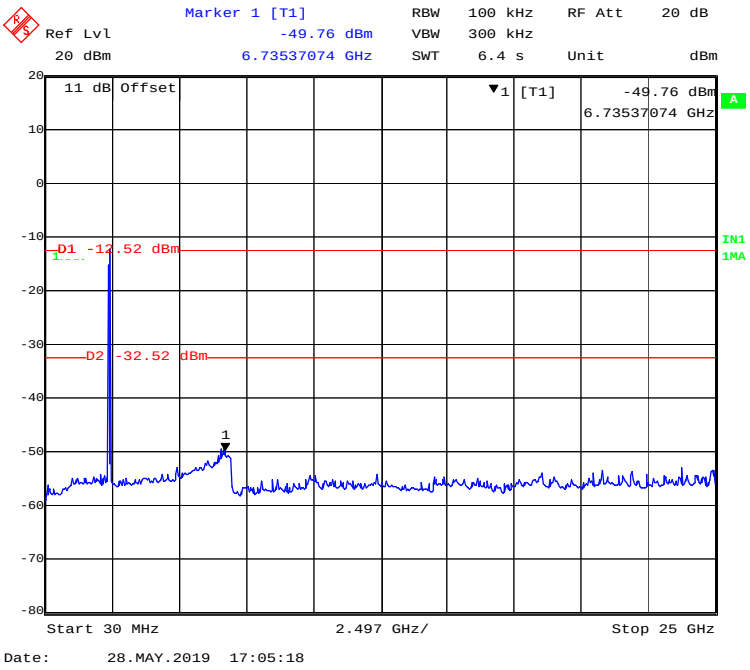
802.11n-HT20 Mode High Channel



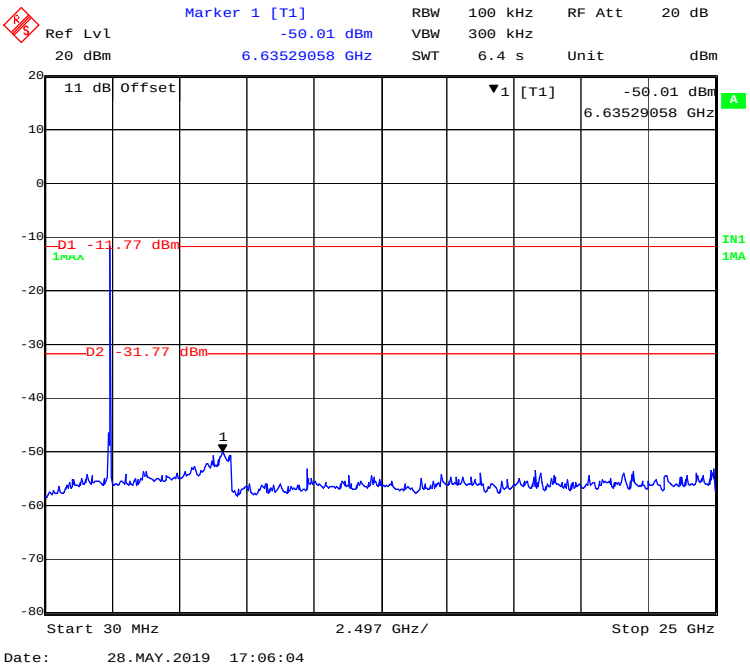
802.11n-HT40 Mode Low Channel



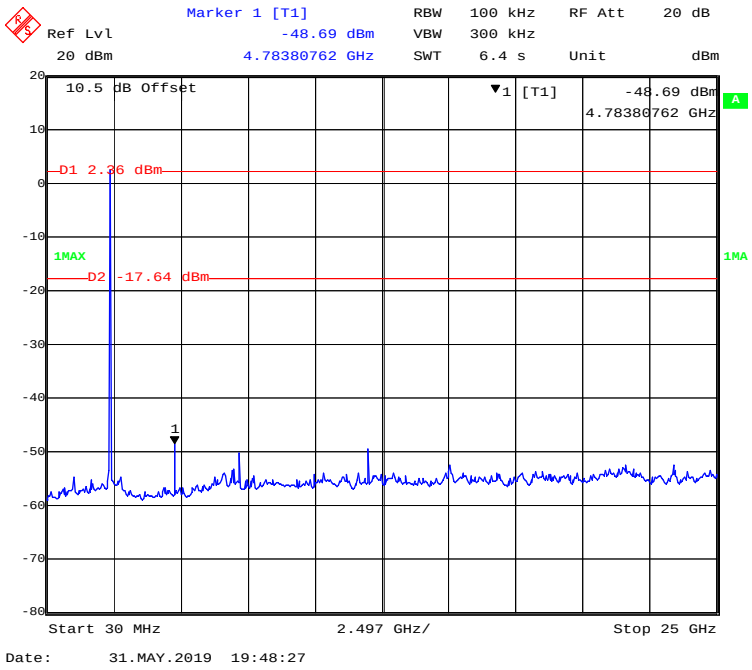
802.11n-HT40 Mode Middle Channel



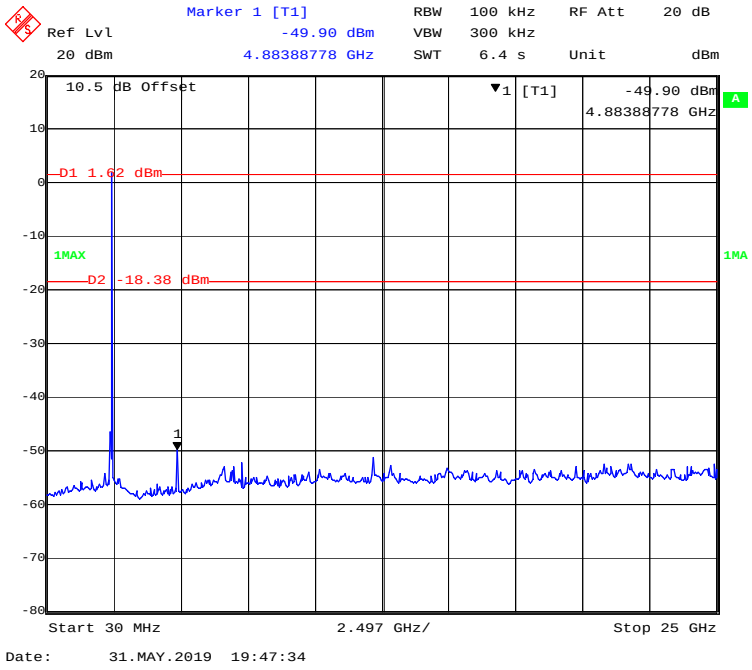
802.11n-HT40 Mode High Channel



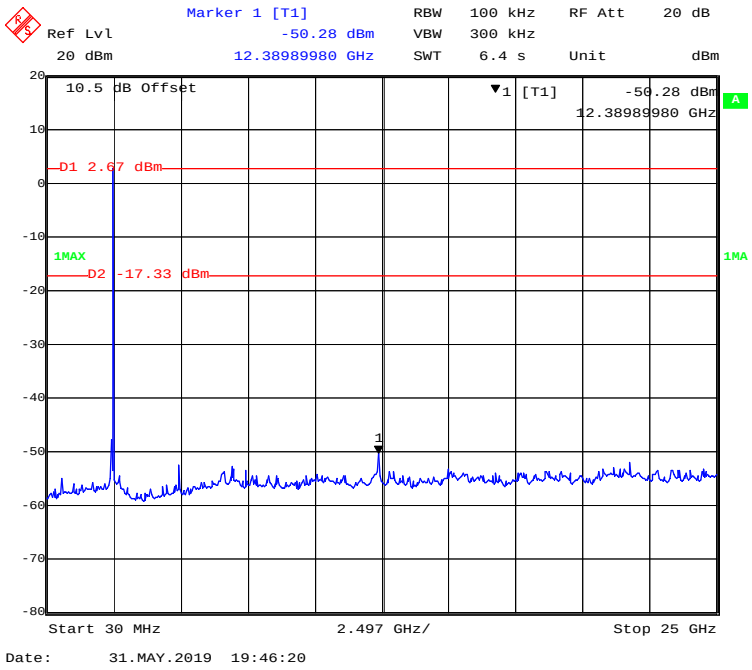
BLE Mode Low Channel



BLE Mode Middle Channel



BLE Mode High Channel



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

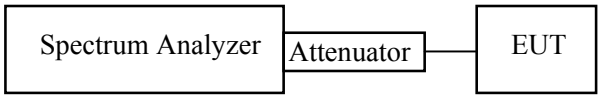
Applicable Standard

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 x 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:	24.3~25.2℃
Relative Humidity:	48~50%
ATM Pressure:	101.3 ~101.5kPa

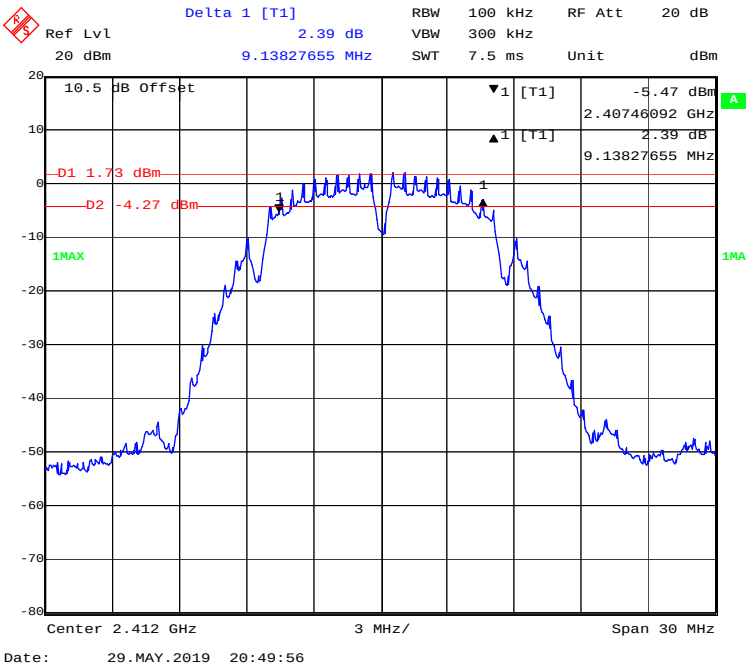
The testing was performed by Matt yao from 2019-05-28 to 2019-05-31.

Test Result: Compliant.

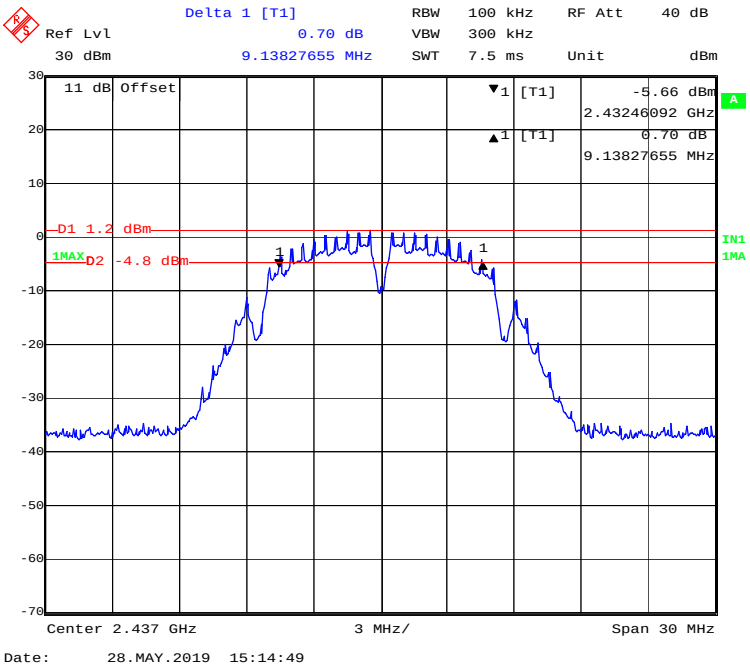
EUT operation mode: Transmitting

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b Mode			
Low	2412	9.138	≥0.5
Middle	2437	9.138	≥0.5
High	2462	9.138	≥0.5
802.11g Mode			
Low	2412	16.533	≥0.5
Middle	2437	16.473	≥0.5
High	2462	16.473	≥0.5
802.11n-HT20 Mode			
Low	2412	17.735	≥0.5
Middle	2437	17.735	≥0.5
High	2462	17.796	≥0.5
802.11n-HT40 Mode			
Low	2422	36.192	≥0.5
Middle	2437	36.433	≥0.5
High	2452	36.433	≥0.5
BLE Mode			
Low	2402	0.733	≥0.5
Middle	2440	0.758	≥0.5
High	2480	0.727	≥0.5

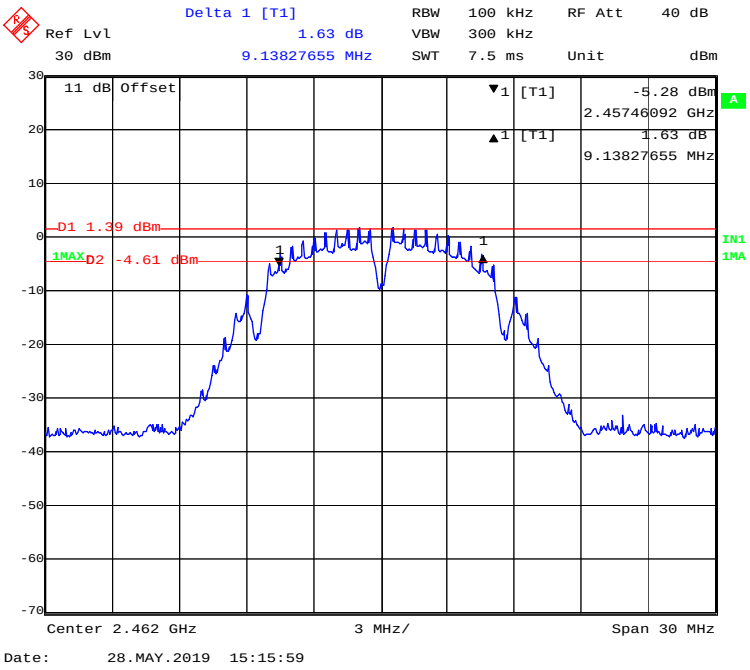
802.11b Mode Low Channel



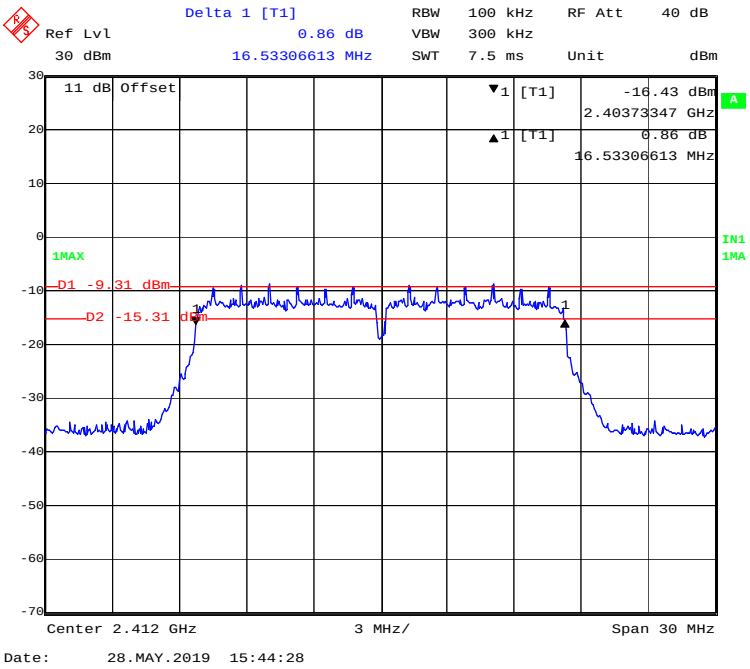
802.11b Mode Middle Channel



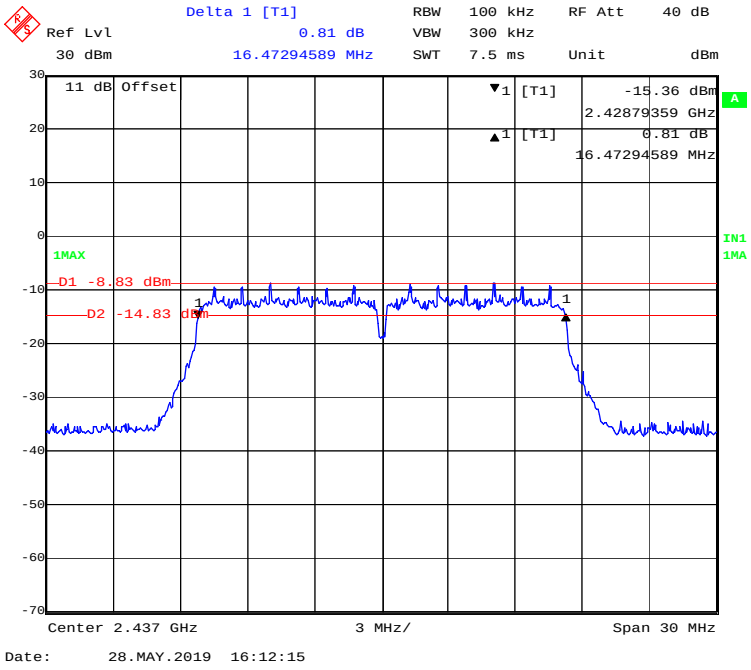
802.11b Mode High Channel



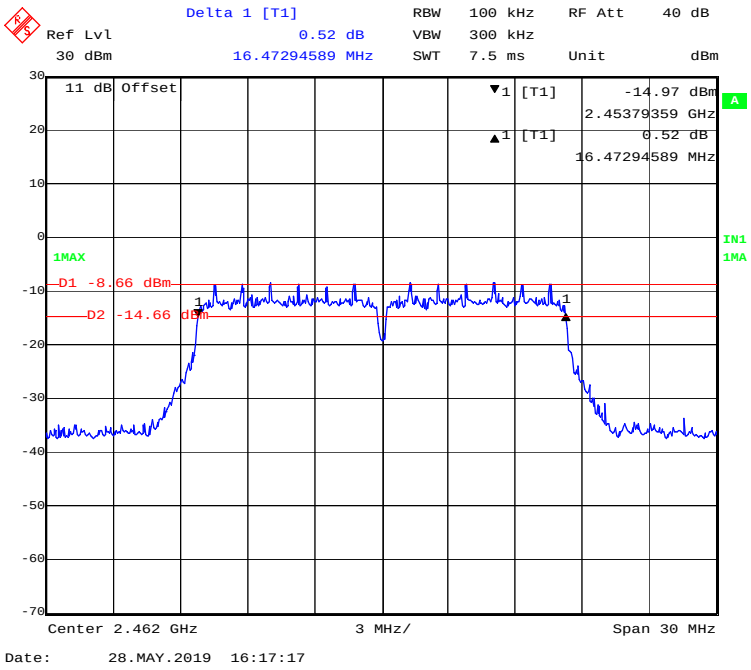
802.11g Mode Low Channel



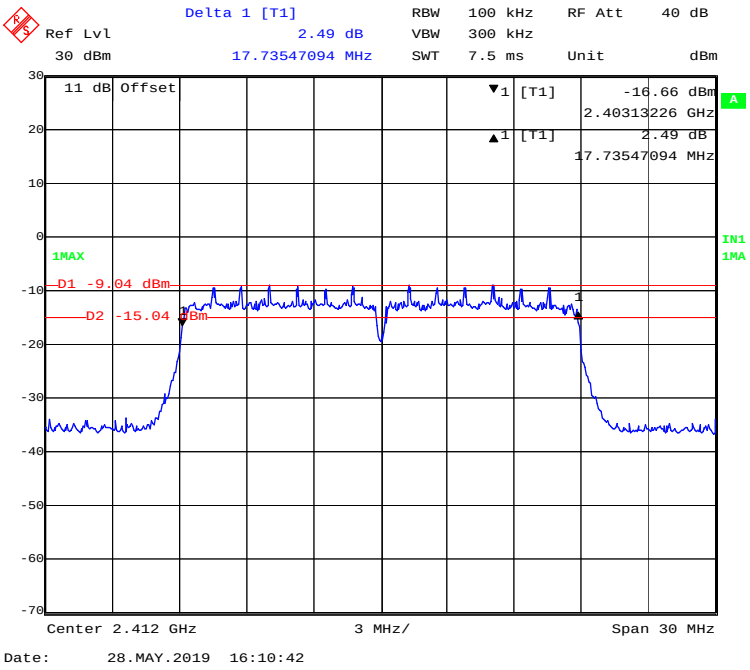
802.11g Mode Middle Channel



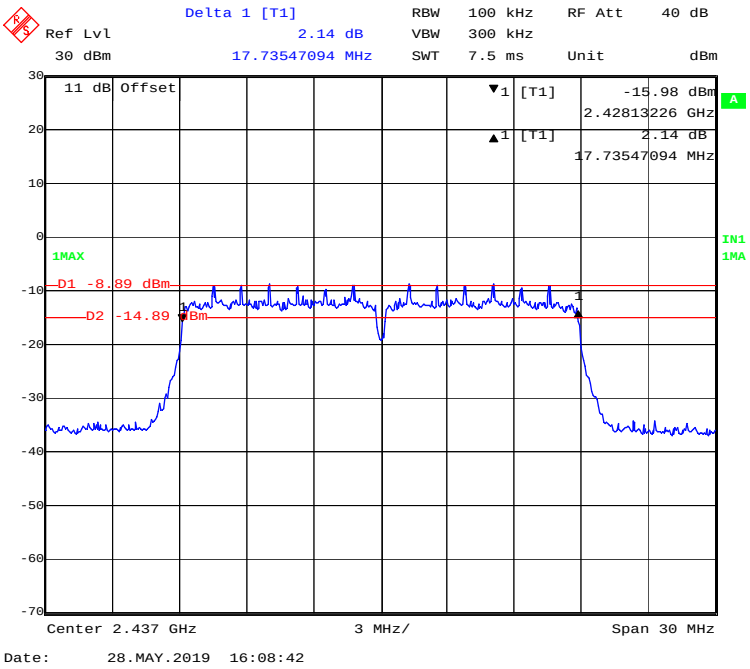
802.11g Mode High Channel



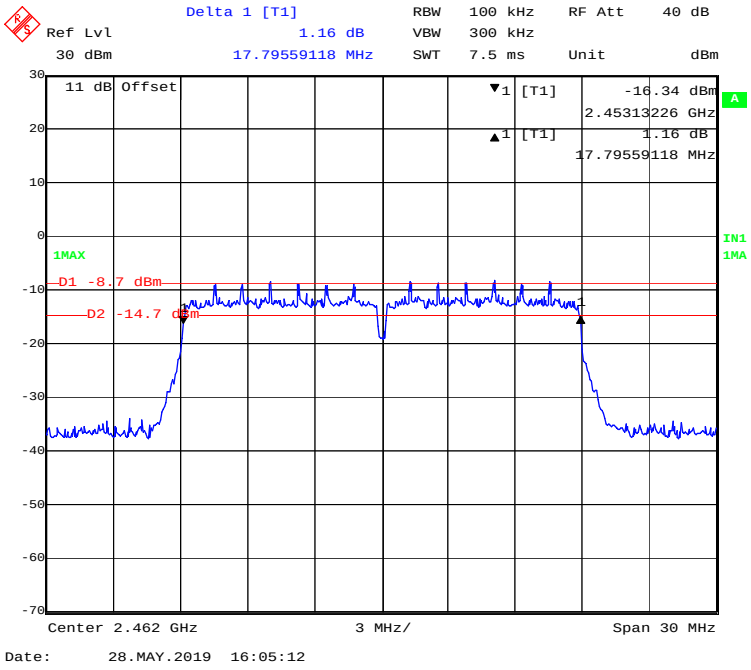
802.11n-HT20 Mode Low Channel



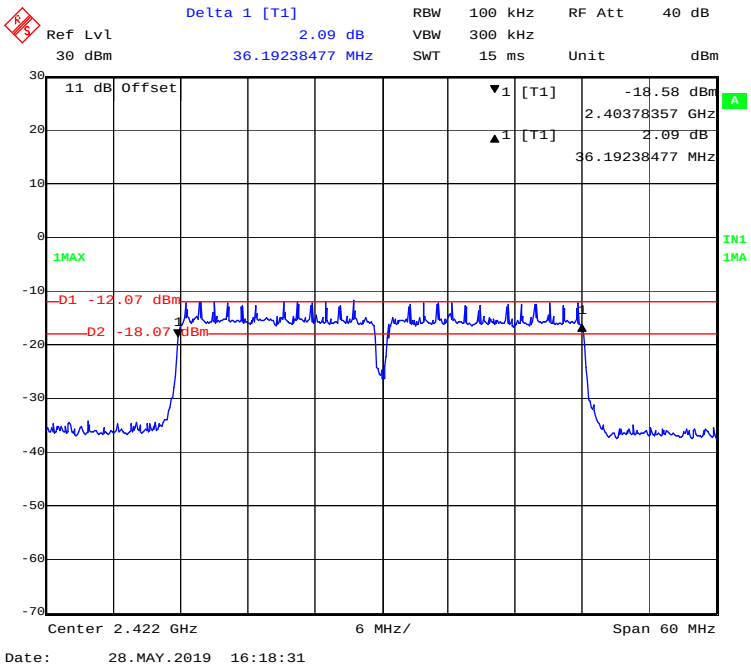
802.11n-HT20 Mode Middle Channel



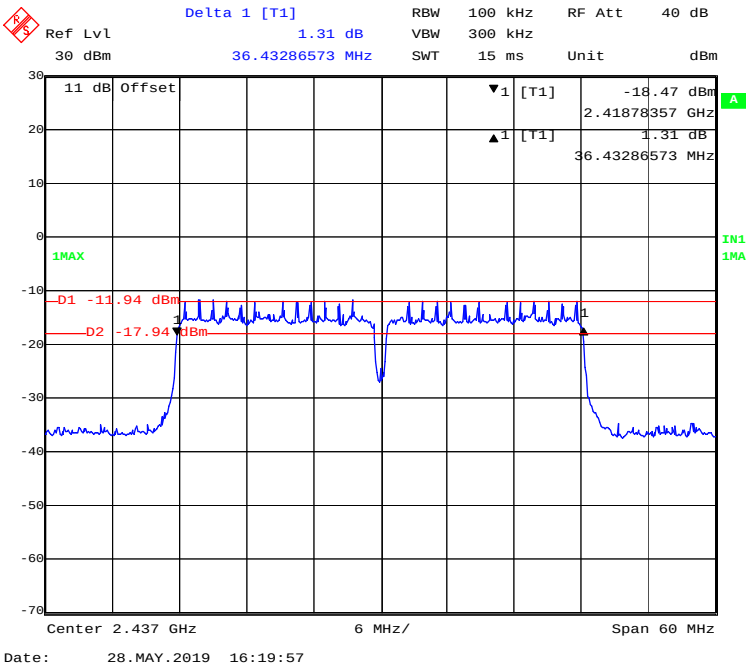
802.11n-HT20 Mode High Channel



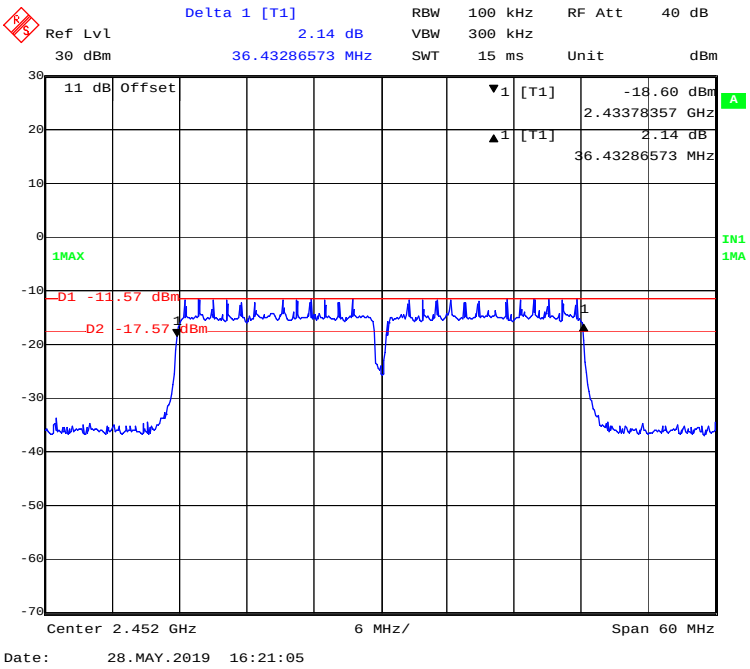
802.11n-HT40 Mode Low Channel



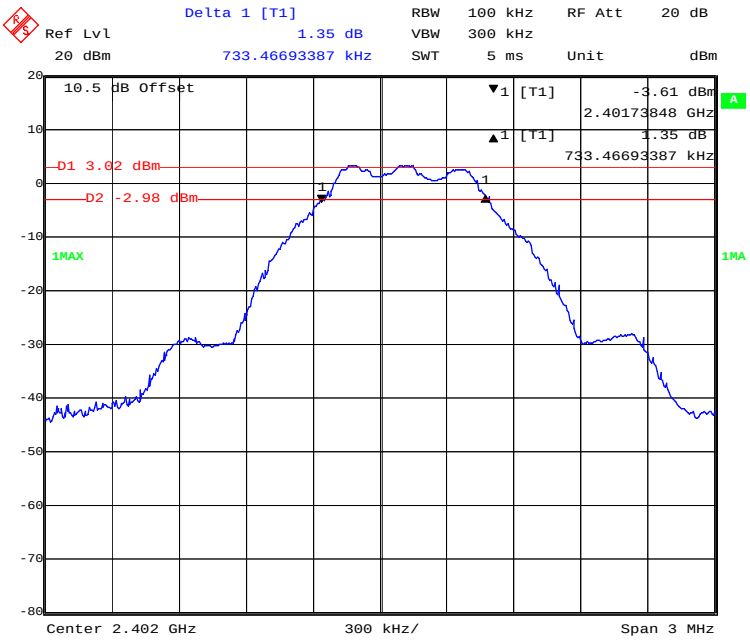
802.11n-HT40 Mode Middle Channel



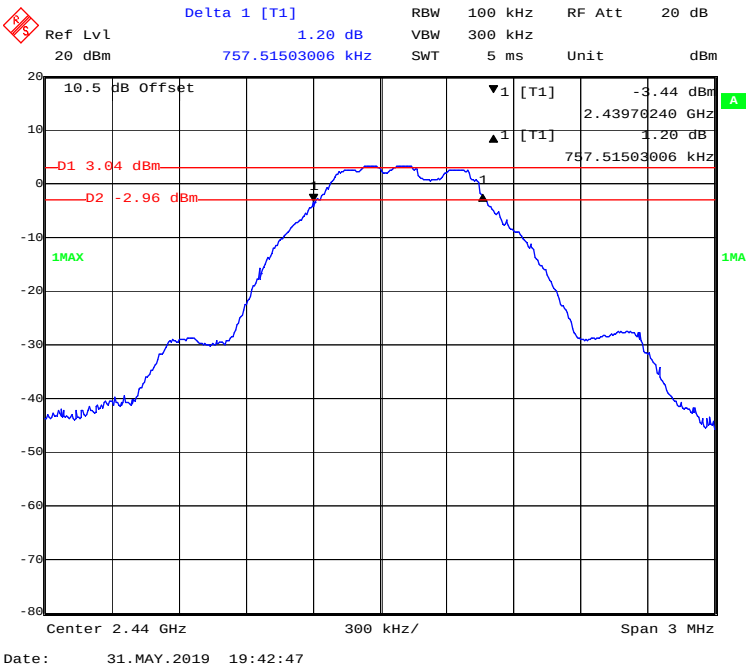
802.11n-HT40 Mode High Channel



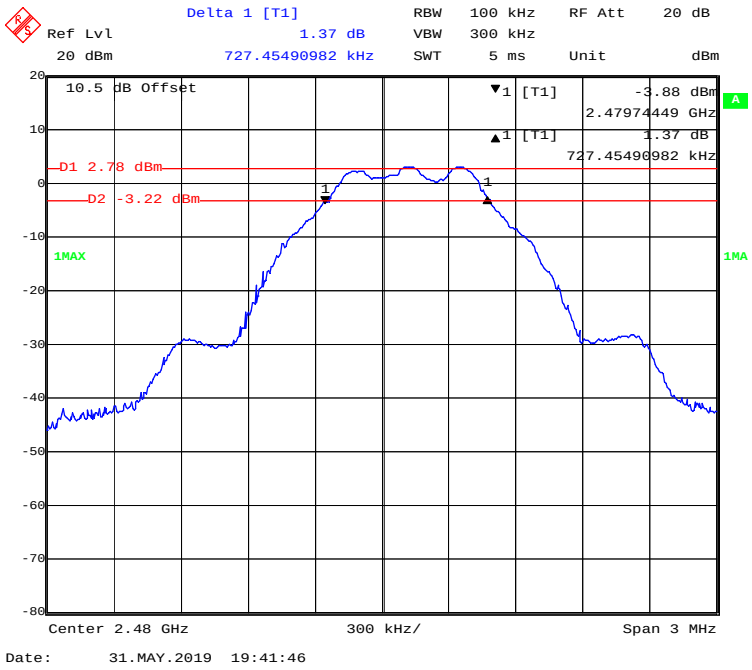
BLE Mode Low Channel



BLE Mode Middle Channel



BLE Mode High Channel



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

Applicable Standard

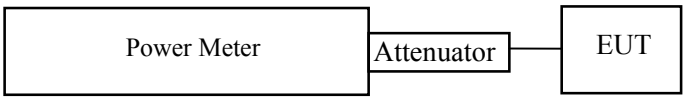
According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, Compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted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

For Wi-Fi:

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

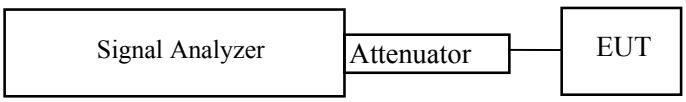
The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.



For BLE:

According to ANSI C63.10-2013 sub-clause 11.9.1.1

1. Set the RBW ≥ DTS bandwidth.
2. Set VBW ≥ 3 x RBW.
3. Set span ≥ 3 x RBW
4. Sweep time = auto couple.
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use peak marker function to determine the peak amplitude level.



Test Data

Environmental Conditions

Temperature:	23.5℃
Relative Humidity:	48%
ATM Pressure:	101.2 kPa

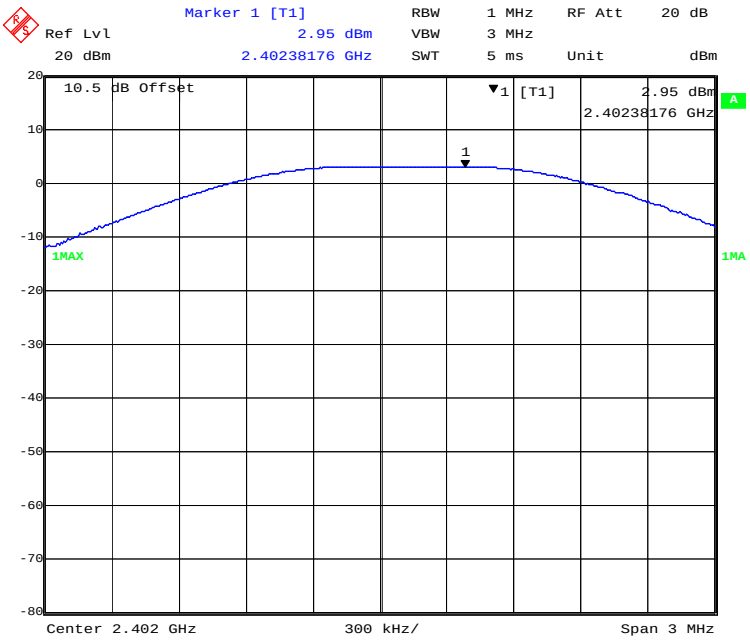
The testing was performed by Matt yao from 2019-05-28 to 2019-05-31.

Test Result: Compliant.

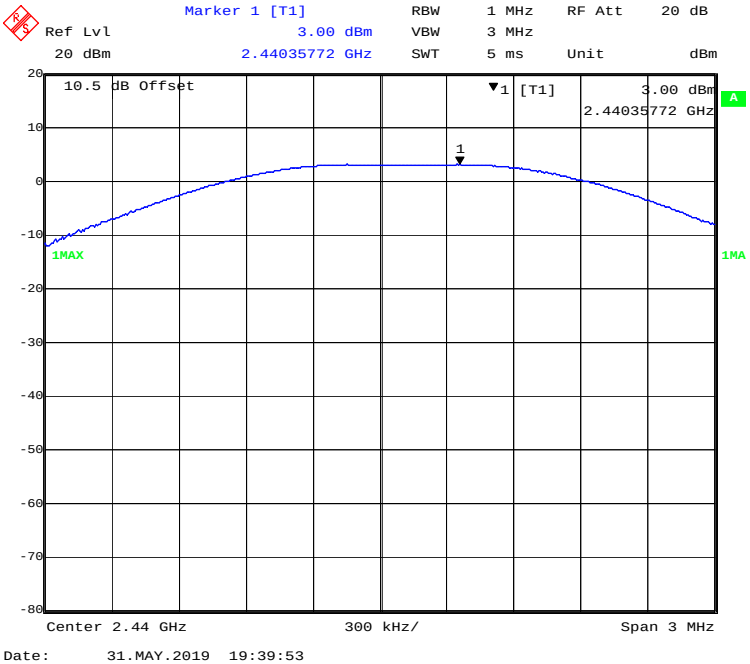
EUT operation mode: Transmitting

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Max Conducted Average power (dBm)	Limit (dBm)	Result
802.11b Mode					
Low	2412	12.73	9.63	30	Pass
Middle	2437	12.75	9.65	30	Pass
High	2462	13.30	9.74	30	Pass
802.11g Mode					
Low	2412	9.92	4.22	30	Pass
Middle	2437	9.94	4.24	30	Pass
High	2462	10.34	4.41	30	Pass
802.11n-HT20 Mode					
Low	2412	9.74	3.84	30	Pass
Middle	2437	9.95	4.05	30	Pass
High	2462	10.41	4.31	30	Pass
802.11n-HT40 Mode					
Low	2422	10.22	4.52	30	Pass
Middle	2437	9.93	4.45	30	Pass
High	2452	10.35	4.65	30	Pass
BLE Mode					
Low	2402	2.95	/	30	Pass
Middle	2440	3.00	/	30	Pass
High	2480	2.71	/	30	Pass

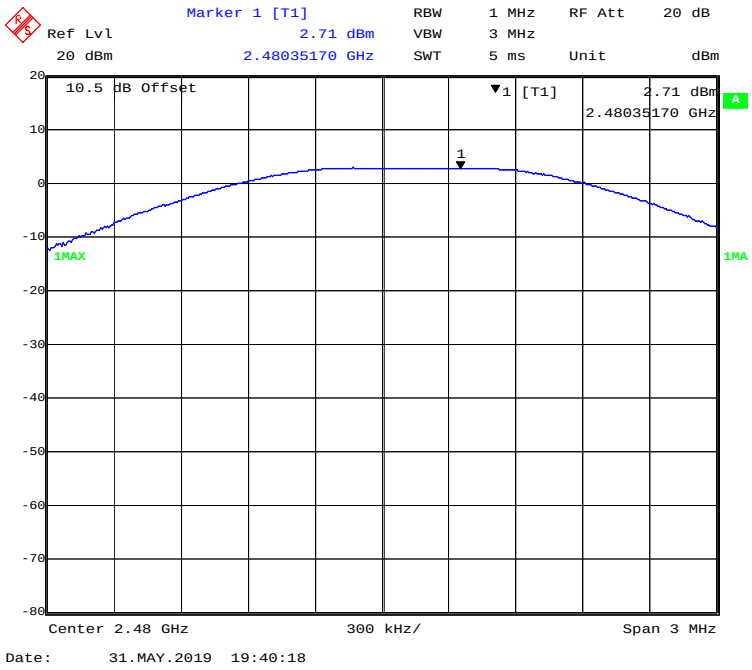
BLE Mode Low Channel



BLE Mode Middle Channel



BLE Mode High Channel



FCC §15.247(d) – 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

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

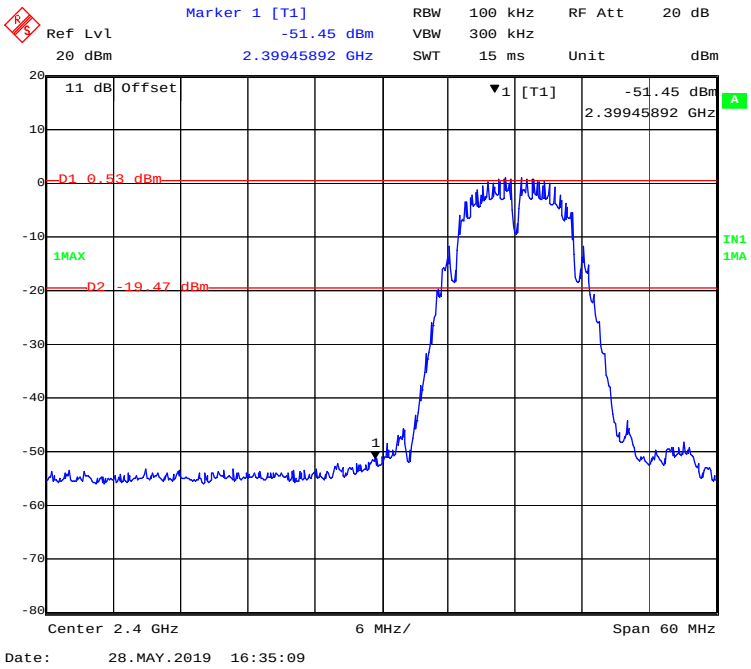
Temperature:	24.3 ~25℃
Relative Humidity:	48~50%
ATM Pressure:	10.1.0~101.3 kPa

The testing was performed by Matt yao from 2019-05-28 to 2019-05-31.

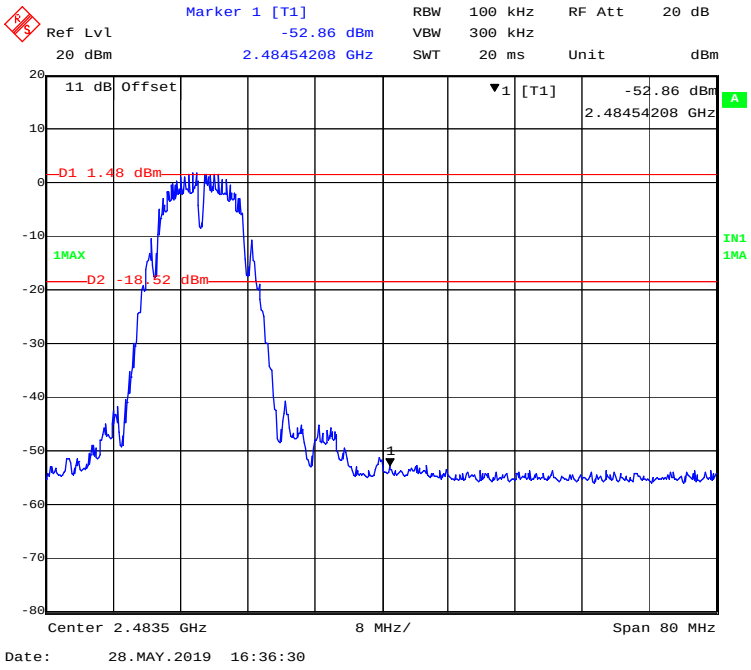
Test Result: Compliant.

EUT operation mode: Transmitting

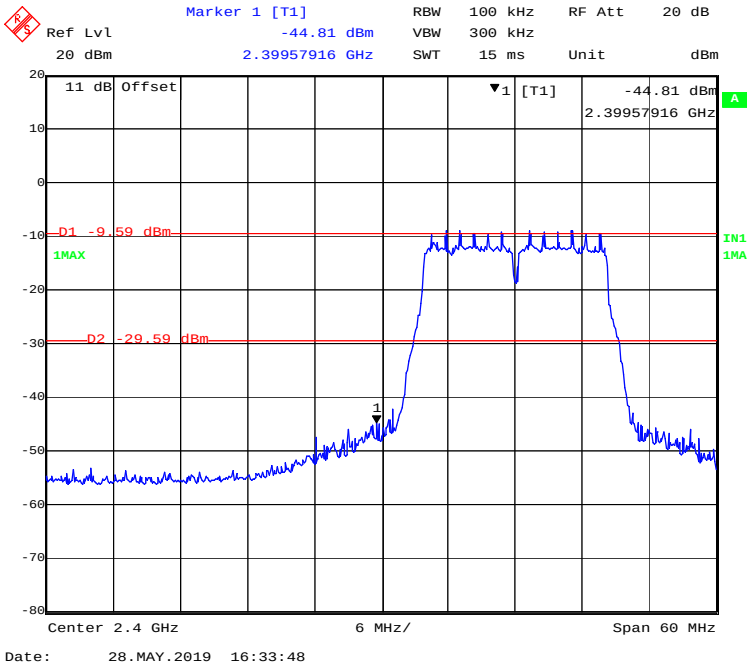
802.11b Mode Left Side



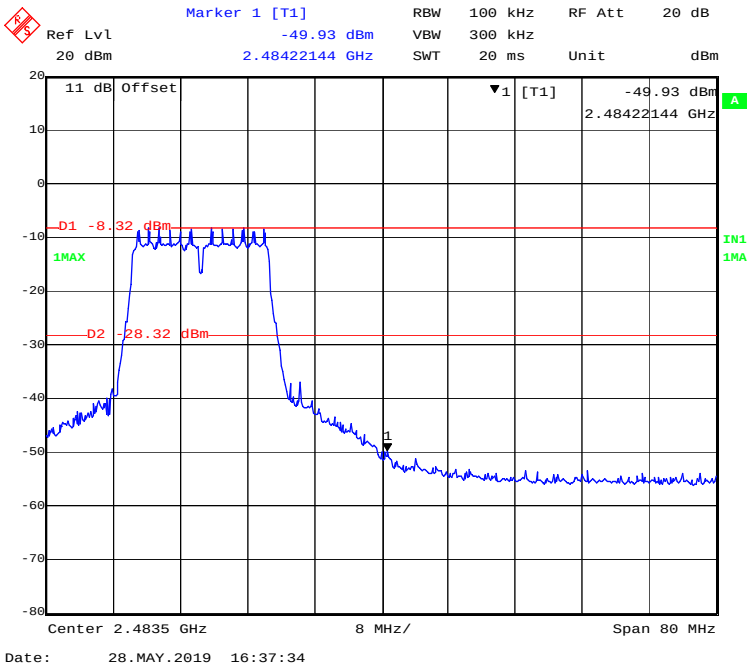
802.11b Mode Right Side



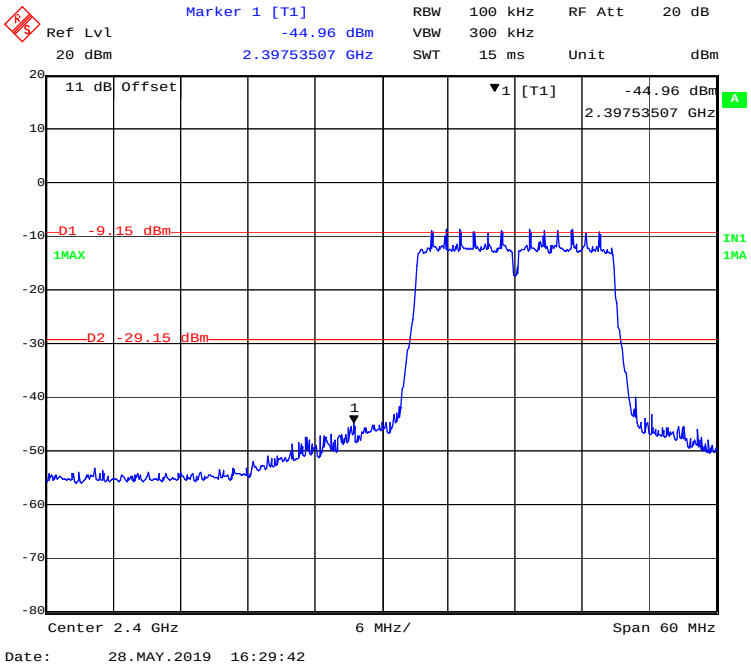
802.11g Mode Left Side



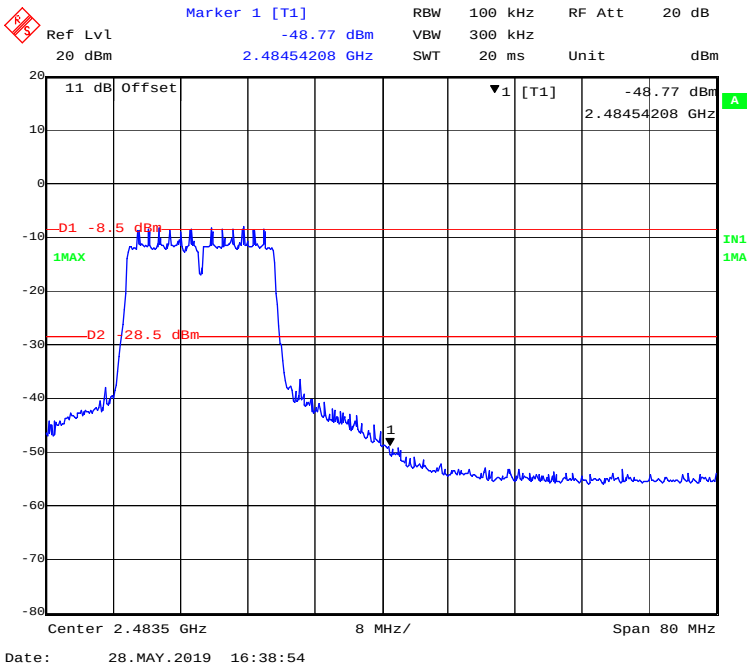
802.11g Mode Right Side



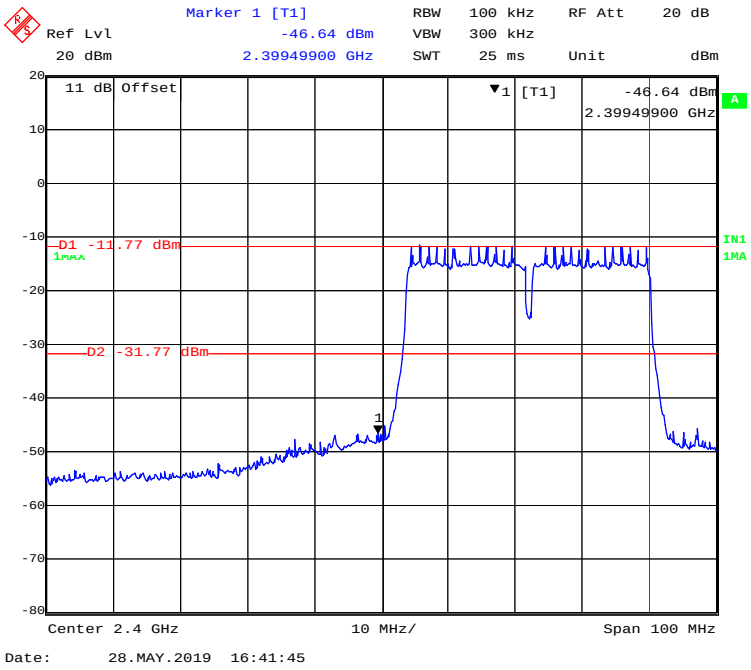
802.11n-HT20 Mode Left Side



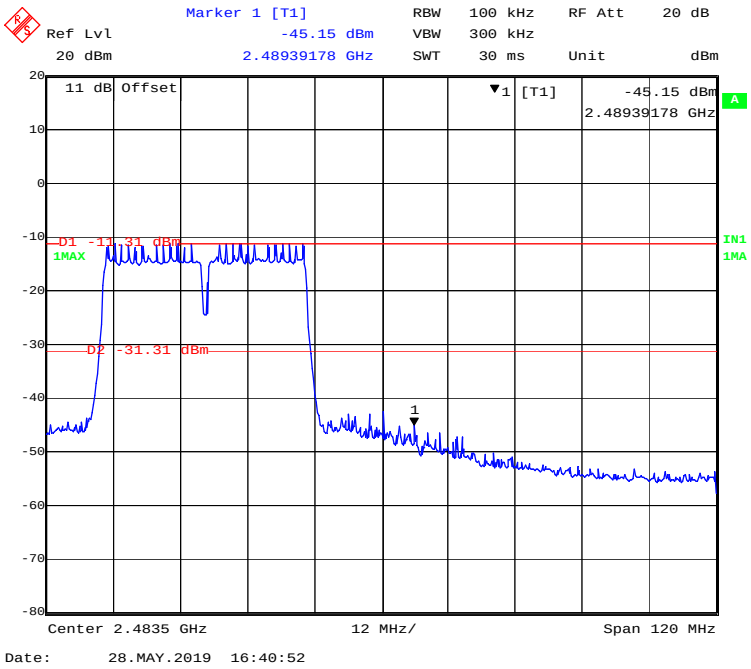
802.11n-HT20 Mode Right Side



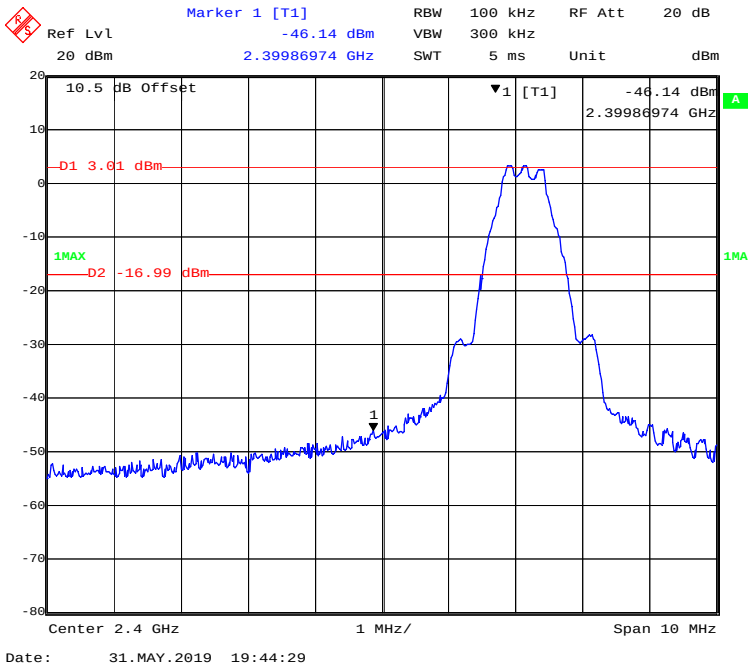
802.11n-HT40 Mode Left Side



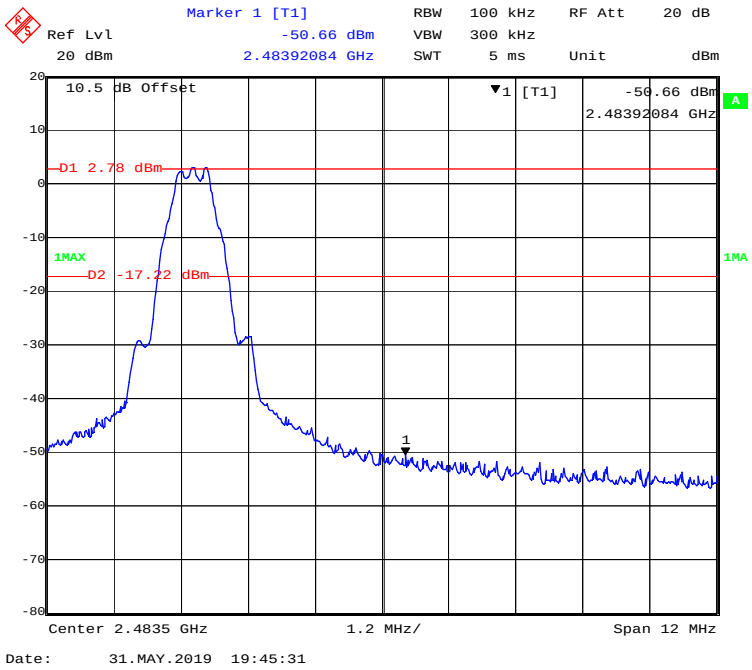
802.11n-HT40 Mode Right Side



BLE Mode Left Side



BLE Mode Right Side



FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

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

Test Procedure

According to 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 compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:

1. Set the RBW to: 3kHz≤ 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 ℃
Relative Humidity:	48%
ATM Pressure:	101.1 kPa

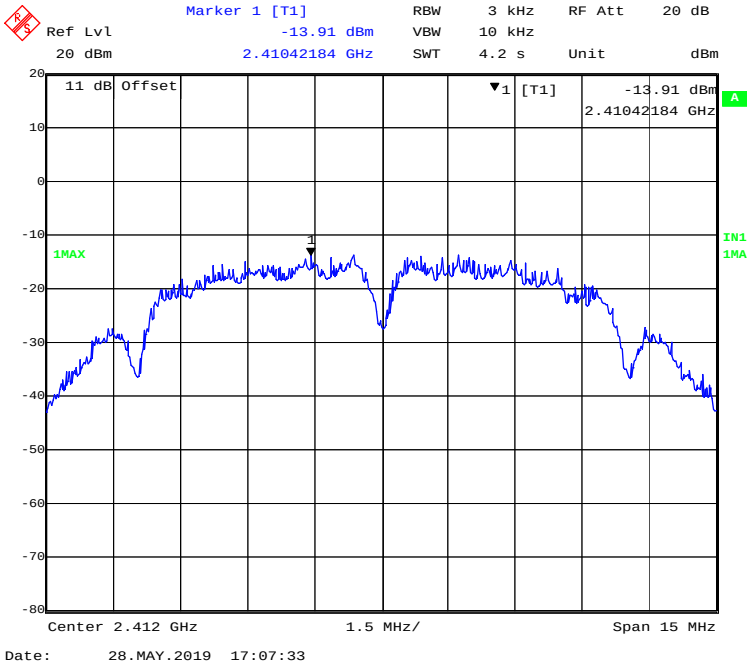
The testing was performed by Matt yao from 2019-05-28 to 2019-06-24.

Test Result: Compliant.

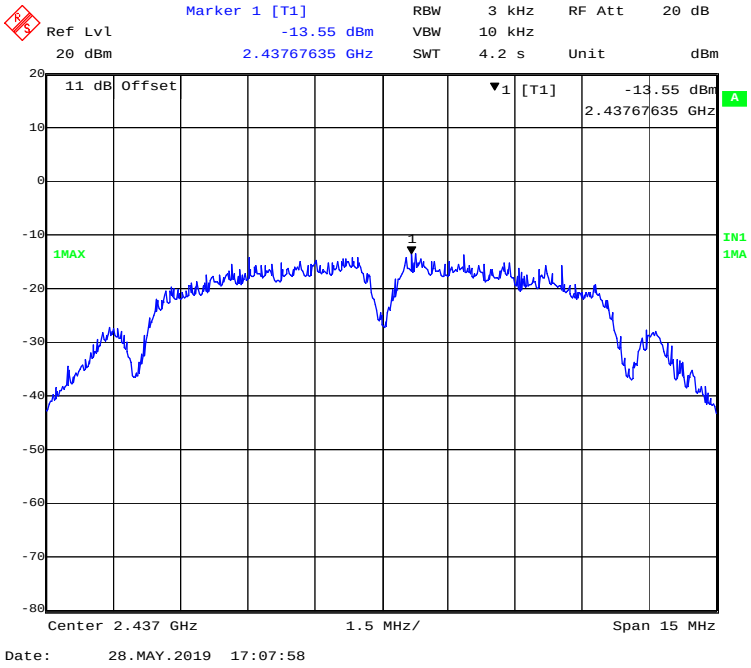
EUT operation mode: Transmitting

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b Mode			
Low	2412	-13.91	≤8
Middle	2437	-13.55	≤8
High	2462	-11.15	≤8
802.11g Mode			
Low	2412	-23.75	≤8
Middle	2437	-22.36	≤8
High	2462	-22.85	≤8
802.11n-HT20 mode			
Low	2412	-23.32	≤8
Middle	2437	-23.37	≤8
High	2462	-22.43	≤8
802.11n-HT40 Mode			
Low	2422	-26.20	≤8
Middle	2437	-26.22	≤8
High	2452	-25.25	≤8
BLE Mode			
Low	2402	-11.72	≤8
Middle	2440	-12.21	≤8
High	2480	-11.53	≤8

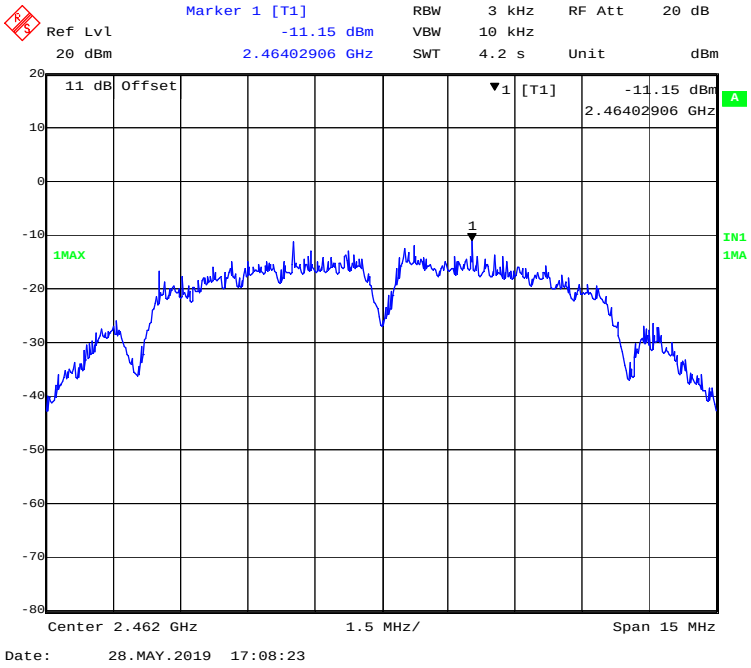
802.11b Mode Low Channel



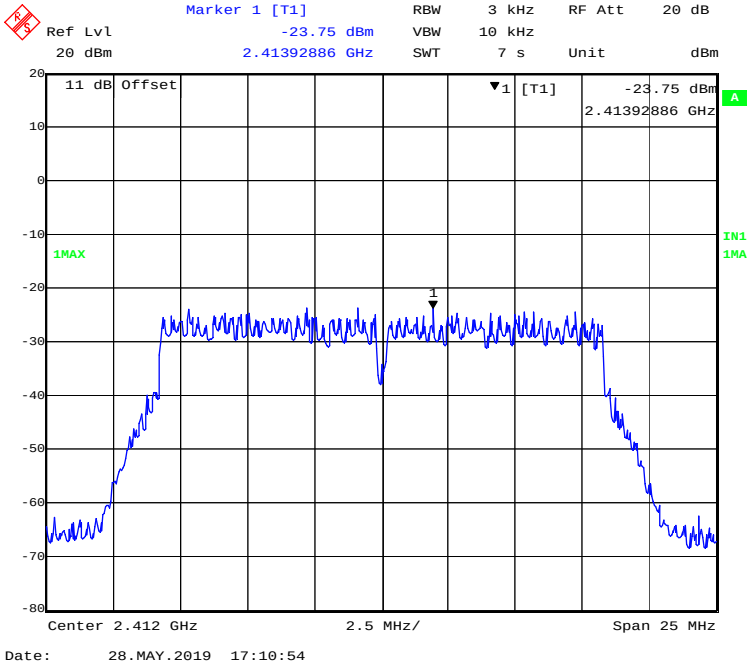
802.11b Mode Middle Channel



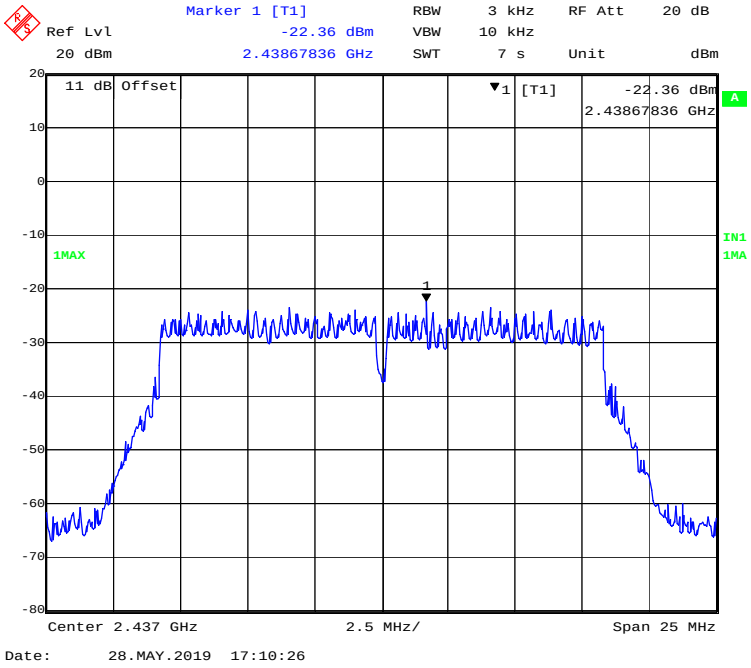
802.11b Mode High Channel



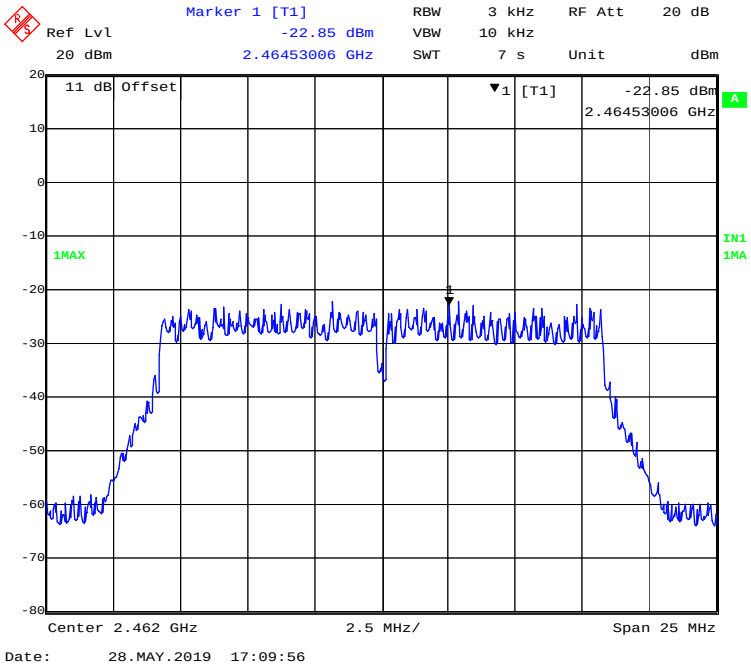
802.11g Mode Low Channel



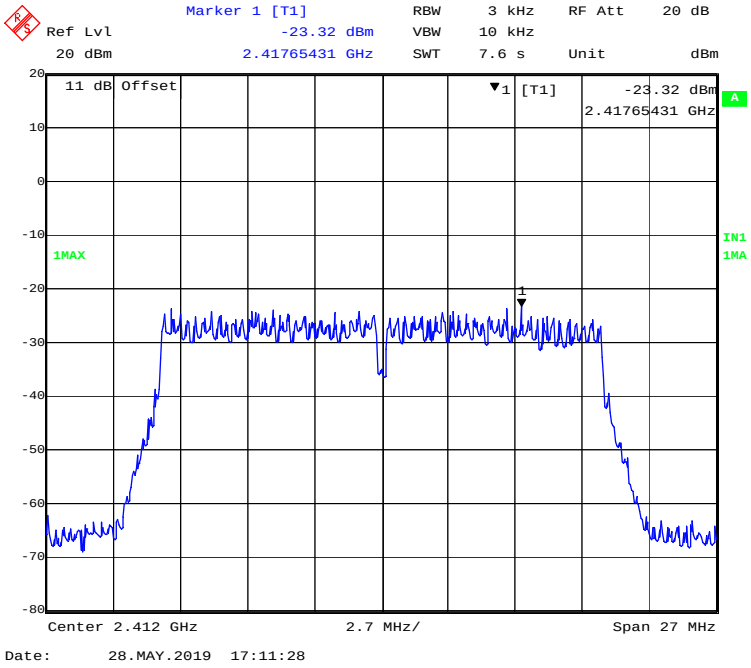
802.11g Mode Middle Channel



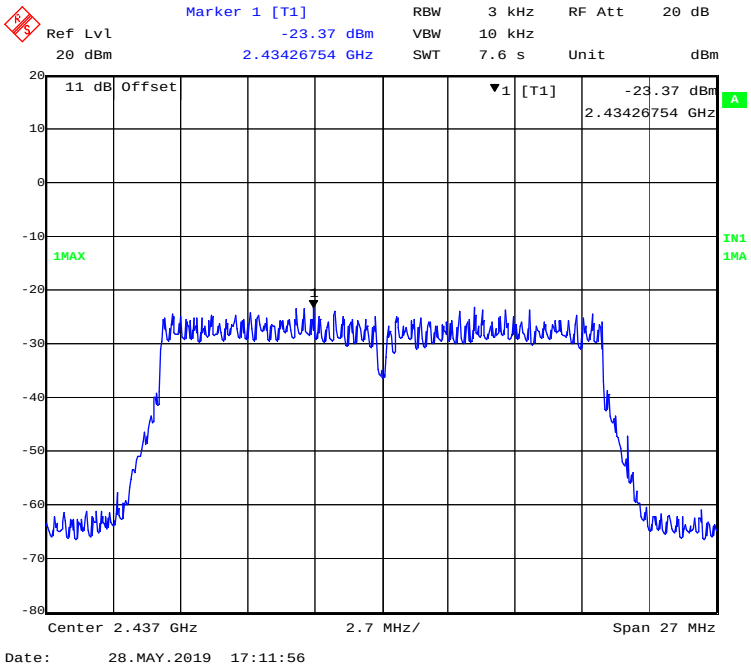
802.11g Mode High Channel



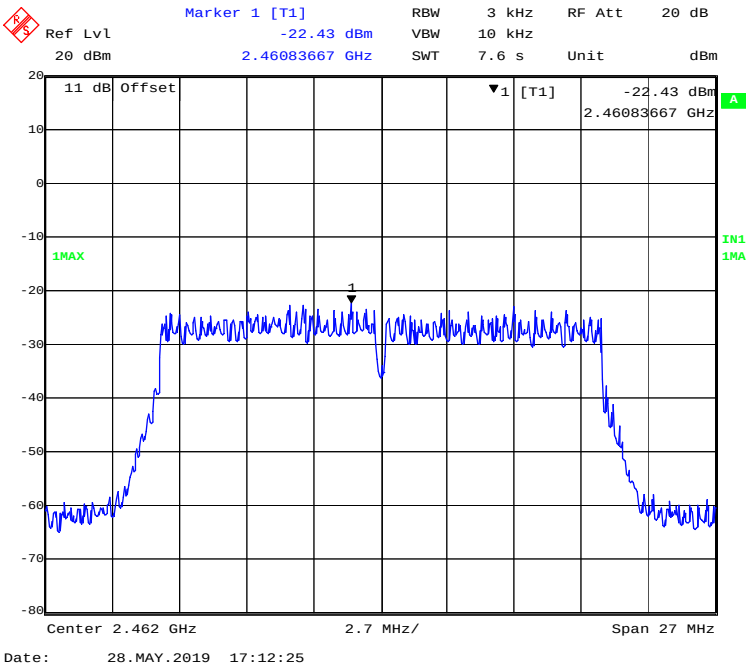
802.11n-HT20 Mode Low Channel



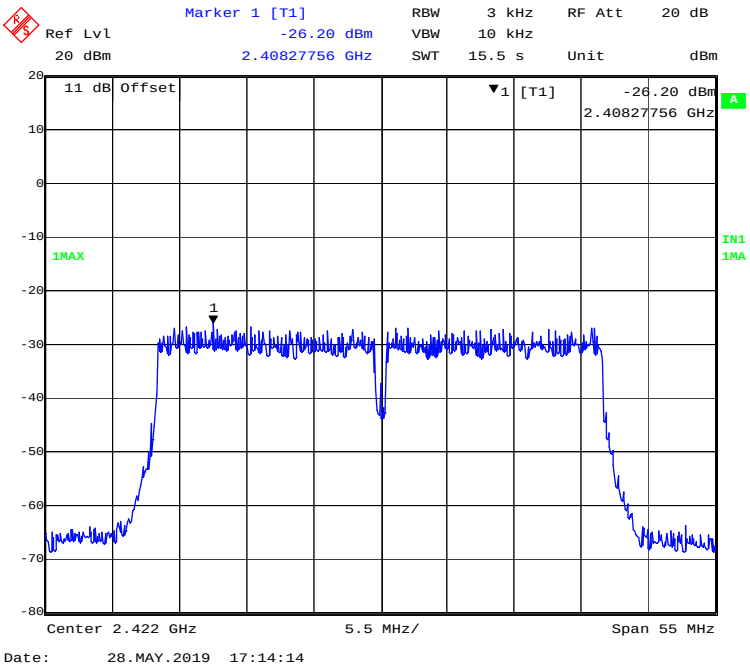
802.11n-HT20 Mode Middle Channel



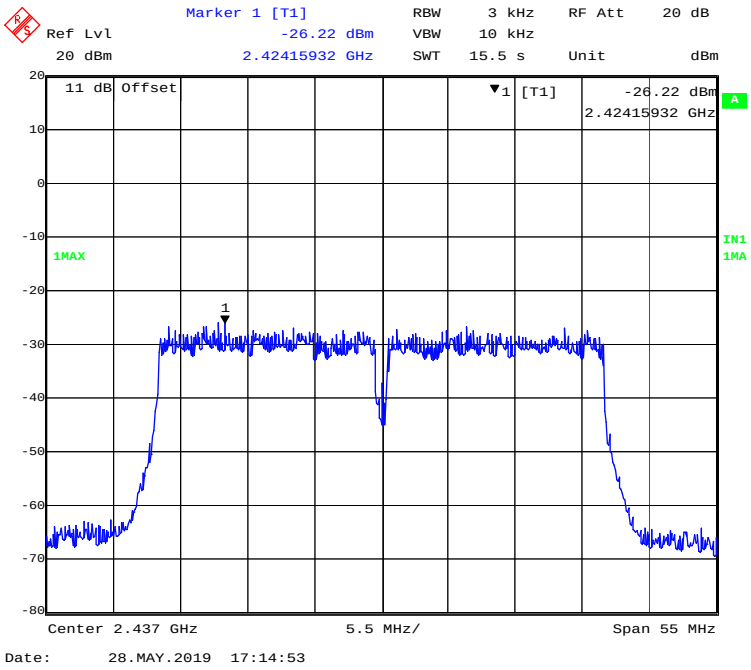
802.11n-HT20 Mode High Channel



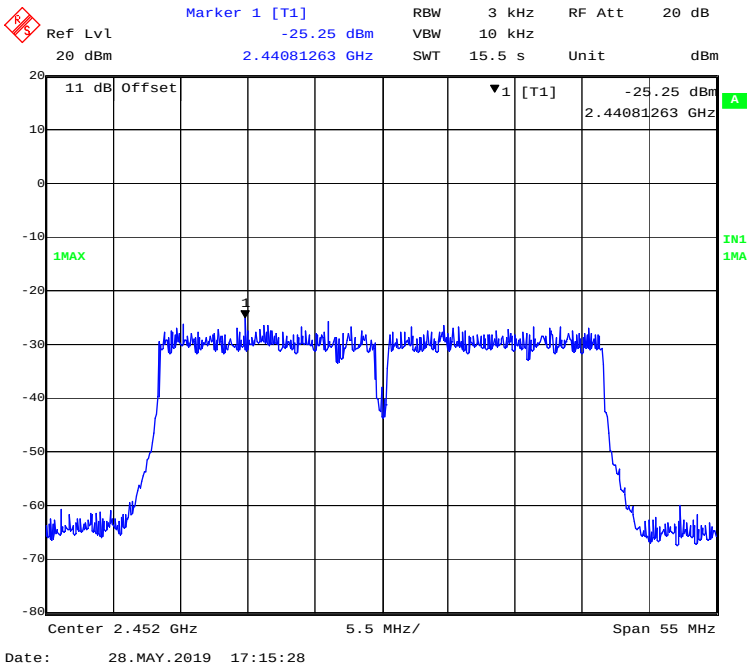
802.11n-HT40 Mode Low Channel



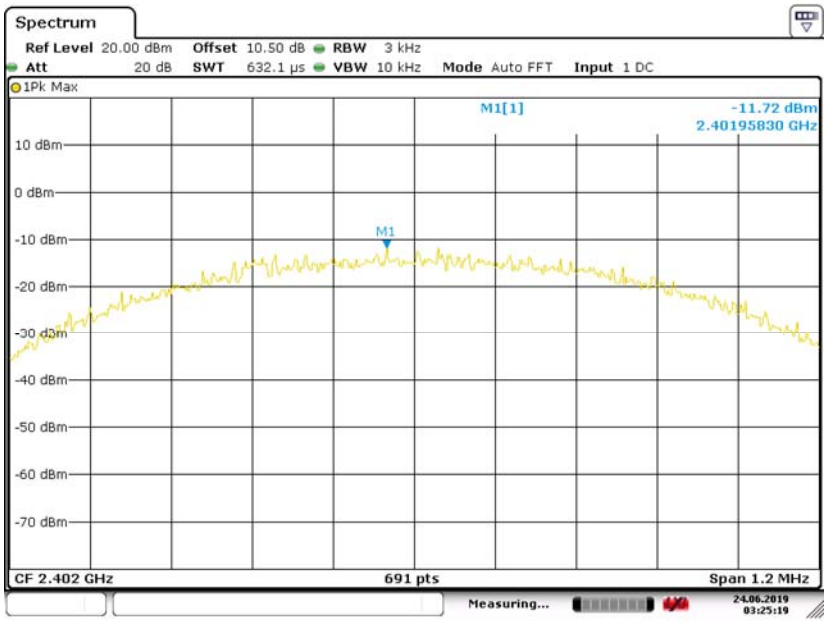
802.11n-HT40 Mode Middle Channel



802.11n-HT40 Mode High Channel

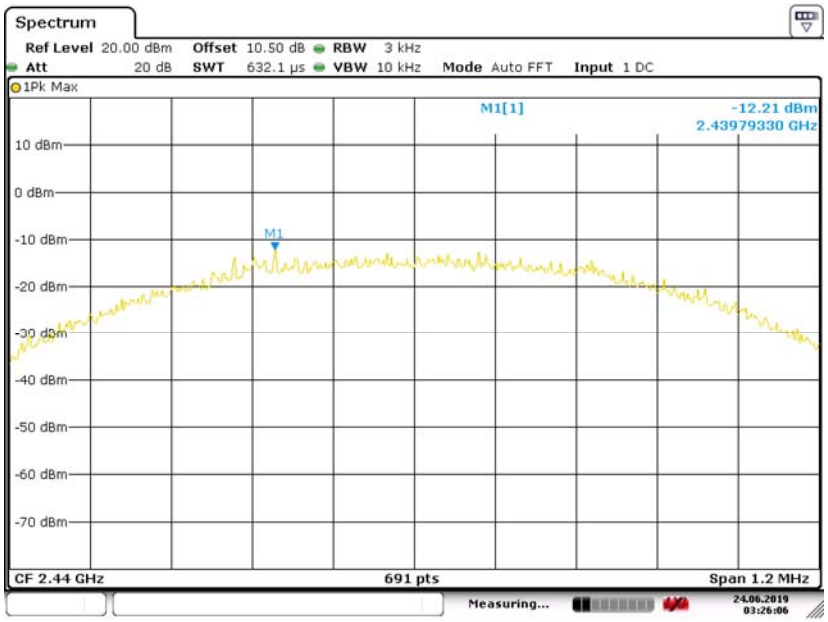


BLE Mode Low Channel



Date: 24.JUN.2019 03:25:19

BLE Mode Middle Channel



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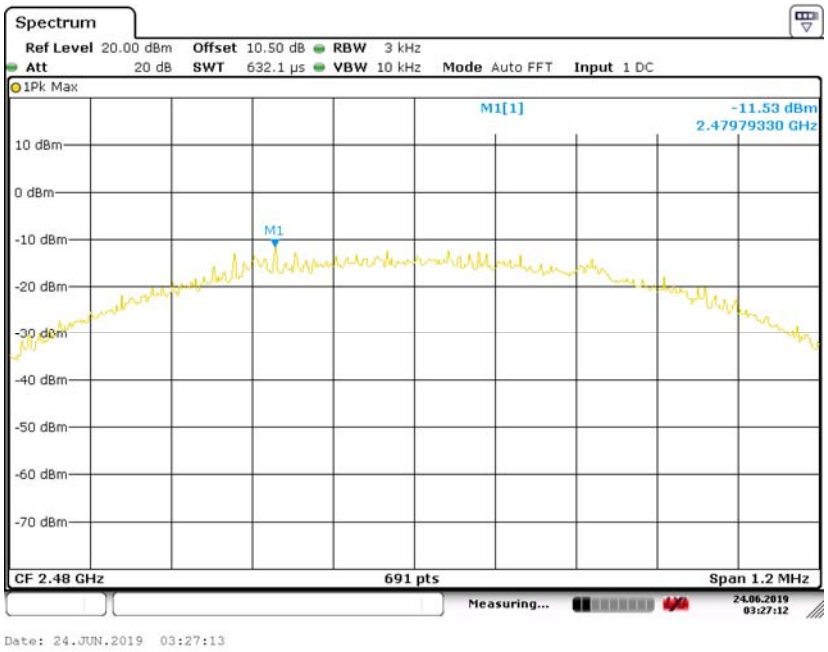
BLE Mode High Channel



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