

TEST REPORT

Applicant Name: Whirlpool Corporation
Address: FCC: 2000 N M63 Benton Harbor Michigan 49022 United States
IC: 2000 N M63 Benton Harbor MI 49022 United States Of America
Report Number: 2501T13935E-RFA2
FCC ID: A5UWICHAM01
IC: 10248A-WICHAM01

Test Standard (s)

FCC PART 15.247; RSS-GEN ISSUE 5, FEBRUARY 2021 AMENDMENT 2;
RSS-247 ISSUE 3, AUGUST 2023

Sample Description

Product Type: Amber WiFi Module
Model No.: WICHAM01
Multiple Model(s) No.: N/A
Trade Mark: Whirlpool
Date Received: 2025-05-08
Issue Date: 2025-11-10

Test Result:	Pass▲
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▲ In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

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GaLa Liu
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Approved By:

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Jimmy Xiao
EMC Manager

Note: The information marked # is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	2501T13935E-RFA2	Original Report	2025-11-10

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

HVIN	WICHAM01
FVIN	S16_00_00
Frequency Range	2412~2462MHz
Maximum Conducted Output Peak Power	24.61dBm
Modulation Technique	DSSS, OFDM
Antenna Specification[#]	1.3dBi (provided by the applicant)
Voltage Range	DC 3.3V
Sample serial number	32HV-3 for Radiated Emissions Test
Sample/EUT Status	Good condition
Adapter Information	N/A

Objective

This report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules and RSS-GEN Issue 5, February 2021 Amendment 2 and RSS-247 Issue 3, August 2023 of the Innovation, Science and Economic Development Canada rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2020 + Cor.1-2023[▼], RSS-Gen and RSS-247.

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

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		109.2kHz(k=2, 95% level of confidence)
RF output power, conducted		0.86dB(k=2, 95% level of confidence)
Power Spectral Density		0.90dB(k=2, 95% level of confidence)
AC Power Lines Conducted Emissions	9kHz~150 kHz	3.63dB(k=2, 95% level of confidence)
	150 kHz ~30MHz	3.66dB(k=2, 95% level of confidence)
Radiated Emissions	0.009MHz~30MHz	3.60dB(k=2, 95% level of confidence)
	30MHz~200MHz (Horizontal)	5.32dB(k=2, 95% level of confidence)
	30MHz~200MHz (Vertical)	5.43dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Horizontal)	5.77dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Vertical)	5.73dB(k=2, 95% level of confidence)
	1GHz - 6GHz	5.34dB(k=2, 95% level of confidence)
	6GHz - 18GHz	5.40dB(k=2, 95% level of confidence)
	18GHz - 40GHz	5.64dB(k=2, 95% level of confidence)
Temperature		±1°C
Humidity		±1%
Supply voltages		±0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. 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. (Shenzhen) to collect test data is located on the 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 715558, the FCC Designation No. : CN5045.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0023.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For 2.4GHz Wi-Fi mode, total 11 channels are provided to testing:

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

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

EUT Exercise Software

Exercise Software [#]		DutApiWiFiMW30XBrdigeUart.exe		
Mode	Data rate	Power Level [#]		
		Low Channel	Middle Channel	High Channel
802.11b	1Mbps	18	18	18
802.11g	6Mbps	17	17	17
802.11n20	MCS0	14	14	14

Note: The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the power and PSD across all data rates bandwidths, and modulations.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

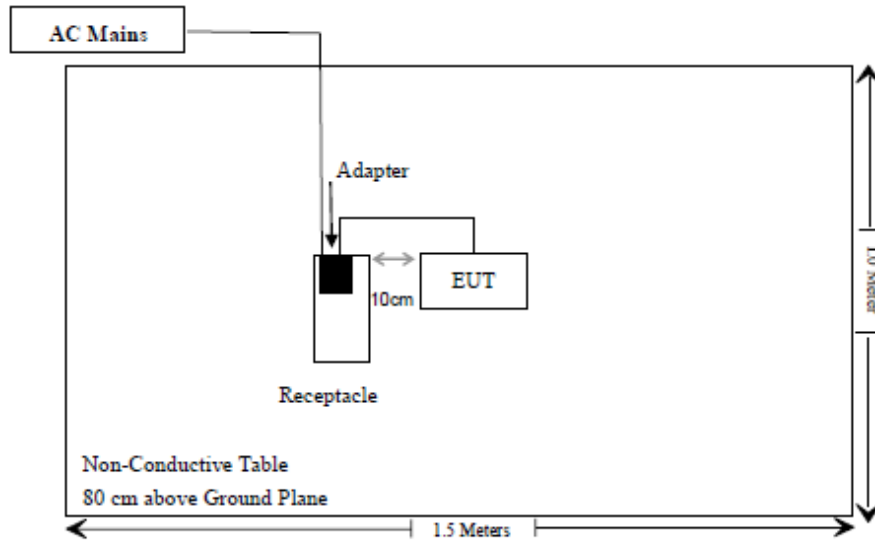
Manufacturer	Description	Model	Serial Number
OUPU	Receptacle	PDU-OP1606K	6971041358020
Whirlpool Corporation	Adapter	SPF-888	Unknown

External I/O Cable

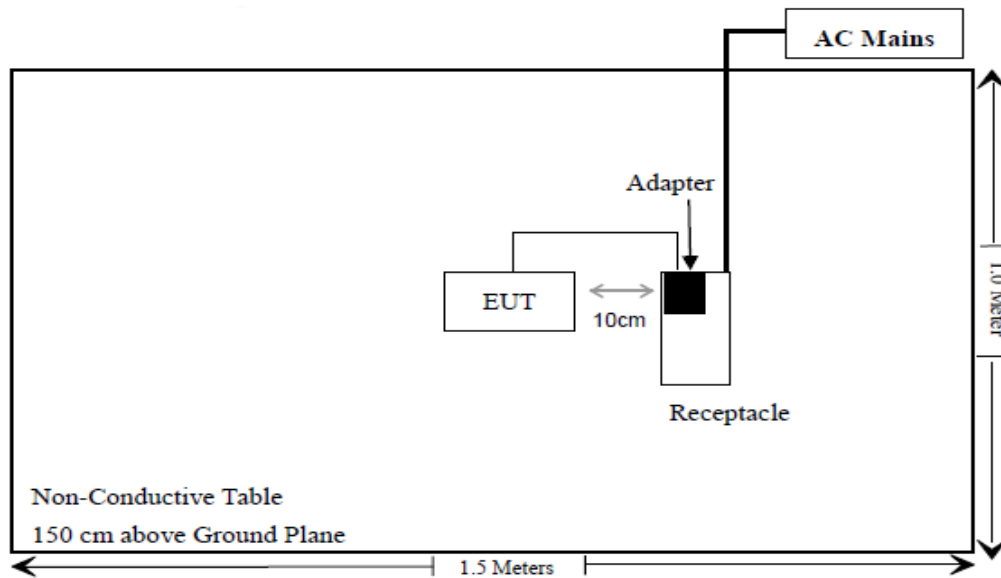
Cable Description	Length (m)	From Port	To
Unshielded Un-Detachable Cable	1.0	Receptacle	AC Main
Unshielded Un-Detachable DC Cable	1.0	Adapter	EUT

Block Diagram of Test Setup

For Radiated Emissions below 1GHz:



For Radiated Emissions above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	RSS Rules	Description of Test	Result	Remark
§15.247 (i), §1.1307 (b) & §2.1091	/	MPE-Based Exemption	Compliant	/
/	RSS-102 §6.6	Field reference level exposure exemption limits	Compliant	/
§15.203	RSS-Gen §6.8	Antenna Requirement	Compliant	/
§15.207 (a)	RSS-Gen §8.8	AC Line Conducted Emissions	-	See Note 2
§15.205, §15.209, §15.247(d)	RSS-GEN § 8.10 & RSS-247 § 5.5	Spurious Emissions	Compliant	/
§15.247 (a)(2)	RSS- Gen§6.7 RSS-247 § 5.2 (a)	99% Occupied Bandwidth & 6 dB Emission Bandwidth	-	See Note 2
§15.247(b)(3)	RSS-247 § 5.4(d)	Maximum Conducted Output Power	-	See Note 2
§15.247(d)	RSS-247 § 5.5	100 kHz Bandwidth of Frequency Band Edge	-	See Note 2
§15.247(e)	RSS-247 § 5.2 (b)	Power Spectral Density	-	See Note 2
C63.10 §11.6	C63.10 §11.6	Duty Cycle	-	See Note 2

Note:

1: This is Class II permissive change application for FCC ID: A5UWICHAM01 & IC: 10248A-WICHAM01, the below changes was declared by the applicant.

a. Change the external antenna.

b. Delete the chip LM3526 which provides Universal Serial Bus standard over-current protect.

c. Upgrading the standard version to “RSS-247 ISSUE 3, AUGUST 2023, RSS-102 Issue 6, December 15, 2023”.

d. Change the FVIN to “S16_00_00” (Only the firmware version is different, which has no impact RF parameters)

e. The manufacturer of the RF chip changed from Marvell to NXP, but the model number remained the same.

2: The test data refers to the original module report of FCC ID: A5UWICHAM01 & IC: 10248A-WICHAM01.

3: The Bay Area Compliance Laboratories Corp. (Shenzhen) is responsible for all the information provided in this report, except when information is provided by the customer as identified in this report.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESR3	102455	2024/12/04	2025/12/03
Sonoma instrument	Pre-amplifier	310N	186238	2025/04/29	2026/04/28
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2026/07/19
Unknown	Cable	Chamber Cable 1	F-03-EM236	2025/04/29	2026/04/28
Unknown	Cable	XH500C	J-10M-A	2025/04/29	2026/04/28
BACL	Active Loop Antenna	1313-1A	4031911	2024/05/14	2027/05/13
Unknown	Cable	2Y194	0735	2024/12/04	2025/12/03
Unknown	Cable	PNG214	1354	2024/12/04	2025/12/03
Audix	EMI Test software	E3	19821b(V9)	NCR	NCR
Rohde&Schwarz	Spectrum Analyzer	FSV40	101605	2025/03/26	2026/03/25
A.H.System	Preamplifier	PAM-0118P	489	2024/11/15	2025/11/14
Schwarzbeck	Horn Antenna	BBHA9120D(1201)	1143	2023/07/26	2026/07/25
Unknown	RF Cable	KMSE	0735	2024/12/06	2025/12/05
Unknown	RF Cable	UFA147	219661	2024/12/06	2025/12/05
Unknown	RF Cable	XH750A-N	J-10M	2024/12/06	2025/12/05
JD	Filter Switch Unit	DT7220FSU	DS79906	2024/09/09	2025/09/08
JD	Multiplex Switch Test Control Set	DT7220SCU	DS79903	2024/09/09	2025/09/08
A.H.System	Pre-amplifier	PAM-1840VH	190	2025/04/29	2026/04/28
Electro-Mechanics Co	Horn Antenna	3116	9510-2270	2023/09/18	2026/09/17
UTIFLEX	RF Cable	NO. 13	232308-001	2024/12/18	2025/12/17

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

REQUIREMENTS AND TEST PROCEDURES

Spurious Emissions

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

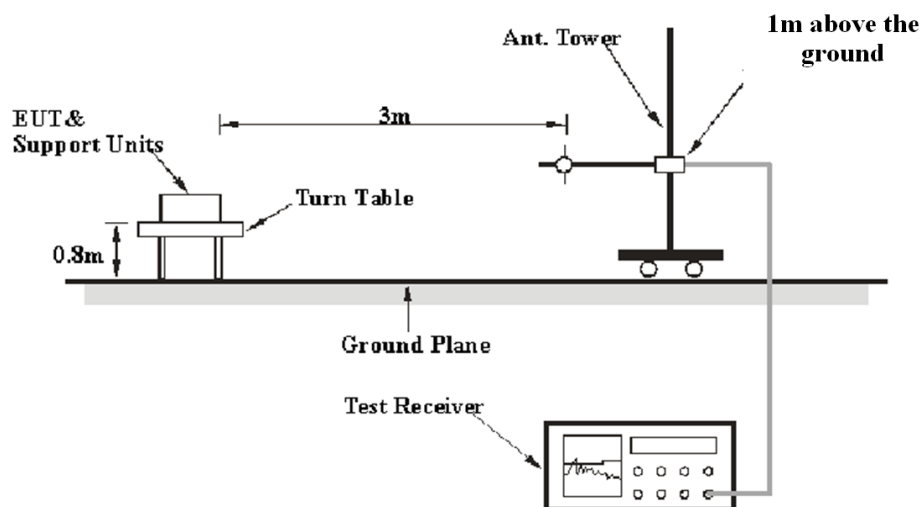
According to RSS-GEN § 8.10 & RSS-247 § 5.5

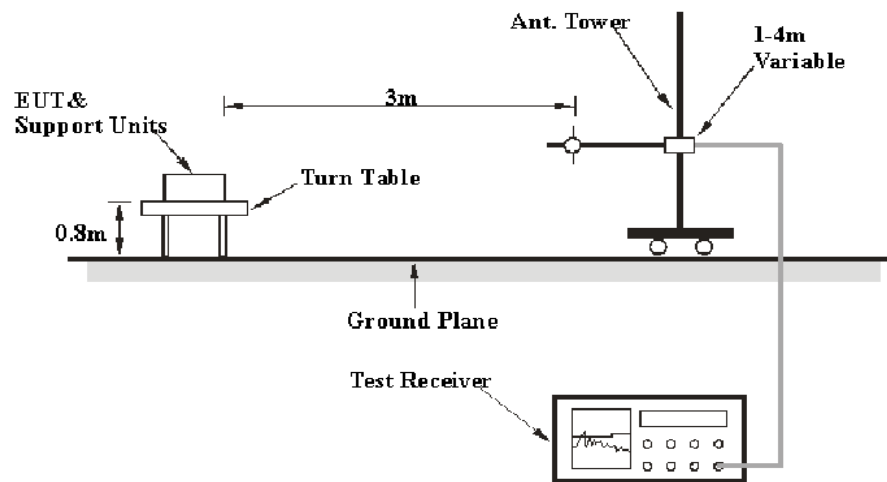
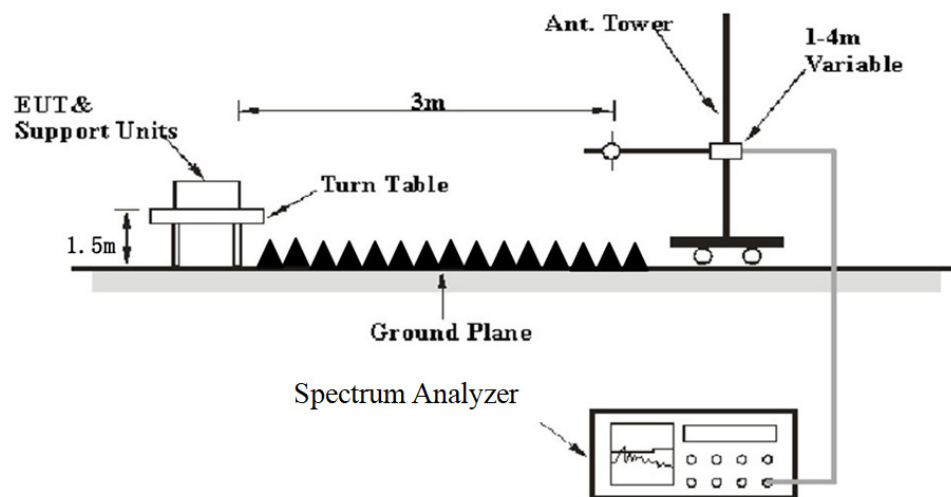
Restricted frequency bands, identified in table 7, are designated primarily for safety-of-life services (distress calling and certain aeronautical activities), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following conditions related to the restricted frequency bands apply: (a) The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands listed in table 7 except for apparatus compliant with RSS-287, Emergency Position Indicating Radio Beacons (EPIRB), Emergency Locator Transmitters (ELT), Personal Locator Beacons (PLB), and Maritime Survivor Locator Devices (MSLD). (b) Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6. (c) Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in table 5 and table 6.

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates Compliant with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

EUT Setup

9 kHz-30MHz:



30MHz-1GHz:**Above 1GHz:**

The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2020 & RSS-Gen. The specification used was the FCC 15.205, FCC 15.209, FCC 15.247, RSS-Gen and RSS-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.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 25 GHz.

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

9 kHz-1GHz:

Frequency Range	RBW	Video B/W	IF B/W	Measurement	Detector
9 kHz – 150 kHz	/	/	200 Hz	QP	QP
	300 Hz	1 kHz	/	PK	Peak
150 kHz – 30 MHz	/	/	9 kHz	QP	QP
	10 kHz	30 kHz	/	PK	Peak
30 MHz – 1000 MHz	/	/	120 kHz	QP	QP
	100 kHz	300 kHz	/	PK	Peak

1-25GHz:

Pre-scan

Measurement	Duty cycle	RBW	Video B/W	Detector
PK	Any	1MHz	3 MHz	Peak
AV	>98%	1MHz	1 kHz	Peak
	<98%	1MHz	≥1/Ton	Peak

Final measurement for emission identified during pre-scan

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

Note: Ton is minimum transmission duration

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

Test Procedure

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

All final data was recorded in Quasi-peak detection mode except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz, average detection modes for frequency bands 9–90 kHz and 110–490 kHz, peak and average detection modes for frequencies above 1 GHz.

For 9 kHz-30MHz, the report shall list the six emissions with the smallest margin relative to the limit, for each of the three antenna orientations (parallel, perpendicular, and ground-parallel) unless the margin is greater than 20 dB.

All emissions under the average limit and under the noise floor have not recorded in the report.

Factor & Over Limit/Margin Calculation

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

$$\text{Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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

$$\begin{aligned}\text{Over Limit/Margin} &= \text{Level/Corrected Amplitude} - \text{Limit} \\ \text{Level / Corrected Amplitude} &= \text{Read Level} + \text{Factor}\end{aligned}$$

ANTENNA REQUIREMENT

Applicable Standard

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

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

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the Compliant of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

Antenna Connector Construction

The EUT has one unique antenna port and the antenna gain[#] is 1.3dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Type	Antenna Gain [#]	Impedance
PCB	1.3dBi	50Ω

Result: Compliant

TEST DATA AND RESULTS

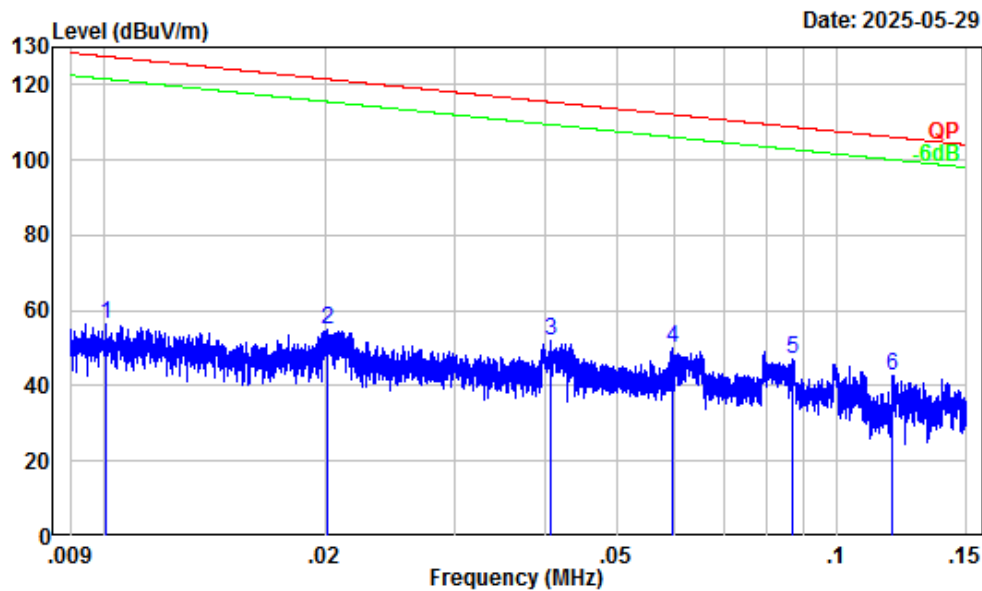
Spurious Emissions

Environmental Conditions

Temperature (°C)	24-25.2	Relative Humidity (%)	47-50.5
ATM Pressure (kPa):	101.1-101.3	Test engineer:	Anson Su & Zenos Qiao
Test date:	2025.05.29-2025.06.10		
EUT operation mode:	Below 1GHz: Transmitting (Maximum output power mode: 802.11g middle channel) Above 1GHz: Transmitting		
Note:	1. For the radiated spurious emission below 30MHz, only the worst case (parallel) was recorded. 2. For the radiated spurious emission below 1GHz, When the test result of peak was less than the limit of QP/Average more than 6dB, just peak value were recorded. 3. After pre-scan in the X, Y and Z axes of orientation, the worst case z-axis of orientation were recorded.		

Below 1GHz:

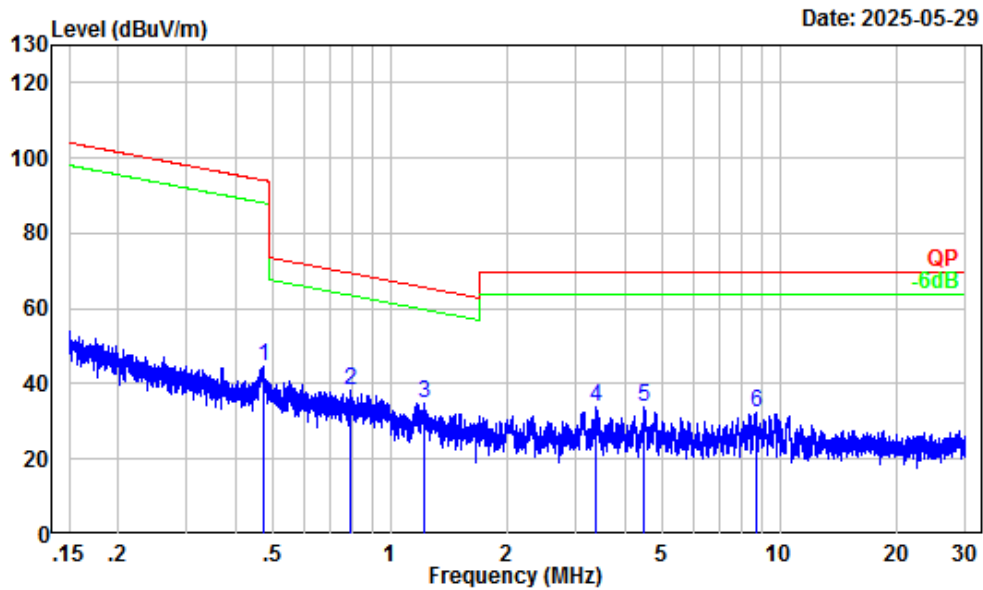
9kHz-150kHz



Site : Chamber A
Condition : 3m
Project Number : 2501T13935E-RFA2
Test Mode : 2.4G WIFI Transmitting
Detector: Peak RBW/VBW: 0.3/1kHz
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.010	32.29	23.98	56.27	127.55	-71.28	Peak
2	0.020	30.37	24.66	55.03	121.51	-66.48	Peak
3	0.041	27.39	24.47	51.86	115.43	-63.57	Peak
4	0.060	25.44	24.77	50.21	112.10	-61.89	Peak
5	0.087	22.90	23.96	46.86	108.80	-61.94	Peak
6	0.119	20.87	21.61	42.48	106.09	-63.61	Peak

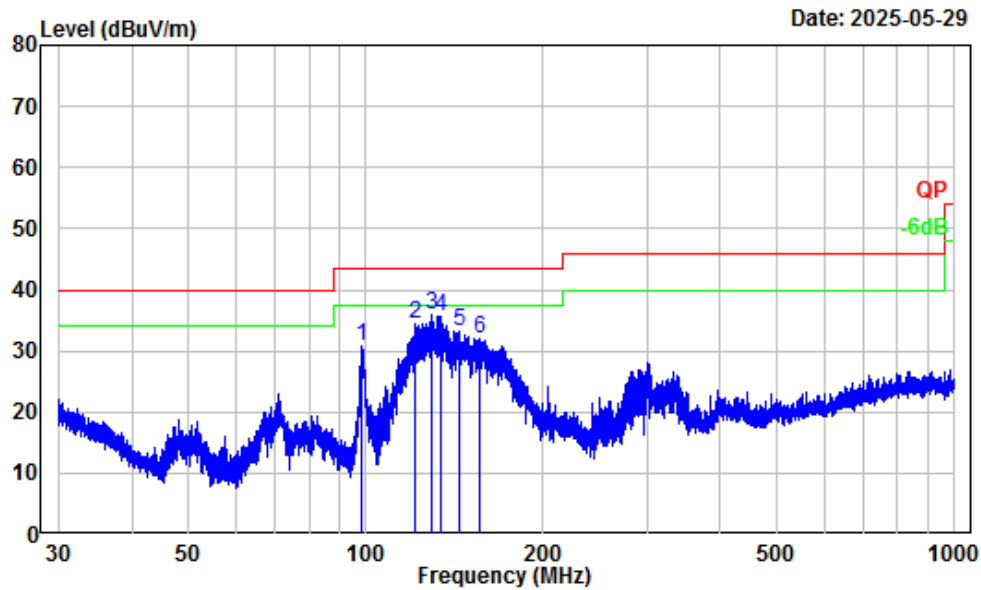
150kHz-30MHz



Site : Chamber A
Condition : 3m
Project Number : 2501T13935E-RFA2
Test Mode : 2.4G WIFI Transmitting
Detector: Peak RBW/VBW: 10/30kHz
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.472	6.94	37.54	44.48	94.13	-49.65	Peak
2	0.794	2.78	35.27	38.05	69.52	-31.47	Peak
3	1.228	0.56	34.47	35.03	65.65	-30.62	Peak
4	3.384	-2.36	36.12	33.76	69.54	-35.78	Peak
5	4.501	-2.75	36.41	33.66	69.54	-35.88	Peak
6	8.683	-2.93	35.43	32.50	69.54	-37.04	Peak

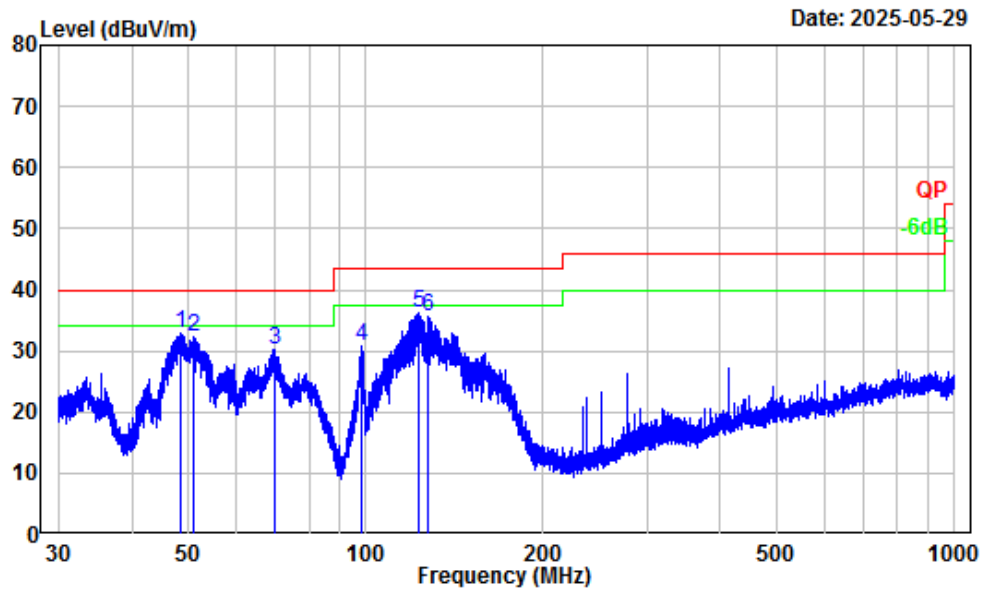
30MHz-1GHz_Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number : 2501T13935E-RFA2
Test Mode : 2.4G WIFI Transmitting
Detector: Peak RBW/VBW: 100/300kHz
Tester : Anson Su

	Freq		Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz		dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	98.57		-16.34	46.99	30.65	43.50	-12.85	Peak
2	120.96		-11.35	45.65	34.30	43.50	-9.20	Peak
3	129.24		-11.21	47.14	35.93	43.50	-7.57	Peak
4	134.32		-11.43	46.96	35.53	43.50	-7.97	Peak
5	143.96		-12.18	45.24	33.06	43.50	-10.44	Peak
6	156.32		-12.64	44.62	31.98	43.50	-11.52	Peak

30MHz-1GHz_Vertical



Site : Chamber A
Condition : 3m Vertical
Project Number : 2501T13935E-RFA2
Test Mode : 2.4G WIFI Transmitting
Detector: Peak RBW/VBW: 100/300kHz
Tester : Anson Su

	Freq		Read		Limit	Over	Remark
	Factor		Level	Level	Line	Limit	
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	48.37	-17.48	50.39	32.91	40.00	-7.09	Peak
2	51.08	-18.13	50.34	32.21	40.00	-7.79	Peak
3	70.12	-17.87	48.14	30.27	40.00	-9.73	Peak
4	98.53	-16.35	47.27	30.92	43.50	-12.58	Peak
5	123.27	-11.14	47.33	36.19	43.50	-7.31	Peak
6	127.89	-11.12	46.60	35.48	43.50	-8.02	Peak

Above 1GHz:

Frequency (MHz)	Reading (dBμV)	PK/Ave	Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11b							
Low Channel							
4824	57.54	PK	H	-7.75	49.79	74	-24.21
4824	56.87	PK	V	-7.75	49.12	74	-24.88
Middle Channel							
4874	56.95	PK	H	-7.61	49.34	74	-24.66
4874	56.21	PK	V	-7.61	48.60	74	-25.40
High Channel							
4924	56.32	PK	H	-7.57	48.75	74	-25.25
4924	55.58	PK	V	-7.57	48.01	74	-25.99
802.11g							
Low Channel							
4824	53.39	PK	H	-7.75	45.64	74	-28.36
4824	52.87	PK	V	-7.75	45.12	74	-28.88
Middle Channel							
4874	52.95	PK	H	-7.61	45.34	74	-28.66
4874	52.48	PK	V	-7.61	44.87	74	-29.13
High Channel							
4924	52.64	PK	H	-7.57	45.07	74	-28.93
4924	52.13	PK	V	-7.57	44.56	74	-29.44
802.11n20							
Low Channel							
4824	52.88	PK	H	-7.75	45.13	74	-28.87
4824	52.41	PK	V	-7.75	44.66	74	-29.34
Middle Channel							
4874	52.54	PK	H	-7.61	44.93	74	-29.07
4874	52.06	PK	V	-7.61	44.45	74	-29.55
High Channel							
4924	52.19	PK	H	-7.57	44.62	74	-29.38
4924	51.65	PK	V	-7.57	44.08	74	-29.92

Note:

Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

Corrected Amplitude = Corrected Factor + Reading

Margin = Corrected. Amplitude - Limit

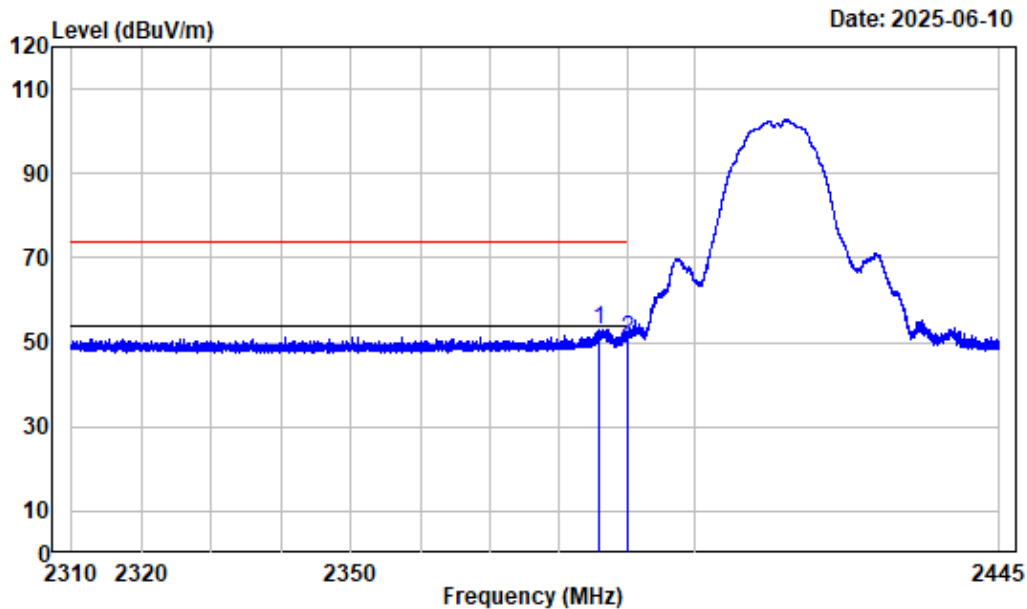
The other spurious emission which is in the noise floor level was not recorded.

The test result of peak was less than the limit of average, so just peak values were recorded.

Test plots

Band Edge

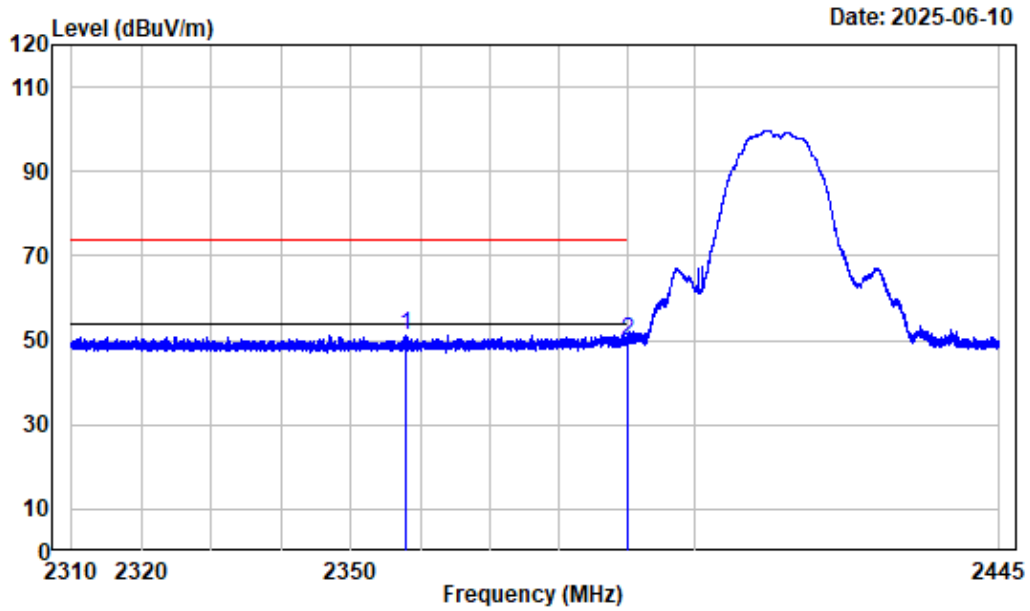
Left Band edge_Horizontal_Peak_802.11b



Condition : Horizontal
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-b-2412

Freq Factor		Read Level	Level	Limit Line	Over Limit	Remark
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2385.879	-10.97	63.90	52.93	74.00	-21.07 Peak
2	2390.000	-10.98	61.55	50.57	74.00	-23.43 Peak

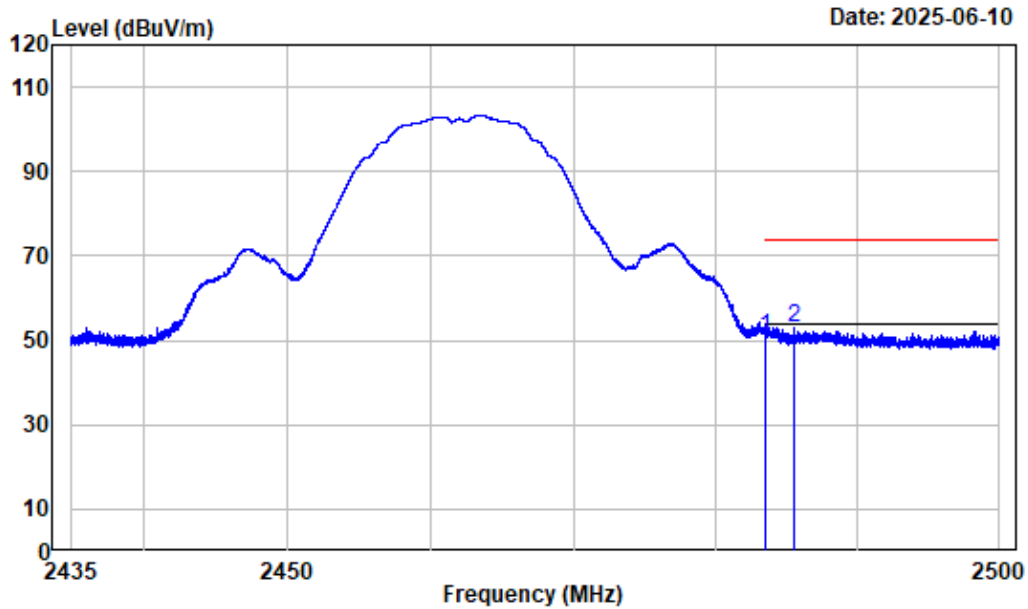
Left Band edge_Vertical_Peak_802.11b



Condition : Vertical
 Project No. : 2501T13935E-RFA2
 Tester : Zenos Qiao
 Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
 Note : 2.4GWiFi-b-2412

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2357.897	-10.91	62.28	51.37	74.00	-22.63	Peak
2	2390.000	-10.98	60.95	49.97	74.00	-24.03	Peak

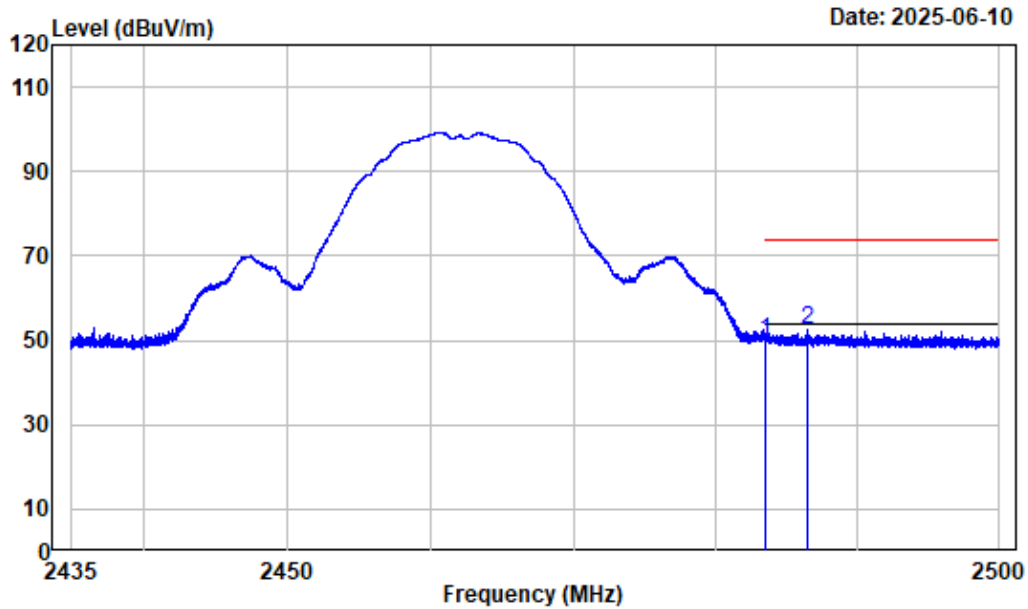
Right Band edge_Horizontal_Peak_802.11b



Condition : Horizontal
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-b-2462

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2483.500	-10.97	61.84	50.87	74.00	-23.13	Peak
2	2485.487	-10.97	64.16	53.19	74.00	-20.81	Peak

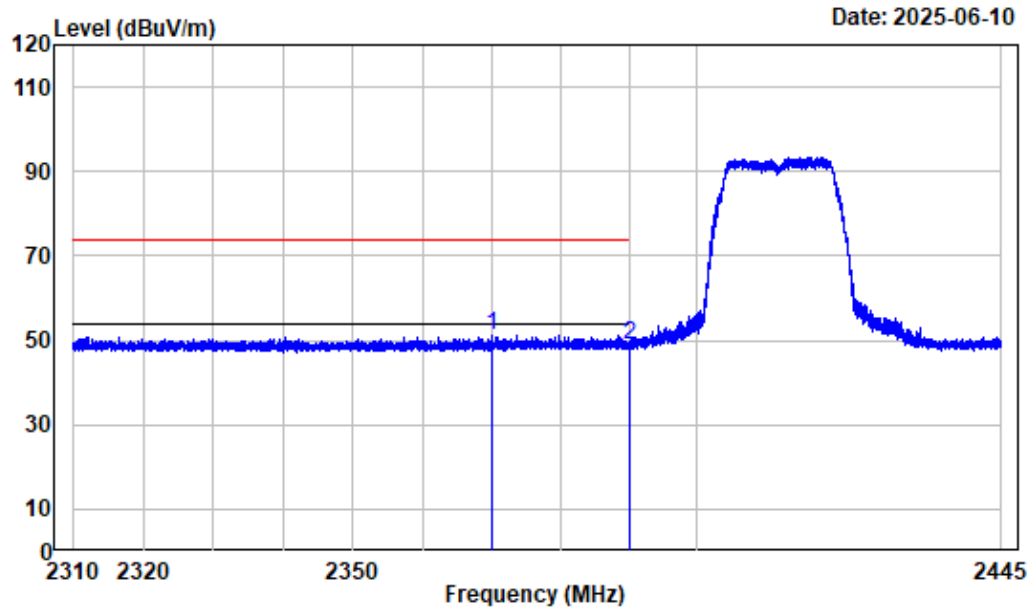
Right Band edge_Vertical_Peak_802.11b



Condition : Vertical
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-b-2462

	Freq Factor		Read		Limit	Over	Remark
	MHz	dB/m	Level	Level	Line	Limit	
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2483.500	-10.97	60.95	49.98	74.00	-24.02	Peak
2	2486.478	-10.97	63.64	52.67	74.00	-21.33	Peak

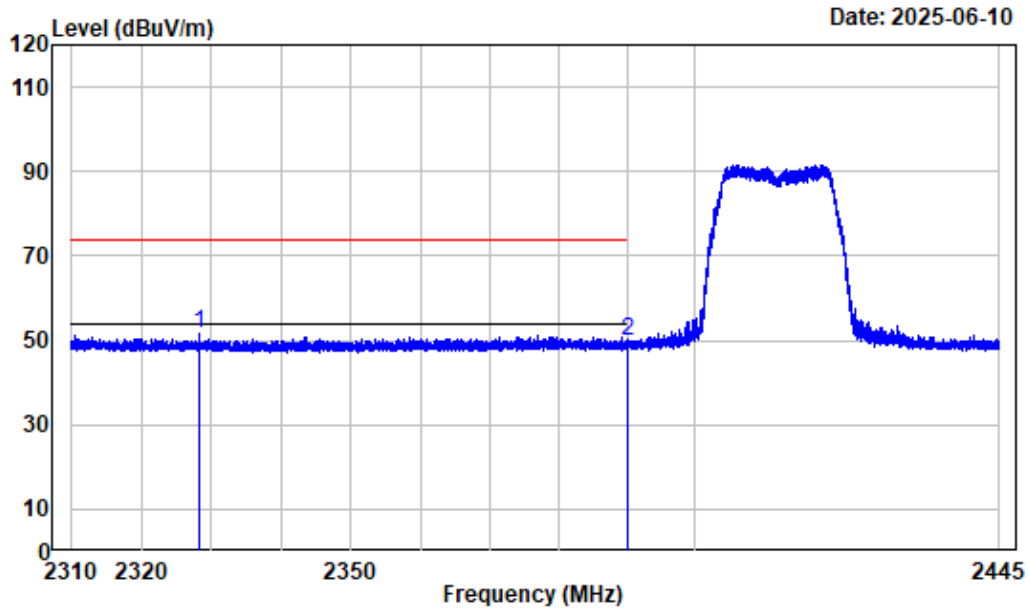
Left Band edge_Horizontal_Peak_802.11g



Condition : Horizontal
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-g-2412

	Freq Factor		Read		Limit	Over	Remark
	MHz	dB/m	Level	Level	Line	Limit	
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2369.964	-10.94	62.23	51.29	74.00	-22.71	Peak
2	2390.000	-10.98	59.81	48.83	74.00	-25.17	Peak

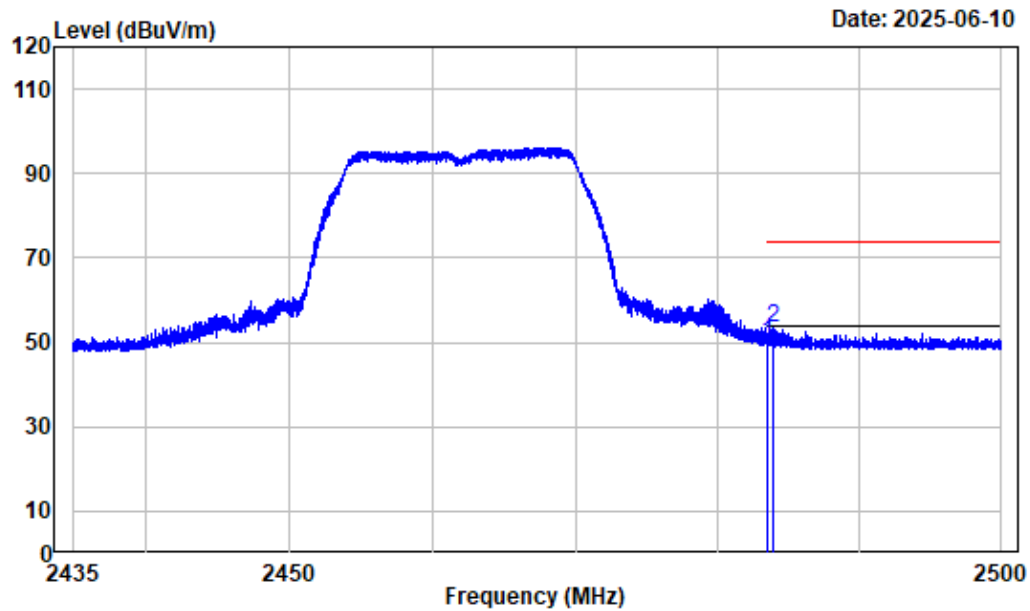
Left Band edge_Vertical_Peak_802.11g



Condition : Vertical
 Project No. : 2501T13935E-RFA2
 Tester : Zenos Qiao
 Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
 Note : 2.4GWiFi-g-2412

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2328.295	-10.84	62.26	51.42	74.00	-22.58	Peak
2	2390.000	-10.98	60.86	49.88	74.00	-24.12	Peak

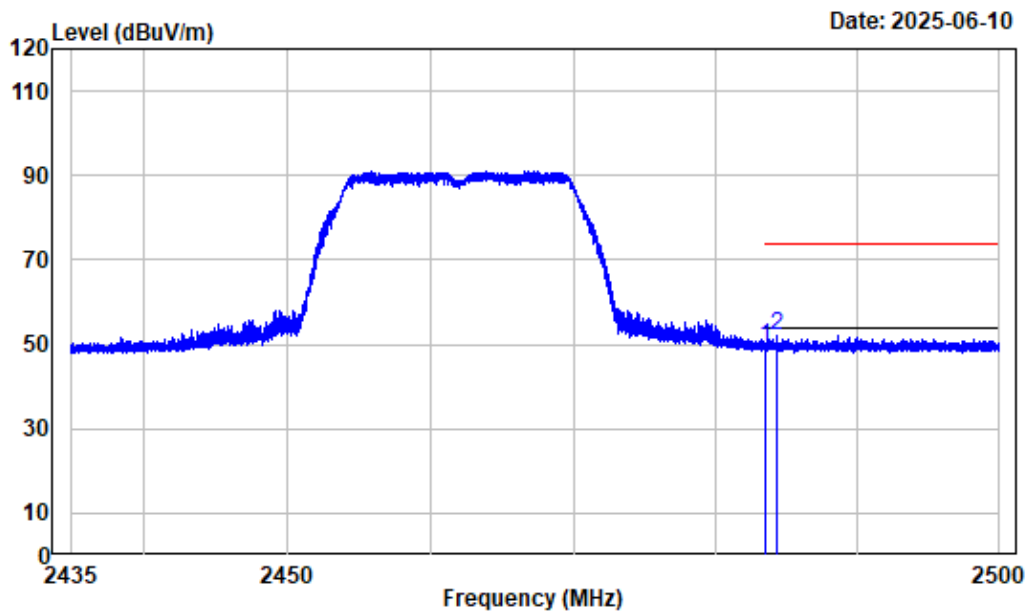
Right Band edge_Horizontal_Peak_802.11g



Condition : Horizontal
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-g-2462

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2483.500	-10.97	60.69	49.72	74.00	-24.28	Peak
2	2483.821	-10.97	64.27	53.30	74.00	-20.70	Peak

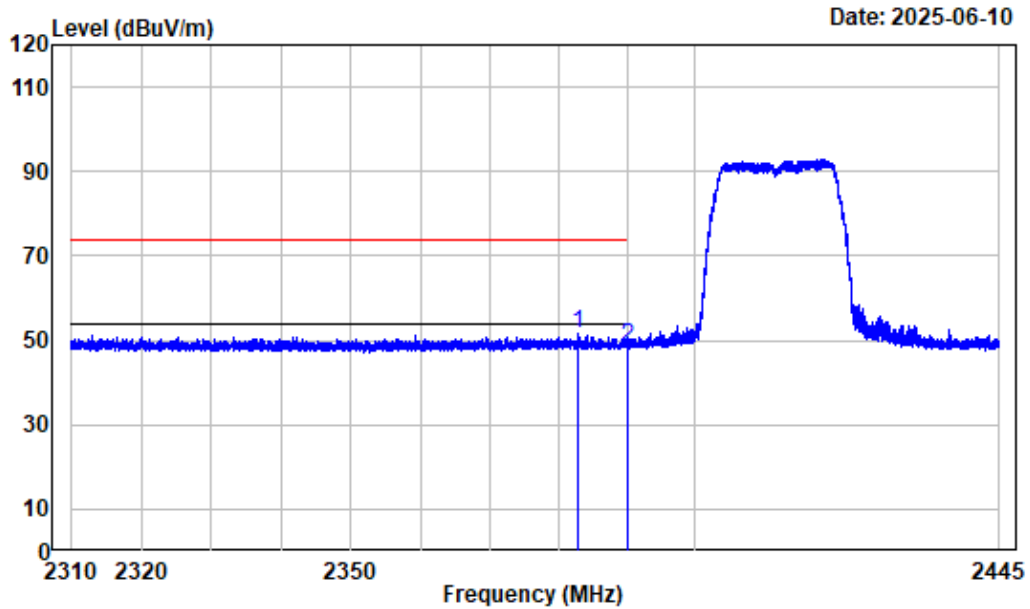
Right Band edge_Vertical_Peak_802.11g



Condition : Vertical
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-g-2462

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2483.500	-10.97	60.28	49.31	74.00	-24.69	Peak
2	2484.244	-10.97	62.91	51.94	74.00	-22.06	Peak

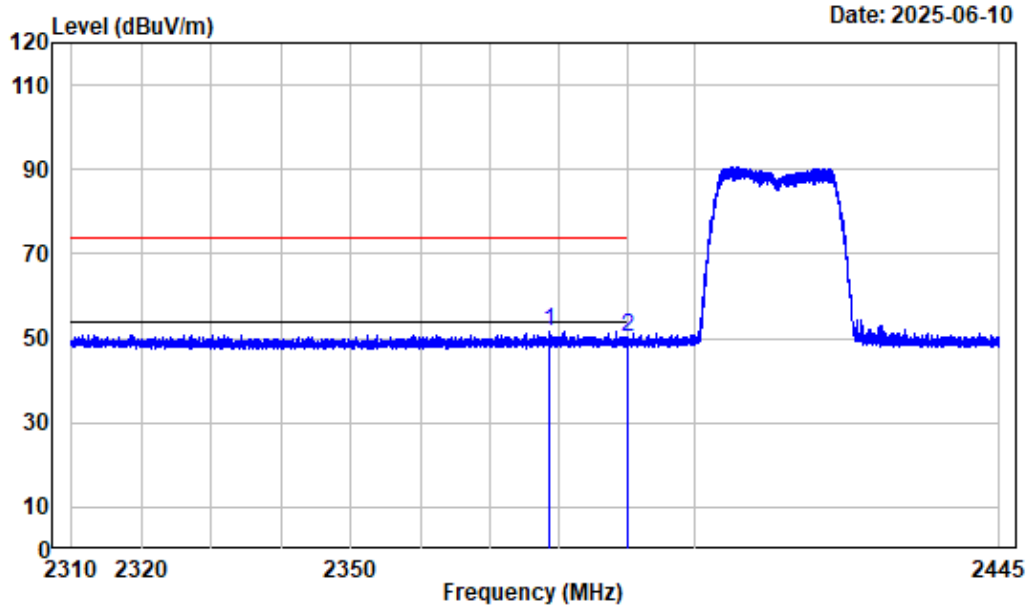
Left Band edge_Horizontal_Peak_802.11n20



Condition : Horizontal
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-n20-2412

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2382.842	-10.98	62.42	51.44	74.00	-22.56	Peak
2	2390.000	-10.98	59.39	48.41	74.00	-25.59	Peak

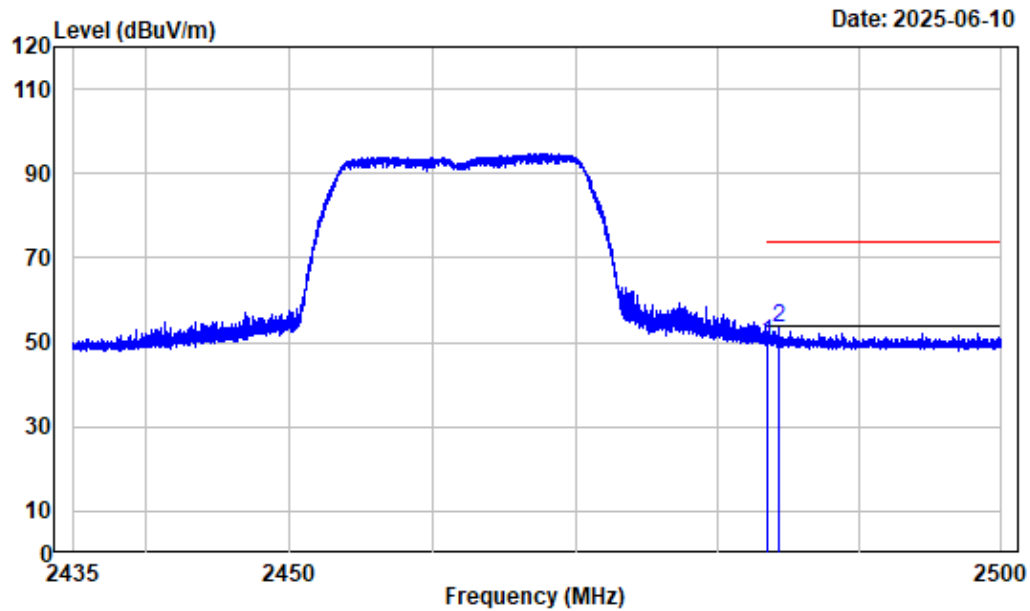
Left Band edge_Vertical_Peak_802.11n20



Condition : Vertical
 Project No. : 2501T13935E-RFA2
 Tester : Zenos Qiao
 Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
 Note : 2.4GWiFi-n20-2412

	Freq Factor		Read	Limit	Over	Remark
	MHz	dB/m	Level	Line	Limit	
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	2378.690	-10.96	62.68	51.72	74.00	-22.28 Peak
2	2390.000	-10.98	61.12	50.14	74.00	-23.86 Peak

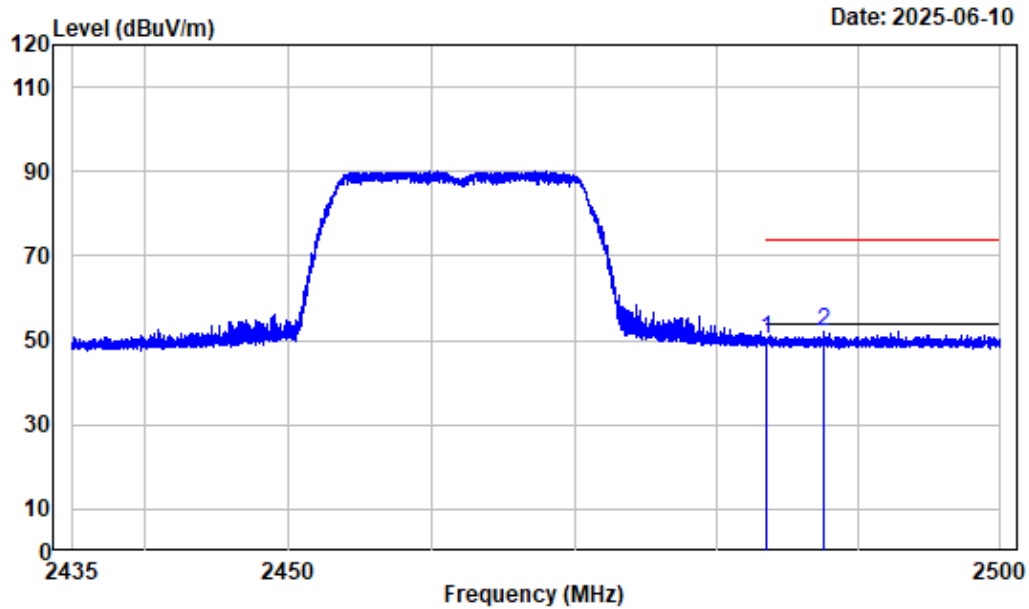
Right Band edge_Horizontal_Peak_802.11n20



Condition : Horizontal
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-n20-2462

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2483.500	-10.97	60.98	50.01	74.00	-23.99	Peak
2	2484.252	-10.97	64.27	53.30	74.00	-20.70	Peak

Right Band edge_Vertical_Peak_802.11n20

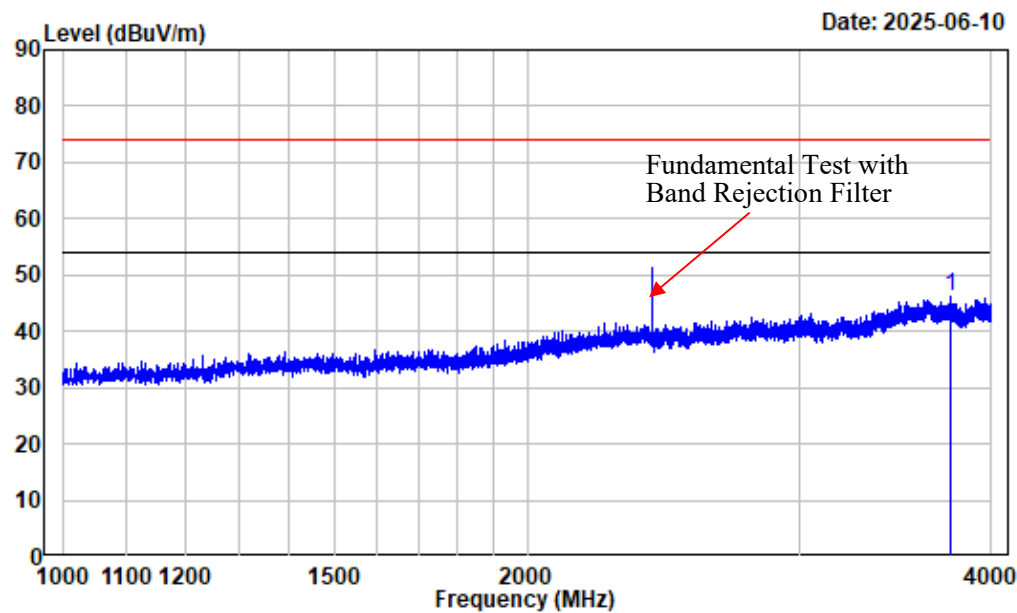


Condition : Vertical
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-n20-2462

	Freq Factor		Read		Limit	Over	Remark
	Level	Level	Level	Level	Line	Limit	
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2483.500	-10.97	61.05	50.08	74.00	-23.92	Peak
2	2487.486	-10.97	63.00	52.03	74.00	-21.97	Peak

1-18GHz (Listed with the worst harmonic margin test plot)

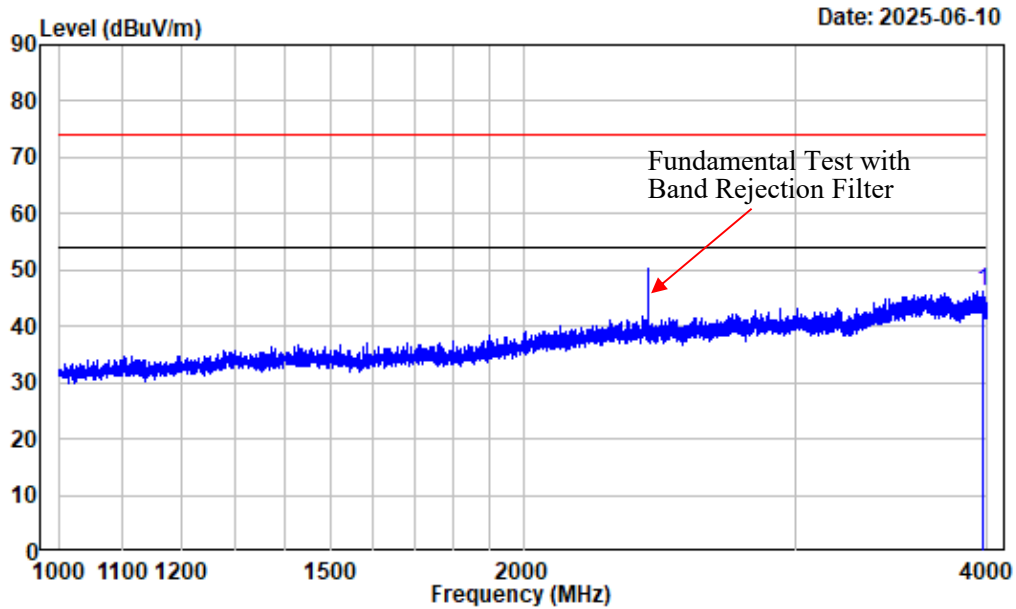
1-4GHz_Horizontal_802.11b



Condition : Horizontal
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-b-2412

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	3765.971	-9.67	55.76	46.09	74.00	-27.91	Peak

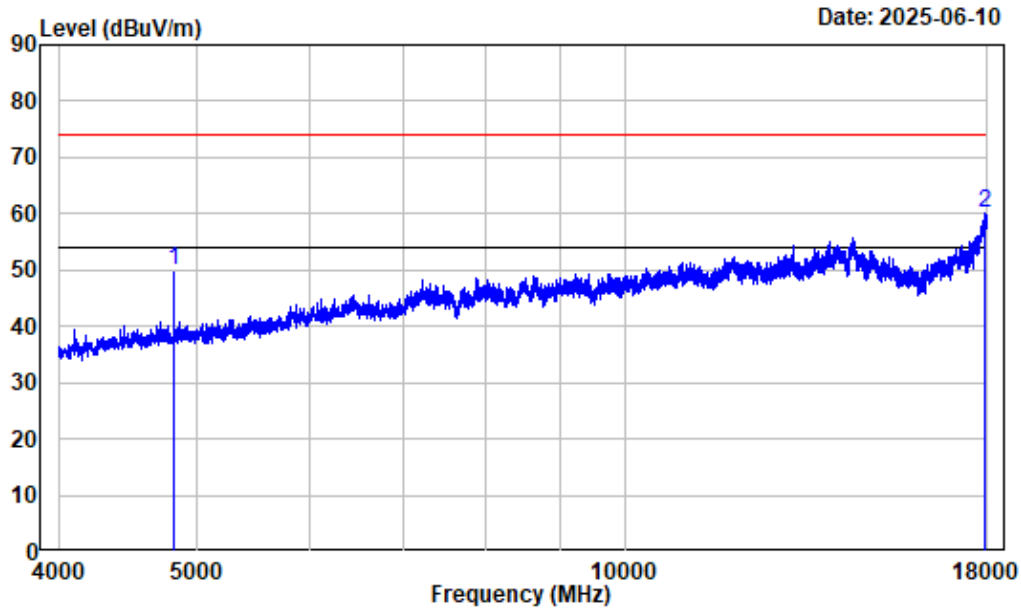
1-4GHz_Vertical_802.11b



Condition : Vertical
 Project No. : 2501T13935E-RFA2
 Tester : Zenos Qiao
 Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
 Note : 2.4GWiFi-b-2412

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	3969.246	-9.29	55.40	46.11	74.00	-27.89	Peak

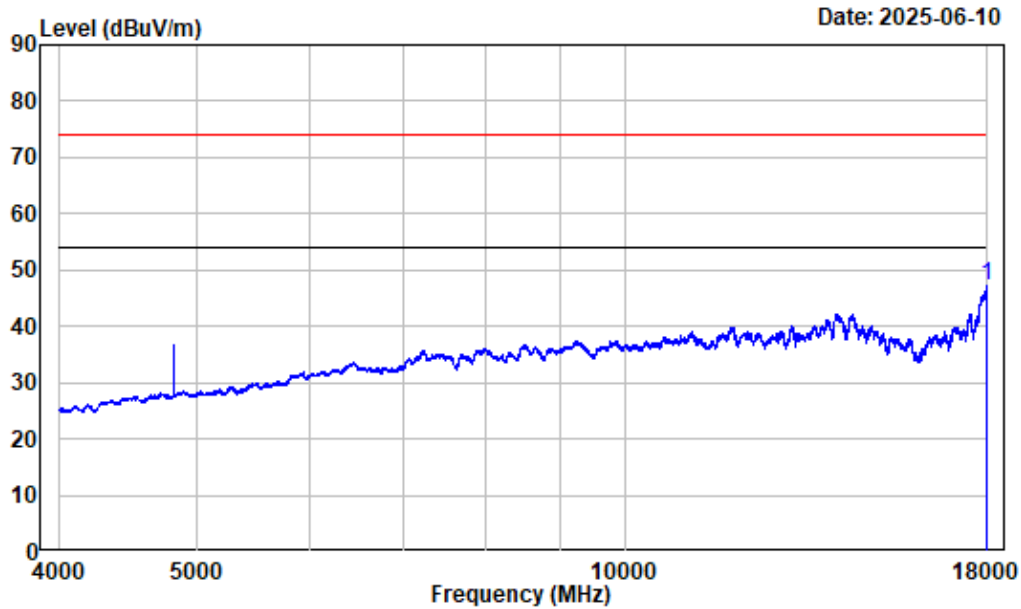
4-18GHz_Horizontal_Peak_802.11b



Condition : Horizontal
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-b-2412

	Freq Factor		Read		Limit	Over	Remark
	MHz	dB/m	Level	Level	Line	Limit	
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	4824.000	-7.75	57.54	49.79	74.00	-24.21	Peak
2	17954.490	12.97	47.18	60.15	74.00	-13.85	Peak

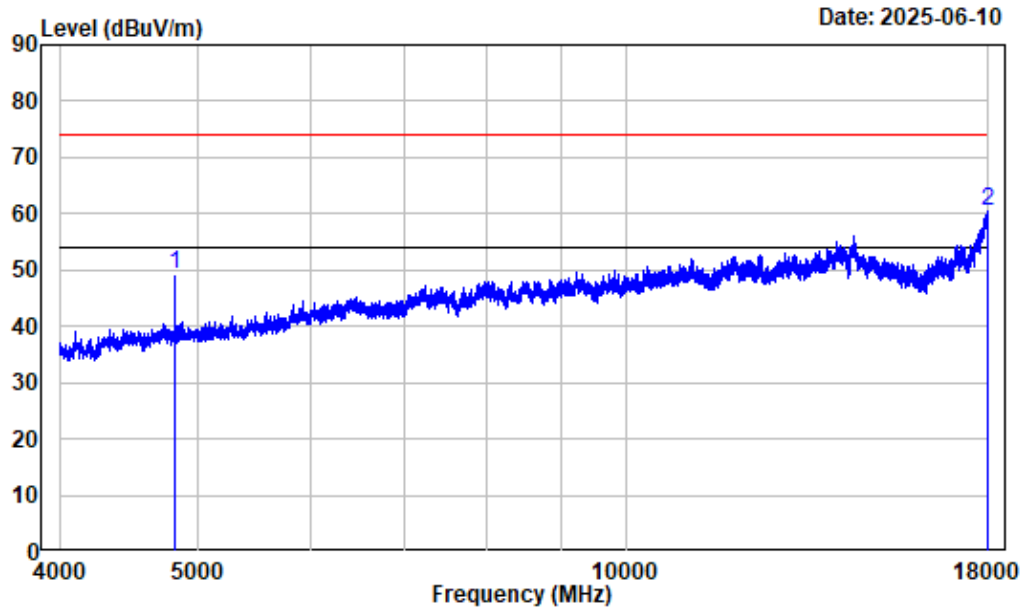
4-18GHz_Horizontal_Average_802.11b



Condition : Horizontal
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Average reading:RBW:1MHz VBW:1kHz Detector:Peak
Note : 2.4GWiFi-b-2412

Freq	Factor	Read		Limit	Over	Remark
		Level	Level	Line	Limit	
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1 17993.000	13.17	34.01	47.18	54.00	-6.82	Average

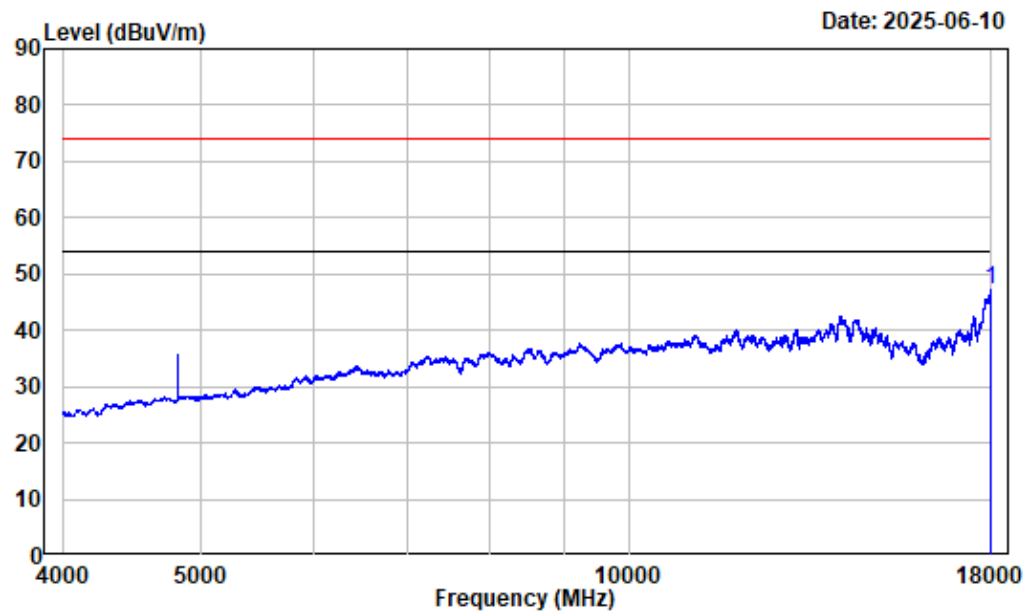
4-18GHz_Vertical_Peak_802.11b



Condition : Vertical
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-b-2412

	Freq Factor		Read		Limit	Over	Remark
	MHz	dB/m	Level	Level	Line	Limit	
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	4824.000	-7.75	56.87	49.12	74.00	-24.88	Peak
2	17984.250	13.12	47.42	60.54	74.00	-13.46	Peak

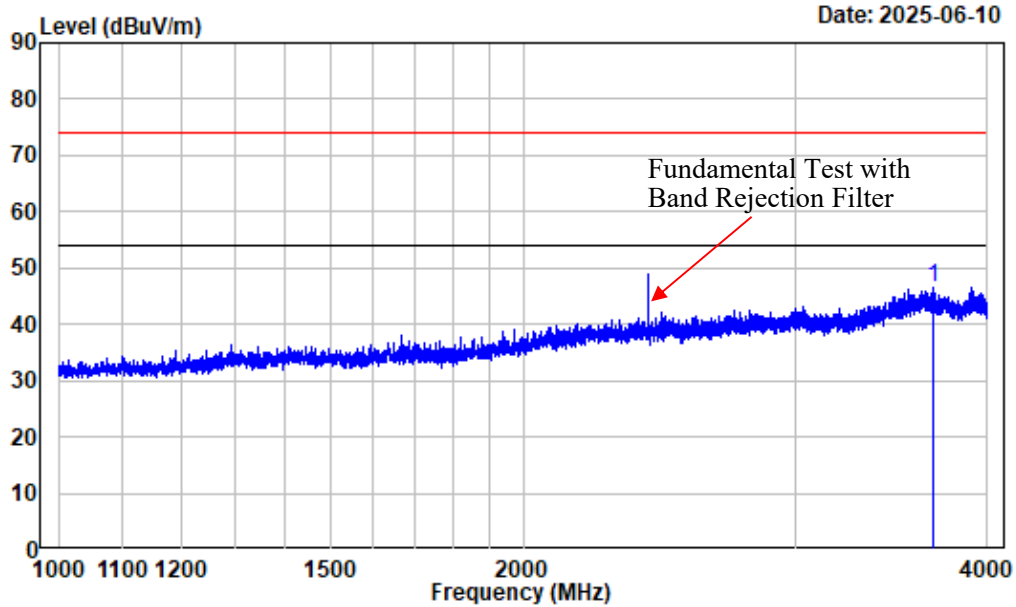
4-18GHz_Vertical_Average_802.11b



Condition : Vertical
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Average reading:RBW:1MHz VBW:1kHz Detector:Peak
Note : 2.4GWiFi-b-2412

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	17998.250	13.19	33.87	47.06	54.00	-6.94	Average

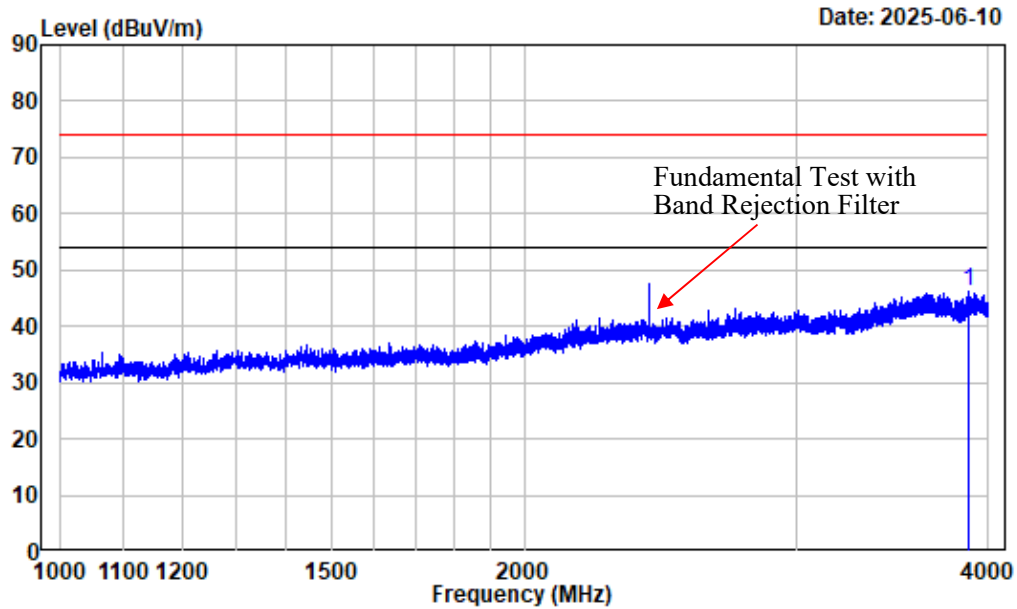
1-4GHz_Horizontal_802.11g



Condition : Horizontal
 Project No. : 2501T13935E-RFA2
 Tester : Zenos Qiao
 Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
 Note : 2.4GWiFi-g-2412

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	3686.086	-9.57	56.18	46.61	74.00	-27.39	Peak

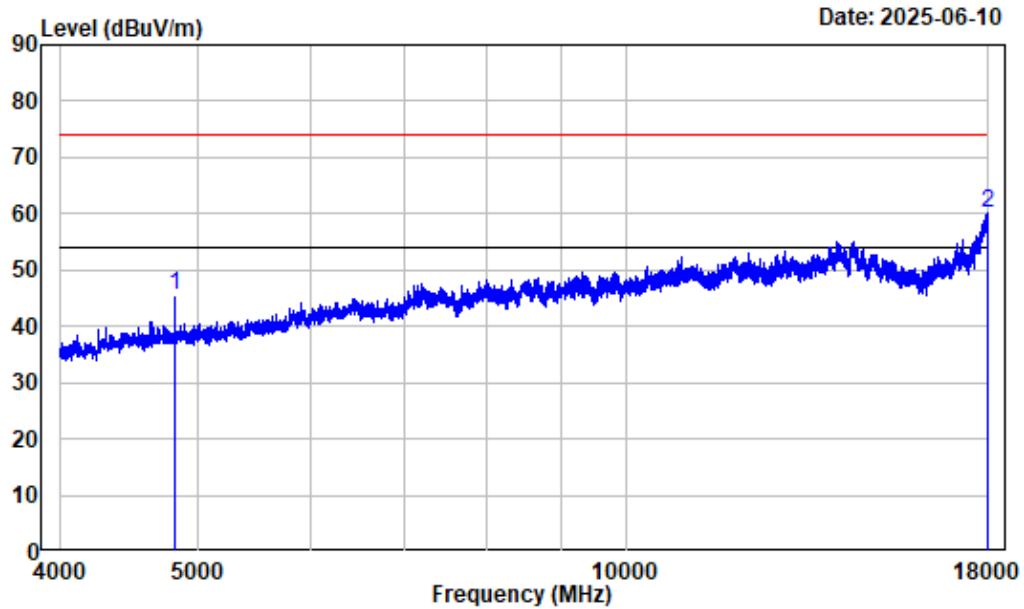
1-4GHz_Vertical_802.11g



Condition : Vertical
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-g-2412

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	3888.986	-9.86	56.00	46.14	74.00	-27.86	Peak

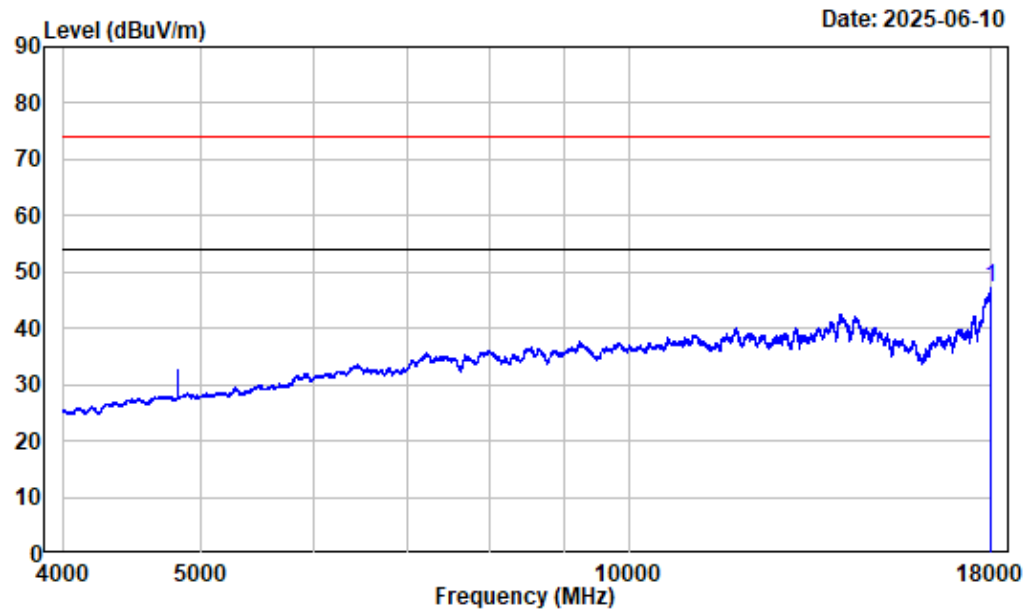
4-18GHz_Horizontal_Peak_802.11g



Condition : Horizontal
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-g-2412

	Freq Factor		Read		Limit	Over	Remark
	MHz	dB/m	Level	Level	Line	Limit	
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	4824.000	-7.75	53.39	45.64	74.00	-28.36	Peak
2	17979.000	13.09	46.87	59.96	74.00	-14.04	Peak

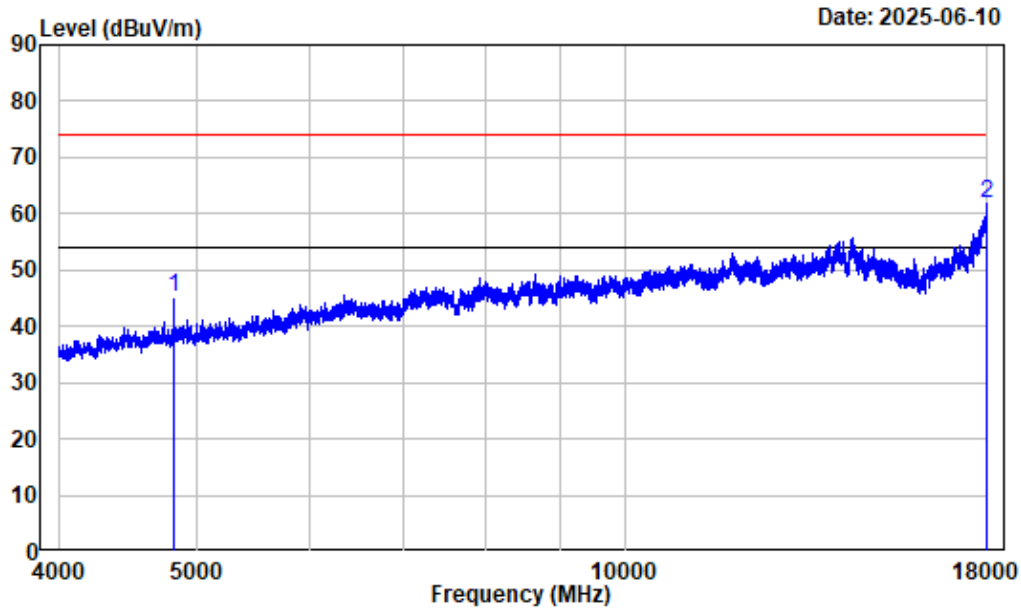
4-18GHz_Horizontal_Average_802.11g



Condition : Horizontal
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Average reading:RBW:1MHz VBW:1kHz Detector:Peak
Note : 2.4GWiFi-g-2412

Freq Factor		Read Level		Limit	Over	Remark
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	17998.250	13.19	33.98	47.17	54.00	-6.83 Average

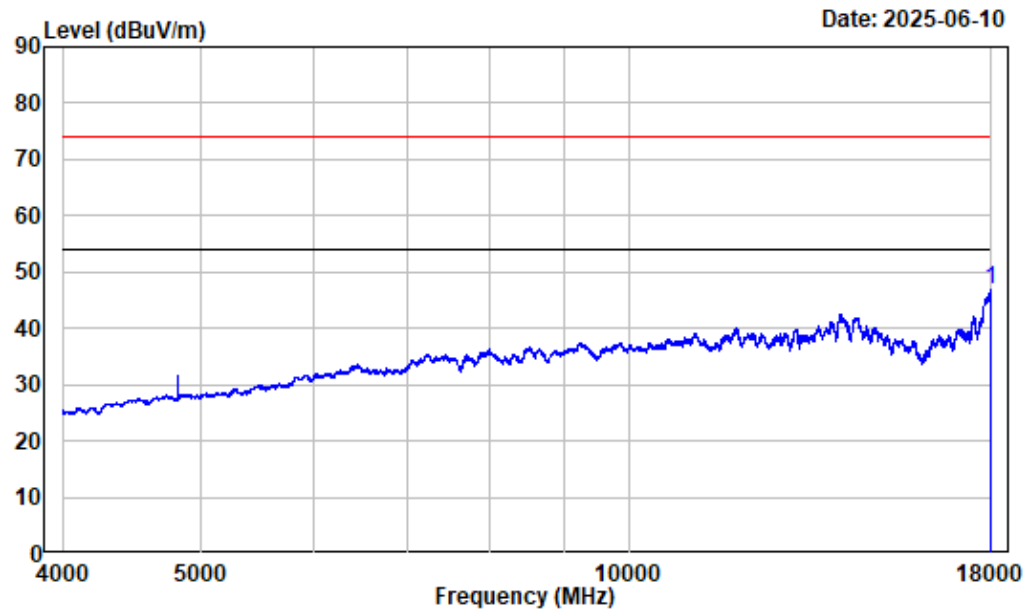
4-18GHz_Vertical_Peak_802.11g



Condition : Vertical
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-g-2412

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	4824.000	-7.75	52.87	45.12	74.00	-28.88	Peak
2	17977.250	13.09	48.57	61.66	74.00	-12.34	Peak

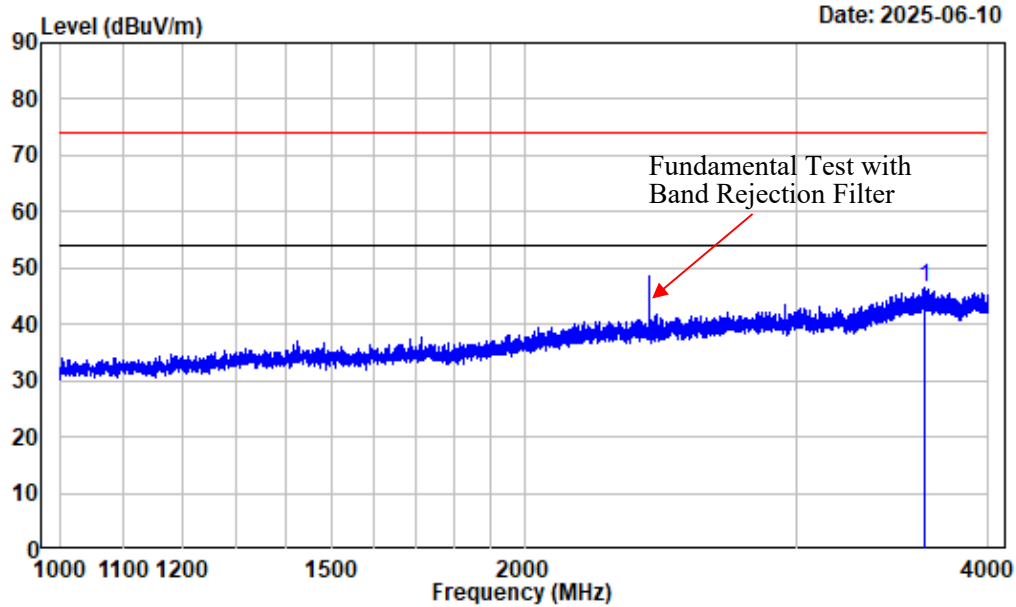
4-18GHz_Vertical_Average_802.11g



Condition : Vertical
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Average reading:RBW:1MHz VBW:1kHz Detector:Peak
Note : 2.4GWiFi-g-2412

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	17989.500	13.16	33.88	47.04	54.00	-6.96	Average

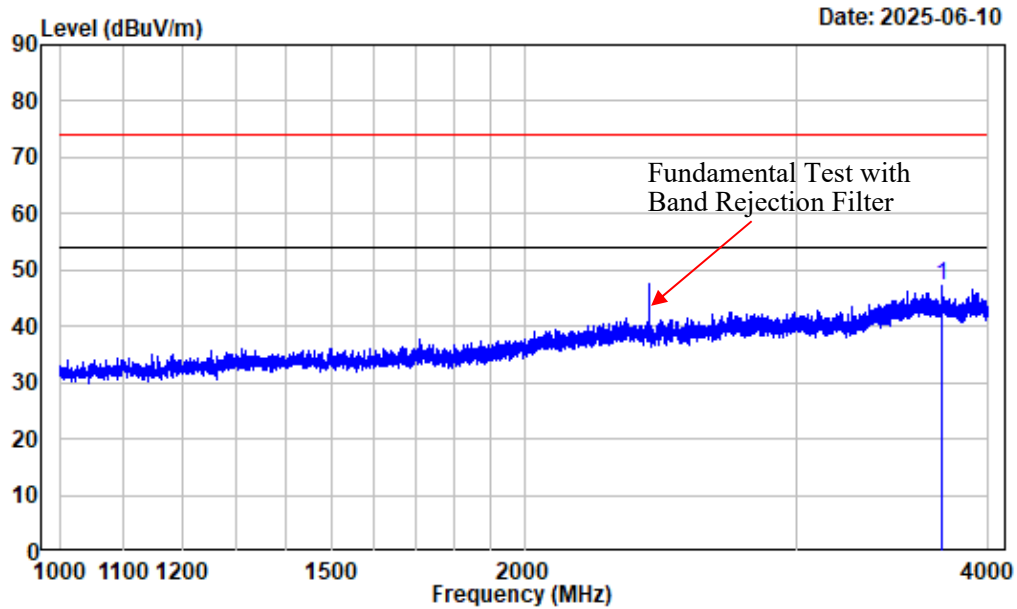
1-4GHz_Horizontal_802.11n-HT20



Condition : Horizontal
 Project No. : 2501T13935E-RFA2
 Tester : Zenos Qiao
 Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
 Note : 2.4GWiFi-n20-2412

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	3636.580	-9.88	56.54	46.66	74.00	-27.34	Peak

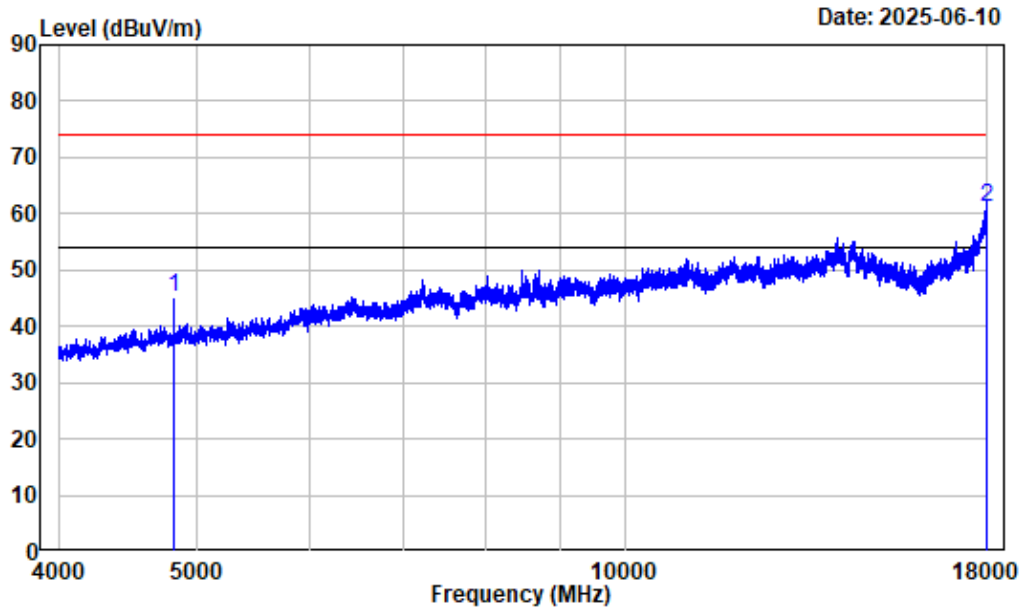
1-4GHz_Vertical_802.11n-HT20



Condition : Vertical
 Project No. : 2501T13935E-RFA2
 Tester : Zenos Qiao
 Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
 Note : 2.4GWiFi-n20-2412

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	3729.216	-9.55	56.59	47.04	74.00	-26.96	Peak

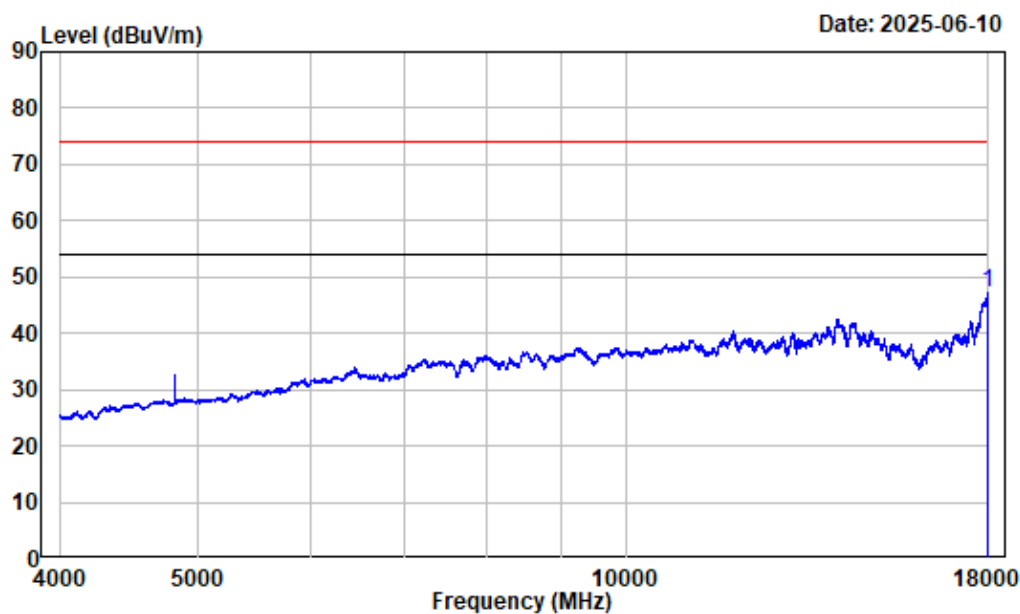
4-18GHz_Horizontal_Peak_802.11n-HT20



Condition : Horizontal
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-n20-2412

	Freq Factor		Read		Limit	Over	Remark
	MHz	dB/m	Level	Level	Line	Limit	
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	4824.000	-7.75	52.88	45.13	74.00	-28.87	Peak
2	17996.500	13.19	47.92	61.11	74.00	-12.89	Peak

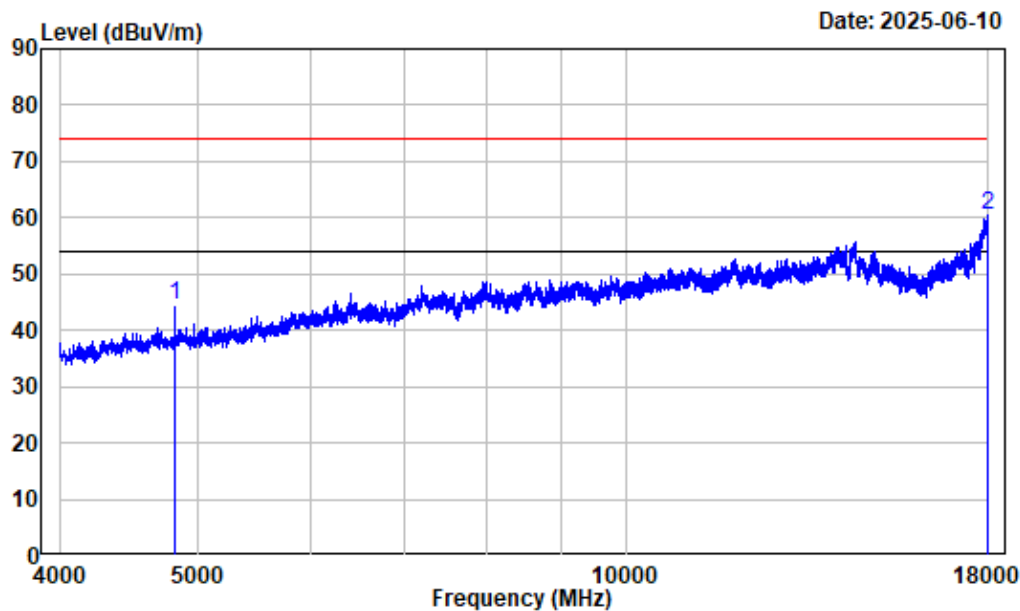
4-18GHz_Horizontal_Average_802.11n-HT20



Condition : Horizontal
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Average reading:RBW:1MHz VBW:1kHz Detector:Peak
Note : 2.4GWiFi-n20-2412

Freq	Factor	Read		Limit	Over	Remark
		Level	Level	Line	Limit	
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1 17994.750	13.17	34.02	47.19	54.00	-6.81	Average

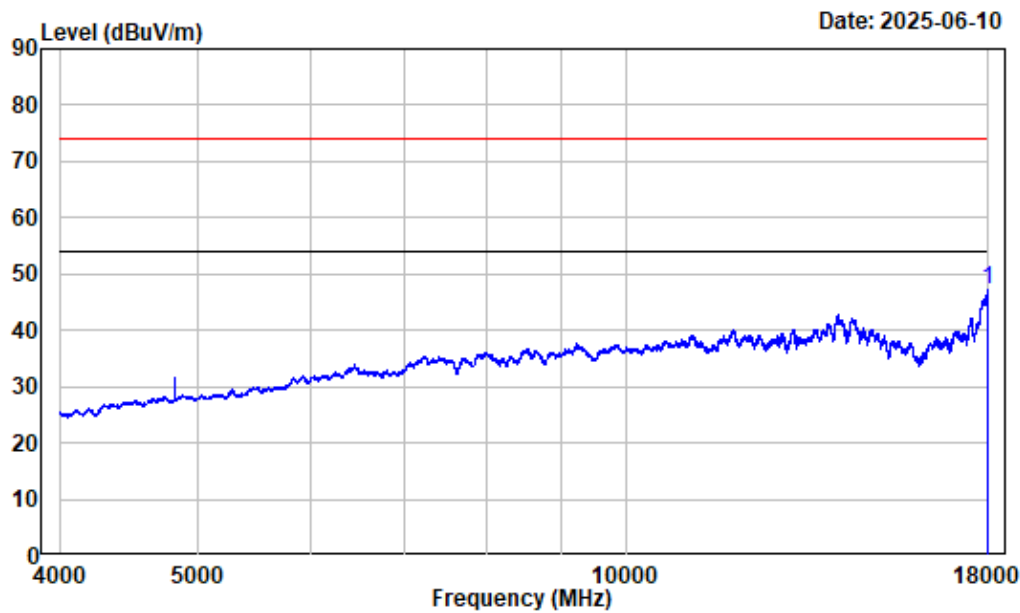
4-18GHz_Vertical_Peak_802.11n-HT20



Condition : Vertical
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-n20-2412

	Freq Factor		Read		Limit	Over	Remark
	MHz	dB/m	Level	Level	Line	Limit	
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	4824.000	-7.75	52.41	44.66	74.00	-29.34	Peak
2	17993.000	13.17	47.28	60.45	74.00	-13.55	Peak

4-18GHz_Vertical_Average_802.11n-HT20

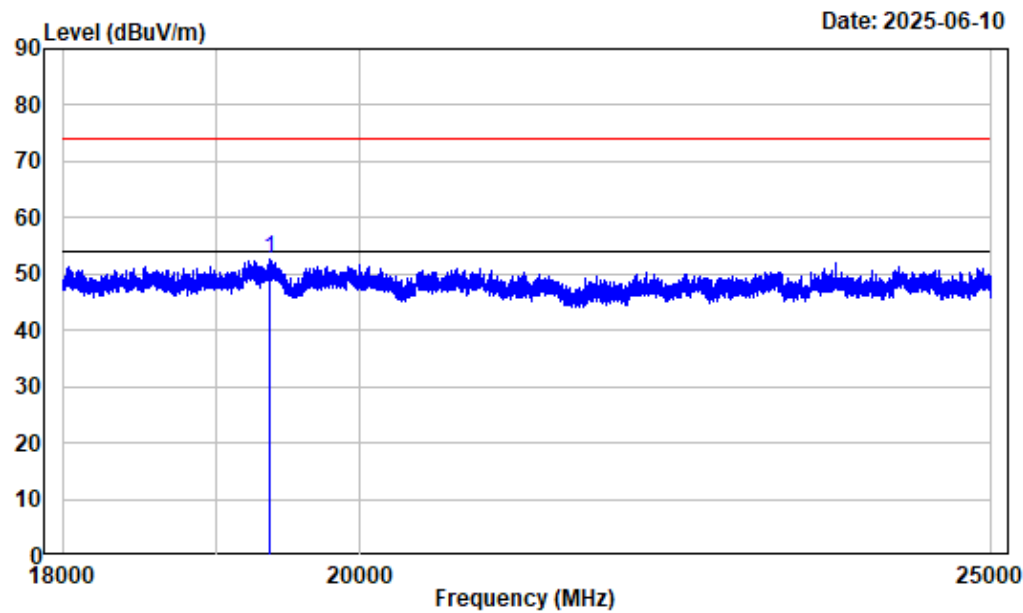


Condition : Vertical
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Average reading:RBW:1MHz VBW:1kHz Detector:Peak
Note : 2.4GWiFi-n20-2412

Freq Factor		Read Level		Limit	Over	Remark
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	17996.500	13.19	33.88	47.07	54.00	-6.93 Average

18-25GHz (Only with worst case margin mode plot):

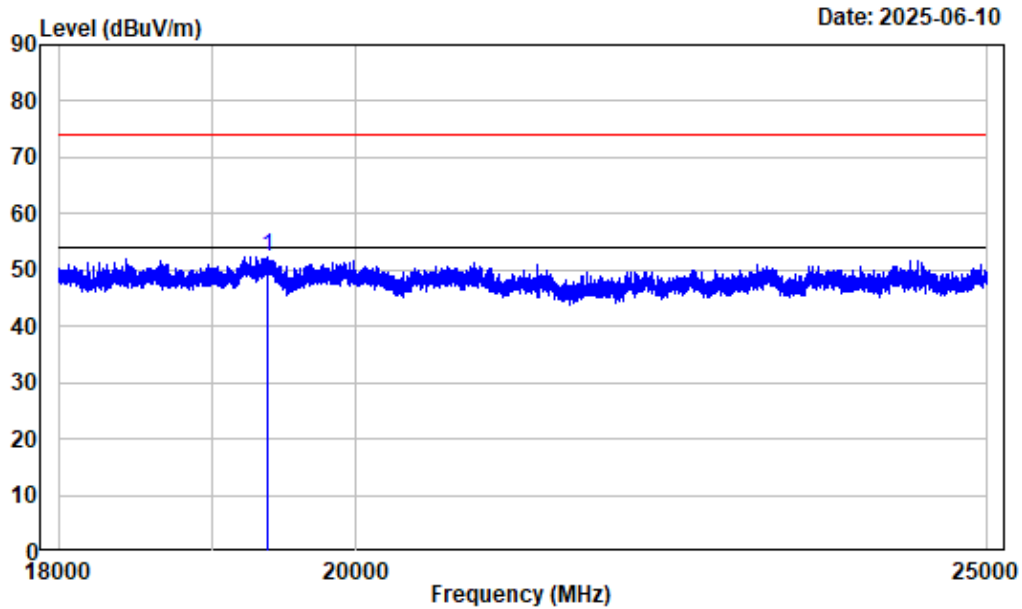
18-25GHz_Horizontal



Condition : Horizontal
Project No. : 2501T13935E-RFA2
Tester : Zenos Qiao
Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
Note : 2.4GWiFi-b-2412

Freq Factor		Read Level		Limit	Over	Remark
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1 19372.170	15.44	37.04	52.48	74.00	-21.52	peak

18-25GHz_Vertical



Condition : Vertical
 Project No. : 2501T13935E-RFA2
 Tester : Zenos Qiao
 Spectrum setting: Peak reading:RBW:1MHz VBW:3MHz Detector:Peak
 Note : 2.4GWiFi-b-2412

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	19382.670	15.46	36.89	52.35	74.00	-21.65	peak

RF EXPOSURE EVALUATION

MPE-BASED EXEMPTION

Applicable Standard

According to subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

According to KDB 447498 D04 v01 Interim General RF Exposure Guidance

MPE-Based Exemption:

General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table B.1 [Table 1 of § 1.1307(b)(1)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz.

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$.
1.34-30	$3,450 R^2/f^2$.
30-300	$3.83 R^2$.
300-1,500	$0.0128 R^2f$.
1,500-100,000	$19.2 R^2$.

R is the minimum separation distance in meters
f = frequency in MHz

Result

Frequency (MHz)	Tune up conducted power [#]	Antenna Gain [#]		ERP		Evaluation Distance (m)	ERP Limit (mW)
	(dBm)	(dBi)	(dBd)	(dBm)	(mW)		
2412-2462	25.0	1.3	-0.85	24.15	0.26	0.2	768

Note: The tune up conducted power and antenna gain was declared by the applicant.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant

FIELD REFERENCE LEVEL EXPOSURE EXEMPTION LIMITS

Applicable Standard

According to RSS-102 Issue 6§6.6:

Field reference level (FRL) exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm (i.e. mobile devices), except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 1 W (adjusted for tune-up tolerance)
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance)
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz
- at or above 6 GHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 5 W (adjusted for tune-up tolerance) In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the EIRP was derived.

Test Result:

For worst case:

Frequency (MHz)	Gain# (dBi)	Max tune-up conducted power# (dBm)	Max tune-up EIRP# (dBm)	Max tune-up EIRP# (W)	Distance (cm)	Exemption Limit (W)	SAR Evaluation Exemption
2412-2462	1.3	25.0	26.3	0.427	20	2.68	Yes

Note: The antenna gain and Conducted output power including Tune-up Tolerance was declared and provided by the applicant.

To maintain compliance with the ISED's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant

EUT PHOTOGRAPHS

Please refer to the attachment 2501T13935E-RFA2-EXP External photo and 2501T13935E-RFA2-INP Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2501T13935E-RFA2-TSP Test Setup photo.

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