RF TEST REPORT

Report No.:	20230417G03299X-W7
Product Name:	LTE Flip Feature Phone
Model No.:	SH3320
FCC ID:	2AWF6-SH3320
Applicant:	START USA, INC.
Address:	6860 Dallas Parkway, Suite 200, Plano, TX 75024, USA
Dates of Testing:	04/19/2023 - 06/16/2023
Issued by:	CCIC Southern Testing Co., Ltd.
Lab Location:	Electronic Testing Building, No. 43 Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China. **Tel**：86 755 26627338 **Fax**：86 755 26627238

Test Report

Product .....:	LTE Flip Feature Phone
Brand Name.....:	START, Consumer Cellular, Verve, IRIS
Trade Name .....:	START, Consumer Cellular, Verve, IRIS
Marketing Name .....:	Cactus
Applicant.....:	START USA, INC.
Applicant Address.....:	6860 Dallas Parkway, Suite 200, Plano, TX 75024, USA
Manufacturer .....:	THINKSTART ELECTRONIC TECHNOLOGY CO., LTD.
Manufacturer Address .....:	Unit A1-403, Kexing Science Park, 15 Keyuan Road, Nanshan District, Shenzhen, CHINA
Test Standards .....:	47 CFR Part 15 Subpart C ANSI C63.10-2013
Test Result.....:	Pass

Tested by .....:	Kim Li	2023.06.20
	Kim Li, Test Engineer	
Reviewed by .....:	Chris You	2023.06.20
	Chris You, Senior Engineer	
Approved by .....:	Yang Fan	2023.06.20
	Yang Fan, Manager	

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Change History		
Issue	Date	Reason for change
1.0	2023.06.20	First edition

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	LTE Flip Feature Phone
Model No.	SH3320
Hardware Version	SH3320HV1.0
Software Version	SH3320SV014
EUT supports Radios application	WLAN2.4GHz 802.11b/g/n (HT20/ HT40)
Frequency Range	802.11b/g/n-20MHz: 2.412GHz - 2.462GHz 802.11n(40MHz): 2422~2452MHz
Channel Number	802.11b/g/n-20MHz: 11 802.11n-40MHz: 7
Transfer Rate	802.11b: 11/5.5/2/1 Mbps 802.11g: 54/48/36/24/18/12/9/6 Mbps 802.11n: up to 150 Mbps
Modulation Type	DSSS (802.11b), OFDM (802.11g/n)
Antenna Type	Internal Antenna
Antenna Gain	4.13dBi
Power supply	Rechargeable Li-ion Battery DC3.8V/2000mAh

Note 1: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

Note 2: The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

Note 3: The antenna gain and RF adapter/cable insert loss provided by manufacture.

1.2. Test Standards and Results

The purpose of the report is to conduct testing according to the following FCC certification standards:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart C	Radio Frequency Devices
2	KDB 558074 D01 15.247 Meas Guidance v05r02	Cuidance for Compliance Measurement on Digital Transmission Systems, Frequency Hopping Spread Spectrum Systems, and Hybrid System Devices Operating under Section 15.247 of the FCC Rules
4	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section in CFR 47	Description	Result
1	15.203 15.247(c)	Antenna Requirement	PASS
2	15.247(b)(3)	Peak Conducted Output Power	PASS
3	15.247(a)(2)	6dB and 99% Bandwidth	PASS
4	15.247(d)	Conducted Band Edges and Spurious Emission	PASS
5	15.247(e)	Power spectral density (PSD)	PASS
6	15.207	AC Power Line Conducted Emission	PASS
7	15.205 15.209 15.247(d)	Radiated Band Edges and Spurious Emission	PASS

Note 1: The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10-2013.

Note 2: These RF tests were performed according to the method of measurements prescribed in KDB 558074 D01 15.247 Meas Guidance v05r02.

1.3. Channel List

For 20MHz bandwidth systems, use Channel 1~ Channel 11.

Channel No.	Frequency	Channel No.	Frequency	Channel No.	Frequency
1	2412MHz	5	2432MHz	9	2452MHz
2	2417MHz	6	2437MHz	10	2457MHz
3	2422MHz	7	2442MHz	11	2462MHz
4	2427MHz	8	2447MHz		

Note: Channel 1, 6 & 11 selected for 802.11b/g/n-HT20 as Lowest, Middle and Highest channel. Channel 3, 6 & 9 selected for 802.11n-HT40 as Lowest, Middle and Highest Channel.

1.4. Test environment and mode

During the measurement, the environmental conditions were within the listed ranges:

Operating Environment	
Temperature	15 ℃ - 35 ℃
Humidity	30% -60%
Atmospheric Pressure	86KPa-106KPa
Test mode:	
Continuously transmitting mode	Keeps the EUT in 100% duty cycle transmitting with modulation in SISO, duty cycle factor is not required.

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel
Peak Conducted Output Power Power Spectral Density 6dB and 99% Bandwidth Conducted Spurious Emission Radiated Spurious Emission	11b/DSSS	1 Mbps	1/6/11
	11g/OFDM	6 Mbps	1/6/11
	11n-HT20/OFDM	MCS 0	1/11
	11n-HT40/OFDM	MCS 0	3/9
Band Edge	11b/DSSS	1 Mbps	1/11
	11g/OFDM	6 Mbps	1/11
	11n-HT20/OFDM	MCS 0	1/11
	11n-HT40/OFDM	MCS 0	3/9

1.5. Table for Supporting Units

No.	Equipment	Brand Name	Model Name	Manufacturer	Serial No.	Note
1	Laptop	HP	TPN-Q221	HP	5CD14347QB	FCC DOC

1.6. EUT Operation Test Setup

For RF test items, an engineering test program was provided and enable to make EUT transmitting.

1.7. Laboratory Facilities

FCC-Registration No.: 406086

CCIC Southern Testing Co., Ltd EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN1283, valid time is until June 30, 2023.

ISED Registration: 11185A-1

CCIC Southern Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until June 30, 2023.

A2LA Code: 5721.01

CCIC-SET is a third party testing organization accredited by A2LA according to ISO/IEC 17025. The accreditation certificate number is 5721.01.

2. Test Requirements

2.1. Antenna requirement

2.1.1. Applicable Standard

According to FCC 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.

And according to FCC 47 CFR Section 15.247(c), if 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 6dBi.

2.1.2. Antenna Information

Antenna Category: Internal Antenna

A internal Antenna was soldered to the antenna port of EUT via an adaptor cable, can't be removed.

Antenna General Information:

No.	EUT	Operating frequency range	Ant. Type	Ant. Gain
1	LTE Flip Feature Phone	2412-2462MHz	Internal	4.13dBi

1.1.1. Result: comply

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

2.2. Maximum Conducted Output Power

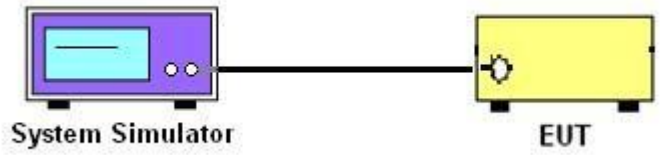
2.2.1. Limit of Maximum Conducted Output Power

For DTSs employing digital modulation techniques operating in the bands 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W.

2.2.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.2.3. Test Setup



2.2.4. Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 Section 11.9.1.3.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. 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.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Record the measurement results in the test report.

2.2.5. Test Result of Maximum Conducted Output Power

Please refer to Appendix A for detail.

2.3. 6dB and 99% Bandwidth

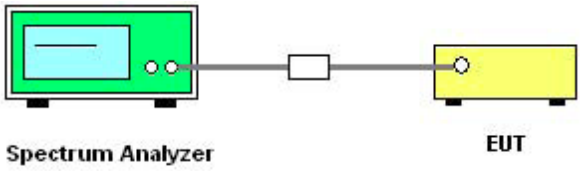
2.3.1. Limit of 6dB Bandwidth

The minimum 6 dB Occupied bandwidth shall be at least 500 kHz.

2.3.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.3.3. Test Setup



2.3.4. Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 Section 11.8 and 6.9.3.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the spectrum analyzer “Channel Bandwidth” function to easurement the 6dB EBW and 99% OBW.
5. For 6dB EBW Use the following spectrum analyzer settings:
   RBW: 100kHz / VBW: 300kHz / Detector: Peak / Trace mode: Max hold / Sweep time: Auto couple / Allow trace to fully stabilize.
6. For 99% OBW Use the following spectrum analyzer settings:
   Set RBW = approximately 1% EBW or 1.5 times to 5.0 times the OBW, VBW $\geq 3 \times$ RBW.
7. Record the measurement results in the test report.

2.3.5. Test Results of 6dB and 99% Bandwidth

Please refer to Appendix A for detail.

2.4. Power spectral density (PSD)

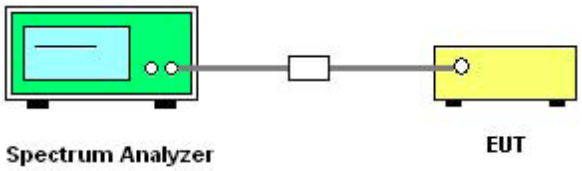
2.4.1. Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

2.4.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.4.3. Test Setup



2.4.4. Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 Section 11.10.2.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the following spectrum analyzer settings:

   Set instrument center frequency to DTS channel center frequency / Set the span to 1.5 times the DTS bandwidth / RBW: 3kHz / VBW: 10kHz / Detector: Peak / Sweep time: Auto couple / Trace mode: Max hold / Allow trace to fully stabilize / Use the peak marker function to determine the maximum power level.
5. Record the measurement results in the test report.

2.4.5. Test Results of Power Spectral Density

Please refer to Appendix A for detail.

2.5. Conducted Band Edges and Spurious Emissions

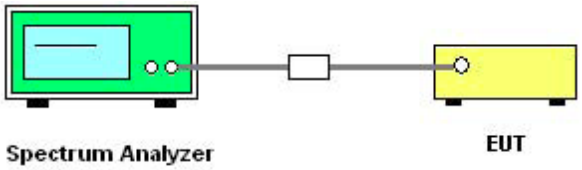
2.5.1. Limit of Conducted Band Edges and Spurious Emissions

In any 100 kHz bandwidth outside the frequency band in which the intentional radiator is perating, 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.

2.5.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.5.3. Test Setup



2.5.4. Test Procedure

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 Section 11.11 and 11.13.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the following spectrum analyzer settings:

   Reference level measurement: Set spectrum analyzer center frequency to DTS channel center frequency / Set the span to ≥1.5 times the DTS bandwidth / RBW: 100kHz / VBW: 300kHz / Detector: Peak / Sweep time: Auto couple / Trace mode: Max hold / Allow trace to fully stabilize / Use the peak marker function to determine the maximum PSD level and attenuate it by 20dB.

   Emission level measurement: Set the center frequency and span to encompass frequency range to be measured / RBW: 100kHz / VBW: 300kHz / Detector: Peak / Sweep time: Auto couple / Trace mode: Max hold / Allow trace to fully stabilize / Use the peak marker function to determine the maximum amplitude level.
5. Record the measurement results in the test report.

2.5.5. Test Results of Conducted Band Edges and Spurious Emissions

Please refer to Appendix A for detail.

2.6. Radiated Band Edge and Spurious Emission

2.6.1. Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the frequency band in which the 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. If the transmitter uses an RMS average conducted power limit, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the estricted bands, as defi ned in §15.205(a), must also comply with the radiated emission limits specifi ed in §15.209(a).

§15.209(a) Radiated emission limits:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Restricted bands of operation refer to §15.205 (a):

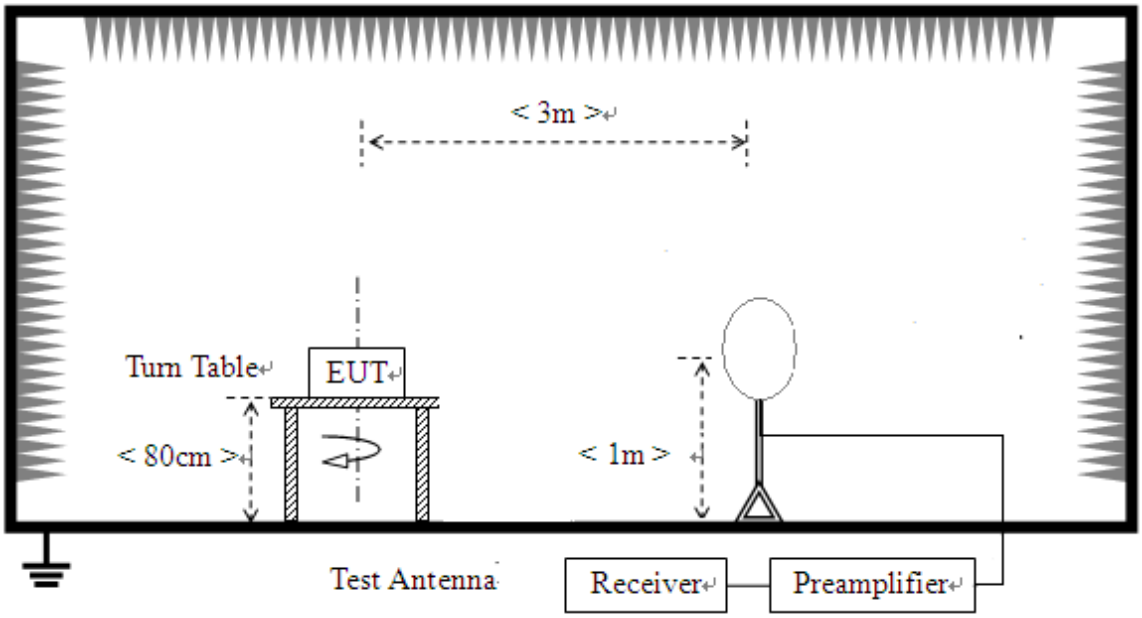
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41	/	/	/
Note: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz. [2]Above 38.6.			

2.6.2. Measuring Instruments

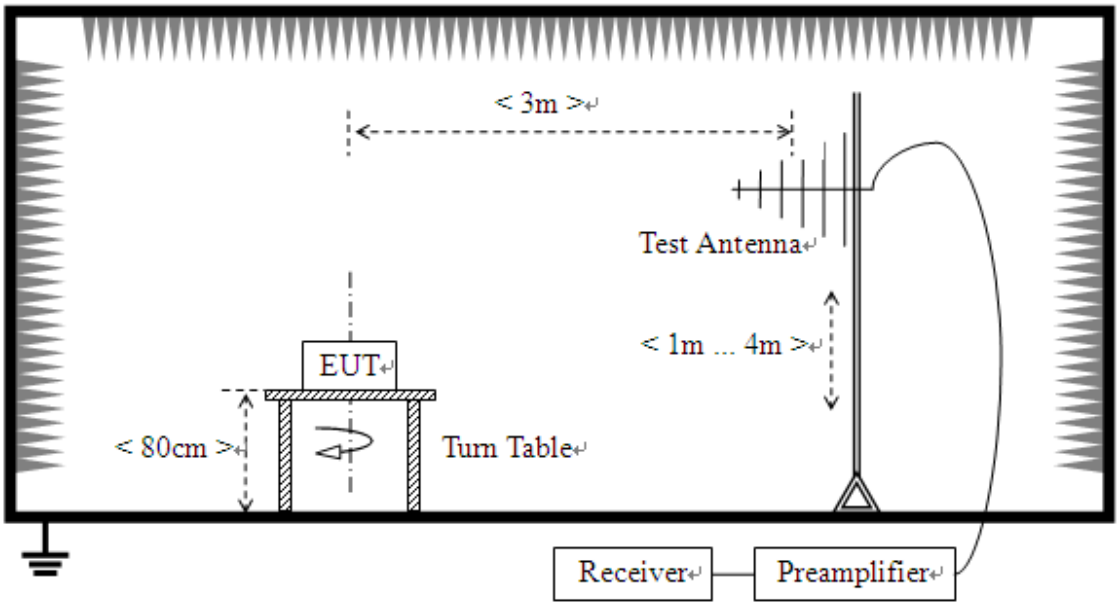
The measuring equipment is listed in the section 3 of this test report.

2.6.3. Test Setup

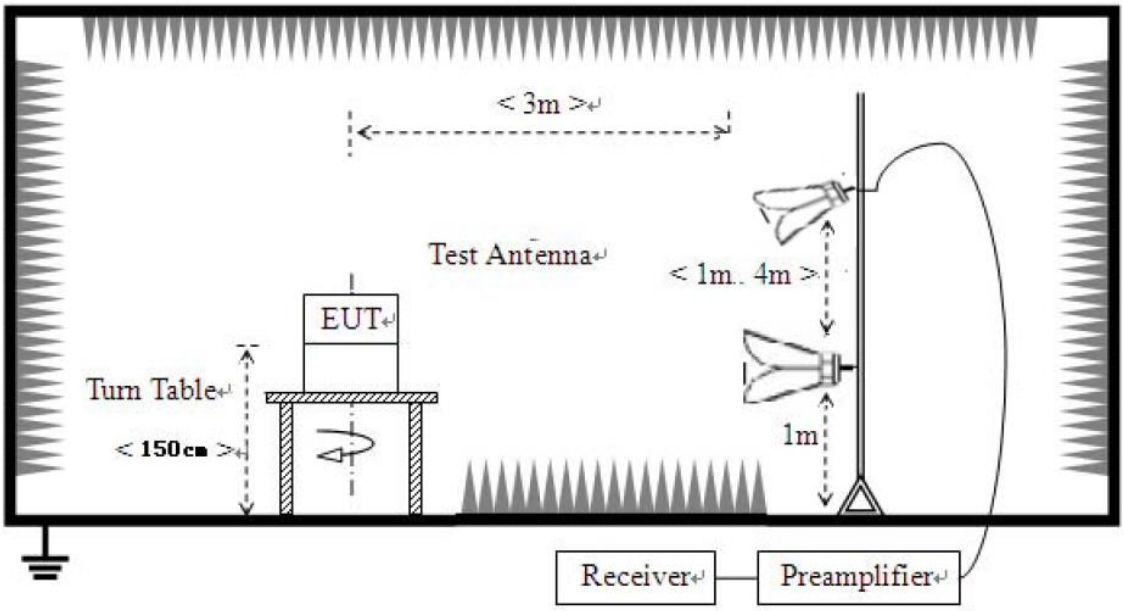
For radiated emissions from 9 kHz to 30 MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



2.6.4. Test Procedures

1. The EUT was placed on the top of a rotating table 0.8m for below 1GHz and 1.5m for above 1GHz above the ground at a 3 meters semi-anechoic chamber.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on thetop of a variable height antenna tower.
3. Height of receiving antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported.Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then

reported in a data sheet.

7. For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T(Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

2.6.5. Test Results of Radiated Band Edge and Spurious Emission

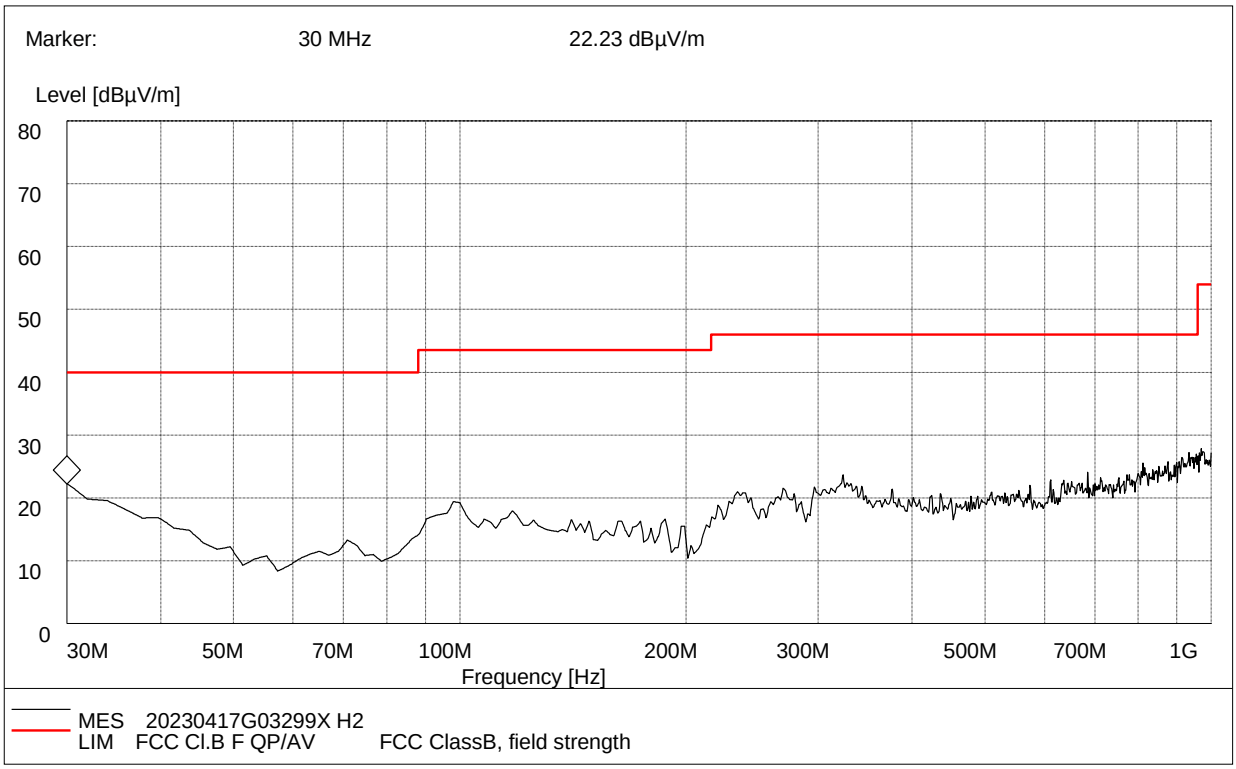
NOTE 1: For 9 kHz to 30MHz, The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

NOTE 2: For 30MHz to 1GHz, All of the EUT Configure mode were tested and found 802.11n20 2462MHz channel is the worst mode, the worst case is recorded in this report.

NOTE 3: For 1GHz to 25GHz, All EUT configuration modes were tested, and this report only reflects the worst mode low channel and high channel of 20M bandwidth and 40M bandwidth.

NOTE 4: Antenna height and turntable angle are the worst positions, the worst case is recorded in this report.

For 30MHz to 1000MHz

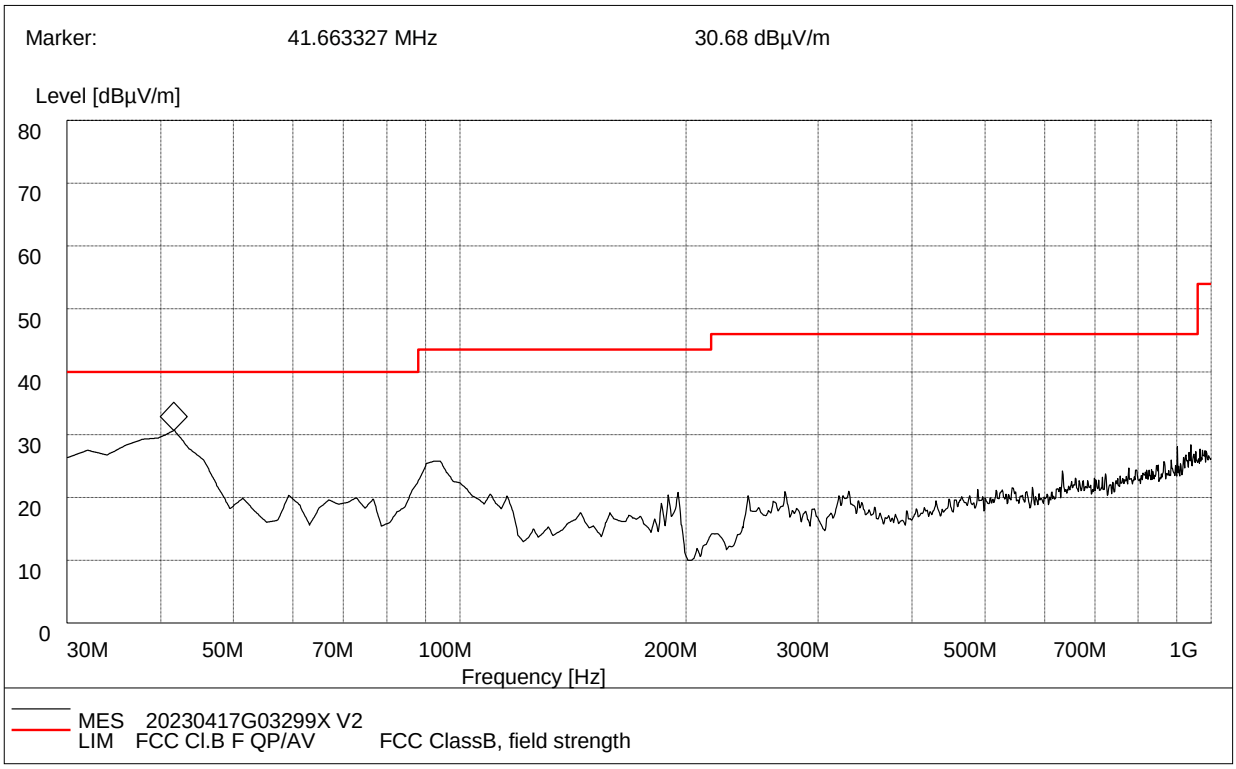


Frequency (MHz)	QuasiPeak (dB µ V/m)	Bandwidth (kHz)	Corr.Factor (dB/m)	Antenna height (cm)	Limit (dB µ V/m)	Margin (dB)	Polarity
30.130000	21.23	120.000	19.3	100.0	40.0	18.77	Horizontal
70.820000	13.26	120.000	6.8	100.0	40.0	26.74	Horizontal
98.030000	19.38	120.000	9.9	100.0	43.5	24.12	Horizontal
117.460000	17.93	120.000	11.8	100.0	43.5	25.57	Horizontal
323.520000	22.50	120.000	15.7	100.0	46.0	23.50	Horizontal
811.440000	25.52	120.000	23.0	100.0	46.0	20.48	Horizontal

Test Result : Pass

Remark:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB).
3. Margin value = Limit value – Emission Level.
4. The other emission levels were very low against the limit.



Frequency (MHz)	QuasiPeak (dB µ V/m)	Bandwidth (kHz)	Corr.Factor (dB/m)	Antenna height (cm)	Limit (dB µ V/m)	Margin (dB)	Polarity
32.030000	26.49	120.000	19.3	100.0	40.0	13.51	Vertical
41.660000	29.68	120.000	14.0	100.0	40.0	10.32	Vertical
92.200000	24.75	120.000	9.9	100.0	43.5	18.75	Vertical
195.230000	19.78	120.000	10.0	100.0	43.5	23.72	Vertical
329.350000	19.98	120.000	15.7	100.0	46.0	26.02	Vertical
634.540000	23.21	120.000	19.9	100.0	46.0	22.79	Vertical

Test Result : Pass

Remark:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB).
3. Margin value = Limit value – Emission Level.
4. The other emission levels were very low against the limit.

For 1GHz to 25GHz

2.4G Wi-Fi 802.11b_2412MHz									
Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)	Polarity	Detector
2390.00	56.24	74.00	-17.76	1.30	170	54.94	1.30	Horizontal	Peak
2390.00	48.20	54.00	-5.80	1.30	170	46.90	1.30	Horizontal	Average
4824.00	45.85	74.00	-28.15	1.30	170	39.45	6.40	Horizontal	Peak
4824.00	37.63	54.00	-16.37	1.30	170	31.23	6.40	Horizontal	Average
7236.00	49.80	74.00	-24.20	1.30	170	39.30	10.50	Horizontal	Peak
7236.00	41.55	54.00	-12.45	1.30	170	31.05	10.50	Horizontal	Average
2390.00	57.01	74.00	-16.99	1.60	150	55.71	1.30	Vertical	Peak
2390.00	48.45	54.00	-5.55	1.60	150	47.15	1.30	Vertical	Average
4824.00	45.84	74.00	-28.16	1.60	150	39.44	6.40	Vertical	Peak
4824.00	37.19	54.00	-16.81	1.60	150	30.79	6.40	Vertical	Average
7236.00	50.41	74.00	-23.59	1.60	150	39.91	10.50	Vertical	Peak
7236.00	41.13	54.00	-12.87	1.60	150	30.63	10.50	Vertical	Average
2.4G Wi-Fi 802.11b_2462MHz									
Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)	Polarity	Detector
2483.50	57.35	74.00	-16.65	1.30	170	55.75	1.60	Horizontal	Peak
2483.50	49.11	54.00	-4.89	1.30	170	47.51	1.60	Horizontal	Average
4924.00	46.52	74.00	-27.48	1.30	170	40.82	5.70	Horizontal	Peak
4924.00	36.28	54.00	-17.72	1.30	170	30.58	5.70	Horizontal	Average
7386.00	49.62	74.00	-24.38	1.30	170	38.82	10.80	Horizontal	Peak
7386.00	41.10	54.00	-12.90	1.30	170	30.30	10.80	Horizontal	Average
2483.50	56.46	74.00	-17.54	1.60	150	54.86	1.60	Vertical	Peak
2483.50	48.92	54.00	-5.08	1.60	150	47.32	1.60	Vertical	Average
4924.00	45.19	74.00	-28.81	1.60	150	39.49	5.70	Vertical	Peak
4924.00	36.58	54.00	-17.42	1.60	150	30.88	5.70	Vertical	Average
7386.00	50.60	74.00	-23.40	1.60	150	39.80	10.80	Vertical	Peak
7386.00	40.93	54.00	-13.07	1.60	150	30.13	10.80	Vertical	Average

Remark:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)

2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) - Pre-Amplifier Factor(dB)

3. Margin value = Emission Level – Limit value

4.The emission levels of other frequencies are very lower than the limit and not show in test report.

2.4G Wi-Fi 802.11n-HT40_2422MHz									
Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)	Polarity	Detector
2390.00	56.00	74.00	-18.00	1.30	170	54.70	1.30	Horizontal	Peak
2390.00	47.60	54.00	-6.40	1.30	170	46.30	1.30	Horizontal	Average
4844.00	45.63	74.00	-28.37	1.30	170	39.23	6.40	Horizontal	Peak
4844.00	37.06	54.00	-16.94	1.30	170	30.66	6.40	Horizontal	Average
7266.00	48.80	74.00	-25.20	1.30	170	38.30	10.50	Horizontal	Peak
7266.00	41.17	54.00	-12.83	1.30	170	30.67	10.50	Horizontal	Average
2390.00	57.29	74.00	-16.71	1.60	150	55.99	1.30	Vertical	Peak
2390.00	48.30	54.00	-5.70	1.60	150	47.00	1.30	Vertical	Average
4844.00	46.24	74.00	-27.76	1.60	150	39.84	6.40	Vertical	Peak
4844.00	37.51	54.00	-16.49	1.60	150	31.11	6.40	Vertical	Average
7266.00	50.35	74.00	-23.65	1.60	150	39.85	10.50	Vertical	Peak
7266.00	41.65	54.00	-12.35	1.60	150	31.15	10.50	Vertical	Average
2.4G Wi-Fi 802.11n-HT40_2452MHz									
Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)	Polarity	Detector
2483.50	57.78	74.00	-16.22	1.30	170	56.18	1.60	Horizontal	Peak
2483.50	49.07	54.00	-4.93	1.30	170	47.47	1.60	Horizontal	Average
4904.00	46.65	74.00	-27.35	1.30	170	40.95	5.70	Horizontal	Peak
4904.00	37.09	54.00	-16.91	1.30	170	31.39	5.70	Horizontal	Average
7356.00	49.82	74.00	-24.18	1.30	170	39.02	10.80	Horizontal	Peak
7356.00	40.80	54.00	-13.20	1.30	170	30.00	10.80	Horizontal	Average
2483.50	55.94	74.00	-18.06	1.60	150	54.34	1.60	Vertical	Peak
2483.50	48.66	54.00	-5.34	1.60	150	47.06	1.60	Vertical	Average
4904.00	45.17	74.00	-28.83	1.60	150	39.47	5.70	Vertical	Peak
4904.00	37.12	54.00	-16.88	1.60	150	31.42	5.70	Vertical	Average
7356.00	50.71	74.00	-23.29	1.60	150	39.91	10.80	Vertical	Peak
7356.00	39.83	54.00	-14.17	1.60	150	29.03	10.80	Vertical	Average

Remark:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)

2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) - Pre-Amplifier Factor(dB)

3. Margin value = Emission Level – Limit value

4.The emission levels of other frequencies are very lower than the limit and not show in test report.

2.7. AC Power Line Conducted Emission

2.7.1. Limit of AC Power Line Conducted Emission

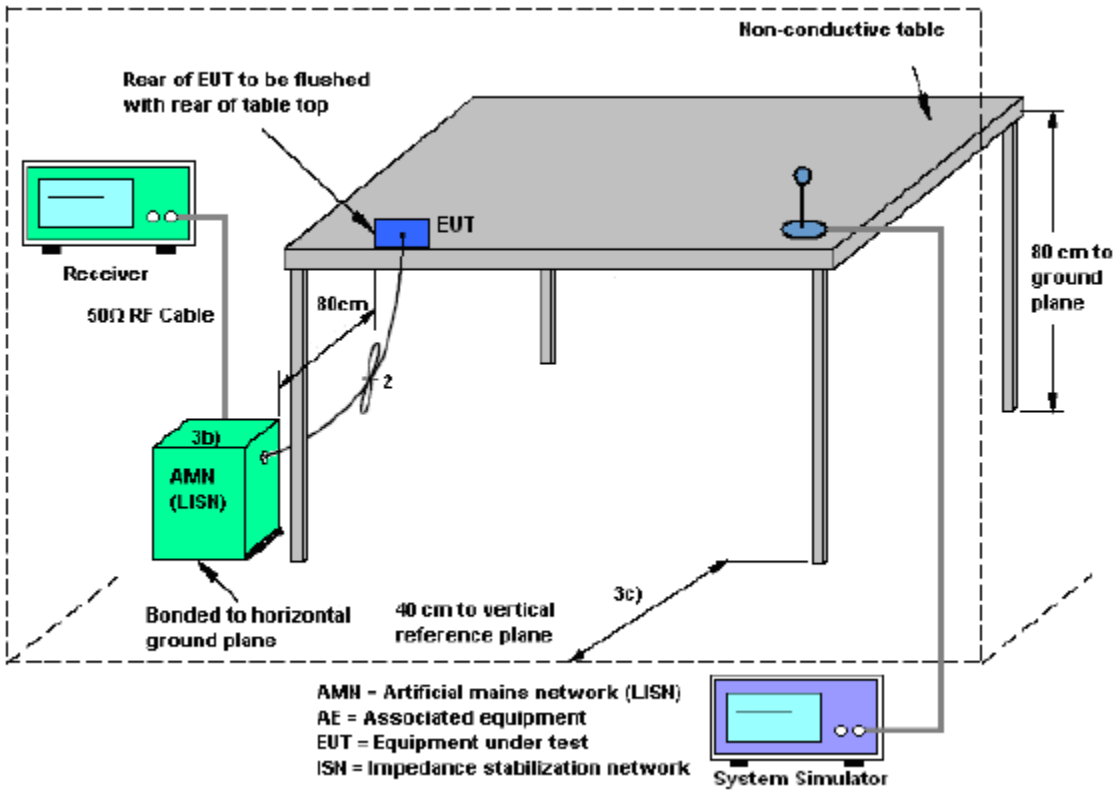
For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

2.7.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.7.3. Test Setup



2.7.4. Test Procedures

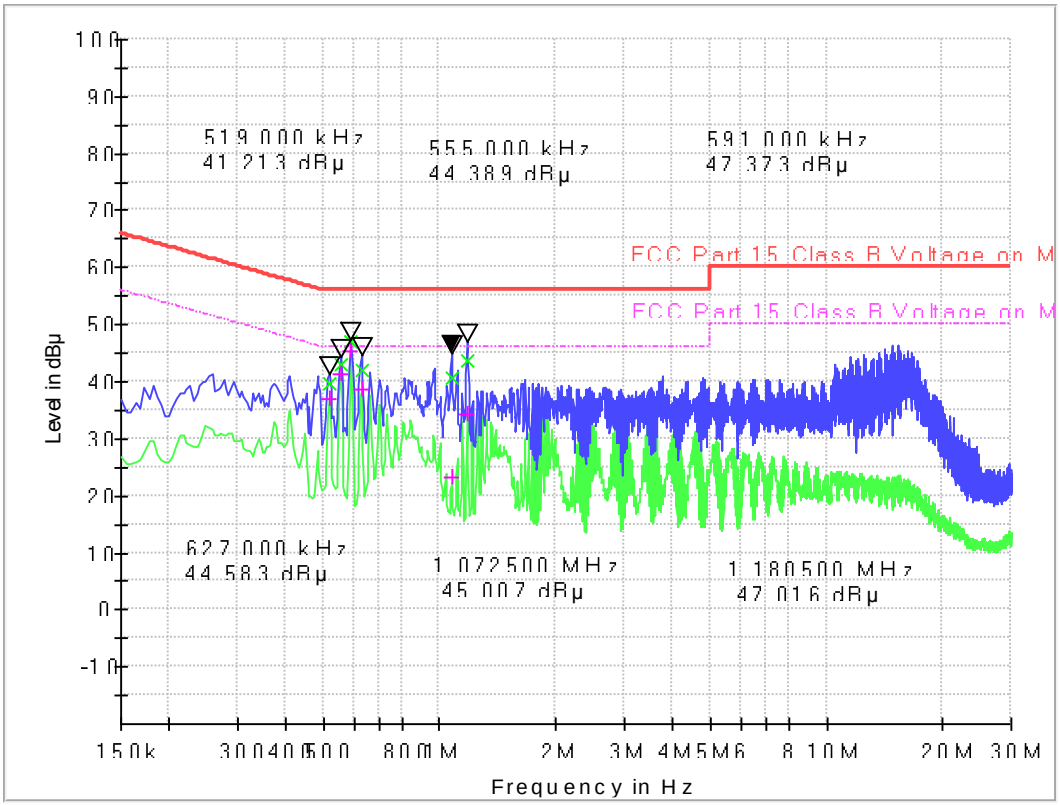
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 micrometry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

2.7.5. Test Results of Conducted Emission

NOTE 1: The EUT configuration of the emission tests is 2.4G WIFI Link + Charging from Adapter.

NOTE 2: All of the EUT Configure mode were tested and found 802.11b 2462MHz channel is the worst mode, the worst case is recorded in this report.

Line Phase

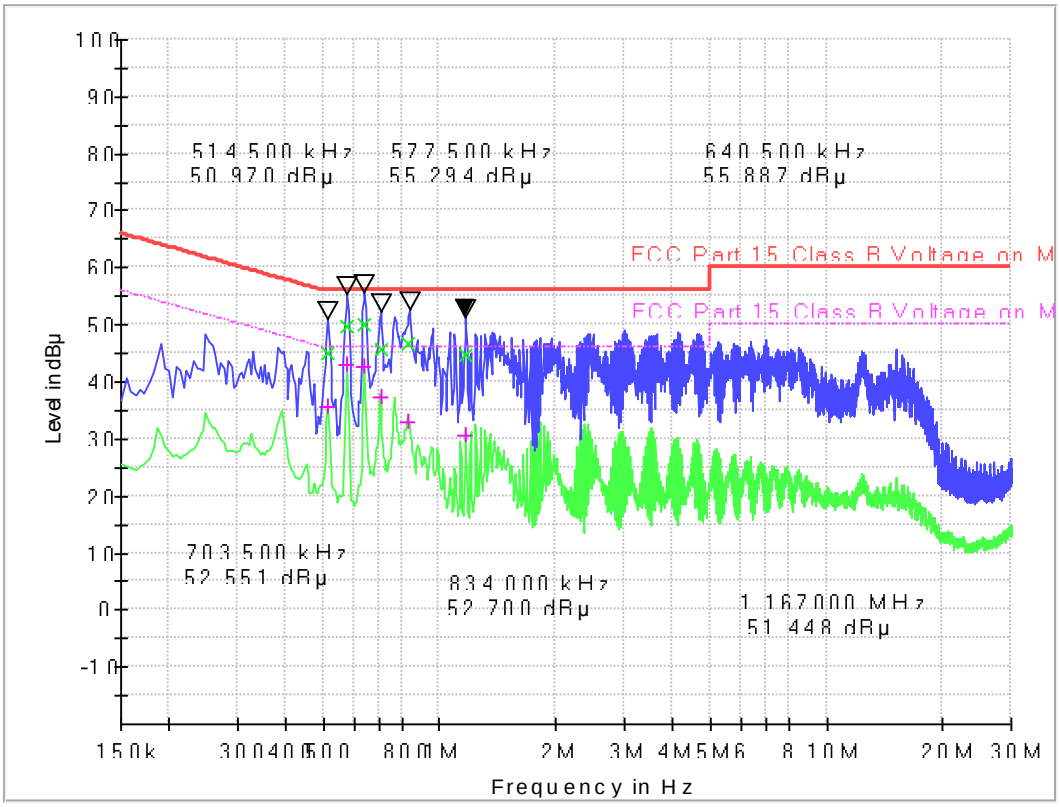


Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Corr.Factor (dB)	Margin - QPK	Limit - QPK	Margin - AV	Limit - AV (dBµV)
0.519000	39.79	37.13	10.2	16.21	56.00	8.87	46.00
0.555000	43.07	41.18	10.2	12.93	56.00	4.82	46.00
0.591000	47.00	45.51	10.2	9.00	56.00	0.49	46.00
0.627000	41.94	38.62	10.2	14.06	56.00	7.38	46.00
1.072500	40.66	23.27	10.2	15.34	56.00	22.73	46.00
1.180500	43.56	34.16	10.2	12.44	56.00	11.84	46.00

Test Result : Pass

Note: Final Level = Receiver Read level + Correction factor.

Neutral Phase



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Corr.Factor (dB)	Margin - QPK	Limit - QPK	Margin - AV	Limit - AV (dBµV)
0.514500	44.89	35.53	10.2	11.11	56.00	10.47	46.00
0.577500	49.83	43.09	10.2	6.17	56.00	2.91	46.00
0.640500	49.90	42.60	10.2	6.10	56.00	3.40	46.00
0.703500	45.74	37.16	10.2	10.26	56.00	8.84	46.00
0.829500	46.80	32.90	10.2	9.20	56.00	13.10	46.00
1.171500	44.75	30.72	10.2	11.25	56.00	15.28	46.00

Test Result : Pass

Note: Final Level = Receiver Read level + Correction factor.

3. List of measuring equipment

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Receiver	ROHDE&SCHWARZ	ESW26	A180502935	2022.07.21	2023.07.20
2	5M Anechoic Chamber	Albatross	SAC-5MAC 12.8x6.8x6.4m	A0304210	2022.06.09	2027.06.08
3	Loop Antenna	Schwarz beck	HFH2-Z2	A0304220	2022.05.02	2025.05.01
4	Broadband antenna (30MHz~1GHz)	R&S	HL562	A0304224	2020.06.19	2023.06.18
5	EMI Horn Ant. (1-18G)	ETC	1209	A150402241	2021.01.02	2024.01.01
6	Horn antenna (18GHz~26.5GHz)	AR	AT4510	A0804450	2020.06.19	2023.06.18
7	Amplifier 30M~1GHz	MILMEGA	80RF1000-10004	A140101634	2022.12.13	2023.12.12
8	Amplifier 1G~18GHz	MILMEGA	AS0104R-800/400	A160302517	2022.12.13	2023.12.12
9	Spectrum Analyzer	KEYSIGHT	N9030A	A160702554	2023.02.20	2024.02.19
10	Test Receiver	R&S	ESIB7	A0501375	2023.03.16	2024.03.15
11	Broadband Ant.	2786	ETC	A150402240	2021.09.16	2024.03.03
12	3M Anechoic Chamber	Albatross	SAC-3MAC 9*6*6m	A0412375	2019.03.26	2024.03.25
13	Test Receiver	KEYSIGHT	N9038A	A141202036	2022.07.21	2023.07.20
14	LISN	ROHDE&SCHWARZ	ENV216	A140701847	2022.07.21	2023.07.20
15	Cable	MATCHING PAD	W7	/	2022.07.21	2023.07.20

4. Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence . The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of AC Power Line Conducted Emission Measurement (150kHz~30MHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	2.8dB

Uncertainty of Radiated Emission Measurement (9kHz~30MHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	3.5dB

Uncertainty of Radiated Emission Measurement (30MHz~1GHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	3.91dB

Uncertainty of Radiated Emission Measurement (1GHz~18GHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	4.5dB

Uncertainty of Radiated Emission Measurement (18GHz~40GHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	4.9dB

Uncertainty of RF Conducted Measurement (9kHz~40GHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	1.2dB

Appendix A

RF Output Power

Test Result and Data

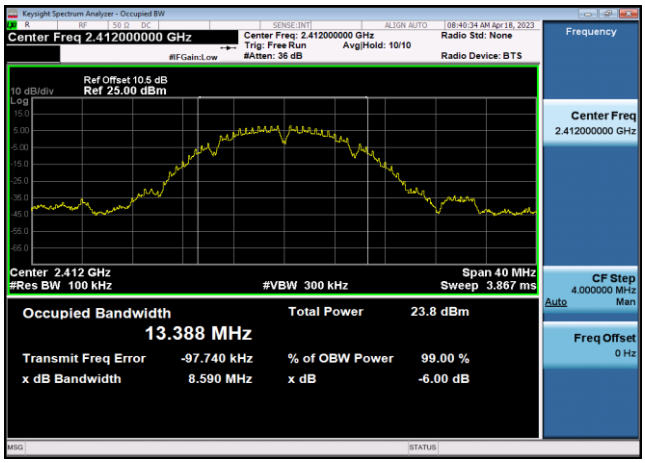
Conducted Output Power (Peak)				
Mode	Test Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Result
802.11b	2412	16.52	30	Pass
802.11b	2437	16.57	30	Pass
802.11b	2462	16.85	30	Pass
802.11g	2412	14.99	30	Pass
802.11g	2437	15.08	30	Pass
802.11g	2462	15.39	30	Pass
802.11n (HT20)	2412	14.98	30	Pass
802.11n (HT20)	2437	14.97	30	Pass
802.11n (HT20)	2462	15.40	30	Pass
802.11n (HT40)	2422	15.23	30	Pass
802.11n (HT40)	2437	15.20	30	Pass
802.11n (HT40)	2452	14.80	30	Pass

6dB Bandwidth

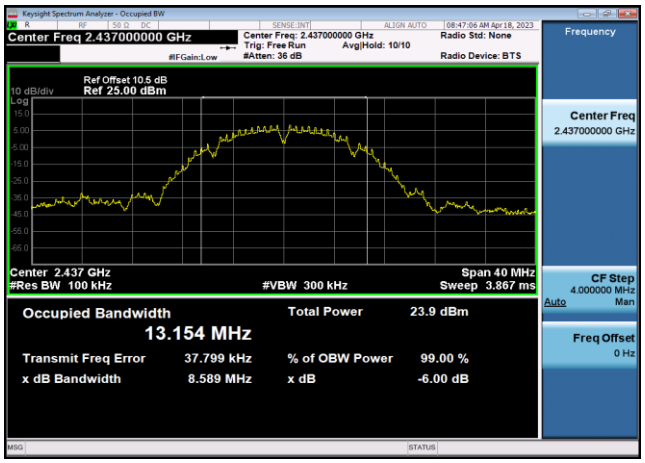
Test Result and Data

WLAN 6dB Bandwidth				
Mode	Test Frequency (MHz)	Occupied Bandwidth (MHz)	Limit (KHz)	Result
802.11b	2412	8.59	500	Pass
802.11b	2437	8.59	500	Pass
802.11b	2462	9.06	500	Pass
802.11g	2412	16.33	500	Pass
802.11g	2437	16.39	500	Pass
802.11g	2462	16.09	500	Pass
802.11n (HT20)	2412	17.21	500	Pass
802.11n (HT20)	2437	17.59	500	Pass
802.11n (HT20)	2462	16.71	500	Pass
802.11n (HT40)	2422	35.37	500	Pass
802.11n (HT40)	2437	35.26	500	Pass
802.11n (HT40)	2452	35.15	500	Pass

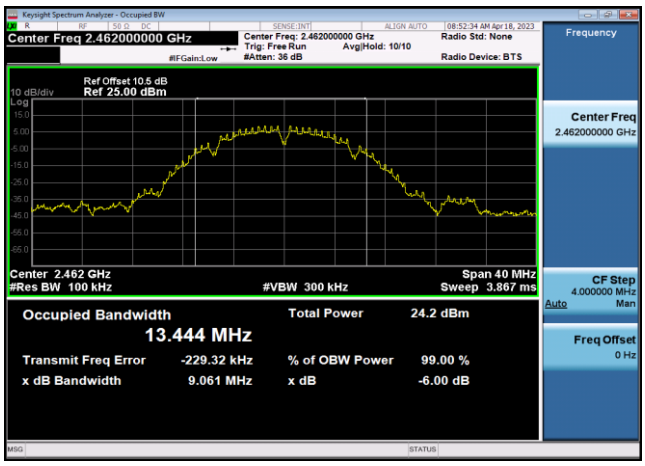
6dB Bandwidth-802.11b,2412MHz,Ant0



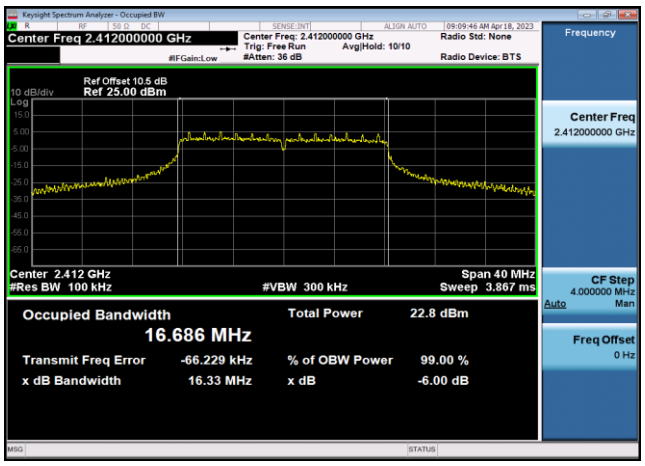
6dB Bandwidth-802.11b,2437MHz,Ant0



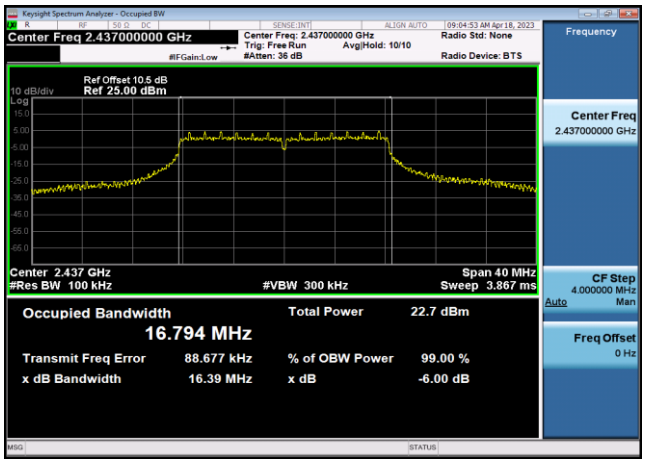
6dB Bandwidth-802.11b,2462MHz,Ant0



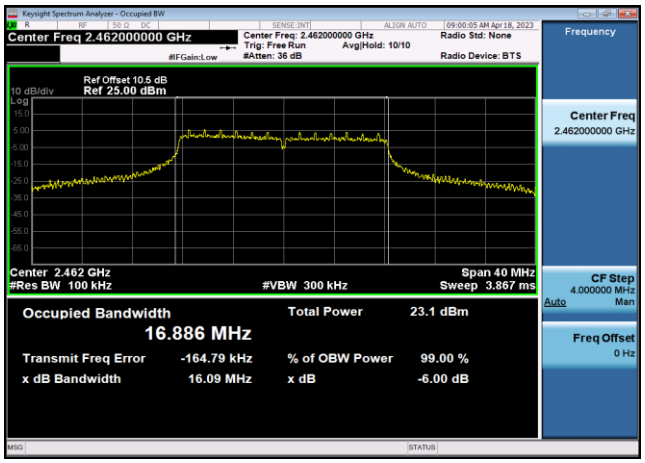
6dB Bandwidth-802.11g,2412MHz,Ant0

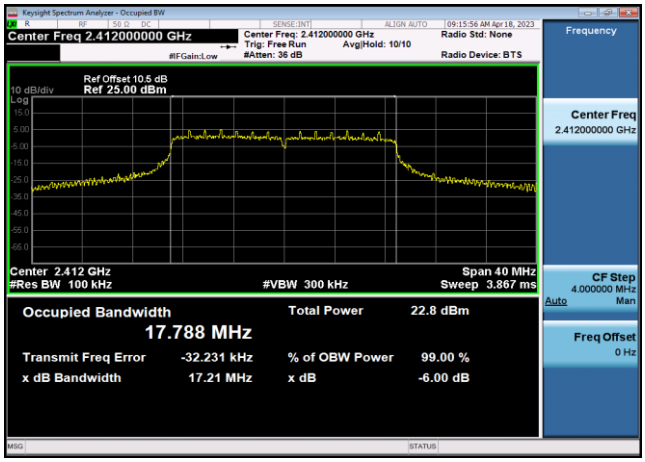
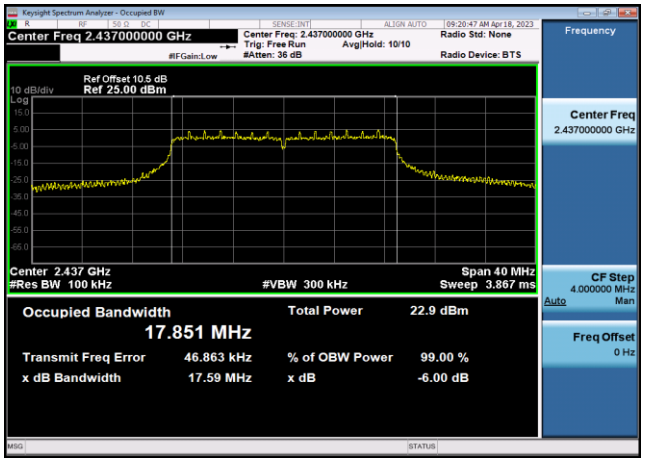
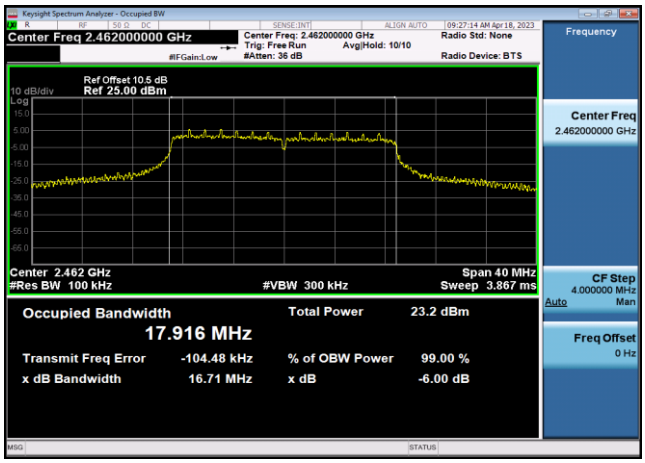
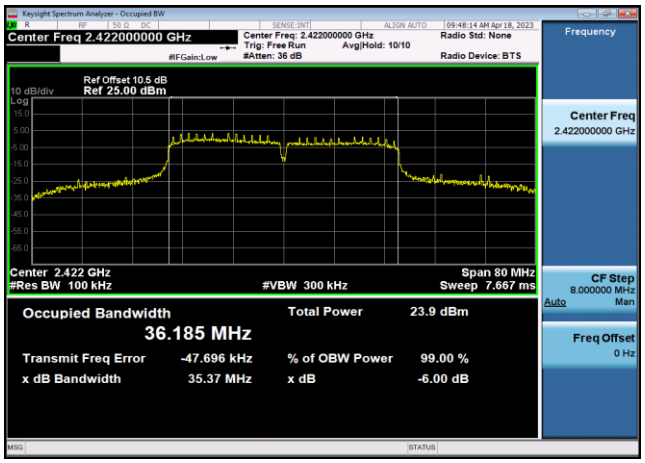
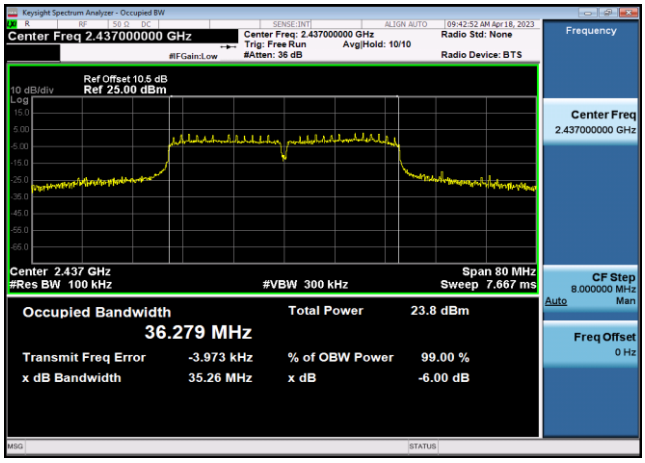
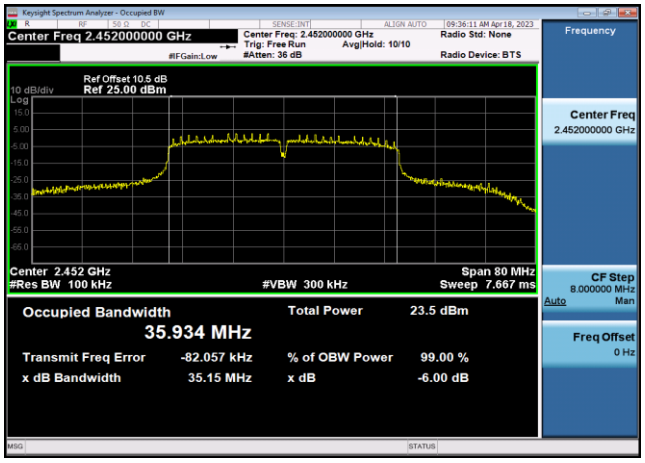


6dB Bandwidth-802.11g,2437MHz,Ant0



6dB Bandwidth-802.11g,2462MHz,Ant0

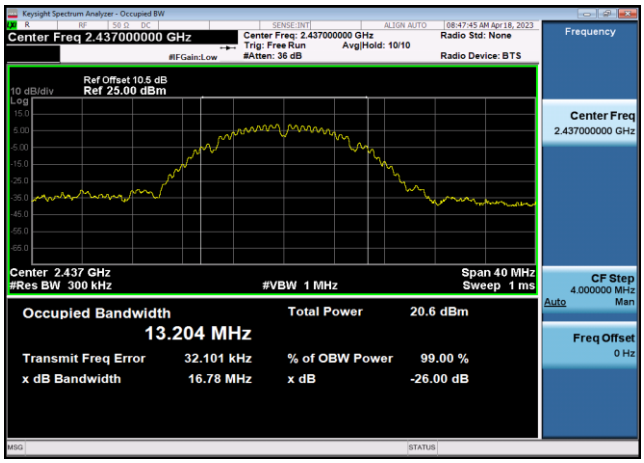
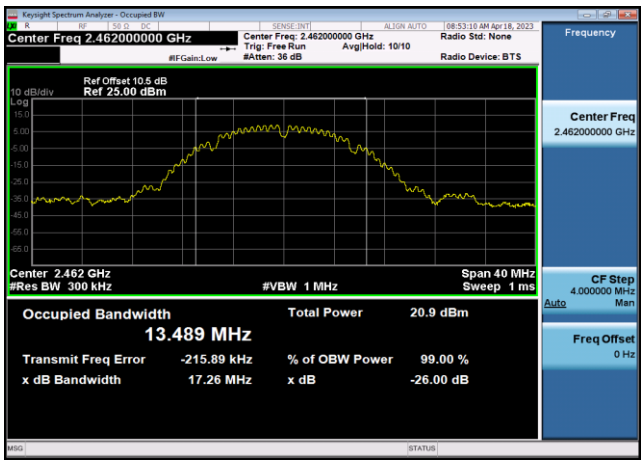
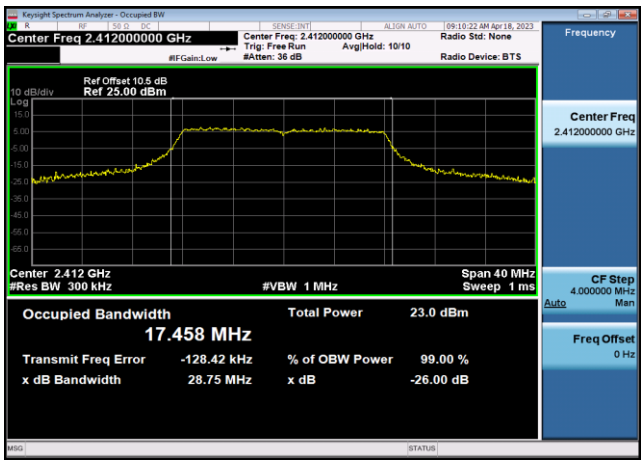
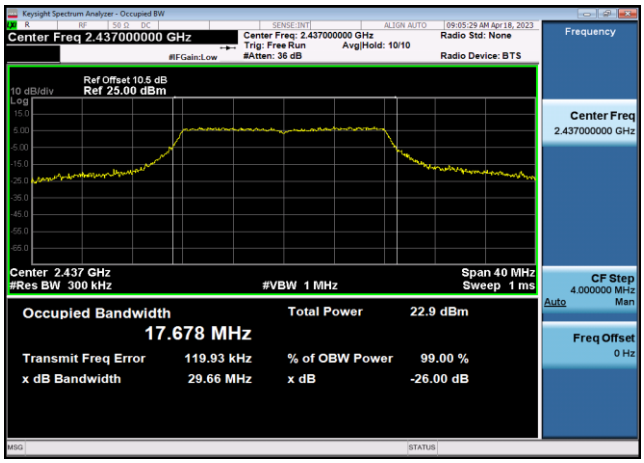
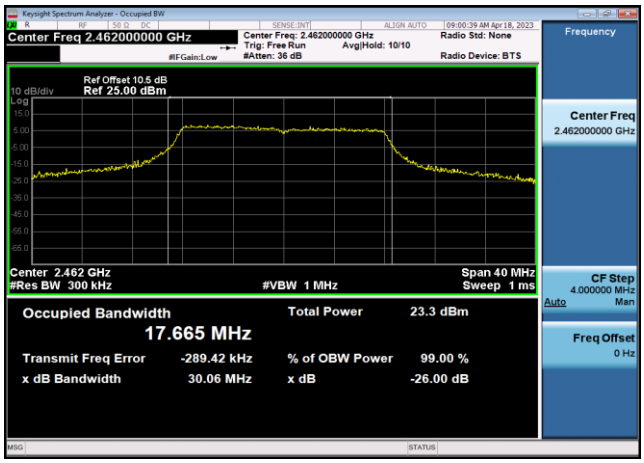


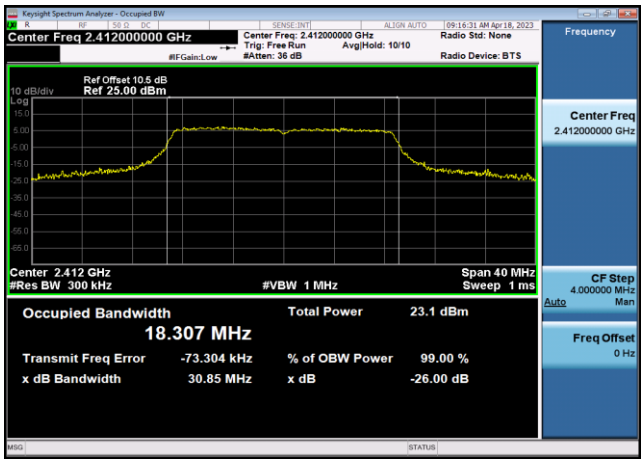
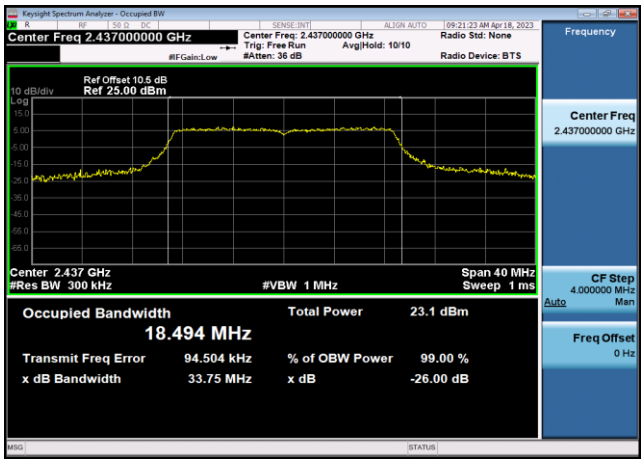
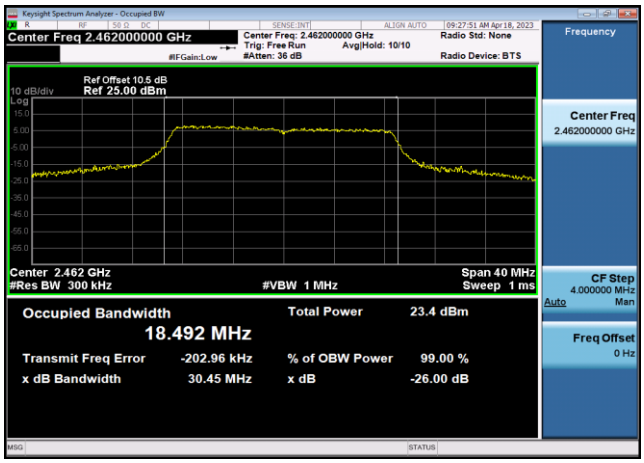
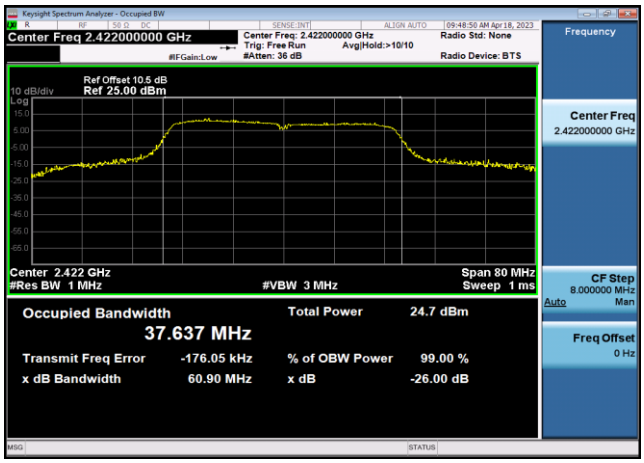
6dB Bandwidth-802.11n(HT20),2412MHz ,Ant0	6dB Bandwidth-802.11n(HT20),2437MHz ,Ant0
	
6dB Bandwidth-802.11n(HT20),2462MHz ,Ant0	6dB Bandwidth-802.11n(HT40),2422MHz ,Ant0
	
6dB Bandwidth-802.11n(HT40),2437MHz ,Ant0	6dB Bandwidth-802.11n(HT40),2452MHz ,Ant0
	

99% Occupied Bandwidth

Test Result and Data

WLAN 99% Occupied Bandwidth			
Mode	Test Frequency (MHz)	99% Occupied Bandwidth (MHz)	Result
802.11b	2412	13.446	Pass
802.11b	2437	13.204	Pass
802.11b	2462	13.489	Pass
802.11g	2412	17.458	Pass
802.11g	2437	17.678	Pass
802.11g	2462	17.665	Pass
802.11n (HT20)	2412	18.307	Pass
802.11n (HT20)	2437	18.494	Pass
802.11n (HT20)	2462	18.492	Pass
802.11n (HT40)	2422	37.637	Pass
802.11n (HT40)	2437	38.053	Pass
802.11n (HT40)	2452	37.008	Pass

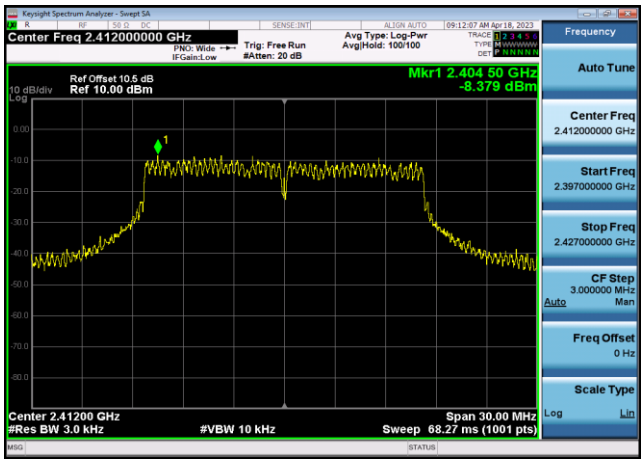
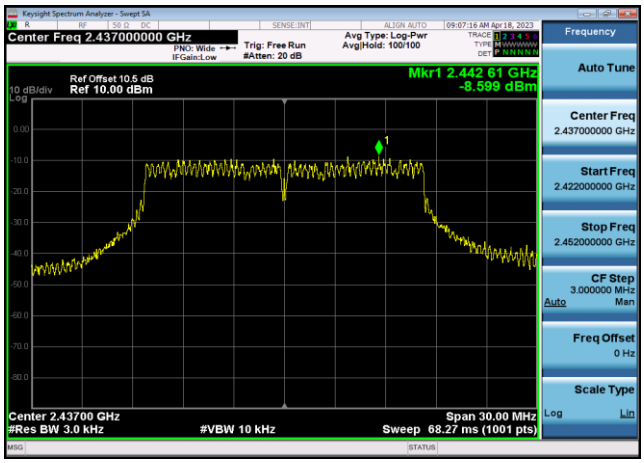
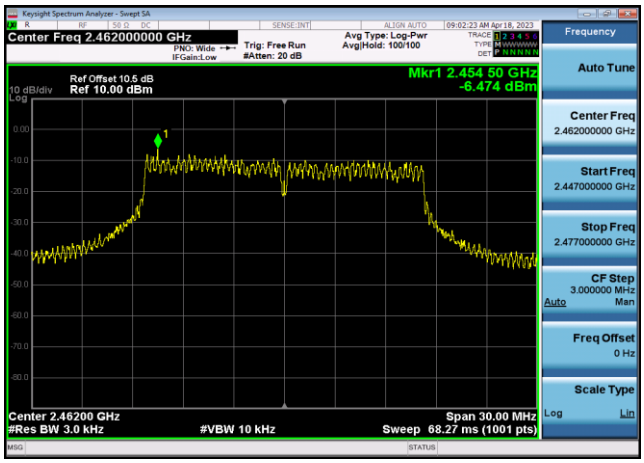
99% Bandwidth-802.11b,2412MHz,Ant0	99% Bandwidth-802.11b,2437MHz,Ant0
	
99% Bandwidth-802.11b,2462MHz,Ant0	99% Bandwidth-802.11g,2412MHz,Ant0
	
99% Bandwidth-802.11g,2437MHz,Ant0	99% Bandwidth-802.11g,2462MHz,Ant0
	

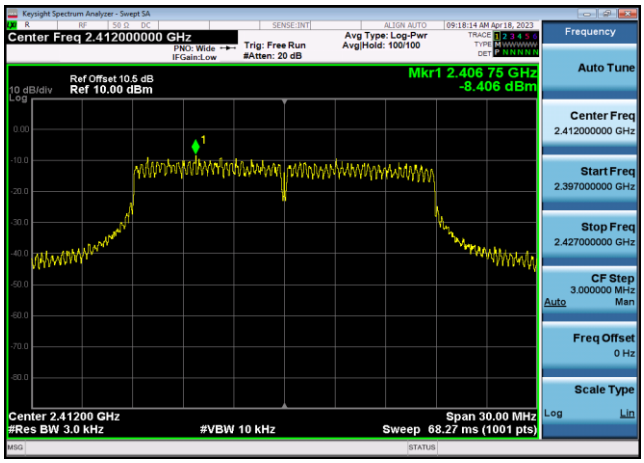
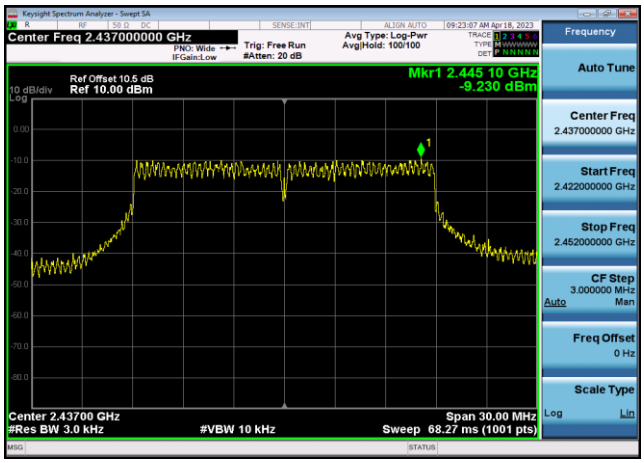
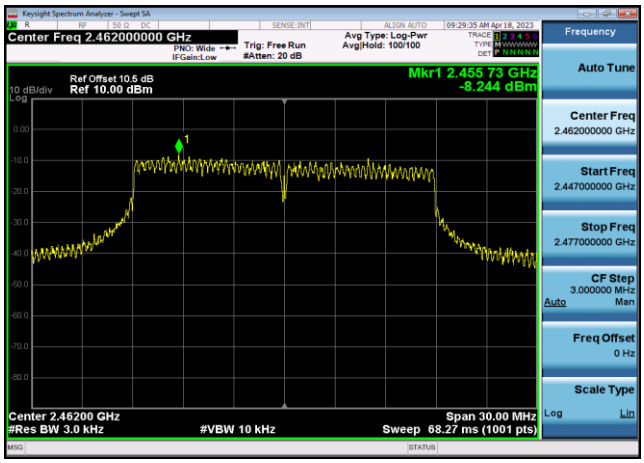
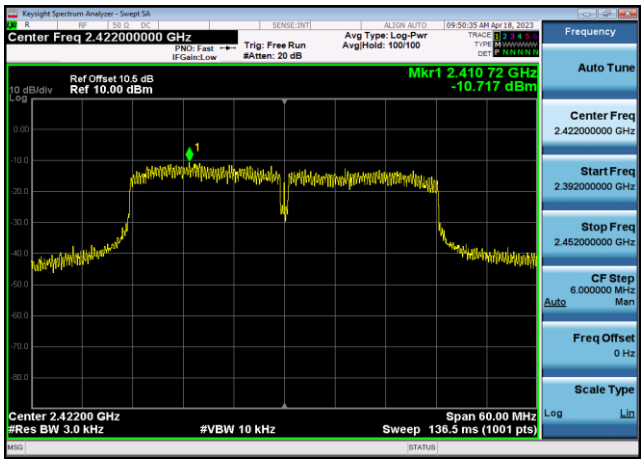
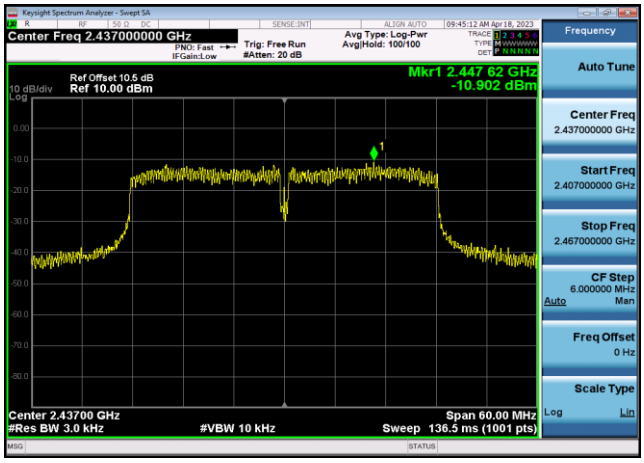
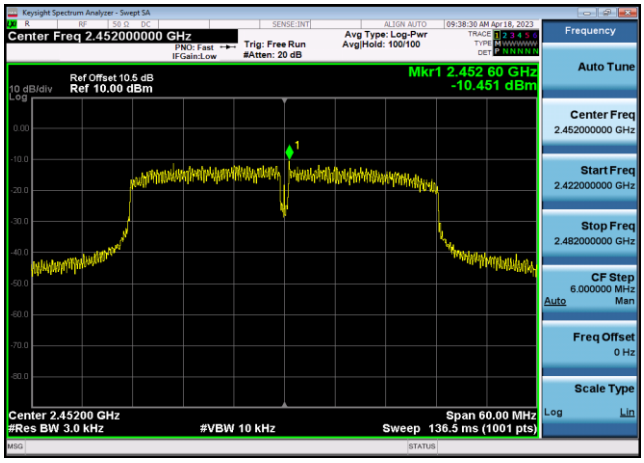
99% Bandwidth-802.11n(HT20),2412MHz ,Ant0	99% Bandwidth-802.11n(HT20),2437MHz ,Ant0
	
99% Bandwidth-802.11n(HT20),2462MHz ,Ant0	99% Bandwidth-802.11n(HT40),2422MHz ,Ant0
	
99% Bandwidth-802.11n(HT40),2437MHz ,Ant0	99% Bandwidth-802.11n(HT40),2452MHz ,Ant0
	

Power Spectral Density

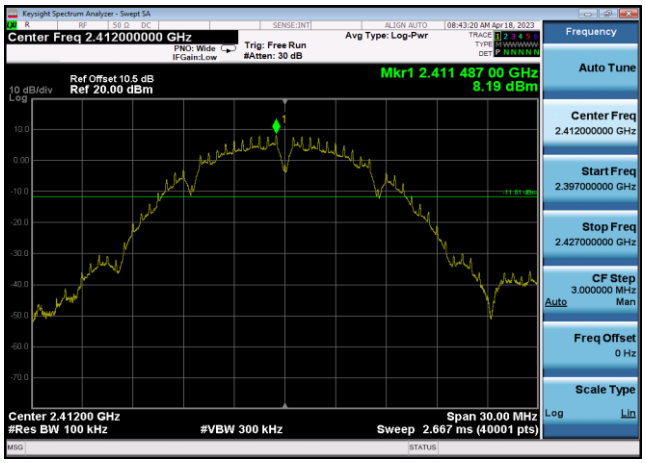
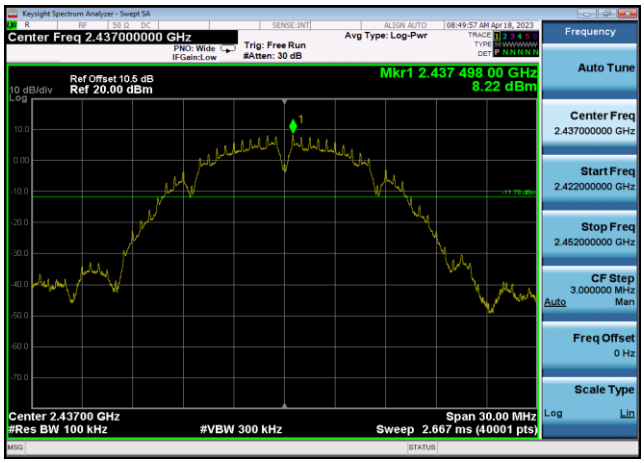
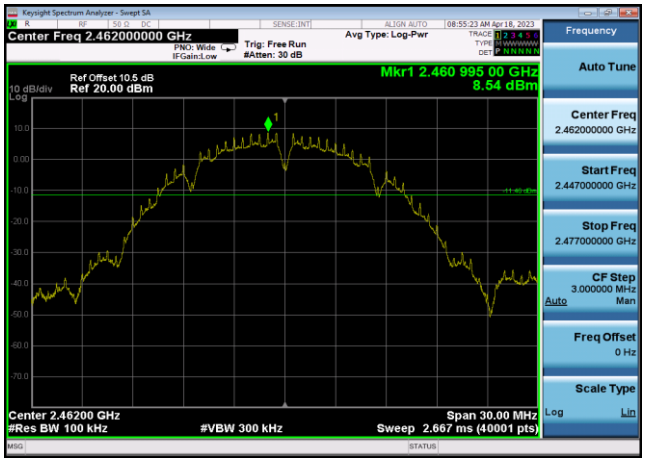
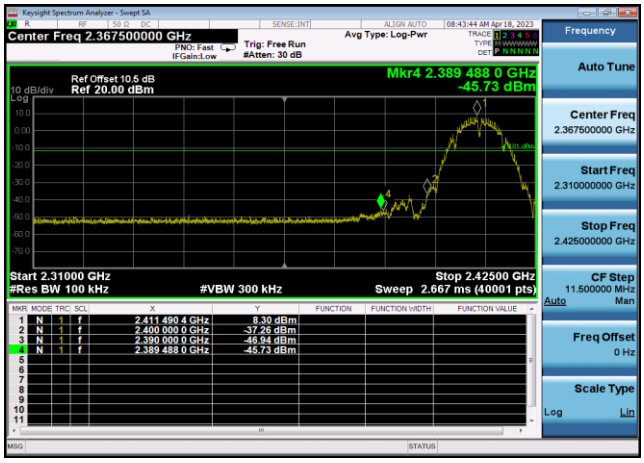
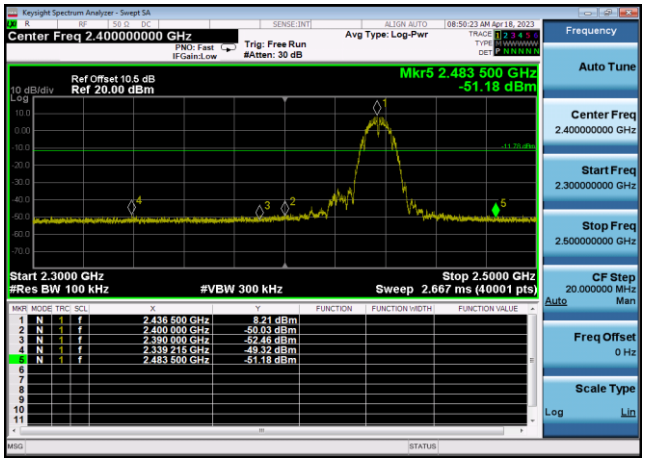
Test Result and Data

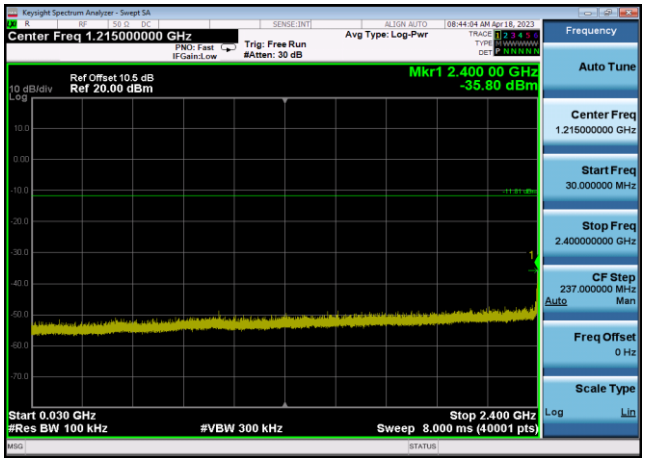
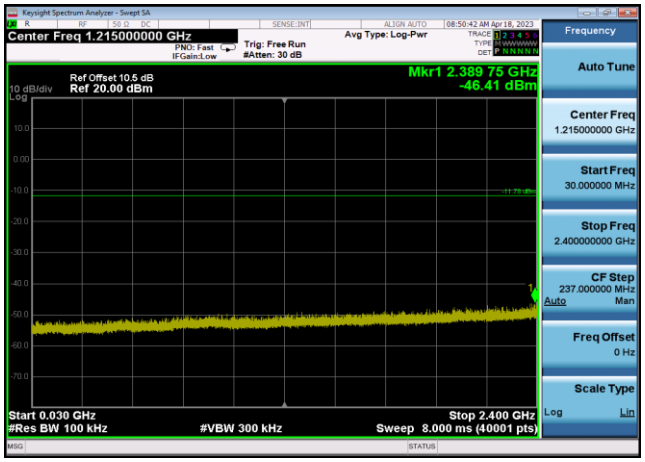
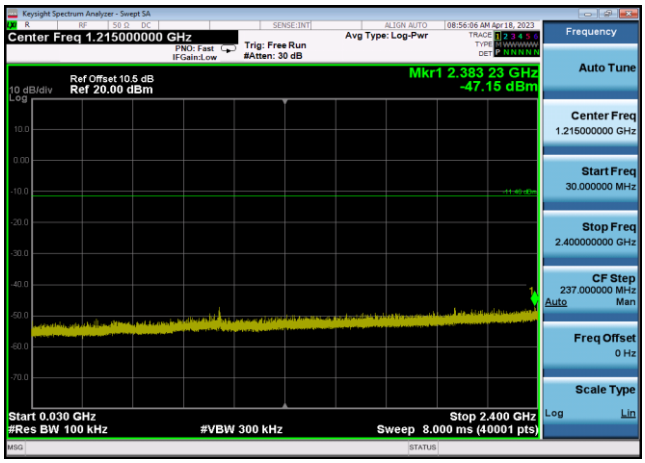
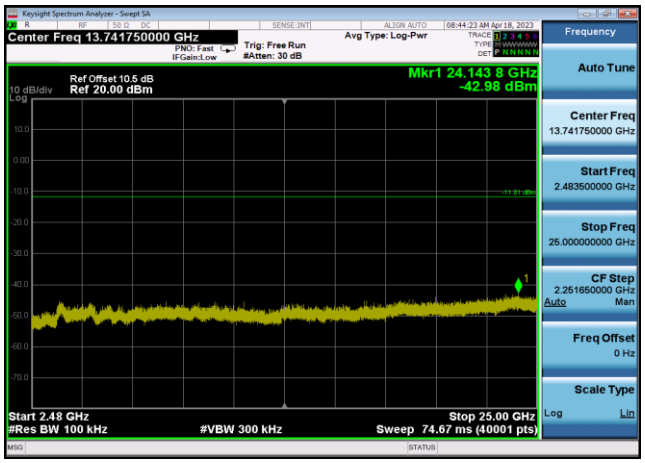
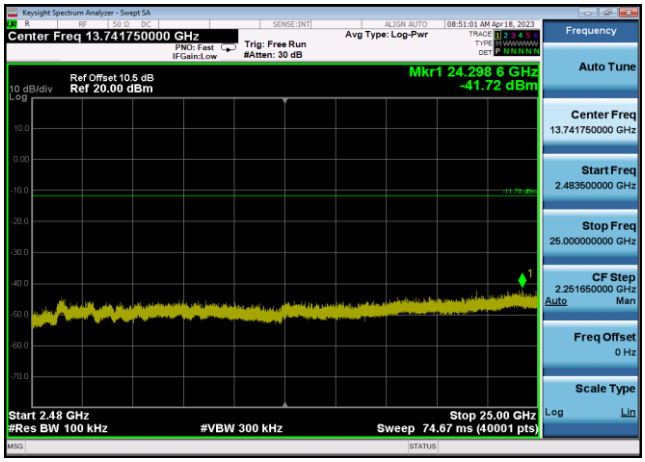
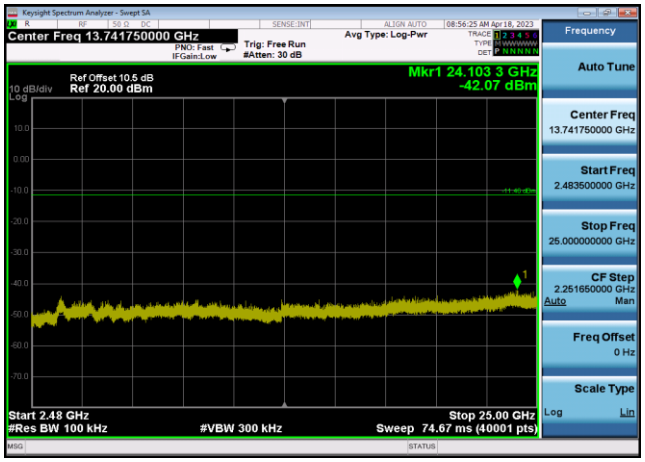
Power Spectral Density				
Mode	Test Frequency (MHz)	PSD (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	2412	-5.126	8	Pass
802.11b	2437	-4.183	8	Pass
802.11b	2462	-4.518	8	Pass
802.11g	2412	-8.379	8	Pass
802.11g	2437	-8.599	8	Pass
802.11g	2462	-6.474	8	Pass
802.11n (HT20)	2412	-8.406	8	Pass
802.11n (HT20)	2437	-9.230	8	Pass
802.11n (HT20)	2462	-8.244	8	Pass
802.11n (HT40)	2422	-10.717	8	Pass
802.11n (HT40)	2437	-10.902	8	Pass
802.11n (HT40)	2452	-10.451	8	Pass

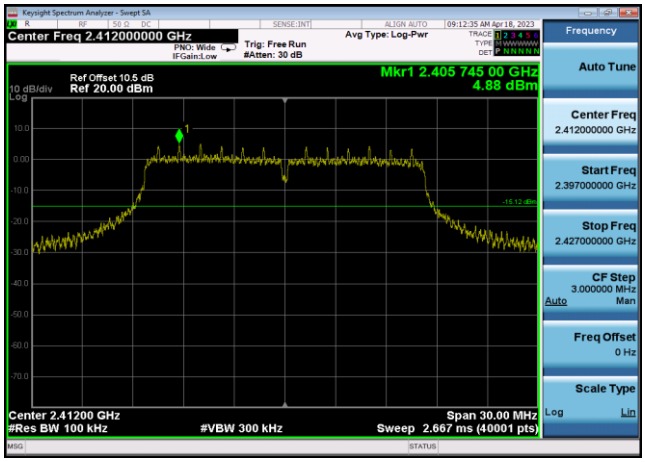
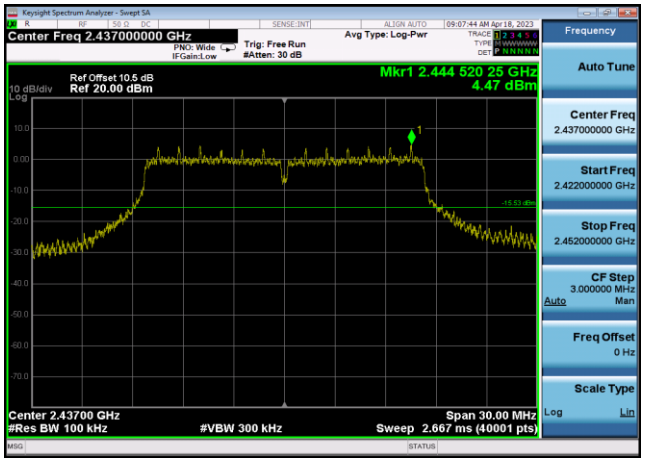
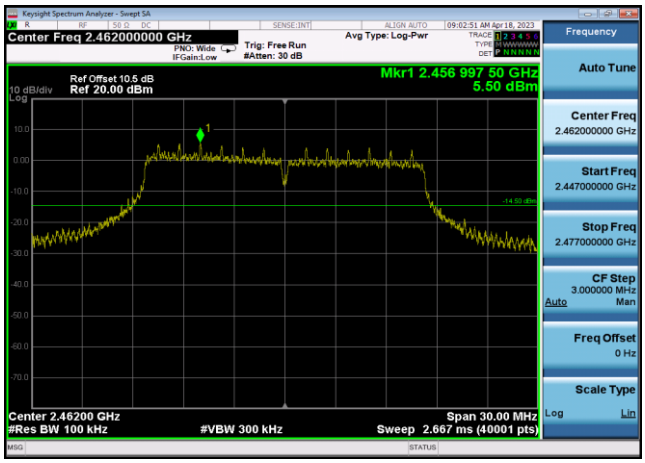
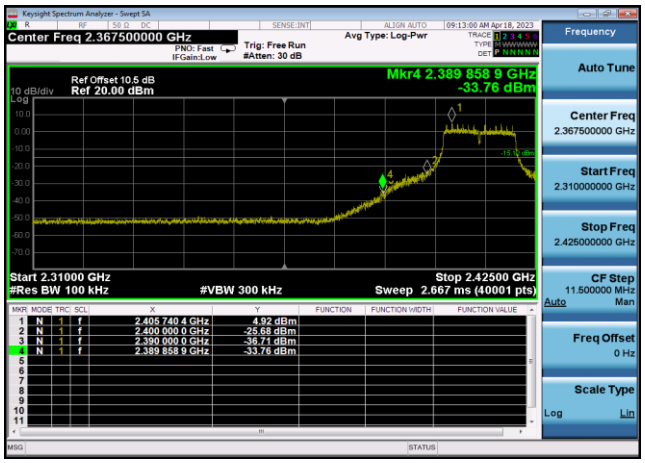
Power spectral density-802.11b ,2412MHz,Ant0	Power spectral density-802.11b ,2437MHz,Ant0
	
Power spectral density-802.11b ,2462MHz,Ant0	Power spectral density-802.11g ,2412MHz,Ant0
	
Power spectral density-802.11g ,2437MHz,Ant0	Power spectral density-802.11g ,2462MHz,Ant0
	

Power spectral density-802.11n(HT20) ,2412MHz,Ant0	Power spectral density-802.11n(HT20) ,2437MHz,Ant0
	
Power spectral density-802.11n(HT20) ,2462MHz,Ant0	Power spectral density-802.11n(HT40) ,2422MHz,Ant0
	
Power spectral density-802.11n(HT40) ,2437MHz,Ant0	Power spectral density-802.11n(HT40) ,2452MHz,Ant0
	

Conducted Band Edges and Spurious Emissions
Test Result and Data

,Plot 1,Reference Level-802.11b ,2412MHz,Ant0	,Plot 1,Reference Level-802.11b ,2437MHz,Ant0
	
,Plot 1,Reference Level-802.11b ,2462MHz,Ant0	,Plot 2,Band Edge-802.11b,2412MHz ,Ant0
	
,Plot 2,Band Edge-802.11b,2437MHz ,Ant0	,Plot 2,Band Edge-802.11b,2462MHz ,Ant0
	

,Plot 3,30MHz~2400MHz-802.11b,2412MHz ,Ant0	,Plot 3,30MHz~2400MHz-802.11b,2437MHz ,Ant0
	
,Plot 3,30MHz~2400MHz-802.11b,2462MHz ,Ant0	,Plot 4,2483.5MHz~25000MHz-802.11b ,2412MHz,Ant0
	
,Plot 4,2483.5MHz~25000MHz-802.11b ,2437MHz,Ant0	,Plot 4,2483.5MHz~25000MHz-802.11b ,2462MHz,Ant0
	

,Plot 1,Reference Level-802.11g ,2412MHz,Ant0	,Plot 1,Reference Level-802.11g ,2437MHz,Ant0
	
,Plot 1,Reference Level-802.11g ,2462MHz,Ant0	,Plot 2,Band Edge-802.11g,2412MHz ,Ant0
	
,Plot 2,Band Edge-802.11g,2437MHz ,Ant0	,Plot 2,Band Edge-802.11g,2462MHz ,Ant0