

FCC RADIO TEST REPORT

FCC ID: 2AUJA-Z10

Product : Visual Instrument

Trade Name : N/A

Model Name : Z10

Serial Model : Z20, Z30, Z40 Z50, Z60, Z70, Z80, Z90, Z100, Z110,
Z120, Z130, Z140, Z150, Z160, Z170, Z180, Z190,
Z200, Z210, Z220, Z230, Z240, Z260, Z270, Z280,
Z290, Z300

Report No. : UNIA21070988ER-04

Prepared for

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Prepared by

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TEST RESULT CERTIFICATION

Applicant's name.....: Shenzhen Zhuochuangfu Technology Co., Ltd.

Address.....: 507-1 Ronghe Building, No.687 Jihua Rd, Dafapu, Bantian, Longgang, Shenzhen

Manufacture's Name: Shenzhen Zhuochuangfu Technology Co., Ltd.

Address.....: 507-1 Ronghe Building, No.687 Jihua Rd, Dafapu, Bantian, Longgang, Shenzhen

Product description

Product name.....: Visual Instrument

Trade Mark.....: N/A

Model and/or type reference ..: Z10, Z20, Z30, Z40 Z50, Z60, Z70, Z80, Z90, Z100, Z110, Z120, Z130, Z140, Z150, Z160, Z170, Z180, Z190, Z200, Z210, Z220, Z230, Z240, Z260, Z270, Z280, Z290, Z300

Standards: FCC Rules and Regulations Part 15 Subpart C Section 15.247
KDB 558074 D01 15.247 Meas Guidance v05r02

Date of Test.....:

Date (s) of performance of tests: Jul. 10, 2021 ~ Aug. 23, 2021

Date of Issue.....: Aug. 30, 2021

Test Result.....: Pass

Prepared by:

kahn.yang

Kahn yang/Editor



Reviewer:

Sky dong/Supervisor



Approved & Authorized Signer:

Liuze/Manager

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1. TEST SUMMARY

1.1 TEST PROCEDURES AND RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
FCC Part 15.207	CONDUCTED EMISSIONS TEST	COMPLIANT
FCC Part 15.209(a)	RADIATED EMISSION TEST	COMPLIANT
FCC Part 15.247(d)	BAND EDGE	COMPLIANT
FCC Part 15.247(a)(2)	OCCUPIED BANDWIDTH MEASUREMENT	COMPLIANT
FCC Part 15.247(e)	POWER SPECTRAL DENSITY	COMPLIANT
FCC Part 15.247(b)	PEAK OUTPUT POWER	COMPLIANT
FCC Part 15.247(d)	OUT OF BAND EMISSIONS	COMPLIANT
FCC Part 15.203	ANTENNA REQUIREMENT	COMPLIANT

1.2 TEST LOCATION

Test Laboratory : Shenzhen United Testing Technology Co., Ltd.

Address : 2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

Our test facility is recognized, certified, or accredited by the following organizations:

CNAS-LAB Code: L6964

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of testing Laboratories.

Designation Number: CN1227

Test Firm Registration Number: 674885

The 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.

1.3 MEASUREMENT UNCERTAINTY

Measurement Uncertainty		
Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty(9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty(30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty(Above 1GHz)	=	4.06dB, k=2

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

The following information of EUT submitted and identified by applicant:

Equipment	Visual Instrument
Trade Mark	N/A
Model Name	Z10
Serial No.	Z20, Z30, Z40 Z50, Z60, Z70, Z80, Z90, Z100, Z110, Z120, Z130, Z140, Z150, Z160, Z170, Z180, Z190, Z200, Z210, Z220, Z230, Z240, Z260, Z270, Z280, Z290, Z300
Model Difference	The series model and the main model are the same except for the color and model name.
FCC ID	2AUJA-Z10
Antenna Type	PCB antenna
Number of transmit chain	1
Antenna Gain	1dBi
Number of Channels	11
Modulation Type	DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM)
Battery	DC 3.7V, 230mAh
Power Source	DC 5V form adapter

2.2 Carrier Frequency of Channels

Frequency Band	Channel Number	Frequency
2400~2483.5MHz	1	2412 MHZ
	2	2417 MHZ
	3	2422 MHZ
	4	2427 MHZ
	5	2432 MHZ
	6	2437 MHZ
	7	2442 MHZ
	8	2447 MHZ
	9	2452 MHZ
	10	2457 MHZ
	11	2462 MHZ

Note: For 20MHz bandwidth system use Channel 1 to Channel 11. For 40MHz bandwidth system use Channel 3 to Channel 9

2.3 DESCRIPTION OF TEST MODES

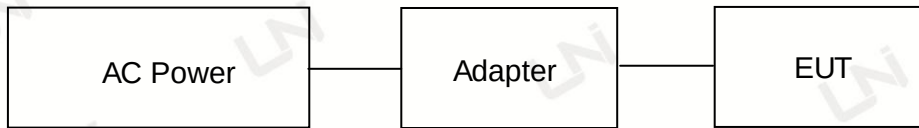
NO.	TEST MODE DESCRIPTION
1	Low channel TX(2412/2422MHz)
2	Middle channel TX(2437MHz)
3	High channel TX(2452/2462MHz)
Note: Transmit by 802.11b with Data rate (1/2/5.5/11) Transmit by 802.11g with Data rate (6/9/12/18/24/36/48/54) Transmit by 802.11n (20MHz) with Data rate (6.5/13/19.5/26/39/52/58.5/65) Transmit by 802.11n (40MHz) with Data rate(13.5/27/40.5/54/81/108/121.5/135)	

Note:

- The EUT has been set to operate continuously on the lowest, middle and highest operation frequency Individually, and the EUT is operating at its maximum duty cycle>or equal 98%
- All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.
- The test software is Wifi Test Toolv1.4.1.exe which can set the EUT into the individual test modes.

2.4 DESCRIPTION OF TEST SETUP

Operation of EUT during Conducted testing:



Operation of EUT during Radiation testing:



Table for auxiliary equipment:

Equipment Description	Manufacturer	Model	Calibration Due Date
PC	Lenovo	Y60	N/A

2.5 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
CONDUCTED EMISSIONS TEST					
1	AMN	Schwarzbeck	NNLK8121	8121370	2021.9.9
2	AMN	ETS	3810/2	00020219	2021.9.9
3	EMI TEST RECEIVER	Rohde&Schwarz	ESCI	101210	2021.9.9
4	AAN	TESEQ	T8-Cat6	38888	2021.9.9
RADIATED EMISSION TEST					
1	Horn Antenna	Sunol	DRH-118	A101415	2021.9.29
2	BicoNLog Antenna	Sunol	JB1 Antenna	A090215	2021.9.29
3	PREAMP	HP	8449B	3008A00160	2021.9.9
4	PREAMP	HP	8447D	2944A07999	2021.9.9
5	EMI TEST RECEIVER	Rohde&Schwarz	ESR3	101891	2021.9.9
6	VECTOR Signal Generator	Rohde&Schwarz	SMU200A	101521	2021.9.28
7	Signal Generator	Agilent	E4421B	MY4335105	2021.9.28
8	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2021.9.28
9	MXA Signal Analyzer	Agilent	N9020A	MY51110104	2021.9.9
10	ANT Tower&Turn table Controller	Champro	EM 1000	60764	2021.9.28
11	Anechoic Chamber	Taihe Maorui	9m*6m*6m	966A0001	2021.9.9
12	Shielding Room	Taihe Maorui	6.4m*4m*3m	643A0001	2021.9.9
13	RF Power sensor	DARE	RPR3006W	15I00041SNO88	2022.3.14
14	RF Power sensor	DARE	RPR3006W	15I00041SNO89	2022.3.14
15	RF power divider	Anritsu	K241B	992289	2021.9.28
16	Wideband radio communication tester	Rohde&Schwarz	CMW500	154987	2021.9.28
17	Biconical antenna	Schwarzbeck	VHA 9103	91032360	2021.9.8
18	Biconical antenna	Schwarzbeck	VHA 9103	91032361	2021.9.8
19	Broadband Hybrid Antennas	Schwarzbeck	VULB9163	VULB9163#958	2021.9.8
20	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2021.1.12
21	Active Receive Loop Antenna	Schwarzbeck	FMZB 1919B	00023	2021.9.8
22	Horn Antenna	A-INFOMW	LB-180400-KF	J211060660	2022.3.14
23	Microwave Broadband Preamplifier	Schwarzbeck	BBV 9721	100472	2021.9.8
24	Active Loop Antenna	Com-Power	AL-130R	10160009	2022.5.09
25	Power Meter	KEYSIGHT	N1911A	MY50520168	2022.5.09
26	Frequency Meter	VICTOR	VC2000	997406086	2022.5.09
27	DC Power Source	HYELEC	HY5020E	055161818	2022.5.09

3. CONDUCTED EMISSIONS TEST

3.1 Conducted Power Line Emission Limit

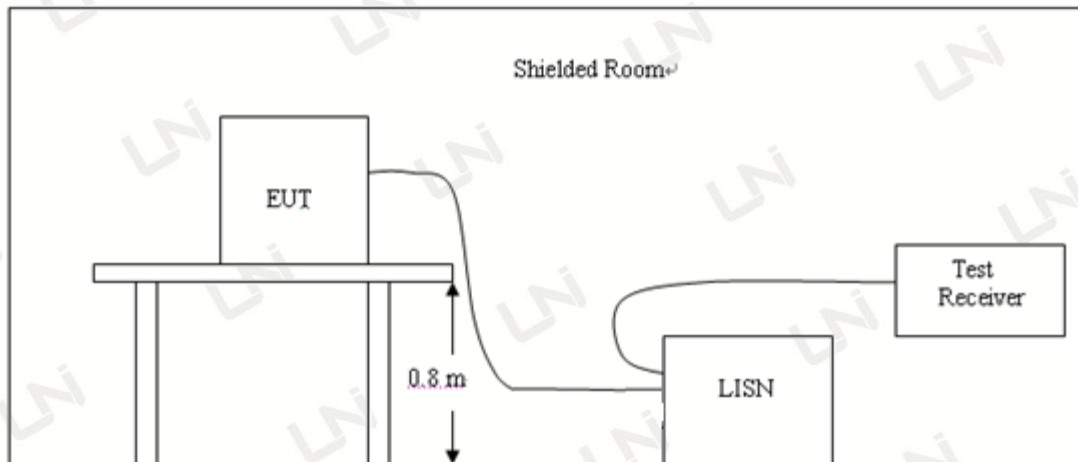
For unintentional device, according to § 15.207 Line Conducted Emission Limits is as following

Frequency (MHz)	Maximum RF Line Voltage(dB μ V)			
	CLASS A		CLASS B	
	Q.P.	Average.	Q.P.	Average.
0.15~0.50	79	66	66~56*	56~46*
0.50~5.00	73	60	56	46
5.00~30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

3.2 Test Setup



3.3 Test Procedure

- 1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. A wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
- 2, Support equipment, if needed, was placed as per ANSI C63.10.
- 3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4, If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5, All support equipments received AC power from a second LISN, if any.
- 6, The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7, Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

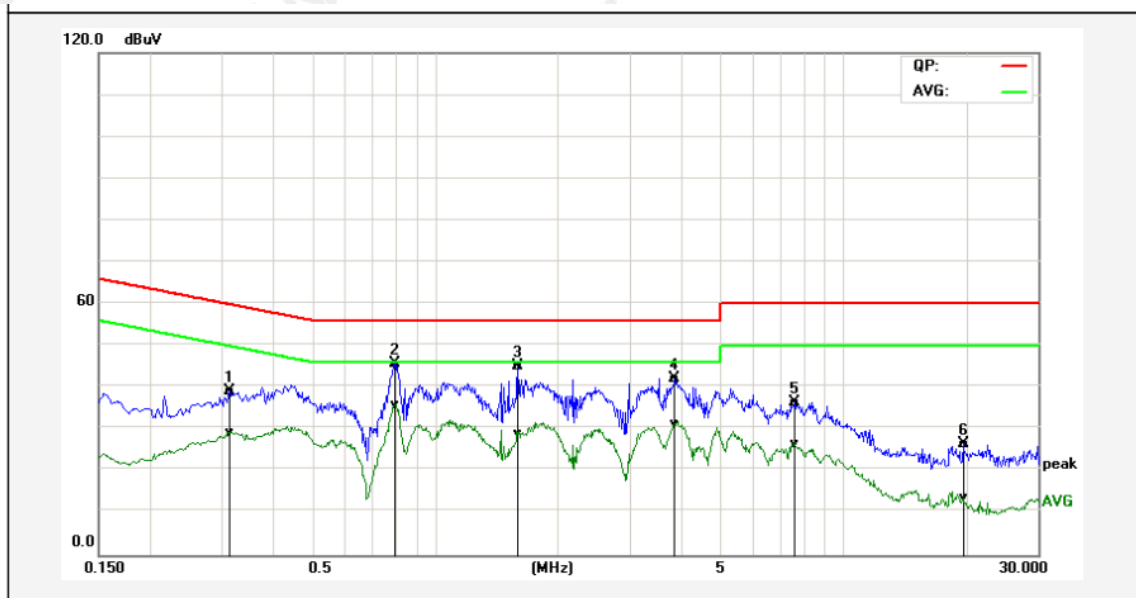
3.4 Test Result

Pass

Remark:

1. All modes were tested at AC 120V and 240V, only the worst result of AC 120V was reported.
2. All modes were tested at Low, Middle, and High channel, only the worst result of 802.11b High Channel was reported as below:

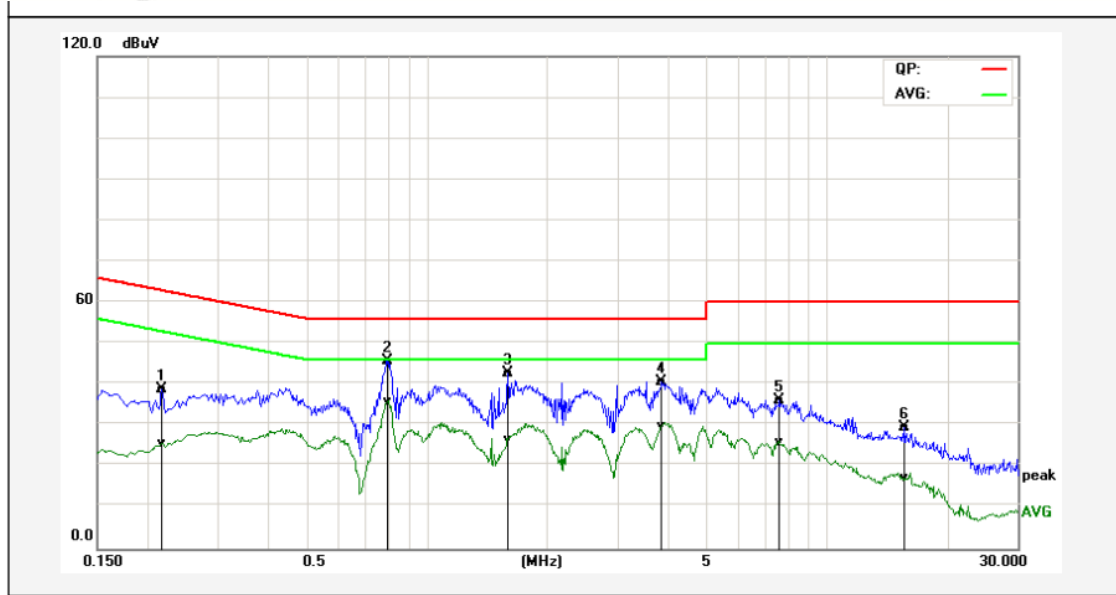
Temperature:	24°C	Relative Humidity:	48%
Test Date:	Jul. 26, 2021	Pressure:	1030hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Line
Test Mode:	Transmitting mode of 802.11b 2462MHz		



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1P	0.3140	29.62	19.55	9.68	39.30	29.23	59.86	49.86	-20.56	-20.63	Pass
2*	0.7980	36.02	26.09	9.75	45.77	35.84	56.00	46.00	-10.23	-10.16	Pass
3P	1.5980	35.40	19.22	9.79	45.19	29.01	56.00	46.00	-10.81	-16.99	Pass
4P	3.8660	32.22	21.61	9.83	42.05	31.44	56.00	46.00	-13.95	-14.56	Pass
5P	7.6380	26.71	16.72	9.84	36.55	26.56	60.00	50.00	-23.45	-23.44	Pass
6P	19.6620	25.99	13.25	0.54	26.53	13.79	60.00	50.00	-33.47	-36.21	Pass

Remark: Factor = Insertion Loss + Cable Loss, Result = Reading + Factor, Margin = Result – Limit.

Temperature:	24°C	Relative Humidity:	48%
Test Date:	Jul. 26, 2021	Pressure:	1030hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Neutral
Test Mode:	Transmitting mode of 802.11b 2462MHz		



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1P	0.2180	29.28	16.12	9.65	38.93	25.77	62.89	52.89	-23.96	-27.12	Pass
2*	0.7980	36.02	26.09	9.75	45.77	35.84	56.00	46.00	-10.23	-10.16	Pass
3P	1.5980	32.90	16.72	9.79	42.69	26.51	56.00	46.00	-13.31	-19.49	Pass
4P	3.8660	30.72	20.11	9.83	40.55	29.94	56.00	46.00	-15.45	-16.06	Pass
5P	7.6380	26.21	16.22	9.84	36.05	26.06	60.00	50.00	-23.95	-23.94	Pass
6P	15.7020	29.13	17.02	0.34	29.47	17.36	60.00	50.00	-30.53	-32.64	Pass

Remark: Factor = Insertion Loss + Cable Loss, Result = Reading + Factor, Margin = Result – Limit.

4 RADIATED EMISSION TEST

4.1 Radiation Limit

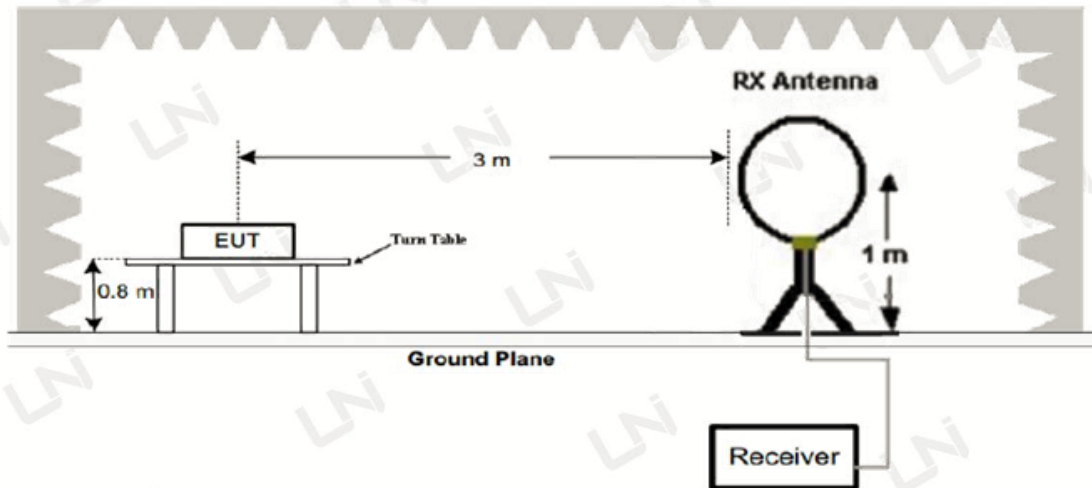
For unintentional device, according to § 15.209(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
30-88	3	40	100
88-216	3	43.5	150
216-960	3	46	200
Above 960	3	54	500

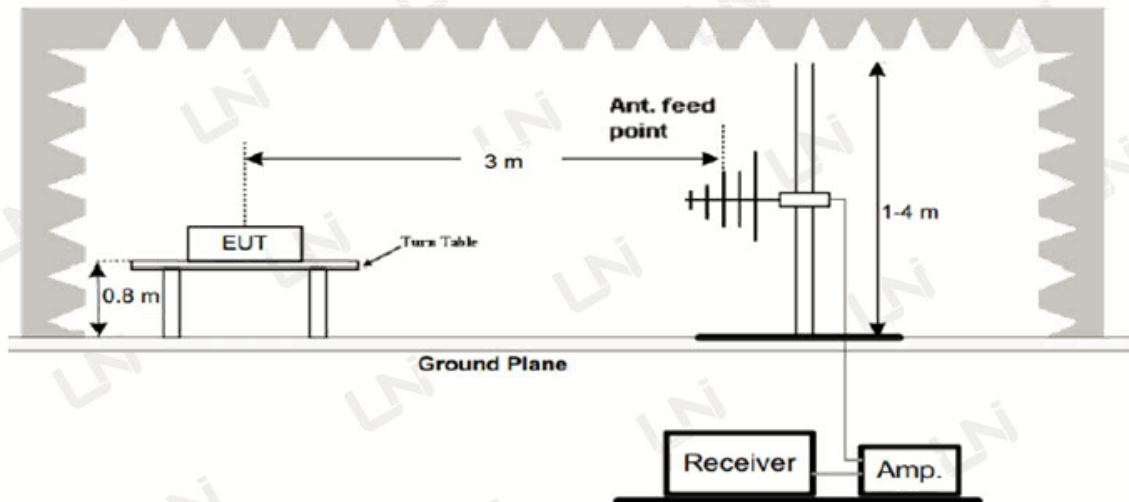
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

4.2 Test Setup

1. Radiated Emission Test-Up Frequency Below 30MHz



2. Radiated Emission Test-Up Frequency 30MHz~1GHz

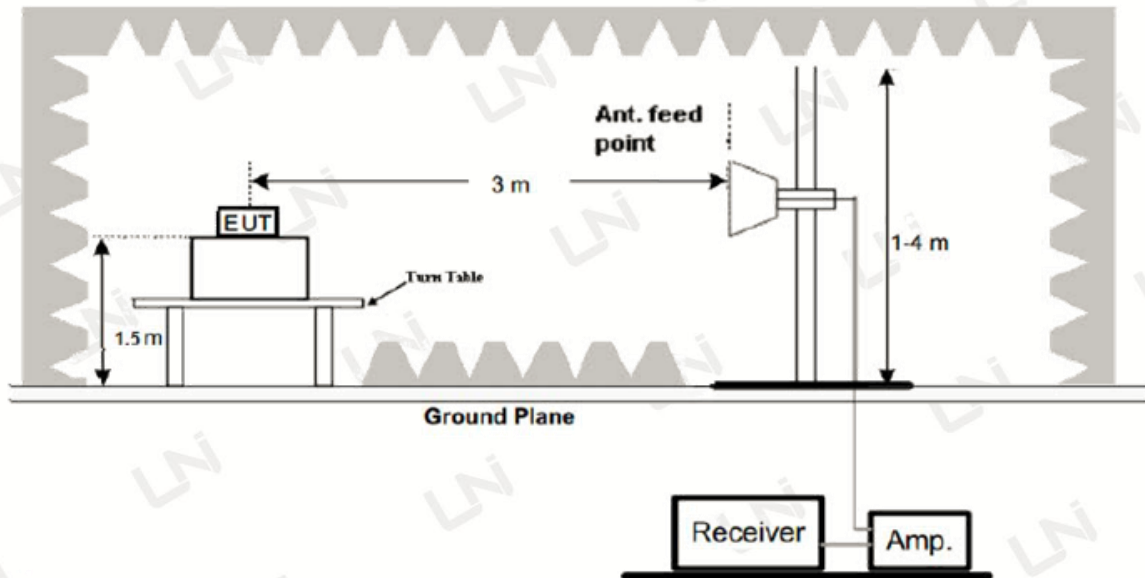


3. Radiated Emission Test-Up Frequency Above 1GHz

For unintentional device, according to § 15.209(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Detection method
Above 1000	3	74	PK
Above 1000	3	54	AV

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.



4.3 Test Procedure

- Below 1GHz measurement the EUT is placed on turntable which is 0.8m above ground plane. And above 1GHz measurement EUT was placed on low permittivity and low tangent turn table which is 1.5m above ground plane.
- The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- Repeat above procedures until the measurements for all frequencies are complete.
- The test frequency range from 9KHz to 25GHz per FCC PART 15.33(a).

Note:

For battery operated equipment, the equipment tests shall be performed using a new battery.

4.4 Test Result

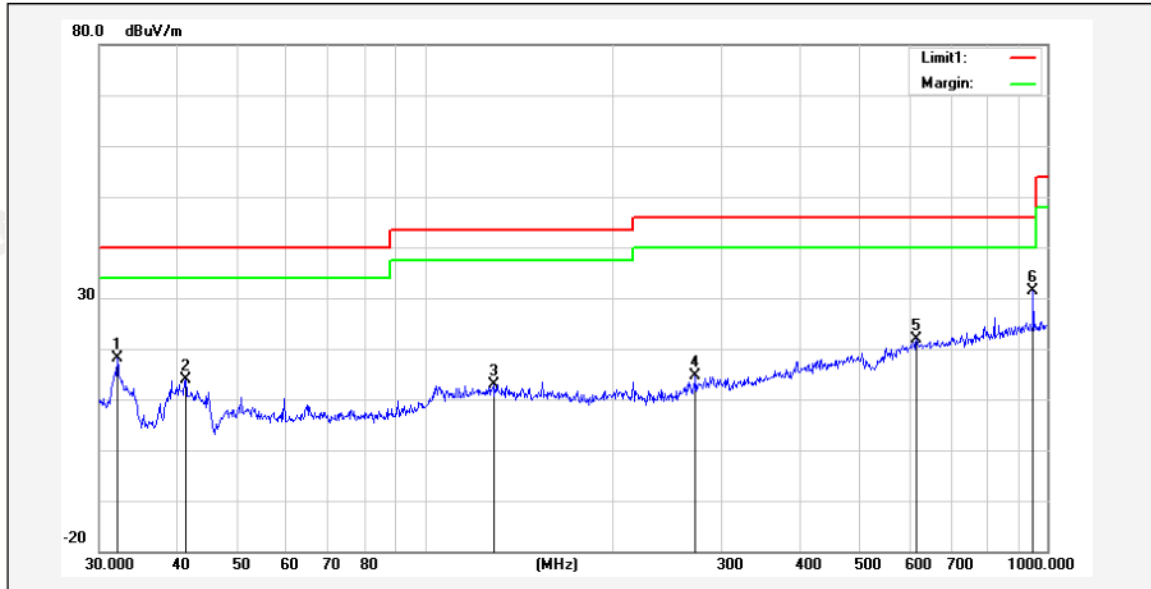
PASS

Remark:

- All modes were test at Low, Middle, and High channel, only the worst result of 802.11b High Channel was reported for below 1GHz test.
- By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "Z axis" position was the worst, and test data recorded in this report.

Below 1GHz Test Results:

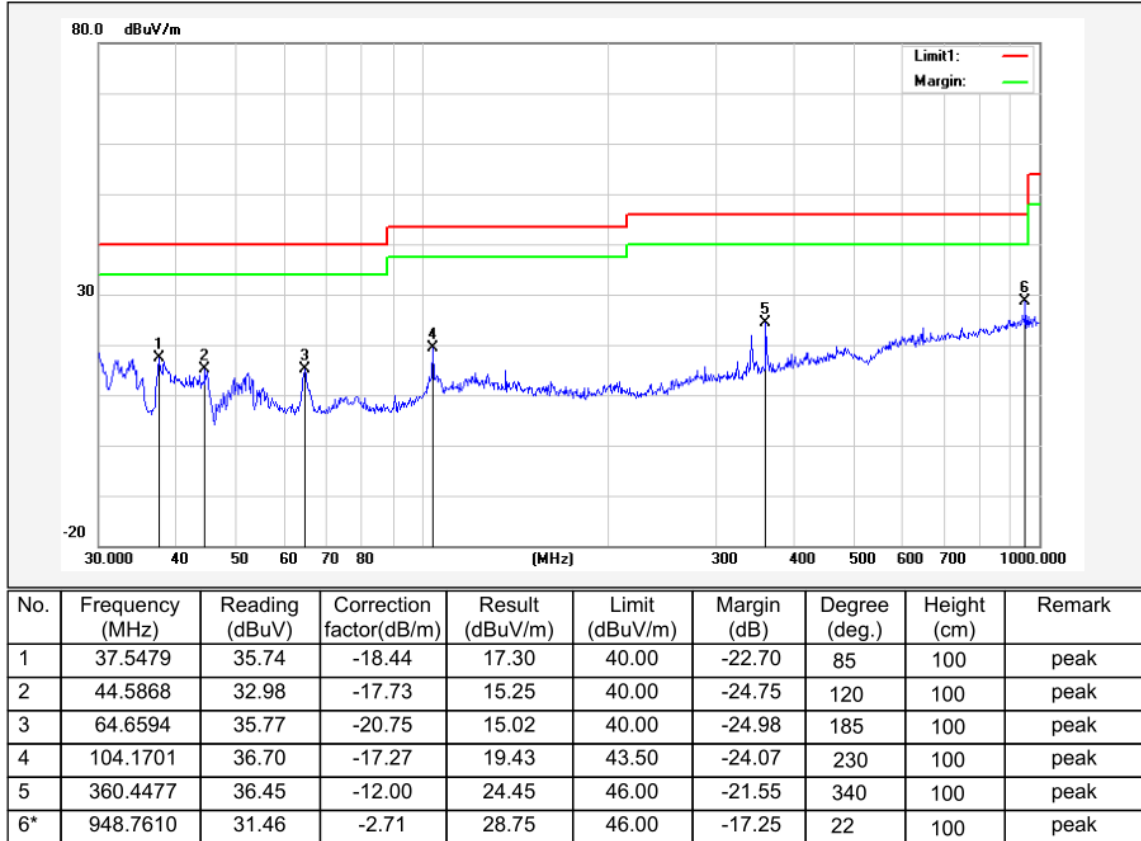
Temperature:	24°C	Relative Humidity:	48%
Test Voltage:	DC 3.7V	Pressure:	1030hPa
Test Mode:	Transmitting mode of 802.11b 2462MHz	Polarization:	Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	32.0668	29.03	-10.97	18.06	40.00	-21.94	120	100	peak
2	41.2765	29.56	-15.70	13.86	40.00	-26.14	162	100	peak
3	129.0146	28.01	-15.22	12.79	43.50	-30.71	205	100	peak
4	272.2776	28.39	-13.80	14.59	46.00	-31.41	282	100	peak
5	616.3718	28.64	-6.82	21.82	46.00	-24.18	300	100	peak
6*	948.7610	34.15	-2.71	31.44	46.00	-14.56	33	100	peak

Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier

Temperature:	24°C	Relative Humidity:	48%
Test Voltage:	DC 3.7V	Pressure:	1030hPa
Test Mode:	Transmitting mode of 802.11b 2462MHz	Polarization:	Vertical



Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier

Remark:

- (1) The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.
- (2) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (3) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

Above 1 GHz Test Results:

CH Low of 802.11b Mode (2412MHz)

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4824	56.57	-3.64	52.92	74.00	-20.91	PK
4824	45.44	-3.64	41.81	54.00	-12.24	AV
7236	50.77	-0.95	49.88	74.00	-24.65	PK
7236	39.38	-0.95	38.16	54.00	-15.29	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4824	57.15	-3.64	53.54	74.00	-20.08	PK
4824	45.04	-3.64	41.85	54.00	-12.05	AV
7236	50.49	-0.95	48.90	74.00	-24.73	PK
7236	40.27	-0.95	39.42	54.00	-14.88	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

CH Middle of 802.11b Mode (2437MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type
4874	56.76	-3.51	53.69	74.00	-20.29	PK
4874	46.01	-3.51	42.57	54.00	-11.31	AV
7311	49.58	-0.82	48.46	74.00	-24.94	PK
7311	38.83	-0.82	38.60	54.00	-16.12	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type
4874	58.21	-3.51	54.09	74.00	-19.66	PK
4874	47.24	-3.51	43.12	54.00	-10.76	AV
7311	51.42	-0.82	50.00	74.00	-23.86	PK
7311	39.91	-0.82	39.02	54.00	-14.55	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

CH High of 802.11b Mode (2462MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type
4924	56.30	-3.43	52.92	74.00	-21.04	PK
4924	45.41	-3.43	42.10	54.00	-11.64	AV
7386	49.59	-0.75	49.43	74.00	-24.64	PK
7386	39.68	-0.75	38.72	54.00	-15.10	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4924	56.66	-3.43	54.02	74.00	-20.06	PK
4924	45.74	-3.43	42.61	54.00	-11.22	AV
7386	50.13	-0.75	49.49	74.00	-24.57	PK
7386	39.23	-0.75	37.89	54.00	-15.46	AV

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit

Remark :

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed.

CH Low of 802.11g Mode (2412MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type
4824	56.72	-3.64	52.72	74.00	-21.05	PK
4824	45.66	-3.64	41.91	54.00	-11.86	AV
7236	51.21	-0.95	50.60	74.00	-24.03	PK
7236	39.79	-0.95	38.59	54.00	-15.53	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type
4824	57.33	-3.64	53.88	74.00	-20.46	PK
4824	45.86	-3.64	41.96	54.00	-11.81	AV
7236	50.01	-0.95	48.75	74.00	-24.92	PK
7236	38.95	-0.95	38.04	54.00	-15.39	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

CH Middle of 802.11g Mode (2437MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type
4874	56.86	-3.51	53.43	74.00	-21.24	PK
4874	44.93	-3.51	41.31	54.00	-11.86	AV
7311	50.69	-0.82	49.32	74.00	-25.06	PK
7311	39.14	-0.82	38.17	54.00	-15.76	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type
4874	56.72	-3.51	53.69	74.00	-20.38	PK
4874	45.53	-3.51	41.95	54.00	-12.21	AV
7311	50.75	-0.82	49.74	74.00	-24.16	PK
7311	39.90	-0.82	38.95	54.00	-15.32	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

CH High of 802.11g Mode (2462MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	Type
4924	55.76	-3.43	52.71	74.00	-21.59	PK
4924	44.67	-3.43	41.49	54.00	-12.48	AV
7386	50.41	-0.75	48.90	74.00	-25.22	PK
7386	39.23	-0.75	38.63	54.00	-15.79	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	Type
4924	57.17	-3.43	53.12	74.00	-20.24	PK
4924	45.45	-3.43	41.26	54.00	-12.04	AV
7386	49.35	-0.75	48.95	74.00	-24.53	PK
7386	39.14	-0.75	38.23	54.00	-15.44	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Remark :

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed.

CH Low of 802.11n20 Mode (2412MHz)

Horizontal:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4824	55.04	-3.64	51.07	74.00	-22.91	PK
4824	43.69	-3.64	39.89	54.00	-14.52	AV
7236	48.09	-0.95	46.89	74.00	-26.92	PK
7236	38.09	-0.95	36.53	54.00	-17.27	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4824	54.97	-3.64	50.57	74.00	-23.38	PK
4824	44.51	-3.64	40.48	54.00	-13.00	AV
7236	47.17	-0.95	46.29	74.00	-27.58	PK
7236	37.79	-0.95	36.12	54.00	-17.99	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

CH Middle of 802.11n20 Mode (2437MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type
4874	54.82	-3.51	51.25	74.00	-22.58	PK
4874	43.60	-3.51	39.56	54.00	-14.64	AV
7311	47.90	-0.82	46.20	74.00	-27.20	PK
7311	37.15	-0.82	36.58	54.00	-17.36	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type
4874	54.19	-3.51	50.74	74.00	-22.76	PK
4874	43.25	-3.51	40.18	54.00	-14.08	AV
7311	47.28	-0.82	45.82	74.00	-27.77	PK
7311	37.79	-0.82	36.38	54.00	-17.69	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

CH High of 802.11n20 Mode (2462MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type
4924	54.09	-3.43	51.22	74.00	-23.33	PK
4924	42.91	-3.43	39.49	54.00	-14.72	AV
7386	48.67	-0.75	47.24	74.00	-26.61	PK
7386	37.66	-0.75	37.06	54.00	-17.10	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type
4924	54.96	-3.43	50.89	74.00	-22.35	PK
4924	42.77	-3.43	38.92	54.00	-15.02	AV
7386	46.91	-0.75	46.47	74.00	-27.26	PK
7386	37.93	-0.75	36.68	54.00	-17.07	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Remark :

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed.

CH Low of 802.11n40 Mode (2422MHz)

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4844	53.19	-3.64	49.21	74.00	-24.50	PK
4844	43.48	-3.64	39.96	54.00	-14.00	AV
7266	43.44	-0.95	42.97	74.00	-31.32	PK
7266	33.79	-0.95	32.50	54.00	-21.70	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4844	55.20	-3.64	50.88	74.00	-22.77	PK
4844	43.58	-3.64	39.92	54.00	-14.27	AV
7266	44.62	-0.95	43.77	74.00	-30.64	PK
7266	34.92	-0.95	33.70	54.00	-20.44	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

CH Middle of 802.11n40 Mode (2437MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type
4874	53.17	-3.51	48.95	74.00	-25.00	PK
4874	42.60	-3.51	39.46	54.00	-14.48	AV
7311	43.78	-0.82	43.25	74.00	-30.52	PK
7311	33.62	-0.82	33.36	54.00	-20.66	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type
4874	53.68	-3.51	49.92	74.00	-23.49	PK
4874	43.07	-3.51	39.34	54.00	-14.56	AV
7311	44.25	-0.82	42.72	74.00	-31.20	PK
7311	35.32	-0.82	33.90	54.00	-20.26	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

CH High of 802.11n40 Mode (2452MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type
4904	54.84	-3.43	51.32	74.00	-22.91	PK
4904	43.00	-3.43	39.13	54.00	-14.85	AV
7356	45.29	-0.75	44.24	74.00	-29.37	PK
7356	34.68	-0.75	33.67	54.00	-19.99	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type
4904	54.77	-3.43	50.62	74.00	-23.48	PK
4904	42.87	-3.43	39.21	54.00	-14.87	AV
7356	45.02	-0.75	44.13	74.00	-29.83	PK
7356	34.90	-0.75	33.80	54.00	-19.73	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Remark :

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed.

5.1 Limits

FCC PART 15.247(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20 dB below the level of the fundamental. 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).

5.2 Test Procedure

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW to 1MHz and VBM to 3MHz to measure the peak field strength and set RMS detector to measure the average radiated field strength. The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW to 100 KHz and VBW to 300 KHz, to measure the conducted peak band edge.

5.3 Test Result

PASS

Operation Mode: 802.11b Mode TX CH Low (2412MHz)

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2310	52.15	-5.81	46.44	74.00	-27.66	PK
2310	/	-5.81	/	54.00	/	AV
2390	60.05	-5.84	54.25	74.00	-19.73	PK
2390	50.33	-5.84	44.79	54.00	-9.51	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2310	51.20	-5.81	45.68	74.00	-28.59	PK
2310	/	-5.81	/	54.00	/	AV
2390	60.56	-5.84	54.77	74.00	-19.05	PK
2390	51.04	-5.84	45.01	54.00	-8.86	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: 802.11b Mode TX CH High (2462MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	54.89	-5.65	49.49	74.00	-24.91	PK
2483.5	/	-5.65	/	54.00	/	AV
2500	47.17	-5.72	41.46	74.00	-32.39	PK
2500	/	-5.72	/	54.00	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	55.61	-5.65	49.74	74.00	-24.47	PK
2483.5	/	-5.65	/	54.00	/	AV
2500	46.86	-5.72	41.90	74.00	-32.54	PK
2500	/	-5.72	/	54.00	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: 802.11g Mode TX CH Low (2412MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2310	47.32	-5.81	41.71	74.00	-31.95	PK
2310	/	-5.81	/	54.00	/	AV
2390	61.99	-5.84	56.87	74.00	-17.32	PK
2390	49.27	-5.84	42.79	54.00	-11.19	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2310	47.76	-5.81	41.92	74.00	-31.87	PK
2310	/	-5.81	/	54.00	/	AV
2390	62.19	-5.84	56.91	74.00	-17.00	PK
2390	48.47	-5.84	42.42	54.00	-11.86	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: 802.11g Mode TX CH High (2462MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	54.14	-5.65	48.65	74.00	-26.07	PK
2483.5	/	-5.65	/	54.00	/	AV
2500	48.04	-5.72	42.05	74.00	-31.52	PK
2500	/	-5.72	/	54.00	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	55.05	-5.65	49.68	74.00	-24.63	PK
2483.5	/	-5.65	/	54.00	/	AV
2500	47.11	-5.72	41.60	74.00	-32.34	PK
2500	/	-5.72	/	54.00	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: 802.11n20 Mode TX CH Low (2412MHz)

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2310	49.26	-5.81	43.03	74.00	-30.45	PK
2310	/	-5.81	/	54.00	/	AV
2390	60.55	-5.84	54.29	74.00	-19.68	PK
2390	49.53	-5.84	43.69	54.00	-10.31	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2310	48.27	-5.81	42.57	74.00	-31.45	PK
2310	/	-5.81	/	54.00	/	AV
2390	61.03	-5.84	54.91	74.00	-19.23	PK
2390	47.81	-5.84	42.04	54.00	-11.71	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: 802.11n20 Mode TX CH High (2462MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	55.32	-5.65	48.87	74.00	-25.30	PK
2483.5	/	-5.65	/	54.00	/	AV
2500	47.87	-5.72	42.33	74.00	-31.82	PK
2500	/	-5.72	/	54.00	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	55.80	-5.65	49.32	74.00	-23.98	PK
2483.5	/	-5.65	/	54.00	/	AV
2500	47.76	-5.72	42.27	74.00	-31.59	PK
2500	/	-5.72	/	54.00	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: 802.11n40 Mode TX CH Low (2422MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2310	42.24	-5.81	37.25	74.00	-36.92	PK
2310	/	-5.81	/	54.00	/	AV
2390	58.46	-5.84	53.10	74.00	-20.97	PK
2390	49.73	-5.84	44.42	54.00	-9.68	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2310	42.03	-5.81	35.69	74.00	-37.42	PK
2310	/	-5.81	/	54.00	/	AV
2390	61.28	-5.84	55.44	74.00	-18.56	PK
2390	51.57	-5.84	45.73	54.00	-8.27	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: 802.11n40 Mode TX CH Low (2452MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	52.96	-5.65	47.39	74.00	-25.88	PK
2483.5	/	-5.65	/	54.00	/	AV
2500	42.38	-5.72	36.50	74.00	-37.83	PK
2500	/	-5.72	/	54.00	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	54.28	-5.65	48.76	74.00	-25.81	PK
2483.5	/	-5.65	/	54.00	/	AV
2500	41.63	-5.72	35.60	74.00	-38.29	PK
2500	/	-5.72	/	54.00	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

6 OCCUPIED BANDWIDTH MEASUREMENT

6.1 Test Limit

FCC Part15(15.247), Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

6.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation.
3. Based on FCC Part15 C Section 15.247: RBW=100KHz, VBW=300KHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyzer with peak detector.

6.3 Measurement Equipment Used

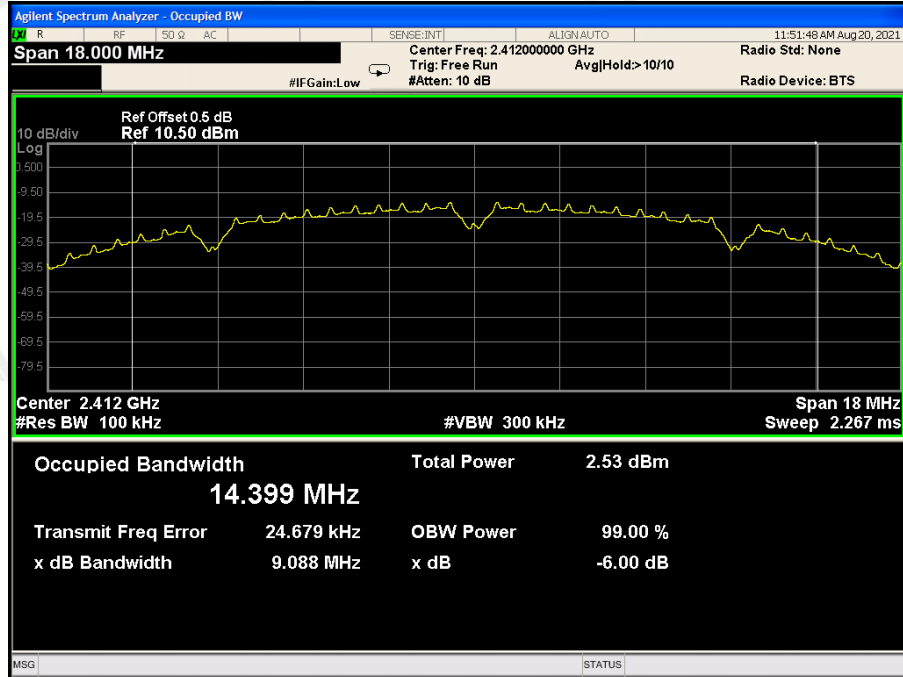
Same as Radiated Emission Measurement

6.4 Test Result

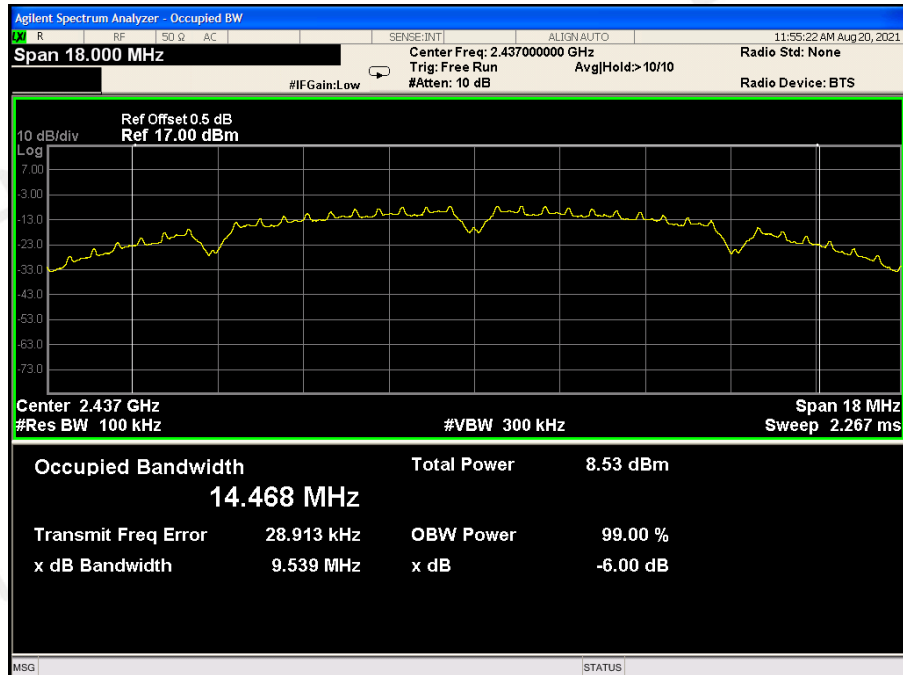
PASS

TX 802.11b Mode			
Frequency (MHz)	6dB Bandwidth (MHz)	Channel Separation (MHz)	Result
2412	9.088	$\geq 500\text{KHz}$	PASS
2437	9.539	$\geq 500\text{KHz}$	PASS
2462	9.083	$\geq 500\text{KHz}$	PASS

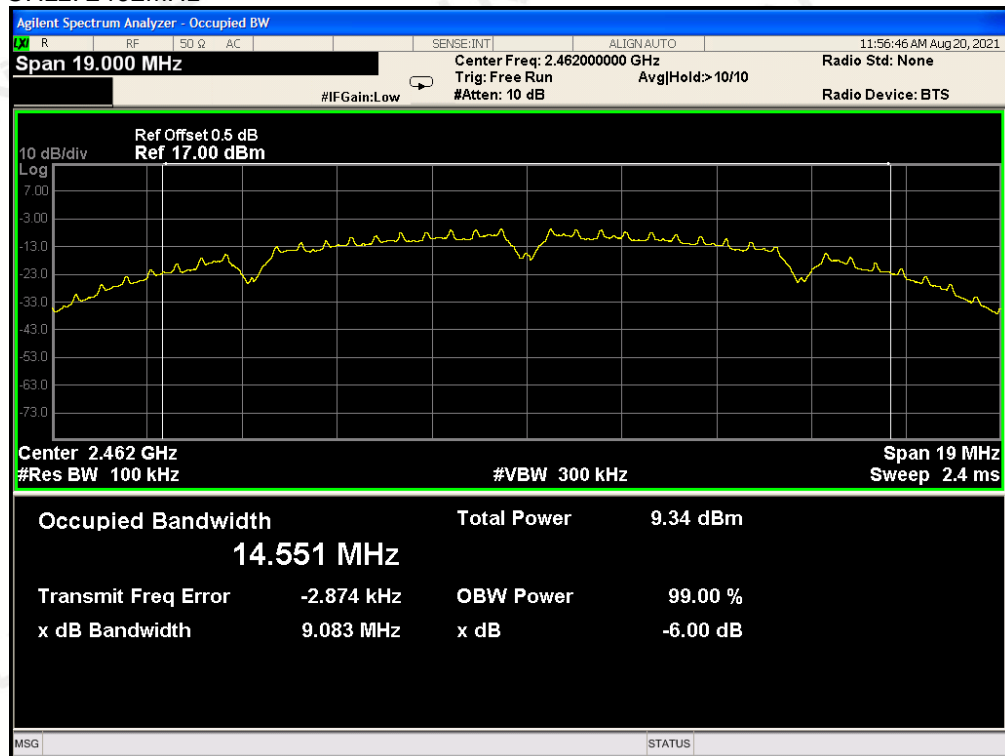
CH01: 2412MHz



CH06: 2437MHz

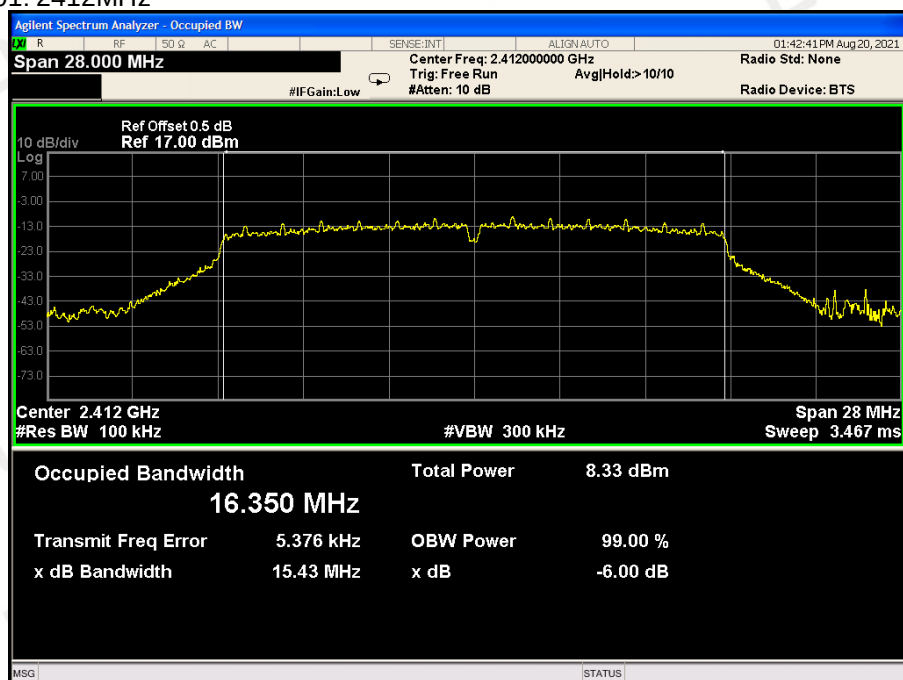


CH11: 2462MHz

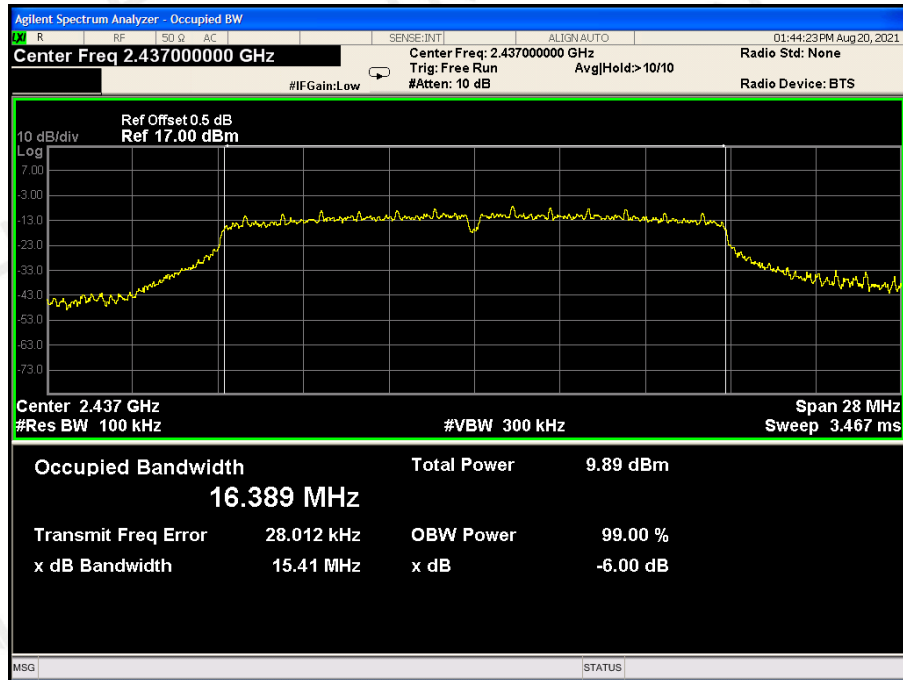


TX 802.11g Mode			
Frequency (MHz)	6dB Bandwidth (MHz)	Channel Separation (MHz)	Result
2412	15.43	>=500KHz	PASS
2437	15.41	>=500KHz	PASS
2462	15.31	>=500KHz	PASS

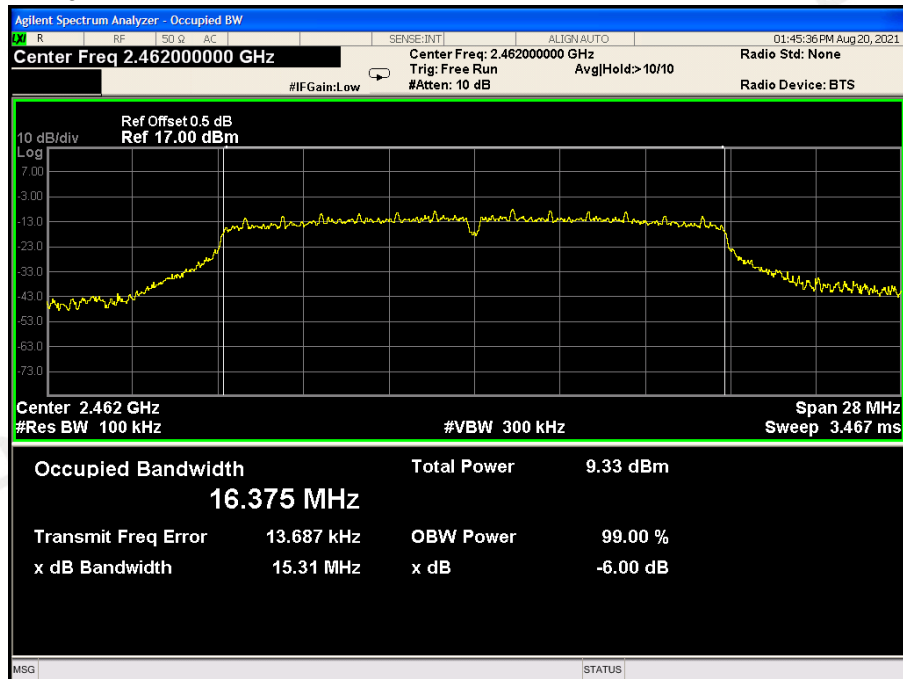
CH01: 2412MHz



CH06: 2437MHz

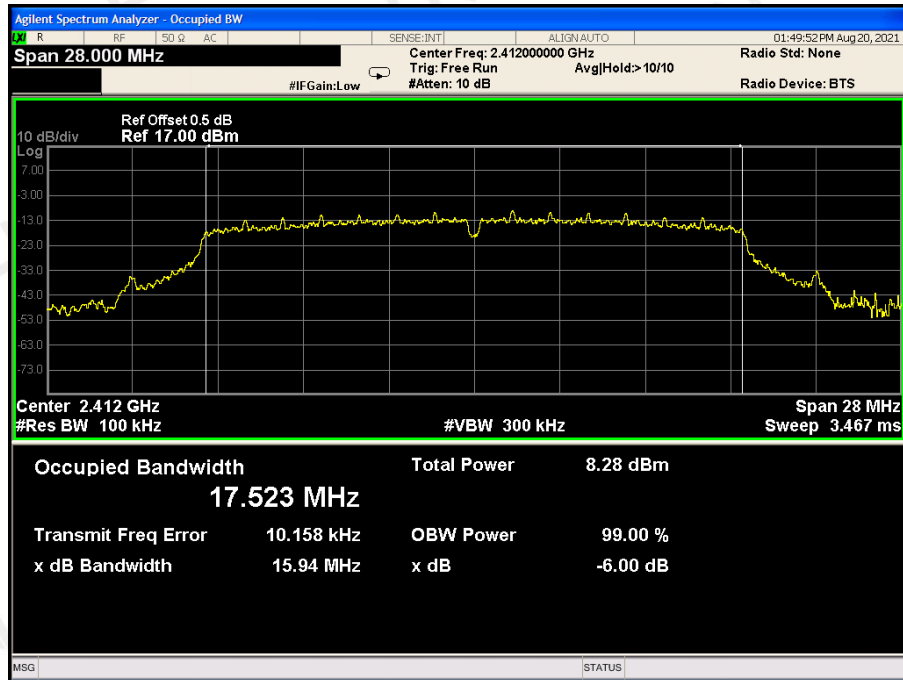


CH11: 2462MHz

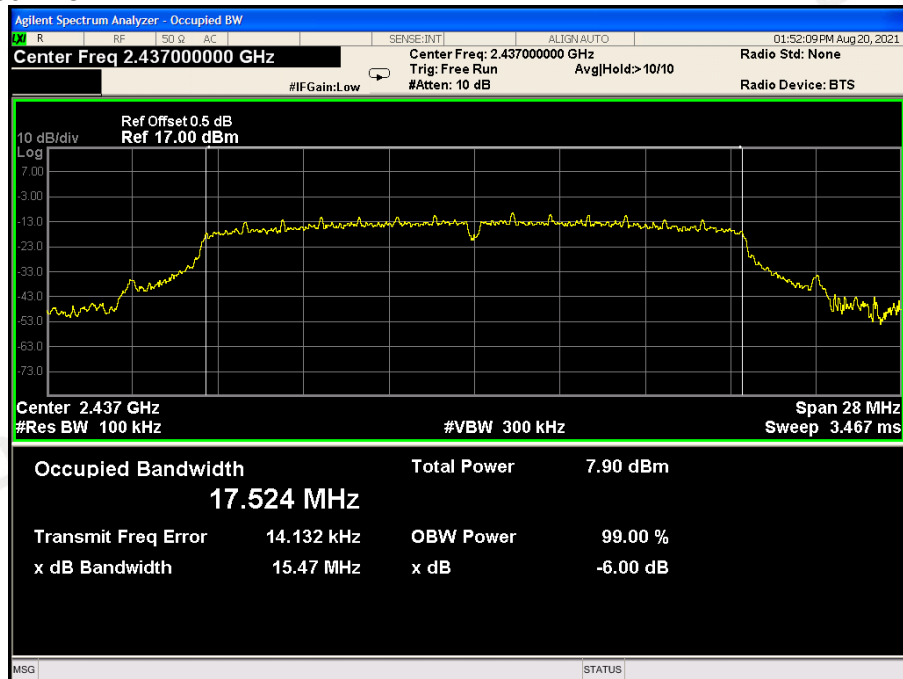


TX 802.11n20 Mode			
Frequency (MHz)	6dB Bandwidth (MHz)	Channel Separation (MHz)	Result
2412	15.94	>=500KHz	PASS
2437	15.47	>=500KHz	PASS
2462	15.34	>=500KHz	PASS

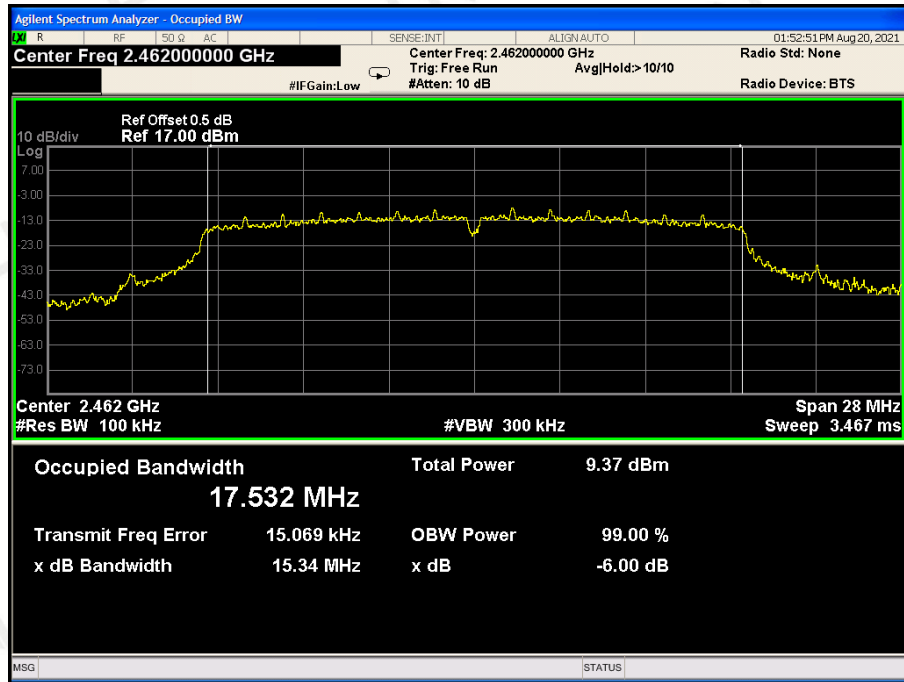
CH01: 2412MHz



CH06: 2437MHz

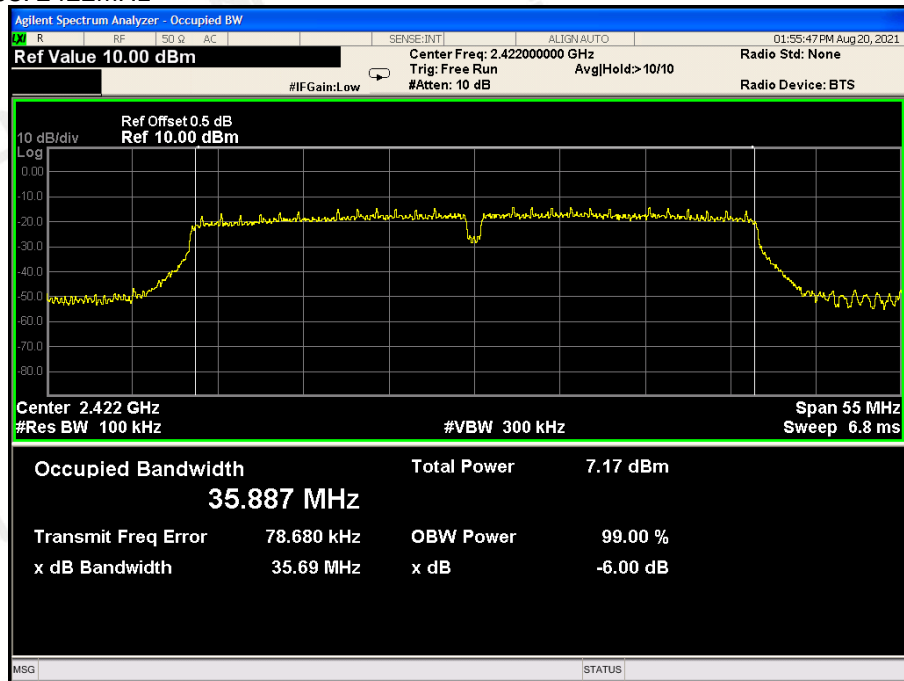


CH11: 2462MHz

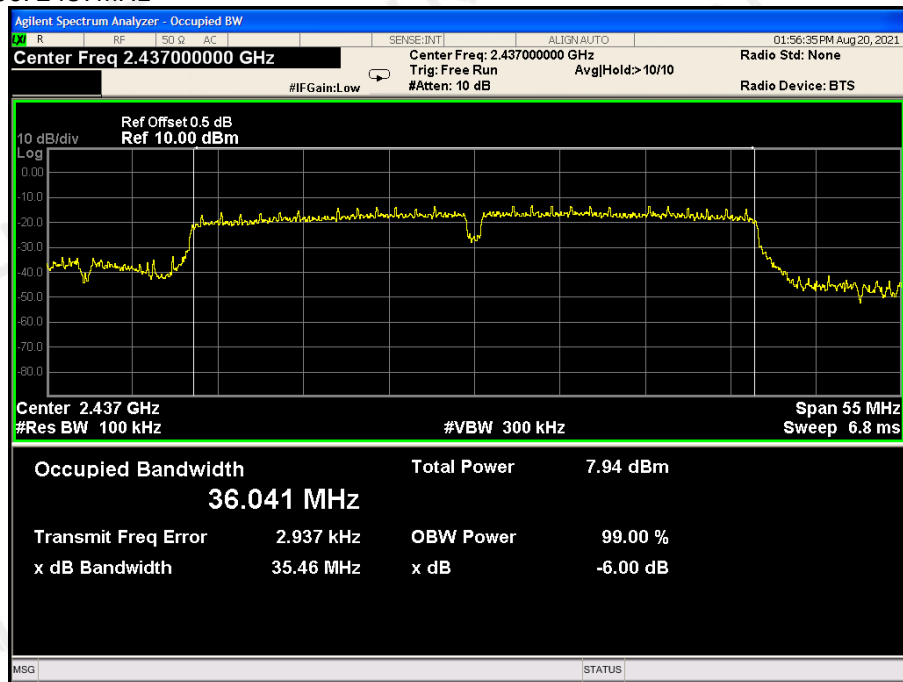


TX 802.11n40 Mode			
Frequency (MHz)	6dB Bandwidth (MHz)	Channel Separation (MHz)	Result
2422	35.69	>=500KHz	PASS
2437	35.46	>=500KHz	PASS
2452	35.46	>=500KHz	PASS

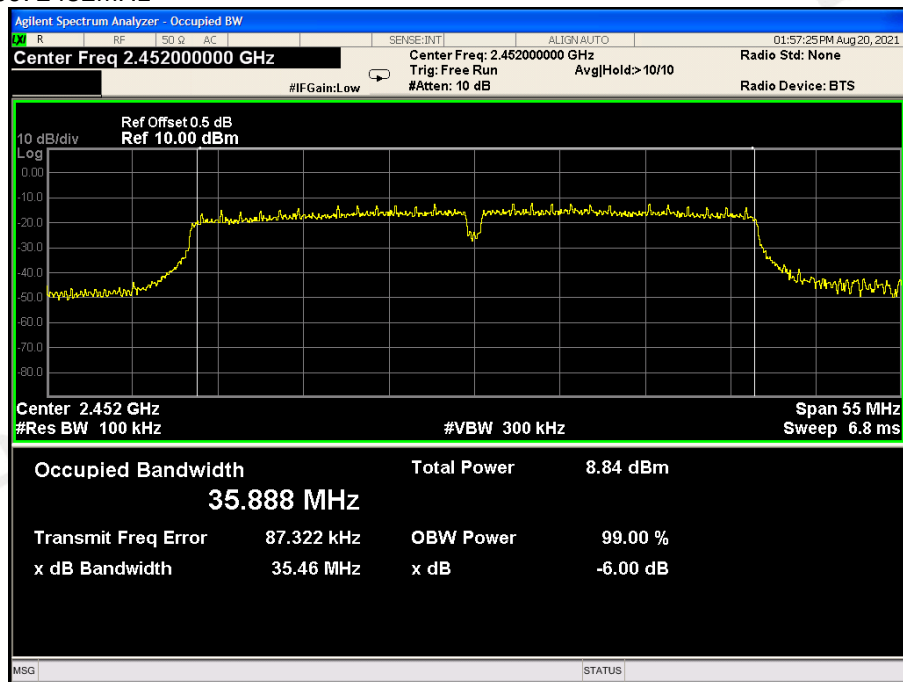
CH03: 2422MHz



CH06: 2437MHz



CH09: 2452MHz



7 POWER SPECTRAL DENSITY TEST

7.1 Test Limit

FCC Part15(15.247), Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e)	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

7.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation.
3. Based on FCC Part15 C Section 15.247: RBW=3KHz, VBW=10KHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyzer with peak detector.

7.3 Measurement Equipment Used

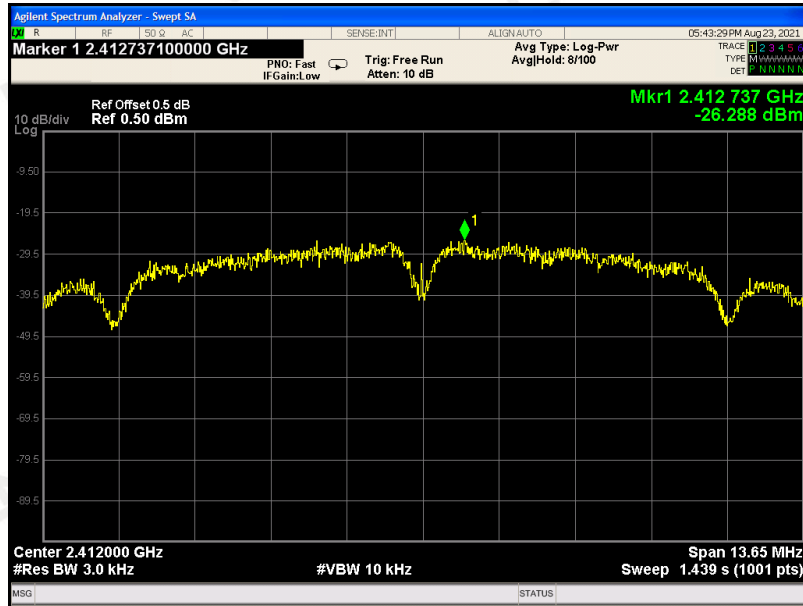
Same as Radiated Emission Measurement

7.4 Test Result

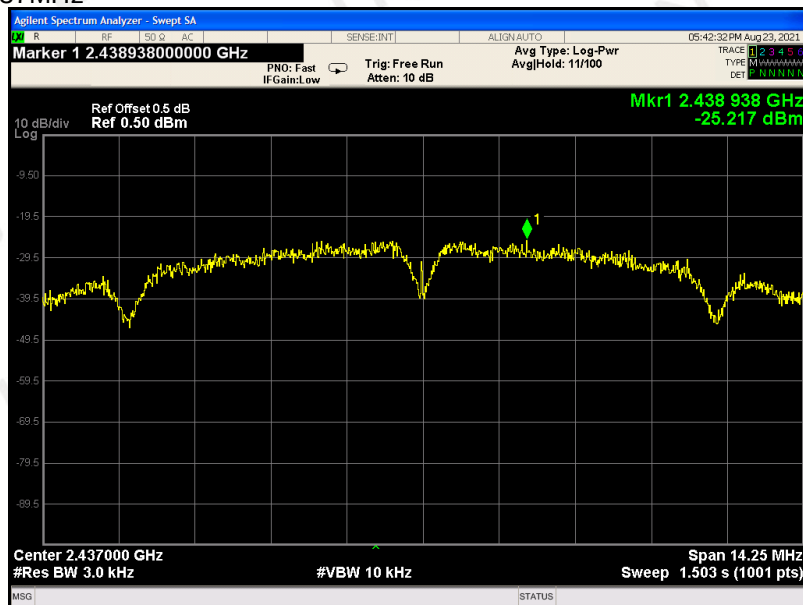
PASS

TX 802.11b Mode			
Frequency (MHz)	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
2412	-26.288	8	PASS
2437	-25.217	8	PASS
2462	-23.974	8	PASS

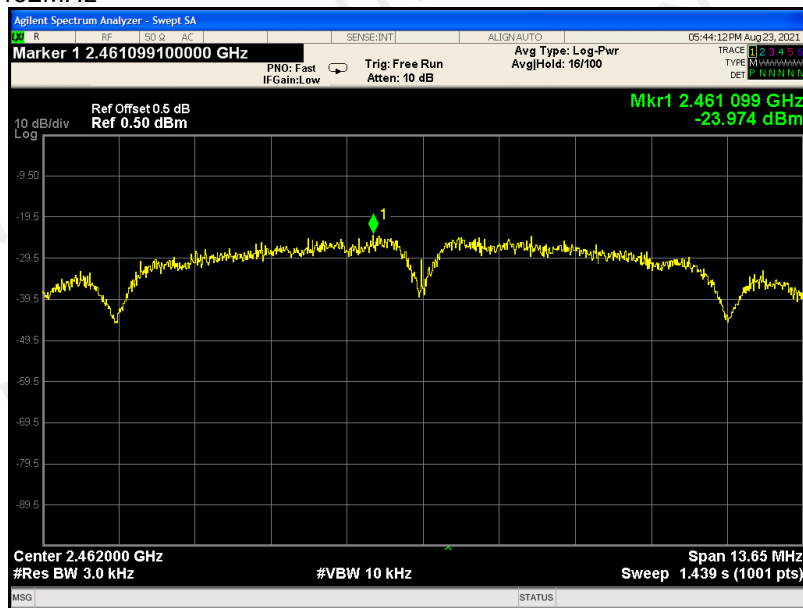
CH1: 2412MHz



CH6: 2437MHz

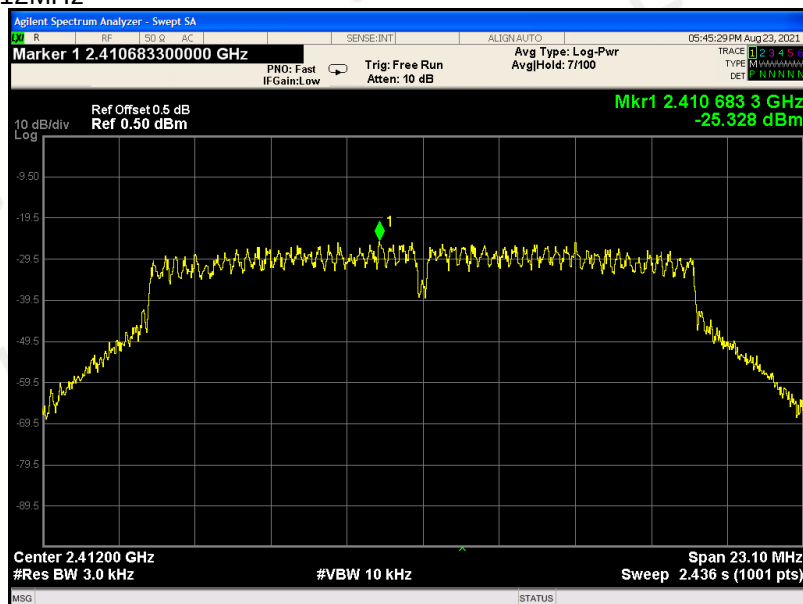


CH11: 2462MHz

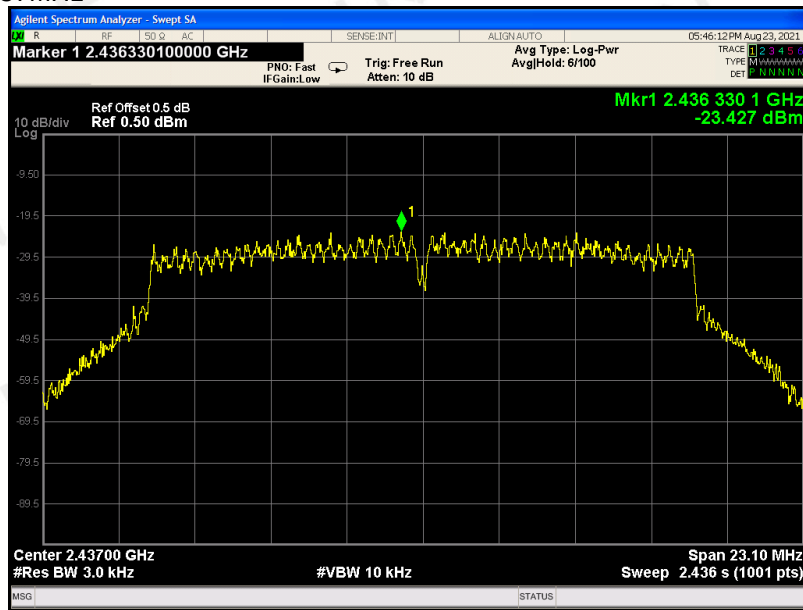


TX 802.11g Mode			
Frequency (MHz)	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
2412	-25.328	8	PASS
2437	-23.427	8	PASS
2462	-21.363	8	PASS

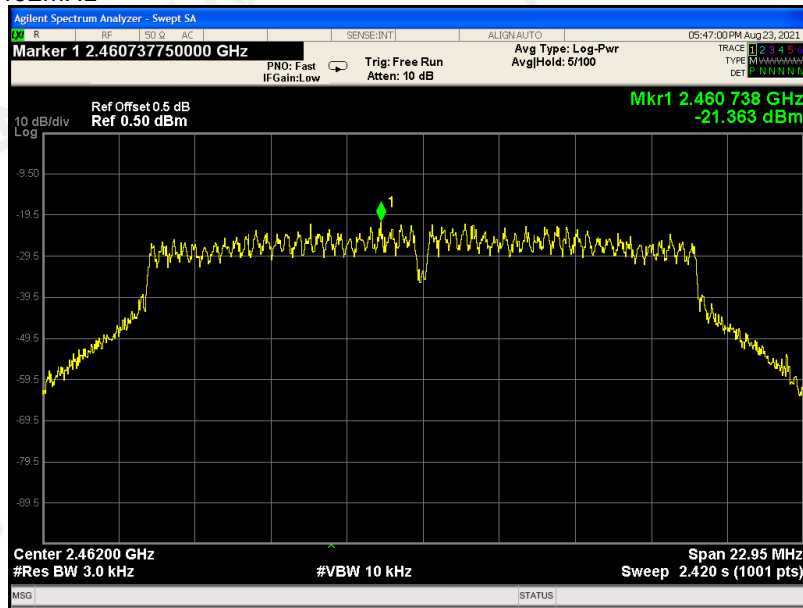
CH1: 2412MHz



CH6: 2437MHz

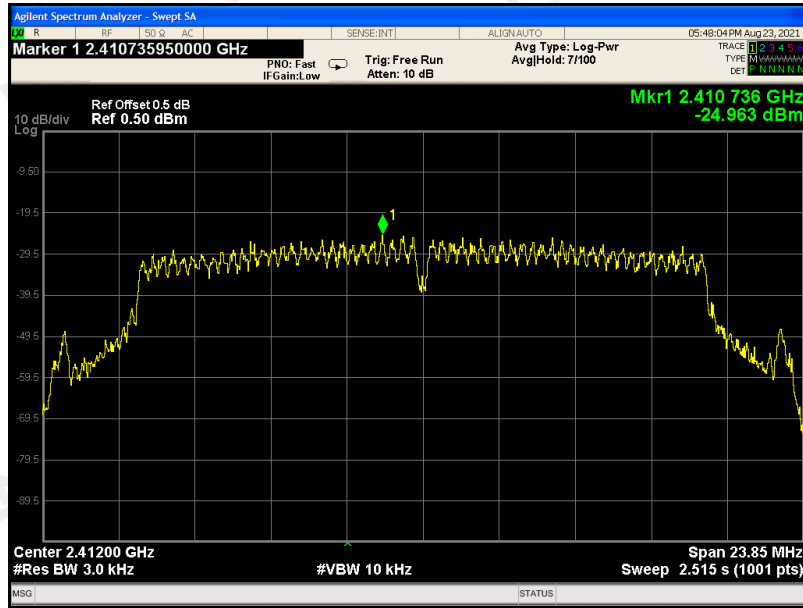


CH11: 2462MHz

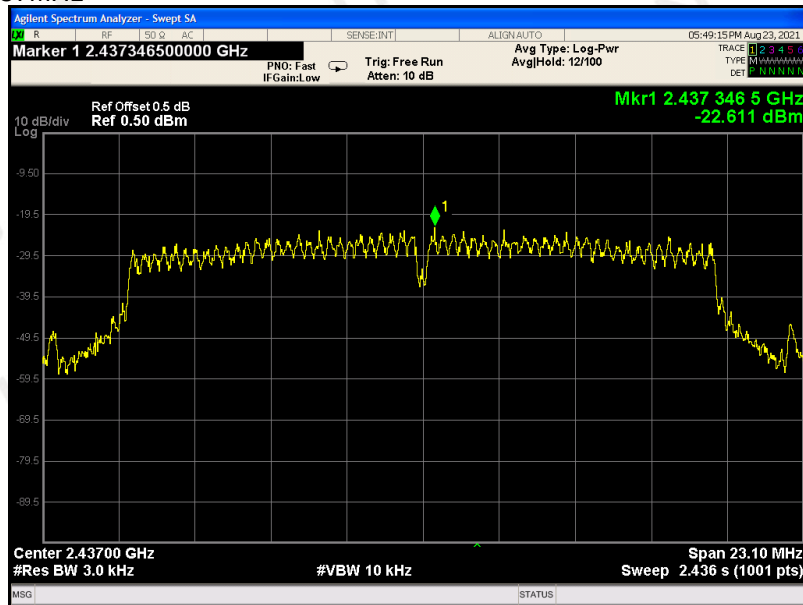


TX 802.11n20 Mode			
Frequency (MHz)	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
2412	-24.963	8	PASS
2437	-22.611	8	PASS
2462	-21.699	8	PASS

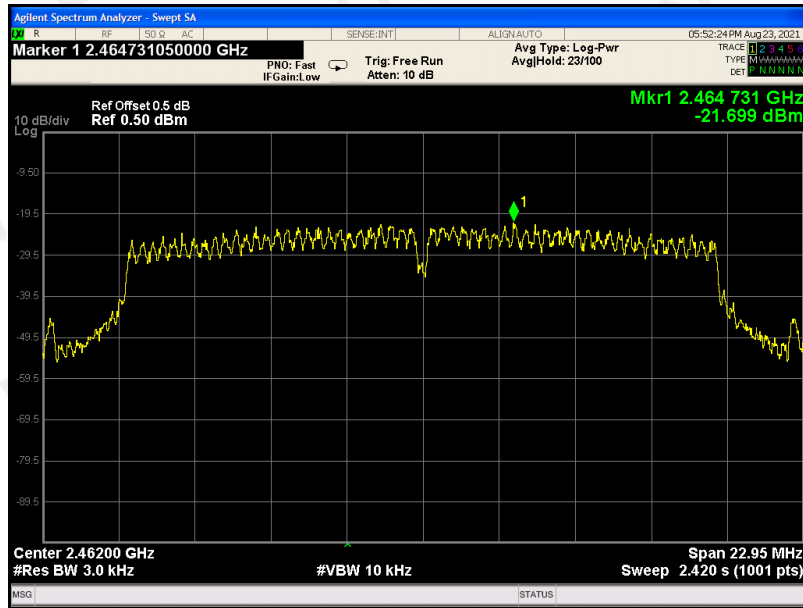
CH1: 2412MHz



CH6: 2437MHz

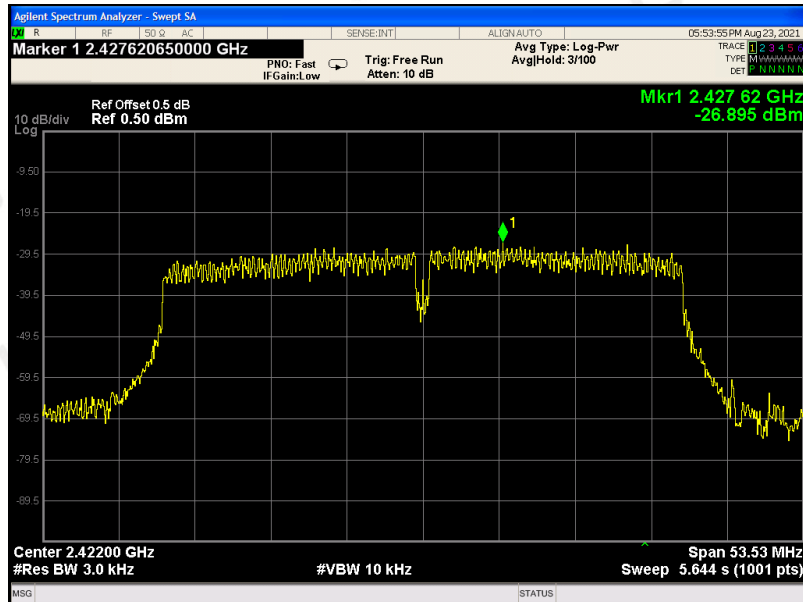


CH11: 2462MHz

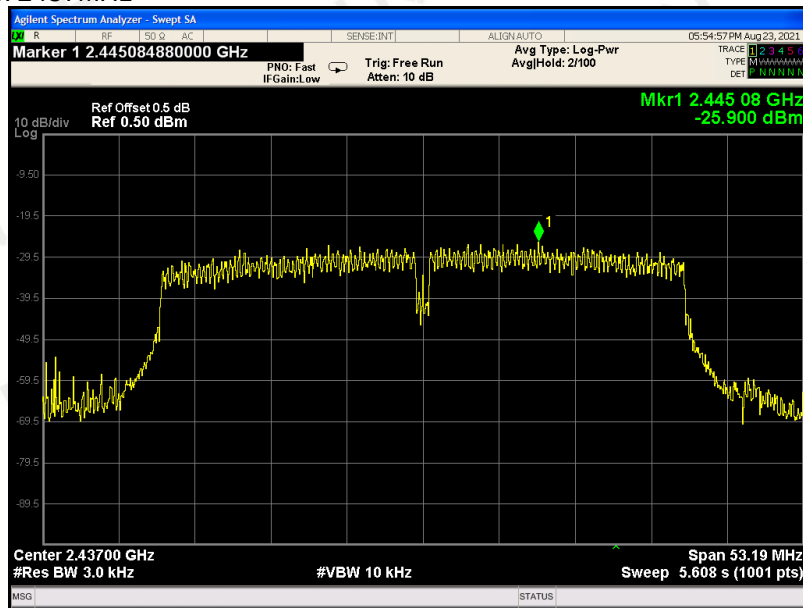


TX 802.11n40 Mode			
Frequency (MHz)	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
2422	-26.895	8	PASS
2437	-25.900	8	PASS
2452	-24.609	8	PASS

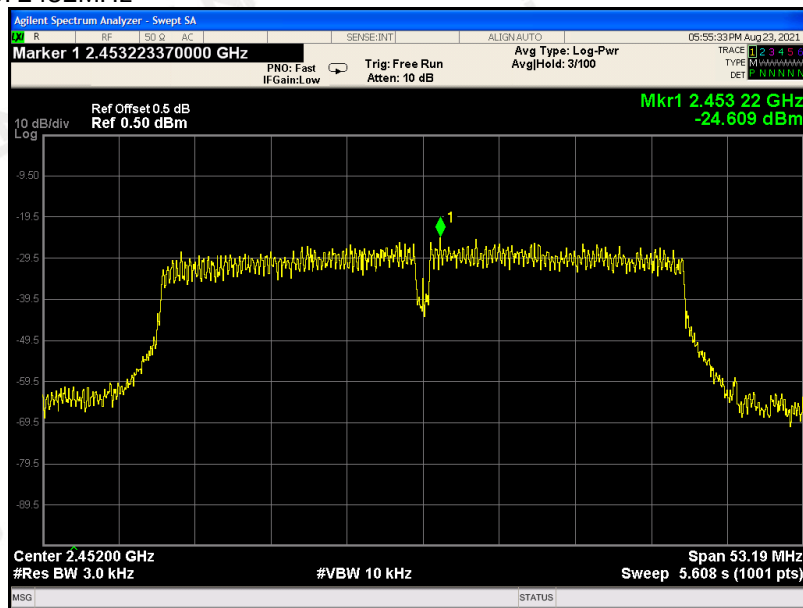
CH3: 2422MHz



CH6: 2437MHz



CH9: 2452MHz



8 PEAK OUTPUT POWER TEST

8.1 Test Limit

FCC Part15(15.247), Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

8.2 Test Procedure

For average power test:

1. Connect EUT RF output port to power sensor through an RF attenuator.
2. Connect the power sensor to the PC.
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Record the maximum power from the software.

Note : The EUT was tested according to ANSI C63.10 (2013) for compliance to FCC 47CFR 15.247 requirements.

8.3 Test Result

PASS

All the test modes completed for test.

TX 802.11b Mode			
Test	Frequency	Maximum Peak Conducted Output Power	LIMIT
Channel	(MHz)	(dBm)	(dBm)
CH01	2412	7.55	30
CH06	2437	8.85	30
CH11	2462	9.74	30
TX 802.11g Mode			
CH01	2412	6.02	30
CH06	2437	7.53	30
CH11	2462	9.26	30
TX 802.11n20 Mode			
CH01	2412	6.15	30
CH06	2437	7.22	30
CH11	2462	8.52	30
TX 802.11n40 Mode			
CH03	2422	7.57	30
CH06	2437	8.09	30
CH09	2452	9.09	30

9 OUT OF BAND EMISSIONS TEST

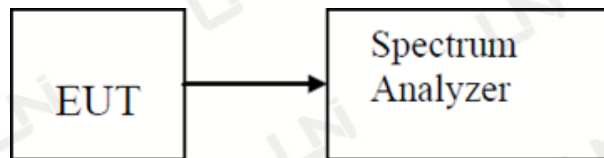
9.1 Test Limit

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.

9.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as TX operation and connect directly to the spectrum analyzer.
3. Based on FCC Part15 C Section 15.247: RBW=100KHz, VBW=300KHz.
4. Set detected by the spectrum analyzer with peak detector.

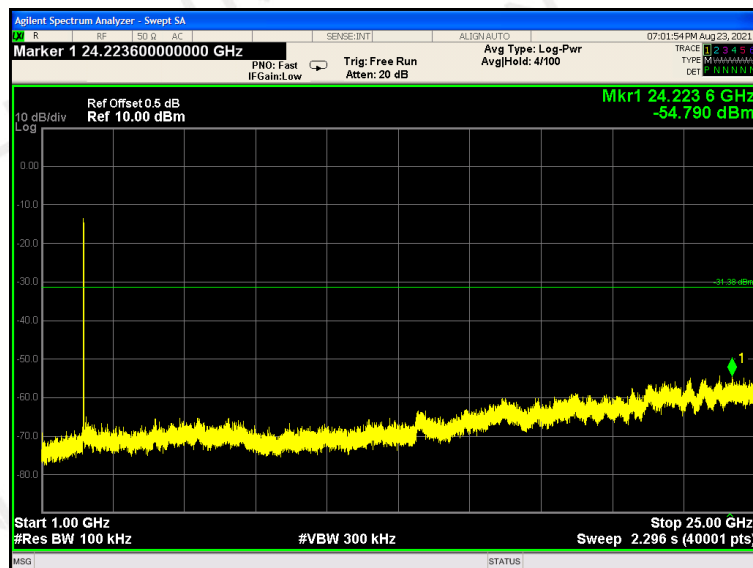
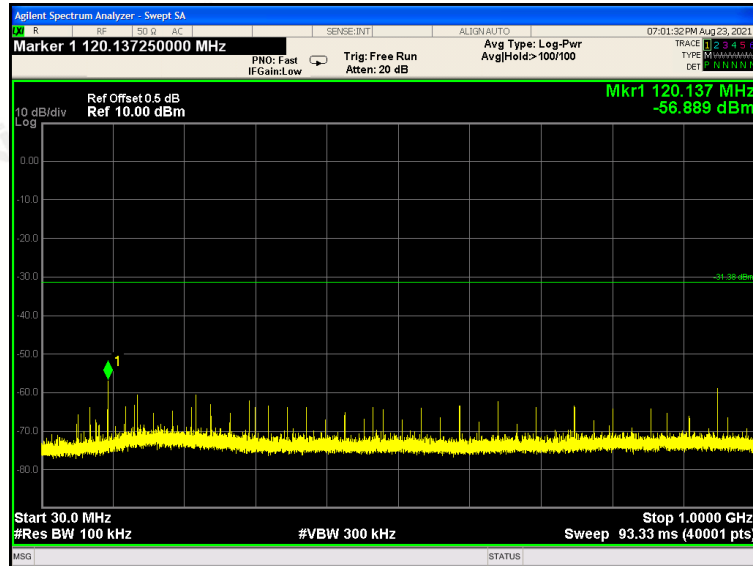
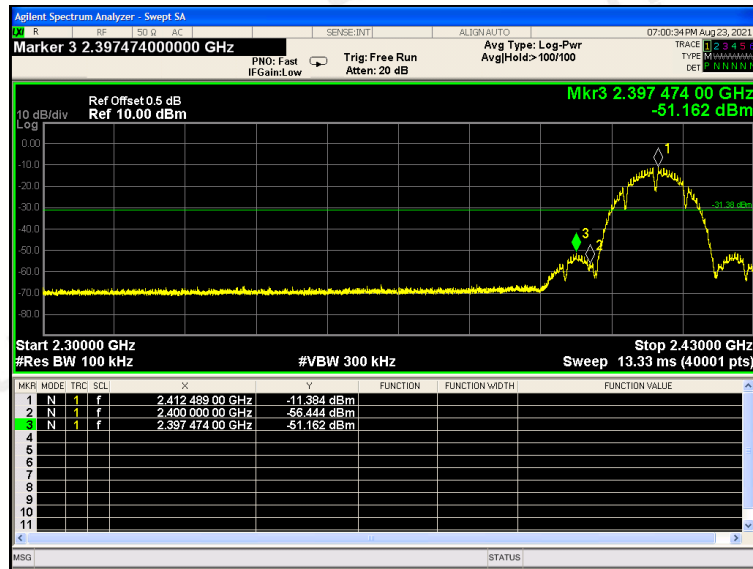
9.3 Test Setup



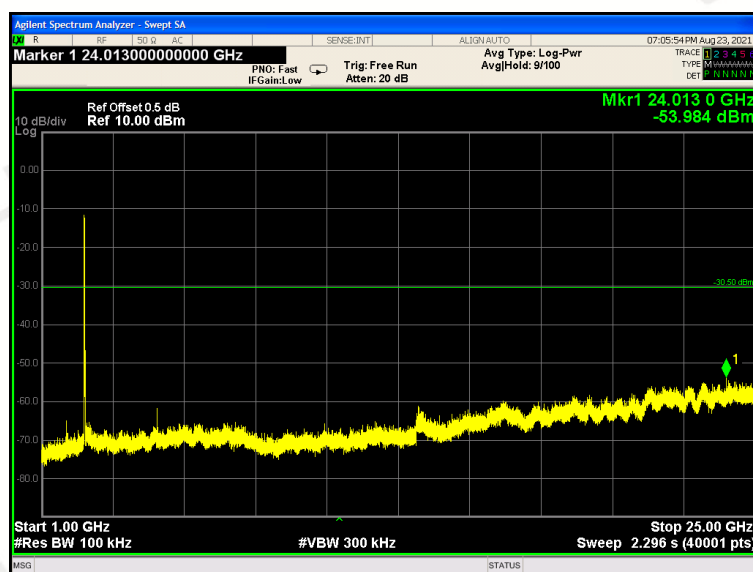
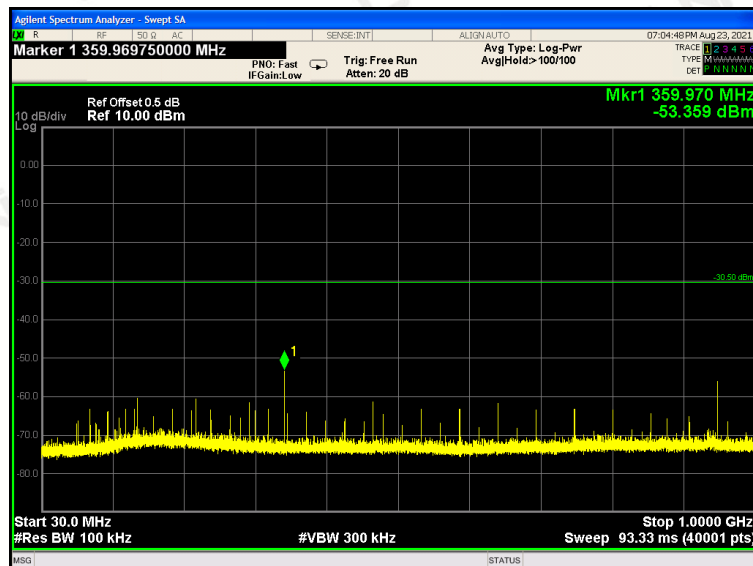
9.4 Test Result

PASS

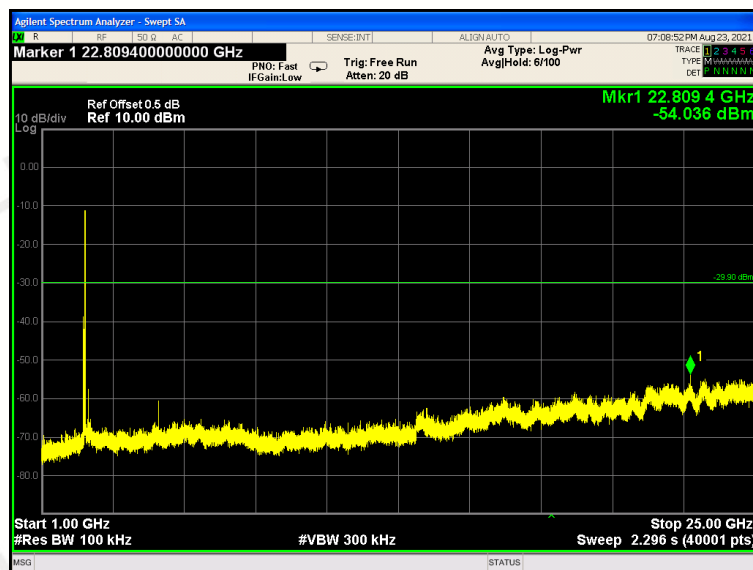
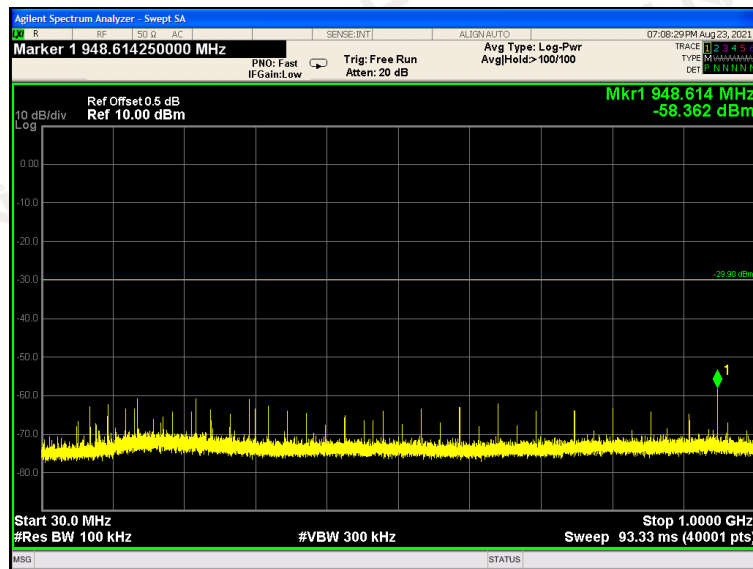
TX 802.11b Mode
CH1: 2412MHz



CH6: 2437MHz

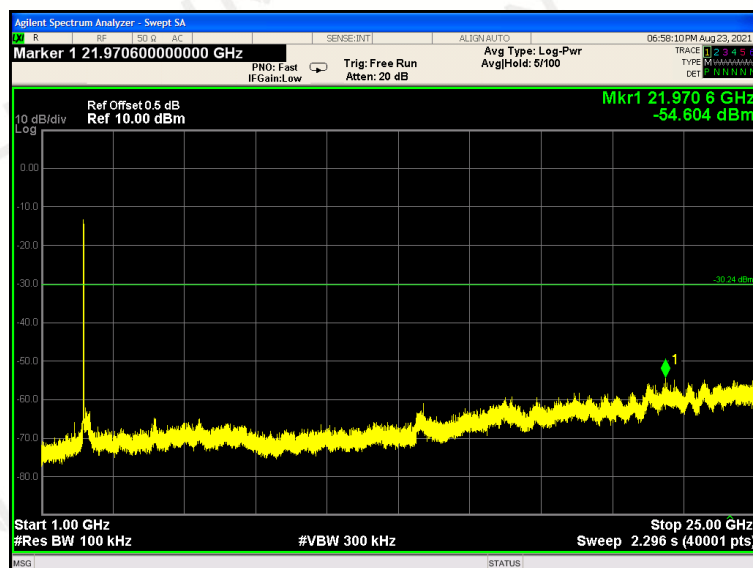
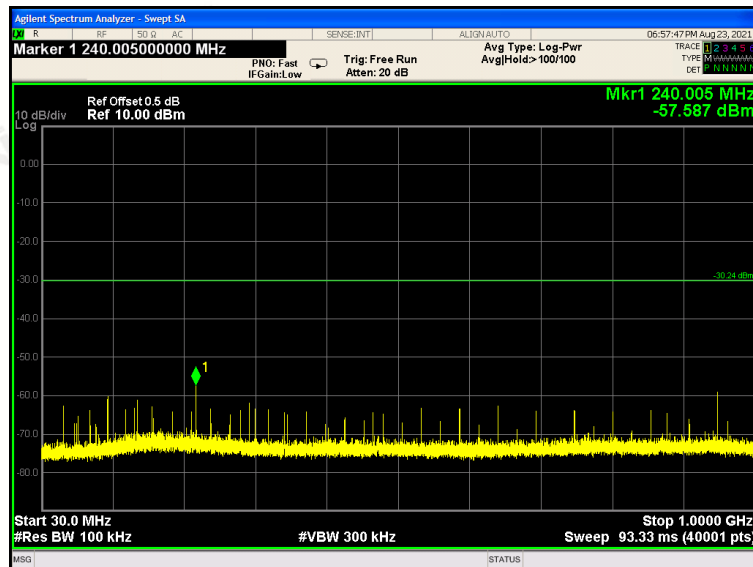
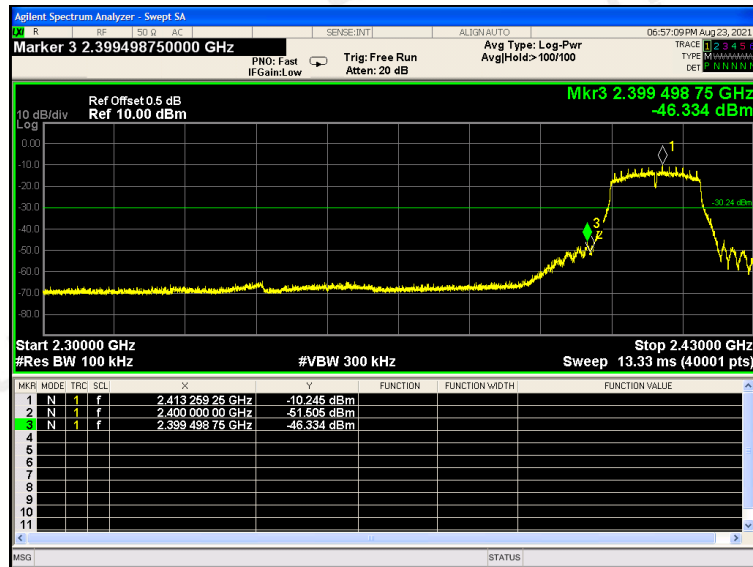


CH11: 2462MHz

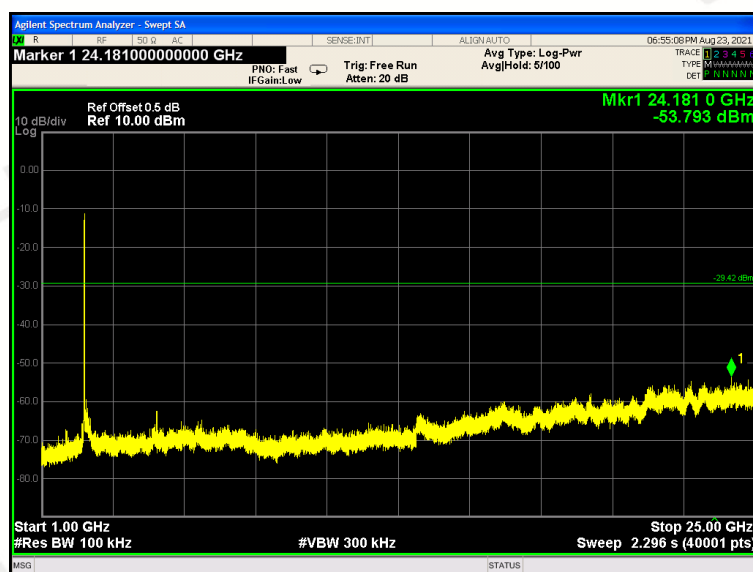
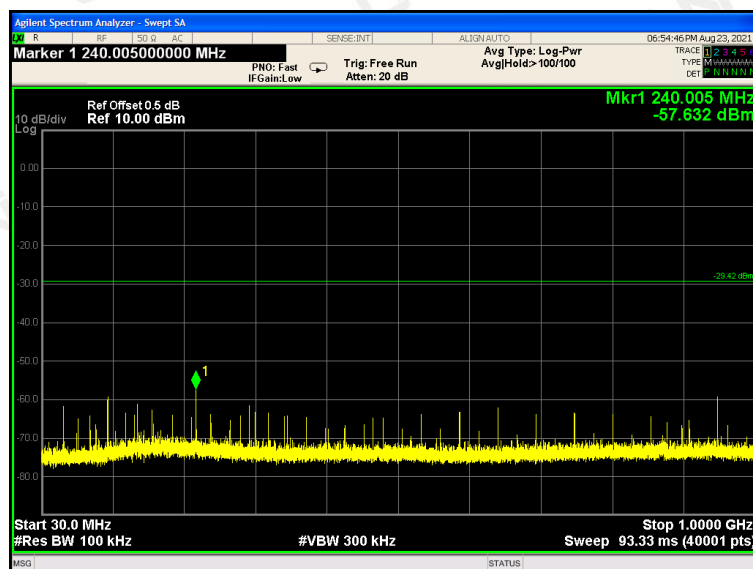


TX 802.11g Mode

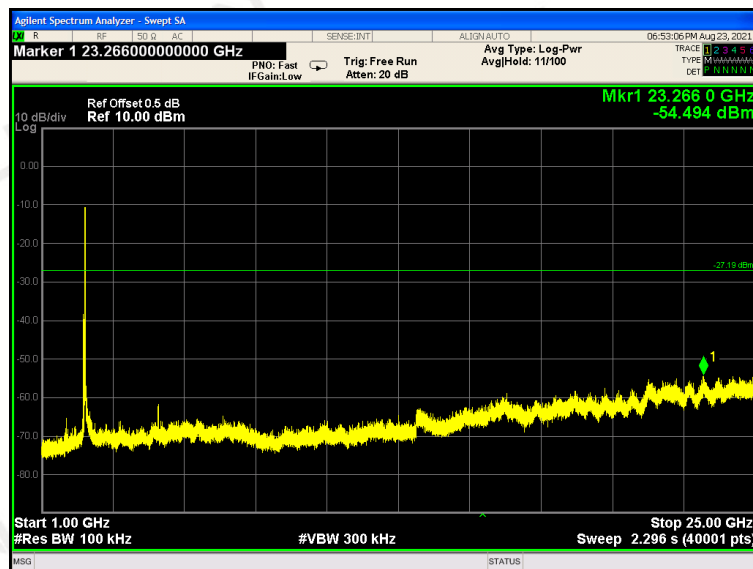
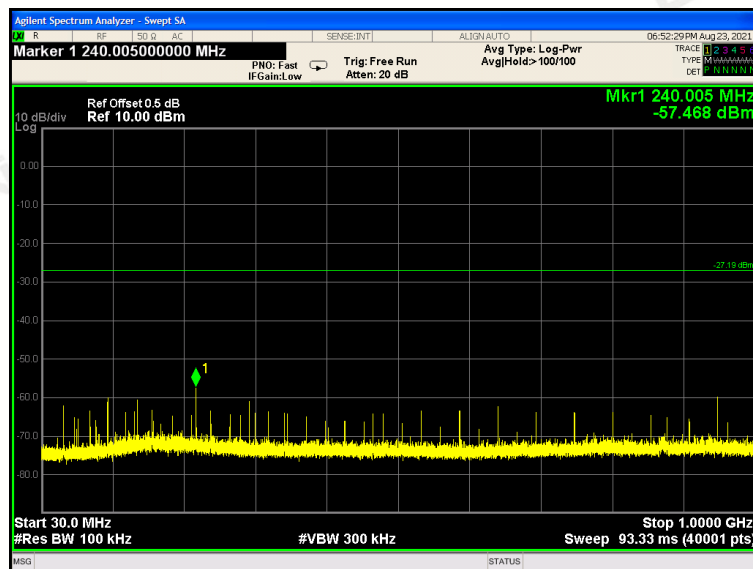
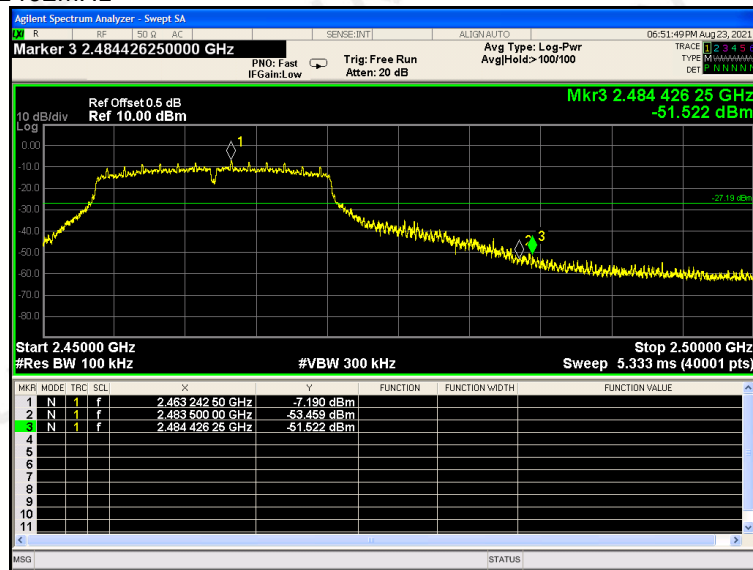
CH1: 2412MHz



CH6: 2437MHz

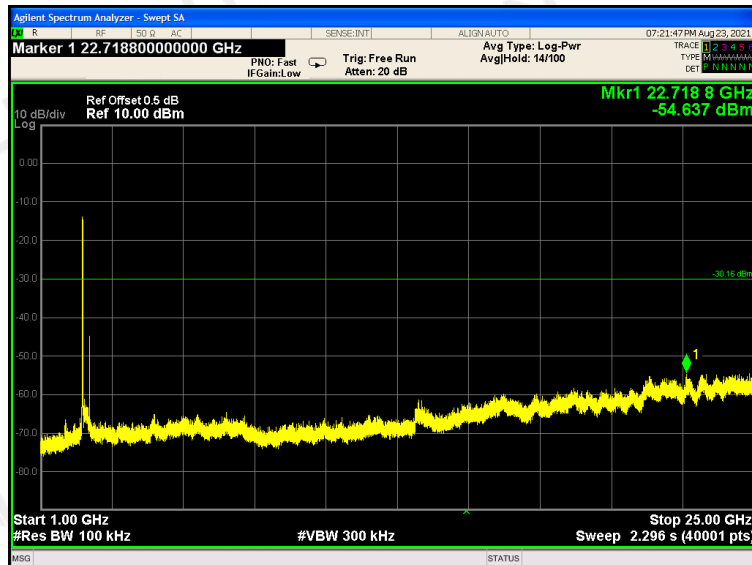
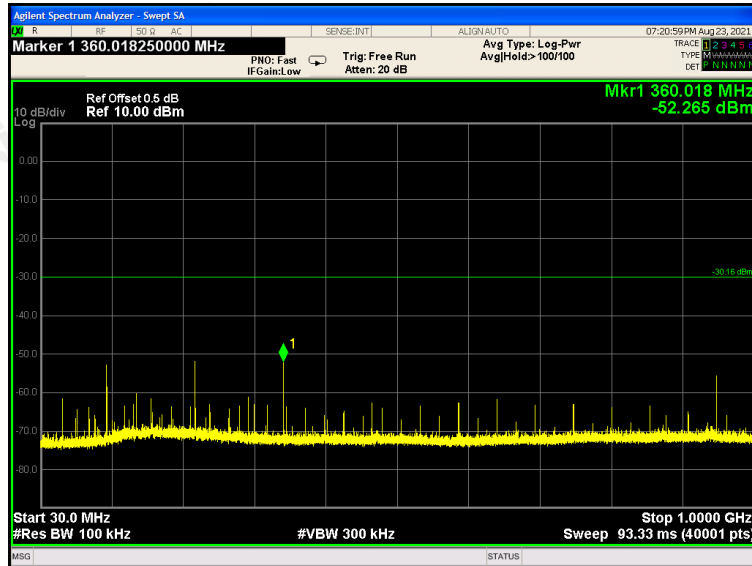
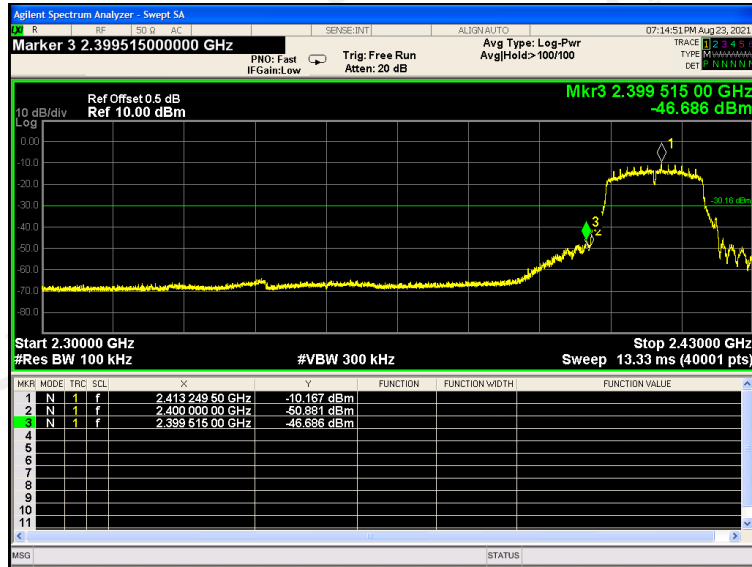


CH11: 2462MHz

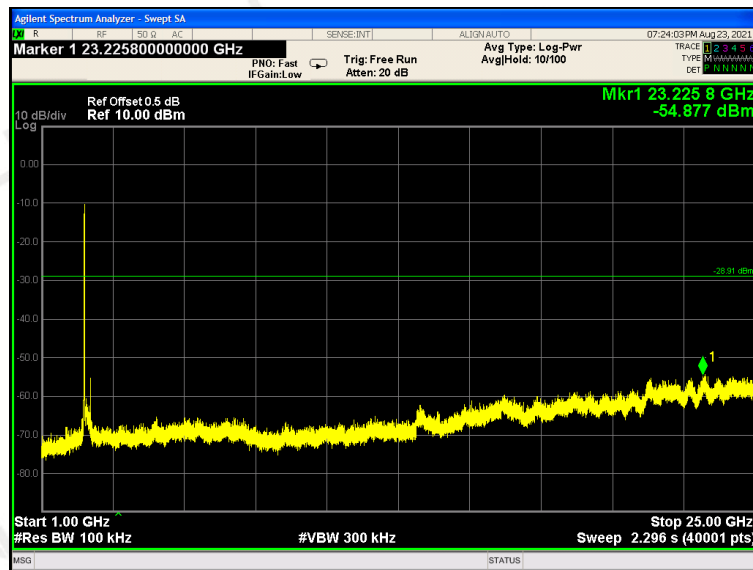
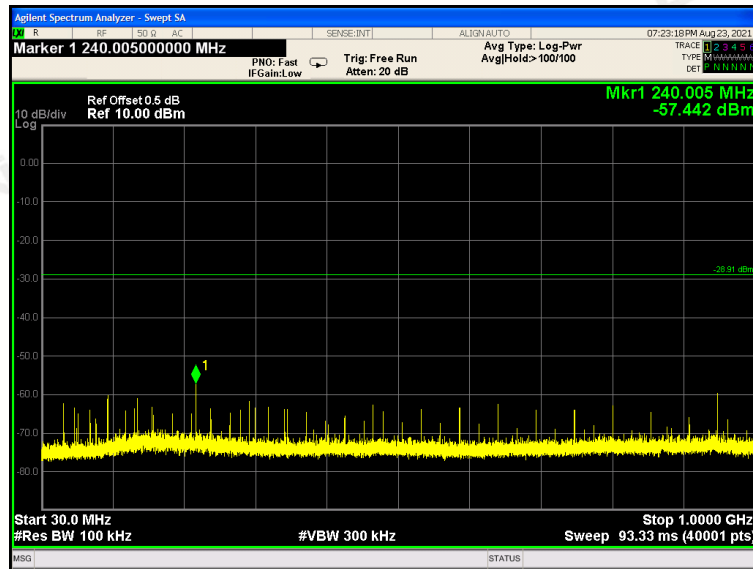


TX 802.11n20 Mode

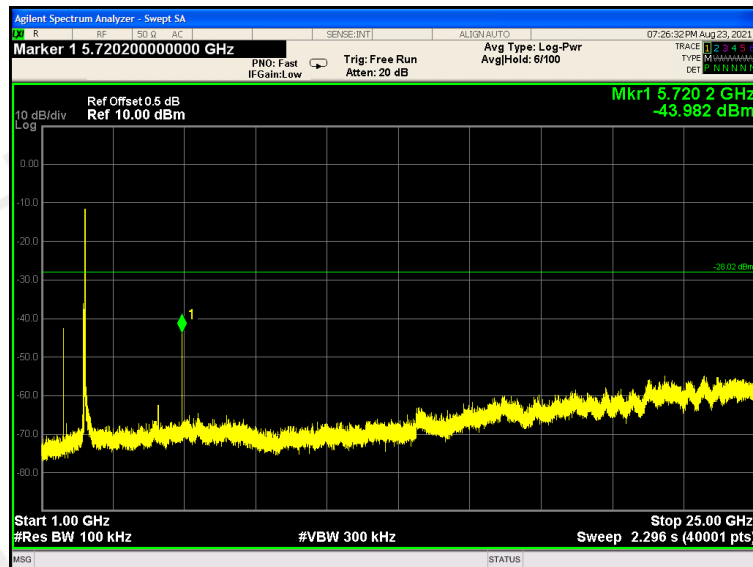
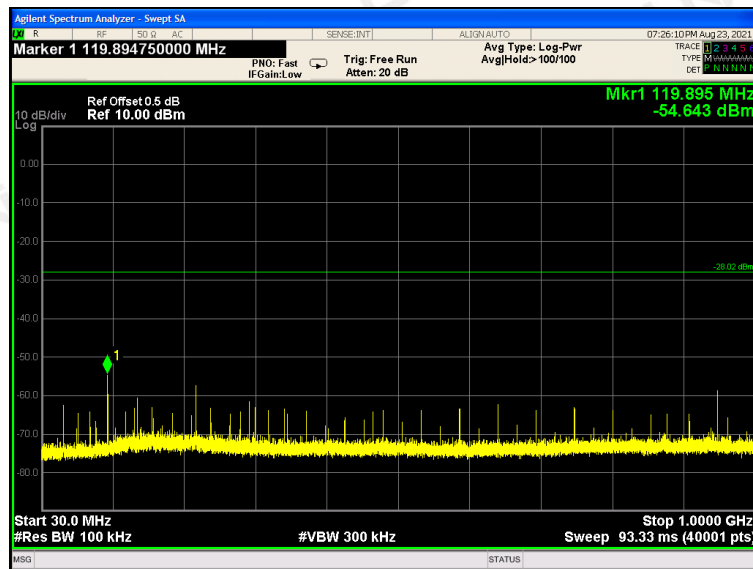
CH1: 2412MHz



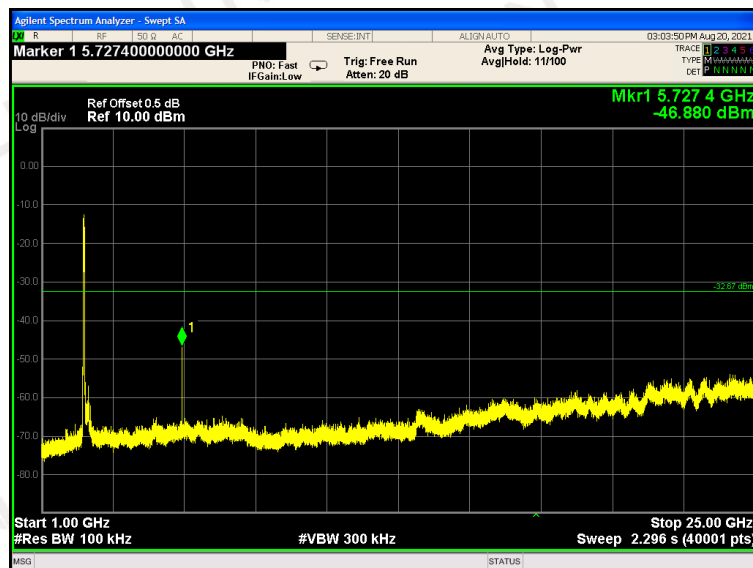
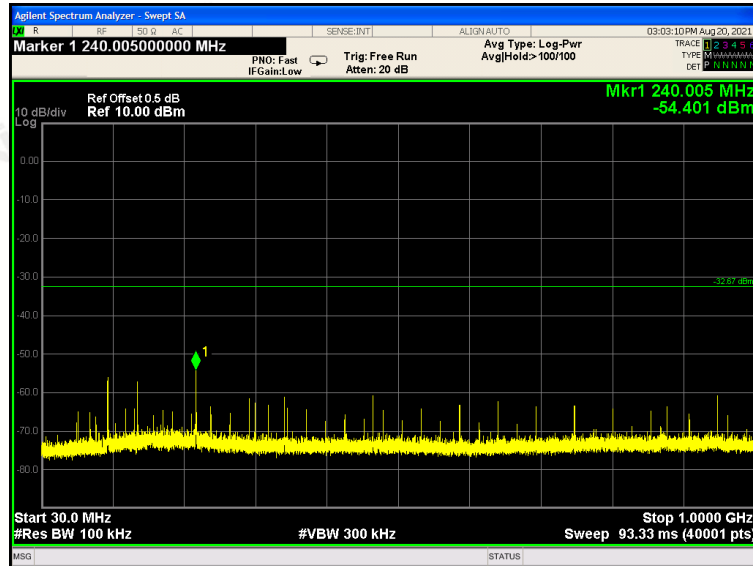
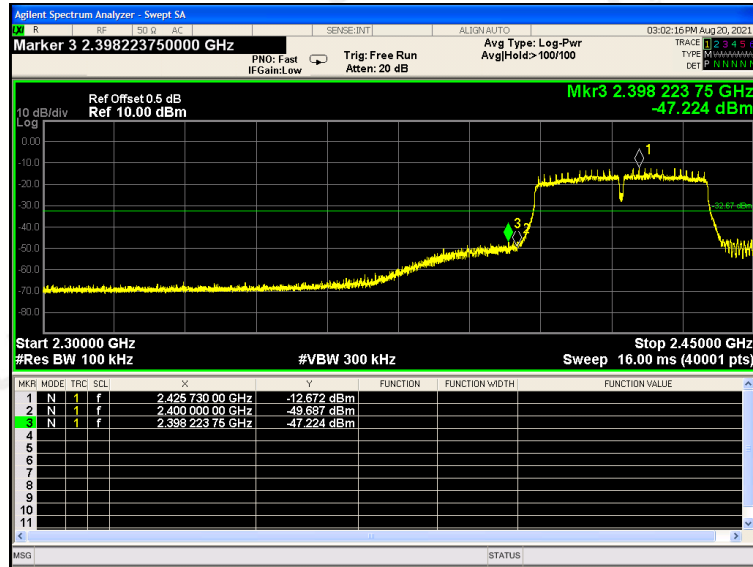
CH6: 2437MHz



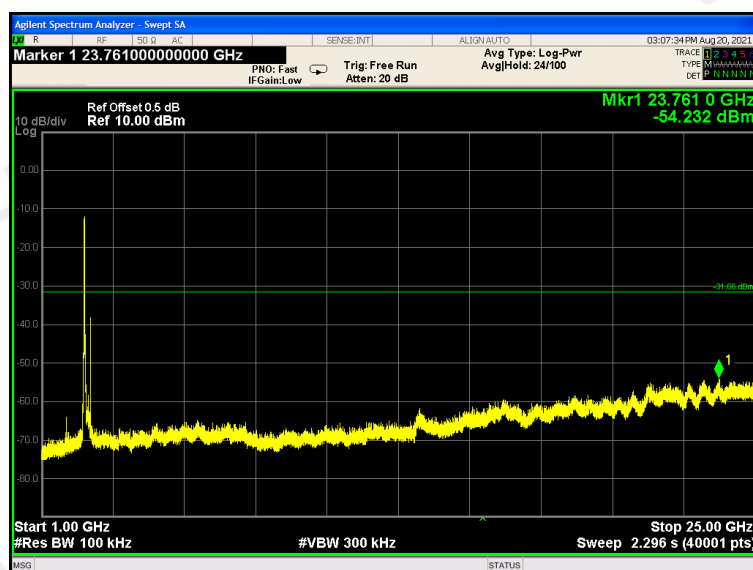
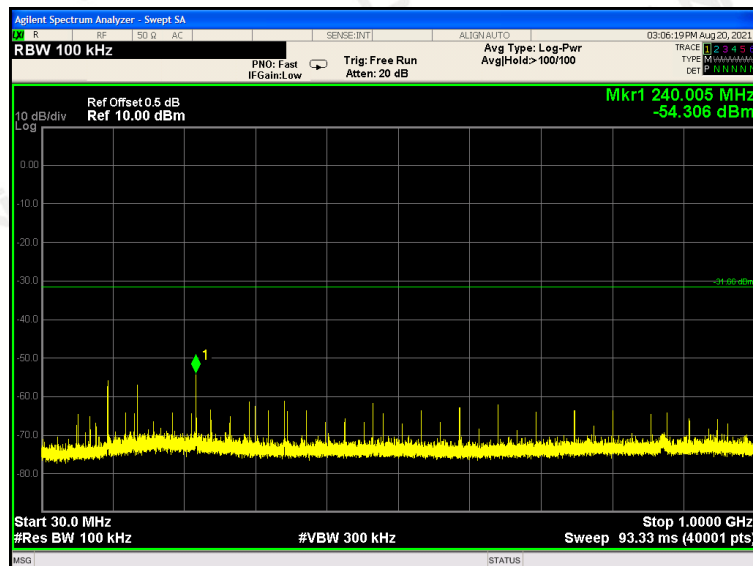
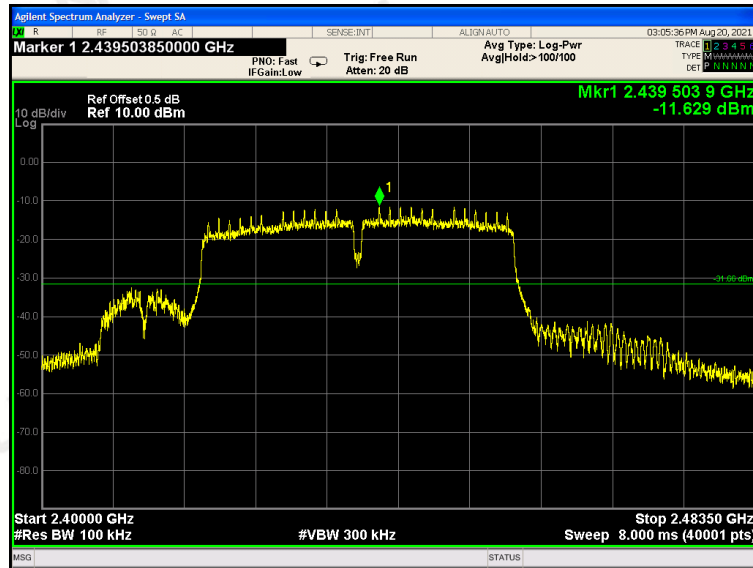
CH11: 2462MHz



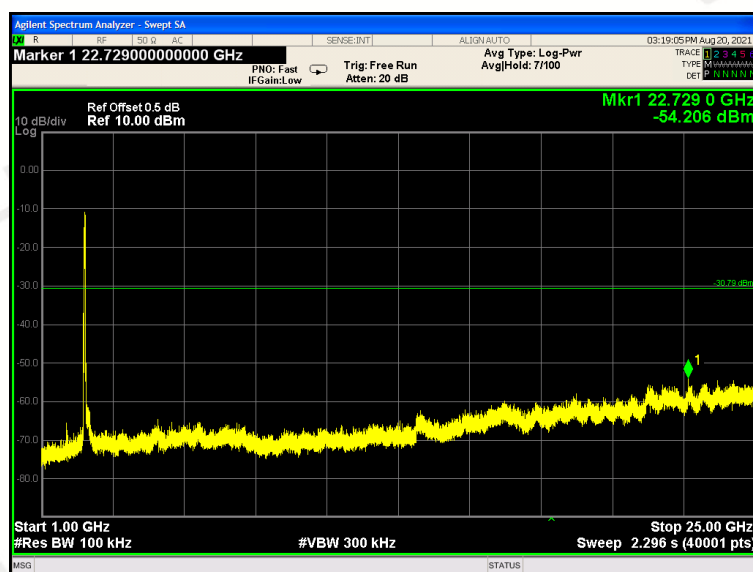
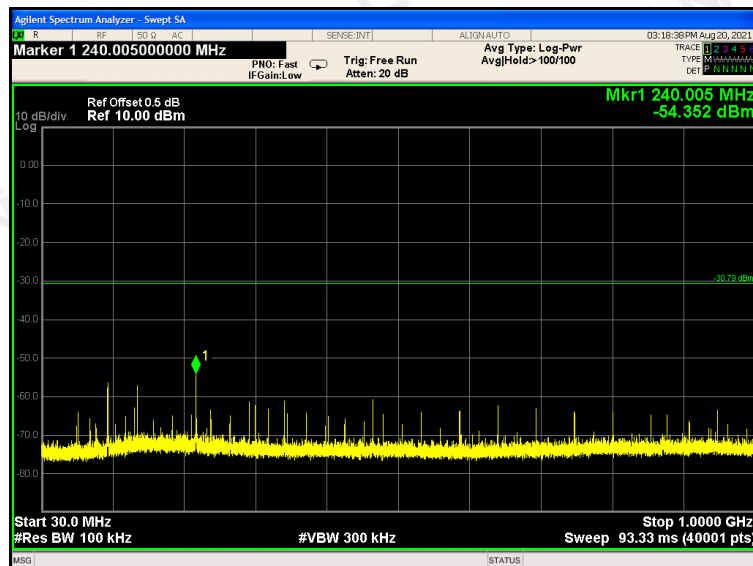
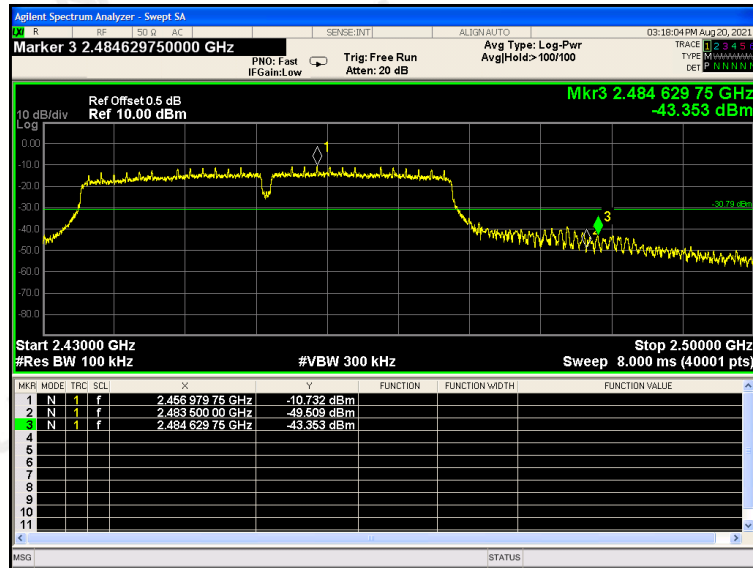
TX 802.11n40 Mode
CH3: 2422MHz



CH6: 2437MHz



CH9: 2452MHz



10 ANTENNA REQUIREMENT

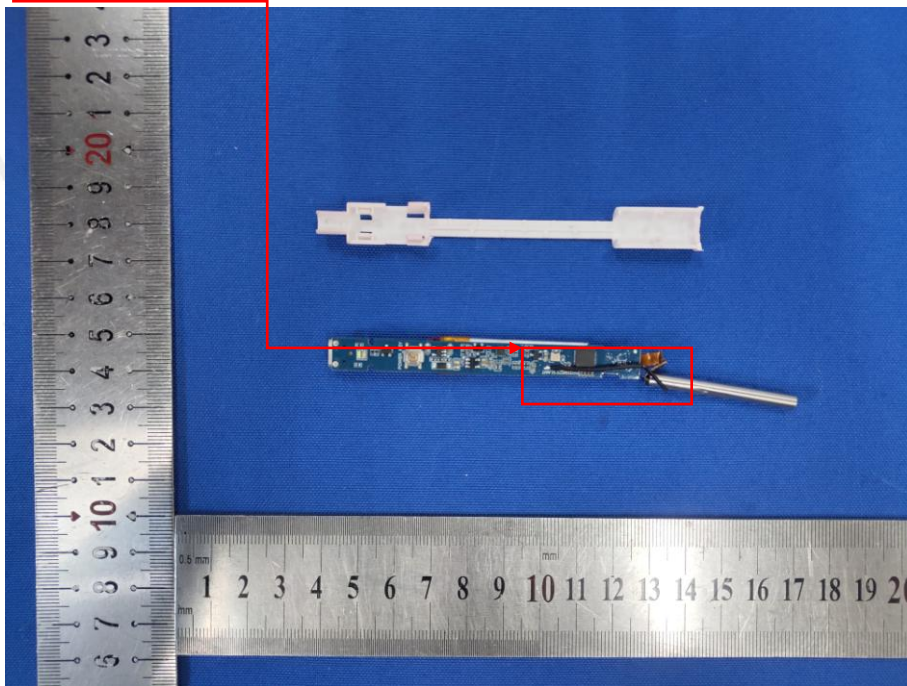
Standard Applicable:

For intentional device, according to FCC 47 CFR Section 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.

Antenna Connected Construction

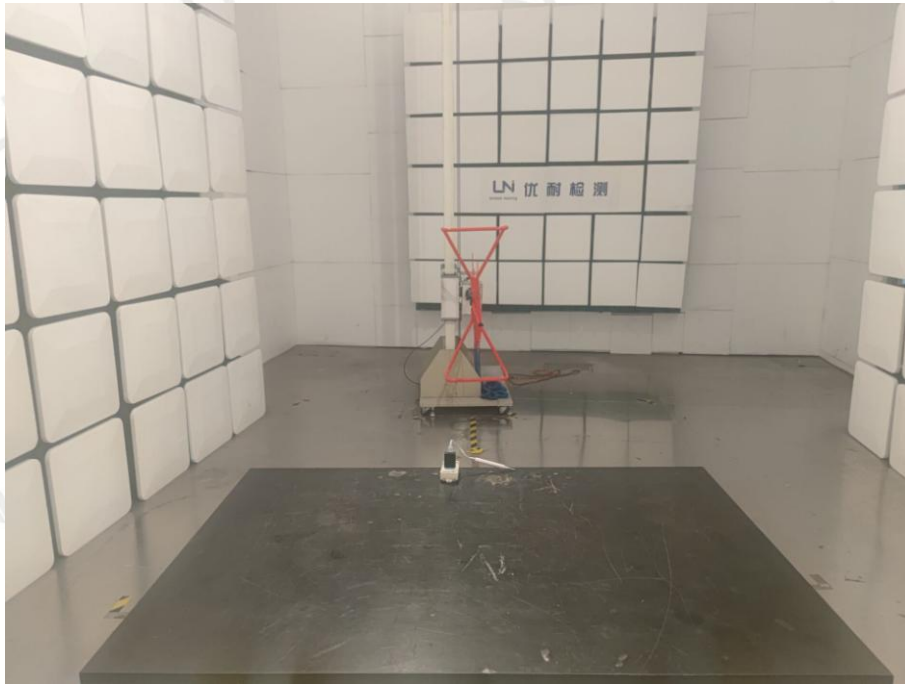
The antenna used is a PCB antenna, For Conducted Test method, a temporary antenna connector is provided by the manufacture. (Provided by non-manufacturers will use the product can not work), considered a special connector accepted by the FCC to comply with rule part 15.203. Please see EUT photos for details, it comply with the standard requirement. The gain of antenna used for transmitting is 1dBi.

ANTENNA:



11 PHOTOGRAPH OF TEST

11.1 Radiated Emission



11.2 Conducted Emission



End of Report

Statement

1. This report must have the signature of the authorized signatory and the special seal of the report, otherwise it will be considered invalid. If there is no anti-counterfeiting electronic seal of the laboratory in the report in PDF format or it is displayed as "x", the report is invalid.
2. This report shall not be modified, added or deleted without authorization.
3. The results of this report are only valid for the EUT provided by Applicant to our laboratory for inspection (That is, EUT received by our laboratory. Without special explanation, it refers to the samples presented in the report "Sample Photo(s)").
4. If there is any objection to the test data and conclusions of this report, please submit it in writing within 10 working days after the date of issuance of the report.
5. Without the written consent of the laboratory, this report shall not be copied (except for full copy), nor shall it be used as publicity materials or advertising.
6. The cover of the report is for decoration only, not included in the body of the report.
7. The paper report issued by our laboratory has the same effect as the electronic report. In case of any difference between the two, the electronic report shall prevail.
8. The Chinese and English reports issued by our laboratory have the same effect. In case of any difference in understanding, the Chinese version shall prevail.
9. Please provide the complete report documents issued by our laboratory when inquiring the report.
10. For cases where compliance is determined based on test values, when relevant specifications, standards, documents, and customers have no relevant requirements and no other special instructions, the test report issued by this laboratory is carried out in full value and adopts ILAC-G8:09 /2019 "Simple Acceptance Rule" for judgment.
11. In the People's Republic of China, when there is no CMA Accredited Symbol in this report, the report is only for scientific research, teaching or internal quality control activities.