



FCC Part 15E Test Report

FCC ID: 2AU7O-FT1821CE

Applicant: Shenzhen Phaten Technology Co., Ltd.

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Manufacturer: Shenzhen Phaten Technology Co., Ltd.

Address: 602, Building 1, Aidimengtuo Industrial Park, 4th Industrial Zone, Matian Street, Guangming District, Shenzhen

EUT: Wireless network adapter

Trade Mark: N/A

Model Number: FT1821CEV2, FT1821CE-20PW5A22D1, LK-A51

Date of Receipt: Nov. 25, 2022

Test Date: Nov. 25, 2022 - Dec. 10, 2022

Date of Report: Dec. 10, 2022

Prepared By: Shenzhen DL Testing Technology Co., Ltd.

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Applicable Standards: FCC PART 15 E 15.407
ANSI C63.10:2013

Test Result: Pass

Report Number: DL-20221210003E

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This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Shenzhen DL Testing Technology Co., Ltd.



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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.407) , Subpart E			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.407(b), 15.209	Radiated Spurious Emission	PASS	
15.407 (b)	Band Edge Emission	PASS	
15.407 (a)	Peak Output Power	PASS	
15.407 (a)	Power Spectral Density	PASS	
15.407(a)	26dB bandwidth and 99%dB Bandwidth	PASS	
15.407(g)	Frequency Stability	PASS	
15.407(c)	Transmission in case of Absence of Information	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

1.1 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$ providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 2.56\text{dB}$
2	RF power,conducted	$\pm 0.42\text{dB}$
3	Spurious emissions,conducted	$\pm 2.76\text{dB}$
4	All emissions,radiated(<1G)	$\pm 3.65\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$
8	Bandwidth	$\pm 0.2\text{MHz}$
9	Power Spectral Density	$\pm 2.45\text{dBm}$
10	Frequency Stability	$\pm 0.3\text{MHz}$
11	DUTY CYCLE	$\pm 0.53\text{dB}$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	Wireless network adapter
Trademark	N/A
Model No.:	FT1821CEV2, FT1821CE-20PW5A22D1, LK-A51
Model Difference	The product's different for model number.
Operation Frequency:	5180-5240MHz(802.11a/n/ac(HT20)) 5190-5230MHz(802.11n/ac(HT40)) 5210MHzMHz (802.11ac(HT80))
Channel numbers:	See channel list
Channel separation:	20MHz/40MHz/80MHz
Modulation technology:	802.11a: OFDM 802.11n(20/40): OFDM 802.11ac(20/40/80):OFDM
Rate of Transmitter	802.11a: 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps,54Mbps 802.11n: Up to 300Mbps 802.11ac: up to 867Mbps
Antenna Type:	External antenna
Antenna gain:	-4.62dBi
Power supply:	DC 3.3V from PC
Note:	The MIMO mode only support external External antenna1 and External antenna2 the 802.11n/ac mode, the Directional Gain= $-4.62\text{dBi}+10\log(2)=-1.62\text{dBi}$.

Note:

- 1.For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.The EUT's all information provided by client.



2. Channel List

Channel List for 802.11a/n(HT20)/ac(HT20)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
40	5200	48	5240

Channel List for 802.11n(HT40)/ac(HT40)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230

Channel List for 802.11ac(HT80)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
42	5210	/	/

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Description		
Pretest Mode	Channel	Band 1
Mode 1	802.11a/n/acHT20	CH36, CH44, CH48
Mode 2	802.11n/acHT40	CH38, CH46
Mode 3	802.11acHT80	CH42
Mode 4	Other	Link Mode
Mode 5	MIMO Mode	

For Radiated Emission		
Pretest Mode	Channel	Band 1
Mode 1	802.11a/n/acHT20	CH36, CH44, CH48
Mode 2	802.11n/acHT40	CH38, CH46
Mode 3	802.11acHT80	CH42
Mode 4	Other	Link Mode
Mode 5	MIMO Mode	

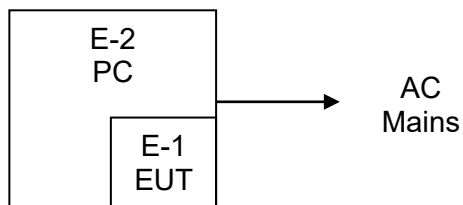
Note: 1. The measurements are performed at the highest, middle, lowest available channels.

2. During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.

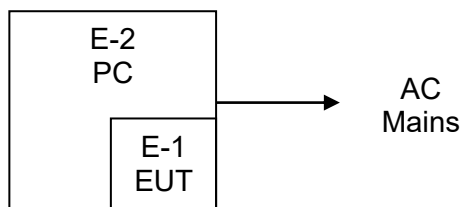


2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



Conducted Spurious Emission Test



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Model/Type No.	Series No.	Note
E-1	Wireless network adapter	FT1821CE-20PW5A22D1	N/A	EUT
E-2	PC	SE2218HV	N/A	

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing, channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the end product.

Max output power Setting				
Test software Version	Test program: AXDN-0002.0			
Mode	802.11a	802.11n HT20	802.11n HT40	802.11ac HT20/HT40/HT80
Data Rate	6Mbps	MSC0	MSC0	MSC0
Power Setting of Softwave	60	60	66	66



2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation test, Band-edge test and 6db bandwidth test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4408B	MY50140780	Nov. 05, 2022	Nov. 04, 2023
2	Test Receiver (9kHz-7GHz)	R&S	ESRP7	101393	Nov. 05, 2022	Nov. 04, 2023
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB9162	00306	Nov. 05, 2022	Nov. 04, 2023
4	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	02139	Nov. 05, 2022	Nov. 04, 2023
5	Horn Antenna (18GHz-40GHz)	A.H. Systems	SAS-574	588	Nov. 05, 2022	Nov. 04, 2023
6	Amplifier (9KHz-6GHz)	Schwarzbeck	BBV9743B	00153	Nov. 05, 2022	Nov. 04, 2023
7	Amplifier (1GHz-18GHz)	EMEC	EM01G8GA	00270	Nov. 05, 2022	Nov. 04, 2023
8	Amplifier (18GHz-40GHz)	Quanjuda	DLE-161	97	Nov. 05, 2022	Nov. 04, 2023
9	Loop Antenna (9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	Nov. 05, 2022	Nov. 04, 2023
10	RF cables1 (9kHz-1GHz)	ChengYu	966	004	Nov. 05, 2022	Nov. 04, 2023
11	RF cables2 (1GHz-40GHz)	ChengYu	966	003	Nov. 05, 2022	Nov. 04, 2023
12	Antenna connector	Florida RF Labs	N/A	RF 01#	Nov. 05, 2022	Nov. 04, 2023
13	Power probe	KEYSIGHT	U2021XA	MY55210018	Nov. 05, 2022	Nov. 04, 2023
14	Signal Analyzer 9kHz-26.5GHz	Agilent	N9020A	MY55370280	Nov. 05, 2022	Nov. 04, 2023
15	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	Nov. 05, 2022	Nov. 04, 2023
16	D.C. Power Supply	LongWei	PS-305D	010964729	Nov. 05, 2022	Nov. 04, 2023

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	843 Shielded Room	ChengYu	843 Room	843	Sep. 20, 2022	Sep. 19, 2025
2	EMI Receiver	R&S	ESR	101421	Nov. 05, 2022	Nov. 04, 2023
3	LISN	R&S	ENV216	102417	Nov. 05, 2022	Nov. 04, 2023
4	843 Cable 1#	ChengYu	CE Cable	001	Nov. 05, 2022	Nov. 04, 2023

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ_EMCC	EMC-CON 3A1.1
2	EMC radiation test system	FALA	EZ_EMCC	FA-03A2
3	RF test system	MAIWEI	MTS8310	2.0.0.0
4	RF communication test system	MAIWEI	MTS8200	2.0.0.0



3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.5 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

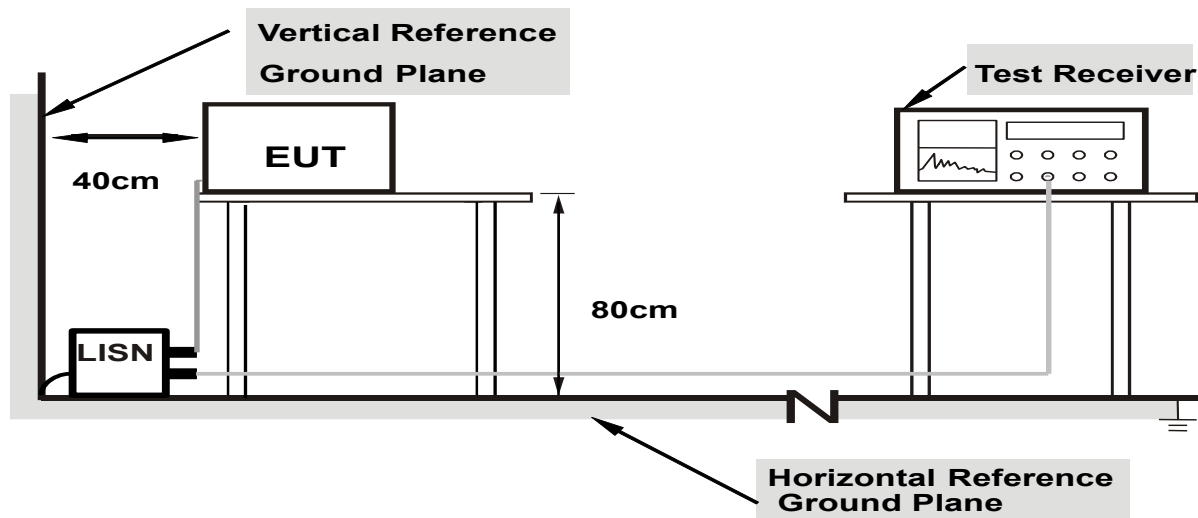
3.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

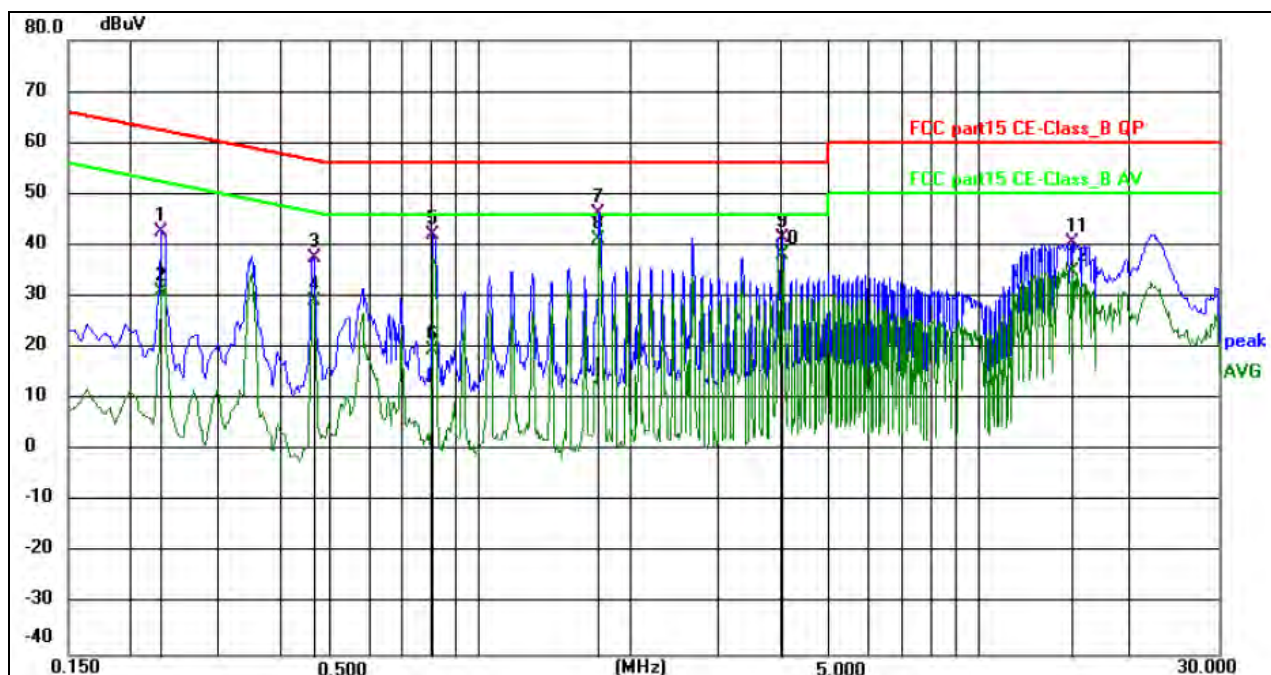
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

We pretest AC 120V and AC 230V, the worst voltage was AC 120V and the data recording in the report.

3.1.6 TEST RESULTS



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 4



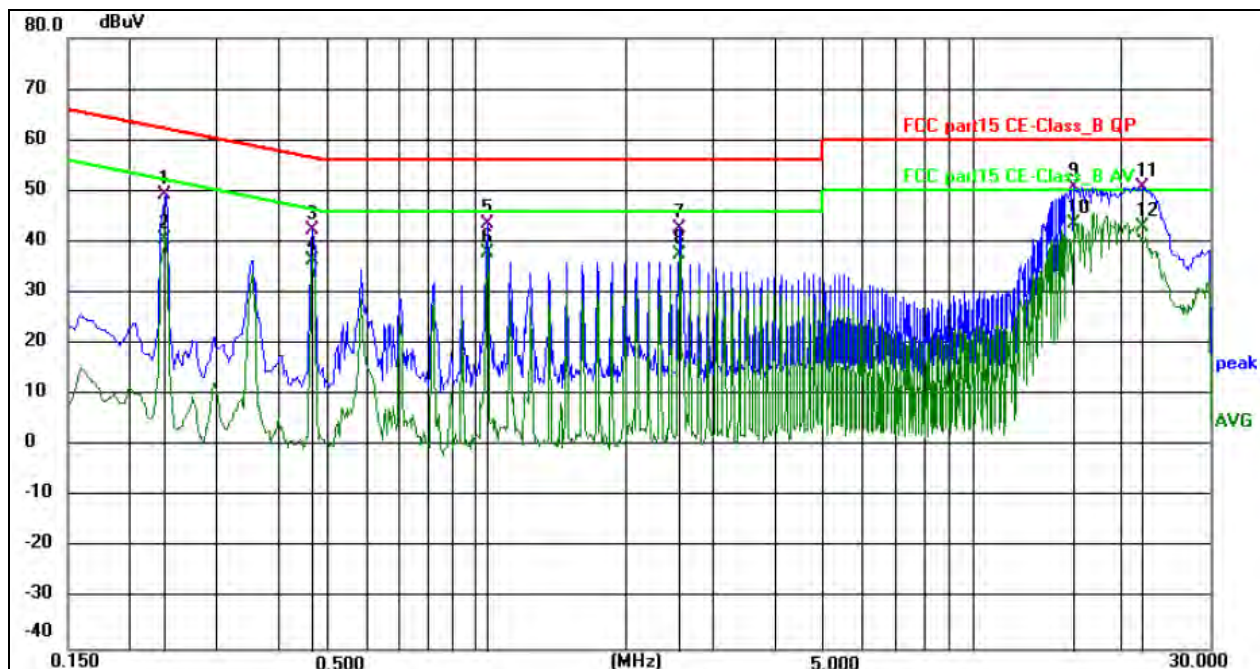
Remark:

Margin = Limit – Level, Correct Factor = Cable lose + LISN insertion loss, Level= Reading + Correct factor

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.229000	33.26	9.39	42.65	62.49	-19.84	QP	P	
2	0.229000	21.66	9.39	31.05	52.49	-21.44	AVG	P	
3	0.465000	28.43	9.17	37.60	56.60	-19.00	QP	P	
4	0.465000	19.96	9.17	29.13	46.60	-17.47	AVG	P	
5	0.807000	32.60	9.35	41.95	56.00	-14.05	QP	P	
6	0.807000	10.07	9.35	19.42	46.00	-26.58	AVG	P	
7	1.733800	36.64	9.72	46.36	56.00	-9.64	QP	P	
8 *	1.733800	31.58	9.72	41.30	46.00	-4.70	AVG	P	
9	4.046800	31.88	9.62	41.50	56.00	-14.50	QP	P	
10	4.046800	28.61	9.62	38.23	46.00	-7.77	AVG	P	
11	15.292500	30.44	10.14	40.58	60.00	-19.42	QP	P	
12	15.292500	24.67	10.14	34.81	50.00	-15.19	AVG	P	



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 4



Remark:

Margin = Limit – Level, Correct Factor = Cable lose + LISN insertion loss, Level= Reading + Correct factor

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.235300	40.25	8.93	49.18	62.26	-13.08	QP	P	
2	0.235300	31.49	8.93	40.42	52.26	-11.84	AVG	P	
3	0.465000	33.08	9.33	42.41	56.60	-14.19	QP	P	
4	0.465000	27.12	9.33	36.45	46.60	-10.15	AVG	P	
5	1.050000	34.16	9.43	43.59	56.00	-12.41	QP	P	
6	1.050000	28.37	9.43	37.80	46.00	-8.20	AVG	P	
7	2.566500	32.91	9.83	42.74	56.00	-13.26	QP	P	
8	2.566500	27.74	9.83	37.57	46.00	-8.43	AVG	P	
9	15.904500	40.58	10.31	50.89	60.00	-9.11	QP	P	
10 *	15.904500	33.11	10.31	43.42	50.00	-6.58	AVG	P	
11	21.997300	40.09	10.79	50.88	60.00	-9.12	QP	P	
12	21.997300	32.24	10.79	43.03	50.00	-6.97	AVG	P	



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	40GHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP



3.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height 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.
- 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
- Test the EUT in the lowest channel, the middle channel, the Highest channel

Note:

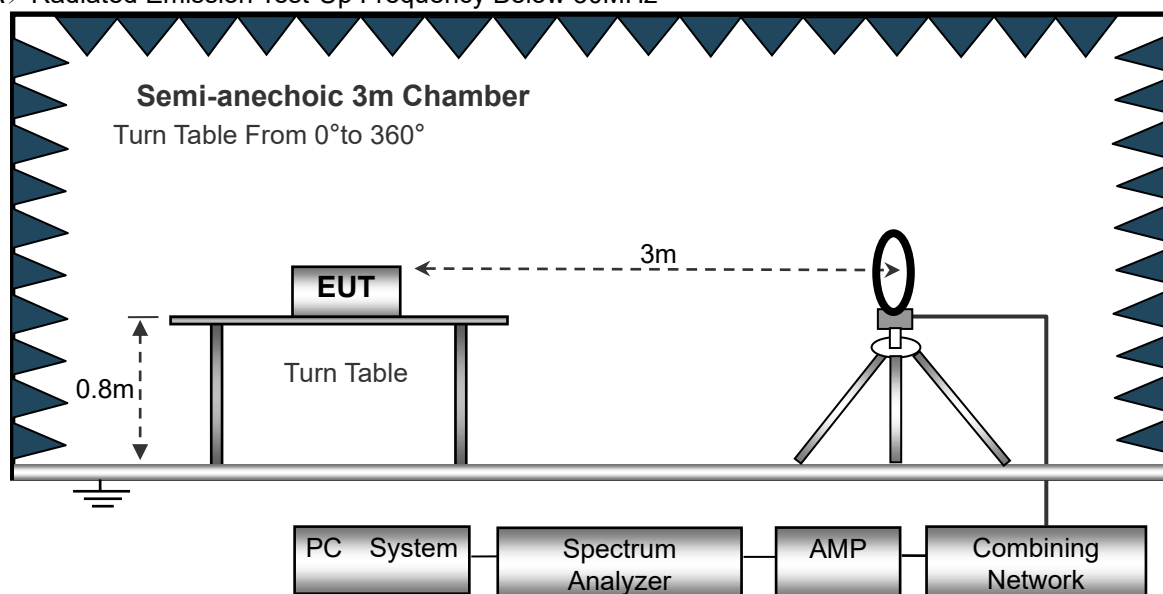
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

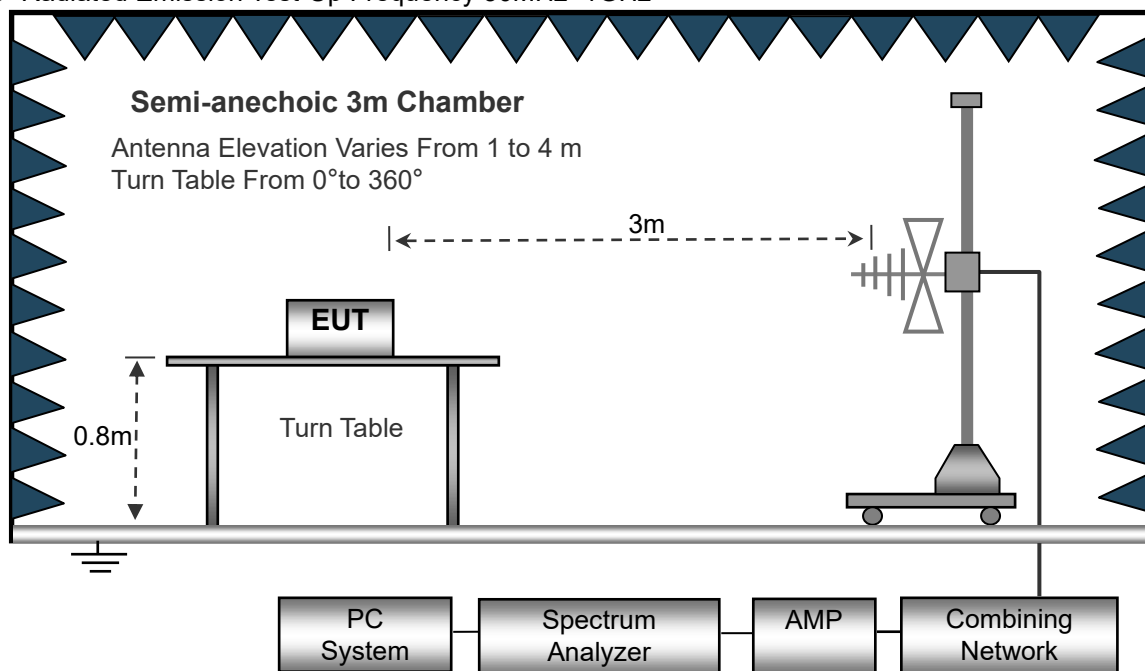
No deviation

3.2.4 TEST SETUP

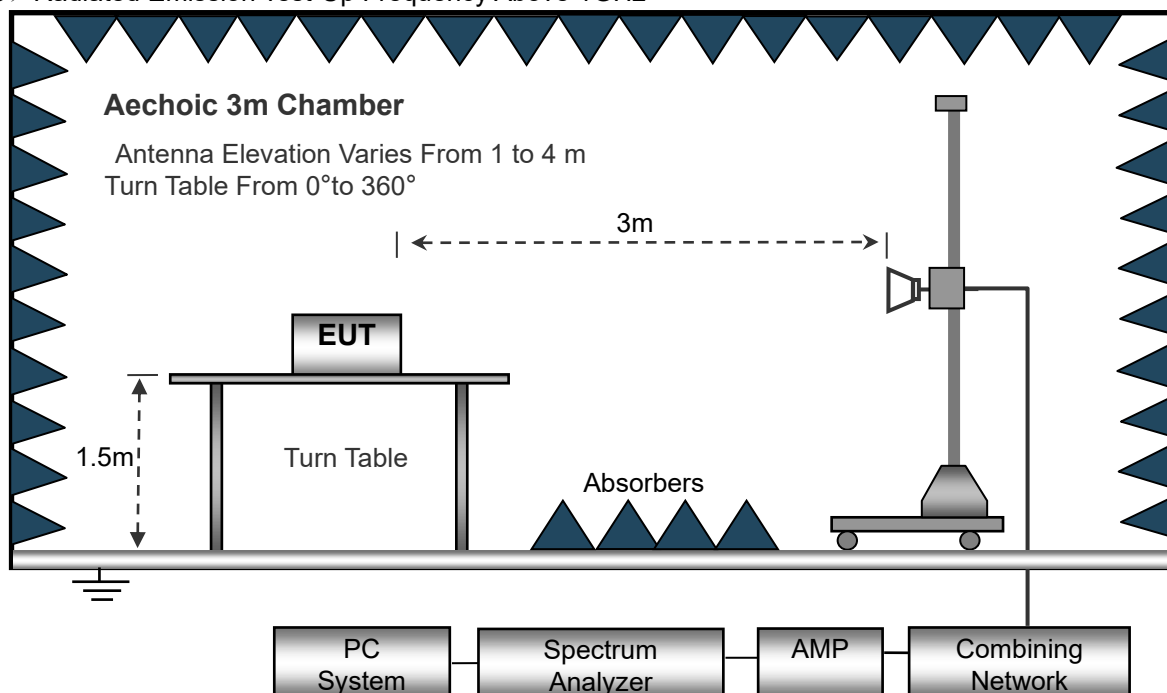
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**3.2.6 TEST RESULTS (Between 9KHz – 30 MHz)**

Temperature:	20℃	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	Mode 4	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

**3.2.7 TEST RESULTS (Between 30MHz – 1GHz)**

Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Horizontal
Test Voltage :	AC 120V/60Hz		
Test Mode :	Mode 4		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector
		MHz	dBuV	dB	dBuV/m	dB/m	dB	
1		68.3906	47.43	-13.48	33.95	40.00	-6.05	QP
2	*	187.7529	52.22	-14.07	38.15	43.50	-5.35	QP
3		233.3486	50.87	-12.27	38.60	46.00	-7.40	QP
4	!	300.3672	50.95	-10.69	40.26	46.00	-5.74	QP
5		465.5994	46.45	-7.64	38.81	46.00	-7.19	QP
6		729.3582	43.08	-3.33	39.75	46.00	-6.25	QP

Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

Level = Reading Level + Correct Factor; Margin = Level - Limit;



Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Vertical
test voltage :	AC 120V/60Hz		
Test Mode :	Mode 4		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		34.5172	47.46	-13.80	33.66	40.00	-6.34	QP
2	!	70.3365	49.51	-15.09	34.42	40.00	-5.58	QP
3		232.5318	50.40	-11.67	38.73	46.00	-7.27	QP
4		299.3158	47.86	-9.62	38.24	46.00	-7.76	QP
5	*	470.5230	48.87	-6.57	42.30	46.00	-3.70	QP
6	!	547.0976	46.55	-5.31	41.24	46.00	-4.76	QP

Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

Level = Reading Level + Correct Factor; Margin = Level - Limit;



3.2.8 TEST RESULTS (1ghz~40ghZ)

802.11a band 1

We test all antenna's data, the data only show the antenna1 mode 1 worst mode.

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre- amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:5180									
V	10360	56.33	49.05	15.3	37.39	59.97	74	-14.03	PK
V	10360	41.63	49.05	15.3	37.39	45.27	54	-8.73	AV
V	15540	56.61	49.16	15.27	40.45	63.17	74	-10.83	PK
V	15540	39.12	49.16	15.27	40.45	45.68	54	-8.32	AV
H	10360	56.09	49.05	15.3	37.39	59.73	74	-14.27	PK
H	10360	40.41	49.05	15.3	37.39	44.05	54	-9.95	AV
H	15540	59.15	49.16	15.27	40.45	65.71	74	-8.29	PK
H	15540	38.09	49.16	15.27	40.45	44.65	54	-9.35	AV
operation frequency:5220									
V	10400	57.43	49.09	15.34	37.42	61.1	74	-12.90	PK
V	10400	39.35	49.09	15.34	37.42	43.02	54	-10.98	AV
V	15600	59.47	49.18	15.29	40.47	66.05	74	-7.95	PK
V	15600	38.12	49.18	15.29	40.47	44.7	54	-9.30	AV
H	10400	56.33	49.09	15.34	37.42	60	74	-14.00	PK
H	10400	39.79	49.09	15.34	37.42	43.46	54	-10.54	AV
H	15600	59.41	49.18	15.29	40.47	65.99	74	-8.01	PK
H	15600	38.35	49.18	15.29	40.47	44.93	54	-9.07	AV
operation frequency:5240									
V	10480	58.56	49.11	15.37	37.46	62.28	74	-11.72	PK
V	10480	39.28	49.11	15.37	37.46	43	54	-11.00	AV
V	15720	59.14	49.21	15.34	40.51	65.78	74	-8.22	PK
V	15720	38.36	49.21	15.34	40.51	45	54	-9.00	AV
H	10480	57.22	49.11	15.37	31.31	54.79	74	-19.21	PK
H	10480	45.57	49.11	15.37	31.31	43.14	54	-10.86	AV
H	15720	57.43	49.21	15.34	40.51	64.07	74	-9.93	PK
H	15720	37.55	49.21	15.34	40.51	44.19	54	-9.81	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



802.11n HT20

We test all antenna's data, the data only show the mode 5 worst mode.

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5180									
V	10360	56.16	49.05	15.3	37.39	59.8	74	-14.20	PK
V	10360	38.47	49.05	15.3	37.39	42.11	54	-11.89	AV
V	15540	56.55	49.16	15.27	40.45	63.11	74	-10.89	PK
V	15540	38.22	49.16	15.27	40.45	44.78	54	-9.22	AV
H	10360	56.66	49.05	15.3	37.39	60.3	74	-13.70	PK
H	10360	39.39	49.05	15.3	37.39	43.03	54	-10.97	AV
H	15540	54.14	49.16	15.27	40.45	60.7	74	-13.30	PK
H	15540	38.31	49.16	15.27	40.45	44.87	54	-9.13	AV
operation frequency:5220									
V	10400	56.26	49.09	15.34	37.42	59.93	74	-14.07	PK
V	10400	39.78	49.09	15.34	37.42	43.45	54	-10.55	AV
V	15600	55.34	49.18	15.29	40.47	61.92	74	-12.08	PK
V	15600	38.33	49.18	15.29	40.47	44.91	54	-9.09	AV
H	10400	55.59	49.09	15.34	37.42	59.26	74	-14.74	PK
H	10400	40.32	49.09	15.34	37.42	43.99	54	-10.01	AV
H	15600	55.04	49.18	15.29	40.47	61.62	74	-12.38	PK
H	15600	39.23	49.18	15.29	40.47	45.81	54	-8.19	AV
operation frequency:5240									
V	10480	57.17	49.11	15.37	37.46	60.89	74	-13.11	PK
V	10480	40.56	49.11	15.37	37.46	44.28	54	-9.72	AV
V	15720	54.35	49.21	15.34	40.51	60.99	74	-13.01	PK
V	15720	38.66	49.21	15.34	40.51	45.3	54	-8.70	AV
H	10480	57.18	49.11	15.37	31.31	54.75	74	-19.25	PK
H	10480	44.64	49.11	15.37	31.31	42.21	54	-11.79	AV
H	15720	55.32	49.21	15.34	40.51	61.96	74	-12.04	PK
H	15720	39.26	49.21	15.34	40.51	45.9	54	-8.10	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



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We test all antenna's data, the data only show the mode 5 worst mode.

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5190									
V	10380	56.79	49.07	15.33	37.41	60.46	74	-13.54	PK
V	10380	39.21	49.07	15.33	37.41	42.88	54	-11.12	AV
V	15570	56.26	49.17	15.28	40.46	62.83	74	-11.17	PK
V	15570	38.38	49.17	15.28	40.46	44.95	54	-9.05	AV
H	10380	56.65	49.07	15.33	37.41	60.32	74	-13.68	PK
H	10380	40.33	49.07	15.33	37.41	44	54	-10.00	AV
H	15570	54.67	49.17	15.28	40.46	61.24	74	-12.76	PK
H	15570	38.26	49.17	15.28	40.46	44.83	54	-9.17	AV
operation frequency:5230									
V	10460	57.14	49.11	15.37	37.46	60.86	74	-13.14	PK
V	10460	39.61	49.11	15.37	37.46	43.33	54	-10.67	AV
V	15690	54.43	49.21	15.34	40.51	61.07	74	-12.93	PK
V	15690	38.38	49.21	15.34	40.51	45.02	54	-8.98	AV
H	10460	57.23	49.11	15.37	31.31	54.8	74	-19.20	PK
H	10460	44.85	49.11	15.37	31.31	42.42	54	-11.58	AV
H	15690	55.32	49.21	15.34	40.51	61.96	74	-12.04	PK
H	15690	39.06	49.21	15.34	40.51	45.7	54	-8.30	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



802.11ac HT20

We test all antenna's data, the data only show the mode 5 worst mode.

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5180									
V	10360	56.71	49.05	15.3	37.39	60.35	74	-13.65	PK
V	10360	39.53	49.05	15.3	37.39	43.17	54	-10.83	AV
V	15540	56.14	49.16	15.27	40.45	62.7	74	-11.30	PK
V	15540	38.39	49.16	15.27	40.45	44.95	54	-9.05	AV
H	10360	56.15	49.05	15.3	37.39	59.79	74	-14.21	PK
H	10360	38.23	49.05	15.3	37.39	41.87	54	-12.13	AV
H	15540	54.28	49.16	15.27	40.45	60.84	74	-13.16	PK
H	15540	39.34	49.16	15.27	40.45	45.9	54	-8.10	AV
operation frequency:5220									
V	10400	56.52	49.09	15.34	37.42	60.19	74	-13.81	PK
V	10400	41.79	49.09	15.34	37.42	45.46	54	-8.54	AV
V	15600	55.58	49.18	15.29	40.47	62.16	74	-11.84	PK
V	15600	40.33	49.18	15.29	40.47	46.91	54	-7.09	AV
H	10400	55.19	49.09	15.34	37.42	58.86	74	-15.14	PK
H	10400	40.54	49.09	15.34	37.42	44.21	54	-9.79	AV
H	15600	55.03	49.18	15.29	40.47	61.61	74	-12.39	PK
H	15600	41.28	49.18	15.29	40.47	47.86	54	-6.14	AV
operation frequency:5240									
V	10480	57.42	49.11	15.37	37.46	61.14	74	-12.86	PK
V	10480	40.31	49.11	15.37	37.46	44.03	54	-9.97	AV
V	15720	54.16	49.21	15.34	40.51	60.8	74	-13.20	PK
V	15720	39.72	49.21	15.34	40.51	46.36	54	-7.64	AV
H	10480	57.18	49.11	15.37	31.31	54.75	74	-19.25	PK
H	10480	44.59	49.11	15.37	31.31	42.16	54	-11.84	AV
H	15720	55.63	49.21	15.34	40.51	62.27	74	-11.73	PK
H	15720	40.05	49.21	15.34	40.51	46.69	54	-7.31	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



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We test all antenna's data, the data only show the mode 5 worst mode.

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5190									
V	10380	56.41	49.07	15.33	37.41	60.08	74	-13.92	PK
V	10380	40.66	49.07	15.33	37.41	44.33	54	-9.67	AV
V	15570	56.26	49.17	15.28	40.46	62.83	74	-11.17	PK
V	15570	39.53	49.17	15.28	40.46	46.1	54	-7.90	AV
H	10380	56.47	49.07	15.33	37.41	60.14	74	-13.86	PK
H	10380	40.38	49.07	15.33	37.41	44.05	54	-9.95	AV
H	15570	54.22	49.17	15.28	40.46	60.79	74	-13.21	PK
H	15570	39.56	49.17	15.28	40.46	46.13	54	-7.87	AV
operation frequency:5230									
V	10460	57.22	49.11	15.37	37.46	60.94	74	-13.06	PK
V	10460	41.59	49.11	15.37	37.46	45.31	54	-8.69	AV
V	15690	54.37	49.21	15.34	40.51	61.01	74	-12.99	PK
V	15690	39.29	49.21	15.34	40.51	45.93	54	-8.07	AV
H	10460	57.18	49.11	15.37	31.31	54.75	74	-19.25	PK
H	10460	44.26	49.11	15.37	31.31	41.83	54	-12.17	AV
H	15690	55.17	49.21	15.34	40.51	61.81	74	-12.19	PK
H	15690	40.06	49.21	15.34	40.51	46.7	54	-7.30	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

802.11ac HT80

We test all antenna's data, the data only show the mode 5 worst mode.

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5210									
V	10420	56.24	49.07	15.33	37.41	59.91	74	-14.09	PK
V	10420	41.61	49.07	15.33	37.41	45.28	54	-8.72	AV
V	15630	56.18	49.17	15.28	40.46	62.75	74	-11.25	PK
V	15630	39.13	49.17	15.28	40.46	45.7	54	-8.30	AV
H	10420	56.34	49.07	15.33	37.41	60.01	74	-13.99	PK
H	10420	41.23	49.07	15.33	37.41	44.9	54	-9.10	AV
H	15630	54.07	49.17	15.28	40.46	60.64	74	-13.36	PK
H	15630	40.35	49.17	15.28	40.46	46.92	54	-7.08	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



3.3 RADIATED BAND EMISSION MEASUREMENT

3.3.1 TEST REQUIREMENT:

RSS-247 Section 5.5

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	5000MHz
Stop Frequency	5420MHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

3.3.2 TEST PROCEDURE

Above 1GHz test procedure as below:

- a. 1. The EUT was placed on the top of a rotating table 0.1 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height 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.
- d. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel,the Highest channel

Note:

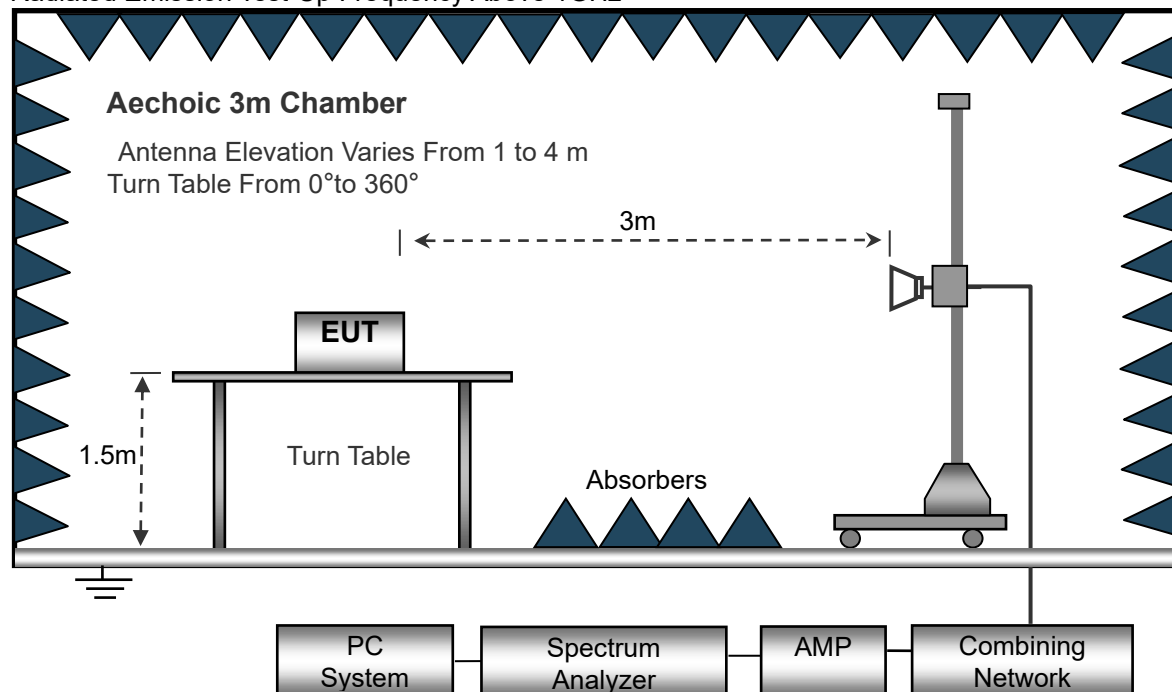
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



3.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



3.3.6 TEST RESULT

802.11a

We test all antenna's data, the data only show the antenna1 mode 1 worst mode.

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre- amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:5180									
V	5150	53.13	49.12	15.6	37.34	56.95	74	-17.05	PK
V	5150	39.37	49.12	15.6	37.34	43.19	54	-10.81	AV
V	5145	54.25	49.19	15.24	40.43	60.73	74	-13.27	PK
V	5145	36.31	49.19	15.24	40.43	42.79	54	-11.21	AV
H	5150	52.96	49.12	15.6	37.34	56.78	74	-17.22	PK
H	5150	37.54	49.12	15.6	37.34	41.36	54	-12.64	AV
H	5145	54.31	49.19	15.24	40.43	60.79	74	-13.21	PK
H	5145	33.18	49.19	15.24	40.43	39.66	54	-14.34	AV
operation frequency:5240									
V	5350	53.14	49.13	15.32	37.46	56.79	74	-17.21	PK
V	5350	35.46	49.13	15.32	37.46	39.11	54	-14.89	AV
V	5370	53.27	49.24	15.36	40.51	59.9	74	-14.1	PK
V	5370	32.22	49.24	15.36	40.51	38.85	54	-15.15	AV
H	5350	52.17	49.13	15.32	31.31	49.67	74	-24.33	PK
H	5350	40.26	49.13	15.32	31.31	37.76	54	-16.24	AV
H	5370	52.46	49.24	15.36	40.51	59.09	74	-14.91	PK
H	5370	32.57	49.24	15.36	40.51	39.2	54	-14.8	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



802.11n HT20

We test all antenna's data, the data only show the mode 5 worst mode.

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5180									
V	5150	51.29	49.12	15.6	37.34	55.11	74	-18.89	PK
V	5150	33.14	49.12	15.6	37.34	36.96	54	-17.04	AV
V	5145	51.46	49.19	15.24	40.43	57.94	74	-16.06	PK
V	5145	33.19	49.19	15.24	40.43	39.67	54	-14.33	AV
H	5150	51.41	49.12	15.6	37.34	55.23	74	-18.77	PK
H	5150	33.47	49.12	15.6	37.34	37.29	54	-16.71	AV
H	5145	50.14	49.19	15.24	40.43	56.62	74	-17.38	PK
H	5145	32.63	49.19	15.24	40.43	39.11	54	-14.89	AV
operation frequency:5240									
V	5350	53.67	49.13	15.32	37.46	57.32	74	-16.68	PK
V	5350	34.14	49.13	15.32	37.46	37.79	54	-16.21	AV
V	5370	50.26	49.24	15.36	40.51	56.89	74	-17.11	PK
V	5370	33.55	49.24	15.36	40.51	40.18	54	-13.82	AV
H	5350	54.16	49.13	15.32	31.31	51.66	74	-22.34	PK
H	5350	36.27	49.13	15.32	31.31	33.77	54	-20.23	AV
H	5370	51.25	49.24	15.36	40.51	57.88	74	-16.12	PK
H	5370	33.51	49.24	15.36	40.51	40.14	54	-13.86	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



802.11ac HT20

We test all antenna's data, the data only show the mode 5 worst mode.

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5180									
V	5150	52.17	49.12	15.33	37.41	55.79	74	-18.21	PK
V	5150	34.53	49.12	15.33	37.41	38.15	54	-15.85	AV
V	5145	51.24	49.19	15.28	40.46	57.79	74	-16.21	PK
V	5145	33.66	49.19	15.28	40.46	40.21	54	-13.79	AV
H	5150	52.48	49.12	15.33	37.41	56.1	74	-17.9	PK
H	5150	34.64	49.12	15.33	37.41	38.26	54	-15.74	AV
H	5145	50.61	49.19	15.28	40.46	57.16	74	-16.84	PK
H	5145	33.55	49.19	15.28	40.46	40.1	54	-13.9	AV
operation frequency:5240									
V	5350	53.63	49.13	15.32	37.46	57.28	74	-16.72	PK
V	5350	36.37	49.13	15.32	37.46	40.02	54	-13.98	AV
V	5370	50.14	49.24	15.36	40.51	56.77	74	-17.23	PK
V	5370	33.65	49.24	15.36	40.51	40.28	54	-13.72	AV
H	5350	53.16	49.13	15.32	31.31	50.66	74	-23.34	PK
H	5350	40.21	49.13	15.32	31.31	37.71	54	-16.29	AV
H	5370	51.85	49.24	15.36	40.51	58.48	74	-15.52	PK
H	5370	35.63	49.24	15.36	40.51	42.26	54	-11.74	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



802.11n HT40

We test all antenna's data, the data only show the mode 5 worst mode.

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5190									
V	5150	52.11	49.12	15.6	37.39	55.98	74	-18.02	PK
V	5150	35.46	49.12	15.6	37.39	39.33	54	-14.67	AV
V	5145	51.54	49.19	15.24	40.45	58.04	74	-15.96	PK
V	5145	34.61	49.19	15.24	40.45	41.11	54	-12.89	AV
H	5150	52.63	49.12	15.6	37.39	56.5	74	-17.5	PK
H	5150	34.77	49.12	15.6	37.39	38.64	54	-15.36	AV
H	5145	50.14	49.19	15.24	40.45	56.64	74	-17.36	PK
H	5145	35.63	49.19	15.24	40.45	42.13	54	-11.87	AV
operation frequency:5230									
V	5350	53.65	49.13	15.34	37.46	57.32	74	-16.68	PK
V	5350	37.51	49.13	15.34	37.46	41.18	54	-12.82	AV
V	5370	50.24	49.24	15.35	40.51	56.86	74	-17.14	PK
V	5370	36.33	49.24	15.35	40.51	42.95	54	-11.05	AV
H	5350	54.28	49.13	15.34	31.31	51.8	74	-22.2	PK
H	5350	41.24	49.13	15.34	31.31	38.76	54	-15.24	AV
H	5370	52.63	49.24	15.35	40.51	59.25	74	-14.75	PK
H	5370	36.87	49.24	15.35	40.51	43.49	54	-10.51	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



802.11ac HT40

We test all antenna's data, the data only show the mode 5 worst mode.

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5190									
V	5150	52.83	49.12	15.32	37.41	56.44	74	-17.56	PK
V	5150	37.64	49.12	15.32	37.41	41.25	54	-12.75	AV
V	5145	52.41	49.19	15.36	40.46	59.04	74	-14.96	PK
V	5145	36.56	49.19	15.36	40.46	43.19	54	-10.81	AV
H	5150	52.97	49.12	15.32	37.41	56.58	74	-17.42	PK
H	5150	37.64	49.12	15.32	37.41	41.25	54	-12.75	AV
H	5145	51.23	49.19	15.36	40.46	57.86	74	-16.14	PK
H	5145	36.37	49.19	15.36	40.46	43	54	-11	AV
operation frequency:5230									
V	5350	54.63	49.13	15.34	37.34	58.18	74	-15.82	PK
V	5350	36.64	49.13	15.34	37.34	40.19	54	-13.81	AV
V	5370	51.46	49.24	15.35	40.43	58	74	-16	PK
V	5370	36.98	49.24	15.35	40.43	43.52	54	-10.48	AV
H	5350	54.11	49.13	15.34	37.34	57.66	74	-16.34	PK
H	5350	41.38	49.13	15.34	37.34	44.93	54	-9.07	AV
H	5370	50.26	49.24	15.35	40.43	56.8	74	-17.2	PK
H	5370	35.65	49.24	15.35	40.43	42.19	54	-11.81	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

802.11ac HT80

We test all antenna's data, the data only show the mode 5 worst mode.

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5210									
V	5350	52.13	49.13	15.32	37.48	55.8	74	-18.2	PK
V	5350	35.28	49.13	15.32	37.48	38.95	54	-15.05	AV
V	5370	51.24	49.24	15.36	40.42	57.78	74	-16.22	PK
V	5370	35.63	49.24	15.36	40.42	42.17	54	-11.83	AV
H	5350	52.45	49.13	15.32	37.48	56.12	74	-17.88	PK
H	5350	36.21	49.13	15.32	37.48	39.88	54	-14.12	AV
H	5370	50.24	49.24	15.36	40.42	56.78	74	-17.22	PK
H	5370	35.26	49.24	15.36	40.42	41.8	54	-12.2	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



3.3 CONDUCTED BAND EMISSION MEASUREMENT

3.3.1 TEST REQUIREMENT:

FCC Part15 C Section 15.209 and 15.407

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

Spectrum Parameter	Setting	
Attenuation	Auto	
Start Frequency	5150MHz	5725MHz
Stop Frequency	5250MHz	5850MHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average	

3.3.2 TEST PROCEDURE

Test method: FCC KDB 789033 G)& Parts 15.407(b)(4) & 15.209(a)

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP



3.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



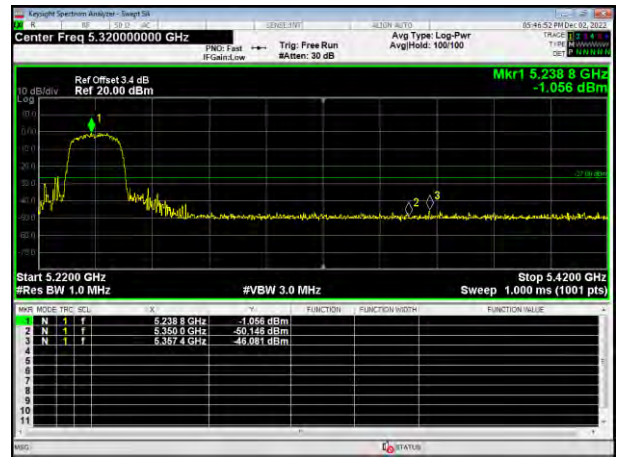
3.3.6 TEST RESULT

Each antenna has been tested and has a margin of more than 3 dB, the data only show the antenna1 worst mode, so the MIMO mode is definitely Pass.

802.11a

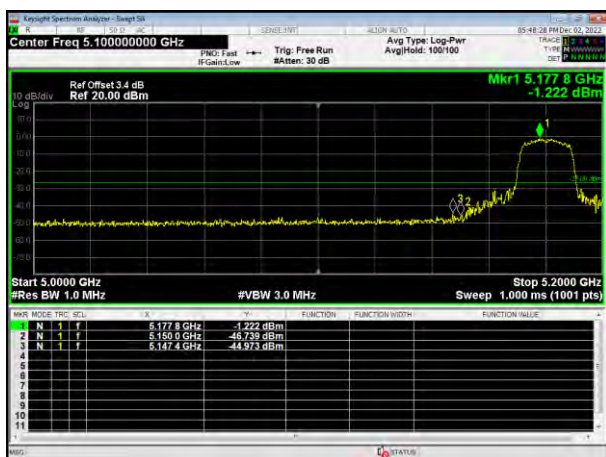


5180MHz

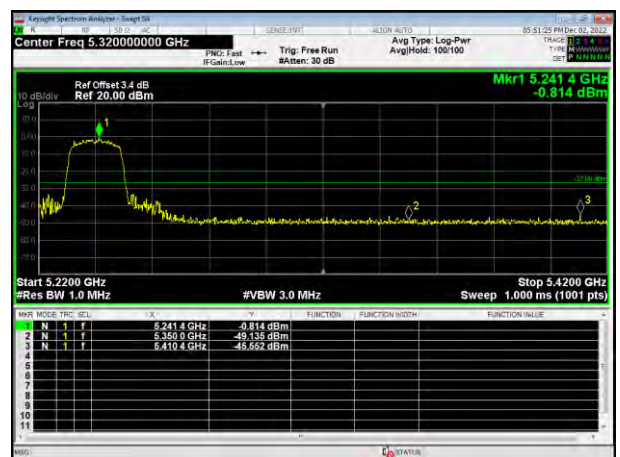


5240MHz

802.11n HT20

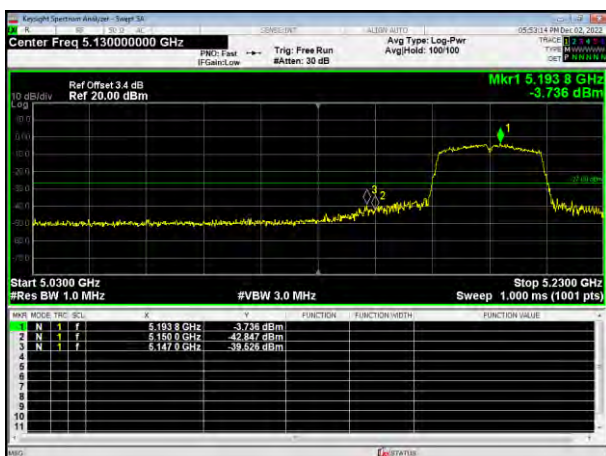


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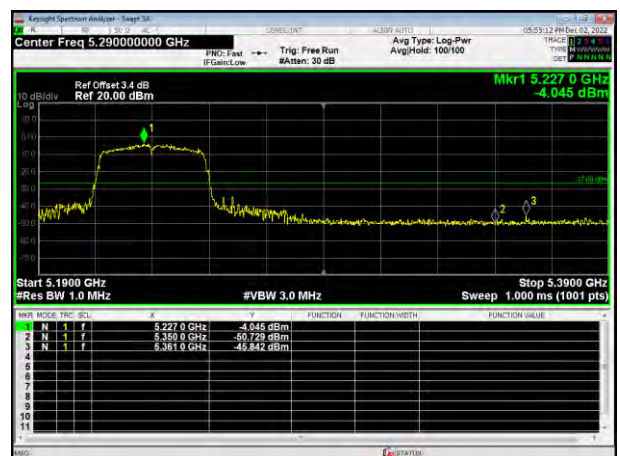


5240MHz

802.11n HT40



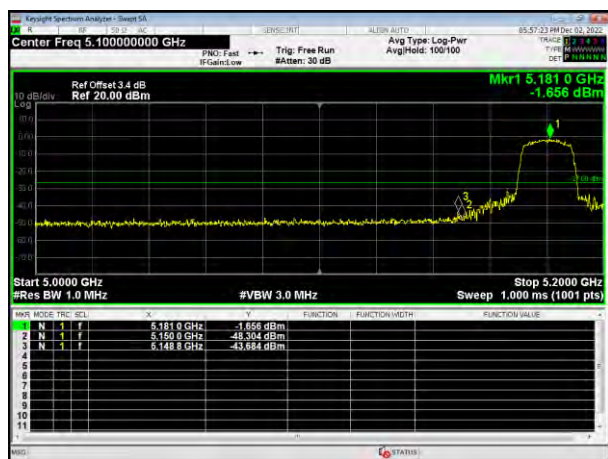
5190MHz



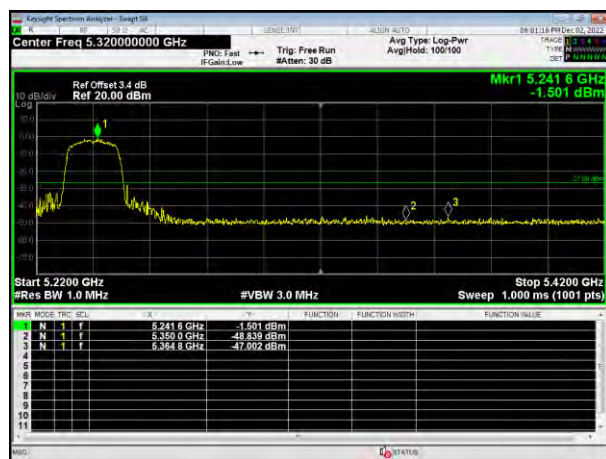
5230MHz



802.11ac HT20

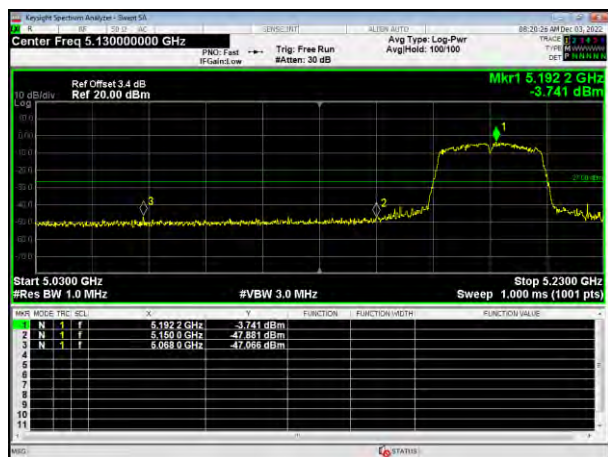


5180MHz

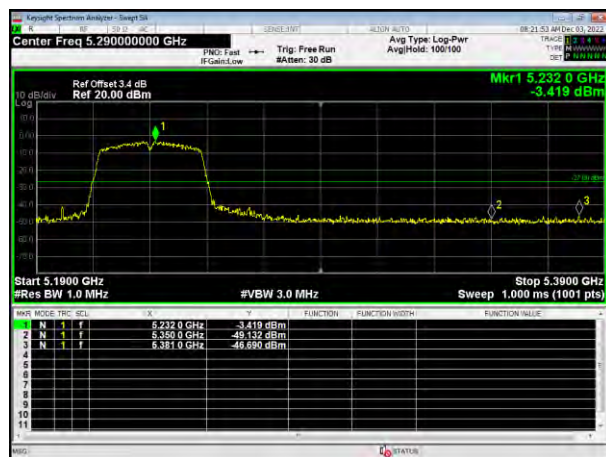


5240MHz

802.11ac HT40

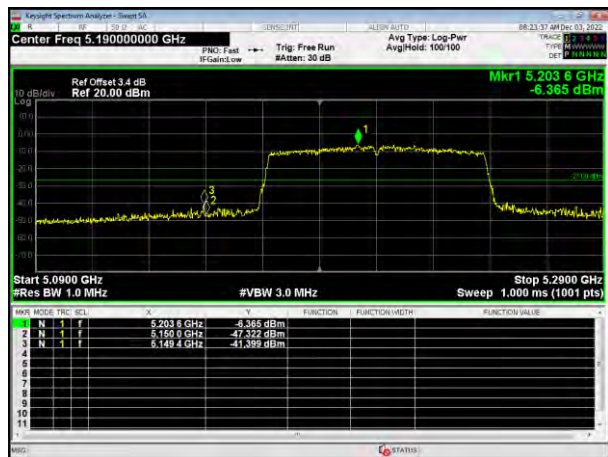


5190MHz



5230MHz

802.11ac HT80



5210MHz



4. AVERAGE OUTPUT POWER

4.1 APPLIED PROCEDURES / LIMIT

For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

4.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW > the 20 dB bandwidth of the emission being measured
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
VBW $\geq$ RBW
Sweep = auto
Detector function = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
Trace = max hold

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

**4.1.5 TEST RESULTS**

Temperature:	25 °C	Relative Humidity:	60%
Pressure:	1012 hPa	Test Voltage :	AC 120V/60Hz

ANT1

Band	Mode	Test Channel	Average Output Power (dBm)	Duty factor (dB)	Total Output Power(dB)	LIMIT (dBm)
Band 1	802.11a	Low	6.985	0.11	7.095	23.98
		Middle	6.805	0.11	6.915	23.98
		High	7.016	0.11	7.126	23.98
	802.11n HT20	Low	6.847	0.21	7.057	23.98
		Middle	6.671	0.21	6.881	23.98
		High	6.885	0.21	7.095	23.98
	802.11n HT40	Low	6.408	0.4	6.808	23.98
		High	6.496	0.4	6.896	23.98
	802.11ac HT20	Low	6.538	0.3	6.838	23.98
		Middle	6.586	0.3	6.886	23.98
		High	6.825	0.3	7.125	23.98
	802.11ac HT40	Low	6.578	0.21	6.788	23.98
		High	7.234	0.21	7.444	23.98
	802.11ac HT80	/	6.606	0.4	7.006	23.98

ANT2

Band	Mode	Test Channel	Average Output Power (dBm)	Duty factor (dB)	Total Output Power(dB)	LIMIT (dBm)
Band 1	802.11a	Low	6.814	0.11	6.924	23.98
		Middle	7.235	0.11	7.345	23.98
		High	7.188	0.11	7.298	23.98
	802.11n HT20	Low	6.104	0.21	6.314	23.98
		Middle	7.107	0.21	7.317	23.98
		High	7.018	0.21	7.228	23.98
	802.11n HT40	Low	6.5	0.39	6.89	23.98
		High	6.857	0.39	7.247	23.98
	802.11ac HT20	Low	6.614	0.29	6.904	23.98
		Middle	7.008	0.29	7.298	23.98
		High	6.944	0.29	7.234	23.98
	802.11ac HT40	Low	6.338	0.52	6.858	23.98
		High	6.605	0.52	7.125	23.98
	802.11ac HT80	/	5.956	0.87	6.826	23.98

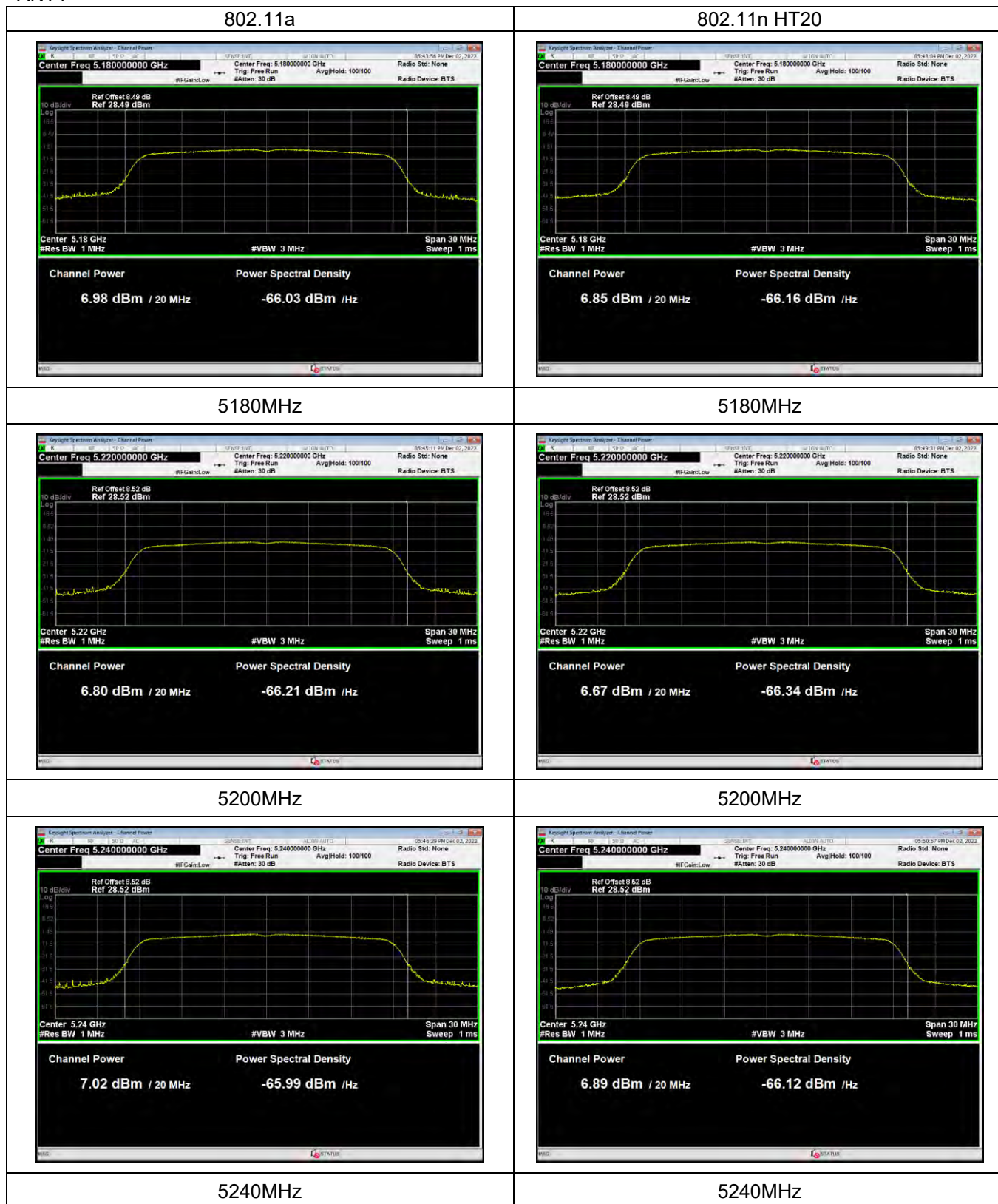


For MIMO

Mode	Test Channel	Antenna	Total Output Power(dB)	Limit (dBm)	Result
802.11n20	Low	Antenna1+ Antenna2	9.71	23.98	PASS
	Middle		10.11	23.98	PASS
	High		10.17	23.98	PASS
802.11n40	Low		9.86	23.98	PASS
	High		10.09	23.98	PASS
802.11ac HT20	Low		9.88	23.98	PASS
	Middle		10.11	23.98	PASS
	High		10.19	23.98	PASS
802.11ac HT40	Low		9.83	23.98	PASS
	High		10.30	23.98	PASS
802.11ac HT80	/		9.93	23.98	PASS



ANT1





802.11n HT40



802.11ac HT20



5190MHz



5180



5230MHz



5200

5240



802.11ac HT40



802.11ac HT80



5190MHz

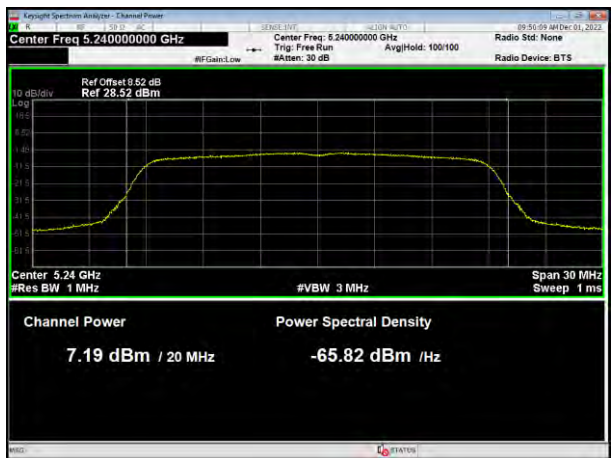
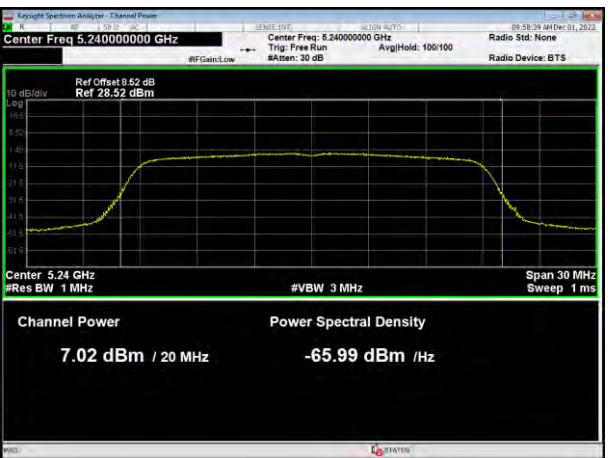


5210

5230MHz

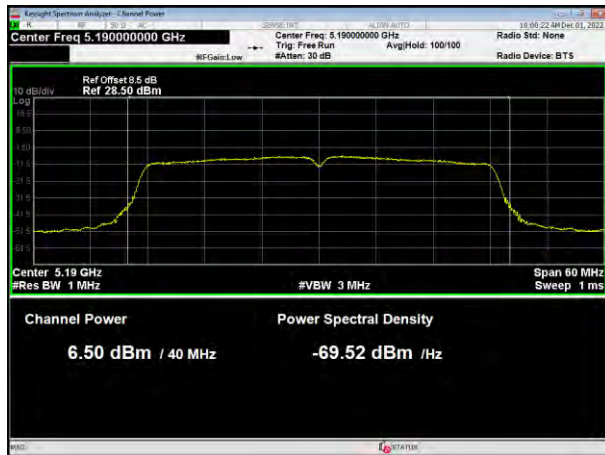


ANT2

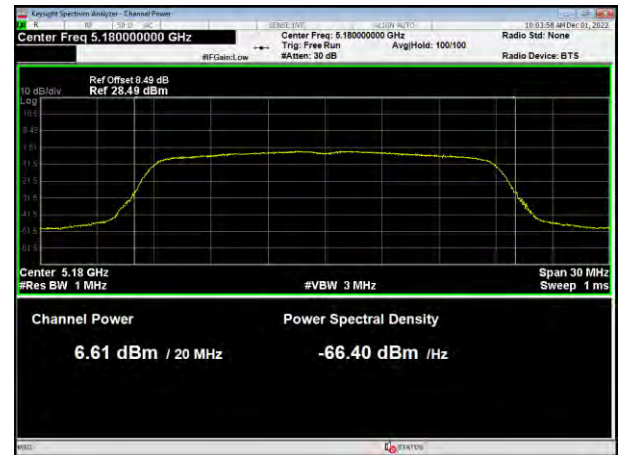
802.11a 	802.11n HT20 
5180MHz 	5180MHz 
5200MHz 	5200MHz 
5240MHz	5240MHz



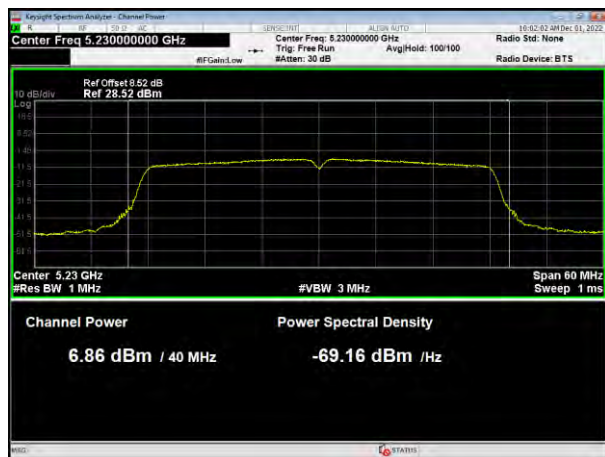
802.11n HT40



802.11ac HT20



5190MHz



5180



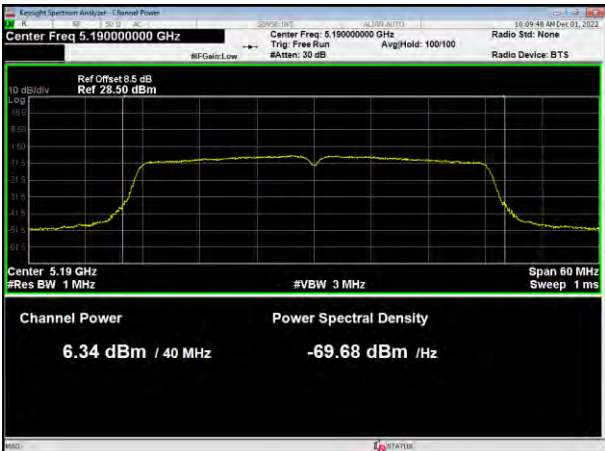
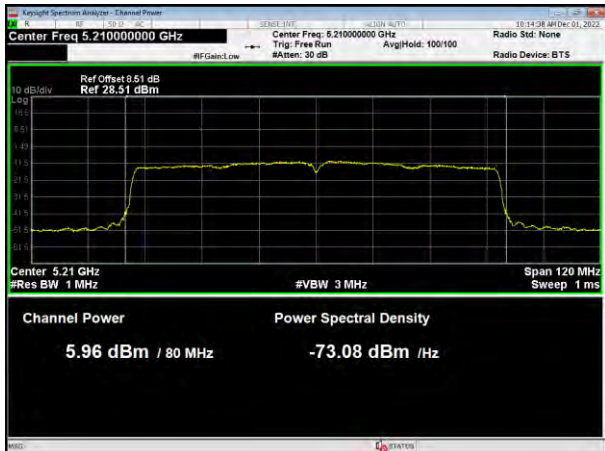
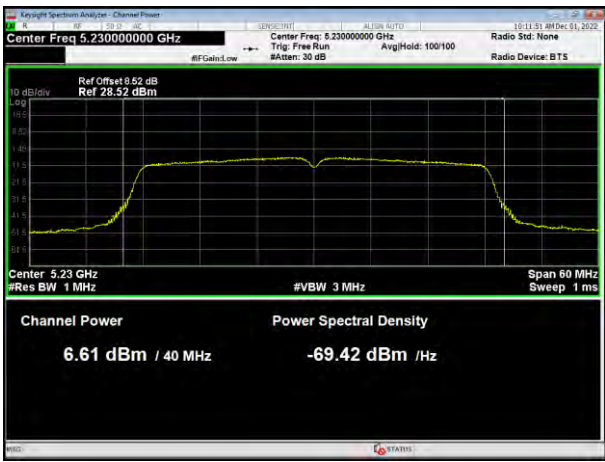
5230MHz



5200

5240



802.11ac HT40 	802.11ac HT80 
5190MHz 	5210
5230MHz	



5. POWER SPECTRAL DENSITY TEST

5.1 APPLIED PROCEDURES / LIMIT

In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	RBW $\geq$ 1MHz for band 1 RBW $\geq$ 510KHz for band 4
VB	VBW $\geq$ 3RBW
Detector	RMS (i.e., power averaging).
Trace	Max Hold
Sweep Time	Auto

5.1.1 TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
4. For U-NII1, U-NII-2A, U-NII-2C Band:
Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
For U-NII-3 Band:
Set RBW=510 kHz, VBW=3*RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
5. Use the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add 10 log(1/duty cycle).
we test all antennas, the antenna 1 was worst mode and the data recording in the report.
7. Duty factor Reference is made to the test results in Section 7.1.5.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

**5.1.5 TEST RESULTS****ANT1**

	Mode	Test Channel	Reading Level (dBm)	Duty factor (dB)	PSD (dBm/MHz)	Limit (dBm)	Result
Band1	802.11a	Low	-2.901	0.11	-2.791	11.00	PASS
		Middle	-2.692	0.11	-2.582	11.00	PASS
		High	-2.716	0.11	-2.606	11.00	PASS
	802.11n20	Low	-2.855	0.21	-2.645	11.00	PASS
		Middle	-3.236	0.21	-3.026	11.00	PASS
		High	-2.91	0.21	-2.7	11.00	PASS
	802.11n40	Low	-6.232	0.4	-5.832	11.00	PASS
		High	-6.278	0.4	-5.878	11.00	PASS
	802.11ac20	Low	-3.37	0.3	-3.07	11.00	PASS
		Middle	-3.161	0.3	-2.861	11.00	PASS
		High	-2.958	0.3	-2.658	11.00	PASS
	802.11ac40	Low	-6.15	0.21	-5.94	11.00	PASS
		High	-5.518	0.21	-5.308	11.00	PASS
	802.11ac80	/	-9.561	0.4	-9.161	11.00	PASS

ANT2

	Mode	Test Channel	Reading Level (dBm)	Duty factor (dB)	PSD (dBm/MHz)	Limit (dBm)	Result
Band1	802.11a	Low	-3.176	0.11	-3.066	11.00	PASS
		Middle	-2.507	0.11	-2.397	11.00	PASS
		High	-2.61	0.11	-2.5	11.00	PASS
	802.11n20	Low	-3.31	0.21	-3.1	11.00	PASS
		Middle	-2.835	0.21	-2.625	11.00	PASS
		High	-2.482	0.21	-2.272	11.00	PASS
	802.11n40	Low	-6.128	0.39	-5.738	11.00	PASS
		High	-5.652	0.39	-5.262	11.00	PASS
	802.11ac20	Low	-3.325	0.29	-3.035	11.00	PASS
		Middle	-2.698	0.29	-2.408	11.00	PASS
		High	-2.908	0.29	-2.618	11.00	PASS
	802.11ac40	Low	-6.274	0.52	-5.754	11.00	PASS
		High	-5.764	0.52	-5.244	11.00	PASS
	802.11ac80	/	-9.79	0.87	-8.92	11.00	PASS

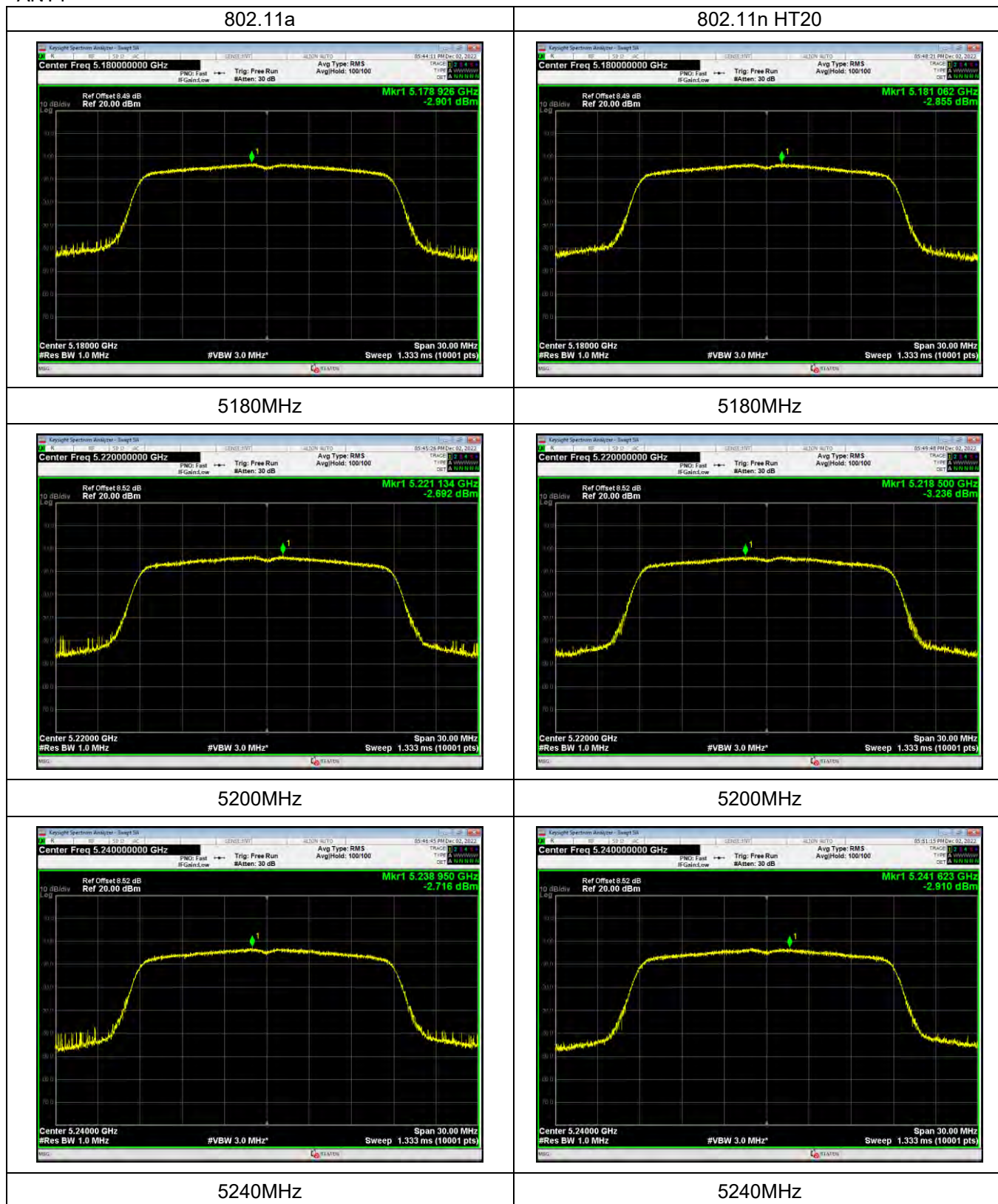


For MIMO

Mode	Test Channel	Antenna	PSD (dBm/ 500kHz)	Limit (dBm/ 500kHz)	Result
802.11n20	Low	Antenna1+ Antenna2	0.14	11.00	PASS
	Middle		0.19	11.00	PASS
	High		0.53	11.00	PASS
802.11n40	Low		-2.77	11.00	PASS
	High		-2.55	11.00	PASS
802.11ac20	Low		-0.04	11.00	PASS
	Middle		0.38	11.00	PASS
	High		0.37	11.00	PASS
802.11ac40	Low		-2.84	11.00	PASS
	High		-2.27	11.00	PASS
802.11ac80	/		-6.03	11.00	PASS



ANT1





802.11n HT40



802.11ac HT20



5190MHz



5180



5230MHz



5200

5240



802.11ac HT40



802.11ac HT80



5190MHz

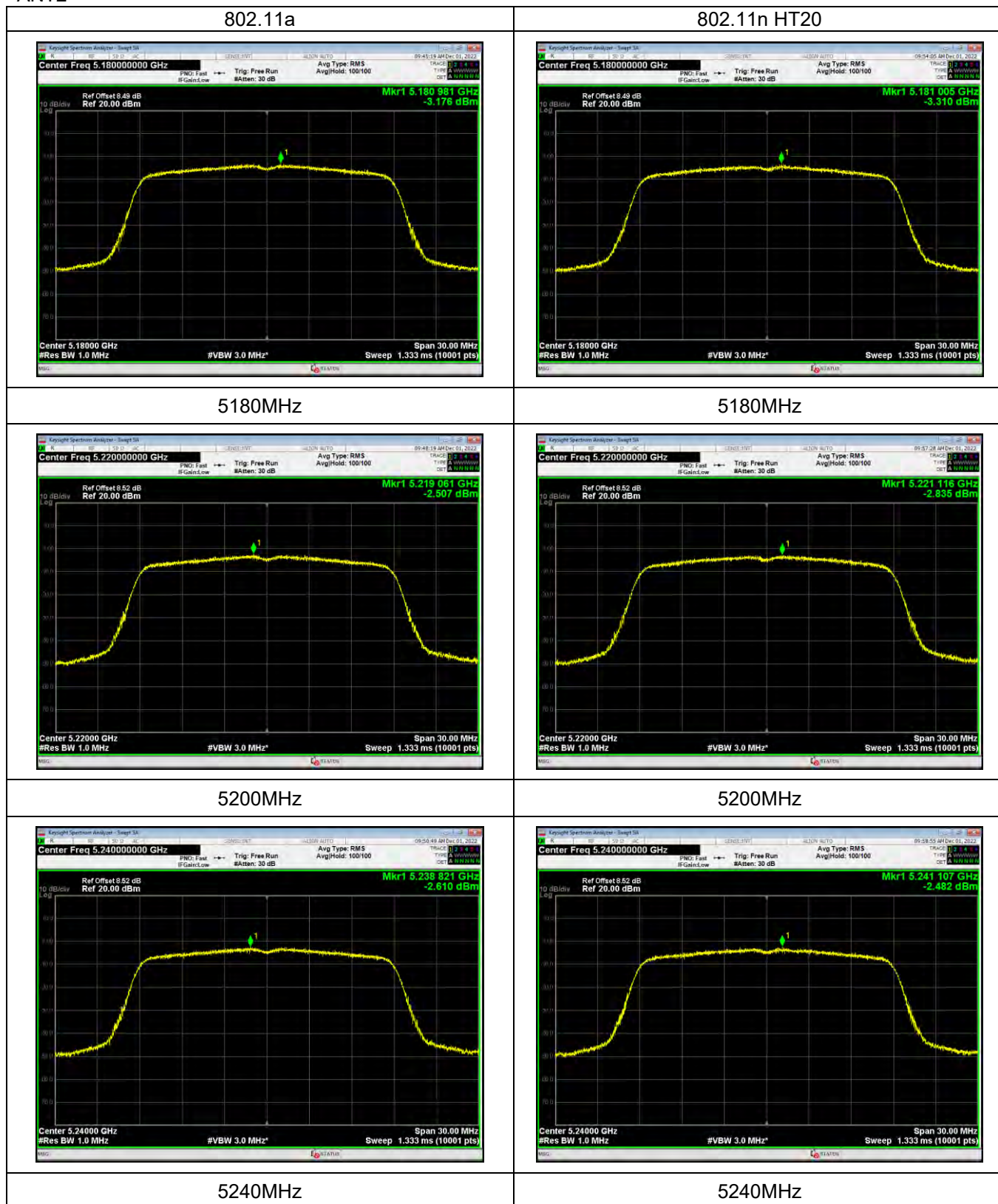


5210

5230MHz



ANT2





802.11n HT40



802.11ac HT20



5190MHz



5180



5230MHz



5200

5240



802.11ac HT40



802.11ac HT80



5190MHz



5210

5230MHz



6. 26DB&99% BANDWIDTH TEST

6.1 APPLIED PROCEDURES / LIMIT

The 26 dB bandwidth is used to determine the conducted power limits.

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.

6.1.1 TEST PROCEDURE

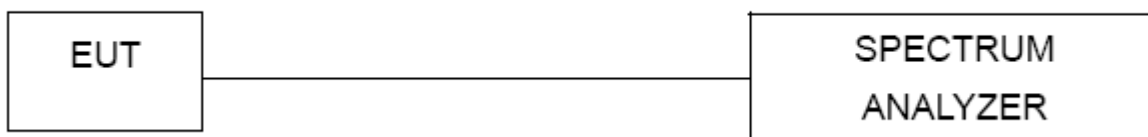
26dB Bandwidth	
Spectrum Parameters	Setting
RBW	approximately 1% of the emission bandwidth
VBW	>RBW
Span	30MHz(20MHz Bandwidth mode) 60MHz(40MHz Bandwidth mode) 120MHz(80MHz Bandwidth mode)
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

99% Occupied Bandwidth	
Spectrum Parameters	Setting
RBW	1% to 5% of the OBW
VBW	Approximately three times the RBW
Span	between 1.5 times and 5.0 times the OBW
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**6.1.5 TEST RESULTS**

		Test Channel	26dB Bandwidth (MHz)		99% Bandwidth (MHz)		Result
			ANT1	ANT2	ANT1	ANT2	
Band 1	802.11a	Low	20.08	19.89	17.558	17.546	Pass
		Middle	19.98	19.99	17.566	17.525	Pass
		High	20.01	19.99	17.555	17.525	Pass
	802.11n HT20	Low	20.00	19.84	17.530	17.522	Pass
		Middle	19.98	19.87	17.542	17.538	Pass
		High	20.02	19.96	17.559	17.538	Pass
	802.11n HT40	Low	40.00	40.37	35.944	35.950	Pass
		High	39.81	40.03	35.913	35.938	Pass
	802.11ac HT20	Low	19.97	19.82	17.572	17.497	Pass
		Middle	20.07	19.76	17.510	17.532	Pass
		High	20.16	19.87	17.543	17.558	Pass
	802.11ac HT40	Low	39.90	39.58	35.933	35.950	Pass
		High	39.94	39.96	35.947	35.959	Pass
	802.11ac HT80	/	80.08	80.32	75.263	75.224	Pass



ANT1

802.11a



802.11n HT20



5180MHz



5180MHz



5200MHz



5200MHz



5240MHz

5240MHz



802.11n HT40



802.11ac HT20



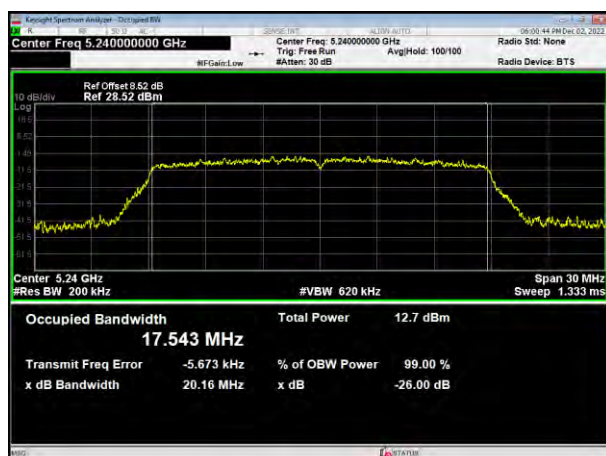
5190MHz



5180MHz



5230MHz

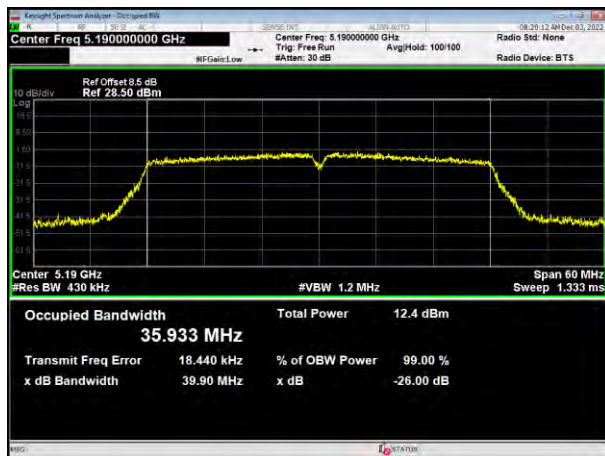


5200MHz

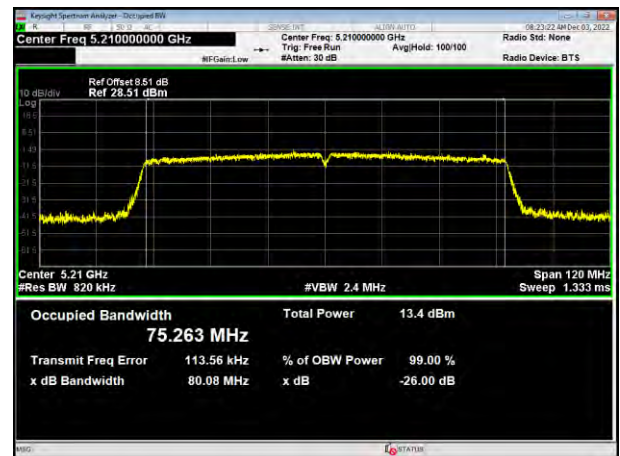
5240MHz



802.11ac HT40



802.11ac HT80



5190MHz



5210MHz



5230MHz





ANT2

802.11a



802.11n HT20



5180MHz



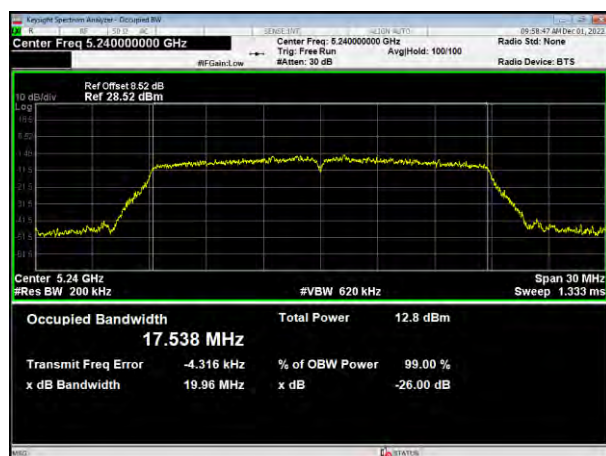
5180MHz



5200MHz



5200MHz

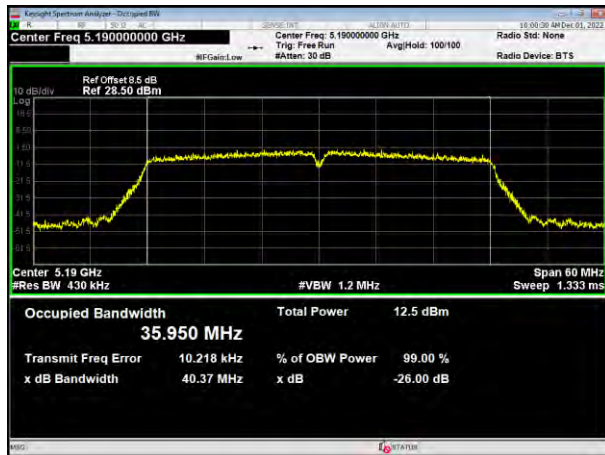


5240MHz

5240MHz



802.11n HT40



802.11ac HT20



5190MHz



5180MHz



5230MHz



5200MHz

5240MHz



802.11ac HT40



802.11ac HT80



5190MHz



5210MHz

5230MHz



7. DUTY CYCLE TEST SIGNAL

7.1 APPLIED PROCEDURES / LIMIT

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle. All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

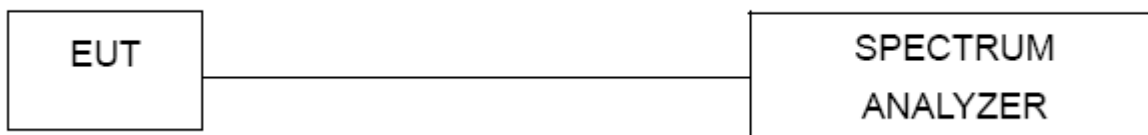
7.1.1 TEST PROCEDURE

1. Set RBW = 1 MHz.
2. Set the video bandwidth (VBW) $\geq$ RBW.
3. Detector = Peak.
4. Sweep = auto couple.
5. Allow the trace to stabilize.
6. Span=0

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



7.1.5 TEST RESULTS

ANT1

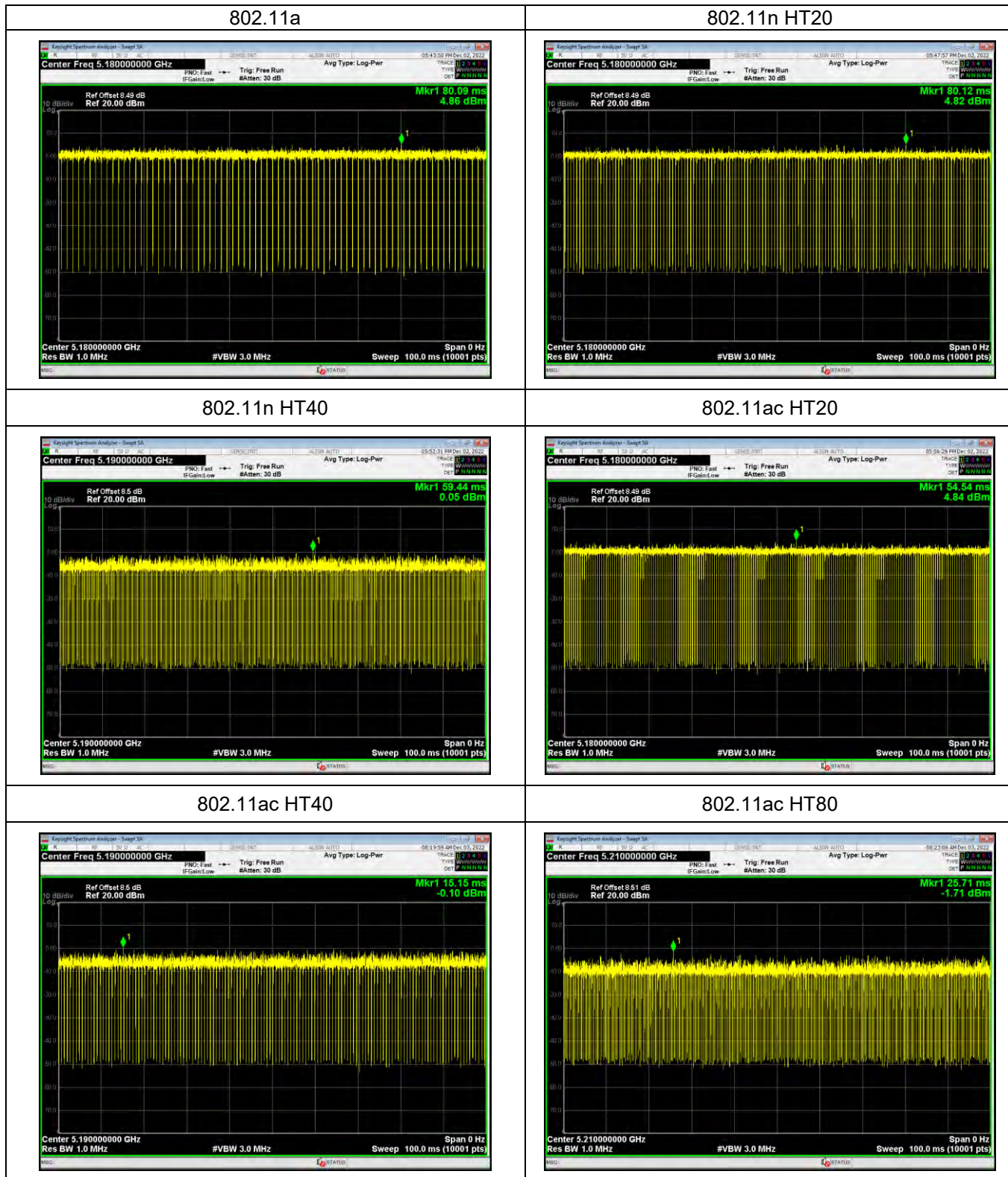
Operation Mode		Duty Cycle(%)	Duty Fator (dB) $10 * \log (1/ \text{Duty cycle})$
Band 1	802.11a	97.53	0.11
	802.11n(HT20)	95.24	0.21
	802.11n(HT40)	91.22	0.4
	802.11ac(HT20)	93.41	0.3
	802.11ac(HT40)	95.31	0.21
	802.11ac(HT80)	91.12	0.4

ANT2

Operation Mode		Duty Cycle(%)	Duty Fator (dB) $10 * \log (1/ \text{Duty cycle})$
Band 1	802.11a	97.54	0.11
	802.11n(HT20)	95.31	0.21
	802.11n(HT40)	91.32	0.39
	802.11ac(HT20)	93.57	0.29
	802.11ac(HT40)	88.64	0.52
	802.11ac(HT80)	81.87	0.87

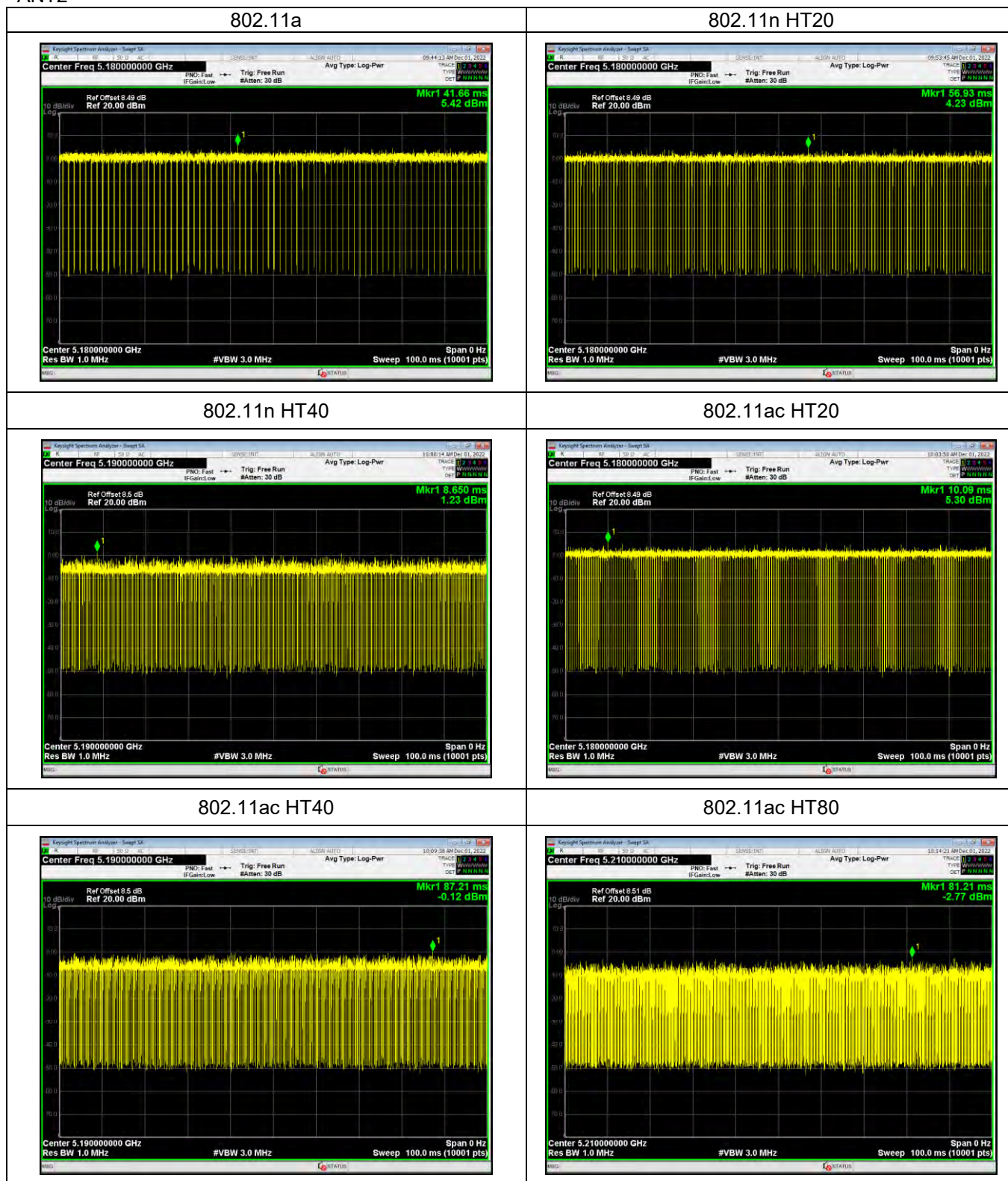


ANT1





ANT2





8. FREQUENCY STABILITY

8.1 APPLIED PROCEDURES / LIMIT

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

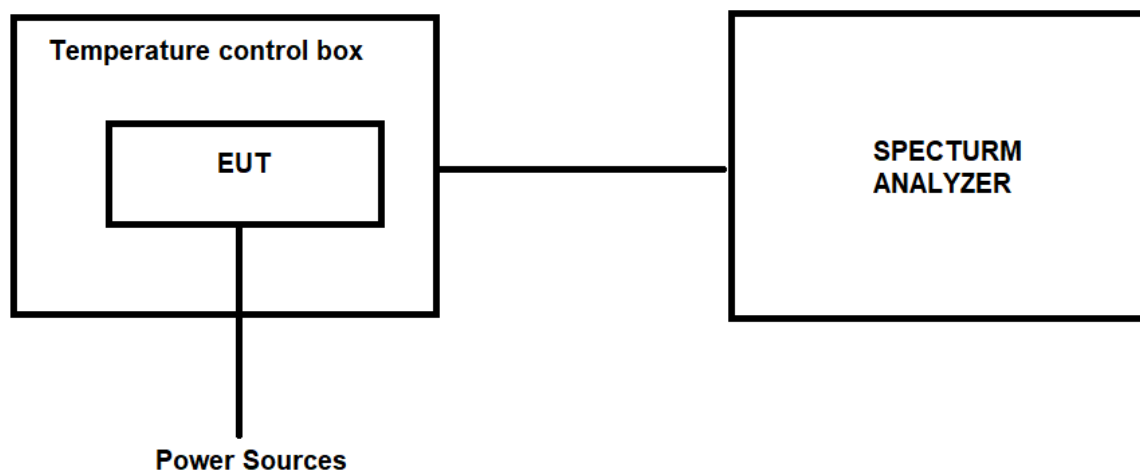
8.1.1 TEST PROCEDURE

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
2. Set EUT as normal operation.
3. Turn the EUT on and couple its output to spectrum.
4. Turn the EUT off and set the chamber to the highest temperature specified.
5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
6. Repeat step with the temperature chamber set to the lowest temperature.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



8.1.5 TEST RESULTS

We test all antenna's data, the data only show the antenna1 worst mode.

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)			Δ Frequency (MHz)		
			802.11a	802.11n HT20	802.11ac HT20	802.11a	802.11n HT20	802.11ac HT20
3.6V	-20℃	5180	5180.0322	5180.0352	5180.0338	-0.0322	-0.0352	-0.0338
		5220	5220.0311	5220.0314	5220.0364	-0.0311	-0.0314	-0.0364
		5240	5240.0236	5240.0266	5240.0253	-0.0236	-0.0266	-0.0253
3.1V		5180	5180.0218	5180.0273	5180.0235	-0.0218	-0.0273	-0.0235
		5220	5220.0336	5220.0355	5220.0344	-0.0336	-0.0355	-0.0344
		5240	5240.0226	5240.0268	5240.0236	-0.0226	-0.0268	-0.0236
3.3V	25℃	5180	5180.0541	5180.0534	5180.0578	-0.0541	-0.0534	-0.0578
		5220	5220.0268	5220.0286	5220.0264	-0.0268	-0.0286	-0.0264
		5240	5240.0353	5240.0348	5240.0346	-0.0353	-0.0348	-0.0346
3.6V	50℃	5180	5180.0314	5180.0364	5180.0358	-0.0314	-0.0364	-0.0358
		5220	5220.0271	5220.0246	5220.0235	-0.0271	-0.0246	-0.0235
		5240	5240.0323	5240.0351	5240.0376	-0.0323	-0.0351	-0.0376
3.1V	50℃	5180	5180.0318	5180.0325	5180.0367	-0.0318	-0.0325	-0.0367
		5220	5220.0214	5220.0263	5220.0276	-0.0214	-0.0263	-0.0276
		5240	5240.0323	5240.0356	5240.0358	-0.0323	-0.0356	-0.0358



Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)		Δ Frequency (MHz)	
			802.11n HT40	802.11ac HT40	802.11n HT40	802.11ac HT40
3.6V	-20℃	5190	5190.0214	5190.0236	-0.0214	-0.0236
		5230	5230.0323	5230.0368	-0.0323	-0.0368
3.1V		5190	5190.0255	5190.0233	-0.0255	-0.0233
		5230	5230.0321	5230.0348	-0.0321	-0.0348
3.3V	25℃	5190	5190.0278	5190.0254	-0.0278	-0.0254
		5230	5230.0664	5230.0533	-0.0664	-0.0533
3.6V	50℃	5190	5190.0653	5190.0648	-0.0653	-0.0648
		5230	5230.0563	5230.0552	-0.0563	-0.0552
3.1V	50℃	5190	5190.0558	5190.0546	-0.0558	-0.0546
		5230	5230.0336	5230.0337	-0.0336	-0.0337

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)
			802.11ac HT80	802.11ac HT80
3.6V	-20℃	5210	5210.0139	-0.0139
3.1V		5210	5210.0283	-0.0283
3.3V	25℃	5210	5210.0475	-0.0475
3.6V	50℃	5210	5210.0314	-0.0314
3.1V	50℃	5210	5210.0336	-0.0336



9. TRANSMISSION IN THE ABSENCE OF DATA

9.1 STANDARD REQUIREMENT

According to §15.407(c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

9.2 TEST RESULT

No non-compliance noted:
Refer to the theory of operation.

10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

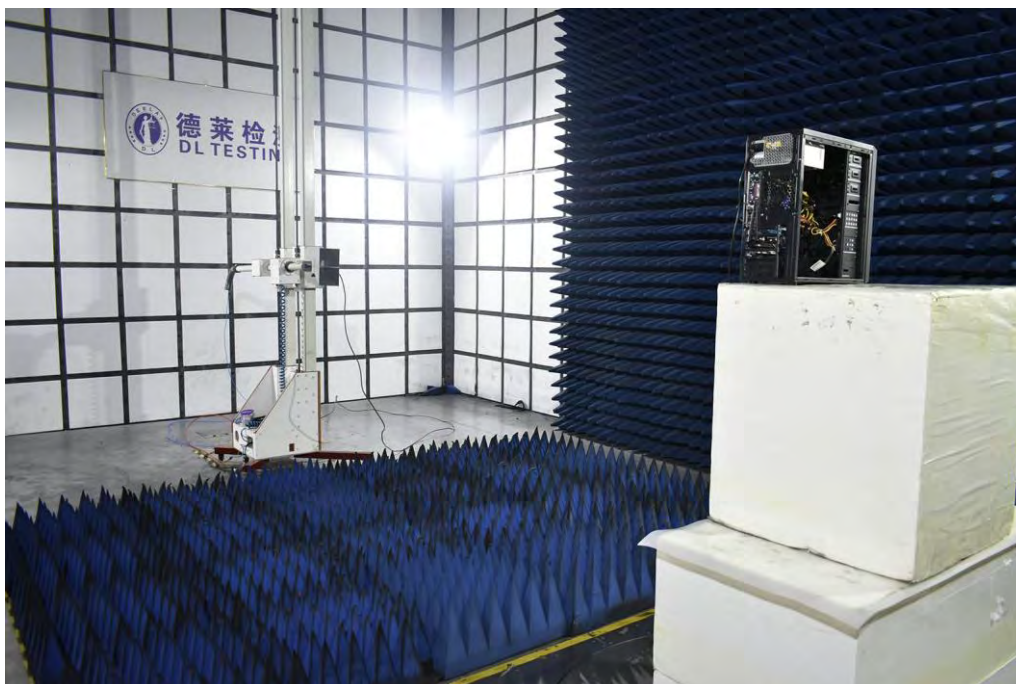
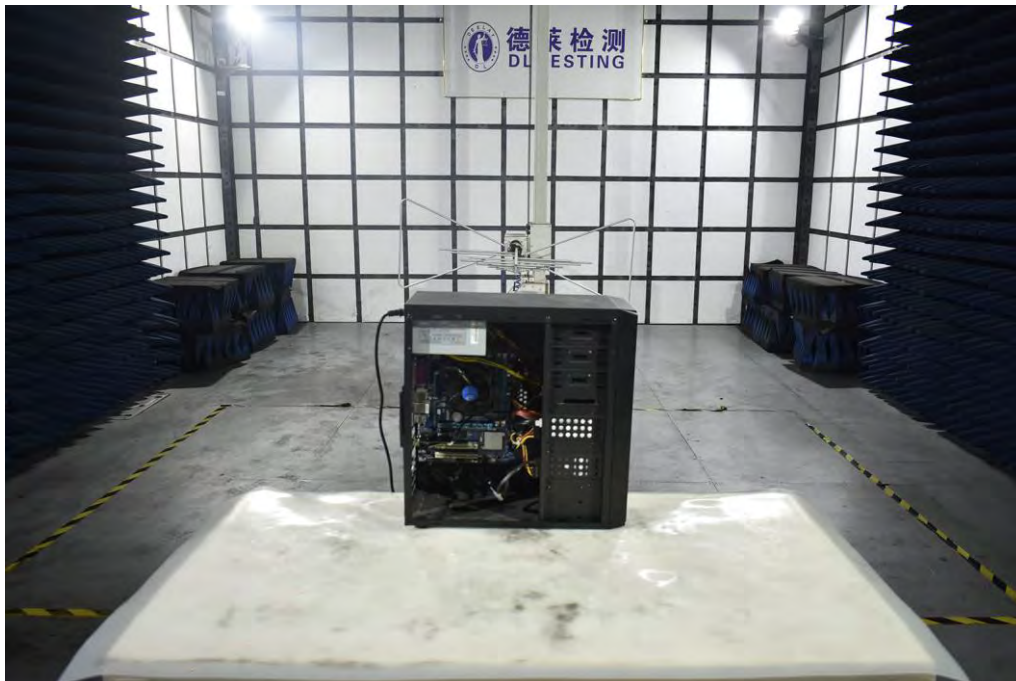
10.2 EUT ANTENNA

The EUT antenna is External antenna, It comply with the standard requirement.



11. TEST SEUUP PHOTO

Radiated Measurement Photos



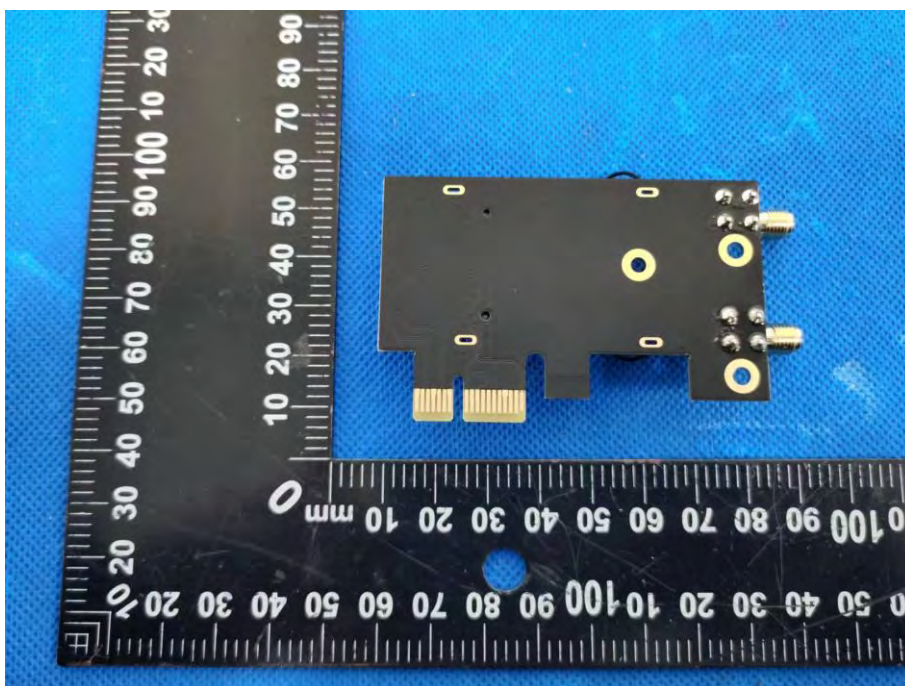
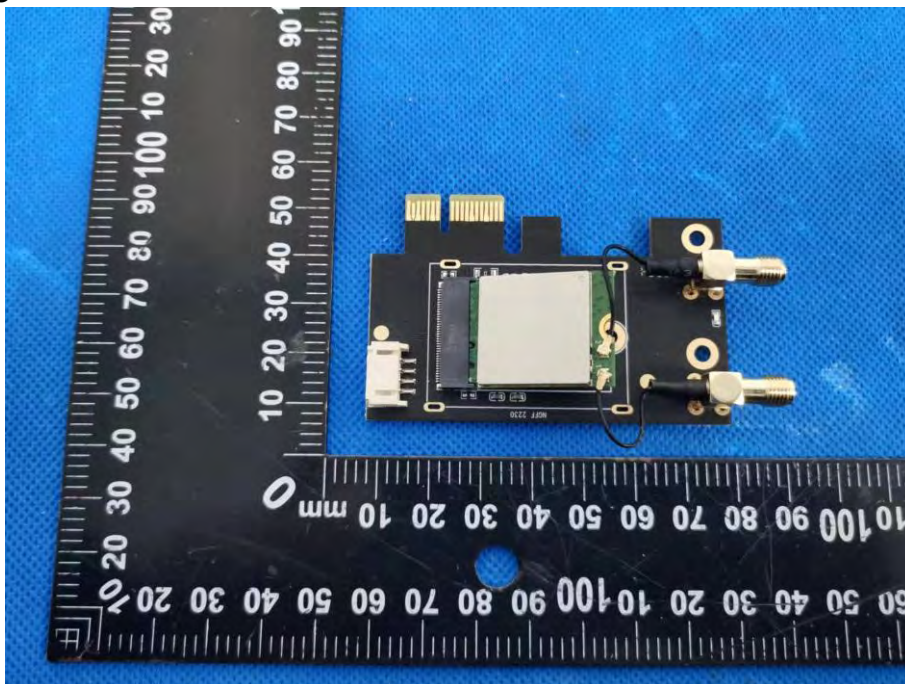


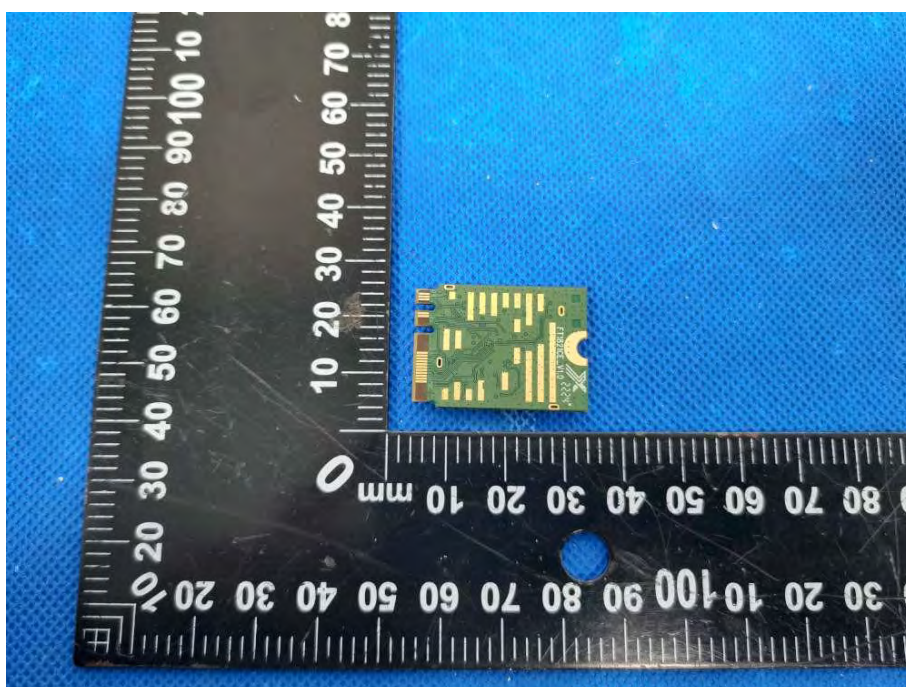
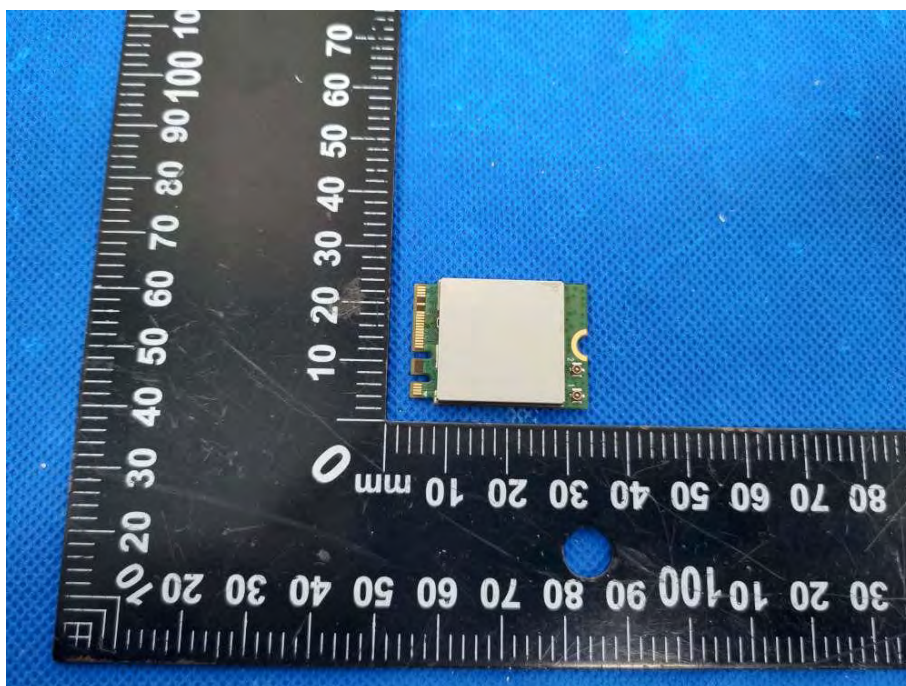
Conducted Measurement Photos

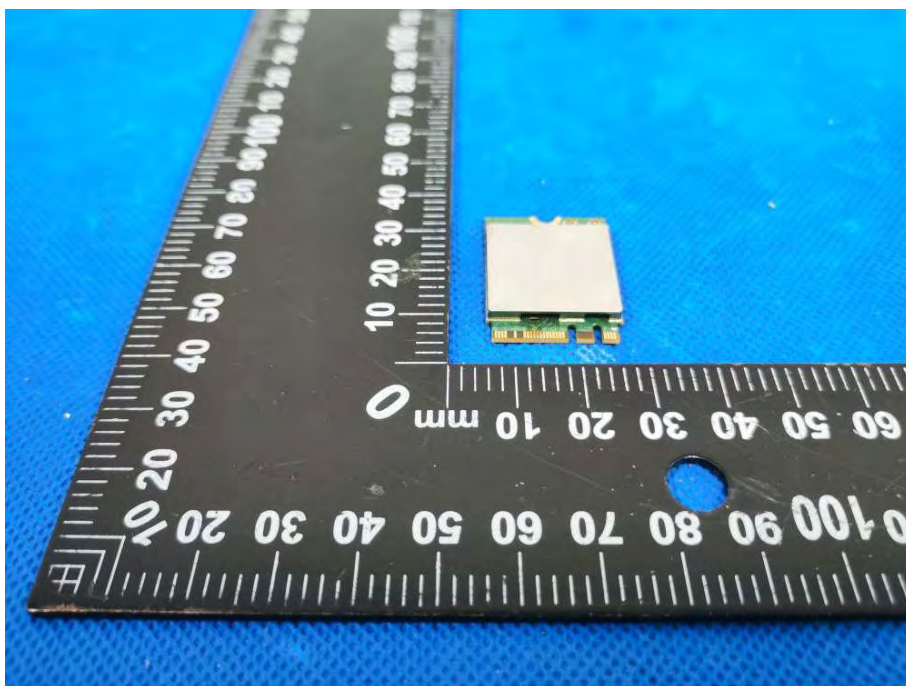
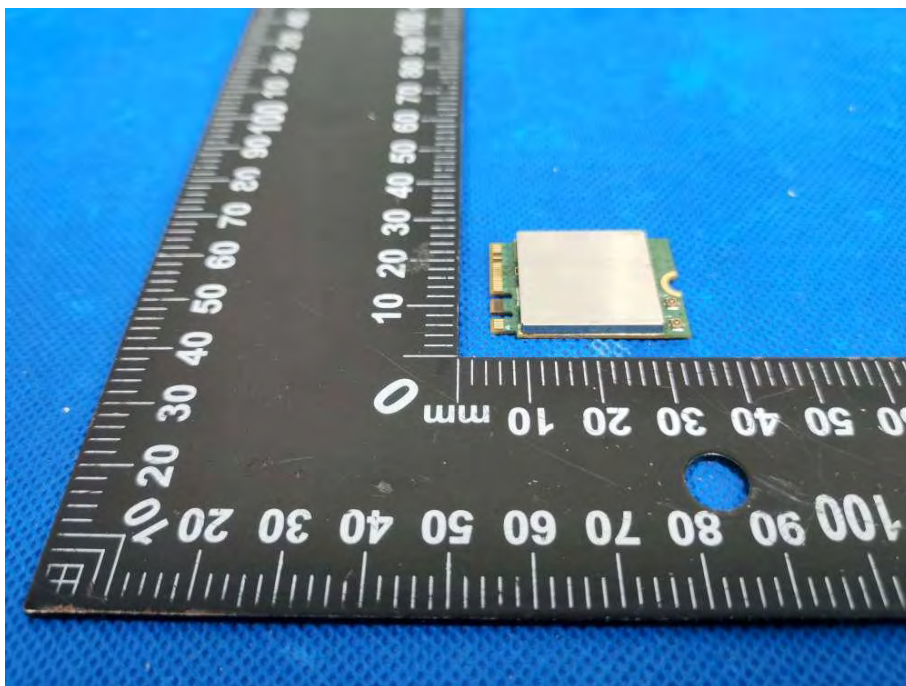


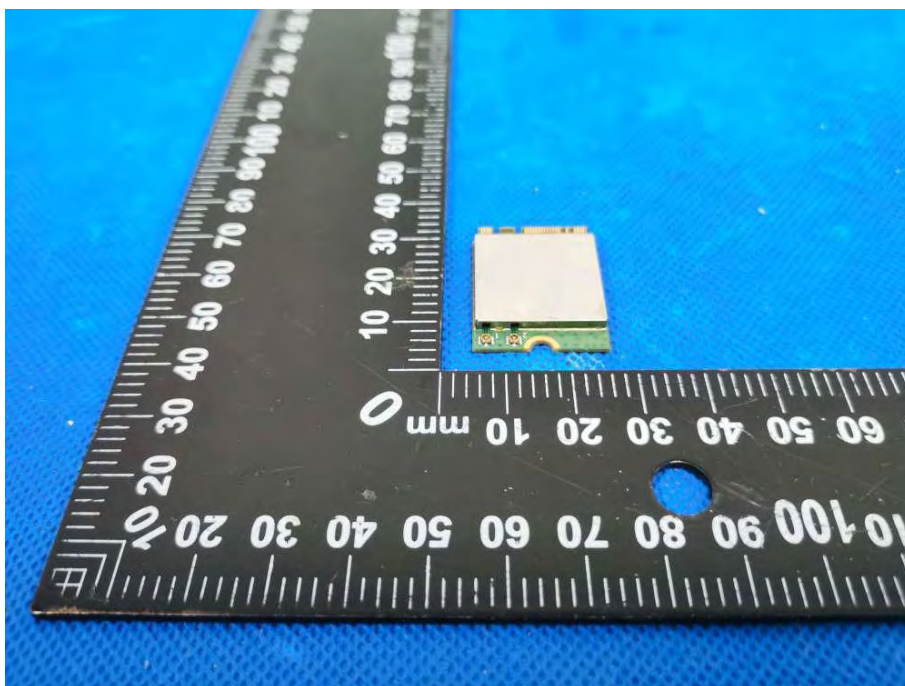
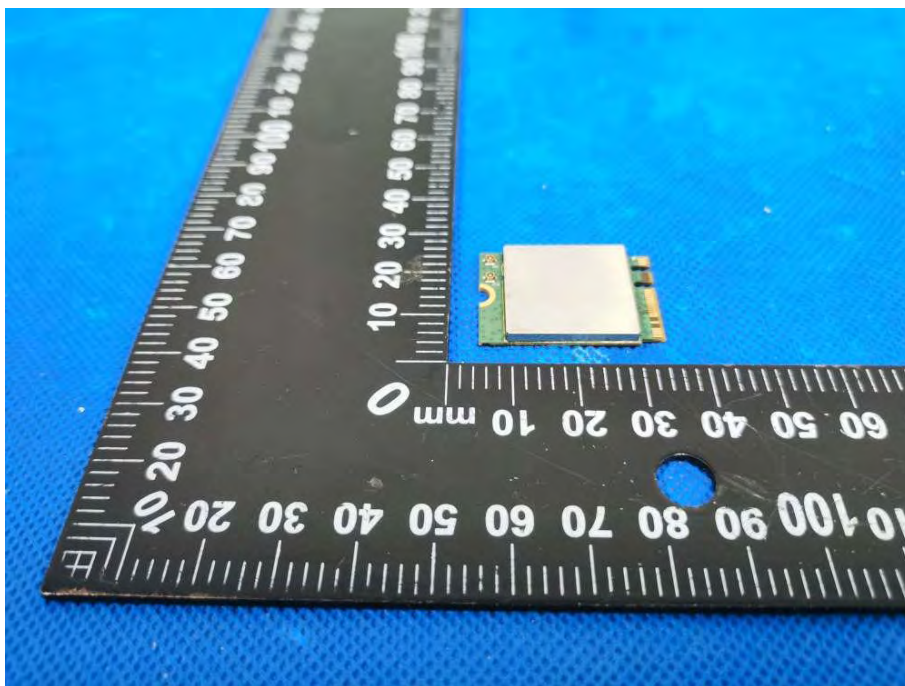


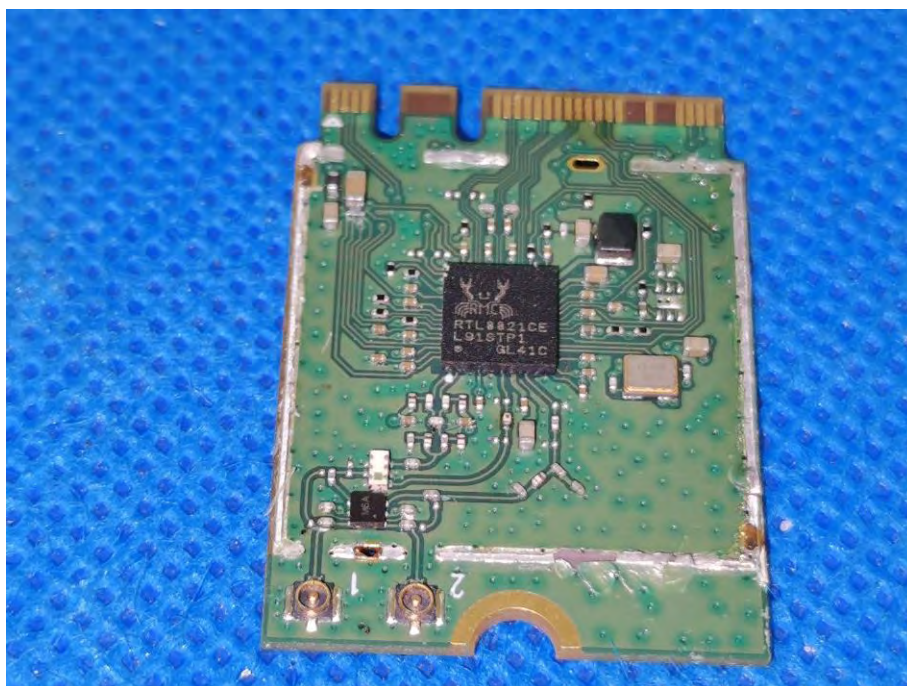
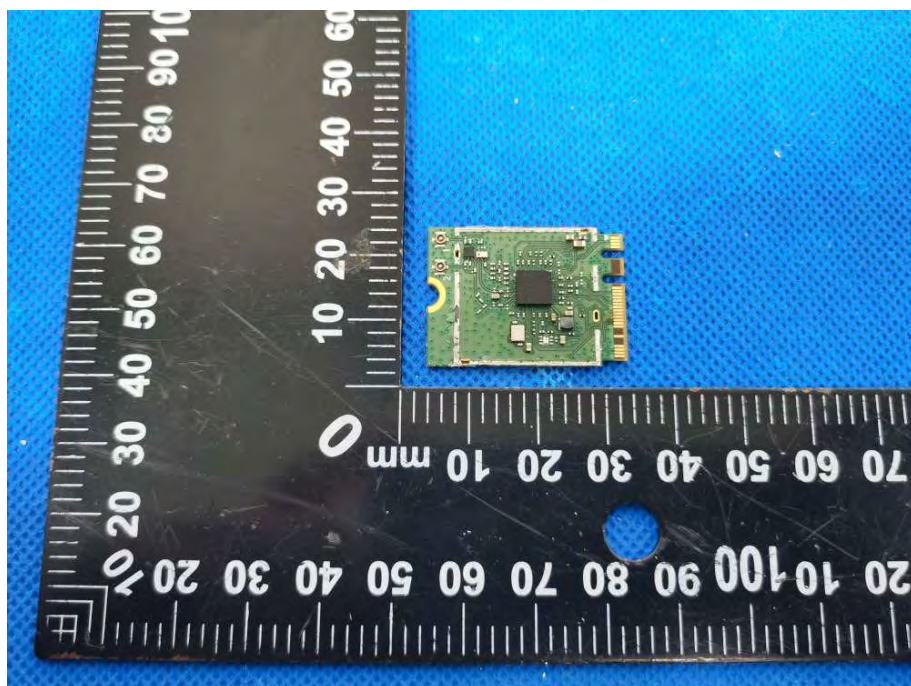
12. EUT PHOTO

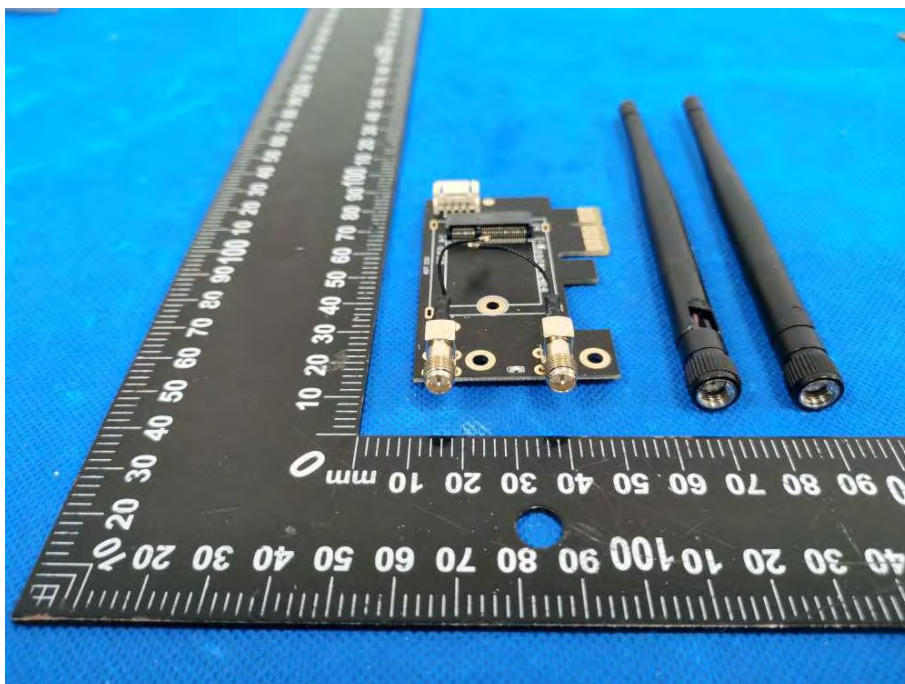












***** END OF REPORT *****