FCC Part 15C Test Report
FCC ID:2AUPL-M31

Applicant:	Shenzhen Embstar Technology Co., Ltd.
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Manufacturer:	Shenzhen Embstar Technology Co., Ltd.
Address:	Room 208, Building B, No. 133 Longsheng Road, Longxin Community, Baolong Street, Longgang District, Shenzhen, Guangdong, China
EUT:	Wifi AP Module
Trade Mark:	N/A
Model Number:	M31
Date of Receipt:	Sep. 03, 2021
Test Date:	Sep. 03, 2021 – Sep. 16, 2021
Date of Report:	Sep. 16, 2021
Prepared By:	Shenzhen DL Testing Technology Co., Ltd.
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Applicable Standards:	FCC PART 15 C 15.407 ANSI C63.10:2013
Test Result:	Pass
Report Number:	DL-20210915029-2E

Prepared (Test Engineer):	Pxing Huang
Reviewer (Supervisor):	Jack Bu
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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.

Table of Contents Page

1 . SUMMARY OF TEST RESULTS 5
1.1 MEASUREMENT UNCERTAINTY 5
2 . GENERAL INFORMATION 6
2.1 GENERAL DESCRIPTION OF EUT 6
2.2 DESCRIPTION OF TEST MODES 8
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED 9
2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE) 9
2.5 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING 9
2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS 10
3 . EMC EMISSION TEST 11
3.1 CONDUCTED EMISSION MEASUREMENT 11
3.1.1 POWER LINE CONDUCTED EMISSION LIMITS 11
3.1.2 TEST PROCEDURE 11
3.1.3 DEVIATION FROM TEST STANDARD 11
3.1.4 TEST SETUP 12
3.1.5 EUT OPERATING CONDITIONS 12
3.1.6 TEST RESULTS 12
3.2 RADIATED EMISSION MEASUREMENT 15
3.2.1 RADIATED EMISSION LIMITS 15
3.2.2 TEST PROCEDURE 16
3.2.3 DEVIATION FROM TEST STANDARD 16
3.2.4 TEST SETUP 16
3.2.5 EUT OPERATING CONDITIONS 17
3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ) 18
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ) 19
3.2.8 TEST RESULTS (1GHZ~40GHZ) 21
3.3 RADIATED BAND EMISSION MEASUREMENT 33
3.3.1 TEST REQUIREMENT: 33
3.3.2 TEST PROCEDURE 33
3.3.3 DEVIATION FROM TEST STANDARD 33
3.3.4 TEST SETUP 33
3.3.5 EUT OPERATING CONDITIONS 33
4 . PEAK OUTPUT POWER 39
4.1 APPLIED PROCEDURES / LIMIT 39
4.1.1 TEST PROCEDURE 39
4.1.2 DEVIATION FROM STANDARD 39
4.1.3 TEST SETUP 39

Table of Contents Page

4.1.4 EUT OPERATION CONDITIONS 39
4.1.5 TEST RESULTS 40
5 . POWER SPECTRAL DENSITY TEST 47
5.1 APPLIED PROCEDURES / LIMIT 47
5.1.1 TEST PROCEDURE 47
5.1.2 DEVIATION FROM STANDARD 47
5.1.3 TEST SETUP 47
5.1.4 EUT OPERATION CONDITIONS 47
5.1.5 TEST RESULTS 48
6 . 26DB BANDWIDTH TEST 55
6.1 APPLIED PROCEDURES / LIMIT 55
6.1.1 TEST PROCEDURE 55
6.1.2 DEVIATION FROM STANDARD 55
6.1.3 TEST SETUP 55
6.1.4 EUT OPERATION CONDITIONS 55
6.1.5 TEST RESULTS 56
7 . DUTY CYCLE TEST SIGNAL 63
7.1 APPLIED PROCEDURES / LIMIT 63
7.1.1 TEST PROCEDURE 63
7.1.2 DEVIATION FROM STANDARD 63
7.1.3 TEST SETUP 63
7.1.4 EUT OPERATION CONDITIONS 63
7.1.5 TEST RESULTS 64
8 . FREQUENCY STABILITY 67
8.1 APPLIED PROCEDURES / LIMIT 67
8.1.1 TEST PROCEDURE 67
8.1.2 DEVIATION FROM STANDARD 67
8.1.3 TEST SETUP 67
8.1.4 EUT OPERATION CONDITIONS 67
8.1.5 TEST RESULTS 68
9 . TRANSMISSION IN THE ABSENCE OF DATA 70
9.1 STANDARD REQUIREMENT 70
9.2 TEST RESULT 70
10 . ANTENNA REQUIREMENT 70
10.1 STANDARD REQUIREMENT 70
10.2 EUT ANTENNA 70
11 . TEST SEUUP PHOTO 71

Table of Contents **Page**

12 . EUT PHOTO **73**

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.407) , Subpart C			
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	
15.403(i) 15.407(e)	26dB bandwidth and 99%dB Bandwidth 6dB 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** ± **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	±2.56dB
2	RF power,conducted	±0.42dB
3	Spurious emissions,conducted	±2.76dB
4	All emissions,radiated(<1G)	±3.65dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5℃
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	Wifi AP Module
Trademark	N/A
Model No.:	M31
Model Difference	N/A
Operation Frequency:	5180-5240, 5745-5825MHz(802.11a/n/ac(HT20)) 5190-5230, 5755-5795MHz(802.11n/ac(HT40)) 5210MHz , 5775MHz (802.11ac(HT80))
Channel numbers:	See channel list
Channel separation:	20MHz
Modulation technology:	64QAM, 16QAM, QPSK, BPSK for OFDM
Rate of Transmitter	802.11a: 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps,54Mbps 802.11n: Up to 500Mbps
Antenna Type:	Ipex antenna
Antenna gain:	2dBi
Power supply:	DC 3.3V

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 802.11a/n(HT20)/ac(HT20)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	161	5805
153	5765	165	5825
157	5785		

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

Channel List for 802.11n(HT40)/ac(HT40)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795

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

Channel List for 802.11ac(HT80)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
155	5775	/	/

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	Band 4
Mode 1	802.11a/n/acHT20	CH36, CH44, CH48	CH149, CH157, CH165
Mode 2	802.11n/acHT40	CH38, CH46	CH151, CH159
Mode 3	802.11acHT80	CH42	CH155
Mode 4	Other	Link Mode	

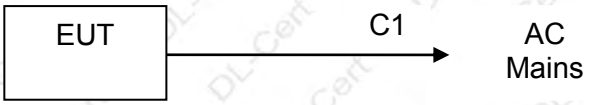
For Radiated Emission			
Pretest Mode	Channel	Band 1	Band 4
Mode 1	802.11a/n/acHT20	CH36, CH44, CH48	CH149, CH157, CH165
Mode 2	802.11n/acHT40	CH38, CH46	CH151, CH159
Mode 3	802.11acHT80	CH42	CH155
Mode 4	Other	Link Mode	

Note: 1. The measurements are performed at the highest, middle, lowest available channels.
2. During the test, the duty cycle >98%, 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

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	Dec. 07, 2020	Dec. 06, 2021
2	Test Receiver (9kHz-7GHz)	R&S	ESRP7	101393	Dec. 07, 2020	Dec. 06, 2021
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB9162	00306	Dec. 07, 2020	Dec. 06, 2021
4	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	02139	Dec. 07, 2020	Dec. 06, 2021
5	Horn Antenna (18GHz-40GHz)	A.H. Systems	SAS-574	588	Dec. 07, 2020	Dec. 06, 2021
6	Amplifier (9KHz-6GHz)	Schwarzbeck	BBV9743B	00153	Dec. 07, 2020	Dec. 06, 2021
7	Amplifier (1GHz-18GHz)	EMEC	EM01G8GA	00270	Dec. 07, 2020	Dec. 06, 2021
8	Amplifier (18GHz-40GHz)	Quanjuda	DLE-161	97	Dec. 07, 2020	Dec. 06, 2021
9	Loop Antenna (9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	Dec. 07, 2020	Dec. 06, 2021
10	RF cables1 (9kHz-1GHz)	ChengYu	966	004	Dec. 07, 2020	Dec. 06, 2021
11	RF cables2 (1GHz-40GHz)	ChengYu	966	003	Dec. 07, 2020	Dec. 06, 2021
12	Antenna connector	Florida RF Labs	N/A	RF 01#	Dec. 07, 2020	Dec. 06, 2021
13	Power probe	KEYSIGHT	U2021XA	MY55210018	Dec. 07, 2020	Dec. 06, 2021
14	Signal Analyzer 9kHz-26.5GHz	Agilent	N9020A	MY55370280	Dec. 07, 2020	Dec. 06, 2021
15	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	Dec. 07, 2020	Dec. 06, 2021
16	D.C. Power Supply	LongWei	PS-305D	010964729	Dec. 07, 2020	Dec. 06, 2021

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	843 Shielded Room	ChengYu	843 Room	843	Nov. 25, 2019	Nov. 24, 2022
2	EMI Receiver	R&S	ESR	101421	Dec. 07, 2020	Dec. 06, 2021
3	LISN	R&S	ENV216	102417	Dec. 07, 2020	Dec. 06, 2021
4	843 Cable 1#	ChengYu	CE Cable	001	Dec. 07, 2020	Dec. 06, 2021

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ_EMC	EMC-CON 3A1.1
2	EMC radiation test system	FALA	EZ_EMC	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.

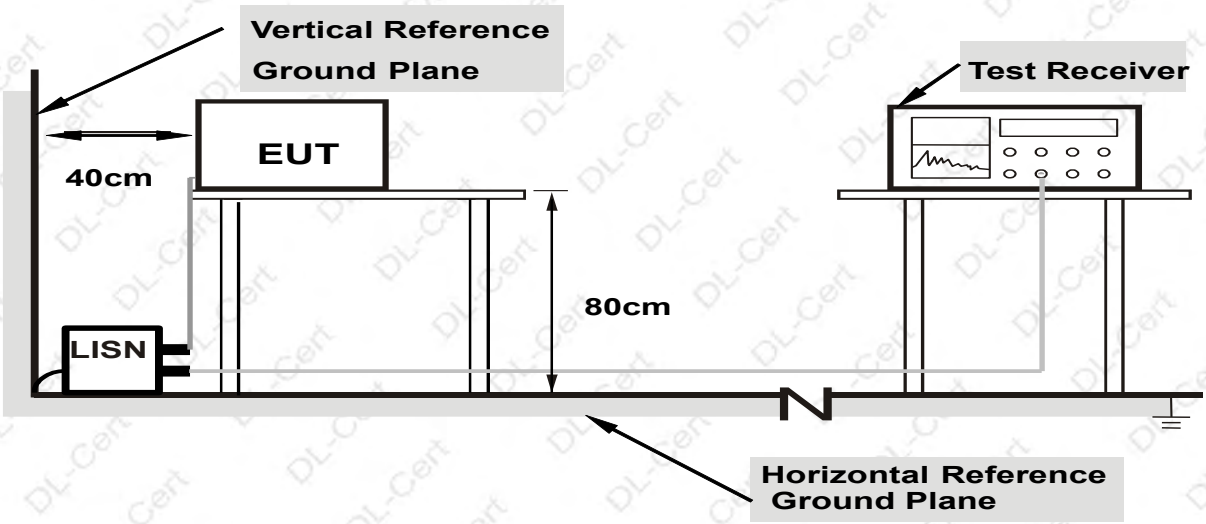
d. LISN at least 80 cm from nearest part of EUT chassis.

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



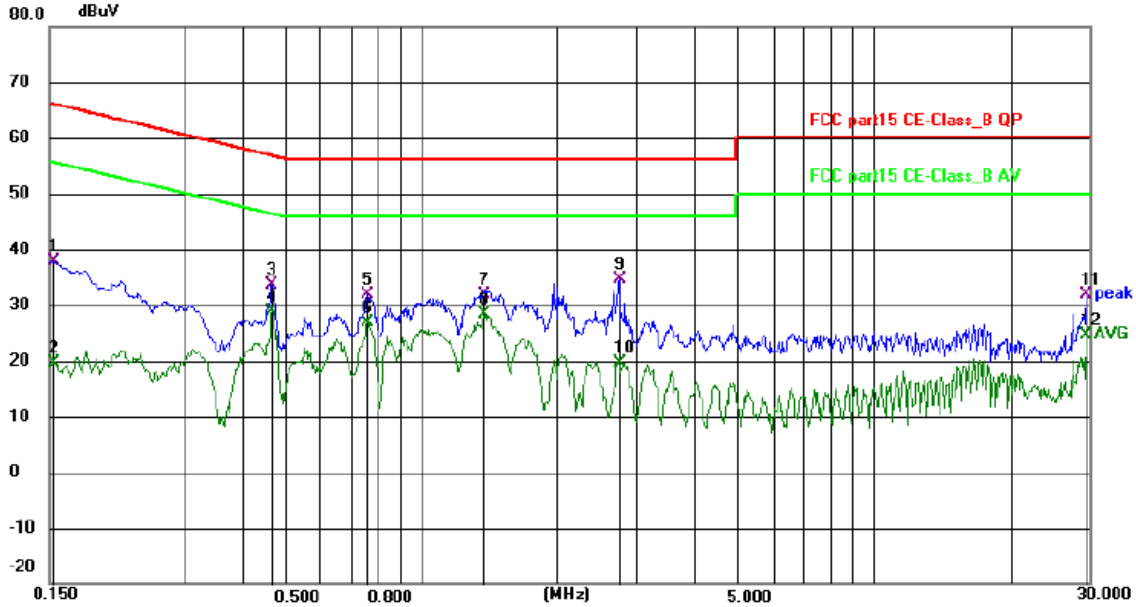
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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.

3.1.6 TEST RESULTS

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

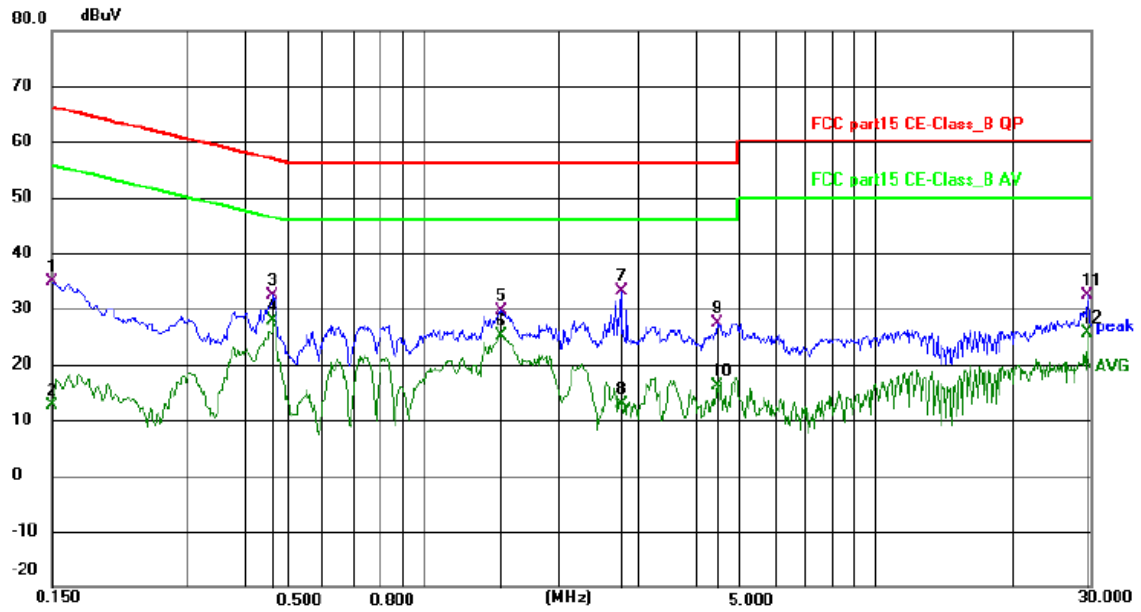


Remark:

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	0.1544	27.19	10.59	37.78	65.76	27.98	QP	P	
2	0.1544	9.00	10.59	19.59	55.76	36.17	AVG	P	
3	0.4661	24.29	9.34	33.63	56.58	22.95	QP	P	
4	0.4661	19.47	9.34	28.81	46.58	17.77	AVG	P	
5	0.7619	22.37	9.54	31.91	56.00	24.09	QP	P	
6	0.7619	17.24	9.54	26.78	46.00	19.22	AVG	P	
7	1.3691	22.31	9.65	31.96	56.00	24.04	QP	P	
8 *	1.3691	18.80	9.65	28.45	46.00	17.55	AVG	P	
9	2.7374	25.61	9.05	34.66	56.00	21.34	QP	P	
10	2.7374	10.49	9.05	19.54	46.00	26.46	AVG	P	
11	29.4987	20.90	10.88	31.78	60.00	28.22	QP	P	
12	29.4987	13.67	10.88	24.55	50.00	25.45	AVG	P	

Temperature:	25 ℃	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	0.1500	24.31	10.53	34.84	66.00	31.16	QP	P	
2	0.1500	2.19	10.53	12.72	56.00	43.28	AVG	P	
3	0.4650	22.76	9.50	32.26	56.60	24.34	QP	P	
4 *	0.4650	18.36	9.50	27.86	46.60	18.74	AVG	P	
5	1.4818	19.93	9.77	29.70	56.00	26.30	QP	P	
6	1.4818	15.39	9.77	25.16	46.00	20.84	AVG	P	
7	2.7374	23.26	9.97	33.23	56.00	22.77	QP	P	
8	2.7374	2.79	9.97	12.76	46.00	33.24	AVG	P	
9	4.4699	17.48	9.94	27.42	56.00	28.58	QP	P	
10	4.4699	6.21	9.94	16.15	46.00	29.85	AVG	P	
11	29.5121	21.48	10.95	32.43	60.00	27.57	QP	P	
12	29.5121	14.61	10.95	25.56	50.00	24.44	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	25GHz
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:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic 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 (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.

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.

Above 1GHz test procedure as below:

g. 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).

h. Test the EUT in the lowest channel, the middle channel, the Highest channel

Note:

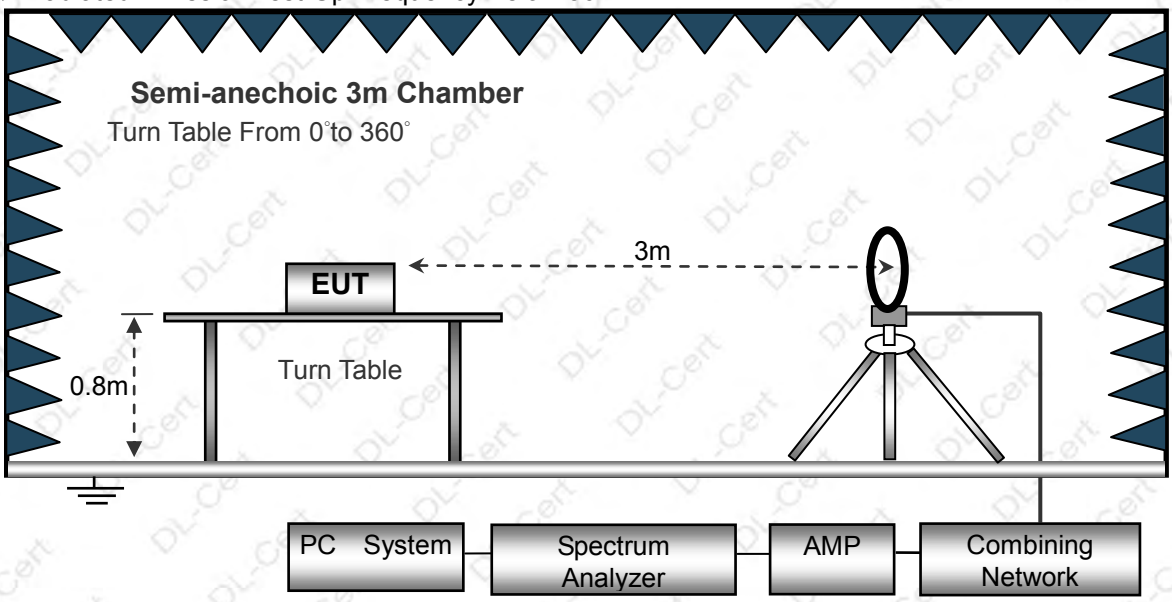
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

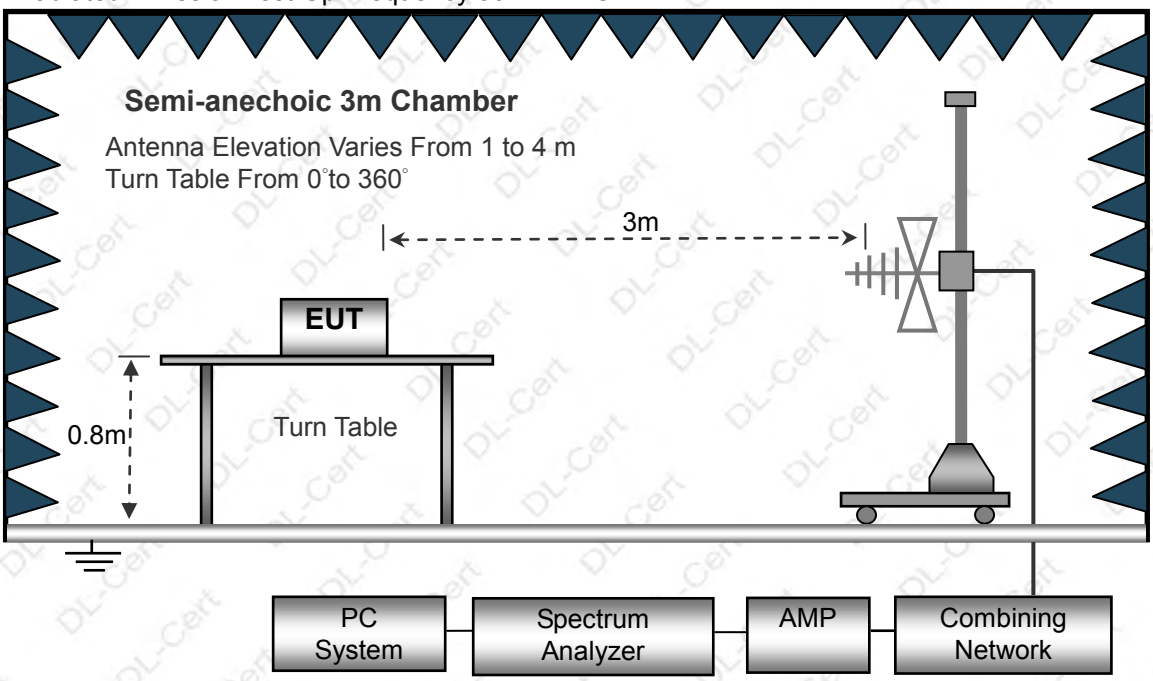
No deviation

3.2.4 TEST SETUP

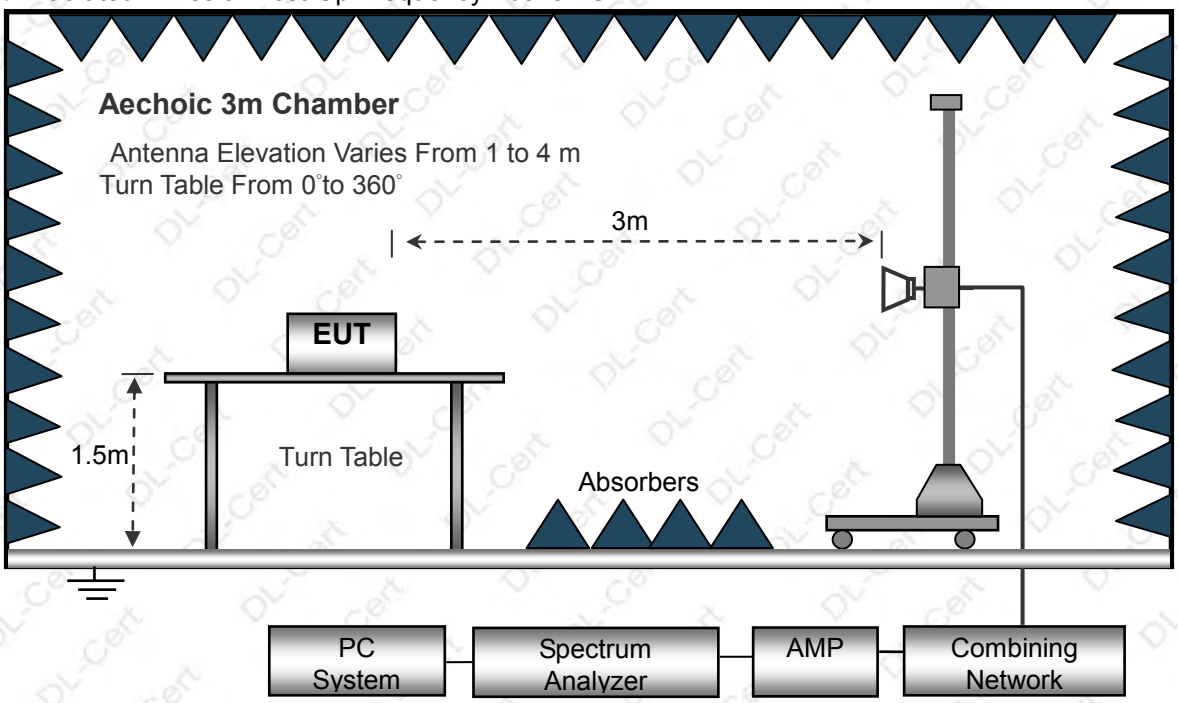
（A）Radiated Emission Test-Up Frequency Below 30MHz



（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 Humidtity:	48%
Pressure:	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	Mode 4	Polarization :	--

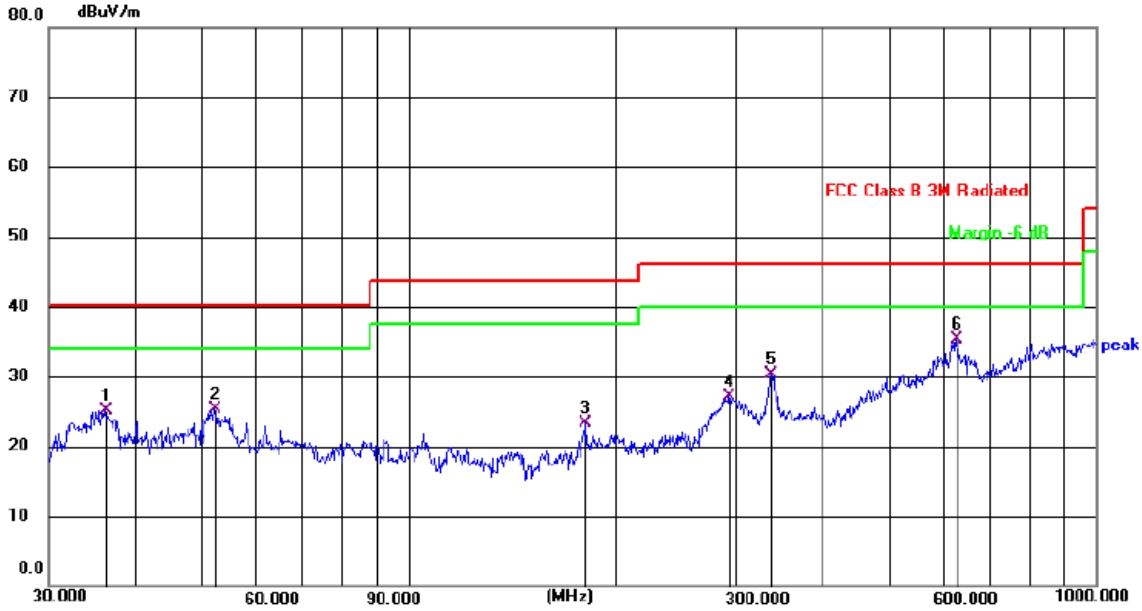
Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

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 (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

3.2.7 TEST RESULTS (Between 30MHz – 1GHz)

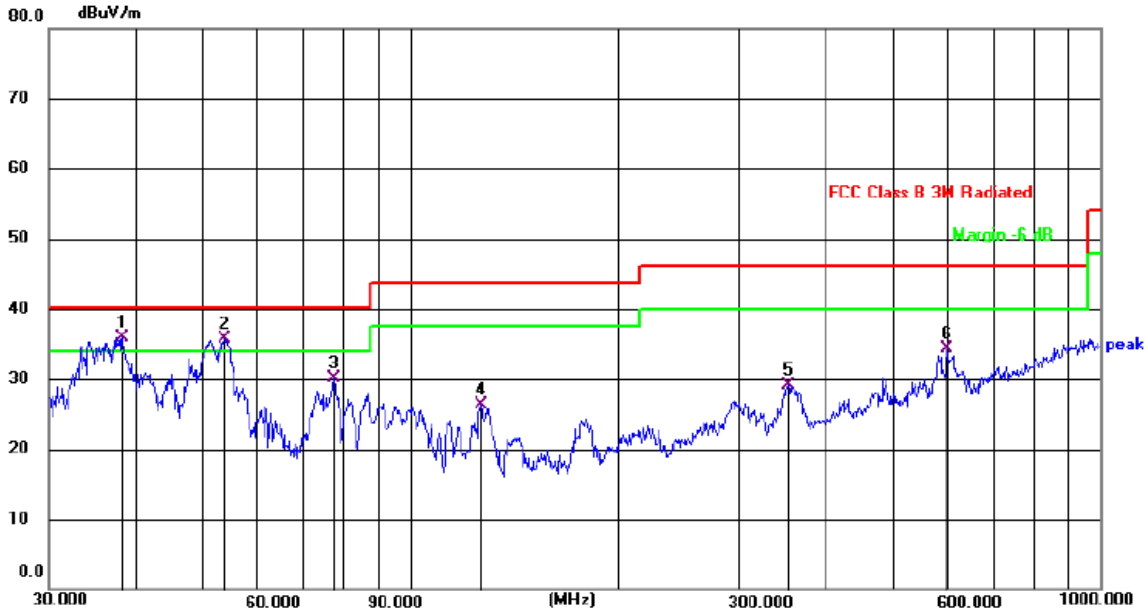
Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 3.3V		
Test Mode :	Mode 4		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		36.2540	40.12	-14.94	25.18	40.00	14.82	QP
2		52.2078	38.86	-13.49	25.37	40.00	14.63	QP
3		181.2834	40.57	-17.24	23.33	43.50	20.17	QP
4		292.0583	39.75	-12.73	27.02	46.00	18.98	QP
5		337.2155	42.26	-11.91	30.35	46.00	15.65	QP
6	*	625.0780	41.57	-6.17	35.40	46.00	10.60	QP

Remark:
Correct Factor = Cable loss + Antenna factor – Preamplifier;
Level = Reading Level + Correct Factor; Margin = Limit – Level;

Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Vertical
test voltage :	DC 3.3V		
Test Mode :	Mode 4		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	38.3462	50.57	-14.58	35.99	40.00	4.01	QP
2	!	53.8817	49.34	-13.64	35.70	40.00	4.30	QP
3		77.5926	49.06	-18.92	30.14	40.00	9.86	QP
4		126.7723	44.64	-18.24	26.40	43.50	17.10	QP
5		352.9433	40.70	-11.65	29.05	46.00	16.95	QP
6		599.3211	41.08	-6.75	34.33	46.00	11.67	QP

Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

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

3.2.8 TEST RESULTS (1ghz~40ghZ)

802.11a band 1

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	56.15	49.05	15.3	37.39	59.79	74	-14.21	PK
V	10360	45.14	49.05	15.3	37.39	48.78	54	-5.22	AV
V	15540	56.53	49.16	15.27	40.45	63.09	74	-10.91	PK
V	15540	43.52	49.16	15.27	40.45	50.08	54	-3.92	AV
H	10360	56.78	49.05	15.3	37.39	60.42	74	-13.58	PK
H	10360	45.45	49.05	15.3	37.39	49.09	54	-4.91	AV
H	15540	59.73	49.16	15.27	40.45	66.29	74	-7.71	PK
H	15540	43.65	49.16	15.27	40.45	50.21	54	-3.79	AV
operation frequency:5200									
V	10400	57.43	49.09	15.34	37.42	61.1	74	-12.90	PK
V	10400	45.14	49.09	15.34	37.42	48.81	54	-5.19	AV
V	15600	59.42	49.18	15.29	40.47	66	74	-8.00	PK
V	15600	43.43	49.18	15.29	40.47	50.01	54	-3.99	AV
H	10400	56.65	49.09	15.34	37.42	60.32	74	-13.68	PK
H	10400	45.35	49.09	15.34	37.42	49.02	54	-4.98	AV
H	15600	59.47	49.18	15.29	40.47	66.05	74	-7.95	PK
H	15600	43.27	49.18	15.29	40.47	49.85	54	-4.15	AV
operation frequency:5240									
V	10480	58.05	49.11	15.37	37.46	61.77	74	-12.23	PK
V	10480	45.35	49.11	15.37	37.46	49.07	54	-4.93	AV
V	15720	59.18	49.21	15.34	40.51	65.82	74	-8.18	PK
V	15720	43.24	49.21	15.34	40.51	49.88	54	-4.12	AV
H	10480	57.05	49.11	15.37	31.31	54.62	74	-19.38	PK
H	10480	45.64	49.11	15.37	31.31	43.21	54	-10.79	AV
H	15720	57.42	49.21	15.34	40.51	64.06	74	-9.94	PK
H	15720	42.36	49.21	15.34	40.51	49	54	-5.00	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

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	56.84	49.05	15.3	37.39	60.48	74	-13.52	PK
V	10360	45.73	49.05	15.3	37.39	49.37	54	-4.63	AV
V	15540	56.25	49.16	15.27	40.45	62.81	74	-11.19	PK
V	15540	43.32	49.16	15.27	40.45	49.88	54	-4.12	AV
H	10360	56.63	49.05	15.3	37.39	60.27	74	-13.73	PK
H	10360	45.64	49.05	15.3	37.39	49.28	54	-4.72	AV
H	15540	54.55	49.16	15.27	40.45	61.11	74	-12.89	PK
H	15540	44.38	49.16	15.27	40.45	50.94	54	-3.06	AV
operation frequency:5200									
V	10400	56.48	49.09	15.34	37.42	60.15	74	-13.85	PK
V	10400	44.93	49.09	15.34	37.42	48.6	54	-5.40	AV
V	15600	55.65	49.18	15.29	40.47	62.23	74	-11.77	PK
V	15600	43.43	49.18	15.29	40.47	50.01	54	-3.99	AV
H	10400	55.37	49.09	15.34	37.42	59.04	74	-14.96	PK
H	10400	43.65	49.09	15.34	37.42	47.32	54	-6.68	AV
H	15600	55.07	49.18	15.29	40.47	61.65	74	-12.35	PK
H	15600	43.43	49.18	15.29	40.47	50.01	54	-3.99	AV
operation frequency:5240									
V	10480	57.53	49.11	15.37	37.46	61.25	74	-12.75	PK
V	10480	44.67	49.11	15.37	37.46	48.39	54	-5.61	AV
V	15720	54.56	49.21	15.34	40.51	61.2	74	-12.80	PK
V	15720	43.44	49.21	15.34	40.51	50.08	54	-3.92	AV
H	10480	57.53	49.11	15.37	31.31	55.1	74	-18.90	PK
H	10480	44.78	49.11	15.37	31.31	42.35	54	-11.65	AV
H	15720	55.36	49.21	15.34	40.51	62	74	-12.00	PK
H	15720	44.07	49.21	15.34	40.51	50.71	54	-3.29	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

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:5190									
V	10380	56.85	49.07	15.33	37.41	60.52	74	-13.48	PK
V	10380	45.72	49.07	15.33	37.41	49.39	54	-4.61	AV
V	15570	56.16	49.17	15.28	40.46	62.73	74	-11.27	PK
V	15570	43.35	49.17	15.28	40.46	49.92	54	-4.08	AV
H	10380	56.32	49.07	15.33	37.41	59.99	74	-14.01	PK
H	10380	45.65	49.07	15.33	37.41	49.32	54	-4.68	AV
H	15570	54.57	49.17	15.28	40.46	61.14	74	-12.86	PK
H	15570	44.35	49.17	15.28	40.46	50.92	54	-3.08	AV
operation frequency:5230									
V	10460	57.66	49.11	15.37	37.46	61.38	74	-12.62	PK
V	10460	44.67	49.11	15.37	37.46	48.39	54	-5.61	AV
V	15690	54.25	49.21	15.34	40.51	60.89	74	-13.11	PK
V	15690	43.41	49.21	15.34	40.51	50.05	54	-3.95	AV
H	10460	57.55	49.11	15.37	31.31	55.12	74	-18.88	PK
H	10460	44.86	49.11	15.37	31.31	42.43	54	-11.57	AV
H	15690	55.43	49.21	15.34	40.51	62.07	74	-11.93	PK
H	15690	44.07	49.21	15.34	40.51	50.71	54	-3.29	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

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	56.88	49.05	15.3	37.39	60.52	74	-13.48	PK
V	10360	45.52	49.05	15.3	37.39	49.16	54	-4.84	AV
V	15540	56.23	49.16	15.27	40.45	62.79	74	-11.21	PK
V	15540	43.35	49.16	15.27	40.45	49.91	54	-4.09	AV
H	10360	56.62	49.05	15.3	37.39	60.26	74	-13.74	PK
H	10360	45.57	49.05	15.3	37.39	49.21	54	-4.79	AV
H	15540	54.52	49.16	15.27	40.45	61.08	74	-12.92	PK
H	15540	44.29	49.16	15.27	40.45	50.85	54	-3.15	AV
operation frequency:5200									
V	10400	56.87	49.09	15.34	37.42	60.54	74	-13.46	PK
V	10400	44.94	49.09	15.34	37.42	48.61	54	-5.39	AV
V	15600	55.63	49.18	15.29	40.47	62.21	74	-11.79	PK
V	15600	43.41	49.18	15.29	40.47	49.99	54	-4.01	AV
H	10400	55.32	49.09	15.34	37.42	58.99	74	-15.01	PK
H	10400	43.67	49.09	15.34	37.42	47.34	54	-6.66	AV
H	15600	55.05	49.18	15.29	40.47	61.63	74	-12.37	PK
H	15600	43.43	49.18	15.29	40.47	50.01	54	-3.99	AV
operation frequency:5240									
V	10480	57.54	49.11	15.37	37.46	61.26	74	-12.74	PK
V	10480	44.67	49.11	15.37	37.46	48.39	54	-5.61	AV
V	15720	54.36	49.21	15.34	40.51	61	74	-13.00	PK
V	15720	43.44	49.21	15.34	40.51	50.08	54	-3.92	AV
H	10480	57.53	49.11	15.37	31.31	55.1	74	-18.90	PK
H	10480	44.59	49.11	15.37	31.31	42.16	54	-11.84	AV
H	15720	55.36	49.21	15.34	40.51	62	74	-12.00	PK
H	15720	44.07	49.21	15.34	40.51	50.71	54	-3.29	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

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:5190									
V	10380	56.85	49.07	15.33	37.41	60.52	74	-13.48	PK
V	10380	45.73	49.07	15.33	37.41	49.4	54	-4.60	AV
V	15570	56.33	49.17	15.28	40.46	62.9	74	-11.10	PK
V	15570	43.37	49.17	15.28	40.46	49.94	54	-4.06	AV
H	10380	56.52	49.07	15.33	37.41	60.19	74	-13.81	PK
H	10380	45.66	49.07	15.33	37.41	49.33	54	-4.67	AV
H	15570	54.57	49.17	15.28	40.46	61.14	74	-12.86	PK
H	15570	44.35	49.17	15.28	40.46	50.92	54	-3.08	AV
operation frequency:5230									
V	10460	57.33	49.11	15.37	37.46	61.05	74	-12.95	PK
V	10460	44.67	49.11	15.37	37.46	48.39	54	-5.61	AV
V	15690	54.52	49.21	15.34	40.51	61.16	74	-12.84	PK
V	15690	43.44	49.21	15.34	40.51	50.08	54	-3.92	AV
H	10460	57.53	49.11	15.37	31.31	55.1	74	-18.90	PK
H	10460	44.59	49.11	15.37	31.31	42.16	54	-11.84	AV
H	15690	55.35	49.21	15.34	40.51	61.99	74	-12.01	PK
H	15690	44.07	49.21	15.34	40.51	50.71	54	-3.29	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

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:5210									
V	10420	56.85	49.07	15.33	37.41	60.52	74	-13.48	PK
V	10420	45.62	49.07	15.33	37.41	49.29	54	-4.71	AV
V	15630	56.22	49.17	15.28	40.46	62.79	74	-11.21	PK
V	15630	43.35	49.17	15.28	40.46	49.92	54	-4.08	AV
H	10420	56.32	49.07	15.33	37.41	59.99	74	-14.01	PK
H	10420	45.65	49.07	15.33	37.41	49.32	54	-4.68	AV
H	15630	54.48	49.17	15.28	40.46	61.05	74	-12.95	PK
H	15630	44.35	49.17	15.28	40.46	50.92	54	-3.08	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.

802.11a band 4

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:5745									
V	11490	56.63	49.05	15.3	37.39	60.27	74	-13.73	PK
V	11490	45.47	49.05	15.3	37.39	49.11	54	-4.89	AV
V	17235	56.32	49.16	15.27	40.45	62.88	74	-11.12	PK
V	17235	43.21	49.16	15.27	40.45	49.77	54	-4.23	AV
H	11490	56.48	49.05	15.3	37.39	60.12	74	-13.88	PK
H	11490	45.53	49.05	15.3	37.39	49.17	54	-4.83	AV
H	17235	59.22	49.16	15.27	40.45	65.78	74	-8.22	PK
H	17235	43.48	49.16	15.27	40.45	50.04	54	-3.96	AV
operation frequency:5785									
V	11570	57.36	49.09	15.34	37.42	61.03	74	-12.97	PK
V	11570	45.25	49.09	15.34	37.42	48.92	54	-5.08	AV
V	17355	59.19	49.18	15.29	40.47	65.77	74	-8.23	PK
V	17355	43.57	49.18	15.29	40.47	50.15	54	-3.85	AV
H	11570	56.38	49.09	15.34	37.42	60.05	74	-13.95	PK
H	11570	45.24	49.09	15.34	37.42	48.91	54	-5.09	AV
H	17355	59.19	49.18	15.29	40.47	65.77	74	-8.23	PK
H	17355	43.26	49.18	15.29	40.47	49.84	54	-4.16	AV
operation frequency:5825									
V	11650	58.33	49.11	15.37	37.46	62.05	74	-11.95	PK
V	11650	45.27	49.11	15.37	37.46	48.99	54	-5.01	AV
V	17475	59.28	49.21	15.34	40.51	65.92	74	-8.08	PK
V	17475	43.17	49.21	15.34	40.51	49.81	54	-4.19	AV
H	11650	57.39	49.11	15.37	31.31	54.96	74	-19.04	PK
H	11650	45.47	49.11	15.37	31.31	43.04	54	-10.96	AV
H	17475	57.38	49.21	15.34	40.51	64.02	74	-9.98	PK
H	17475	42.27	49.21	15.34	40.51	48.91	54	-5.09	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

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:5745									
V	11490	56.19	49.05	15.3	37.39	59.83	74	-14.17	PK
V	11490	45.52	49.05	15.3	37.39	49.16	54	-4.84	AV
V	17235	56.33	49.16	15.27	40.45	62.89	74	-11.11	PK
V	17235	43.48	49.16	15.27	40.45	50.04	54	-3.96	AV
H	11490	56.53	49.05	15.3	37.39	60.17	74	-13.83	PK
H	11490	45.54	49.05	15.3	37.39	49.18	54	-4.82	AV
H	17235	54.47	49.16	15.27	40.45	61.03	74	-12.97	PK
H	17235	44.29	49.16	15.27	40.45	50.85	54	-3.15	AV
operation frequency:5785									
V	11570	56.14	49.09	15.34	37.42	59.81	74	-14.19	PK
V	11570	44.33	49.09	15.34	37.42	48	54	-6.00	AV
V	17355	55.52	49.18	15.29	40.47	62.1	74	-11.90	PK
V	17355	43.35	49.18	15.29	40.47	49.93	54	-4.07	AV
H	11570	55.41	49.09	15.34	37.42	59.08	74	-14.92	PK
H	11570	43.47	49.09	15.34	37.42	47.14	54	-6.86	AV
H	17355	55.35	49.18	15.29	40.47	61.93	74	-12.07	PK
H	17355	43.28	49.18	15.29	40.47	49.86	54	-4.14	AV
operation frequency:5825									
V	11650	57.47	49.11	15.37	37.46	61.19	74	-12.81	PK
V	11650	44.56	49.11	15.37	37.46	48.28	54	-5.72	AV
V	17475	54.47	49.21	15.34	40.51	61.11	74	-12.89	PK
V	17475	43.36	49.21	15.34	40.51	50	54	-4.00	AV
H	11650	57.47	49.11	15.37	31.31	55.04	74	-18.96	PK
H	11650	44.69	49.11	15.37	31.31	42.26	54	-11.74	AV
H	17475	55.52	49.21	15.34	40.51	62.16	74	-11.84	PK
H	17475	44.14	49.21	15.34	40.51	50.78	54	-3.22	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

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:5755									
V	11510	56.74	49.07	15.33	37.41	60.41	74	-13.59	PK
V	11510	45.56	49.07	15.33	37.41	49.23	54	-4.77	AV
V	17265	56.26	49.17	15.28	40.46	62.83	74	-11.17	PK
V	17265	43.58	49.17	15.28	40.46	50.15	54	-3.85	AV
H	11510	56.36	49.07	15.33	37.41	60.03	74	-13.97	PK
H	11510	45.47	49.07	15.33	37.41	49.14	54	-4.86	AV
H	17265	54.56	49.17	15.28	40.46	61.13	74	-12.87	PK
H	17265	44.26	49.17	15.28	40.46	50.83	54	-3.17	AV
operation frequency:5795									
V	11590	57.25	49.11	15.37	37.46	60.97	74	-13.03	PK
V	11590	44.47	49.11	15.37	37.46	48.19	54	-5.81	AV
V	17385	54.36	49.21	15.34	40.51	61	74	-13.00	PK
V	17385	43.28	49.21	15.34	40.51	49.92	54	-4.08	AV
H	11590	57.41	49.11	15.37	31.31	54.98	74	-19.02	PK
H	11590	44.74	49.11	15.37	31.31	42.31	54	-11.69	AV
H	17385	55.26	49.21	15.34	40.51	61.9	74	-12.10	PK
H	17385	44.09	49.21	15.34	40.51	50.73	54	-3.27	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

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:5745									
V	11490	56.17	49.05	15.3	37.39	59.81	74	-14.19	PK
V	11490	45.14	49.05	15.3	37.39	48.78	54	-5.22	AV
V	17235	56.36	49.16	15.27	40.45	62.92	74	-11.08	PK
V	17235	43.41	49.16	15.27	40.45	49.97	54	-4.03	AV
H	11490	56.25	49.05	15.3	37.39	59.89	74	-14.11	PK
H	11490	45.61	49.05	15.3	37.39	49.25	54	-4.75	AV
H	17235	54.25	49.16	15.27	40.45	60.81	74	-13.19	PK
H	17235	44.18	49.16	15.27	40.45	50.74	54	-3.26	AV
operation frequency:5785									
V	11570	56.14	49.09	15.34	37.42	59.81	74	-14.19	PK
V	11570	44.26	49.09	15.34	37.42	47.93	54	-6.07	AV
V	17355	55.18	49.18	15.29	40.47	61.76	74	-12.24	PK
V	17355	43.34	49.18	15.29	40.47	49.92	54	-4.08	AV
H	11570	55.29	49.09	15.34	37.42	58.96	74	-15.04	PK
H	11570	43.24	49.09	15.34	37.42	46.91	54	-7.09	AV
H	17355	55.17	49.18	15.29	40.47	61.75	74	-12.25	PK
H	17355	43.36	49.18	15.29	40.47	49.94	54	-4.06	AV
operation frequency:5825									
V	11650	57.41	49.11	15.37	37.46	61.13	74	-12.87	PK
V	11650	44.58	49.11	15.37	37.46	48.3	54	-5.70	AV
V	17475	54.46	49.21	15.34	40.51	61.1	74	-12.90	PK
V	17475	43.24	49.21	15.34	40.51	49.88	54	-4.12	AV
H	11650	57.46	49.11	15.37	31.31	55.03	74	-18.97	PK
H	11650	44.41	49.11	15.37	31.31	41.98	54	-12.02	AV
H	17475	55.26	49.21	15.34	40.51	61.9	74	-12.10	PK
H	17475	44.34	49.21	15.34	40.51	50.98	54	-3.02	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

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:5755									
V	11510	56.74	49.07	15.33	37.41	60.41	74	-13.59	PK
V	11510	45.52	49.07	15.33	37.41	49.19	54	-4.81	AV
V	17265	56.24	49.17	15.28	40.46	62.81	74	-11.19	PK
V	17265	43.36	49.17	15.28	40.46	49.93	54	-4.07	AV
H	11510	56.47	49.07	15.33	37.41	60.14	74	-13.86	PK
H	11510	45.52	49.07	15.33	37.41	49.19	54	-4.81	AV
H	17265	54.63	49.17	15.28	40.46	61.2	74	-12.80	PK
H	17265	44.27	49.17	15.28	40.46	50.84	54	-3.16	AV
operation frequency:5795									
V	11590	57.41	49.11	15.37	37.46	61.13	74	-12.87	PK
V	11590	44.36	49.11	15.37	37.46	48.08	54	-5.92	AV
V	17385	54.54	49.21	15.34	40.51	61.18	74	-12.82	PK
V	17385	43.52	49.21	15.34	40.51	50.16	54	-3.84	AV
H	11590	57.41	49.11	15.37	31.31	54.98	74	-19.02	PK
H	11590	44.28	49.11	15.37	31.31	41.85	54	-12.15	AV
H	17385	55.16	49.21	15.34	40.51	61.8	74	-12.20	PK
H	17385	44.34	49.21	15.34	40.51	50.98	54	-3.02	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

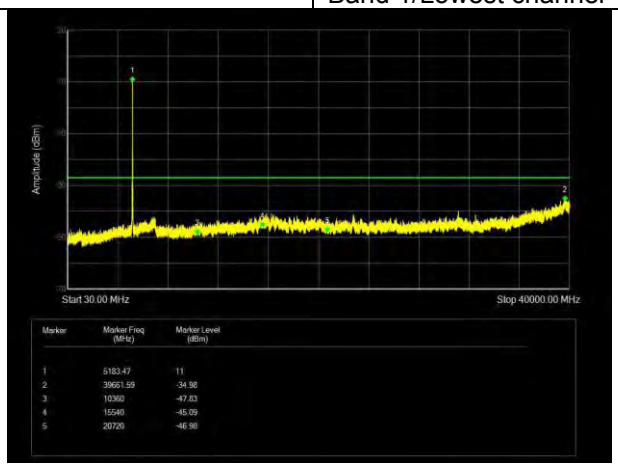
Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:5775									
V	11550	56.71	49.07	15.33	37.41	60.38	74	-13.62	PK
V	11550	45.41	49.07	15.33	37.41	49.08	54	-4.92	AV
V	17325	56.26	49.17	15.28	40.46	62.83	74	-11.17	PK
V	17325	43.25	49.17	15.28	40.46	49.82	54	-4.18	AV
H	11550	56.31	49.07	15.33	37.41	59.98	74	-14.02	PK
H	11550	45.64	49.07	15.33	37.41	49.31	54	-4.69	AV
H	17325	54.47	49.17	15.28	40.46	61.04	74	-12.96	PK
H	17325	44.31	49.17	15.28	40.46	50.88	54	-3.12	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.

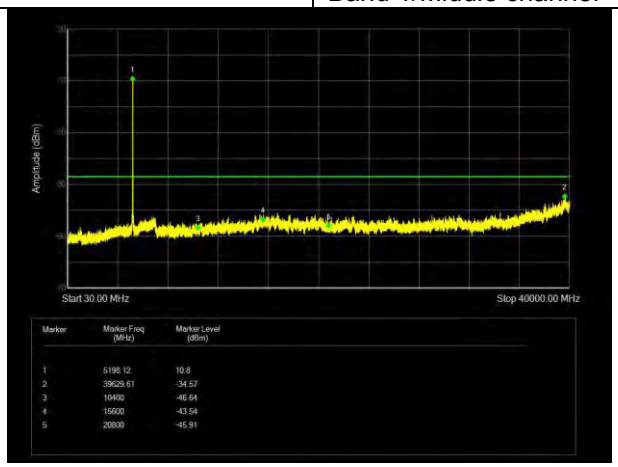
For Conducted
During the test, pre-scan the all modulation, and found the 802.11ac20 mode of Band 1 and Band 4 which it is worse case.

Test channel:	Band 1/Lowest channel



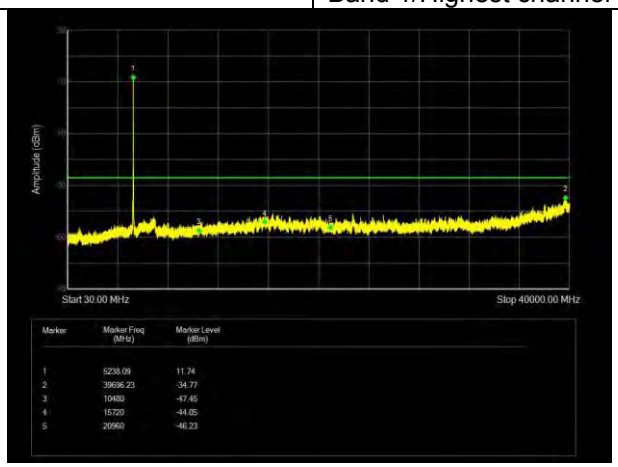
0.03Hz~40GHz

Test channel:	Band 1/Middle channel



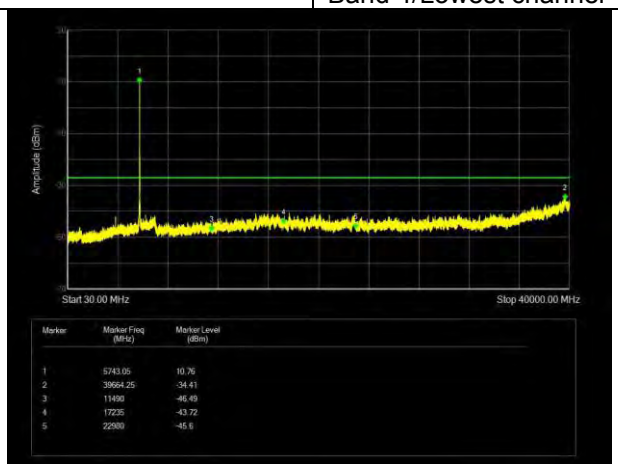
0.03GHz~40GHz

Test channel:	Band 1/Highest channel



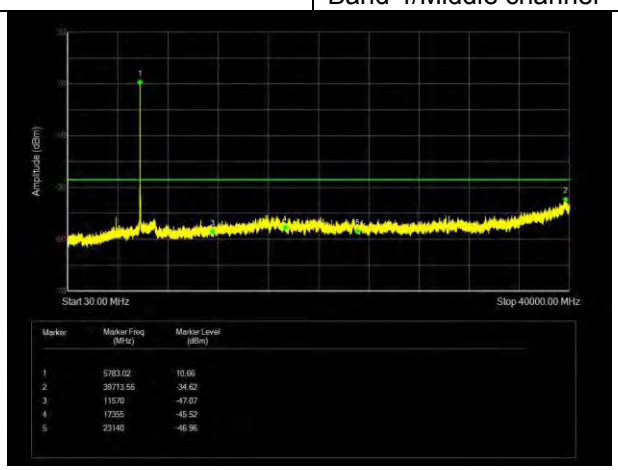
0.03GHz~40GHz

Test channel:	Band 4/Lowest channel



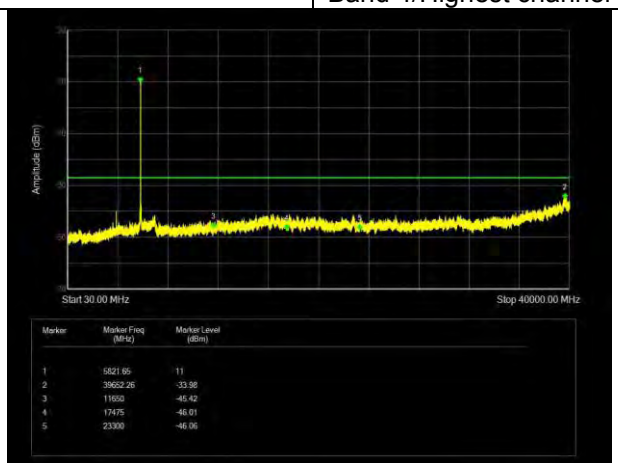
0.03Hz~40GHz

Test channel:	Band 4/Middle channel



0.03GHz~40GHz

Test channel:	Band 4/Highest channel



0.03GHz~40GHz

3.3 RADIATED 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.
(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions 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

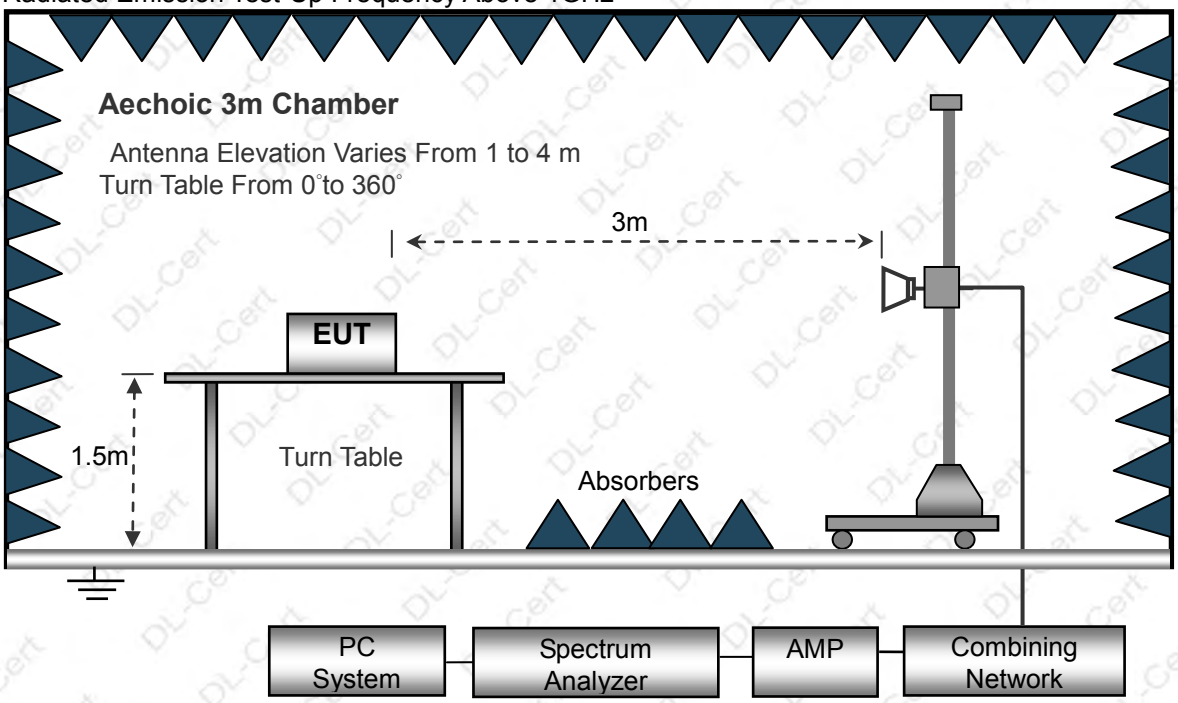
Test method: FCC KDB 789033 G)& Parts 15.407(b)(4) & 15.209(a)

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



3.3.5 EUT OPERATING CONDITIONS

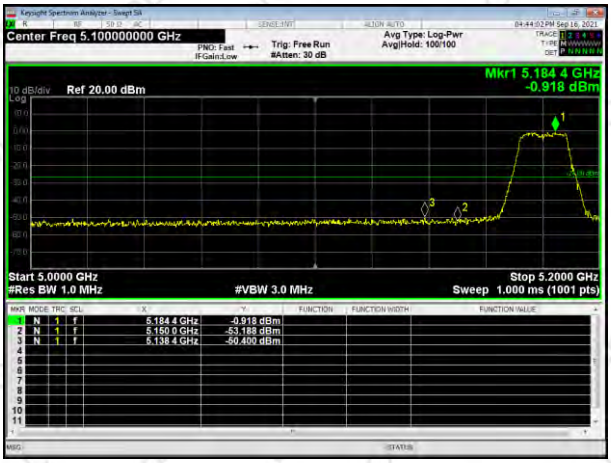
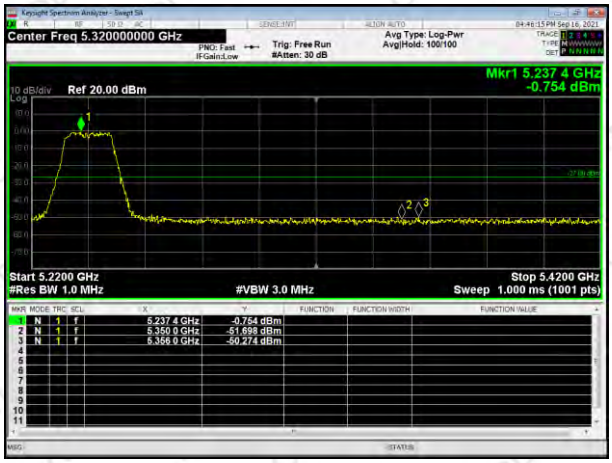
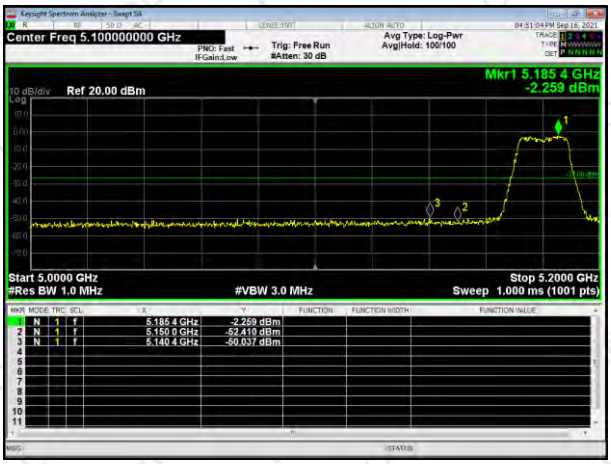
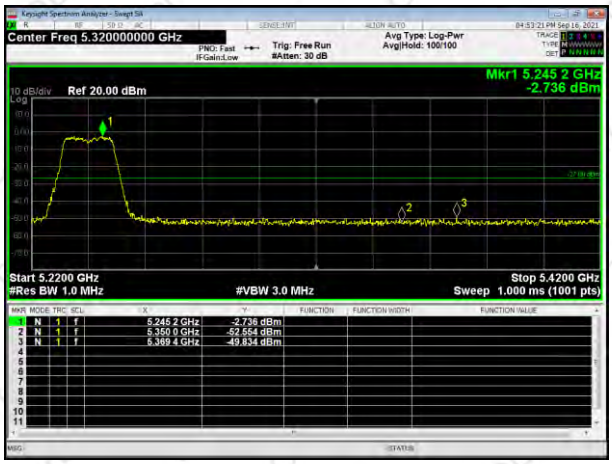
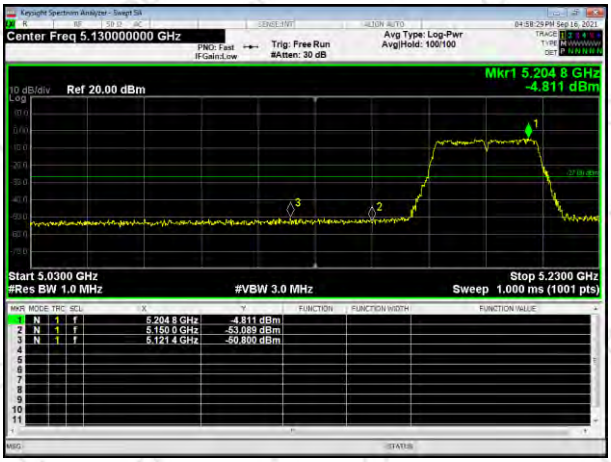
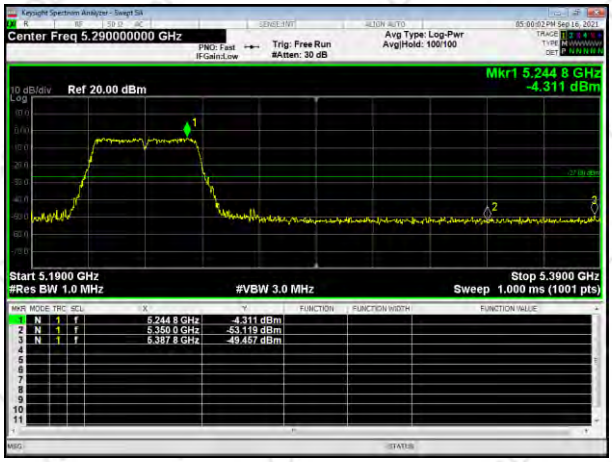
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

3.3.6 TEST RESULT

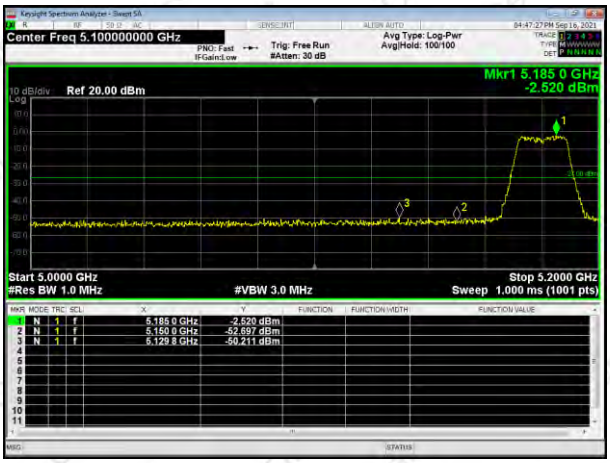
Modulation	Test Frequency (MHz)	Max Level Frequency (MHz)	Max Level (dBμV/m)	EIRP (dBm)	Limit (dBm)	Result
802.11a	5180	5148.63	51.12	-44.08	-27.00	Pass
	5240	5255.34	53.54	-41.66	-27.00	Pass
	5745	5723.67	52.53	-42.67	-27.00	Pass
	5825	5853.16	51.45	-43.75	-27.00	Pass
802.11n(HT20)	5180	5146.86	52.56	-42.64	-27.00	Pass
	5240	5253.19	52.27	-42.93	-27.00	Pass
	5745	5723.51	51.35	-43.85	-27.00	Pass
	5825	5853.43	52.43	-42.77	-27.00	Pass
802.11n(HT40)	5190	5147.69	51.57	-43.63	-27.00	Pass
	5230	5253.42	52.26	-42.94	-27.00	Pass
	5755	5723.11	51.45	-43.75	-27.00	Pass
	5795	5853.61	51.34	-43.86	-27.00	Pass
802.11ac(HT20)	5180	5145.74	52.35	-42.85	-27.00	Pass
	5240	5256.23	52.45	-42.75	-27.00	Pass
	5745	5735.47	51.46	-43.74	-27.00	Pass
	5825	5849.37	52.29	-42.91	-27.00	Pass
802.11ac(HT40)	5190	5145.72	51.73	-43.47	-27.00	Pass
	5230	5252.38	52.28	-42.92	-27.00	Pass
	5755	5736.28	53.45	-41.75	-27.00	Pass
	5795	5856.49	52.29	-42.91	-27.00	Pass
802.11ac(HT80)	5210	5235.14	54.47	-40.73	-27.00	Pass
	5775	5769.48	51.35	-43.85	-27.00	Pass

Remark: 1. According to KDB 789033 D02 section H) d) (iii), for measurement above 1000MHz@3m distance, the limit of EIRP is calculated as follows: EIRP[dBm] = E[dBμV/m] - 95.2

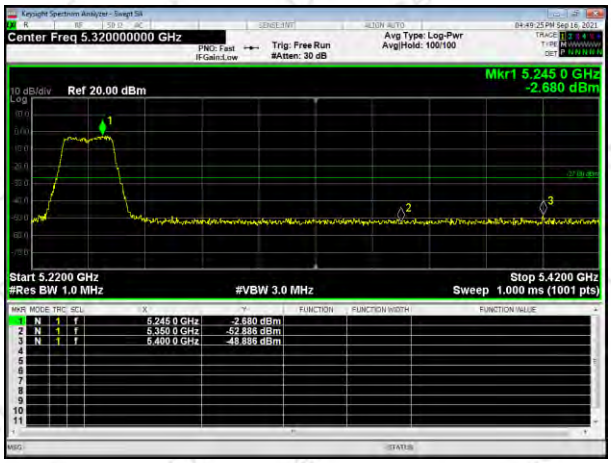
For Conducted

802.11a	
	
5180MHz	5240MHz
802.11n HT20	
	
5180MHz	5240MHz
802.11n HT40	
	
5190MHz	5230MHz

802.11ac HT20

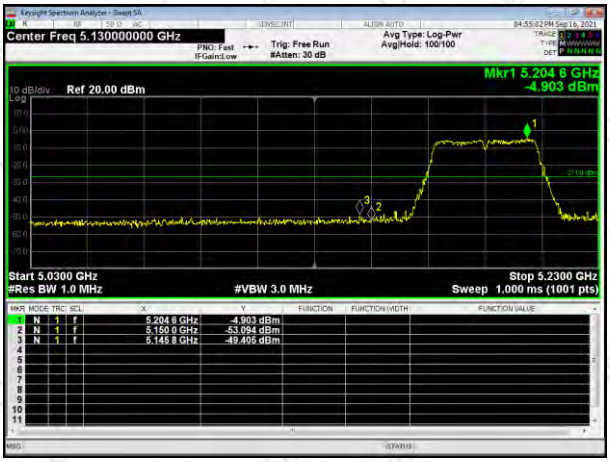


5180MHz

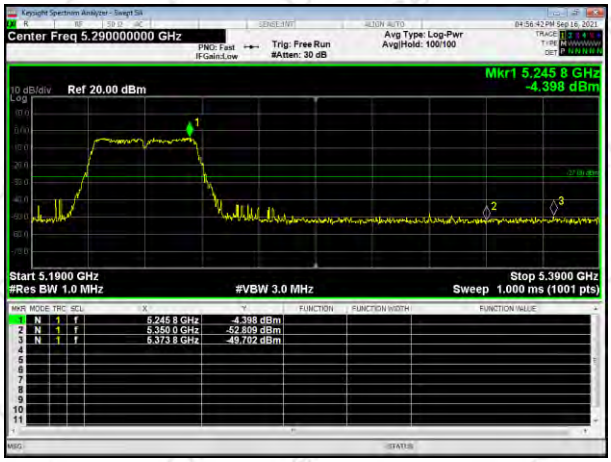


5240MHz

802.11ac HT40

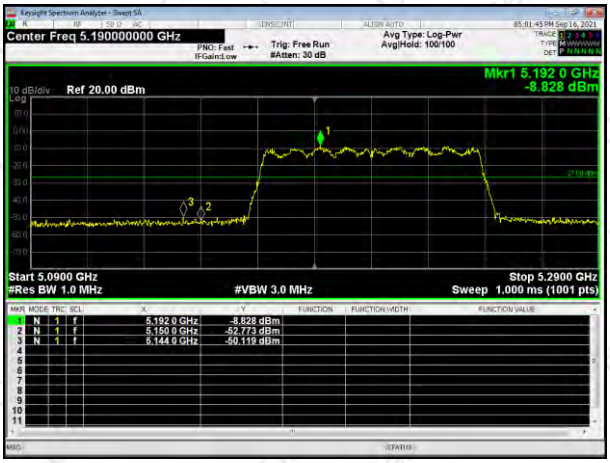


5190MHz



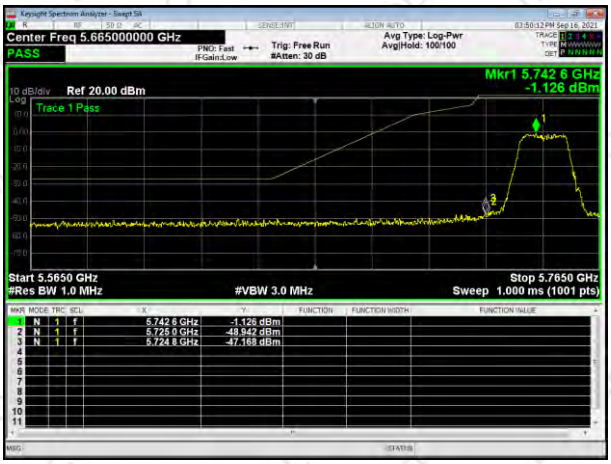
5230MHz

802.11ac HT80



5210MHz

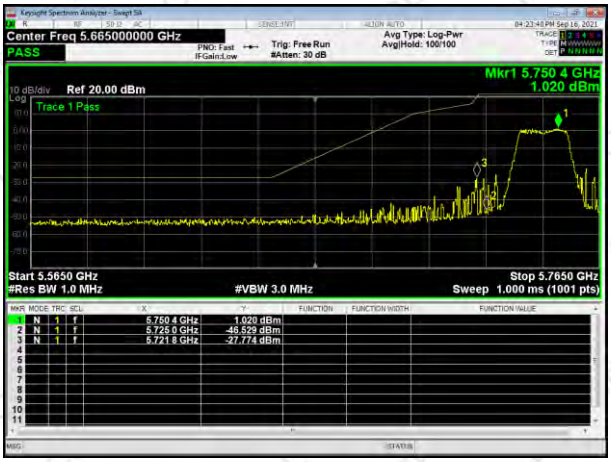
802.11a



5745MHz

5825MHz

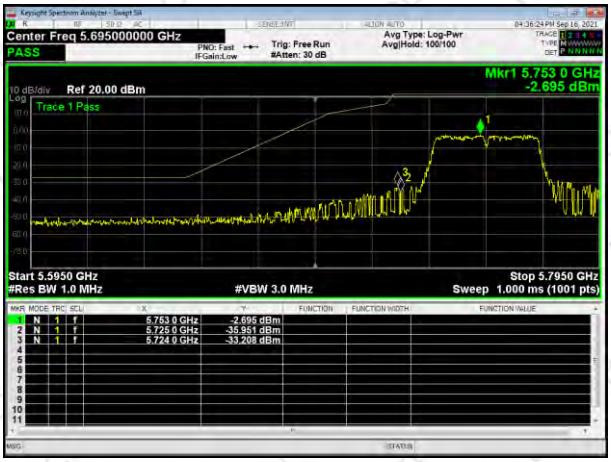
802.11n HT20



5745MHz

5825MHz

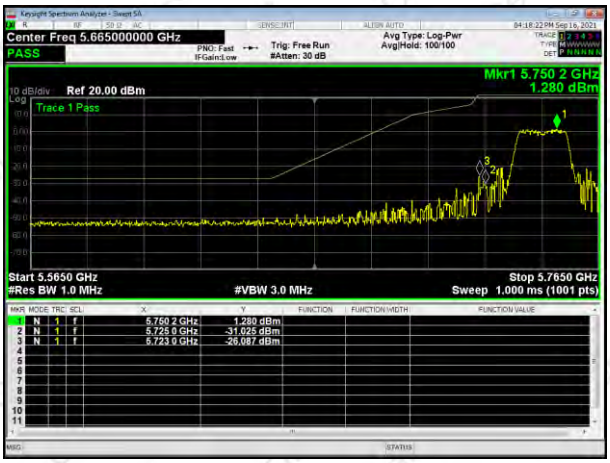
802.11n HT40



5755MHz

5795MHz

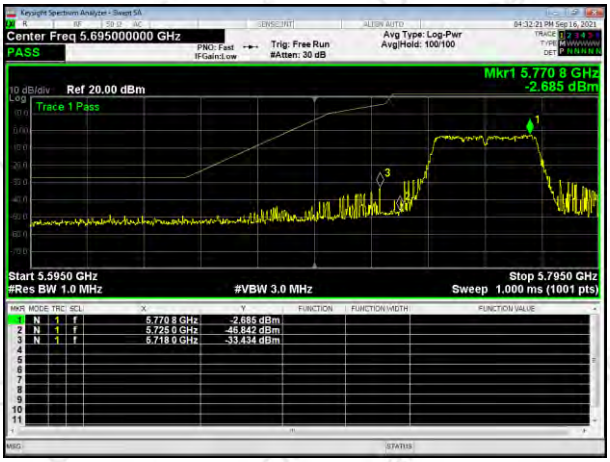
802.11ac HT20



5745MHz

5825MHz

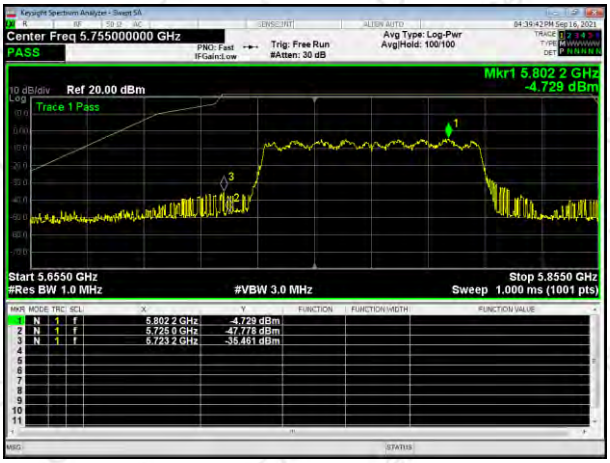
802.11ac HT40



5755MHz

5795MHz

802.11ac HT80



5775MHz

4. PEAK 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.
For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

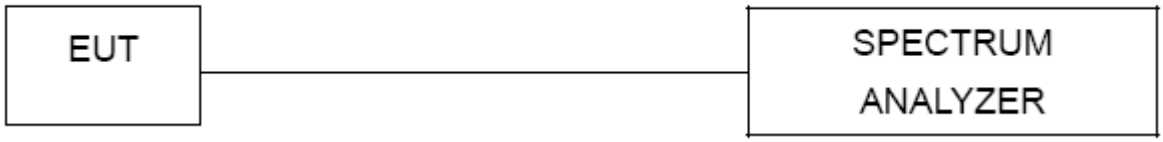
4.1.1 TEST PROCEDURE

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 ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

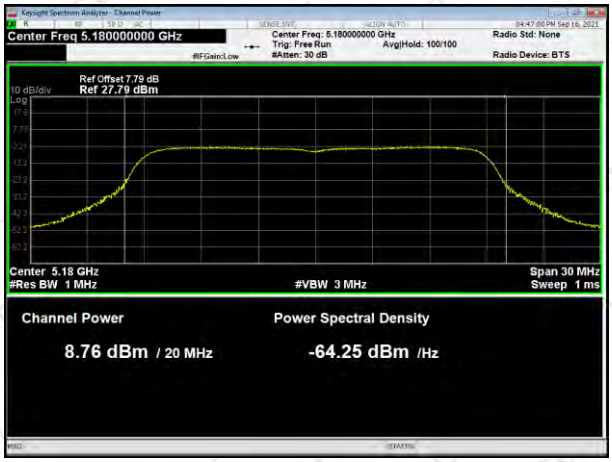
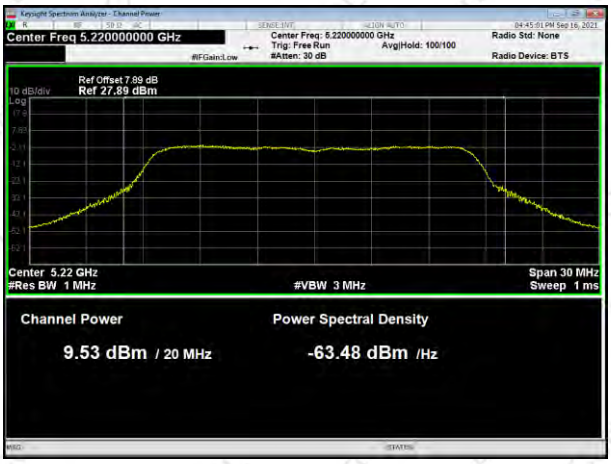
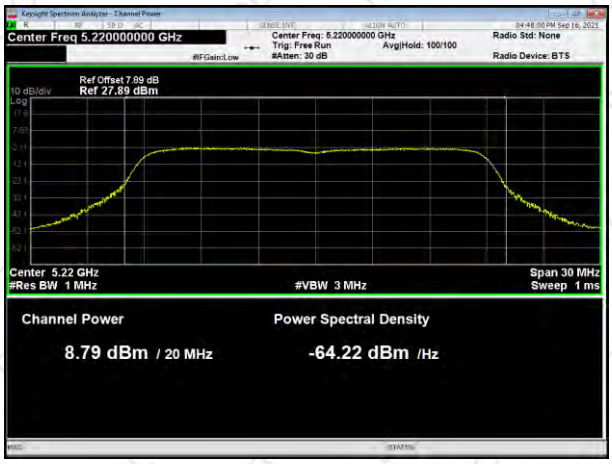
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	60%
Pressure:	1012 hPa	Test Voltage :	DC 3.3V

Band	Mode	Test Channel	Peak Output Power (dBm)	LIMIT (dBm)
Band 1	802.11a	Low	9.333	23.98
		Moddle	9.533	23.98
		High	9.576	23.98
	802.11n HT20	Low	8.765	23.98
		Moddle	8.788	23.98
		High	8.770	23.98
	802.11n HT40	Low	9.119	23.98
		High	9.978	23.98
	802.11ac HT20	Low	8.732	23.98
		Moddle	8.756	23.98
		High	8.764	23.98
	802.11ac HT40	Low	9.222	23.98
		High	10.016	23.98
	802.11ac HT80	/	6.887	23.98

Band	Mode	Test Channel	Peak Output Power (dBm)	LIMIT (dBm)
Band 4	802.11a	Low	8.958	30
		Moddle	9.4	30
		High	9.371	30
	802.11n HT20	Low	12.885	30
		Moddle	13.034	30
		High	12.705	30
	802.11n HT40	Low	11.66	30
		High	12.438	30
	802.11ac HT20	Low	12.581	30
		Moddle	12.87	30
		High	12.606	30
	802.11ac HT40	Low	11.847	30
		High	12.419	30
	802.11ac HT80	/	11.104	30

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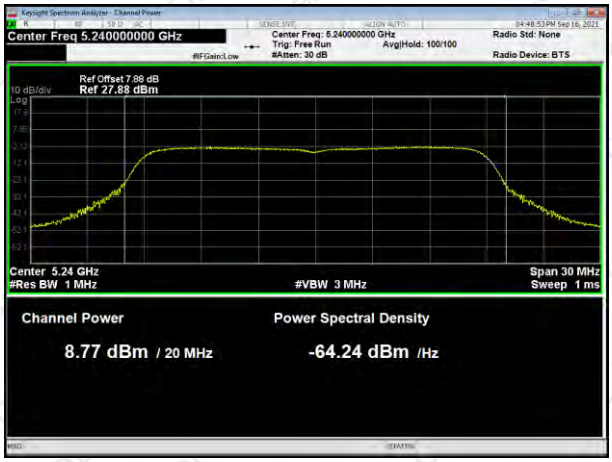
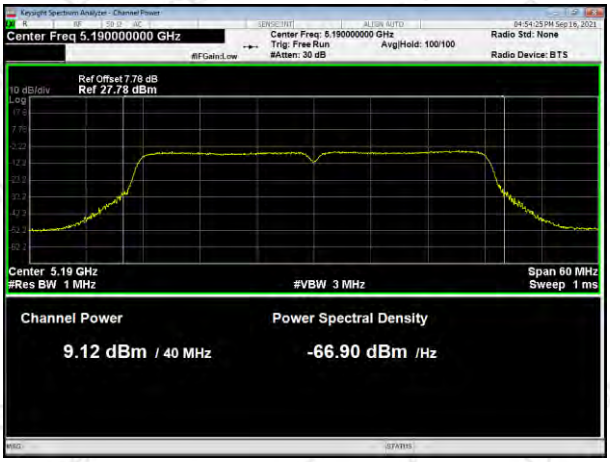
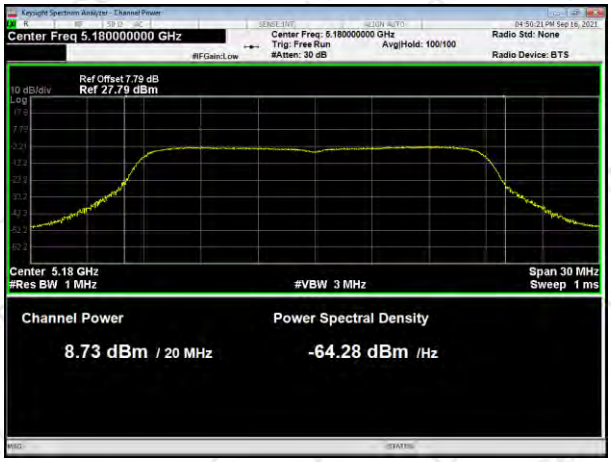
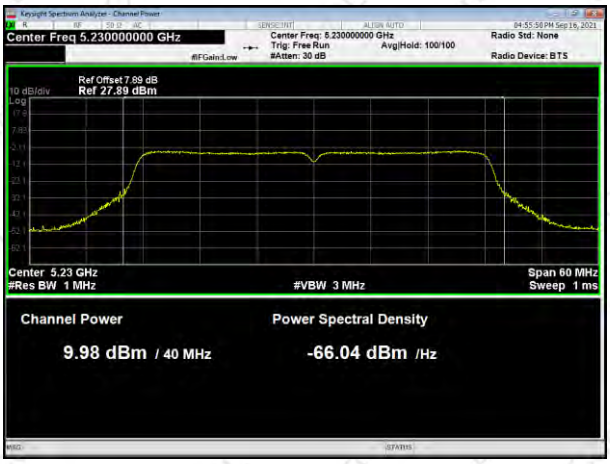
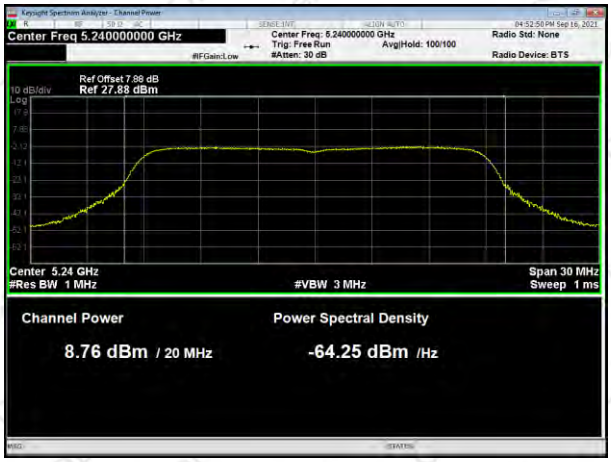
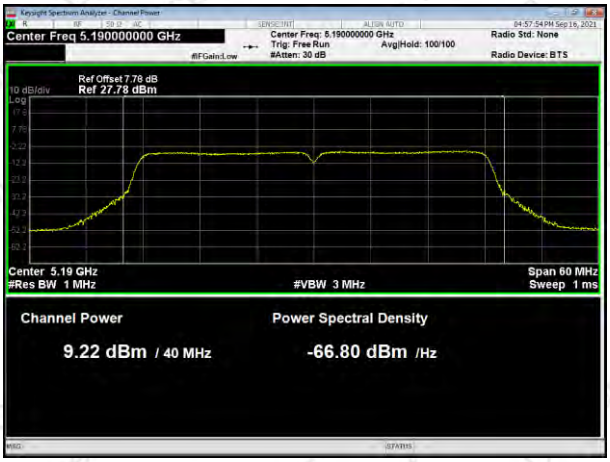
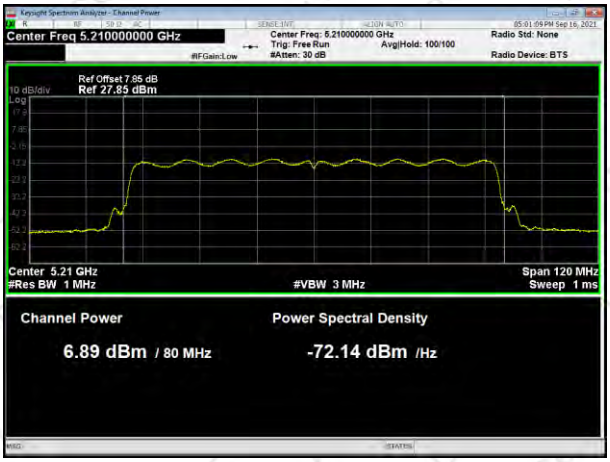
	
5240MHz	5240MHz

802.11n HT40	802.11ac HT20
	
5190MHz	5180
	
5230MHz	5200
	
	5240

802.11ac HT40	802.11ac HT80
	
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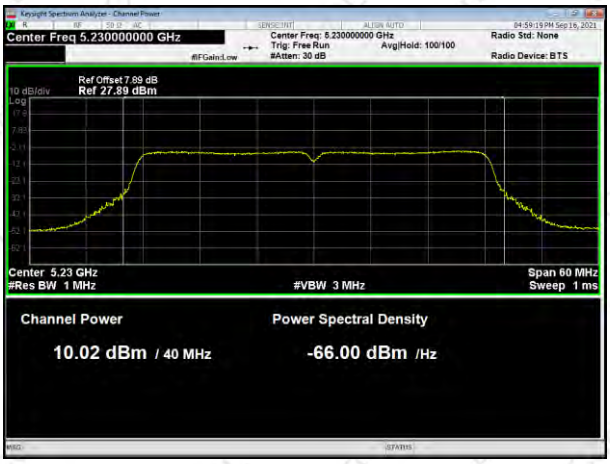
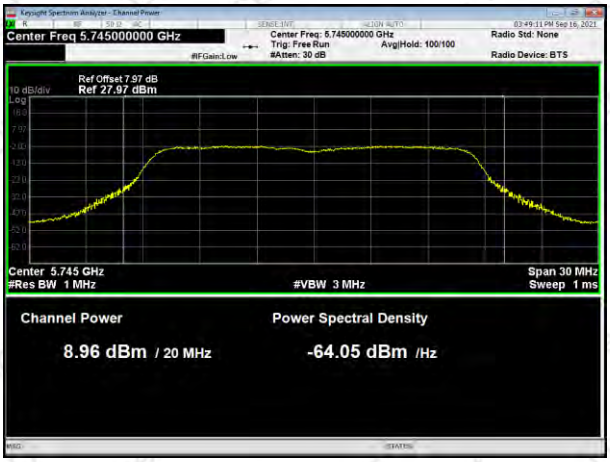
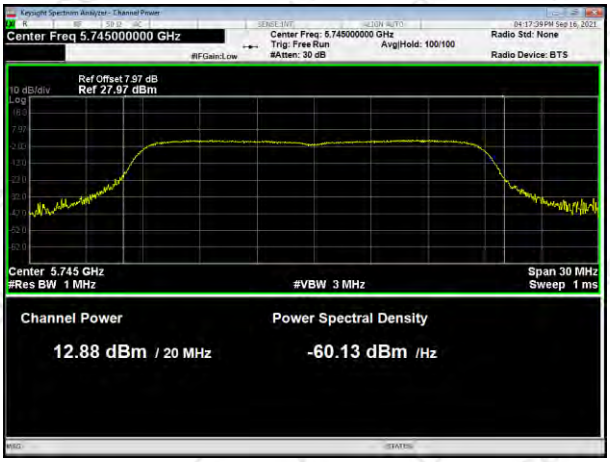
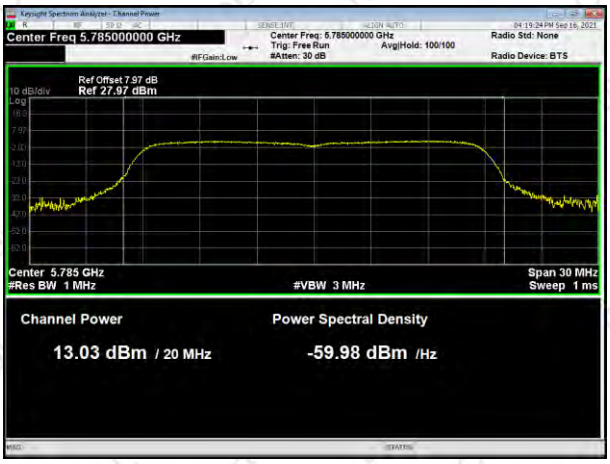
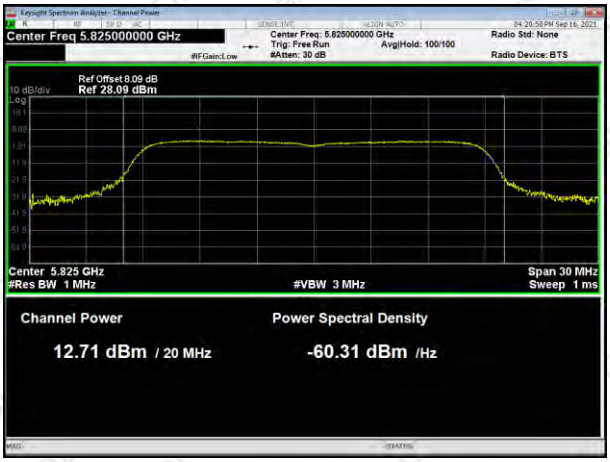
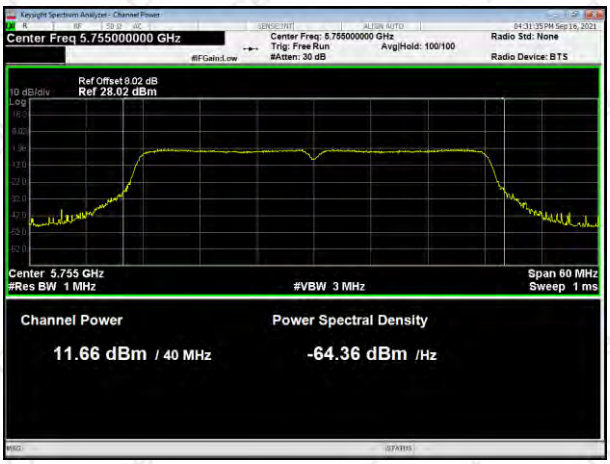
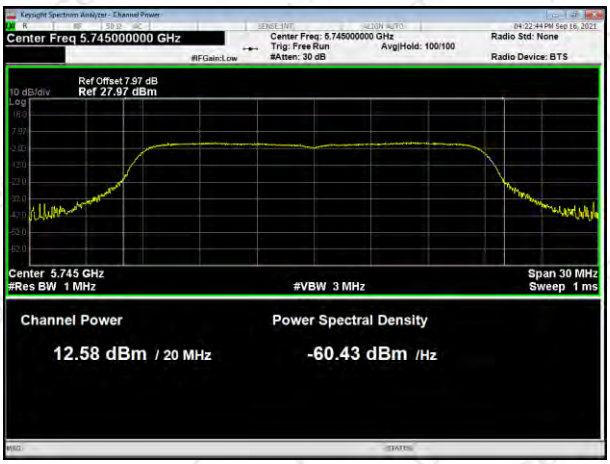
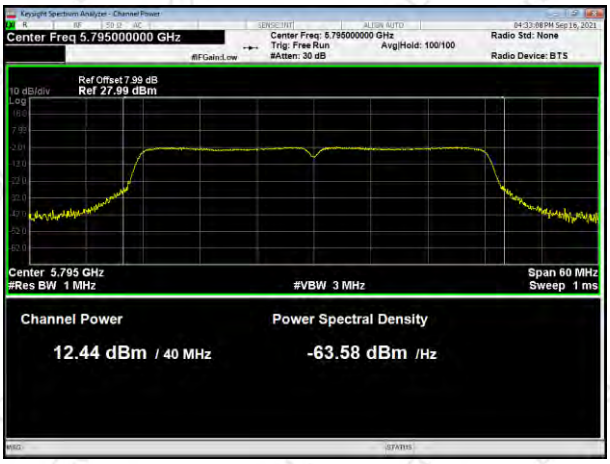
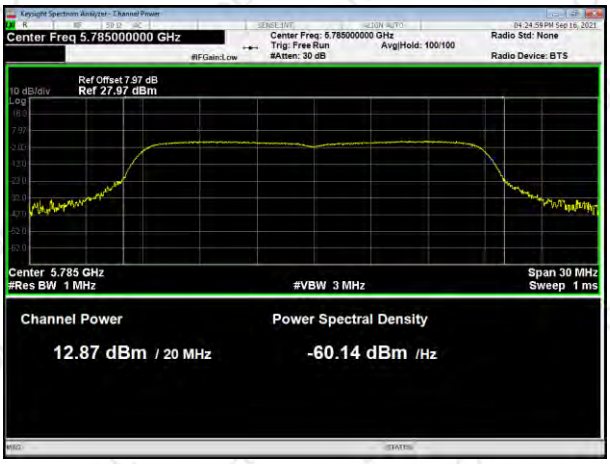
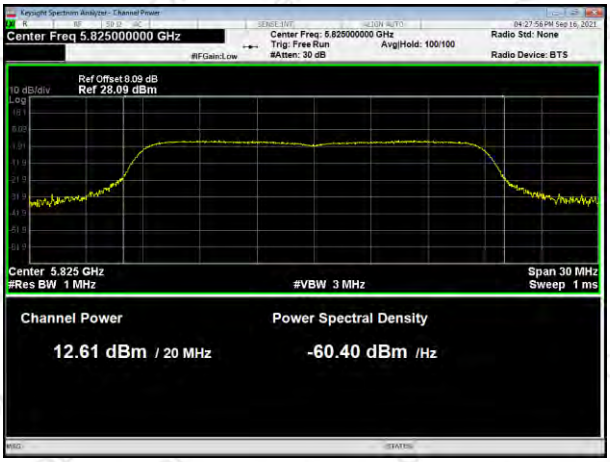
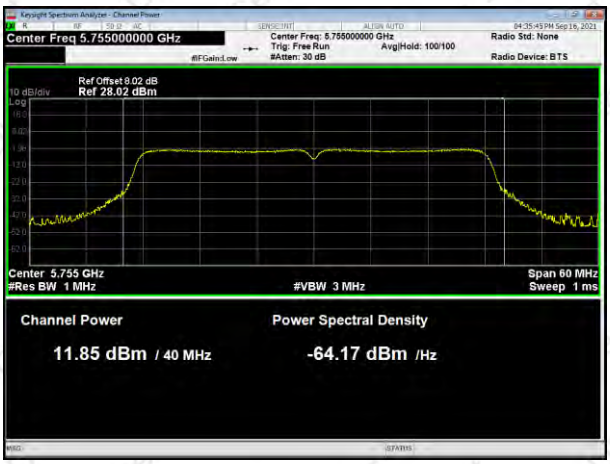
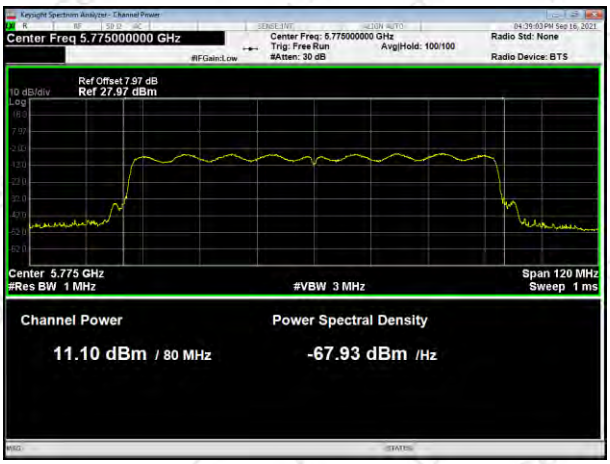
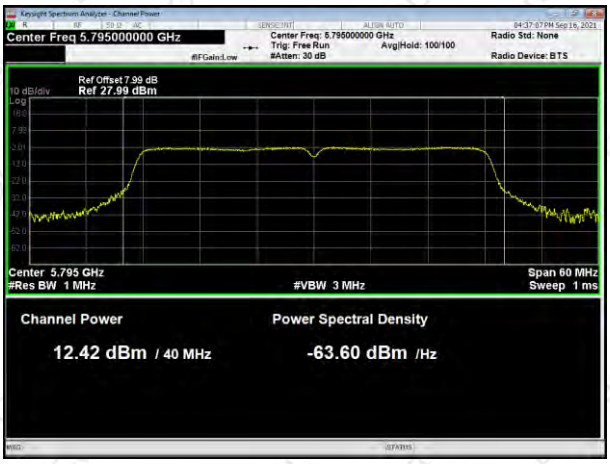
	
5230MHz	

802.11a	802.11n HT20
	
5745MHz	5745MHz
	
5785MHz	5785MHz
	
5825MHz	5825MHz

802.11n HT40	802.11ac HT20
	
5755MHz	5745MHz
	
5795MHz	5785MHz
	
	5825MHz

802.11ac HT40	802.11ac HT80
	
5755MHz	5775MHz
	
5795MHz	

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.
In addition, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	RBW ≥ 1MHz for band 1 RBW ≥ 510KHz for band 4
VB	VBW ≥ 3RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

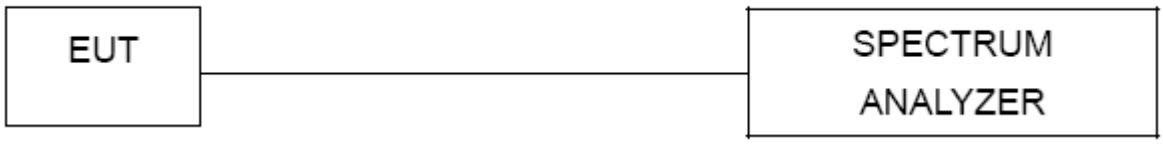
5.1.1 TEST PROCEDURE

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. User 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.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



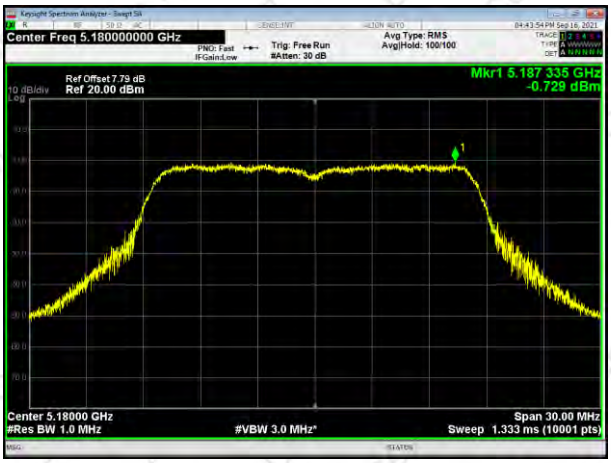
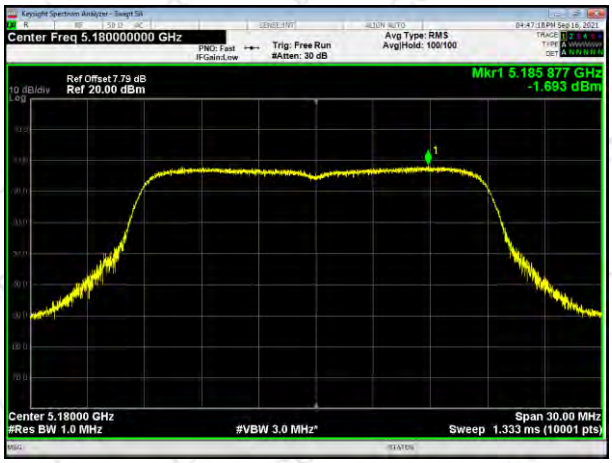
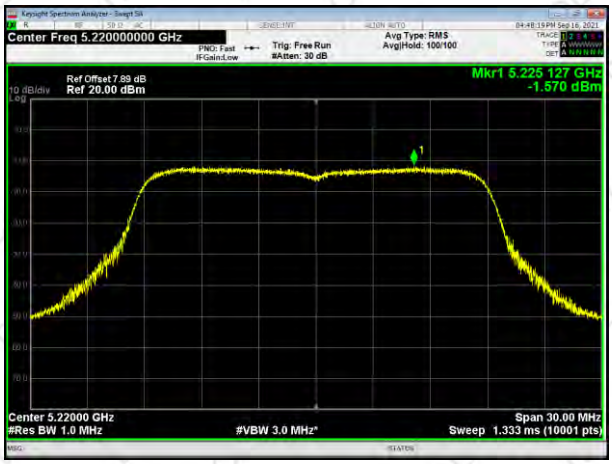
5.1.4 EUT OPERATION CONDITIONS

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

	Mode	Test Channel	Reading Level (dBm)	Duty factor (dB)	PSD (dBm)	Limit (dBm)	Result
Band1	802.11a	Low	-0.729	0.91	0.181	11.00	PASS
		Moddle	-0.13	0.91	0.78	11.00	PASS
		High	-0.585	0.91	0.325	11.00	PASS
	802.11n20	Low	-1.88	0.14	-1.74	11.00	PASS
		Moddle	-1.832	0.14	-1.692	11.00	PASS
		High	-1.828	0.14	-1.688	11.00	PASS
	802.11n40	Low	-4.059	0.29	-3.769	11.00	PASS
		High	-3.82	0.29	-3.53	11.00	PASS
	802.11ac20	Low	-8.746	0.14	-8.606	11.00	PASS
		Moddle	-1.693	0.14	-1.553	11.00	PASS
		High	-1.57	0.14	-1.43	11.00	PASS
	802.11ac40	Low	-1.871	0.27	-1.601	11.00	PASS
		High	-4.486	0.27	-4.216	11.00	PASS
	802.11ac80	/	-3.832	0.52	-3.312	11.00	PASS

	Mode	Test Channel	Reading Level (dBm)	Duty factor (dB)	PSD (dBm)	Limit (dBm)	Result
Band4	802.11a	Low	-4.024	0.85	-3.174	30.00	PASS
		Moddle	-3.706	0.85	-2.856	30.00	PASS
		High	-3.477	0.85	-2.627	30.00	PASS
	802.11n20	Low	-1.324	0.14	-1.184	30.00	PASS
		Moddle	-0.709	0.14	-0.569	30.00	PASS
		High	-0.979	0.14	-0.839	30.00	PASS
	802.11n40	Low	-4.935	0.26	-4.675	30.00	PASS
		High	-4.263	0.26	-4.003	30.00	PASS
	802.11ac20	Low	-7.331	0.14	-7.191	30.00	PASS
		Moddle	-1.078	0.14	-0.938	30.00	PASS
		High	-0.591	0.14	-0.451	30.00	PASS
	802.11ac40	Low	-1.062	0.27	-0.792	30.00	PASS
		High	-4.938	0.27	-4.668	30.00	PASS
	802.11ac80	/	-4.395	0.52	-3.875	30.00	PASS

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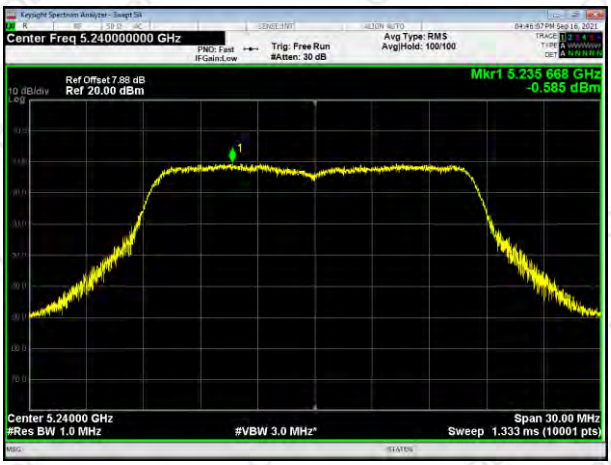
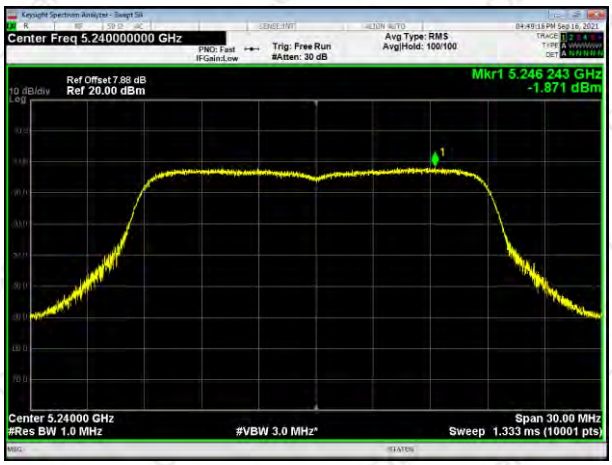
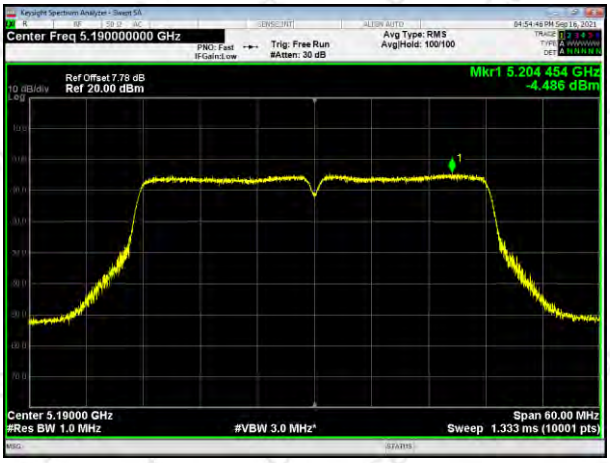
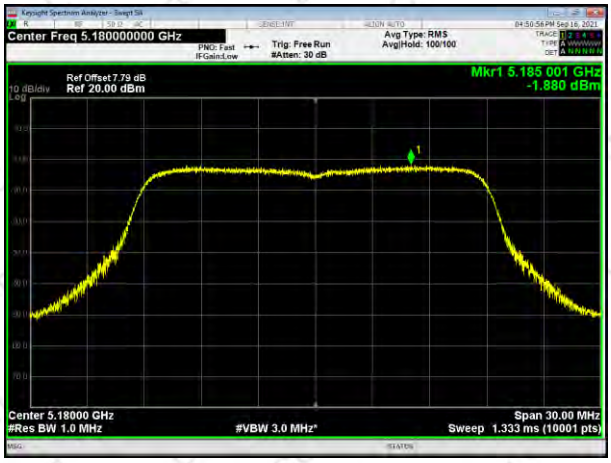
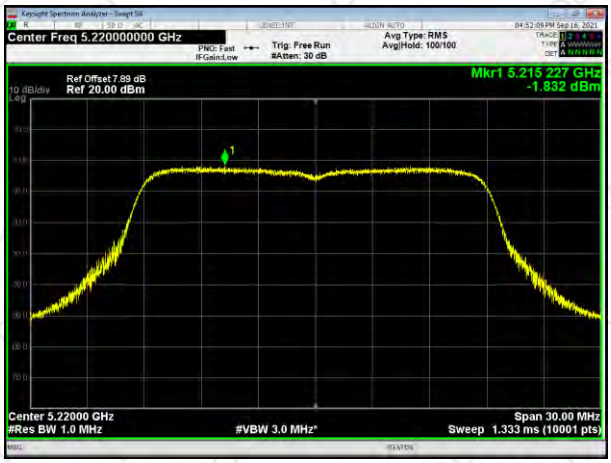
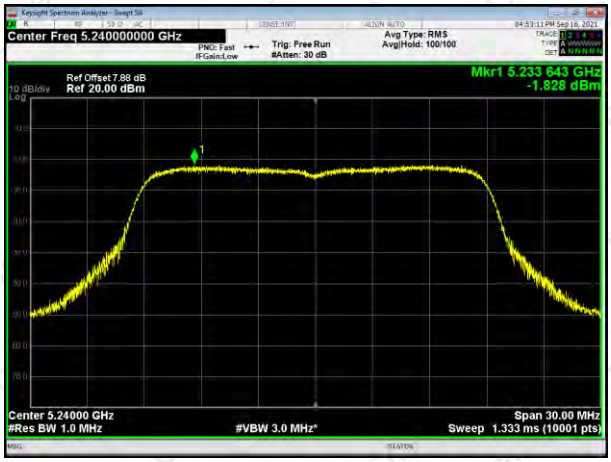
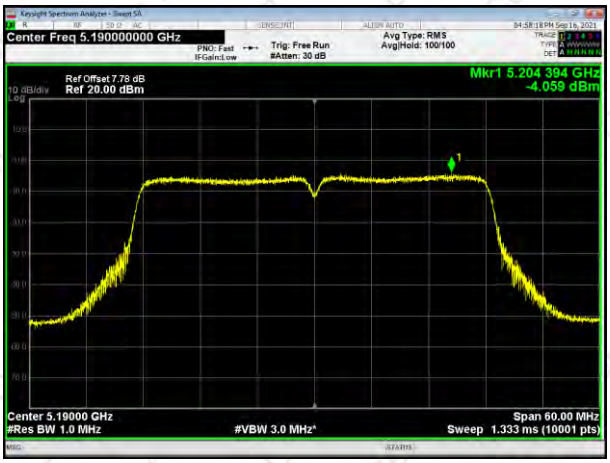
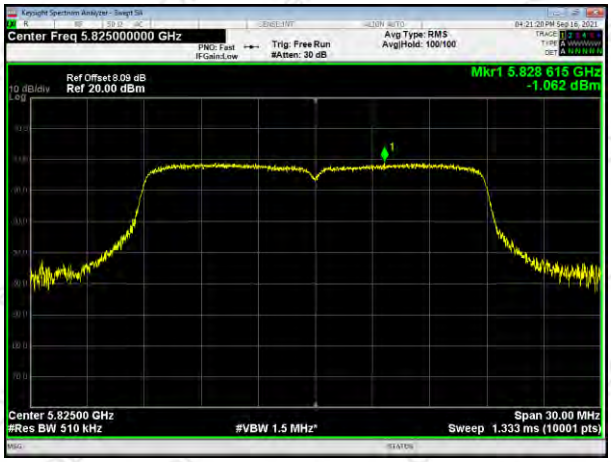
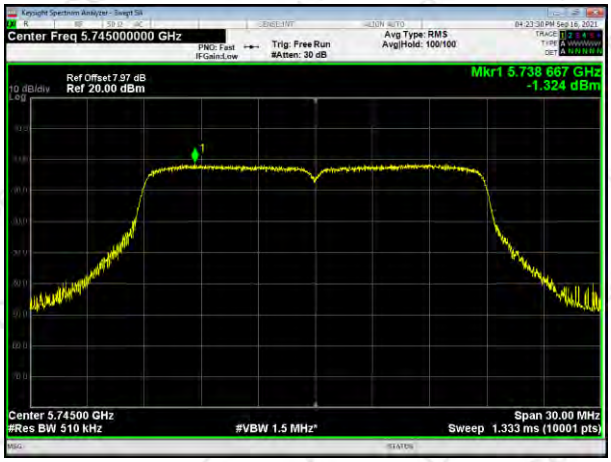
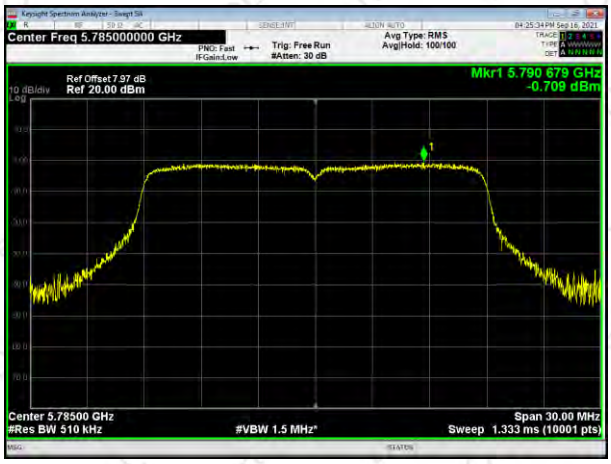
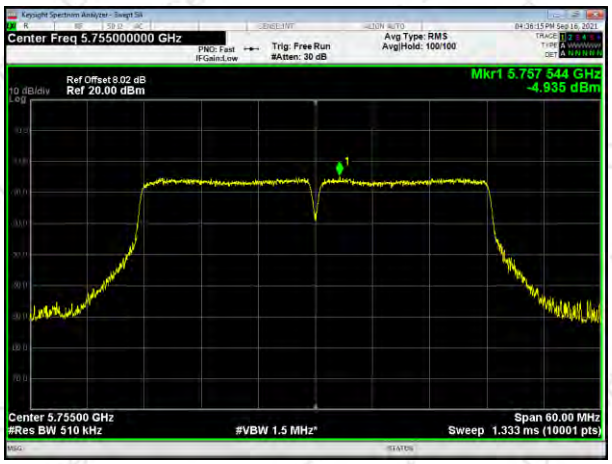
	
5240MHz	5240MHz

802.11n HT40	802.11ac HT20
	
5190MHz	5180
	
5230MHz	5200
	
	5240

802.11ac HT40	802.11ac HT80
	
5190MHz	5210
5230MHz	

802.11a	802.11n HT20
5745MHz	5745MHz
5785MHz	5785MHz
	
5825MHz	5825MHz

802.11n HT40	802.11ac HT20
	
5755MHz	5745MHz
	
5795MHz	5785MHz
	5825MHz

802.11ac HT40	802.11ac HT80
	
5755MHz	5775MHz
5795MHz	

6. 26DB 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.
The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

6.1.1 TEST PROCEDURE

1. Set RBW = 300 kHz.
2. Set the video bandwidth (VBW) ≥3RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP

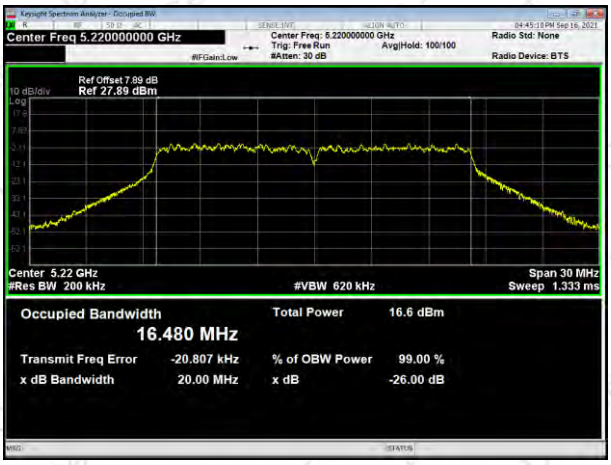
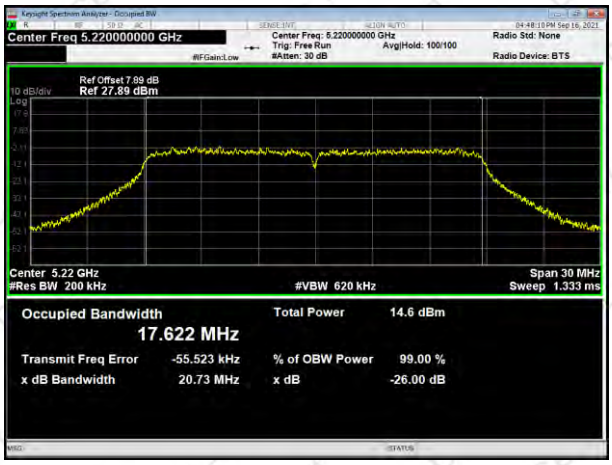
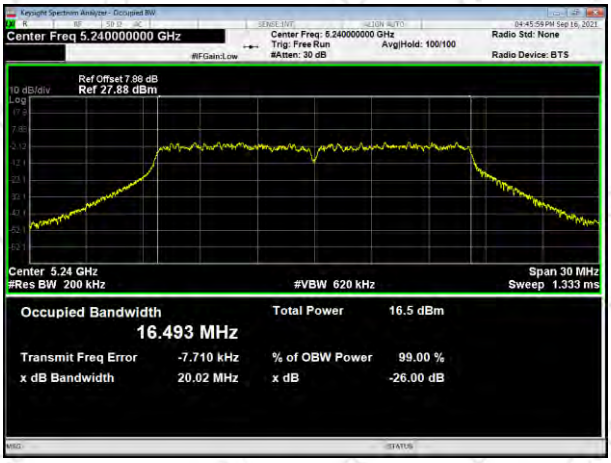
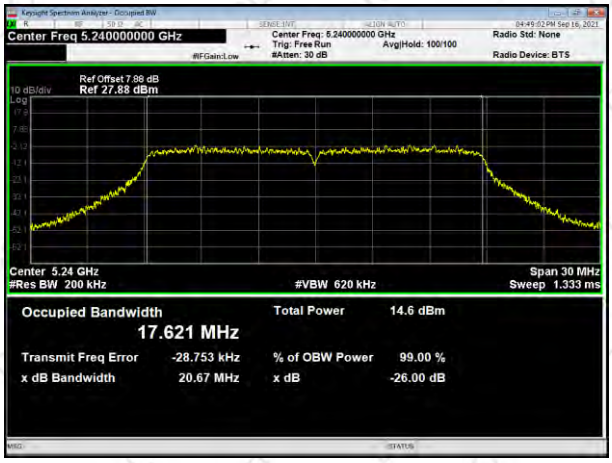
6.1.4 EUT OPERATION CONDITIONS

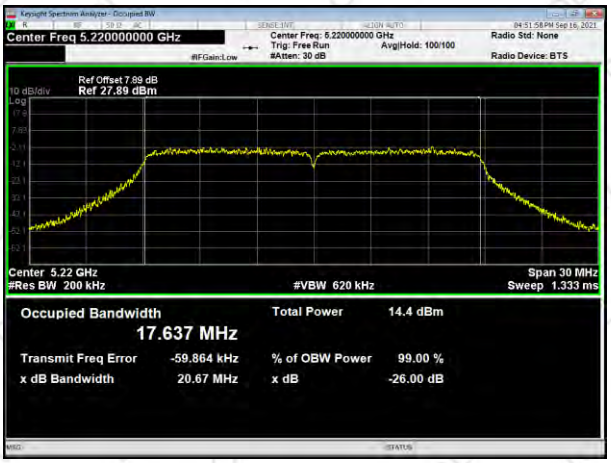
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 TEST RESULTS

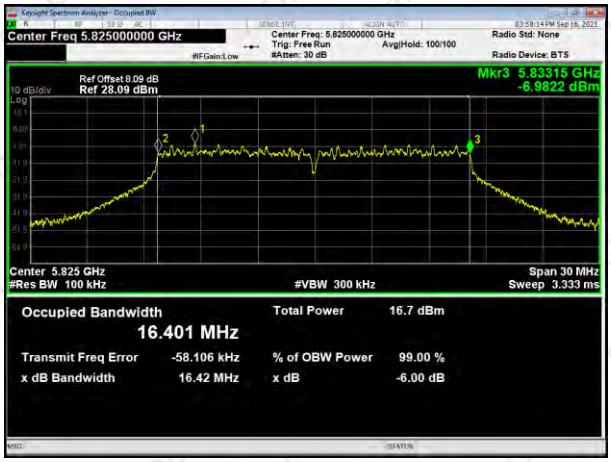
		Test Channel	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
Band 1	802.11a	Low	19.92	16.487	Pass
		Middle	20.00	16.480	Pass
		High	20.02	16.493	Pass
	802.11n HT20	Low	20.55	17.635	Pass
		Middle	20.73	17.622	Pass
		High	20.67	17.621	Pass
	802.11n HT40	Low	43.22	36.387	Pass
		High	43.71	36.431	Pass
	802.11ac HT20	Low	20.77	17.636	Pass
		Middle	20.67	17.637	Pass
		High	20.78	17.616	Pass
	802.11ac HT40	Low	43.36	36.349	Pass
		High	43.73	36.413	Pass
	802.11ac HT80	/	82.39	75.524	Pass

		Test Channel	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth Limit (MHz)	Result
Band 4	802.11a	Low	16.40	16.395	>0.5	Pass
		Middle	16.41	16.393	>0.5	Pass
		High	16.42	16.401	>0.5	Pass
	802.11n HT20	Low	17.36	17.589	>0.5	Pass
		Middle	17.33	17.585	>0.5	Pass
		High	17.54	17.629	>0.5	Pass
	802.11n HT40	Low	36.04	36.168	>0.5	Pass
		High	35.95	36.152	>0.5	Pass
	802.11ac HT20	Low	17.01	17.580	>0.5	Pass
		Middle	16.98	17.617	>0.5	Pass
		High	17.25	17.617	>0.5	Pass
	802.11ac HT40	Low	36.30	36.158	>0.5	Pass
		High	36.03	36.149	>0.5	Pass
	802.11ac HT80	/	75.14	75.340	>0.5	Pass

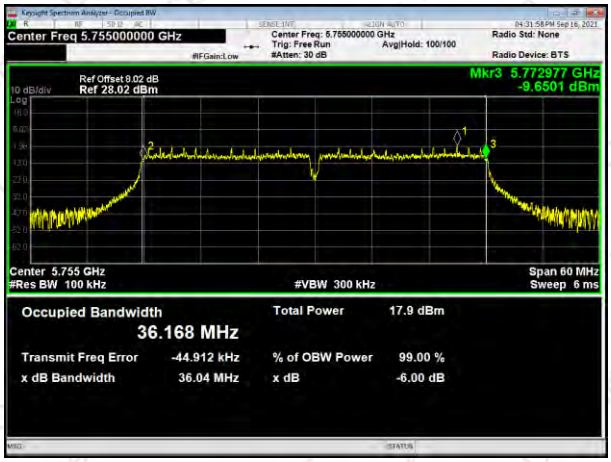
802.11a	802.11n HT20
5180MHz	5180MHz
	
5200MHz	5200MHz
	
5240MHz	5240MHz

802.11n HT40	802.11ac HT20
5190MHz	5180
	
5230MHz	5200
	5240

802.11ac HT40	802.11ac HT80
5190MHz	5210
5230MHz	

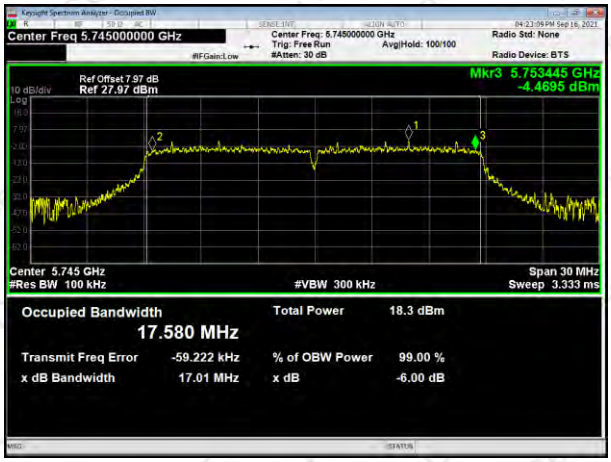
802.11a	802.11n HT20
5745MHz	5745MHz
5785MHz	5785MHz
	
5825MHz	5825MHz

802.11n HT40

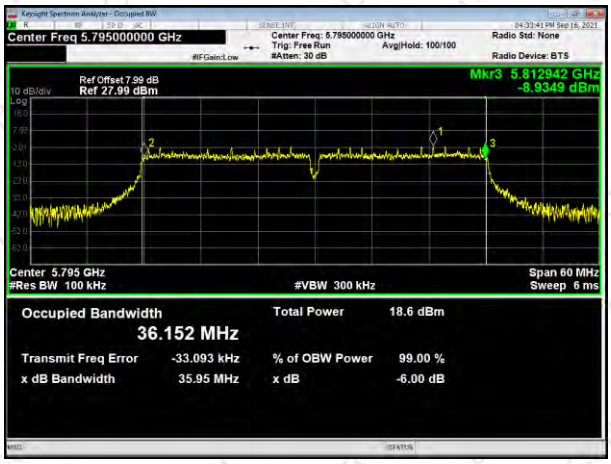


5755MHz

802.11ac HT20



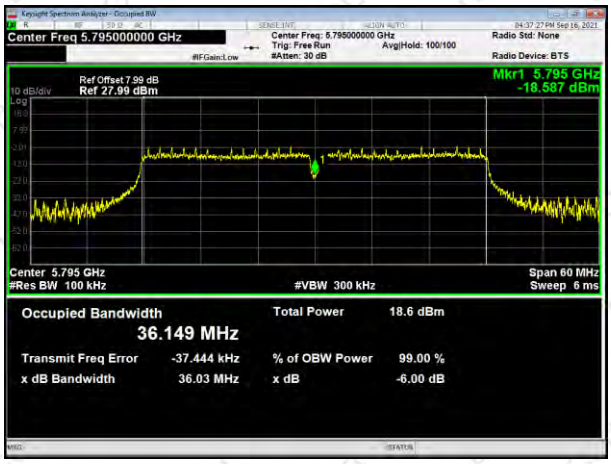
5745MHz



5795MHz

5785MHz

5825MHz

802.11ac HT40	802.11ac HT80
5755MHz	5775MHz
	
5795MHz	

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.

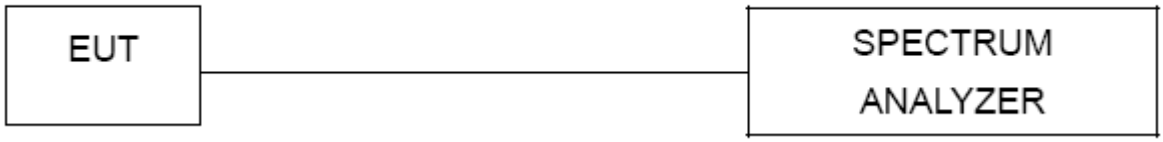
7.1.1 TEST PROCEDURE

1. Set RBW = 8 MHz.
2. Set the video bandwidth (VBW) ≥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



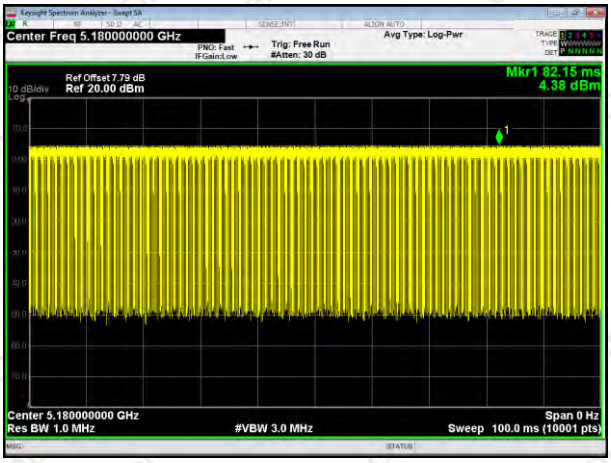
7.1.4 EUT OPERATION CONDITIONS

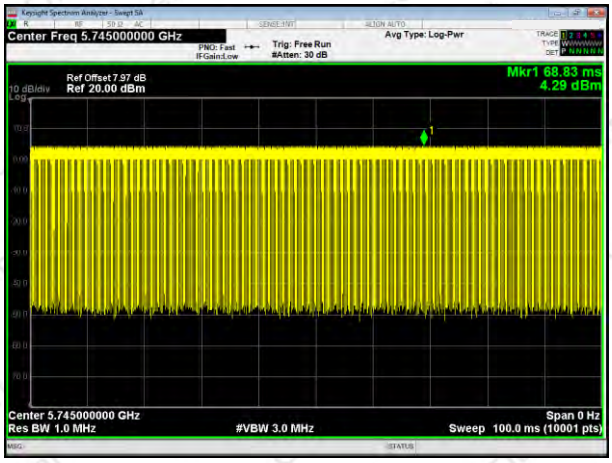
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

7.1.5 TEST RESULTS

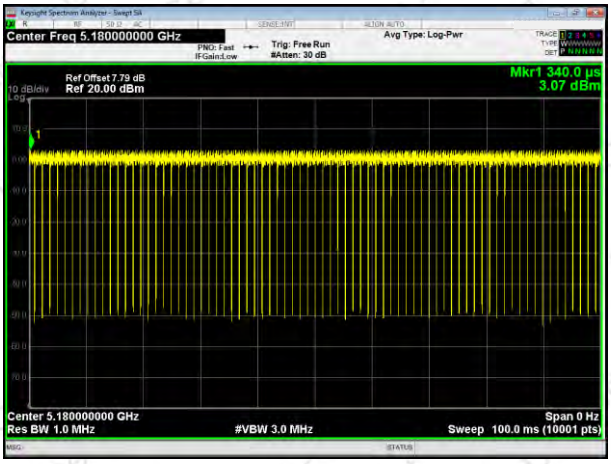
Operation Mode		Duty Cycle(%)	Duty Fator (dB) 10 * log (1/ Duty cycle)
Band 1	802.11a	81.04	0.91
	802.11n(HT20)	96.84	0.14
	802.11n(HT40)	93.45	0.29
	802.11ac(HT20)	96.88	0.14
	802.11ac(HT40)	93.97	0.27
	802.11ac(HT80)	88.64	0.52
Band 4	802.11a	82.21	0.85
	802.11n(HT20)	96.78	0.14
	802.11n(HT40)	94.16	0.26
	802.11ac(HT20)	96.89	0.14
	802.11ac(HT40)	94.04	0.27
	802.11ac(HT80)	88.76	0.52

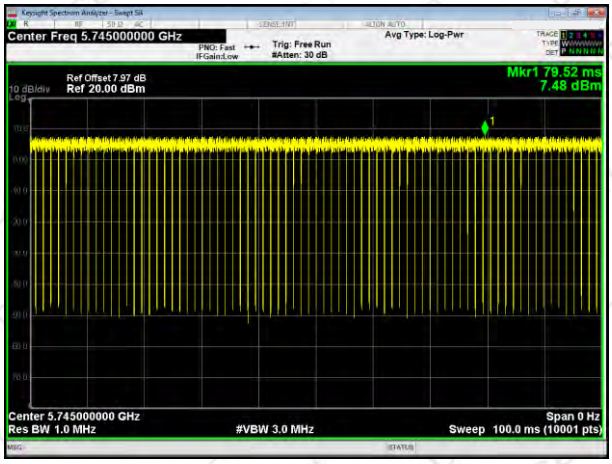
802.11a



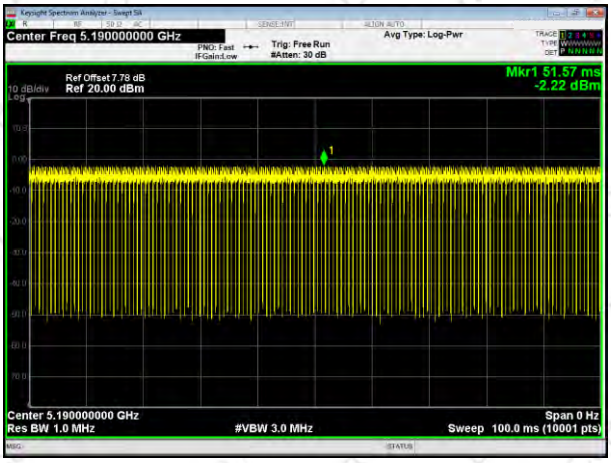


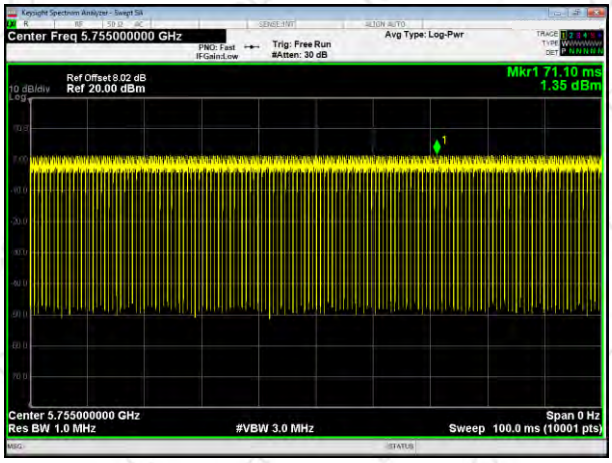
802.11n HT20



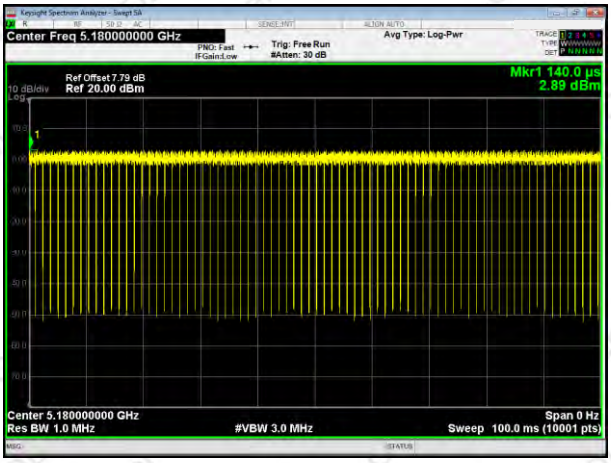


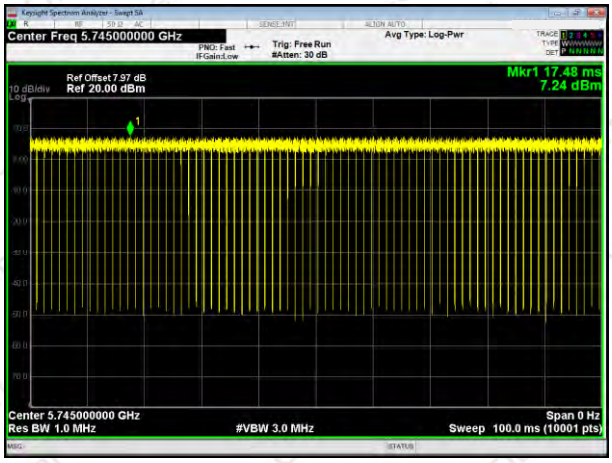
802.11n HT40



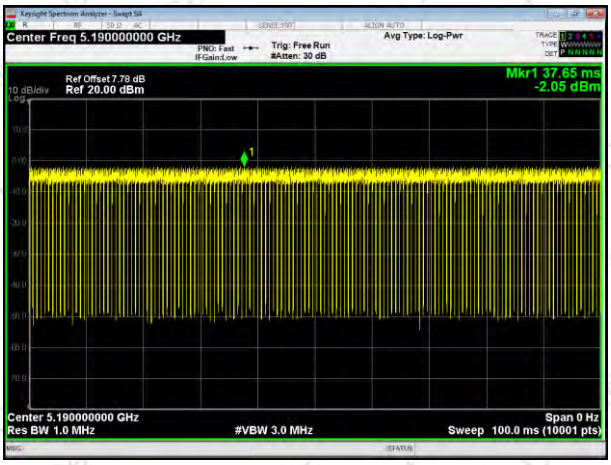


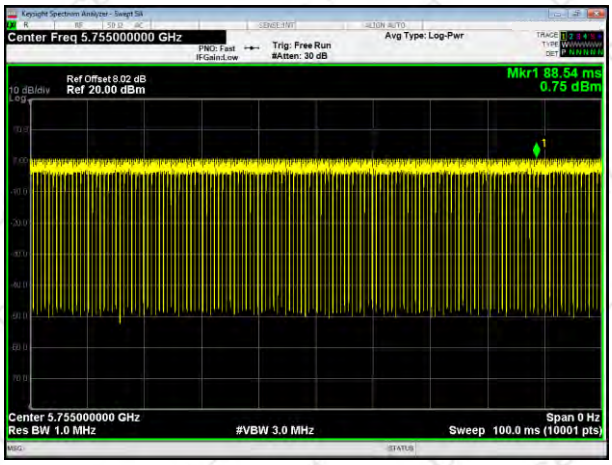
802.11ac HT20



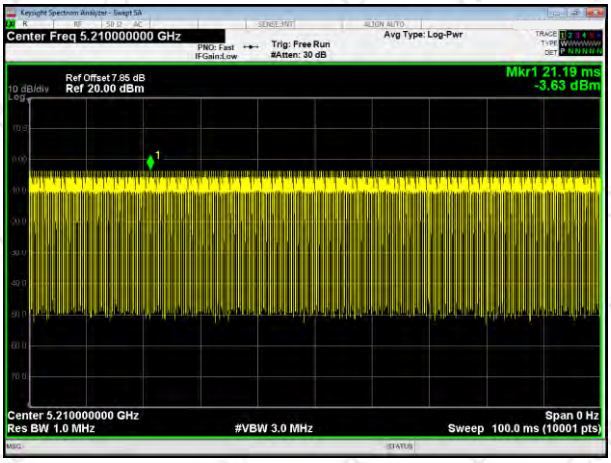


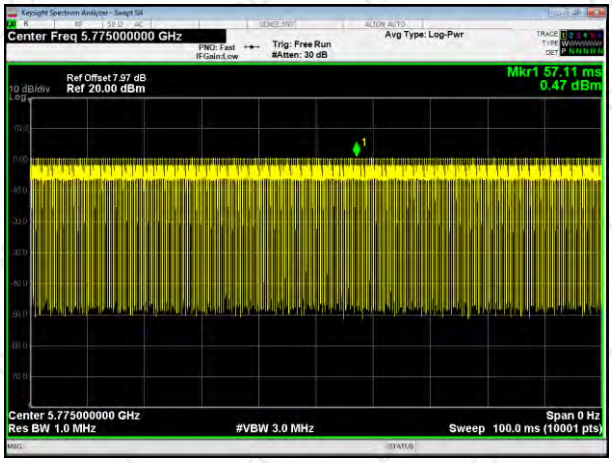
802.11ac HT40





802.11ac HT80





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.

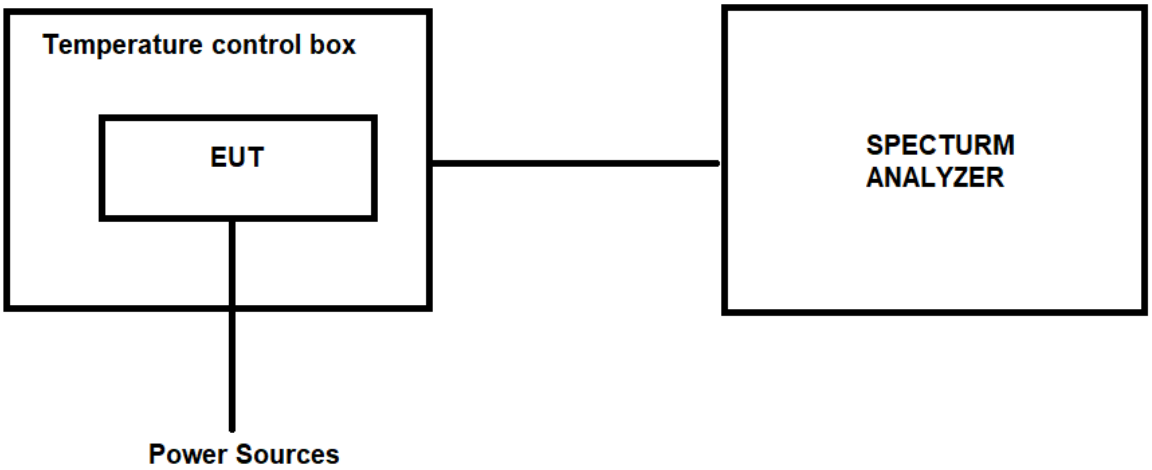
8.1.1 TEST PROCEDURE

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

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
3.63V	-20℃	5180.000	5180.0336	5180.0322	5180.0354	-0.0336	-0.0322	-0.0354
		5220.000	5220.0321	5220.0361	5220.0352	-0.0321	-0.0361	-0.0352
		5240.000	5240.0241	5240.0231	5240.0236	-0.0241	-0.0231	-0.0236
		5745.000	5745.0336	5745.0348	5745.0341	-0.0336	-0.0348	-0.0341
		5785.000	5785.0327	5785.0328	5785.0385	-0.0327	-0.0328	-0.0385
		5825.000	5825.0332	5825.0336	5825.0336	-0.0332	-0.0336	-0.0336
2.97V		5180.000	5180.0215	5180.0274	5180.0252	-0.0215	-0.0274	-0.0252
		5220.000	5220.0324	5220.0332	5220.0345	-0.0324	-0.0332	-0.0345
		5240.000	5240.0231	5240.0224	5240.0263	-0.0231	-0.0224	-0.0263
		5745.000	5745.0245	5745.0237	5745.0257	-0.0245	-0.0237	-0.0257
		5785.000	5785.0327	5785.0341	5785.0325	-0.0327	-0.0341	-0.0325
		5825.000	5825.0441	5825.0427	5825.0463	-0.0441	-0.0427	-0.0463
3.3V	25℃	5180.000	5180.0536	5180.0536	5180.0557	-0.0536	-0.0536	-0.0557
		5220.000	5220.0274	5220.0274	5220.0232	-0.0274	-0.0274	-0.0232
		5240.000	5240.0352	5240.0336	5240.0352	-0.0352	-0.0336	-0.0352
		5745.000	5745.0335	5745.0314	5745.0334	-0.0335	-0.0314	-0.0334
		5785.000	5785.0441	5785.0457	5785.0437	-0.0441	-0.0457	-0.0437
		5825.000	5825.0272	5825.0263	5825.0252	-0.0272	-0.0263	-0.0252
3.63V	50℃	5180.000	5180.0341	5180.0341	5180.0333	-0.0341	-0.0341	-0.0333
		5220.000	5220.0263	5220.0265	5220.0254	-0.0263	-0.0265	-0.0254
		5240.000	5240.0318	5240.0352	5240.0336	-0.0318	-0.0352	-0.0336
		5745.000	5745.0645	5745.0614	5745.0652	-0.0645	-0.0614	-0.0652
		5785.000	5785.0428	5785.0427	5785.0433	-0.0428	-0.0427	-0.0433
		5825.000	5825.0633	5825.0663	5825.0654	-0.0633	-0.0663	-0.0654
2.97V	50℃	5180.000	5180.0341	5180.0357	5180.0338	-0.0341	-0.0357	-0.0338
		5220.000	5220.0257	5220.0245	5220.0224	-0.0257	-0.0245	-0.0224
		5240.000	5240.0336	5240.0378	5240.0341	-0.0336	-0.0378	-0.0341
		5745.000	5745.0457	5745.0436	5745.0432	-0.0457	-0.0436	-0.0432
		5785.000	5785.0232	5785.0252	5785.0227	-0.0232	-0.0252	-0.0227
		5825.000	5825.0727	5825.0741	5825.0736	-0.0727	-0.0741	-0.0736

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
3.63V	-20℃	5190.000	5190.0245	5190.0252	-0.0245	-0.0252
		5230.000	5230.0336	5230.0363	-0.0336	-0.0363
		5755.000	5755.0522	5755.0524	-0.0522	-0.0524
		5795.000	5795.0641	5795.0674	-0.0641	-0.0674
2.97V		5190.000	5190.0274	5190.0235	-0.0274	-0.0235
		5230.000	5230.0363	5230.0324	-0.0363	-0.0324
		5755.000	5755.0225	5755.0237	-0.0225	-0.0237
		5795.000	5795.0454	5795.0441	-0.0454	-0.0441
3.3V	25℃	5190.000	5190.0235	5190.0225	-0.0235	-0.0225
		5230.000	5230.0627	5230.0674	-0.0627	-0.0674
		5755.000	5755.0233	5755.0236	-0.0233	-0.0236
		5795.000	5795.0545	5795.0552	-0.0545	-0.0552
3.63V	50℃	5190.000	5190.0628	5190.0625	-0.0628	-0.0625
		5230.000	5230.0537	5230.0536	-0.0537	-0.0536
		5755.000	5755.0463	5755.0454	-0.0463	-0.0454
		5795.000	5795.0325	5795.0335	-0.0325	-0.0335
2.97V	50℃	5190.000	5190.0536	5190.0536	-0.0536	-0.0536
		5230.000	5230.0357	5230.0345	-0.0357	-0.0345
		5755.000	5755.0336	5755.0336	-0.0336	-0.0336
		5795.000	5795.0424	5795.0424	-0.0424	-0.0424

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)
			802.11ac HT80	802.11ac HT80
3.63V	-20℃	5210.000	5210.0136	-0.0136
		5775.000	5775.0174	-0.0174
2.97V		5210.000	5210.0252	-0.0252
		5775.000	5775.0336	-0.0336
3.3V	25℃	5210.000	5210.0424	-0.0424
		5775.000	5775.0485	-0.0485
3.63V	50℃	5210.000	5210.0336	-0.0336
		5775.000	5775.0245	-0.0245
2.97V	50℃	5210.000	5210.0363	-0.0363
		5775.000	5775.0525	-0.0525

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

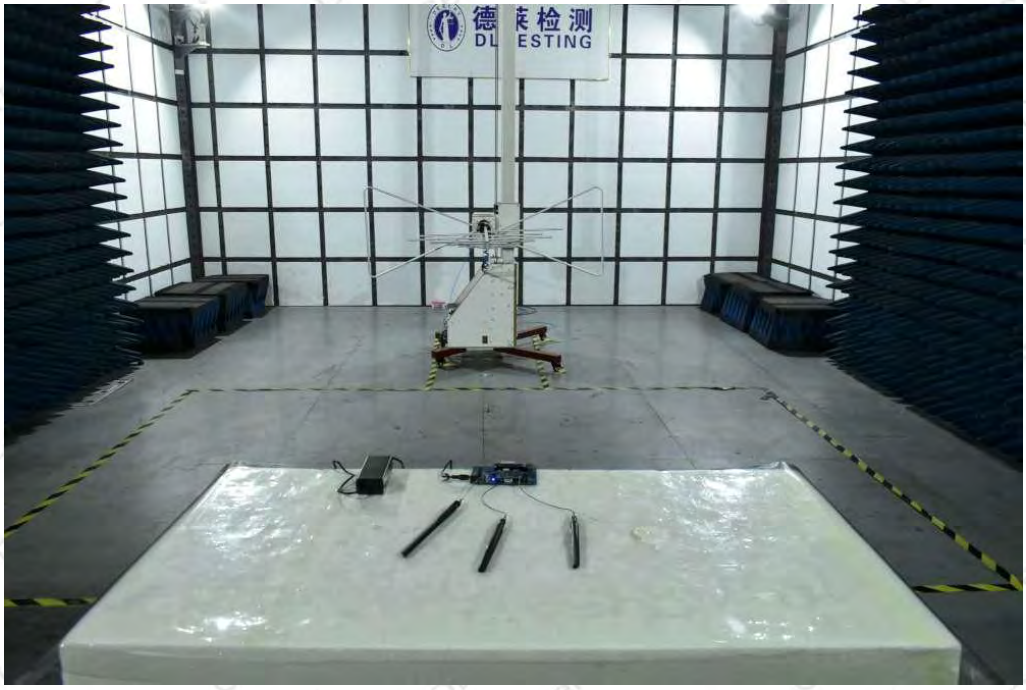
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

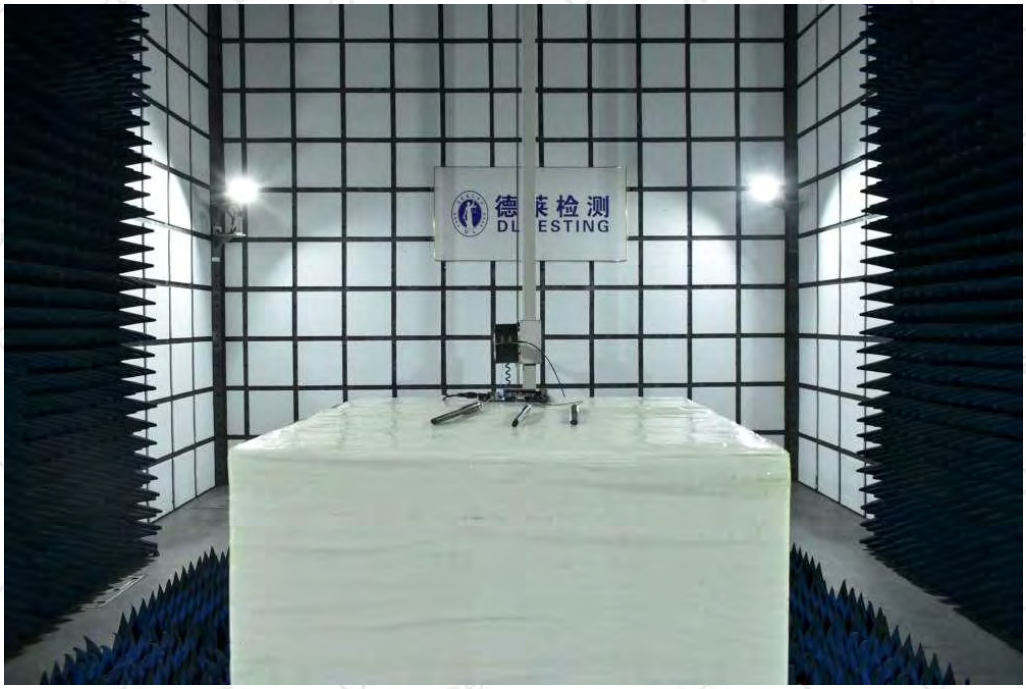
10.2 EUT ANTENNA

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

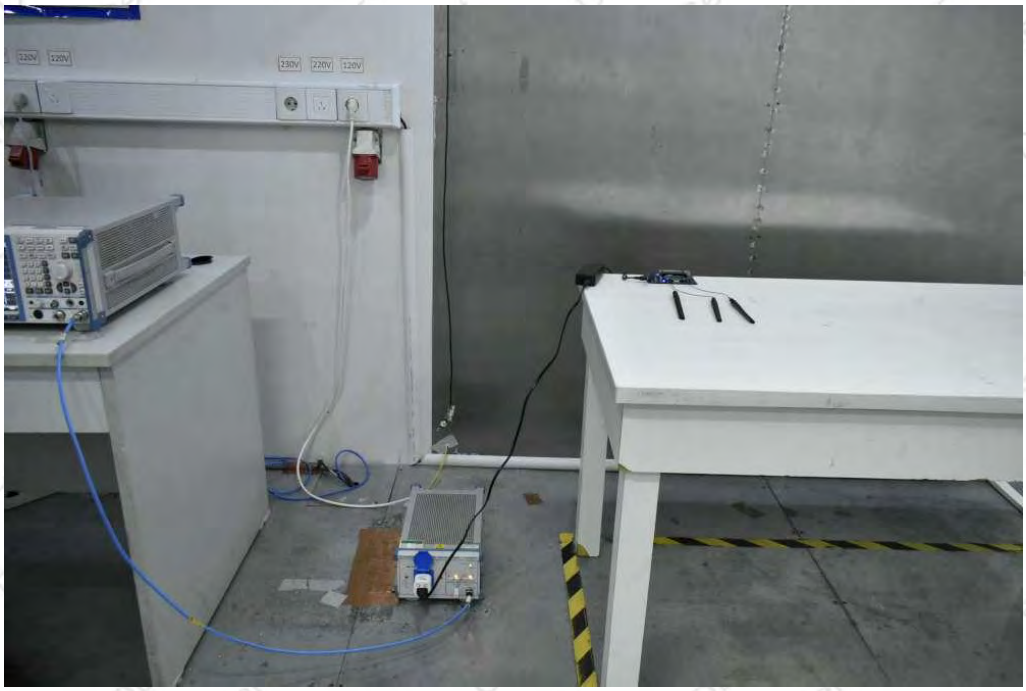
11. TEST SEUUP PHOTO

Radiated Measurement Photos

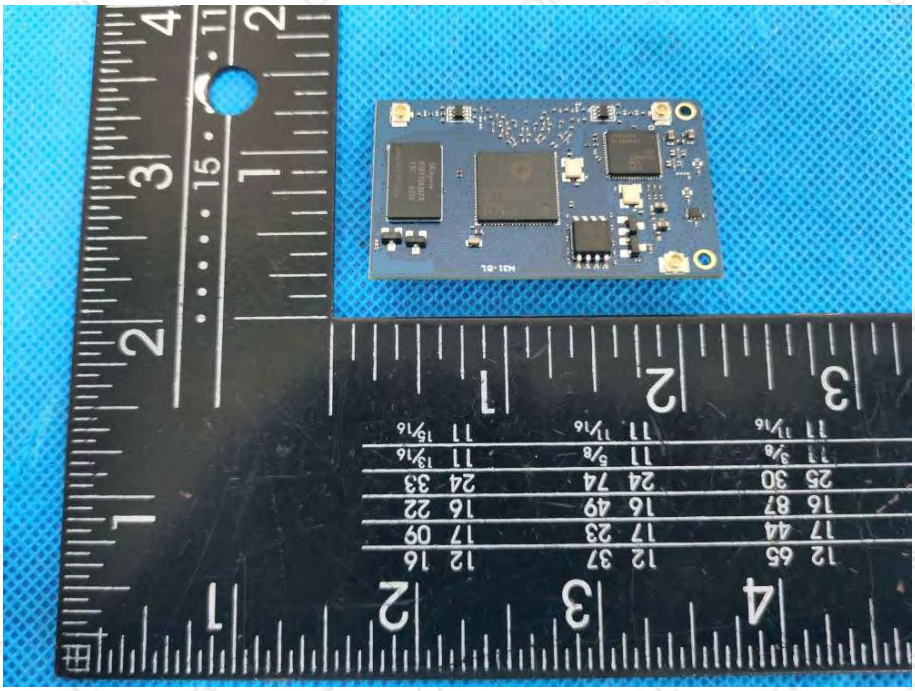


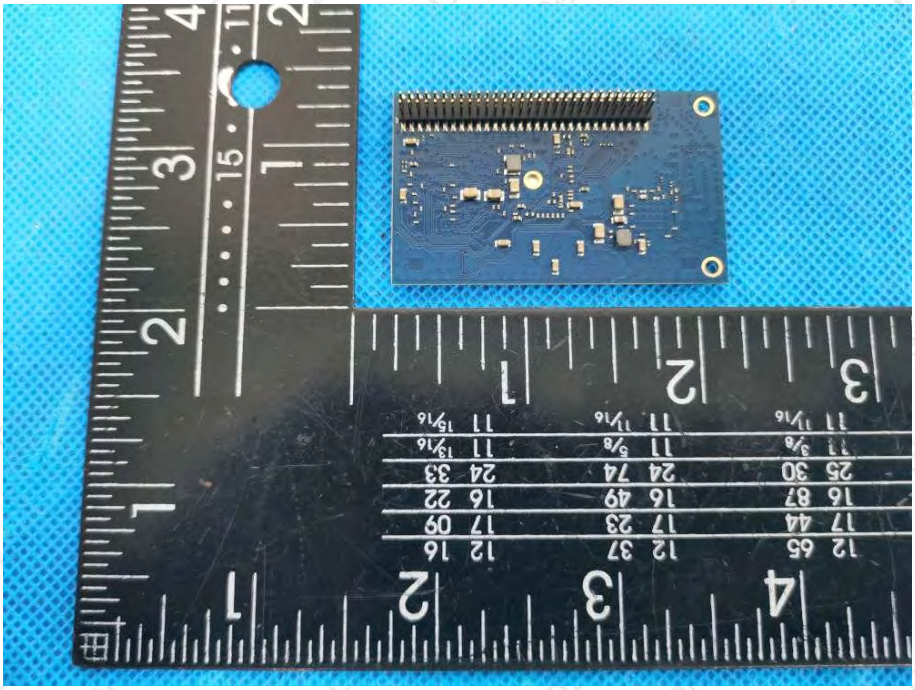


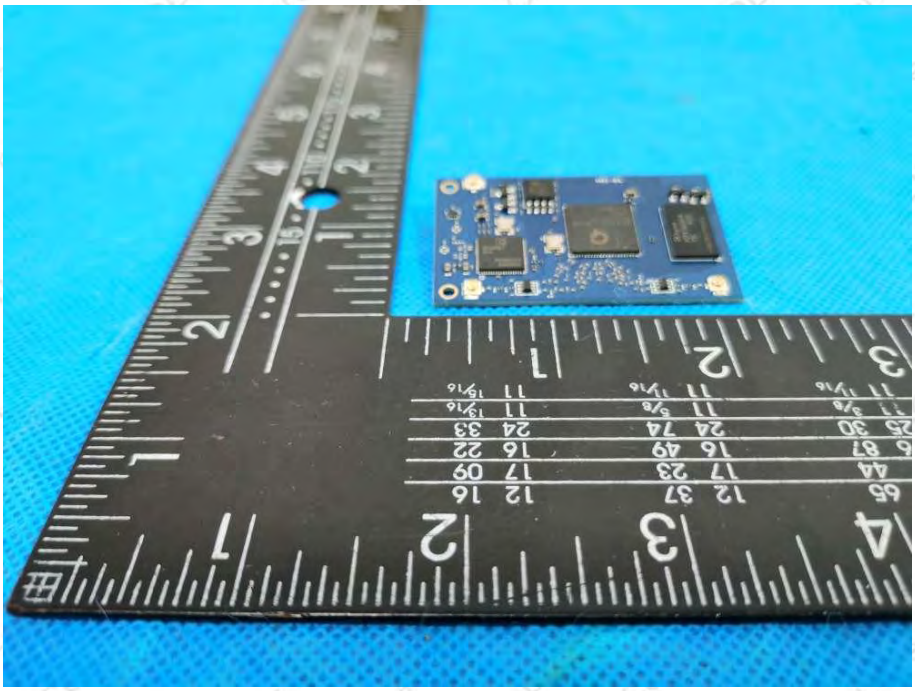
Conducted Measurement Photos

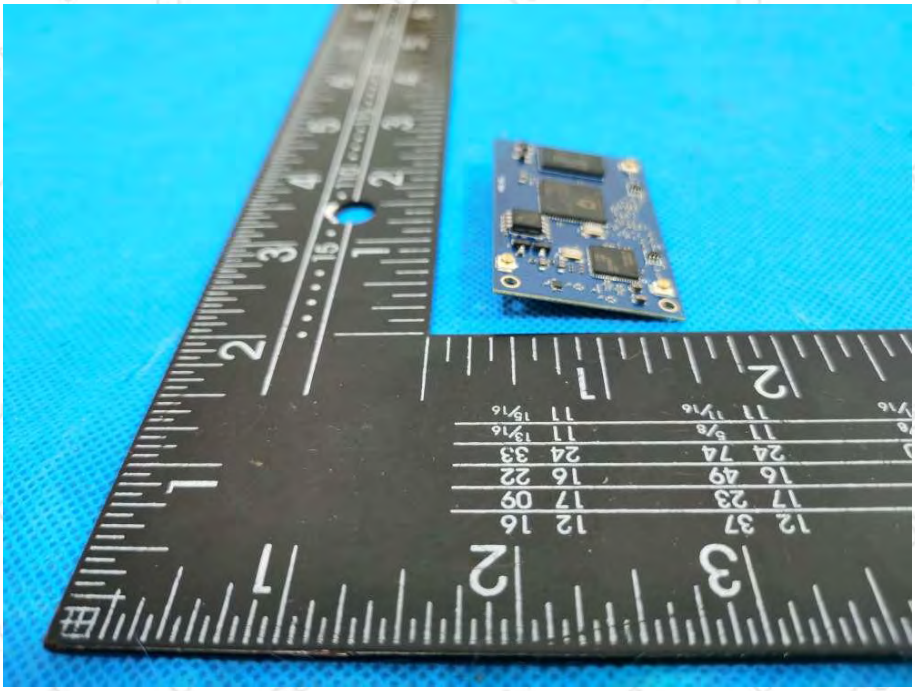


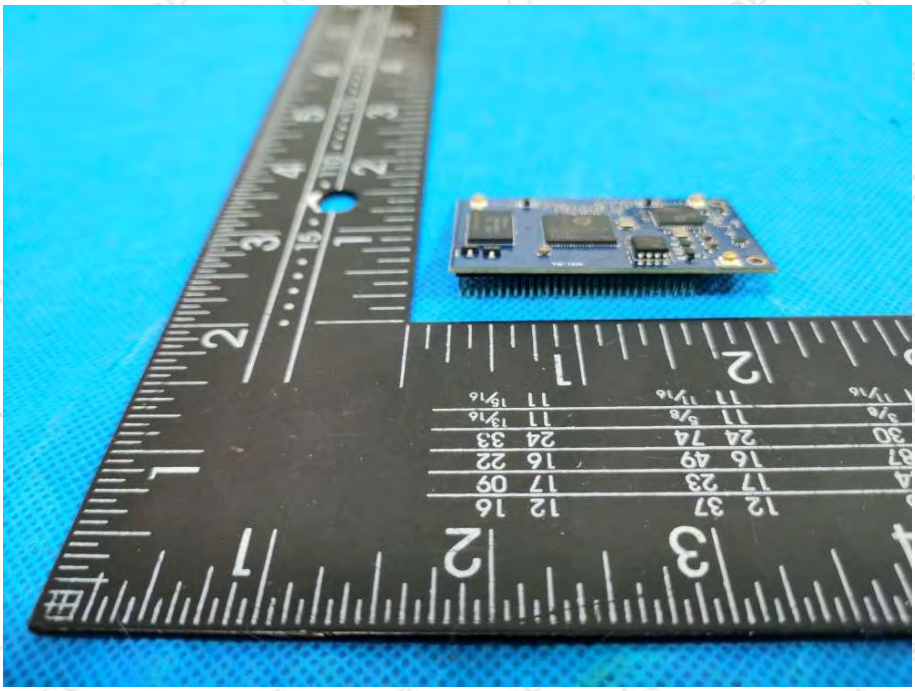
12. EUT PHOTO

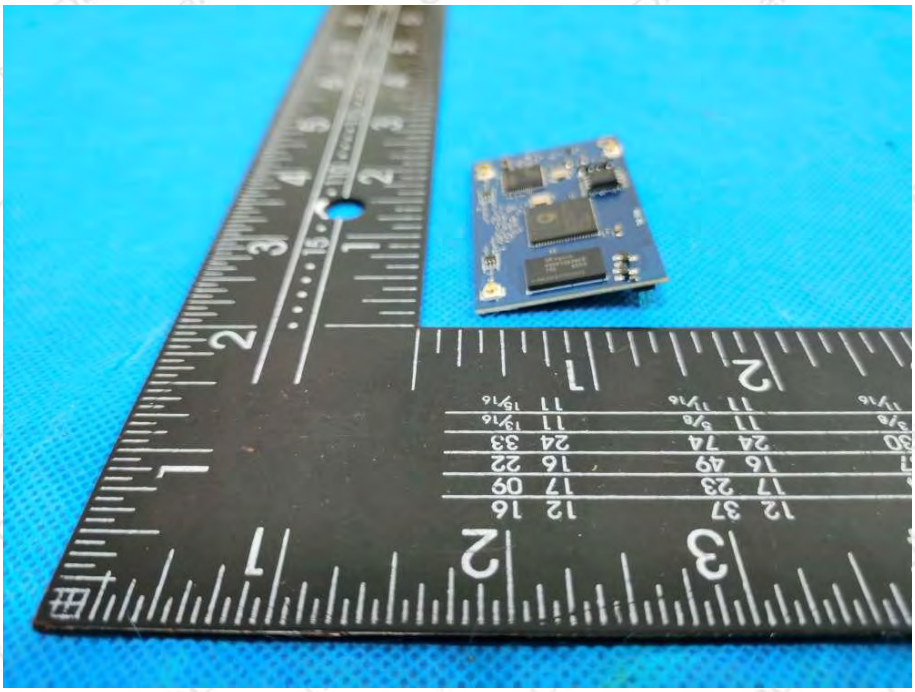


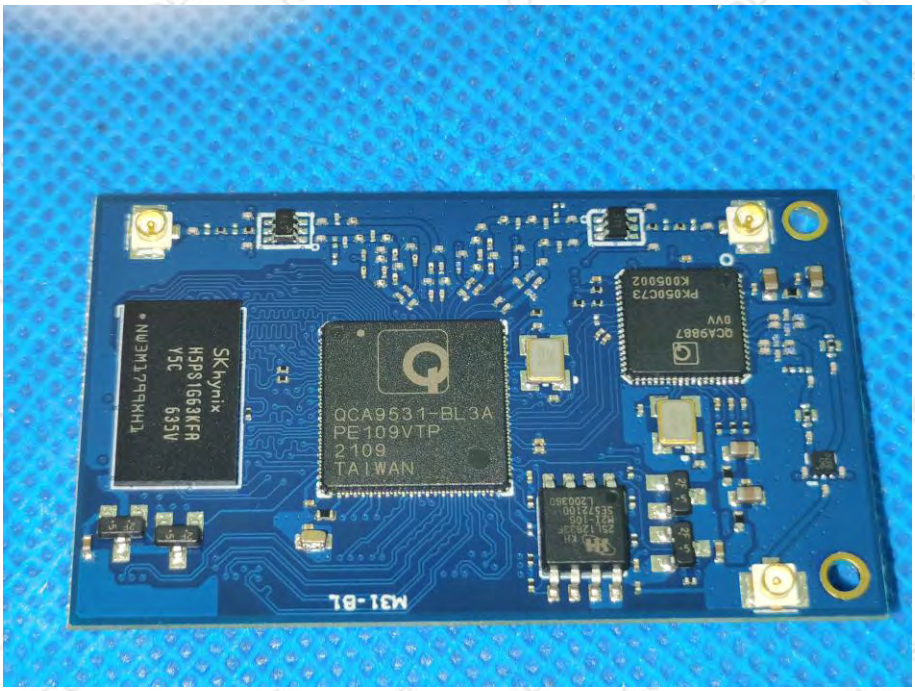












※※※※※ **END OF REPORT** ※※※※※