Aibo Standard Technology (Shenzhen) Co., Ltd.
101, Building B, Tuori New Energy Industrial Park, High-tech Park, Tianliao Community, Yutang Street, Guangming District, Shenzhen City, Guangdong Province, China
Tel.: +(86) 0755 85250797 E-mail: Aibonorm@aibonorm.com Website: www.Aibonorm.com

FCC&IC TEST REPORT

Report No.:	AB25020001CW04
FCC ID.:	**2BQHD-DGEN1**
IC ID.:	**34121-DGEN1**
Applicant.:	Freedom Factory Inc
Address.:	4 Peddlers Row 295, Newark, Delaware 19702 USA
Manufacturer.:	Freedom Factory Inc
Address.:	4 Peddlers Row 295, Newark, Delaware 19702 USA
Product Name.:	dGEN1
Trade Mark.:	/
Test Model.:	dGEN1
Additional Model(s).:	/
Standard.:	FCC 47 CFR Part 15 Subpart E (Part 15.407) RSS-Gen Issue 5 RSS-247 Issue 3
Date of Receipt.:	2025.04.15
Date of Test Date.:	2025.04.15-2025.06.19
Date of Issue.:	2025.07.07
Test Result.:	Pass

Compiled by: (Printed Name + Signature)	Huaijie Li	Huaijie Li
Supervised by: (Printed Name + Signature)	Jay Liu	jay liu
Approved by: (Printed Name + Signature)	Mic Cheng	Mic Cheng

Testing Laboratory Name.:	Aibo Standard Technology (Shenzhen) Co., Ltd.
Address.:	101, Building B, Tuori New Energy Industrial Park, High-tech Park, Tianliao Community, Yutang Street, Guangming District, Shenzhen City, Guangdong Province, China

FCC&IC TEST REPORT

Test Report No.: AB25060001FW04	2025 07.07 Date of issue

EUT.....	: dGEN1
Test Model.....	: dGEN1
Applicant.....	**: Freedom Factory Inc**
Address.....	: 4 Peddlers Row 295, Newark, Delaware 19702 USA
Telephone.....	: +1(726)842-5475
Fax.....	: /
Manufacturer.....	**: Freedom Factory Inc**
Address.....	: 4 Peddlers Row 295, Newark, Delaware 19702 USA
Telephone.....	: +1(726)842-5475
Fax.....	: /

Test Result	Positive

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

REPORT VERSION

Version No.	Issue Date	Description
01	2025 07.07	Initial Issue

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1. GENERAL INFORMATION

1.1. GENERAL DESCRIPTION OF EUT

Product Name:	dGEN1		
Trade Mark:	Freedom Factory		
Test Model:	dGEN1		
Additional Model(s):	/		
Model Difference:	/		
Hardware Version:	S891_MB_V2		
Software Version:	/		
Power Supply:	DC 3.70V by battery(4500mAh) or DC 5V 2A from AC/DC adapter		
EUT Supports Function: (Provided by the customer)	5GHz U-NII Bands	5150MHz~5250MHz	IEEE 802.11a/n/ac
		5250MHz~5350MHz	IEEE 802.11a/n/ac
		5725MHz~5850MHz	IEEE 802.11a/n/ac
Test Sample(s) Number:	AB25060001-01 (Engineer Sample) AB25060001-02 (Normal Sample)		
Radio Specification Subject to this Report			
Radio Specification:	IEEE 802.11a/b/g/n/ac		
Frequency Range:	5180MHz~5240MHz for U-NII Band1 5260MHz~5320MHz for U-NII Band2A 5745MHz~5825MHz for U-NII Band3		
Modulation Type:	IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11g: OFDM (64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11ac: OFDM(256QAM, 64QAM, 16QAM, QPSK, BPSK)		
Channel Spacing:	IEEE 802.11a/n(HT20)/ac(VHT20): 20MHz IEEE 802.11n(HT40)/ac(VHT40): 40MHz IEEE 802.11ac(VHT80): 80MHz		
Channel Number(s):	**U-NII Band1:** 4 for IEEE 802.11a/n(HT20)/ac(VHT20) 2 for IEEE 802.11n(HT40))/ac(VHT40) 1 for IEEE 802.11ac(VHT80) **U-NII Band2A:** 4 for IEEE 802.11a/n(HT20)/ac(VHT20) 2 for IEEE 802.11n(HT40))/ac(VHT40) 1 for IEEE 802.11ac(VHT80) **U-NII Band3:** 5 for IEEE 802.11a/n(HT20)/ac(VHT20) 2 for IEEE 802.11n(HT40))/ac(VHT40) 1 for IEEE 802.11ac(VHT80)		
Antenna Type:	PIFA Antenna		
Antenna Gain:	U-NII Band 1:0.16dBi(Max.) U-NII Band 2A: 0.30dBi(Max.) U-NII Band 3: -2.11dBi(Max.)		

TPC Function:	Not Support
DFS Function:	Slave without radar detection

1.2. DESCRIPTION OF SUPPORT EQUIPMENT

Description	Manufacturer	Model	Serial Number	Supplied by
AC/DC Adapter	Xiaomi	MDY-11-EX	SA62212LA04358J	Applicant

1.3. DESCRIPTION OF EXTERNAL I/O

I/O Port Description	Quantity	Cable
USB Type-C Interface	1	0.8m, unshielded
Earphone Jack	1	N/A

1.4. GENERAL DESCRIPTION OF APPLIED STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.407 - General technical requirements of Unlicensed National Information Infrastructure Devices.

ANSI C63.10-2013 - American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

KDB 789033 D02 General UNII Test Procedures New Rules v02r01 - Guidelines For Compliance Testing Of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E

KDB 905462 D03 UNII Clients Without Radar Detection New Rules v01r02 - U-NII Client Devices Without Radar Detection Capability.

RSS-Gen Issue 5-General Requirements for Compliance of Radio Apparatus

RSS-247 Issue 3-Digital Transmission Systems (DTSs),Frequency Hopping Systems (FHSs)and Licence-Exempt Local Area Network(LE-LAN) Devices

1.5. DESCRIPTION OF TEST FACILITY

Test Lab: Aibo Standard Technology (Shenzhen) Co., Ltd.

Address: 101, Building B, Tuori New Energy Industrial Park, High-tech Park, Tianliao Community, Yutang Street, Guangming District, Shenzhen City, Guangdong Province, China

Tel.: +(86) 0755 85250797

E-mail: Aibonorm@aibonorm.com

Website: www.Aibonorm.com

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

A2LA-Lab Certificate No.: 7514.01

Aibo Standard Technology (Shenzhen) Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC Accredited Lab.

Designation Number: CN1411

Test Firm Registration Number: 567066

ISED Wireless Device Testing Laboratories

CAB identifier: CN0185

1.6. MEASUREMENT UNCERTAINTY

The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Items	Measurement Uncertainty
Power Line Conducted Emission (9kHz~150kHz)	±3.62dB
Power Line Conducted Emission (150kHz~30MHz)	±3.38dB
Radiated Emission (9kHz~30MHz)	±3.10dB
Radiated Emission (30MHz~1GHz)	±4.90dB
Radiated Emission (1GHz~18GHz)	±3.88dB
Radiated Emission (8GHz~40GHz)	±5.32dB
RF Conducted Power	±0.57dB
Conducted Spurious Emissions	±1.60dB
RF Frequency	$\pm 6.0 \times 10^{-7}$

Note: All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

1.7. ENVIRONMENTAL CONDITIONS

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

Normal Temperature:	+15°C ~ +35°C
Lative Humidity	20 % ~ 75 %
Air Pressure	98KPa ~ 101KPa

1.8. DESCRIPTION OF TEST MODES

Mode	Tx/Rx Frequency (MHz)	Test Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11a IEEE 802.11n(HT20) IEEE 802.11ac(VHT20)	5150MHz~5250MHz	Channel 36	Channel 40	Channel 48
		5180MHz	5200MHz	5240MHz
	5250MHz~5350MHz	Channel 52	Channel 60	Channel 64
		5260MHz	5300MHz	5320MHz
	5725MHz~5850MHz	Channel 149	Channel 157	Channel 165
		5745MHz	5785MHz	5825MHz
IEEE 802.11n(HT40) IEEE 802.11ac(VHT40)	5150MHz~5250MHz	Channel 38	--	Channel 46
		5190MHz	--	5230MHz
	5250MHz~5350MHz	Channel 54	--	Channel 62
		5270MHz	--	5310MHz
	5725MHz~5850MHz	Channel 151	--	Channel 159
		5755MHz	--	5795MHz
IEEE 802.11ac(VHT80)	5150MHz~5250MHz	--	Channel 42	--
		--	5210MHz	--
	5250MHz~5350MHz	--	Channel 58	--
		--	5290MHz	--
	5725MHz~5850MHz	Channel 138	Channel 155	--
		5610MHz	5775MHz	--

For portable device, radiated emission was verified over X, Y, Z Axis, and shown the worst case in this report. The following operating modes were applied for the related test items. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data packets and antenna ports (if EUT with antenna diversity architecture), only the result of the worst case was recorded in the report.

List of Test Modes	
Test Mode(s)	Description
TM1	Keep the EUT works in continuously transmitting mode (IEEE 802.11a)
TM2	Keep the EUT works in continuously transmitting mode (IEEE 802.11n)
TM3	Keep the EUT works in continuously transmitting mode (IEEE 802.11ac)

Power setting during the test:

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 firmware of the final end product.

Test Software Version	#*#*3646633#*#*		
Mode	U-NII Band1	U-NII Band2A	U-NII Band3
	Power Setting		
IEEE 802.11a	Default	Default	Default
IEEE 802.11n(HT20)	Default	Default	Default
IEEE 802.11n(HT40)	Default	Default	Default
IEEE 802.11ac(VHT20)	Default	Default	Default
IEEE 802.11ac(VHT40)	Default	Default	Default
IEEE 802.11ac(VHT80)	Default	Default	Default

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Following data rate was (were) selected for the final test as listed below:

Mode	Worst-case data rates
IEEE 802.11a	6Mbps
IEEE 802.11n(HT20)	MCS0
IEEE 802.11n(HT40)	MCS0
IEEE 802.11ac(VHT20)	MCS0
IEEE 802.11ac(VHT40)	MCS0
IEEE 802.11ac(VHT80)	MCS0

2. SUMMARY OF TEST RESULT

Test Cases			
FCC&IC Rule	**Description of Test Item(s)**	**Result**	**Test Engineer**
Part 15.203 Part 15.407(a)	Antenna Requirement	Pass	Jacey Fu
Part 15.407(a)	Duty Cycle	Pass	Jacey Fu
Part 15.407(a) RSS-247 6.2.1(1) RSS-247 6.2.2(1) RSS-247 6.2.3(1) RSS-247 6.2.4(2)	Maximum Conducted Output Power	Pass	Jacey Fu
Part 15.407(a) RSS-Gen 6.7	26dB Bandwidth and Occupied Bandwidth	Pass	Jacey Fu
Part 15.407(e) RSS-247 6.2.4(2)	6dB Bandwidth	Pass	Jacey Fu
Part 15.407(a) RSS-247 6.2.1(1) RSS-247 6.2.2(1) RSS-247 6.2.3(1) RSS-247 6.2.4(2)	Power Spectral Density	Pass	Jacey Fu
Part 15.407(b) Part 15.205 Part 15.209 RSS-247 6.2.1(2) RSS-247 6.2.2(2) RSS-247 6.2.3(2) RSS-247 6.2.4(3)	Radiated Emissions and Radiated Band Edges Measurement	Pass	Jacey Fu
Part 15.407(g)	Frequency Stability	Pass	Jacey Fu
Part 15.407(c)	Automatically Discontinue Transmission	Pass	Jacey Fu
Part 15.407(h) RSS-247 6.3	Dynamic Frequency Selection	Pass	Jacey Fu
Part 15.207 RSS-Gen 8.8	Power Line Conducted Emissions	Pass	Jacey Fu

3. MEASUREMENT INSTRUMENTS LIST

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Until
1	Loop Antenna	Schwarzbeck	FMZB 1519	1519-025	07/02/2024	07/01/2025
2	Power Amplifier	HZEMC	HPA-9K0133	HYPA23029	02/19/2025	02/18/2026
3	Broadband Antenna	Schwarzbeck	VULB 9168	01763	02/19/2025	02/18/2026
4	Attenuator	PRM	ATT50-6-3	ATT50-6-3	01/20/2025	01/19/2026
5	Spectrum Analyzer	R&S	FSV40-N	101365	01/20/2025	01/19/2026
6	Horn Antenna	Schwarzbeck	BBHA 9120 D	02786	02/19/2025	02/18/2026
7	Horn Antenna	Schwarzbeck	ZLB7-18-40G-77	072410839	02/19/2025	02/18/2026
8	Power Amplifier	HZEMC	PA0118-43	HYPA23030	02/19/2025	02/18/2026
9	Power Amplifier	HZEMC	PA01840-45	HYPA23031	02/19/2025	02/18/2026
10	EMI Test Receiver	R&S	ESCI	101196	01/20/2025	01/19/2026
11	LISN	R&S	ENV216	102374	01/20/2025	01/19/2026
12	Pulse Limiter	Schwarzbeck	ESH3-Z2	0357.8810.54	01/20/2025	01/19/2026
13	MXA Signal Analyzer	Keysight	N9020A	MY52091389	01/20/2025	01/19/2026
14	Power Sensor	Agilent	U2021XA	MY54110007	01/31/2025	01/30/2026
15	Power Sensor	Agilent	U2021XA	MY54110009	01/31/2025	01/30/2026
16	MXG Vector Signal Generator	Agilent	N5182A	MY47070153	01/20/2025	01/19/2026
17	Analog Signal Source	Keysight	N5173B	MY60403029	01/20/2025	01/19/2026
18	Vector Signal Generator	R&S	SMCV100B	106103	01/20/2025	01/19/2026
19	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW500	118780	01/20/2025	01/19/2026
20	DC POWER SUPPLY	MAISHENG	MT-305DS	2021040016	02/28/2025	02/27/2026
21	Const Temp. & Humidity Chamber	GRT	GR-HWX-150L	GR25010601	01/20/2025	01/19/2026

Test Software		
Software name	Model	Version
Conducted Emission Measurement Software	FASLAB	V4.1
Radiated Emission Measurement Software	FASLAB	V4.1
Bluetooth and WIFI Test System	MTS 8310	V3.0.0.0

4. ANTENNA REQUIREMENT

1) Standard Requirement

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.407(a)(1) (2) requirement:

The conducted output power limit specified in paragraph (a) of this section is based on the use of antennas with directional gains that do not exceed 6dBi. Except as shown in paragraph (a) of this section, if transmitting antennas of directional gain greater than 6dBi are used, the conducted output power and the peak power spectral density shall be reduced by the by the amount in dB that the directional gain of the antenna exceeds 6dBi.

2) Conclusion

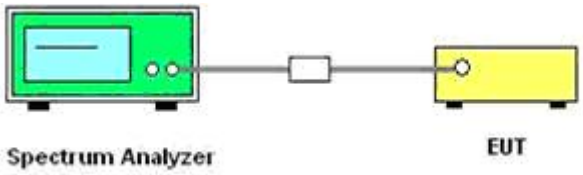
Antenna in the interior of the equipment and no consideration of replacement. The gain of the antenna is 0.30dBi (Max.). It complies with the standard requirement.

5. DUTY CYCLE

5.1. LIMIT

All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum-power transmission duration, T, are required for each tested mode of operation.

5.2. TEST SETUP



5.3. TEST PROCEDURE

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

a) Set the Centre frequency of the spectrum analyzer to the transmitting frequency;

b) Set RBW >= EBW if possible; otherwise, set RBW to the largest available value(8MHz);

c) Set VBW >= RBW, Span = 0, Detector = Peak;

d) Trace Mode = Clear Write;

e) When the trace is complete, measure the sending time of 1 burst and the duty cycle of 1 burst cycle.

5.4. TEST RESULT

Pass.

Please refer to the Appendix for 5GWIFI Test Data.RF Conducted Test Data.

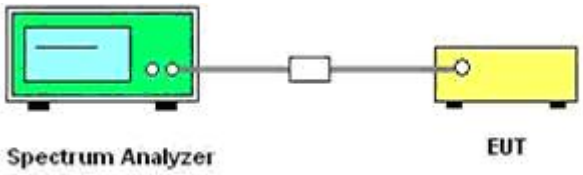
Note: 1) The test results including the cable lose.
2) Duty cycle= On Time/ Period;
3) Duty Cycle factor = 10*log(1/Duty cycle)

6. 26DB BANDWIDTH AND OCCUPIED BANDWIDTH

6.1. LIMIT

None; for reporting purposes only.

6.2. TEST SETUP



6.3. TEST PROCEDURE

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

For 26dB Bandwidth Measurement:

a) Set RBW = approximately 1% of the emission bandwidth.

b) Set the VBW > RBW.

c) Detector = Peak.

d) Detector = Peak.

e) Trace mode = max hold.

f) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

For 99% Occupied Bandwidth Measurement:

a) Set center frequency to the nominal EUT channel center frequency.

b) Set span = 1.5 times to 5.0 times the OBW.

c) Set RBW = 1 % to 5 % of the OBW.

d) Set VBW ≥ 3 x RBW.

e) Detector function = peak

f) Trace = max hold

g) Use the 99% power bandwidth function of the instrument to measure the Occupied Bandwidth and recoded.

6.4. TEST RESULT

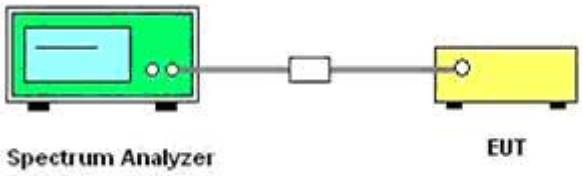
Please refer to the Appendix for 5GWIFI Test Data.RF Conducted Test Data.

7. 6DB BANDWIDTH

7.1. LIMIT

According to FCC 47 CFR Part 15 Subpart C Section 15.407(e) and IC RSS-247 6.2.4(2) , Within the 5.725-5.85GHz band, the minimum 6dB bandwidth of U-NII devices shall be at least 500kHz.

7.2. TEST SETUP



7.3. TEST PROCEDURE

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

a) Set RBW = 100 kHz.

b) Set the video bandwidth (VBW) ≥ 3 * RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

g) 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 6 dB relative to the maximum level measured in the fundamental emission.

7.4. TEST RESULT

Please refer to the Appendix for 5GWIFI Test Data.RF Conducted Test Data.

8. CONDUCTED OUTPUT POWER

8.1. LIMIT

According to FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3) , RSS-247 6.2.1(1),RSS-247 6.2.2(1) RSS-247 6.2.3(1),RSS-247 6.2.4(2).

For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1W provided the maximum antenna gain does not exceed 6dBi. In addition, the maximum power spectral density shall not exceed 17dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125mW (21dBm).

(ii) For an indoor access point operating in the band 5.15-5.25GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1W provided the maximum antenna gain does not exceed 6dBi. In addition, the maximum power spectral density shall not exceed 17dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23dBi, a 1dB reduction in maximum conducted output power and maximum power spectral density is required for each 1dB of antenna gain in excess of 23dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

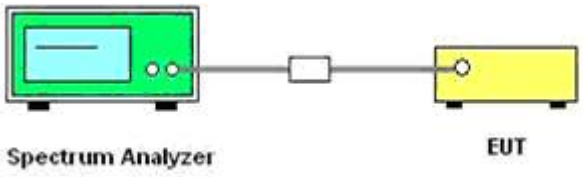
(iv) For client devices in the 5.15-5.25GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6dBi. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

For the 5.25-5.35GHz , the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or 11dBm + 10logB, where B is the 26dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

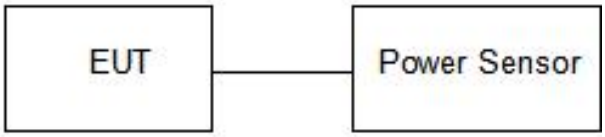
For the band 5.725-5.85GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1W. In addition, the maximum power spectral density shall not exceed 30dBm in any 500kHz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

8.2. TEST SETUP

☒ **Using a Spectrum Analyzer for Testing:**



☐ **Using a Broadband Power Meter for Testing:**



8.3. TEST PROCEDURE

☒ **Using a Spectrum Analyzer for Testing:**

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

a) Set span to encompass the entire 26dB EBW or 99% OBW of the signal.

b) Set RBW = 1 MHz, Set VBW >= 3MHz, Number of points in sweep >= [2*span / RBW]. (This gives bin-to-bin spacing <= RBW / 2, so that narrowband signals are not lost between frequency bins.)

c) Set Sweep time = auto, Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

d) Do not use sweep triggering. Allow the sweep to “free run.”.

e) Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the ON and OFF periods of the transmitter.

f) Compute power by integrating the spectrum across the 26dB EBW or 99% OBW of the signal using the instrument’s band power measurement function with band limits set equal to the EBW or OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at 1MHz intervals extending across the 26 dB EBW or 99% OBW of the spectrum.

g) Add [10*log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the

actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add [10 log (1 / 0.25)] = 6dB if the duty cycle is 25%.

☐ **Using a Broadband Power Meter for Testing:**

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the broadband power meter and measure the average output power. Add [10*log (1 / D)] to calculate the final result.

8.4. TEST RESULT

Pass.

Please refer to the Appendix for 5GWIFI Test Data.RF Conducted Test Data.

Note: The test results including the cable lose.

9. POWER SPECTRAL DENSITY

9.1. LIMIT

According to FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3) and RSS-247 6.2.1(1), RSS-2476.2.3(1),RSS-2476.2.4(1) :

For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1W provided the maximum antenna gain does not exceed 6dBi. In addition, the maximum power spectral density shall not exceed 17dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125mW (21dBm).

(ii) For an indoor access point operating in the band 5.15-5.25GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1W provided the maximum antenna gain does not exceed 6dBi. In addition, the maximum power spectral density shall not exceed 17dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23dBi, a 1dB reduction in maximum conducted output power and maximum power spectral density is required for each 1dB of antenna gain in excess of 23dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

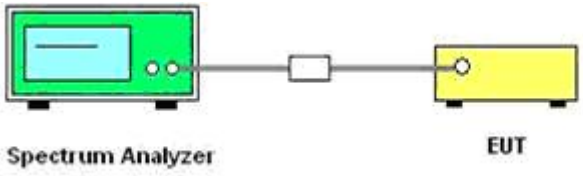
(iv) For client devices in the 5.15-5.25GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6dBi. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

For the 5.25-5.35GHz , the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or 11dBm + 10logB, where B is the 26dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

For the band 5.725-5.85GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1W. In addition, the maximum power spectral density shall not exceed 30dBm in any 500kHz band. If

transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

9.2. TEST SETUP



9.3. TEST PROCEDURE

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

For U-NII-1, U-NII-2A band:

Using method SA-2

a) Set span to encompass the entire emission bandwidth (EBW) of the signal.

b) Set RBW = 1 MHz, Set VBW ≥ 3 RBW, Detector = RMS

c) Sweep time = auto, trigger set to “free run”.

d) Trace average at least 100 traces in power averaging mode.

e) Record the max value and add 10 log (1/duty cycle)

For U-NII-3 band:

a) Set span to encompass the entire emission bandwidth (EBW) of the signal.

b) Set RBW = 500 kHz, Set VBW ≥ 3 RBW, Detector = RMS

c) Use the peak marker function to determine the maximum power level in any 500 kHz band segment within the fundamental EBW.

d) Sweep time = auto, trigger set to “free run”.

e) Trace average at least 100 traces in power averaging mode.

f) Record the max value and add 10 log (1/duty cycle)

9.4. TEST RESULT

Pass.

Please refer to the Appendix for 5GWIFI Test Data.RF Conducted Test Data.

10. OUT OF BAND EMISSIONS(CONDUCTED)

10.1. LIMIT

According to §15.407(b) and RSS-247 6.2.1(1), RSS-2476.2.2(1),RSS-2476.2.3(1) ,RSS-2476.2.4(1),*Undesirable emission limits*. Except as shown in paragraph (b)(10) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

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

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

(3) For transmitters operating solely in the 5.725-5.850GHz band:

(i) All emissions shall be limited to a level of −27dBm/MHz at 75MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25MHz above or below the band edge increasing linearly to a level of 15.6dBm/MHz at 5MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27dBm/MHz at the band edge.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10dBi may demonstrate compliance with the emission limits in § 15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10dBi or less may demonstrate compliance with the emission limits in § 15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

10.2. TEST SETUP

10.3. TEST PROCEDURE

(1) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

(2) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

(3) Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.

(4) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

(5) Repeat above procedures until all measured frequencies were complete.

10.4. TEST RESULT

Pass.

Please refer to the Appendix for 5GWIFI Test Data.RF Conducted Test Data.

11. RADIATED EMISSIONS AND RADIATED BAND EDGES MEASUREMENT

11.1. LIMIT

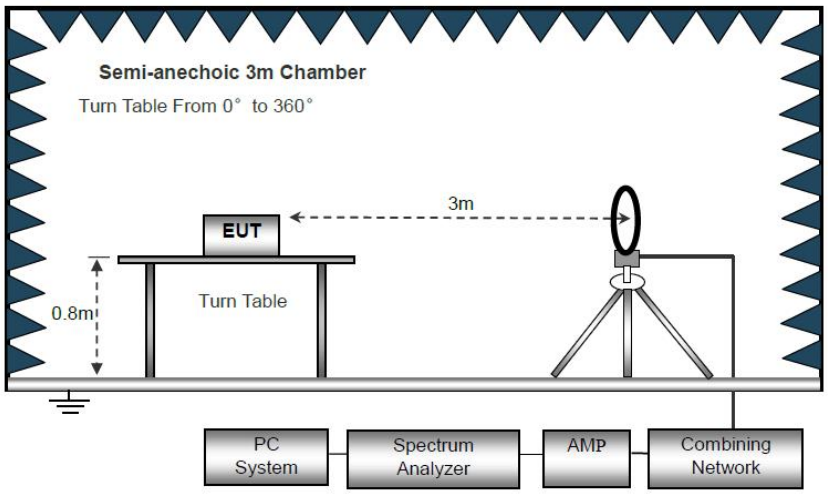
Radiated emissions which fall in the restricted bands, as defined in § 15.205(a) and RSS-247 6.2.1(1), RSS-2476.2.2(1),RSS-2476.2.3(1) ,RSS-2476.2.4(1), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Limits of Spurious Emissions				
Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009MHz~0.490MHz	2400/F(kHz)	---	---	300
0.490MHz~1.705MHz	24000/F(kHz)	---	---	30
1.705MHz~30MHz	30	---	---	30
30MHz~88MHz	100	40.0	Quasi-peak	3
88MHz~216MHz	150	43.5	Quasi-peak	3
216MHz~960MHz	200	46.0	Quasi-peak	3
960MHz~1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

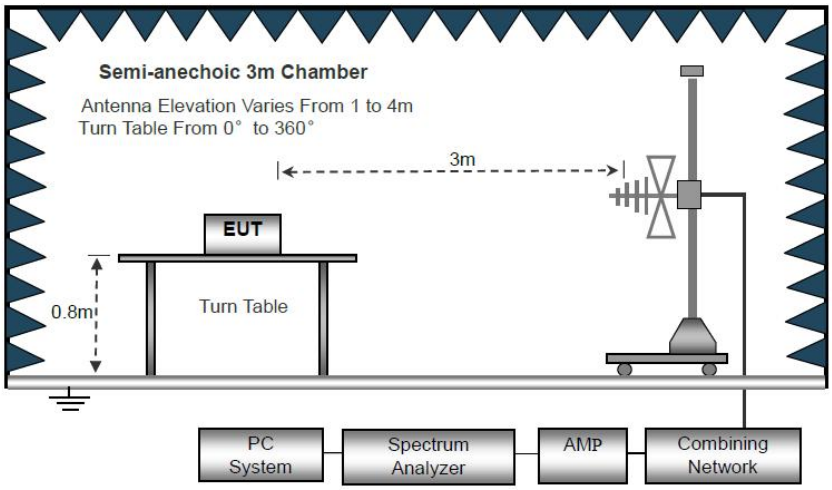
Remark:
a) The lower limit shall apply at the transition frequencies.
b) Emission level (dBuV/m) = 20*log Emission level (uV/m).
c) For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
d) Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

Limits of Unwanted Emission Out of the Restricted Bands		
Applicable To	**Limit**	
KDB 789033 D02 General UNII Test Procedures New Rules v02r01	**Field Strength at 3 m**	
	PK: 74 (dBμV/m)	**AV: 54 (dBμV/m)**
Applicable To	EIRP Limit	Equivalent Field Strength at 3 m
FCC Part 15.407 (b)(1)	PK: -27 (dBm/MHz)	PK: 68.2 (dBμV/m)
FCC Part 15.407 (b)(2)	PK: -27 (dBm/MHz)	PK: 68.2 (dBμV/m)
FCC Part 15.407 (b)(3)	PK: -27 (dBm/MHz)	PK: 68.2 (dBμV/m)
FCC Part 15.407 (b)(4)	27dBm/MHz at frequencies from the band edges decreasing linearly to 15.6dBm/MHz at 5MHz above or below the band edges;	PK: 68.2 (dBμV/m)
	15.6dBm/MHz at 5MHz above or below the band edges decreasing linearly to 10dBm/MHz at 25MHz above or below the band edges;	
	10dBm/MHz at 25MHz above or below the band edges decreasing linearly to -27dBm/MHz at 75MHz above or below the band edges;	
	-27dBm/MHz at frequencies more than 75MHz above or below the band edges.	

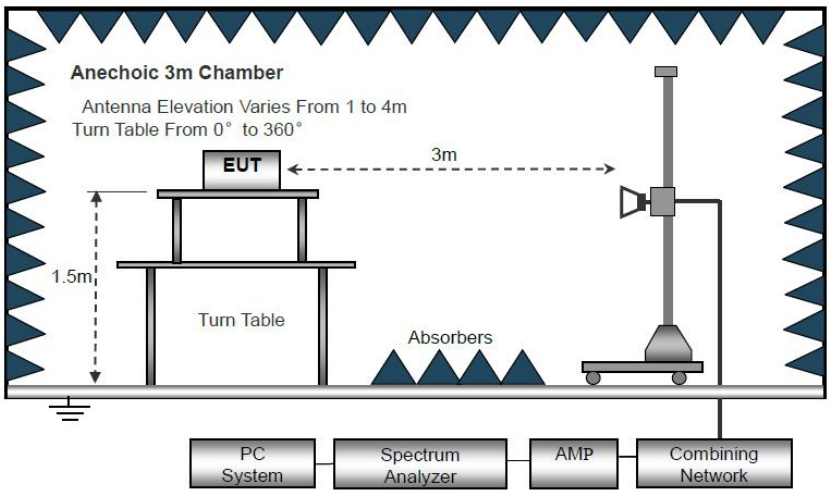
11.2. TEST SETUP



Block Diagram of Radiated Emission Below 30MHz



Block Diagram of Radiated Emission From 30MHz to 1GHz



Block Diagram of Radiated Emission Above 1GHz

11.3. TEST PROCEDURE

a) Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.

b) Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0 degree to 360 degree to acquire the highest emissions from EUT.

c) And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

d) Repeat above procedures until all frequency measurements have been completed.

e) Radiated emission test frequency band from 9KHz to 40GHz.

f) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and record the worst case in this report.

g) The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz~30MHz	Active Loop Antenna	3
30MHz~1GHz	Bilog Antenna	3
1GHz~18GHz	Horn Antenna	3
18GHz~25GHz	Horn Anternna	1

h) Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz~150KHz	RBW=200Hz/VBW=3KHz, Sweep time=Auto	QP
150KHz~30MHz	RBW=9KHz/VBW=100KHz, Sweep time=Auto	QP
30MHz~1GHz	RBW=120KHz/VBW=1000KHz, Sweep time=Auto	QP
1GHz~40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

11.4. TEST RESULT

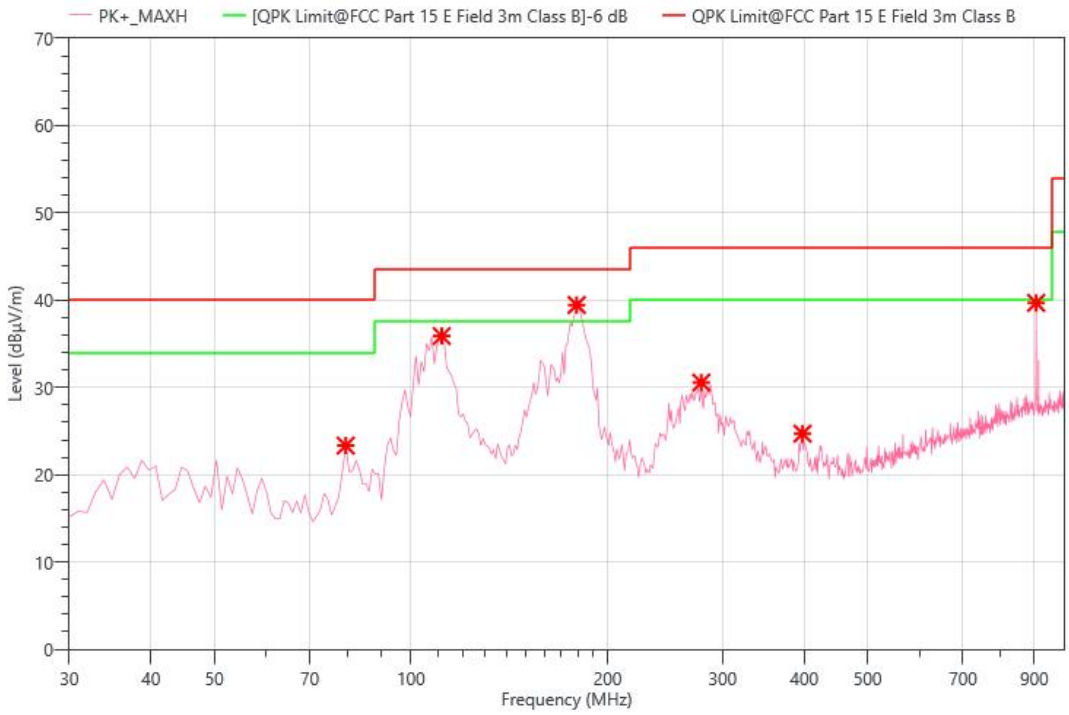
Pass.

Remark:

a) Pre-scan all modes and recorded the worst case in this report.

b) Radiated emission test from 9KHz to 10th harmonic of fundamental was verified, and the emission levels from 9kHz to 30MHz are attenuated 20dB below the limit and not recorded in report.

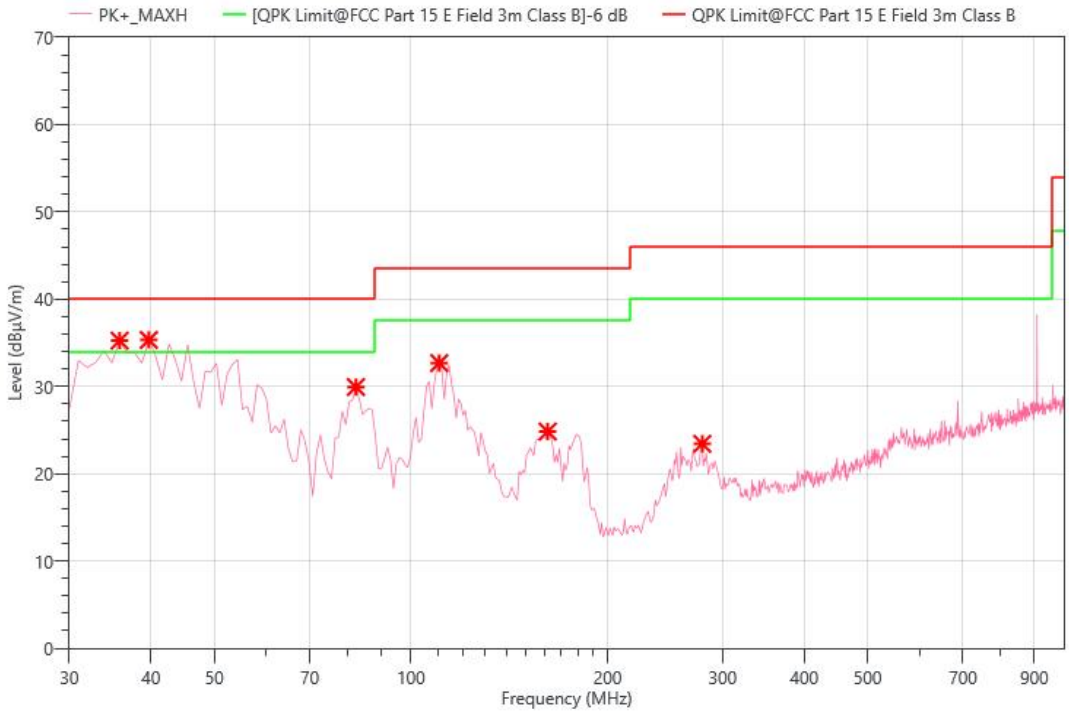
Radiated Emission Test Data (30MHz to 1GHz)			
Environmental Conditions	24.6℃, 53.4% RH	Test Engineer	Jacey Fu
Worst Test Mode:	802.11a(Channel 36)	Polarity:	Horizontal



No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	79.470	40.56	-17.22	23.34	40.00	16.66	PK+	H
2	111.480	50.99	-15.1	35.89	43.50	7.61	PK+	H
3	179.380	53.71	-14.27	39.44	43.50	4.06	PK+	H
4	278.320	43.51	-12.95	30.56	46.00	15.44	PK+	H
5	397.630	34.53	-9.82	24.71	46.00	21.29	PK+	H
6	905.910	40.71	-1.02	39.69	46.00	6.31	PK+	H

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

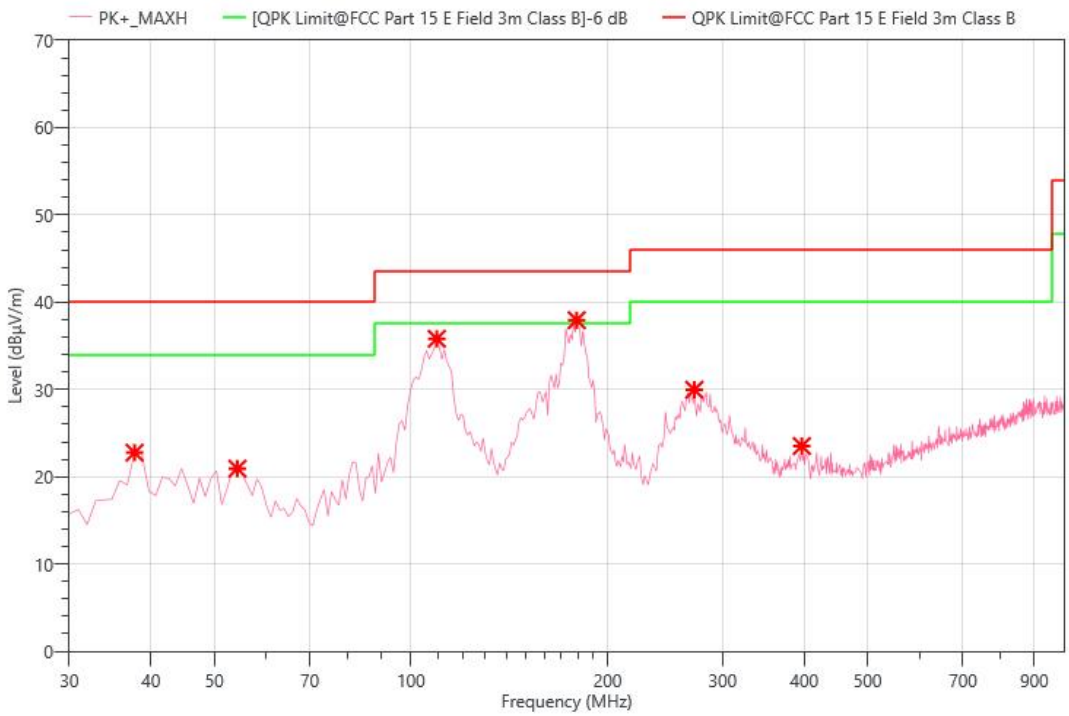
Radiated Emission Test Data (30MHz to 1GHz)			
Environmental Conditions	24.6℃, 53.4% RH	Test Engineer	Jacey Fu
Worst Test Mode:	802.11a(Channel 36)	Polarity:	Vertical



No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	35.820	48.71	-13.46	35.25	40.00	4.75	PK+	V
2	39.700	48.16	-12.83	35.33	40.00	4.67	PK+	V
3	82.380	47.22	-17.29	29.93	40.00	10.07	PK+	V
4	110.510	47.88	-15.2	32.68	43.50	10.82	PK+	V
5	161.920	37.02	-12.19	24.83	43.50	18.67	PK+	V
6	279.290	36.35	-12.92	23.43	46.00	22.57	PK+	V

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

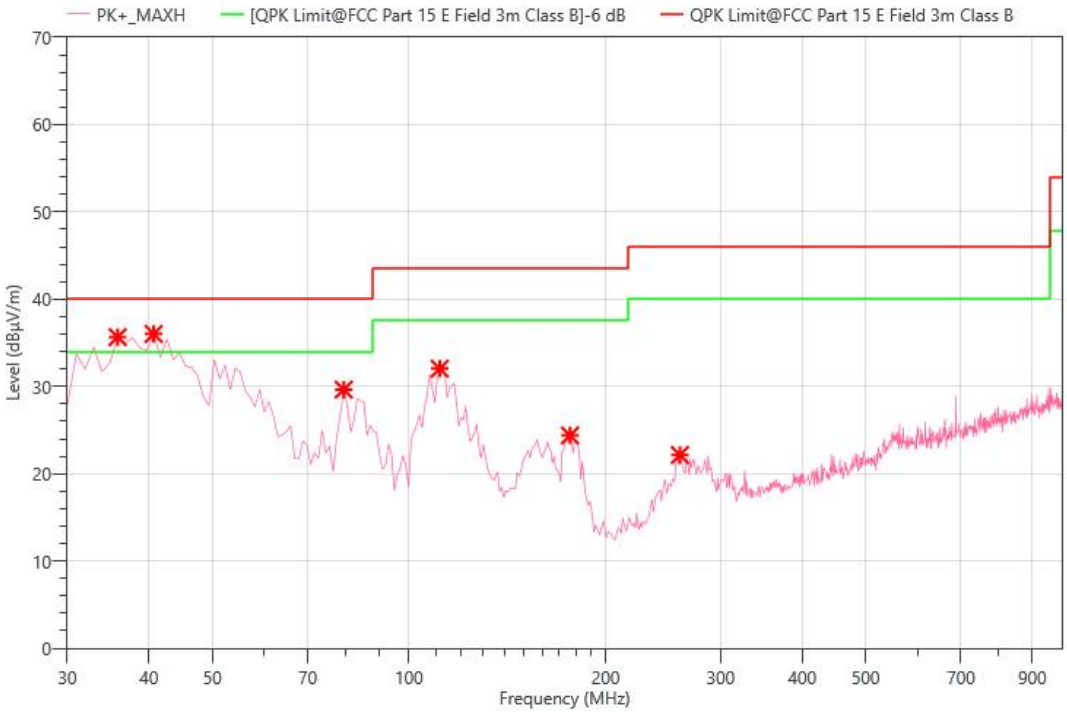
Radiated Emission Test Data (30MHz to 1GHz)			
Environmental Conditions	24.6℃, 53.4% RH	Test Engineer	Jacey Fu
Worst Test Mode:	802.11a(Channel 149)	Polarity:	Horizontal



No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	37.760	35.91	-13.15	22.76	40.00	17.24	PK+	H
2	54.250	34.51	-13.58	20.93	40.00	19.07	PK+	H
3	109.540	51.15	-15.35	35.80	43.50	7.70	PK+	H
4	179.380	52.20	-14.27	37.93	43.50	5.57	PK+	H
5	271.530	43.19	-13.22	29.97	46.00	16.03	PK+	H
6	396.660	33.32	-9.81	23.51	46.00	22.49	PK+	H

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

Radiated Emission Test Data (30MHz to 1GHz)			
Environmental Conditions	24.6℃, 53.4% RH	Test Engineer	Jacey Fu
Worst Test Mode:	802.11a(Channel 149)	Polarity:	Vertical



No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	35.820	49.11	-13.46	35.65	40.00	4.35	PK+	V
2	40.670	48.87	-12.86	36.01	40.00	3.99	PK+	V
3	79.470	46.86	-17.22	29.64	40.00	10.36	PK+	V
4	111.480	47.14	-15.1	32.04	43.50	11.46	PK+	V
5	176.470	38.17	-13.78	24.39	43.50	19.11	PK+	V
6	259.890	35.72	-13.57	22.15	46.00	23.85	PK+	V

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

Radiated Emission Test Data (Above 1GHz): Worst Case Configuration							
Environmental Conditions	24.6℃, 53.4% RH		Test Engineer		Jacey Fu		
IEEE 802.11a_Channel 36							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10360	35.90	3.40	39.30	54	-14.70	PEAK	H
10360	51.60	3.40	55.00	68.2	-13.30	AVG	H
15540	31.70	7.60	39.20	54	-14.80	PEAK	H
15540	44.70	7.60	52.20	74	-21.80	AVG	H
10360	35.60	3.40	39.00	54	-15.00	PEAK	V
10360	51.20	3.40	54.60	68.2	-13.60	AVG	V
15540	31.60	7.60	39.20	54	-14.80	PEAK	V
15540	44.90	7.60	52.50	74	-21.60	AVG	V
IEEE 802.11a_Channel 40							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10440	36.30	3.40	39.70	54	-14.30	PEAK	H
10440	51.30	3.40	54.60	68.2	-13.60	AVG	H
15660	32.20	7.50	39.70	54	-14.30	PEAK	H
15660	45.00	7.50	52.50	74	-21.60	AVG	H
10440	36.50	3.40	39.80	54	-14.20	PEAK	V
10440	50.60	3.40	54.00	68.2	-14.20	AVG	V
15660	32.30	7.50	39.70	54	-14.30	PEAK	V
15660	45.20	7.50	52.60	74	-21.40	AVG	V
IEEE 802.11a_Channel 48							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10480	34.90	3.40	38.30	54	-15.70	PEAK	H
10480	48.90	3.40	52.30	68.2	-15.90	AVG	H
15720	31.80	7.40	39.20	54	-14.80	PEAK	H
15720	44.30	7.40	51.70	74	-22.30	AVG	H
10480	35.70	3.40	39.10	54	-14.90	PEAK	V
10480	49.40	3.40	52.80	68.2	-15.40	AVG	V
15720	31.80	7.40	39.20	54	-14.80	PEAK	V
15720	45.00	7.40	52.40	74	-21.60	AVG	V
IEEE 802.11a_Channel 52							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10520	33.40	3.40	36.70	54	-17.30	PEAK	H
10520	45.10	3.40	48.50	68.2	-19.70	AVG	H
15780	31.90	7.40	39.30	54	-14.70	PEAK	H
15780	45.20	7.40	52.50	74	-21.50	AVG	H
10520	33.30	3.40	36.60	54	-17.40	PEAK	V
10520	45.70	3.40	49.00	68.2	-19.20	AVG	V
15780	31.80	7.40	39.20	54	-14.80	PEAK	V
15780	44.00	7.40	51.40	74	-22.60	AVG	V
IEEE 802.11a_Channel 60							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10600	32.90	3.20	36.10	54	-17.90	PEAK	H
10600	46.00	3.20	49.20	74	-24.80	AVG	H
15900	30.70	7.20	38.00	54	-16.00	PEAK	H
15900	43.40	7.20	50.60	74	-23.40	AVG	H
10600	33.10	3.20	36.30	54	-17.70	PEAK	V
10600	45.00	3.20	48.20	74	-25.80	AVG	V
15900	30.70	7.20	37.90	54	-16.10	PEAK	V
15900	43.70	7.20	51.00	74	-23.00	AVG	V

Radiated Emission Test Data (Above 1GHz): Worst Case Configuration							
Environmental Conditions	24.6℃, 53.4% RH		Test Engineer		Jacey Fu		
IEEE 802.11a_Channel 64							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10640	33.00	3.10	36.10	54	-17.90	PEAK	H
10640	45.00	3.10	48.10	74	-25.90	AVG	H
15960	30.70	7.20	37.90	54	-16.10	PEAK	H
15960	43.50	7.20	50.70	74	-23.30	AVG	H
10640	32.80	3.10	35.90	54	-18.10	PEAK	V
10640	45.70	3.10	48.80	74	-25.30	AVG	V
15960	30.80	7.20	38.00	54	-16.00	PEAK	V
15960	45.10	7.20	52.30	74	-21.70	AVG	V
IEEE 802.11a_Channel 100							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
11000	33.70	2.40	36.10	54	-17.90	PEAK	H
11000	45.50	2.40	47.90	74	-26.10	AVG	H
16500	31.70	8.00	39.70	54	-14.30	PEAK	H
16500	44.30	8.00	52.30	68.2	-15.90	AVG	H
11000	33.50	2.40	35.90	54	-18.10	PEAK	V
11000	45.60	2.40	48.00	74	-26.00	AVG	V
16500	31.80	8.00	39.80	54	-14.30	PEAK	V
16500	44.20	8.00	52.20	68.2	-16.00	AVG	V
IEEE 802.11a_Channel 116							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
11200	32.40	2.20	34.60	54	-19.40	PEAK	H
11200	44.80	2.20	47.00	74	-27.00	AVG	H
16800	31.30	8.40	39.70	54	-14.30	PEAK	H
16800	43.80	8.40	52.20	68.2	-16.00	AVG	H
11200	32.30	2.20	34.60	54	-19.40	PEAK	V
11200	44.40	2.20	46.60	74	-27.40	AVG	V
16800	31.20	8.40	39.60	54	-14.40	PEAK	V
16800	43.70	8.40	52.10	68.2	-16.10	AVG	V
IEEE 802.11a_Channel 140							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
11400	32.40	2.10	34.50	54	-19.50	PEAK	H
11400	45.30	2.10	47.40	74	-26.60	AVG	H
17100	31.40	8.80	40.20	54	-13.80	PEAK	H
17100	43.90	8.80	52.70	68.2	-15.50	AVG	H
11400	32.30	2.10	34.40	54	-19.60	PEAK	V
11400	44.70	2.10	46.80	74	-27.20	AVG	V
17100	31.40	8.80	40.20	54	-13.80	PEAK	V
17100	43.80	8.80	52.60	68.2	-15.60	AVG	V
IEEE 802.11a_Channel 149							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
11490	32.00	2.10	34.00	54	-20.00	PEAK	H
11490	44.20	2.10	46.20	74	-27.80	AVG	H
17235	30.50	9.00	39.50	54	-14.50	PEAK	H
17235	43.20	9.00	52.20	68.2	-16.00	AVG	H
11490	32.00	2.10	34.00	54	-20.00	PEAK	V
11490	45.10	2.10	47.20	74	-26.80	AVG	V
17235	30.40	9.00	39.30	54	-14.70	PEAK	V
17235	43.30	9.00	52.30	68.2	-15.90	AVG	V

Radiated Emission Test Data (Above 1GHz): Worst Case Configuration							
Environmental Conditions	24.6℃, 53.4% RH		Test Engineer		Jacey Fu		
IEEE 802.11a_Channel 157							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
11570	32.10	2.10	34.10	54	-19.90	PEAK	H
11570	44.90	2.10	47.00	74	-27.00	AVG	H
17355	30.50	9.20	39.60	54	-14.40	PEAK	H
17355	43.20	9.20	52.30	68.2	-15.90	AVG	H
11570	32.00	2.10	34.00	54	-20.00	PEAK	V
11570	44.70	2.10	46.80	74	-27.30	AVG	V
17355	30.20	9.20	39.40	54	-14.60	PEAK	V
17355	42.50	9.20	51.60	68.2	-16.60	AVG	V
IEEE 802.11a_Channel 165							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
11650	32.70	2.10	34.80	54	-19.20	PEAK	H
11650	46.20	2.10	48.30	74	-25.70	AVG	H
17475	29.90	9.30	39.30	54	-14.70	PEAK	H
17475	42.10	9.30	51.50	68.2	-16.70	AVG	H
11650	32.50	2.10	34.60	54	-19.40	PEAK	V
11650	44.70	2.10	46.80	74	-27.20	AVG	V
17475	29.80	9.30	39.10	54	-14.90	PEAK	V
17475	42.50	9.30	51.80	68.2	-16.40	AVG	V
IEEE 802.11n(HT20)_Channel 36							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10360	34.60	3.40	37.90	54	-16.10	PEAK	H
10360	47.90	3.40	51.30	68.2	-16.90	AVG	H
15540	31.60	7.60	39.20	54	-14.80	PEAK	H
15540	43.90	7.60	51.50	74	-22.50	AVG	H
10360	34.00	3.40	37.40	54	-16.60	PEAK	V
10360	45.80	3.40	49.20	68.2	-19.10	AVG	V
15540	31.70	7.60	39.30	54	-14.70	PEAK	V
15540	44.20	7.60	51.80	74	-22.20	AVG	V
IEEE 802.11n(HT20)_Channel 40							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10440	34.70	3.40	38.10	54	-15.90	PEAK	H
10440	47.30	3.40	50.70	68.2	-17.50	AVG	H
15660	32.30	7.50	39.70	54	-14.30	PEAK	H
15660	44.90	7.50	52.30	74	-21.70	AVG	H
10440	34.30	3.40	37.70	54	-16.30	PEAK	V
10440	47.10	3.40	50.50	68.2	-17.80	AVG	V
15660	32.30	7.50	39.70	54	-14.30	PEAK	V
15660	44.70	7.50	52.10	74	-21.90	AVG	V
IEEE 802.11n(HT20)_Channel 48							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10480	33.90	3.40	37.30	54	-16.70	PEAK	H
10480	46.40	3.40	49.80	68.2	-18.40	AVG	H
15720	31.80	7.40	39.20	54	-14.80	PEAK	H
15720	44.50	7.40	51.90	74	-22.10	AVG	H
10480	33.00	3.40	36.40	54	-17.60	PEAK	V
10480	45.30	3.40	48.70	68.2	-19.50	AVG	V
15720	31.90	7.40	39.30	54	-14.70	PEAK	V
15720	44.70	7.40	52.10	74	-21.90	AVG	V

Radiated Emission Test Data (Above 1GHz): Worst Case Configuration							
Environmental Conditions	24.6℃, 53.4% RH		Test Engineer		Jacey Fu		
IEEE 802.11n(HT20)_Channel 52							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10520	33.80	3.40	37.10	54	-16.90	PEAK	H
10520	47.50	3.40	50.90	68.2	-17.30	AVG	H
15780	31.90	7.40	39.30	54	-14.70	PEAK	H
15780	44.40	7.40	51.70	74	-22.30	AVG	H
10520	33.00	3.40	36.30	54	-17.70	PEAK	V
10520	45.00	3.40	48.30	68.2	-19.90	AVG	V
15780	32.00	7.40	39.30	54	-14.70	PEAK	V
15780	44.40	7.40	51.80	74	-22.20	AVG	V
IEEE 802.11n(HT20)_Channel 60							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10600	32.90	3.20	36.10	54	-17.90	PEAK	H
10600	46.30	3.20	49.50	74	-24.60	AVG	H
15900	30.70	7.20	37.90	54	-16.10	PEAK	H
15900	43.80	7.20	51.00	74	-23.00	AVG	H
10600	32.70	3.20	35.90	54	-18.10	PEAK	V
10600	45.20	3.20	48.40	74	-25.60	AVG	V
15900	30.70	7.20	38.00	54	-16.00	PEAK	V
15900	43.20	7.20	50.40	74	-23.60	AVG	V
IEEE 802.11n(HT20)_Channel 64							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10640	33.00	3.10	36.10	54.00	-17.90	PEAK	H
10640	45.10	3.10	48.20	74.00	-25.80	AVG	H
15960	30.70	7.20	37.90	54.00	-16.10	PEAK	H
15960	43.50	7.20	50.70	74.00	-23.30	AVG	H
10640	32.60	3.10	35.70	54.00	-18.30	PEAK	V
10640	45.50	3.10	48.60	74.00	-25.40	AVG	V
15960	30.90	7.20	38.00	54.00	-16.00	PEAK	V
15960	43.00	7.20	50.20	74.00	-23.80	AVG	V
IEEE 802.11n(HT20)_Channel 100							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
11000	33.70	2.40	36.00	54.00	-18.00	PEAK	H
11000	44.80	2.40	47.20	74.00	-26.80	AVG	H
16500	31.70	8.00	39.70	54.00	-14.30	PEAK	H
16500	44.70	8.00	52.70	68.20	-15.50	AVG	H
11000	33.50	2.40	35.80	54.00	-18.20	PEAK	V
11000	45.80	2.40	48.20	74.00	-25.80	AVG	V
16500	31.80	8.00	39.80	54.00	-14.20	PEAK	V
16500	44.50	8.00	52.50	68.20	-15.70	AVG	V
IEEE 802.11n(HT20)_Channel 116							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
11200	32.60	2.20	34.80	54.00	-19.20	PEAK	H
11200	44.60	2.20	46.80	74.00	-27.20	AVG	H
16800	31.20	8.40	39.60	54.00	-14.40	PEAK	H
16800	44.70	8.40	53.10	68.20	-15.20	AVG	H
11200	32.30	2.20	34.50	54.00	-19.50	PEAK	V
11200	44.80	2.20	47.00	74.00	-27.00	AVG	V
16800	31.10	8.40	39.50	54.00	-14.50	PEAK	V
16800	43.20	8.40	51.60	68.20	-16.60	AVG	V

Radiated Emission Test Data (Above 1GHz): Worst Case Configuration							
Environmental Conditions	24.6℃, 53.4% RH			Test Engineer		Jacey Fu	
IEEE 802.11n(HT20)_Channel 140							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
11400	32.40	2.10	34.50	54	-19.50	PEAK	H
11400	44.40	2.10	46.50	74	-27.50	AVG	H
17100	31.40	8.80	40.20	54	-13.80	PEAK	H
17100	44.50	8.80	53.30	68.2	-14.90	AVG	H
11400	32.40	2.10	34.50	54	-19.50	PEAK	V
11400	45.40	2.10	47.50	74	-26.50	AVG	V
17100	31.30	8.80	40.10	54	-13.90	PEAK	V
17100	44.10	8.80	52.80	68.2	-15.40	AVG	V
IEEE 802.11n(HT20)_Channel 149							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
11490	32.10	2.10	34.10	54	-19.90	PEAK	H
11490	44.40	2.10	46.50	74	-27.50	AVG	H
17235	30.50	9.00	39.50	54	-14.50	PEAK	H
17235	42.90	9.00	51.90	68.2	-16.30	AVG	H
11490	31.90	2.10	34.00	54	-20.10	PEAK	V
11490	45.60	2.10	47.70	74	-26.30	AVG	V
17235	30.40	9.00	39.30	54	-14.70	PEAK	V
17235	42.70	9.00	51.70	68.2	-16.60	AVG	V
IEEE 802.11n(HT20)_Channel 157							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
11570	32.10	2.10	34.20	54	-19.80	PEAK	H
11570	44.30	2.10	46.30	74	-27.70	AVG	H
17355	30.50	9.20	39.60	54	-14.40	PEAK	H
17355	42.60	9.20	51.80	68.2	-16.40	AVG	H
11570	32.00	2.10	34.00	54	-20.00	PEAK	V
11570	44.40	2.10	46.40	74	-27.60	AVG	V
17355	30.30	9.20	39.40	54	-14.60	PEAK	V
17355	42.50	9.20	51.70	68.2	-16.50	AVG	V
IEEE 802.11n(HT20)_Channel 165							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
11650	32.60	2.10	34.70	54	-19.30	PEAK	H
11650	45.20	2.10	47.30	74	-26.80	AVG	H
17475	29.90	9.30	39.30	54	-14.70	PEAK	H
17475	42.20	9.30	51.60	68.2	-16.60	AVG	H
11650	32.50	2.10	34.60	54	-19.40	PEAK	V
11650	45.10	2.10	47.20	74	-26.80	AVG	V
17475	29.80	9.30	39.20	54	-14.80	PEAK	V
17475	42.00	9.30	51.40	68.2	-16.80	AVG	V
IEEE 802.11n(HT40)_Channel 38							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10380	34.50	3.40	37.90	54	-16.10	PEAK	H
10380	47.00	3.40	50.40	68.2	-17.90	AVG	H
15570	31.70	7.50	39.20	54	-14.80	PEAK	H
15570	44.10	7.50	51.70	74	-22.30	AVG	H
10380	33.90	3.40	37.30	54	-16.70	PEAK	V
10380	46.70	3.40	50.10	68.2	-18.10	AVG	V
15570	31.70	7.50	39.20	54	-14.80	PEAK	V
15570	44.30	7.50	51.90	74	-22.10	AVG	V

Radiated Emission Test Data (Above 1GHz): Worst Case Configuration							
Environmental Conditions	24.6℃, 53.4% RH			Test Engineer		Jacey Fu	
IEEE 802.11n(HT40)_Channel 46							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10460	33.90	3.40	37.30	54	-16.70	PEAK	H
10460	45.70	3.40	49.10	68.2	-19.10	AVG	H
15690	32.30	7.40	39.70	54	-14.30	PEAK	H
15690	44.60	7.40	52.00	74	-22.00	AVG	H
10460	33.70	3.40	37.10	54	-16.90	PEAK	V
10460	46.50	3.40	49.90	68.2	-18.30	AVG	V
15690	32.40	7.40	39.80	54	-14.20	PEAK	V
15690	45.00	7.40	52.40	74	-21.60	AVG	V
IEEE 802.11n(HT40)_Channel 54							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10540	34.10	3.30	37.40	54	-16.60	PEAK	H
10540	46.30	3.30	49.60	68.2	-18.60	AVG	H
15810	30.10	7.30	37.40	54	-16.60	PEAK	H
15810	42.60	7.30	50.00	74	-24.00	AVG	H
10540	33.00	3.30	36.30	54	-17.70	PEAK	V
10540	44.80	3.30	48.10	68.2	-20.20	AVG	V
15810	30.10	7.30	37.40	54	-16.60	PEAK	V
15810	42.10	7.30	49.40	74	-24.60	AVG	V
IEEE 802.11n(HT40)_Channel 62							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10620	33.20	3.10	36.30	54	-17.70	PEAK	H
10620	45.50	3.10	48.60	74	-25.40	AVG	H
15930	29.70	7.20	36.90	54	-17.10	PEAK	H
15930	42.90	7.20	50.20	74	-23.90	AVG	H
10620	32.00	3.10	35.20	54	-18.80	PEAK	V
10620	44.30	3.10	47.50	74	-26.50	AVG	V
15930	29.60	7.20	36.80	54	-17.20	PEAK	V
15930	42.10	7.20	49.30	74	-24.70	AVG	V
IEEE 802.11n(HT40)_Channel 151							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
11510	31.70	2.10	33.70	54	-20.30	PEAK	H
11510	43.40	2.10	45.40	74	-28.60	AVG	H
17265	29.30	9.00	38.40	54	-15.60	PEAK	H
17265	41.80	9.00	50.80	68.2	-17.40	AVG	H
11510	31.70	2.10	33.80	54	-20.20	PEAK	V
11510	43.40	2.10	45.40	74	-28.60	AVG	V
17265	29.30	9.00	38.30	54	-15.70	PEAK	V
17265	41.60	9.00	50.70	68.2	-17.50	AVG	V
IEEE 802.11n(HT40)_Channel 159							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
11590	31.80	2.10	33.90	54	-20.10	PEAK	H
11590	45.60	2.10	47.70	74	-26.30	AVG	H
17385	29.10	9.20	38.40	54	-15.70	PEAK	H
17385	41.70	9.20	51.00	68.2	-17.30	AVG	H
11590	31.50	2.10	33.50	54	-20.50	PEAK	V
11590	44.50	2.10	46.60	74	-27.50	AVG	V
17385	29.30	9.20	38.50	54	-15.50	PEAK	V
17385	41.00	9.20	50.20	68.2	-18.00	AVG	V

Radiated Emission Test Data (Above 1GHz): Worst Case Configuration							
Environmental Conditions	24.6℃, 53.4% RH			Test Engineer		Jacey Fu	
IEEE 802.11ac(VHT80)_Channel 42							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10420	33.40	3.40	36.80	54	-17.20	PEAK	H
10420	46.40	3.40	49.80	68.2	-18.40	AVG	H
15630	31.00	7.50	38.50	54	-15.50	PEAK	H
15630	43.30	7.50	50.70	74	-23.30	AVG	H
10420	32.60	3.40	36.00	54	-18.00	PEAK	V
10420	44.50	3.40	47.80	68.2	-20.40	AVG	V
15630	30.80	7.50	38.20	54	-15.80	PEAK	V
15630	42.30	7.50	49.80	74	-24.20	AVG	V
IEEE 802.11ac(VHT80)_Channel 58							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
10580	33.40	3.20	36.60	54	-17.40	PEAK	H
10580	45.00	3.20	48.20	68.2	-20.00	AVG	H
15870	30.00	7.30	37.30	54	-16.70	PEAK	H
15870	42.50	7.30	49.70	74	-24.30	AVG	H
10580	32.60	3.20	35.80	54	-18.20	PEAK	V
10580	45.40	3.20	48.70	68.2	-19.60	AVG	V
15870	29.90	7.30	37.20	54	-16.80	PEAK	V
15870	42.80	7.30	50.10	74	-23.90	AVG	V
IEEE 802.11ac(VHT80)_Channel 155							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
11550	30.70	2.10	32.80	54	-21.20	PEAK	H
11550	42.80	2.10	44.90	74	-29.10	AVG	H
17325	29.40	9.10	38.50	54	-15.50	PEAK	H
17325	42.50	9.10	51.70	68.2	-16.50	AVG	H
11550	31.30	2.10	33.40	54	-20.60	PEAK	V
11550	43.50	2.10	45.60	74	-28.40	AVG	V
17325	28.90	9.10	38.00	54	-16.00	PEAK	V
17325	41.30	9.10	50.50	68.2	-17.80	AVG	V

Remark:

Emission Level = Reading + Factor;

Factor = Antenna Factor + Cable Loss – Pre-amplifier;

Margin= Emission Level - Limit.

Spurious Emission in Restricted Band 4.50GHz~5.15GHz& 5.35GHz~5.46GHz) Radiated Band Edges Test Data: Worst-Case Configuration							
Environmental Conditions	24.6℃, 53.4% RH		Test Engineer		Jacey Fu		
U-NII Band1_IEEE 802.11ac(HT80)_Channel 42(5210MHz)							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
4500	57.01	-3.40	53.61	74	-20.39	PEAK	H
4500	47.72	-3.40	44.32	54	-9.68	AVG	H
4500	59.54	-3.40	56.14	74	-17.86	PEAK	V
4500	46.80	-3.40	43.4	54	-10.6	AVG	V
5150	70.80	-3.20	67.6	74	-6.4	PEAK	H
5150	80.46	-3.20	77.26	54	23.26	AVG	H
5150	57.48	-3.20	54.28	74	-19.72	PEAK	V
5150	80.15	-3.20	76.95	54	22.95	AVG	V
5350	66.01	-2.86	63.15	74	-10.85	PEAK	H
5350	47.51	-2.86	44.65	54	-9.35	AVG	H
5350	61.44	-2.86	58.58	74	-15.42	PEAK	V
5350	45.97	-2.86	43.11	54	-10.89	AVG	V
Remark: (1) Emission Level = Reading + Factor; Factor = Antenna Factor + Cable Loss – Pre-amplifier; Margin= Emission Level - Limit. (2) “IEEE 802.11ac(VHT80)” mode is the worst mode. When PK value is lower than the Average value limit, average don't record.							

Radiated Band Edges Test Data: Worst-Case Configuration							
Environmental Conditions	24.6℃, 53.4% RH		Test Engineer		Jacey Fu		
U-NII Band2A_IEEE 802.11ac(HT80)_Channel 58(5290MHz)							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
5350	70.08	-2.86	67.22	74.00	-6.78	PEAK	H
5350	48.33	-2.86	45.47	54.00	-8.53	AVG	H
5350	71.18	-2.86	68.32	74.00	-5.68	PEAK	V
5350	50.38	-2.86	47.52	54.00	-6.48	AVG	V
Remark: (1) Emission Level = Reading + Factor; Factor = Antenna Factor + Cable Loss – Pre-amplifier; Margin= Emission Level - Limit. (2) “IEEE 802.11ac(VHT80)” mode is the worst mode. When PK value is lower than the Average value limit, average don't record.							

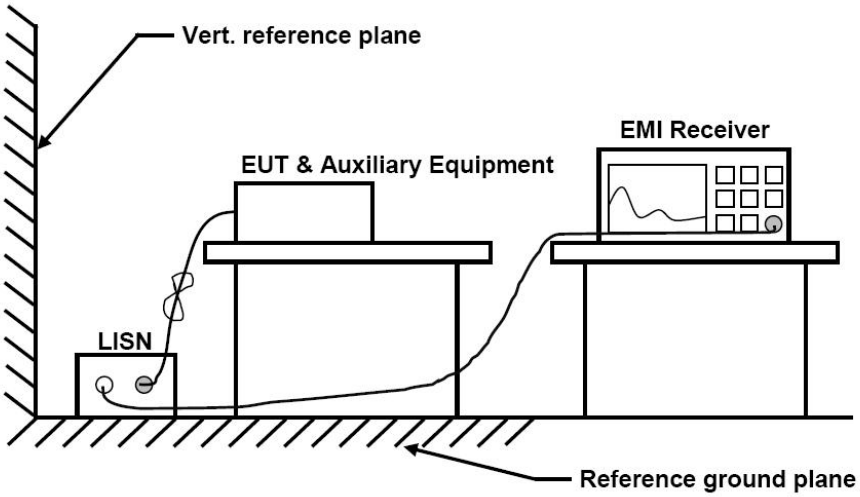
12. POWER LINE CONDUCTED EMISSIONS

12.1. LIMIT

According to the rule FCC Part 15.207 and IC RSS-Gen 8.8, Conducted emissions limit, the limit for a wireless device as below:

Frequency Range (MHz)	Conducted emissions (dBuV)	
	Quasi-peak	Average
0.15~0.5	66 to 56	56 to 46
0.5~5	56	46
5~30	60	50
Remark: a) The lower limit shall apply at the transition frequencies. b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50MHz.		

12.2. TEST SETUP



12.3. TEST PROCEDURE

Test frequency range :150KHz-30MHz

a) The mains terminal disturbance voltage test was conducted in a shielded room.

b) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

c) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

d) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and

associated equipment was at least 0.8 m from the LISN 2.

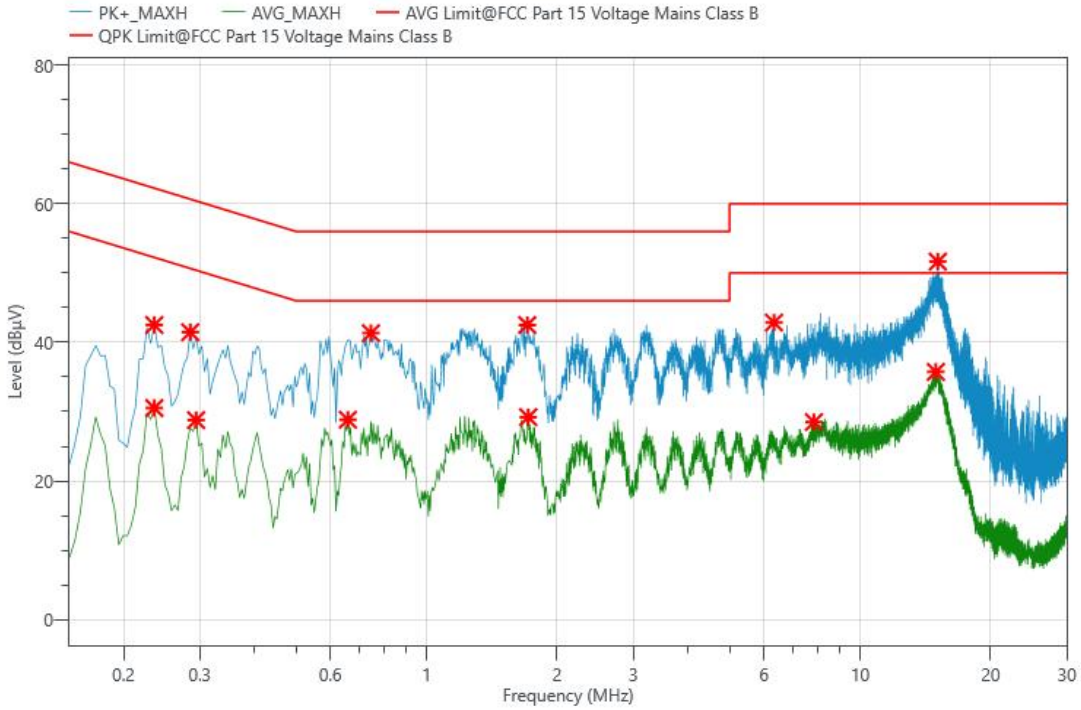
e) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

12.4. TEST RESULT

Pass.

Remark:
a) AC Power line conducted emissions pre-test both at AC 120V/60Hz and AC 240V/50Hz modes, recorded worst case.
b) Worst-case mode and channel used for 150KHz~30MHz power line conducted emissions was determined to be IEEE 802.11a_Channel 36.

Test Plots and Data of Conducted Emissions (Worst Case: IEEE 802.11a_Channel 36)			
Environmental Conditions	24.6℃, 53.4% RH	Test Engineer	Jacey Fu
Test Voltage:	AC 120V/60Hz	Test Power Line:	Live



No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV)	Limit (dBµV)	Margin (dB)	Det.	Line	PE
1	0.236	32.52	9.99	42.51	62.25	19.74	PK+	L1	GND
2	0.236	20.53	9.99	30.52	52.25	21.73	AVG	L1	GND
3	0.285	31.48	9.99	41.47	60.67	19.20	PK+	L1	GND
4	0.294	18.79	9.99	28.78	50.41	21.63	AVG	L1	GND
5	0.659	18.84	10	28.84	46.00	17.16	AVG	L1	GND
6	0.744	31.34	10	41.34	56.00	14.66	PK+	L1	GND
7	1.707	32.48	10.02	42.50	56.00	13.50	PK+	L1	GND
8	1.716	19.19	10.02	29.21	46.00	16.79	AVG	L1	GND
9	6.329	32.77	10.09	42.86	60.00	17.14	PK+	L1	GND
10	7.823	18.01	10.49	28.50	50.00	21.50	AVG	L1	GND
11	14.946	22.13	13.61	35.74	50.00	14.26	AVG	L1	GND
12	15.104	38.03	13.63	51.66	60.00	8.34	PK+	L1	GND

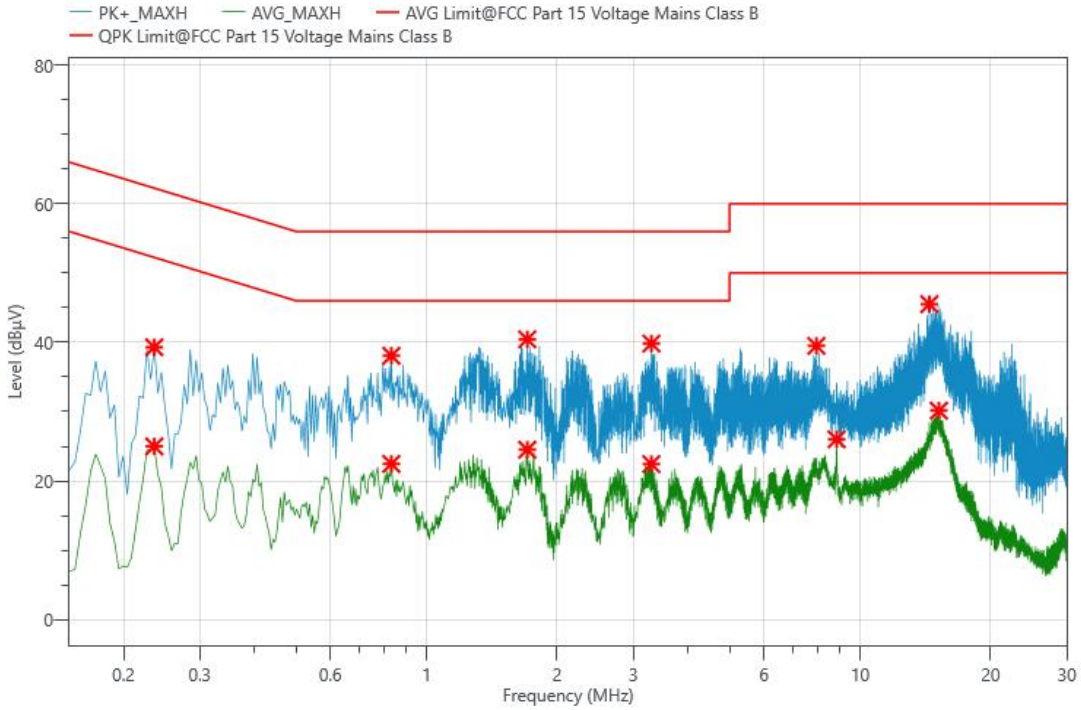
Remark:

Emission Level = Reading + Correct Factor;

Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Attenuation Factor

Margin= Emission Level - Limit.

Test Plots and Data of Conducted Emissions (Worst Case: IEEE 802.11a_Channel 36)			
Environmental Conditions	24.6℃, 53.4% RH	Test Engineer	Jacey Fu
Test Voltage:	AC 120V/60Hz	Test Power Line:	Neutral



No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV)	Limit (dBµV)	Margin (dB)	Det.	Line	PE
1	0.236	29.31	9.99	39.30	62.25	22.95	PK+	N	GND
2	0.236	15.00	9.99	24.99	52.25	27.26	AVG	N	GND
3	0.830	28.07	10	38.07	56.00	17.93	PK+	N	GND
4	0.830	12.46	10	22.46	46.00	23.54	AVG	N	GND
5	1.707	30.42	10.02	40.44	56.00	15.56	PK+	N	GND
6	1.707	14.49	10.02	24.51	46.00	21.49	AVG	N	GND
7	3.300	29.79	10.04	39.83	56.00	16.17	PK+	N	GND
8	3.300	12.40	10.04	22.44	46.00	23.56	AVG	N	GND
9	7.931	28.95	10.54	39.49	60.00	20.51	PK+	N	GND
10	8.826	15.03	10.98	26.01	50.00	23.99	AVG	N	GND
11	14.447	32.10	13.41	45.51	60.00	14.49	PK+	N	GND
12	15.194	16.51	13.64	30.15	50.00	19.85	AVG	N	GND

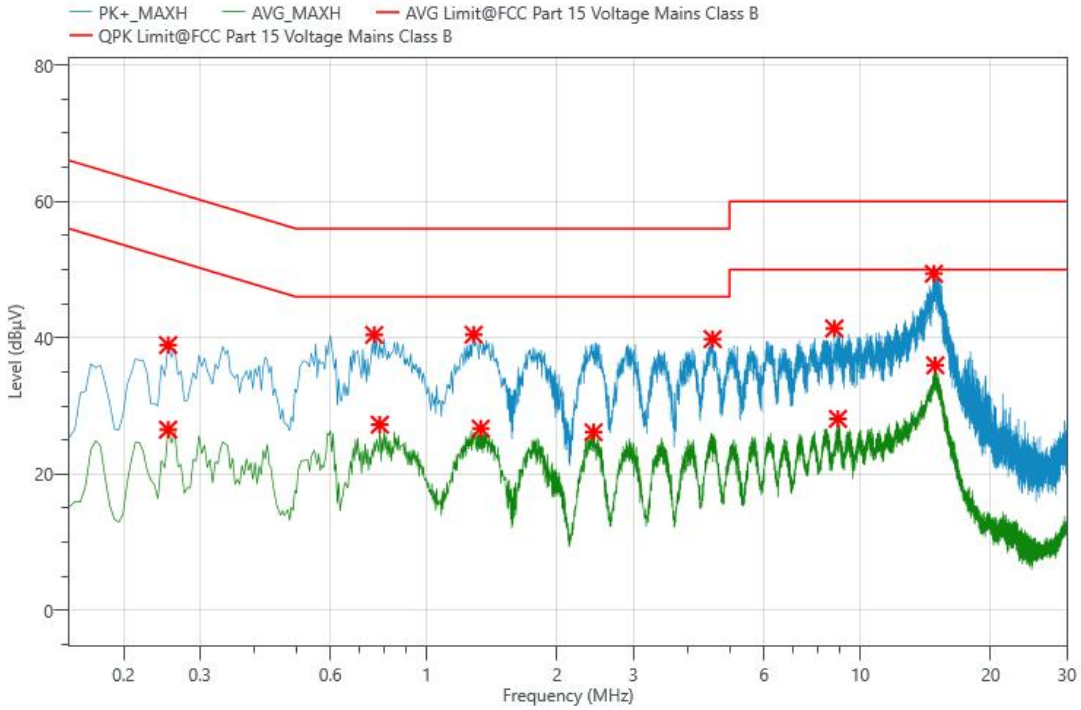
Remark:

Emission Level = Reading + Correct Factor;

Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Attenuation Factor

Margin= Emission Level - Limit.

Test Plots and Data of Conducted Emissions (Worst Case: IEEE 802.11a_Channel 149)			
Environmental Conditions	24.6℃, 53.4% RH	Test Engineer	Jacey Fu
Test Voltage:	AC 120V/60Hz	Test Power Line:	Live



No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV)	Limit (dBµV)	Margin (dB)	Det.	Line	PE
1	0.254	28.94	9.99	38.93	61.64	22.71	PK+	L1	GND
2	0.254	16.53	9.99	26.52	51.64	25.12	AVG	L1	GND
3	0.758	30.42	10	40.42	56.00	15.58	PK+	L1	GND
4	0.780	17.26	10	27.26	46.00	18.74	AVG	L1	GND
5	1.284	30.44	10.01	40.45	56.00	15.55	PK+	L1	GND
6	1.334	16.67	10.01	26.68	46.00	19.32	AVG	L1	GND
7	2.427	16.11	10.03	26.14	46.00	19.86	AVG	L1	GND
8	4.569	29.74	10.06	39.80	56.00	16.20	PK+	L1	GND
9	8.718	30.44	10.92	41.36	60.00	18.64	PK+	L1	GND
10	8.889	17.09	11.01	28.10	50.00	21.90	AVG	L1	GND
11	14.793	35.83	13.55	49.38	60.00	10.62	PK+	L1	GND
12	14.906	22.37	13.59	35.96	50.00	14.04	AVG	L1	GND

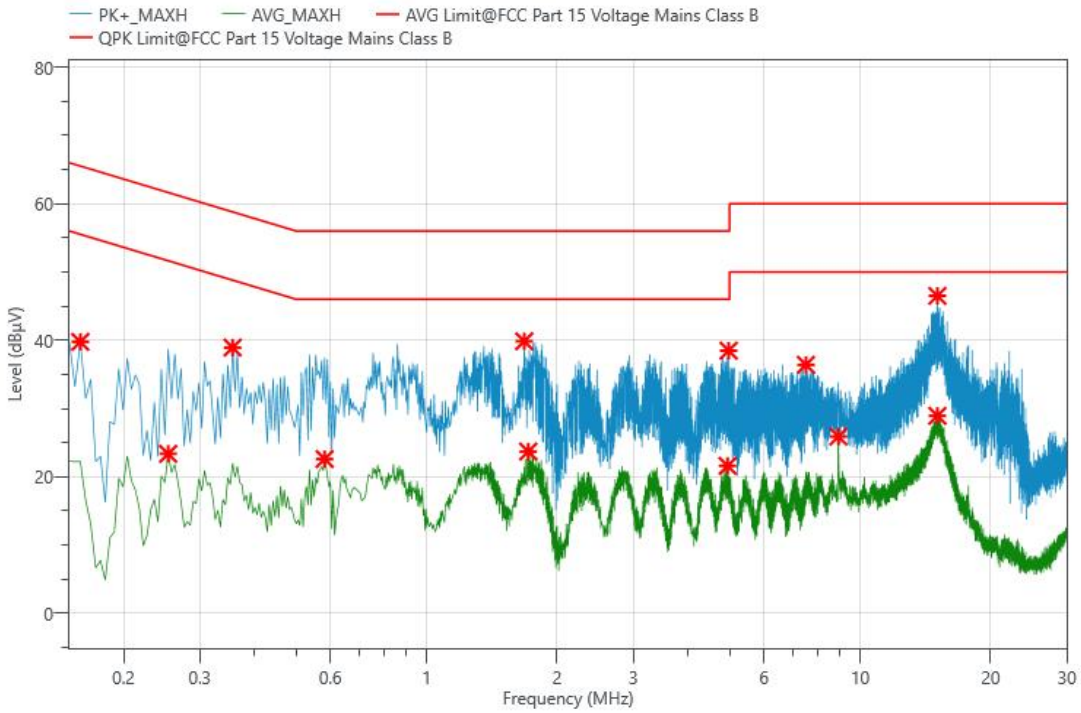
Remark:

Emission Level = Reading + Correct Factor;

Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Attenuation Factor

Margin= Emission Level - Limit.

Test Plots and Data of Conducted Emissions (Worst Case: IEEE 802.11a_Channel 36)			
Environmental Conditions	24.6℃, 53.4% RH	Test Engineer	Jacey Fu
Test Voltage:	AC 120V/60Hz	Test Power Line:	Neutral



No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV)	Limit (dBµV)	Margin (dB)	Det.	Line	PE
1	0.159	29.77	9.99	39.76	65.52	25.76	PK+	N	GND
2	0.254	13.37	9.99	23.36	51.64	28.28	AVG	N	GND
3	0.357	28.94	9.99	38.93	58.80	19.87	PK+	N	GND
4	0.582	12.59	10	22.59	46.00	23.41	AVG	N	GND
5	1.680	29.83	10.02	39.85	56.00	16.15	PK+	N	GND
6	1.716	13.68	10.02	23.70	46.00	22.30	AVG	N	GND
7	4.947	11.53	10.07	21.60	46.00	24.40	AVG	N	GND
8	4.974	28.40	10.07	38.47	56.00	17.53	PK+	N	GND
9	7.499	26.05	10.34	36.39	60.00	23.61	PK+	N	GND
10	8.912	14.87	11.02	25.89	50.00	24.11	AVG	N	GND
11	15.072	32.87	13.63	46.50	60.00	13.50	PK+	N	GND
12	15.072	15.29	13.63	28.92	50.00	21.08	AVG	N	GND

Remark:

Emission Level = Reading + Correct Factor;

Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Attenuation Factor

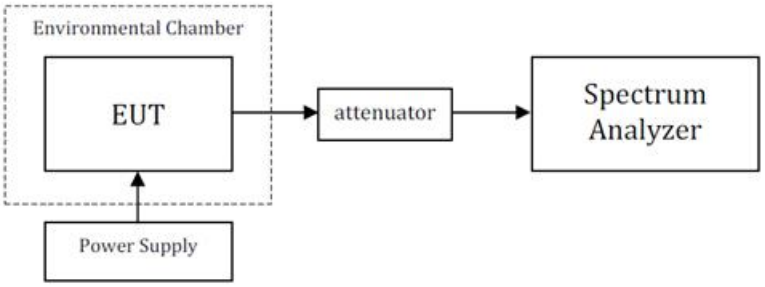
Margin= Emission Level - Limit.

13. FREQUENCY STABILITY

13.1. LIMIT

According to FCC 47 CFR Part 15 Subpart C Section 15.407(g), Manufactures 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.

13.2. TEST SETUP



13.3. TEST PROCEDURE

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Test is conducting under the description of ANSI C63.10-2013 section 6.8.

The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value. Extreme temperature is -20°C~70°C.

13.4. TEST RESULT

Pass.

Please refer to the Appendix for 5GWIFI Test Data.RF Conducted Test Data.

14. DYNAMIC FREQUENCY SELECTION

14.1. LIMIT

According to FCC 47 CFR Part 15 Subpart C Section 15.407(h) and IC RSS-247 6.3, Radar Detection Function of Dynamic Frequency Selection (DFS). U-NII devices operating with any part of its 26 dB emission bandwidth in the 5.25-5.35 GHz and 5.47-5.725 GHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems. Operators shall only use equipment with a DFS mechanism that is turned on when operating in these bands.

EUT Operating Mode		
DFS Operational mode	Operating Frequency Range	
	5250 MHz to 5350 MHz	5470 MHz to 5725 MHz
Slave without radar Interference detection function	✓	✓

The following table from KDB 905462 and the lists of the applicable requirements for the DFS testing.

Applicability of DFS Requirements Prior to Use of a Channel			
Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
Non-Occupancy Period	√	Not required	Yes
DFS Detection Threshold	√	Not required	Yes
Channel Availability Check Time	√	Not required	Not required
U-NII Detection Bandwidth	√	Not required	Yes

Applicability of DFS requirements during normal operation		
Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
DFS Detection Threshold	Yes	Not required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required
Additional requirements for devices with multiple bandwidth modes	**Master Device or Client with Radar Detection**	**Client Without Radar Detection**
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.		

DFS Detection Thresholds for Master Devices and Client Devices with Radar Detection	
Maximum Transmit Power	**Value (See Notes 1, 2, and 3)**
EIRP ≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
Note 1: This is the level at the input of the receiver assuming a 0dBi receive antenna. Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

DFS Response Requirement Values	
Parameter	**Value**
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds. See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.
Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions. Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.	

DFS Radar Signal Parameter:
Radar Type 0 was used in the evaluation of the Client device for the purpose of measuring the Channel Move Time and the Channel Closing Transmission Time.

Short Pulse Radar Test Waveforms					
Radar Type	**Pulse Width (μsec)**	**PRI (μsec)**	**Number of Pulses**	**Minimum Percentage of Successful Detection**	**Minimum Number of Trials**
0	1	1428	18	See Note 1	See Note 1
0	1	Test A	$\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot10^6}{\text{PRI}_{\mu\text{sec}}}\right)\right\}$	60%	30
		Test B			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.

Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a
Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A
A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms.
If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B.
The aggregate is the average of the percentage of successful detections of short pulse radar types 1-4.

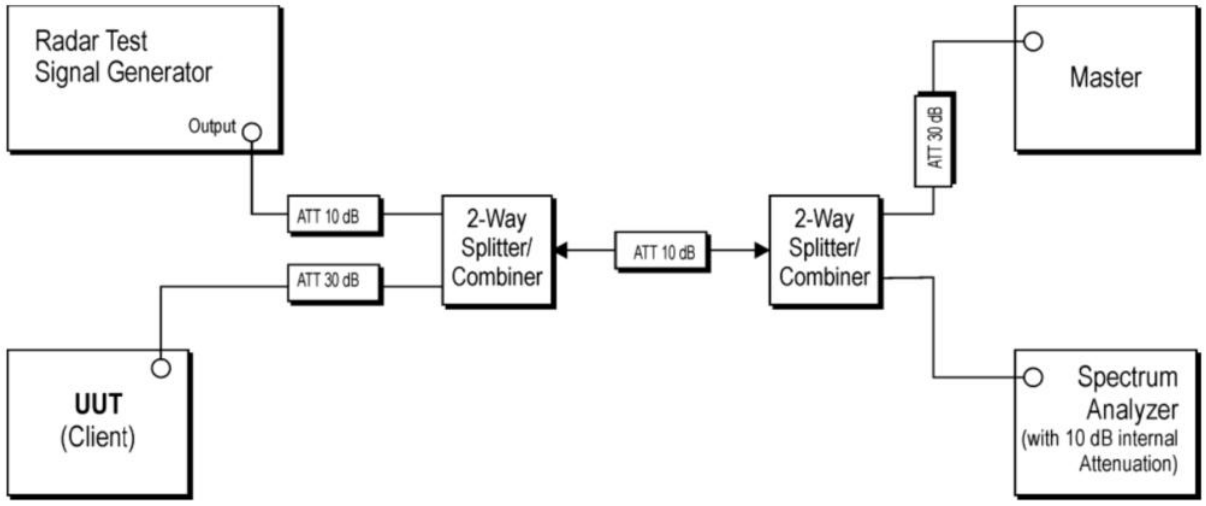
Long Pulse Radar Test Waveform							
Radar Type	**Pulse Width (μsec)**	**Chirp Width (MHz)**	**PRI (μsec)**	**Number of Pulses per Burst**	**Number of Bursts**	**Minimum Percentage of Successful Detection**	**Minimum Number of Trials**
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

Frequency Hopping Radar Test Waveform							
Radar Type	**Pulse Width (μsec)**	**PRI (μsec)**	**Pulses per Hop**	**Hopping Rate (kHz)**	**Hopping Sequence Length (msec)**	**Minimum Percentage of Successful**	**Minimum Number of Trials**
6	1	333	9	0.333	300	70%	30

In-Service Monitoring: Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period

Limit of In-Service Monitoring:
Reference to DFS Radar Signal Parameter Values.

14.2. TEST SETUP



Wireless AP	Manufacturer:	ASUSTek Computer Inc
	Model Number:	AX5400
	FCC ID:	MSQ-RTAXJ300

14.3. TEST PROCEDURE

a) One frequency will be chosen from the Operating Channels of the EUT within the 5250-5350 MHz or 5470-5725 MHz bands. For 802.11 devices, the test frequency must contain control signals. This can be verified by disabling channel loading and monitoring the spectrum analyzer. If no control signals are detected, another frequency must be selected within the emission bandwidth where control signals are detected.

b) In case the EUT is a Master Device, a U-NII device operating as a Client Device will be used and it is assumed that the Client will associate with the EUT (Master). For radiated tests, the emissions of the Radar Waveform generator will be directed towards the Master Device. If the Master Device has antenna gain, the main beam of the antenna will be directed toward the radar emitter. Vertical polarization is used for testing.

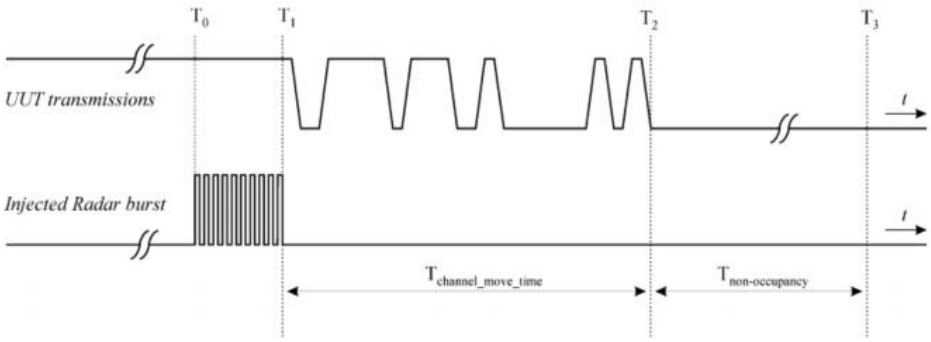
c) The TCP protocol unicast data stream was generated by the iperf software command line with at least 17% activity ratio over any 100ms period.

d) Timing plots are reported with calculations demonstrating a minimum channel loading of approximately 17% or greater. For example, channel loading can be estimated by setting the spectrum analyzer for zero span and approximate the Time On/ (Time On + Off Time).

e) At time T0 the Radar Waveform generator sends a Burst of pulses for one of the Short Pulse Radar Types 1-4 at DFS Detection Threshold levels on the Operating Channel. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.

f) Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the EUT during the observation time (Channel Move Time). Measure and record the Channel Move Time and Channel Closing Transmission Time if radar detection occurs.

g) When operating as a Master Device, monitor the EUT for more than 30 minutes following instant T2 to verify that the EUT does not resume any transmissions on this Channel. Perform this test once and record the measurement result.



14.4. TEST RESULT

Pass.

Please refer to the Appendix for 5G WIFI DFS Test Data.

15. PHOTOGRAPHS OF TEST SETUP

Please refer to separated files for Test Setup Photos of the EUT.

16. EXTERNAL PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

17. INTERNAL PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

**********THE END**********