TEST REPORT

Applicant:	Hall Technologies
Address of Applicant:	1234 Lakeshore Dr, Suite 150, Coppell, Texas 75019, United States
Manufacturer/Factory:	Shen Zhen Proitav Technology Co.,Ltd
Address of Manufacturer/Factory:	301-401, Building 16, Hejing Industrial Zone, No. 87 Hexiu West Road, Zhancheng Community, Fuhai Street, Baoan District, Shenzhen, China

Equipment Under Test (EUT)

Product Name:	4K BYOD Conference Presentation Switcher
Model No.:	HT-RANGER2
Trade Mark:	Hall Technologies
FCC ID:	2A8VX-HT-RANGER2
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt:	September 23, 2024
Date of Test:	September 24, 2024-December 09, 2024
Date of report issued:	December 09, 2024
Test Result :	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Robinson Luo
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	*December 09, 2024*	*Original*

Prepared By: ***Date:*** *December 09, 2024*

Project Engineer

Check By: ***Date:*** *December 09, 2024*

Reviewer

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4 Test Summary

Test Item	Section	Result
Antenna requirement	FCC part 15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	FCC part 15.207	Pass
Conducted Peak Output Power	FCC part 15.247 (b)(3)	Pass
Channel Bandwidth & 99% OCB	FCC part 15.247 (a)(2)	Pass
Power Spectral Density	FCC part 15.247 (e)	Pass
Band Edge	FCC part 15.247(d)	Pass
Spurious Emission	FCC part 15.205/15.209	Pass

Remark: Test according to ANSI C63.10:2013

Pass: The EUT complies with the essential requirements in the standard.

Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25\times 10^{-8}$
2	Duty cycle	±0.37%
3	Occupied Bandwidth	±3%
4	RF conducted power	±0.75dB
5	RF power density	±3dB
6	Conducted Spurious emissions	±2.58dB
7	AC Power Line Conducted Emission	±3.44dB (0.15MHz ~ 30MHz)
8	Radiated Spurious emission test	±3.1dB (9kHz-30MHz)
		±3.8039dB (30MHz-200MHz)
		±3.9679dB (200MHz-1GHz)
		±4.29dB (1GHz-18GHz)
		±3.30dB (18GHz-40GHz)
9	Temperature test	±1°C
10	Humidity test	±3%
11	Time	±3%

5 General Information

5.1 General Description of EUT

Product Name:	4K BYOD Conference Presentation Switcher
Model No.:	HT-RANGER2
Test sample(s) ID:	GTS2024090213-1
Sample(s) Status	Engineer sample
S/N:	117224340019
Operation Frequency:	802.11n(HT20): 2412MHz~2462MHz
Channel numbers:	802.11n(HT20): 11
Channel separation:	5MHz
Modulation technology:	802.11n(HT20): Orthogonal Frequency Division Multiplexing (OFDM)
Antenna Type:	Glue Stick Antenna
Antenna gain:	ANT 1: 4.62dBi ANT 2: 4.62dBi ANT 3: 4.62dBi ANT 4: 4.62dBi
Power supply:	Power supply Model: FJ-GN212020006000D Input: AC 100-240V, 50/60Hz, 2.5A Max Output: DC 20.0V, 6.0A, 120.0W

Remark:
1. Antenna gain information provided by the customer
2. The relevant information of the sample is provided by the entrusting company, and the laboratory is not responsible for its authenticity.
3. The product contains two WIFI modules, each WIFI module has two antennas, and the two WIFI modules cannot transmit signals at the same time.

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	**Frequency (MHz)**
	802.11n(HT20)
Lowest channel	2412MHz
Middle channel	2437MHz
Highest channel	2462MHz

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Pre-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

Mode	802.11n(HT20)
Data rate	6.5Mbps

5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
Lenovo	Notebook PC	E40	N/A
Kingston	USB disk	4GB	N/A
Aoni	Canera	A10	N/A
DELL	KEYBOARD	SK-8115	N/A
DELL	MOUSE	N/A	N/A
Canon	Printer	IP1600	GTS222
AOC	LCD monitor	U27G3X	WGKP7HA000511

5.4 Deviation from Standards

None.

5.5 Abnormalities from Standard Conditions

None.

5.6 Test Facility

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

● **FCC —Registration No.: 381383**

Designation Number: CN5029

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files.

● **ISED—Registration No.: 9079A**

CAB identifier: CN0091

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of ISED for radio equipment testing.

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

5.7 Test Location

All tests were performed at:
Global United Technology Services Co., Ltd. Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102 Tel: 0755-27798480 Fax: 0755-27798960

5.8 Additional Instructions

Test Software	Special test command provided by manufacturer
Power level setup	Default

6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	Jun. 22, 2024	Jun. 21, 2027
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Apr. 11, 2024	Apr. 10, 2025
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9168	GTS640	Mar. 19, 2023	Mar. 18, 2025
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	Apr. 17, 2023	Apr. 16, 2025
6	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	Apr. 11, 2024	Apr. 10, 2025
7	Loop Antenna	ZHINAN	ZN30900A	GTS534	Nov.12, 2024	Nov.11, 2025
8	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	Apr. 11, 2024	Apr. 10, 2025
9	Amplifier(1GHz-26.5GHz)	HP	8449B	GTS601	Apr. 11, 2024	Apr. 10, 2025
10	Horn Antenna (15GH-40GHz)	SCHWARZBECK	01296	GTS691	Mar. 07, 2024	Mar. 06, 2025
11	FSV·Signal Analyzer (10Hz-40GHz)	Keysight	FSV-40-N	GTS666	Mar. 12, 2024	Mar. 11, 2025
12	Amplifier	/	LNA-1000-30S	GTS650	Apr. 11, 2024	Apr. 10, 2025
13	CDNE M2+M3-16A	HCT	30MHz-300MHz	GTS692	Nov. 07, 2024	Nov. 06, 2025
14	Wideband Amplifier	/	WDA-01004000-15P35	GTS602	Apr. 11, 2024	Apr. 10, 2025
15	Thermo meter	JINCHUANG	GSP-8A	GTS643	Apr. 18, 2024	Apr. 17, 2025
16	RE cable 1	GTS	N/A	GTS675	Jul. 02, 2024	Jul. 01, 2025
17	RE cable 2	GTS	N/A	GTS676	Jul. 02, 2024	Jul. 01, 2025
18	RE cable 3	GTS	N/A	GTS677	Jul. 02, 2024	Jul. 01, 2025
19	RE cable 4	GTS	N/A	GTS678	Jul. 02, 2024	Jul. 01, 2025
20	RE cable 5	GTS	N/A	GTS679	Jul. 02, 2024	Jul. 01, 2025
21	RE cable 6	GTS	N/A	GTS680	Jul. 02, 2024	Jul. 01, 2025
22	RE cable 7	GTS	N/A	GTS681	Jul. 05, 2024	Jul. 04, 2025
23	RE cable 8	GTS	N/A	GTS682	Jul. 05, 2024	Jul. 04, 2025
24	EMI Test Software	AUDIX	E3-6.100614a	GTS725	N/A	N/A

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	Jul. 12, 2022	Jul. 11, 2027
2	EMI Test Receiver	R&S	ESCI 7	GTS552	Apr. 11, 2024	Apr. 10, 2025
3	LISN	ROHDE & SCHWARZ	ENV216	GTS226	Apr. 11, 2024	Apr. 10, 2025
4	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
5	Thermo meter	JINCHUANG	GSP-8A	GTS642	Apr. 18, 2024	Apr. 17, 2025
6	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	Apr. 11, 2024	Apr. 10, 2025
7	ISN	SCHWARZBECK	NTFM 8158	GTS565	Apr. 11, 2024	Apr. 10, 2025
8	High voltage probe	SCHWARZBECK	TK9420	GTS537	Apr. 11, 2024	Apr. 10, 2025
9	Antenna end assembly	Weinschel	1870A	GTS560	Apr. 11, 2024	Apr. 10, 2025
10	EMI Test Software	AUDIX	E3-6.100622	GTS726	N/A	N/A

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	Apr. 13, 2024	Apr. 12, 2025
2	EMI Test Receiver	R&S	ESCI 7	GTS552	Apr. 13, 2024	Apr. 12, 2025
3	PSA Series Spectrum Analyzer	Agilent	E4440A	GTS536	Apr. 13, 2024	Apr. 12, 2025
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	Apr. 13, 2024	Apr. 12, 2025
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	Apr. 13, 2024	Apr. 12, 2025
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	Apr. 13, 2024	Apr. 12, 2025
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	Apr. 13, 2024	Apr. 12, 2025
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	Apr. 13, 2024	Apr. 12, 2025
9	Thermo meter	JINCHUANG	GSP-8A	GTS641	Apr. 18, 2024	Apr. 17, 2025
10	EXA Signal Analyzer	Keysight	N9010B	MY60241168	Nov. 02, 2024	Nov. 01, 2025

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Barometer	KUMAO	SF132	GTS647	Apr. 18, 2024	Apr. 17, 2025

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
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. **15.247(c) (1)(i) requirement:** (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.	
EUT Antenna:	
The antenna is glue stick antenna, reference to the appendix II for details	

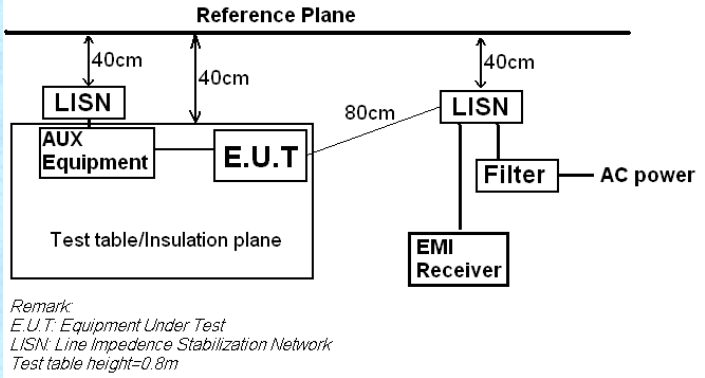
7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test setup:



Test procedure:

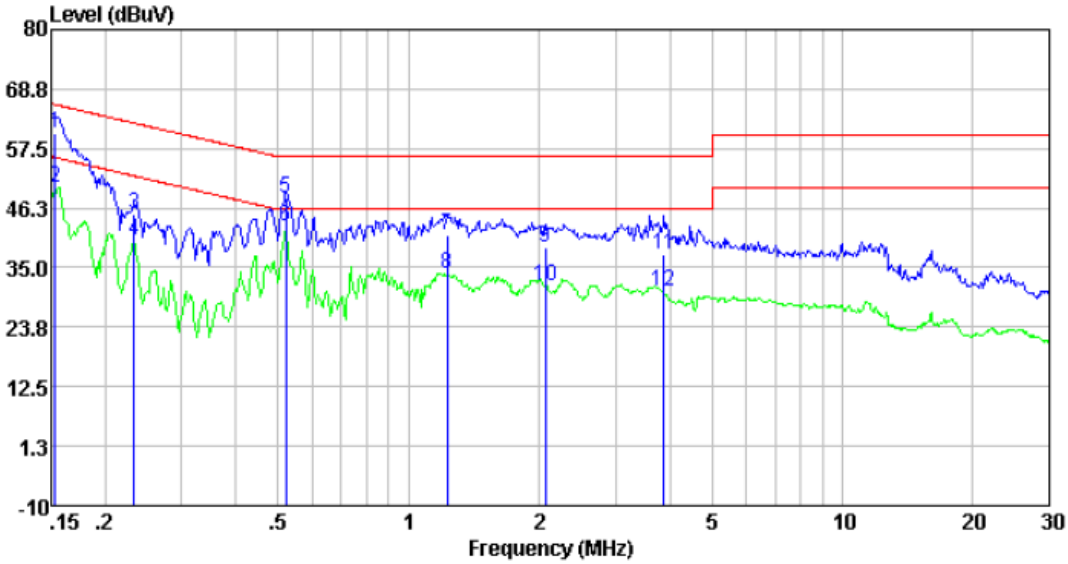
1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.
2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).
3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.

Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Measurement data

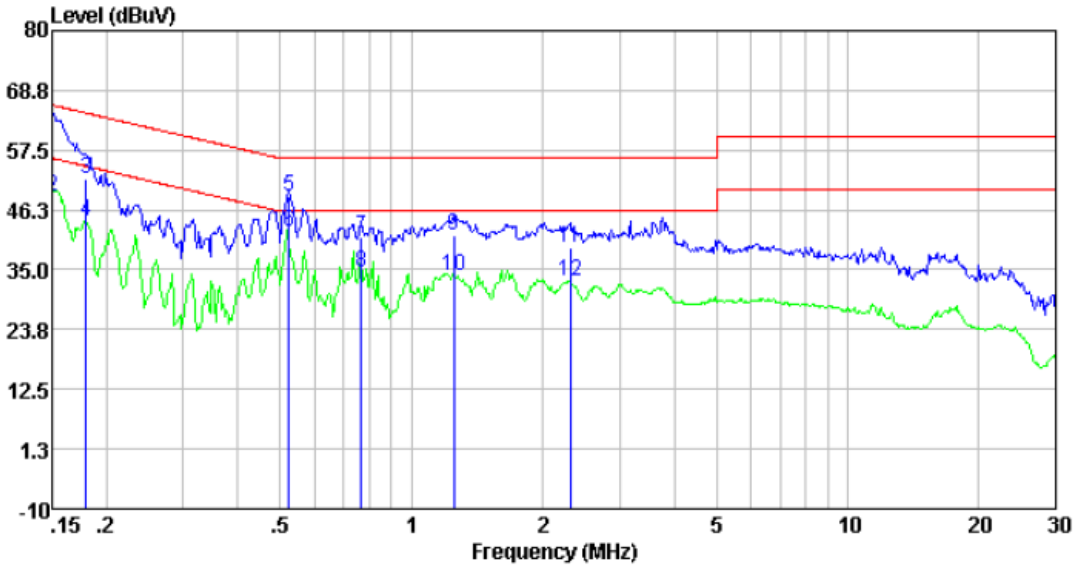
Pre-scan all test modes, found worst case at 802.11n(HT 20) 2412MHz@Ant 1, and so only show the test result of it.

Line:



Freq	Reading level	LISN/ISN factor	Cable loss	Level	Limit level	Over limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.15	50.25	10.02	0.01	60.28	65.82	-5.54	QP
0.15	40.07	10.02	0.01	50.10	55.82	-5.72	Average
0.23	35.38	9.57	0.01	44.96	62.35	-17.39	QP
0.23	30.58	9.57	0.01	40.16	52.35	-12.19	Average
0.52	38.43	9.81	0.01	48.25	56.00	-7.75	QP
0.52	32.84	9.81	0.01	42.66	46.00	-3.34	Average
1.23	31.03	9.93	0.03	40.99	56.00	-15.01	QP
1.23	23.98	9.93	0.03	33.94	46.00	-12.06	Average
2.07	29.07	9.81	0.04	38.92	56.00	-17.08	QP
2.07	21.75	9.81	0.04	31.60	46.00	-14.40	Average
3.88	27.87	9.40	0.06	37.33	56.00	-18.67	QP
3.88	20.97	9.40	0.06	30.43	46.00	-15.57	Average

Neutral:

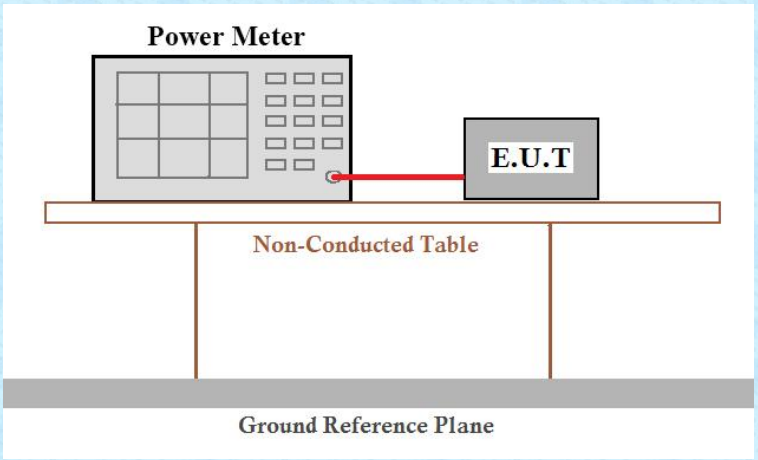


Freq	Reading level	LISN/ISN factor	Cable loss	Level	Limit level	Over limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.15	50.87	9.85	0.01	60.73	66.00	-5.27	QP
0.15	39.05	9.85	0.01	48.91	56.00	-7.09	Average
0.18	42.09	9.87	0.01	51.97	64.50	-12.53	QP
0.18	34.33	9.87	0.01	44.21	54.50	-10.29	Average
0.52	38.87	9.79	0.01	48.67	56.00	-7.33	QP
0.52	32.41	9.79	0.01	42.21	46.00	-3.79	Average
0.77	31.25	9.93	0.02	41.20	56.00	-14.80	QP
0.77	24.60	9.93	0.02	34.55	46.00	-11.45	Average
1.25	31.77	9.63	0.03	41.43	56.00	-14.57	QP
1.25	24.28	9.63	0.03	33.94	46.00	-12.06	Average
2.31	29.39	9.67	0.05	39.11	56.00	-16.89	QP
2.31	23.07	9.67	0.05	32.79	46.00	-13.21	Average

Notes:

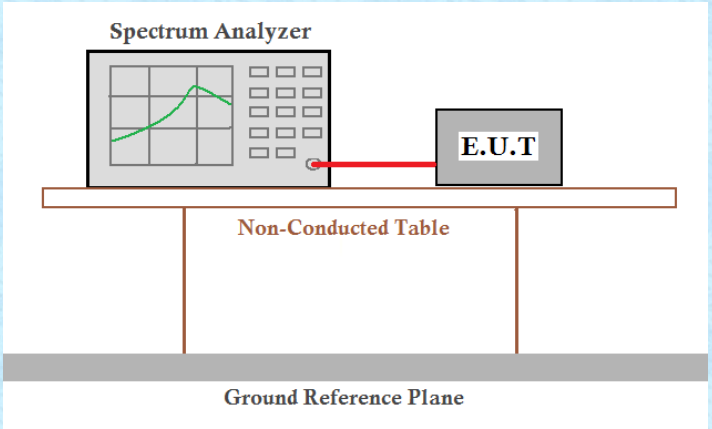
1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss
4. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

7.3 Conducted Output Power

Test Requirement :	FCC Part15 C Section 15.247 (b)(3)
Test Method :	KDB558074 D01 15.247 Meas Guidance v05r02
Limit:	30dBm The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

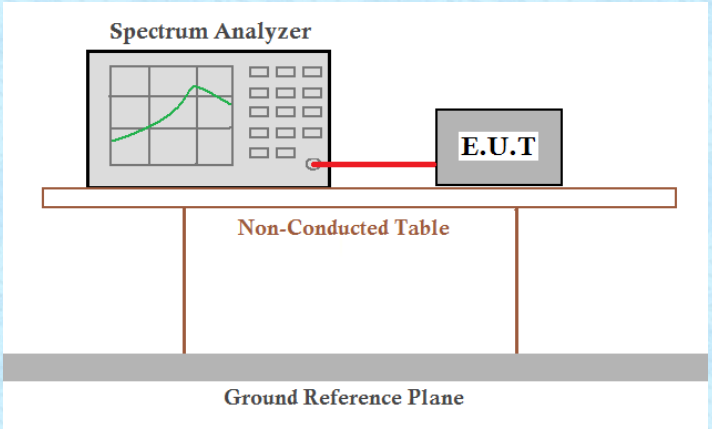
Measurement Data: The detailed test data see Appendix for WIFI 2.4G.

7.4 Channel Bandwidth

Test Requirement :	FCC Part15 C Section 15.247 (a)(2)
Test Method :	KDB558074 D01 15.247 Meas Guidance v05r02
Limit:	>500KHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data: The detailed test data see Appendix for WIFI 2.4G.

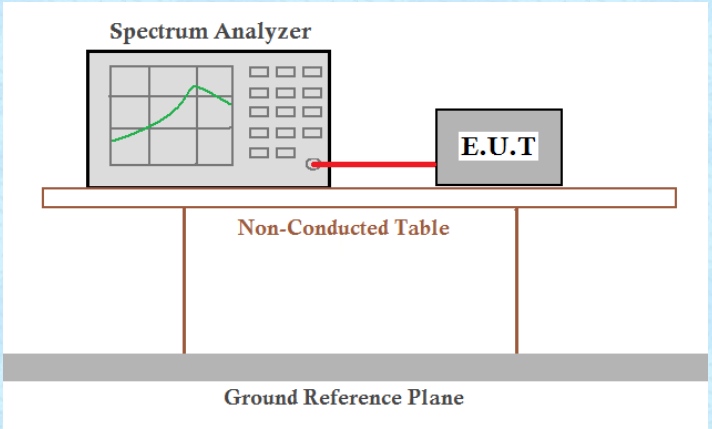
7.5 Power Spectral Density

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	KDB558074 D01 15.247 Meas Guidance v05r02
Limit:	8dBm/3kHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data: The detailed test data see Appendix for WIFI 2.4G.

7.6 Spurious Emission in Non-restricted & restricted Bands

7.6.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	KDB558074 D01 15.247 Meas Guidance v05r02
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data: The detailed test data see Appendix for WIFI 2.4G.

7.6.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.10:2013
Test Frequency Range:	9kHz to 25GHz
Test site:	Measurement Distance: 3m

Receiver setup:

Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

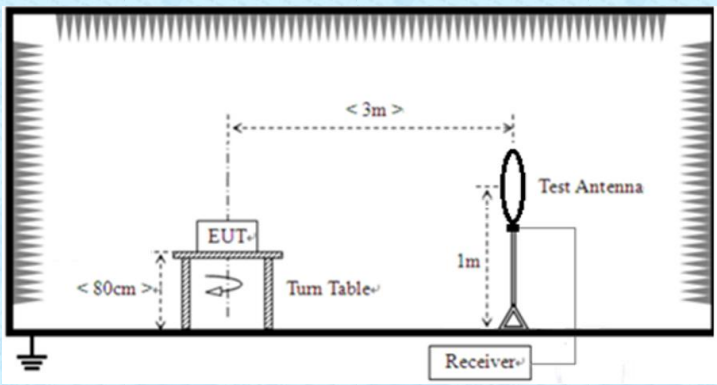
Note: For Duty cycle ≥ 98%, average detector set as above For Duty cycle < 98%, average detector set as below: VBW ≥ 1 / T

Limit:

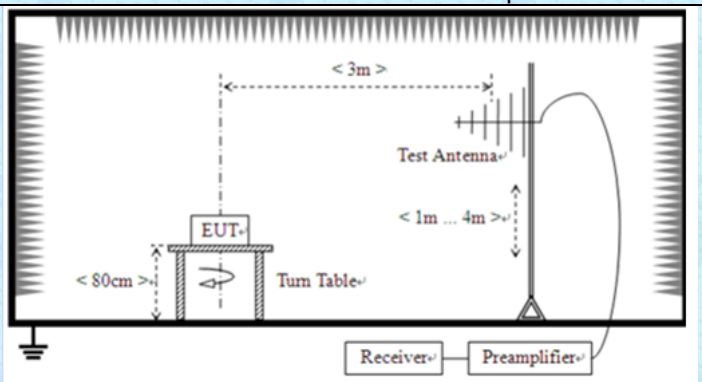
Frequency	Limit (uV/m)	Value	Measurement Distance
0.009MHz-0.490MHz	2400/F(KHz)	PK/QP/AV	300m
0.490MHz-1.705MHz	24000/F(KHz)	QP	30m
1.705MHz-30MHz	30	QP	30m
30MHz-88MHz	100	QP	3m
88MHz-216MHz	150	QP	
216MHz-960MHz	200	QP	
960MHz-1GHz	500	QP	
Above 1GHz	500	Average	
	5000	Peak	

Test setup:

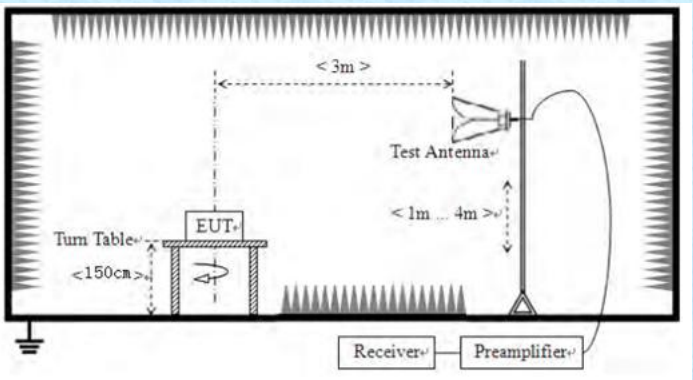
For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30MHz to1GHz

<table>
<tr><td></td><td>


For radiated emissions above 1GHz



</td></tr>
<tr><td>Test Procedure:</td><td>
1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. 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.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 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.
</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 6.0 for details</td></tr>
</table>

Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Remarks:

1. *Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.*

Measurement data:

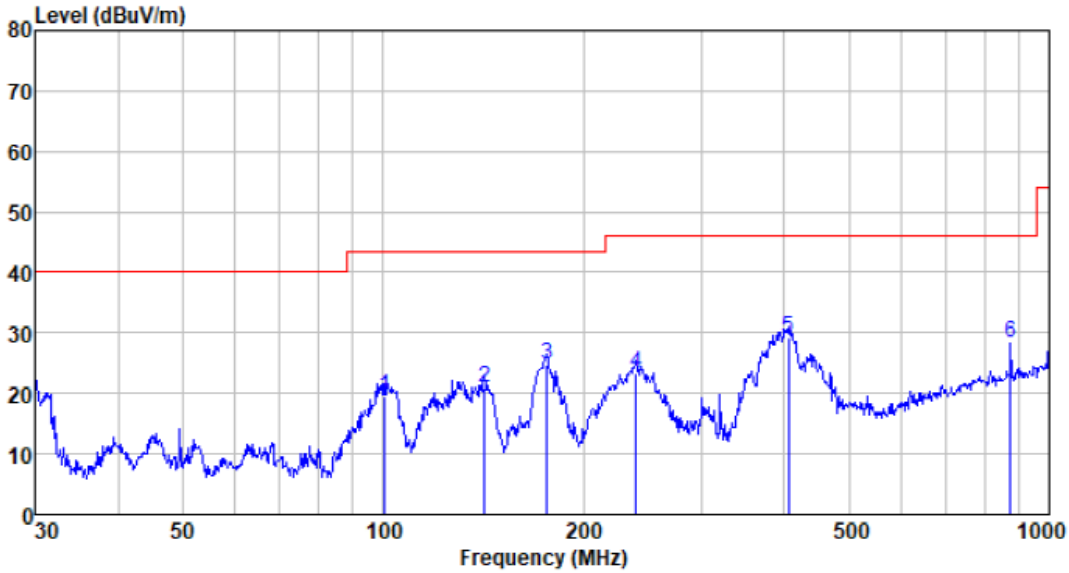
■ **9kHz~30MHz**

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o), the test result no need to reported.

■ **Below 1GHz**

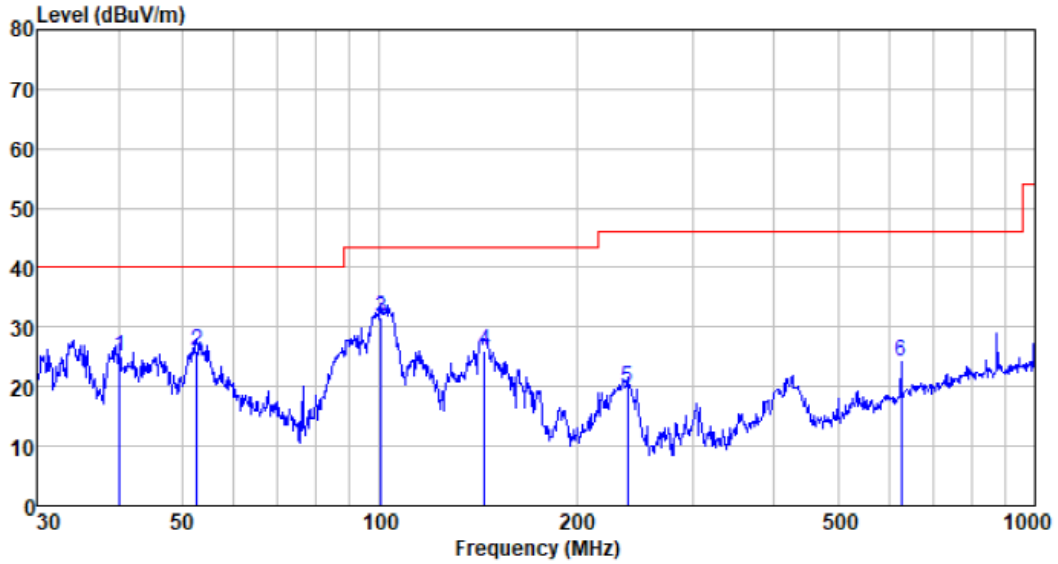
Pre-scan all test modes, found worst case at 802.11n(HT 20)MHz 2412@Ant 1, and so only show the test result of it.

Horizontal:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
100.581	40.77	9.36	1.94	32.50	19.57	43.50	-23.93	QP
141.826	37.14	13.88	2.39	32.46	20.95	43.50	-22.55	QP
176.269	41.64	12.80	2.68	32.42	24.70	43.50	-18.80	QP
239.987	42.63	10.00	3.11	32.36	23.38	46.00	-22.62	QP
406.088	42.52	14.92	3.90	32.25	29.09	46.00	-16.91	QP
875.247	30.94	22.80	5.67	31.10	28.31	46.00	-17.69	QP

Vertical:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
40.135	41.91	14.32	1.26	32.30	25.19	40.00	-14.81	QP
52.575	44.27	12.72	1.41	32.31	26.09	40.00	-13.91	QP
100.581	52.82	9.36	1.94	32.50	31.62	43.50	-11.88	QP
144.842	41.60	14.44	2.42	32.46	26.00	43.50	-17.50	QP
239.147	38.95	9.97	3.10	32.36	19.66	46.00	-26.34	QP
625.078	31.47	19.60	4.75	31.74	24.08	46.00	-21.92	QP

- **Above 1GHz**
- **Unwanted Emissions in non-restricted Frequency Bands**
- **All antennas have test, only the worst case MIMO report.**

MIMO(ANT1&2)

Test mode:	802.11n(HT20)	Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4824.00	42.10	32.05	6.02	38.54	41.63	74.00	-32.37	Vertical
7236.00	42.05	36.27	7.95	39.17	47.10	74.00	-26.90	Vertical
9648.00	38.30	38.20	13.95	40.23	50.22	74.00	-23.78	Vertical
4824.00	41.65	32.05	6.02	38.54	41.18	74.00	-32.82	Horizontal
7236.00	43.06	36.27	7.95	39.17	48.11	74.00	-25.89	Horizontal
9648.00	37.97	38.20	13.95	40.23	49.89	74.00	-24.11	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4824.00	33.24	32.05	6.02	38.54	32.77	54.00	-21.23	Vertical
7236.00	33.65	36.27	7.95	39.17	38.70	54.00	-15.30	Vertical
9648.00	29.42	38.20	13.95	40.23	41.34	54.00	-12.66	Vertical
4824.00	32.26	32.05	6.02	38.54	31.79	54.00	-22.21	Horizontal
7236.00	34.21	36.27	7.95	39.17	39.26	54.00	-14.74	Horizontal
9648.00	28.62	38.20	13.95	40.23	40.54	54.00	-13.46	Horizontal

Test mode:	802.11n(HT20)	Test channel:	Middle

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4874.00	42.57	32.10	6.03	38.52	42.18	74.00	-31.82	Vertical
7311.00	42.03	36.30	8.04	39.23	47.14	74.00	-26.86	Vertical
9748.00	40.84	38.20	11.16	40.25	49.95	74.00	-24.05	Vertical
4874.00	41.93	32.10	6.03	38.52	41.54	74.00	-32.46	Horizontal
7311.00	42.92	36.30	8.04	39.23	48.03	74.00	-25.97	Horizontal
9748.00	40.56	38.20	11.16	40.25	49.67	74.00	-24.33	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4874.00	31.55	32.10	6.03	38.52	31.16	54.00	-22.84	Vertical
7311.00	31.01	36.30	8.04	39.23	36.12	54.00	-17.88	Vertical
9748.00	29.82	38.20	11.16	40.25	38.93	54.00	-15.07	Vertical
4874.00	30.91	32.10	6.03	38.52	30.52	54.00	-23.48	Horizontal
7311.00	31.90	36.30	8.04	39.23	37.01	54.00	-16.99	Horizontal
9748.00	29.54	38.20	11.16	40.25	38.65	54.00	-15.35	Horizontal

Test mode:	802.11n(HT20)	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4924.00	41.93	32.15	6.04	38.52	41.60	74.00	-32.40	Vertical
7386.00	42.40	36.30	8.11	39.27	47.54	74.00	-26.46	Vertical
9848.00	41.54	38.20	10.56	40.27	50.03	74.00	-23.97	Vertical
4924.00	42.24	32.15	6.04	38.52	41.91	74.00	-32.09	Horizontal
7386.00	41.70	36.30	8.11	39.27	46.84	74.00	-27.16	Horizontal
9848.00	40.95	38.20	10.56	40.27	49.44	74.00	-24.56	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4924.00	30.91	32.10	6.03	38.52	30.52	54.00	-23.48	Vertical
7386.00	31.38	36.30	8.04	39.23	36.49	54.00	-17.51	Vertical
9848.00	30.52	38.20	11.16	40.25	39.63	54.00	-14.37	Vertical
4924.00	31.22	32.10	6.03	38.52	30.83	54.00	-23.17	Horizontal
7386.00	30.68	36.30	8.04	39.23	35.79	54.00	-18.21	Horizontal
9848.00	29.93	38.20	11.16	40.25	39.04	54.00	-14.96	Horizontal

MIMO(ANT3&4)

Test mode:	802.11n(HT20)	Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4824.00	42.24	32.05	6.02	38.54	41.77	74.00	-32.23	Vertical
7236.00	42.57	36.27	7.95	39.17	47.62	74.00	-26.38	Vertical
9648.00	38.23	38.20	13.95	40.23	50.15	74.00	-23.85	Vertical
4824.00	41.49	32.05	6.02	38.54	41.02	74.00	-32.98	Horizontal
7236.00	41.14	36.27	7.95	39.17	46.19	74.00	-27.81	Horizontal
9648.00	38.17	38.20	13.95	40.23	50.09	74.00	-23.91	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4824.00	31.22	32.10	6.03	38.52	30.83	54.00	-23.17	Vertical
7236.00	31.55	36.30	8.04	39.23	36.66	54.00	-17.34	Vertical
9648.00	27.21	38.20	11.16	40.25	36.32	54.00	-17.68	Vertical
4824.00	30.47	32.10	6.03	38.52	30.08	54.00	-23.92	Horizontal
7236.00	30.12	36.30	8.04	39.23	35.23	54.00	-18.77	Horizontal
9648.00	27.15	38.20	11.16	40.25	36.26	54.00	-17.74	Horizontal

Test mode:	802.11n(HT20)	Test channel:	Middle

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4874.00	43.55	32.10	6.03	38.52	43.16	74.00	-30.84	Vertical
7311.00	43.34	36.30	8.04	39.23	48.45	74.00	-25.55	Vertical
9748.00	40.39	38.20	11.16	40.25	49.50	74.00	-24.50	Vertical
4874.00	40.88	32.10	6.03	38.52	40.49	74.00	-33.51	Horizontal
7311.00	41.84	36.30	8.04	39.23	46.95	74.00	-27.05	Horizontal
9748.00	40.72	38.20	11.16	40.25	49.83	74.00	-24.17	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4874.00	32.53	32.10	6.03	38.52	32.14	54.00	-21.86	Vertical
7311.00	32.32	36.30	8.04	39.23	37.43	54.00	-16.57	Vertical
9748.00	29.37	38.20	11.16	40.25	38.48	54.00	-15.52	Vertical
4874.00	29.86	32.10	6.03	38.52	29.47	54.00	-24.53	Horizontal
7311.00	30.82	36.30	8.04	39.23	35.93	54.00	-18.07	Horizontal
9748.00	29.70	38.20	11.16	40.25	38.81	54.00	-15.19	Horizontal

Test mode:	802.11n(HT20)	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4924.00	40.63	32.15	6.04	38.52	40.30	74.00	-33.70	Vertical
7386.00	43.29	36.30	8.11	39.27	48.43	74.00	-25.57	Vertical
9848.00	41.73	38.20	10.56	40.27	50.22	74.00	-23.78	Vertical
4924.00	41.27	32.15	6.04	38.52	40.94	74.00	-33.06	Horizontal
7386.00	43.02	36.30	8.11	39.27	48.16	74.00	-25.84	Horizontal
9848.00	41.10	38.20	10.56	40.27	49.59	74.00	-24.41	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4924.00	29.61	32.10	6.03	38.52	29.22	54.00	-24.78	Vertical
7386.00	32.27	36.30	8.04	39.23	37.38	54.00	-16.62	Vertical
9848.00	30.71	38.20	11.16	40.25	39.82	54.00	-14.18	Vertical
4924.00	30.25	32.10	6.03	38.52	29.86	54.00	-24.14	Horizontal
7386.00	32.00	36.30	8.04	39.23	37.11	54.00	-16.89	Horizontal
9848.00	30.08	38.20	11.16	40.25	39.19	54.00	-14.81	Horizontal

Notes:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

- **Unwanted Emissions in restricted Frequency Bands**
- **All antennas have test, only the worst case MIMO report.**

MIMO(ANT1&2)

Test mode:	802.11n(HT20)	Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	46.24	27.00	4.13	39.14	38.23	74.00	-35.77	Horizontal
2390.00	46.35	27.08	4.17	39.34	38.26	74.00	-35.74	Horizontal
2310.00	46.06	27.00	4.13	39.14	38.05	74.00	-35.95	Vertical
2390.00	68.10	27.08	4.17	39.34	60.01	74.00	-13.99	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	33.15	27.00	4.13	39.14	25.14	54.00	-28.86	Horizontal
2390.00	32.28	27.08	4.17	39.34	24.19	54.00	-29.81	Horizontal
2310.00	33.17	27.00	4.13	39.14	25.16	54.00	-28.84	Vertical
2390.00	53.21	27.08	4.17	39.34	45.12	54.00	-8.88	Vertical

Test mode:	802.11n(HT20)	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	46.43	27.27	4.08	39.56	38.22	74.00	-35.78	Horizontal
2500.00	45.88	27.30	4.06	39.60	37.64	74.00	-36.36	Horizontal
2483.50	71.26	27.27	4.08	39.56	63.05	74.00	-10.95	Vertical
2500.00	52.51	27.30	4.06	39.60	44.27	74.00	-29.73	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	33.63	27.27	4.08	39.56	25.42	54.00	-28.58	Horizontal
2500.00	32.60	27.30	4.06	39.60	24.36	54.00	-29.64	Horizontal
2483.50	55.18	27.27	4.08	39.56	46.97	54.00	-7.03	Vertical
2500.00	36.35	27.30	4.06	39.60	28.11	54.00	-25.89	Vertical

MIMO(ANT3&4)

Test mode:	802.11n(HT20)	Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	45.15	27.00	4.13	39.14	37.14	74.00	-36.86	Horizontal
2390.00	46.97	27.08	4.17	39.34	38.88	74.00	-35.12	Horizontal
2310.00	45.02	27.00	4.13	39.14	37.01	74.00	-36.99	Vertical
2390.00	74.21	27.08	4.17	39.34	66.12	74.00	-7.88	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	33.28	27.00	4.13	39.14	25.27	54.00	-28.73	Horizontal
2390.00	35.79	27.08	4.17	39.34	27.70	54.00	-26.30	Horizontal
2310.00	34.14	27.00	4.13	39.14	26.13	54.00	-27.87	Vertical
2390.00	47.61	27.08	4.17	39.34	39.52	54.00	-14.48	Vertical

Test mode:	802.11n(HT20)	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	49.50	27.27	4.08	39.56	41.29	74.00	-32.71	Horizontal
2500.00	45.70	27.30	4.06	39.60	37.46	74.00	-36.54	Horizontal
2483.50	75.10	27.27	4.08	39.56	66.89	74.00	-7.11	Vertical
2500.00	57.14	27.30	4.06	39.60	48.90	74.00	-25.10	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	37.65	27.27	4.08	39.56	29.44	54.00	-24.56	Horizontal
2500.00	33.68	27.30	4.06	39.60	25.44	54.00	-28.56	Horizontal
2483.50	53.26	27.27	4.08	39.56	45.05	54.00	-8.95	Vertical
2500.00	41.27	27.30	4.06	39.60	33.03	54.00	-20.97	Vertical

Remarks:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

------End------