

TEST REPORT

Applicant: HANSHOW TECHNOLOGY CO.,LTD.

Address of Applicant: Building 1(IF podium building and 4F) and Building 5 (7F) in Jiaxing Photovolta High-tech Park, No. 1288 Kanghe Rd., Xiuzhou District, Jiaxing, Zhejiang, China

Manufacturer: HANSHOW TECHNOLOGY CO.,LTD.

Address of Manufacturer: Building 1(IF podium building and 4F) and Building 5 (7F) in Jiaxing Photovolta High-tech Park, No. 1288 Kanghe Rd., Xiuzhou District, Jiaxing, Zhejiang, China

Equipment Under Test (EUT)

Product Name: digital signage

Model No.: Lumina Edge 2301

FCC ID: 2AYMH-LUMINA23

Applicable standards: FCC CFR Title 47 Part 15 Subpart E Section 15.407

Date of sample receipt: July 30, 2024

Date of Test: July 30, 2024-August 26, 2024

Date of report issued: August 26, 2024

Test Result : PASS *

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

Authorized Signature:



Robinson Luo

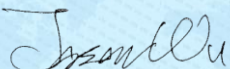
Laboratory Manager

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	August 26, 2024	Original

Prepared By:



Project Engineer

Date:

August 26, 2024

Check By:



Reviewer

Date:

August 26, 2024

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4 Test Summary

Test Item	Section	Result
Antenna requirement	FCC part 15.203	Pass
AC Power Line Conducted Emission	FCC part 15.207	Pass
Maximum Conducted Output Power	FCC part 15.407(a)(3)	Pass
Channel Bandwidth and 99% Occupied Bandwidth	FCC part 15.407(e)	Pass
Power Spectral Density	FCC part 15.407(a)(3)	Pass
Band Edge	FCC part 15.407(b)(4)	Pass
Spurious Emission	FCC part 15.205/15.209/15.407(b)(4)	Pass
Frequency Stability	FCC part 15.407(g)	Pass

Remarks:

1. Pass: The EUT complies with the essential requirements in the standard.
2. Test according to ANSI C63.10:2013.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz-30MHz	3.1dB	(1)
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

5 General Information

5.1 General Description of EUT

Product Name:	digital signage
Model No.:	Lumina Edge 2301
Test sample(s) ID:	GTS2024070422-1
Sample(s) Status:	Engineer sample
S/N:	N/A
Operation Frequency:	802.11a/802.11n(HT20): 5745MHz ~ 5825MHz 802.11n(HT40): 5755MHz ~ 5795MHz
Channel numbers:	802.11a/802.11n(HT20): 5 802.11n(HT40): 2
Channel bandwidth:	802.11a/802.11n(HT20): 20MHz 802.11n(HT40): 40MHz
Modulation technology:	Orthogonal Frequency Division Multiplexing (OFDM)
Antenna Type:	Integrated antenna
Antenna gain:	2.4dBi
Power supply:	Adapter MODEL:XC036WZ-1203000U INPUT:AC100-240V~50/60Hz 1A OUTPUT:DC12.0V 3.0A 36.0W

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.

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745MHz	151	5755MHz	153	5765MHz	155	5775MHz
157	5785MHz	159	5795MHz	161	5805MHz	163	5815MHz
165	5825MHz						

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)		
	802.11 a/n (HT20)	802.11 n (HT40)	
Lowest channel	5745	5755	
Middle channel	5785		
Highest channel	5825	5795	

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode
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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:

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

Mode	Data rate	Mode	Data rate
802.11a	6Mbps	802.11n (HT40)	13Mbps
802.11n (HT20)	6.5Mbps		

5.3 Description of Support Units

None

5.4 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).

5.5 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

5.6 Additional Instructions

Test Software	Special test software 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	June 22, 2024	June 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	April 11, 2024	April 10, 2025
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9168	GTS640	March 19, 2023	March 18, 2025
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	April 17, 2023	April 16, 2025
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	April 11, 2024	April 10, 2025
8	Loop Antenna	ZHINAN	ZN30900A	GTS534	Nov. 13, 2023	Nov.12, 2024
9	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	April 11, 2024	April 10, 2025
10	Amplifier(1GHz-26.5GHz)	HP	8449B	GTS601	April 11, 2024	April 10, 2025
11	Horn Antenna (18-26.5GHz)	/	UG-598A/U	GTS664	Oct. 29, 2023	Oct. 28, 2024
12	Horn Antenna (26.5-40GHz)	A.H Systems	SAS-573	GTS665	Oct. 29, 2023	Oct. 28, 2024
13	FSV·Signal Analyzer (10Hz-40GHz)	Keysight	FSV-40-N	GTS666	March 12, 2024	March 11, 2025
14	Amplifier	/	LNA-1000-30S	GTS650	April 11, 2024	April 10, 2025
15	CDNE M2+M3-16A	HCT	30MHz-300MHz	GTS692	Nov. 08, 2023	Nov.07, 2024
16	Wideband Amplifier	/	WDA-01004000-15P35	GTS602	April 11, 2024	April 10, 2025
17	Thermo meter	JINCHUANG	GSP-8A	GTS643	April 18, 2024	April 17, 2025
18	RE cable 1	GTS	N/A	GTS675	July 31. 2023	July 30. 2024
19	RE cable 2	GTS	N/A	GTS676	July 31. 2023	July 30. 2024
20	RE cable 3	GTS	N/A	GTS677	July 31. 2023	July 30. 2024
21	RE cable 4	GTS	N/A	GTS678	July 31. 2023	July 30. 2024
22	RE cable 5	GTS	N/A	GTS679	July 31. 2023	July 30. 2024
23	RE cable 6	GTS	N/A	GTS680	July 31. 2023	July 30. 2024
24	RE cable 7	GTS	N/A	GTS681	July 31. 2023	July 30. 2024
25	RE cable 8	GTS	N/A	GTS682	July 31. 2023	July 30. 2024

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	July 12, 2022	July 11, 2027
2	EMI Test Receiver	R&S	ESCI 7	GTS552	April 11, 2024	April 10, 2025
3	LISN	ROHDE & SCHWARZ	ENV216	GTS226	April 11, 2024	April 10, 2025
4	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
5	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
6	Thermo meter	JINCHUANG	GSP-8A	GTS642	April 18, 2024	April 17, 2025
7	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	April 11, 2024	April 10, 2025
8	ISN	SCHWARZBECK	NTFM 8158	GTS565	April 11, 2024	April 10, 2025
9	High voltage probe	SCHWARZBECK	TK9420	GTS537	April 11, 2024	April 10, 2025
10	Antenna end assembly	Weinschel	1870A	GTS560	April 11, 2024	April 10, 2025

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	April 11, 2024	April 10, 2025
2	EMI Test Receiver	R&S	ESCI 7	GTS552	April 11, 2024	April 10, 2025
3	PSA Series Spectrum Analyzer	Agilent	E4440A	GTS536	April 11, 2024	April 10, 2025
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	April 11, 2024	April 10, 2025
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	April 11, 2024	April 10, 2025
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	April 11, 2024	April 10, 2025
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	April 11, 2024	April 10, 2025
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	April 11, 2024	April 10, 2025
9	Thermo meter	JINCHUANG	GSP-8A	GTS641	April 18, 2024	April 17, 2025
10	EXA Signal Analyzer	Keysight	N9010B	MY60241168	Nov. 03, 2023	Nov. 02, 2024

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	April 18, 2024	April 17, 2025

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203
<i>15.203 requirement:</i> 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.	
E.U.T Antenna:	
The antenna is Integrated antenna, reference to the appendix II for details	

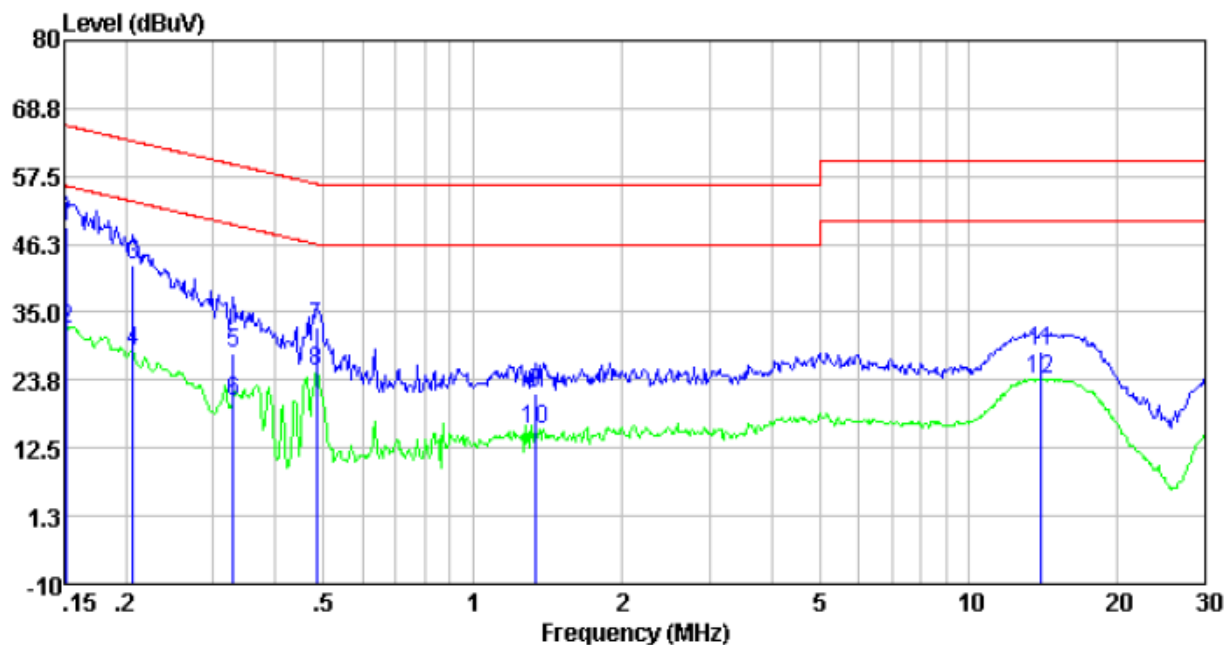
7.2 Conducted Emissions

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:	Reference Plane						

Measurement data

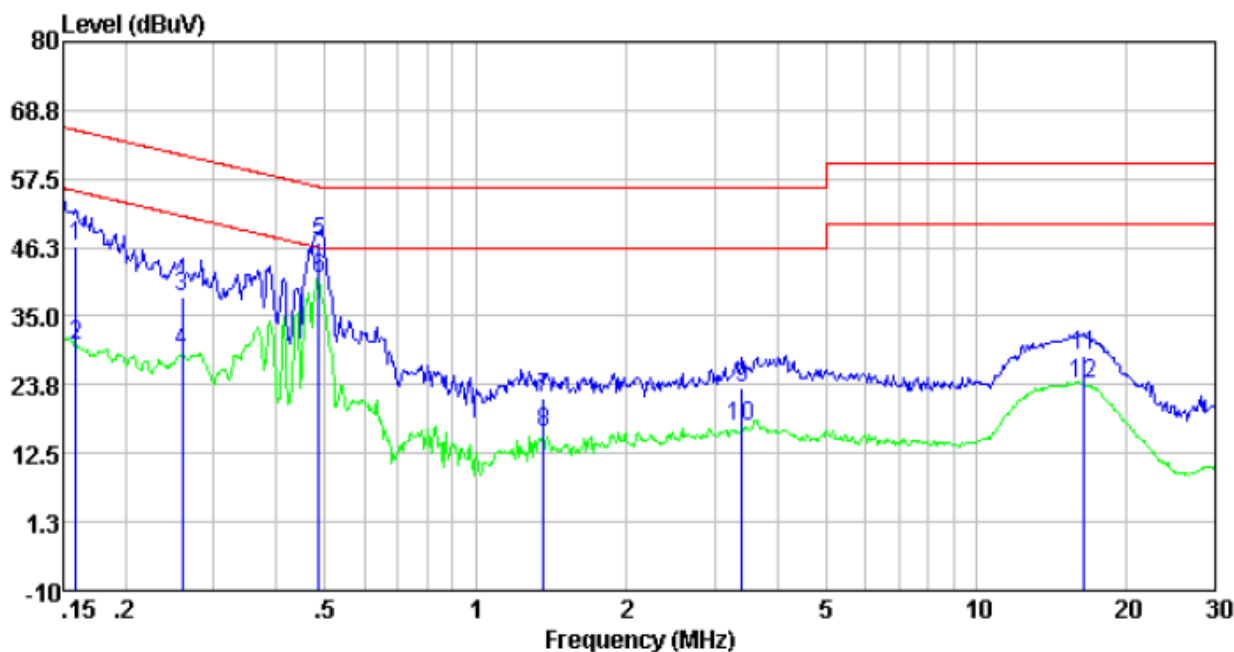
Pre-scan all test modes, found worst case at 802.11a 5745MHz, and so only show the test result of it.

Line:



Freq	Reading	LISN/ISN	Cable	Level	Limit	Over	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.15	39.14	10.04	0.01	49.19	65.91	-16.72	QP
0.15	22.22	10.04	0.01	32.27	55.91	-23.64	Average
0.21	33.28	9.55	0.01	42.84	63.36	-20.52	QP
0.21	19.05	9.55	0.01	28.61	53.36	-24.75	Average
0.33	18.57	9.63	0.01	28.21	59.49	-31.28	QP
0.33	10.71	9.63	0.01	20.35	49.49	-29.14	Average
0.48	22.71	9.83	0.01	32.55	56.27	-23.72	QP
0.48	15.41	9.83	0.01	25.25	46.27	-21.02	Average
1.34	11.84	9.68	0.04	21.56	56.00	-34.44	QP
1.34	5.88	9.68	0.04	15.60	46.00	-30.40	Average
13.99	18.82	9.65	0.15	28.62	60.00	-31.38	QP
13.99	14.14	9.65	0.15	23.94	50.00	-26.06	Average

Neutral:

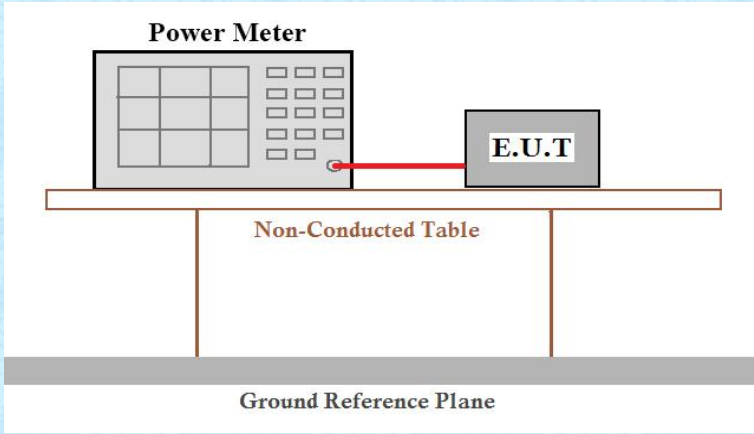


Freq	Reading level	LISN/ISN factor	Cable loss	Level	Limit level	Over limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.16	36.59	9.97	0.01	46.57	65.52	-18.95	QP
0.16	20.25	9.97	0.01	30.23	55.52	-25.29	Average
0.26	28.66	9.61	0.01	38.28	61.47	-23.19	QP
0.26	19.47	9.61	0.01	29.09	51.47	-22.38	Average
0.49	37.36	9.84	0.01	47.21	56.23	-9.02	QP
0.49	31.27	9.84	0.01	41.12	46.23	-5.11	Average
1.37	11.93	9.62	0.04	21.59	56.00	-34.41	QP
1.37	6.11	9.62	0.04	15.77	46.00	-30.23	Average
3.40	13.63	9.44	0.06	23.13	56.00	-32.87	QP
3.40	7.46	9.44	0.06	16.96	46.00	-29.04	Average
16.40	18.71	9.66	0.17	28.54	60.00	-31.46	QP
16.40	13.89	9.66	0.17	23.72	50.00	-26.28	Average

Notes:

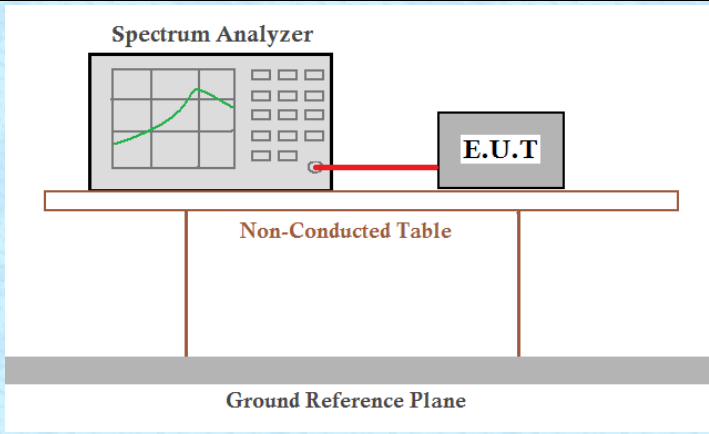
1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak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

7.3 Maximum Conducted Output Power

Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	30dBm
Duty Cycle set up:	RBW=VBW=8MHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

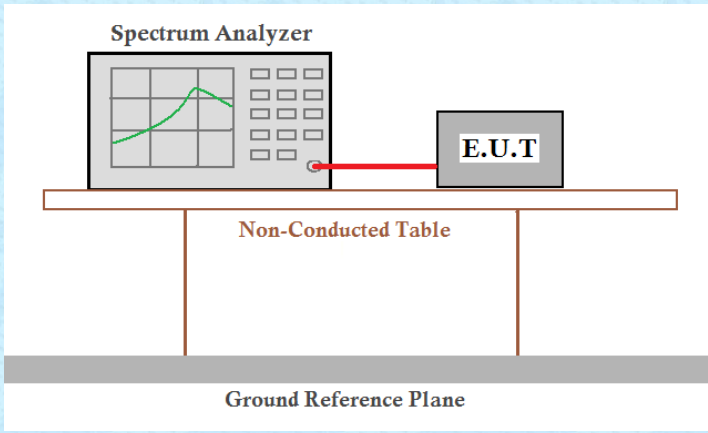
Measurement Data: The detailed test data see Appendix.

7.4 Channel Bandwidth and 99% Occupied Bandwidth

Test Requirement:	FCC Part15 E Section 15.407(e)
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	>500KHz
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer, showing a frequency spectrum on its screen, is connected to an Equipment Under Test (E.U.T.) by a red cable. Both the Spectrum Analyzer and the E.U.T. are positioned on a Non-Conducted Table. This table is supported by a Ground Reference Plane, which is represented by a thick grey bar at the bottom of the 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.

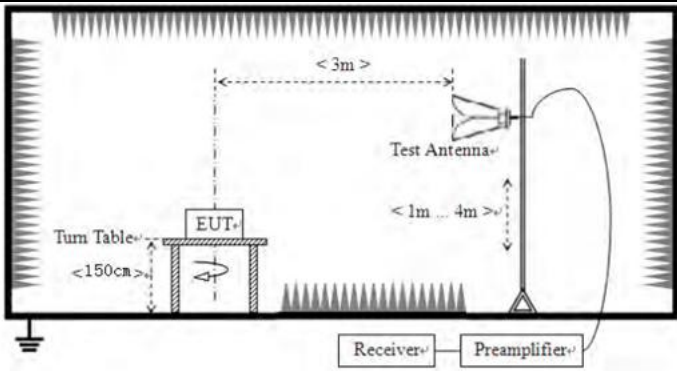
7.5 Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	30dBm/500kHz
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.
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.

7.6 Band edge

7.6.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.10: 2013				
Test Frequency Range:	9kHz to 40GHz, only worse case is reported				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	Above 1GHz	Peak RMS	1MHz 1MHz	3MHz 3MHz	Peak RMS
Limit:	All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz 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 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.				
Test setup:					
Test Procedure:	1. The EUT was placed on the top of a rotating table 1.5 meters 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. 7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.				

Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

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.*
3. *The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.*
4. *According to KDB 789033 D02v02r01 section G) 1) d), for measurements above 1000 MHz @3m distance, the limit of field strength is computed as follows:*

$$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2;$$

$$E[\text{dBuV/m}] = -27 + 95.2 = 68.2\text{dBuV/m}.$$

$$E[\text{dBuV/m}] = 10 + 95.2 = 105.2\text{dBuV/m}.$$

$$E[\text{dBuV/m}] = 15.6 + 95.2 = 110.8\text{dBuV/m}.$$

$$E[\text{dBuV/m}] = 27 + 95.2 = 122.2\text{dBuV/m}$$

Measurement data:

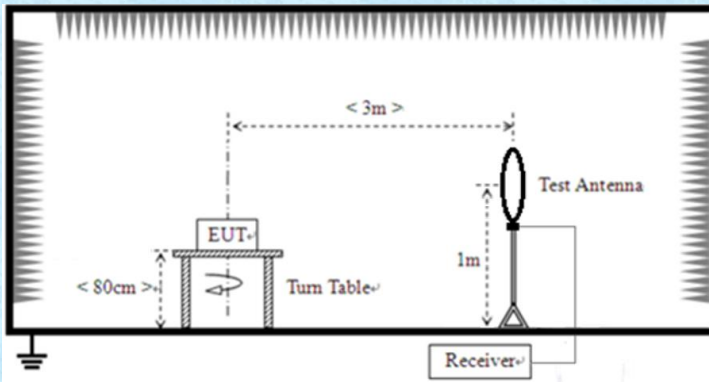
<i>IEEE 802.11a</i>								
Peak value:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5650	34.68	32.36	9.72	23.83	52.93	68.20	-15.27	Horizontal
5700	32.57	32.5	9.79	23.84	51.02	105.20	-54.18	Horizontal
5720	28.71	32.53	9.81	23.85	47.20	110.80	-63.60	Horizontal
5725	32.28	32.53	9.83	23.86	50.78	122.20	-71.42	Horizontal
5850	33.68	32.7	9.99	23.87	52.50	122.20	-69.70	Horizontal
5855	30.05	32.72	9.99	23.88	48.88	110.80	-61.92	Horizontal
5875	32.76	32.74	10.04	23.89	51.65	105.20	-53.55	Horizontal
5925	30.42	32.8	10.11	23.9	49.43	68.20	-18.77	Horizontal
5650	30.92	32.36	9.72	23.83	49.17	68.20	-19.03	Vertical
5700	27.59	32.5	9.79	23.84	46.04	105.20	-59.16	Vertical
5720	31.09	32.53	9.81	23.85	49.58	110.80	-61.22	Vertical
5725	32.10	32.53	9.83	23.86	50.60	122.20	-71.60	Vertical
5850	28.60	32.7	9.99	23.87	47.42	122.20	-74.78	Vertical
5855	33.44	32.72	9.99	23.88	52.27	110.80	-58.53	Vertical
5875	29.52	32.74	10.04	23.89	48.41	105.20	-56.79	Vertical
5925	31.09	32.8	10.11	23.9	50.10	68.20	-18.10	Vertical

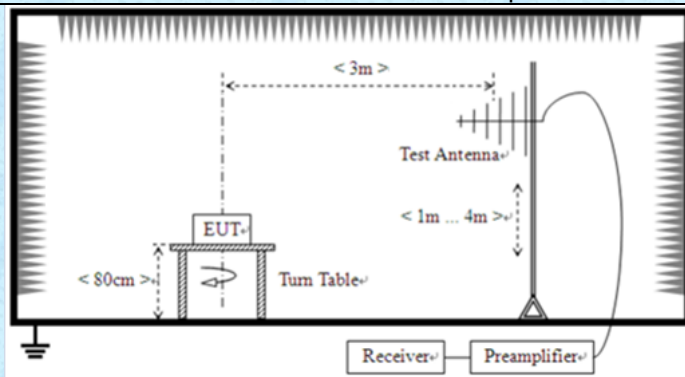
IEEE 802.11n HT20								
Peak value:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5650	28.78	32.36	9.72	23.83	47.03	68.20	-21.17	Horizontal
5700	27.73	32.5	9.79	23.84	46.18	105.20	-59.02	Horizontal
5720	29.11	32.53	9.81	23.85	47.60	110.80	-63.20	Horizontal
5725	29.86	32.53	9.83	23.86	48.36	122.20	-73.84	Horizontal
5850	34.18	32.7	9.99	23.87	53.00	122.20	-69.20	Horizontal
5855	30.32	32.72	9.99	23.88	49.15	110.80	-61.65	Horizontal
5875	33.64	32.74	10.04	23.89	52.53	105.20	-52.67	Horizontal
5925	33.47	32.8	10.11	23.9	52.48	68.20	-15.72	Horizontal
5650	33.26	32.36	9.72	23.83	51.51	68.20	-16.69	Vertical
5700	32.58	32.5	9.79	23.84	51.03	105.20	-54.17	Vertical
5720	32.97	32.53	9.81	23.85	51.46	110.80	-59.34	Vertical
5725	30.71	32.53	9.83	23.86	49.21	122.20	-72.99	Vertical
5850	32.46	32.7	9.99	23.87	51.28	122.20	-70.92	Vertical
5855	33.64	32.72	9.99	23.88	52.47	110.80	-58.33	Vertical
5875	28.45	32.74	10.04	23.89	47.34	105.20	-57.86	Vertical
5925	34.58	32.8	10.11	23.9	53.59	68.20	-14.61	Vertical

IEEE 802.11n HT40								
Peak value:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5650	31.56	32.36	9.72	23.83	49.81	68.20	-18.39	Horizontal
5700	30.75	32.5	9.79	23.84	49.20	105.20	-56.00	Horizontal
5720	31.08	32.53	9.81	23.85	49.57	110.80	-61.23	Horizontal
5725	31.98	32.53	9.83	23.86	50.48	122.20	-71.72	Horizontal
5850	28.48	32.7	9.99	23.87	47.30	122.20	-74.90	Horizontal
5855	33.34	32.72	9.99	23.88	52.17	110.80	-58.63	Horizontal
5875	29.86	32.74	10.04	23.89	48.75	105.20	-56.45	Horizontal
5925	31.12	32.8	10.11	23.9	50.13	68.20	-18.07	Horizontal
5650	33.65	32.36	9.72	23.83	51.90	68.20	-16.30	Vertical
5700	30.10	32.5	9.79	23.84	48.55	105.20	-56.65	Vertical
5720	29.79	32.53	9.81	23.85	48.28	110.80	-62.52	Vertical
5725	30.91	32.53	9.83	23.86	49.41	122.20	-72.79	Vertical
5850	34.30	32.7	9.99	23.87	53.12	122.20	-69.08	Vertical
5855	29.79	32.72	9.99	23.88	48.62	110.80	-62.18	Vertical
5875	29.97	32.74	10.04	23.89	48.86	105.20	-56.34	Vertical
5925	33.68	32.8	10.11	23.9	52.69	68.20	-15.51	Vertical

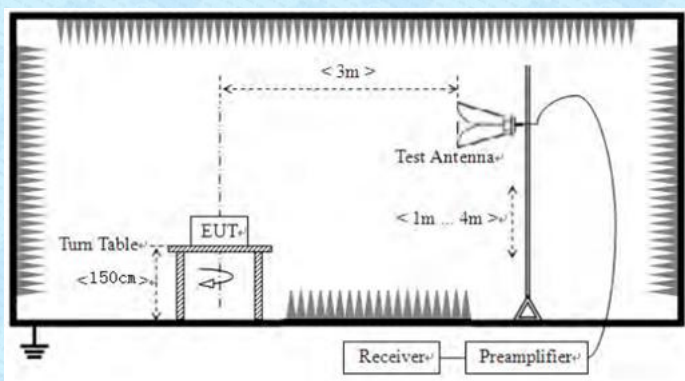
7.7 Spurious Emission

7.7.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209, Part 15E Section 15.407(b)(4)																												
Test Method:	ANSI C63.10:2013																												
Test Frequency Range:	9kHz to 40GHz																												
Test site:	Measurement Distance: 3m																												
Receiver setup:	Frequency	Detector	RBW	VBW	Value																								
	9kHz-150KHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value																								
	150kHz-30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value																								
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value																								
	Above 1GHz	Peak	1MHz	3MHz	Peak Value																								
		AV	1MHz	3MHz	Average Value																								
Note: For Duty cycle ≥ 98%, average detector set as above For Duty cycle < 98%, average detector set as below: VBW ≥ 1 / T																													
Limit:	<table><tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr><tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr><tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr><tr><td>1.705-30.0</td><td>30</td><td>30</td></tr><tr><td>30-88</td><td>100**</td><td>3</td></tr><tr><td>88-216</td><td>150**</td><td>3</td></tr><tr><td>216-960</td><td>200**</td><td>3</td></tr><tr><td>Above 960</td><td>500</td><td>3</td></tr></table>					Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)	0.009-0.490	2400/F(kHz)	300	0.490-1.705	24000/F(kHz)	30	1.705-30.0	30	30	30-88	100**	3	88-216	150**	3	216-960	200**	3	Above 960	500	3
	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)																										
	0.009-0.490	2400/F(kHz)	300																										
	0.490-1.705	24000/F(kHz)	30																										
	1.705-30.0	30	30																										
	30-88	100**	3																										
	88-216	150**	3																										
	216-960	200**	3																										
Above 960	500	3																											
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.																													
Test setup:	For radiated emissions from 9kHz to 30MHz																												
																													
For radiated emissions from 30MHz to1GHz																													



For radiated emissions above 1GHz



Test Procedure:

1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) 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.
7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

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					

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:

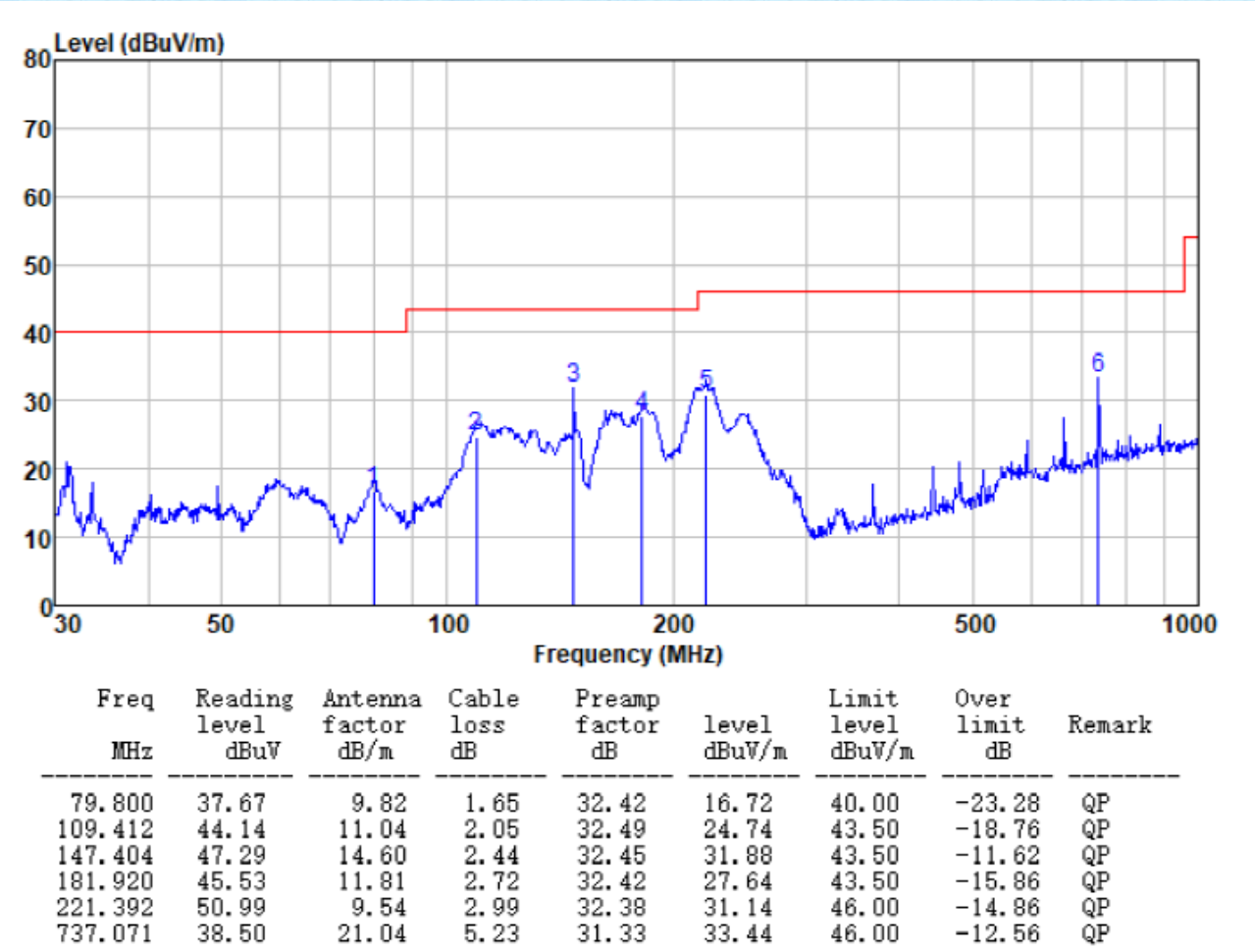
9 kHz ~ 30 MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

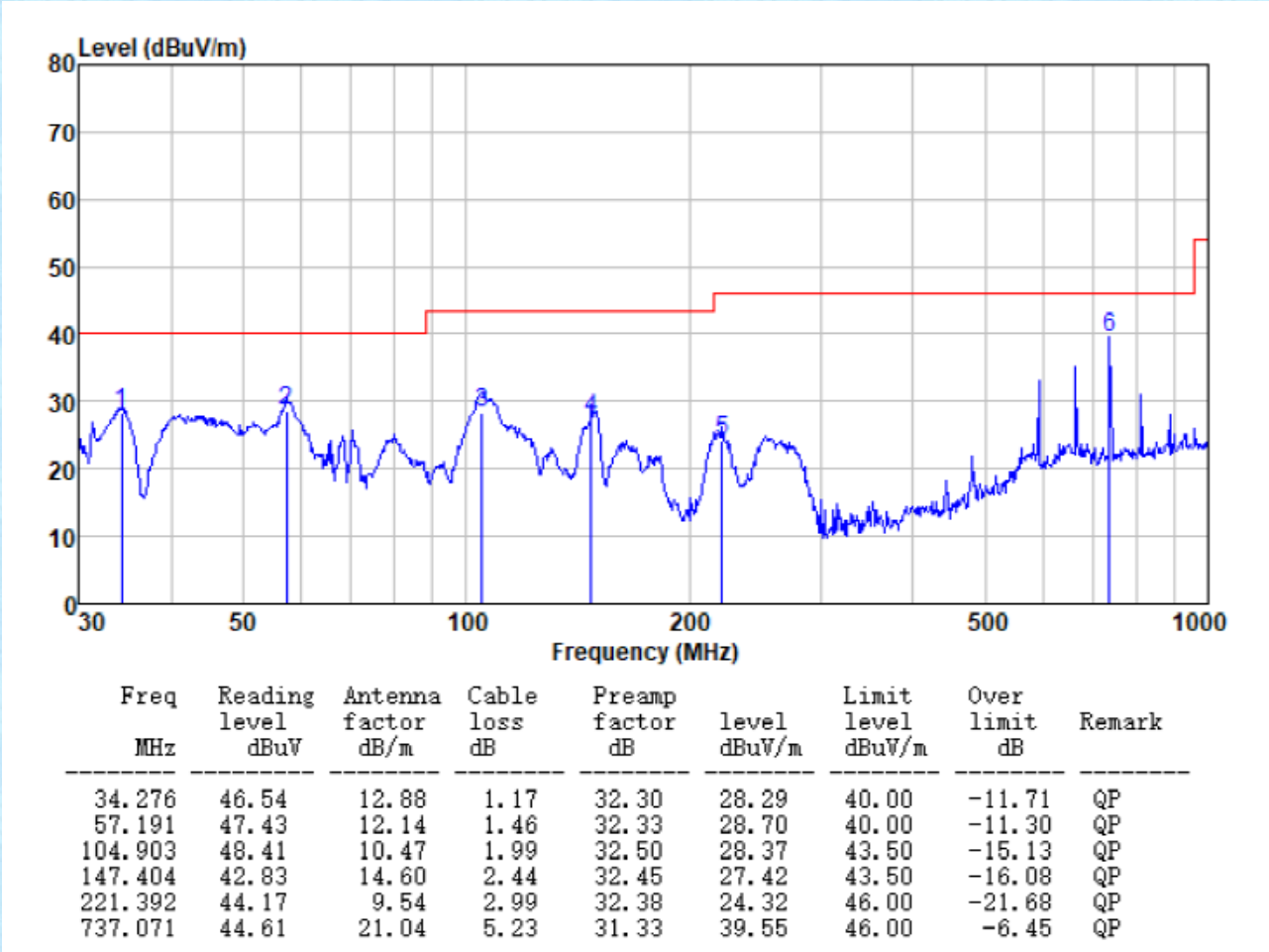
Below 1GHz

Pre-scan all test modes, found worst case at 802.11a 5745MHz, and so only show the test result of it.

Horizontal:



Vertical:



Above 1GHz:

802.11a					Test Frequency: 5745MHz			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
11490	28.83	39.40	8.73	36.30	40.66	68.20	-27.54	Horizontal
17235	29.30	41.00	11.37	36.28	45.39	68.20	-22.81	Horizontal
11490	30.16	39.40	8.73	36.30	41.99	68.20	-26.21	Vertical
17235	28.85	41.00	11.37	36.28	44.94	68.20	-23.26	Vertical

802.11a					Test Frequency: 5785MHz			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
11570	27.57	39.28	8.77	36.29	39.33	68.20	-28.87	Horizontal
17355	31.19	41.52	11.48	36.26	47.93	68.20	-20.27	Horizontal
11570	31.91	39.28	8.77	36.29	43.67	68.20	-24.53	Vertical
17355	26.25	41.52	11.48	36.26	42.99	68.20	-25.21	Vertical

802.11a					Test Frequency: 5825MHz			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
11650	31.22	39.16	8.79	36.27	42.67	68.20	-25.53	Horizontal
17475	26.98	42.30	11.58	36.25	44.20	68.20	-24	Horizontal
11650	30.06	39.16	8.79	36.27	41.46	68.20	-26.74	Vertical
17475	26.62	42.30	11.58	36.25	44.04	68.20	-24.16	Vertical

802.11n(HT20)					Test Frequency: 5745MHz			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
11490	32.92	39.40	8.73	36.30	44.32	68.20	-23.88	Horizontal
17235	30.00	41.00	11.37	36.28	45.82	68.20	-22.38	Horizontal
11490	27.57	39.40	8.73	36.30	39.21	68.20	-28.99	Vertical
17235	31.26	41.00	11.37	36.28	46.99	68.20	-21.21	Vertical

802.11n(HT20)					Test Frequency: 5785MHz			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
11570	32.81	39.28	8.77	36.29	45.33	68.20	-22.87	Horizontal
17355	30.22	41.52	11.48	36.26	46.78	68.20	-21.42	Horizontal
11570	32.77	39.28	8.77	36.29	45.13	68.20	-23.07	Vertical
17355	26.26	41.52	11.48	36.26	42.74	68.20	-25.46	Vertical

802.11n(HT20)					Test Frequency: 5825MHz			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
11650	33.07	39.16	8.79	36.27	44.56	68.20	-23.64	Horizontal
17475	30.65	42.30	11.58	36.25	47.94	68.20	-20.26	Horizontal
11650	30.54	39.16	8.79	36.27	41.99	68.20	-26.21	Vertical
17475	30.04	42.30	11.58	36.25	47.50	68.20	-20.7	Vertical

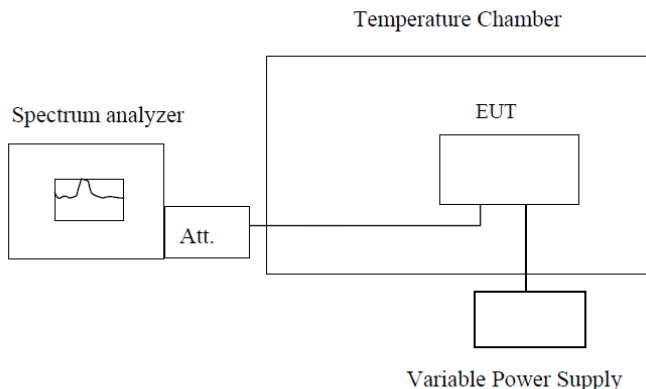
802.11n(HT40)					Test Frequency: 5755MHz			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
11510	28.83	39.40	8.74	36.30	39.93	68.20	-28.27	Horizontal
17265	28.21	41.26	11.40	36.27	44.13	68.20	-24.07	Horizontal
11510	31.36	39.40	8.74	36.30	42.87	68.20	-25.33	Vertical
17265	26.21	41.26	11.40	36.27	41.98	68.20	-26.22	Vertical

802.11n(HT40)					Test Frequency: 5795MHz			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
11590	31.29	39.22	8.77	36.28	42.59	68.20	-25.61	Horizontal
17385	28.00	41.78	11.51	36.26	44.72	68.20	-23.48	Horizontal
11590	30.95	39.22	8.77	36.28	41.98	68.20	-26.22	Vertical
17385	29.58	41.78	11.51	36.26	46.16	68.20	-22.04	Vertical

Notes:

1. Level = Read Level + Antenna Factor+ Cable loss- Preamplifier Factor
2. The test trace is same as the ambient noise (the test frequency range: 18GHz~40GHz), therefore no data appear in the report.
3. If the test result on peak is lower than the limit more than 20dB, then average measurement needn't be performed.

7.8 Frequency stability

Test Requirement:	FCC Part15 C Section 15.407(g)
Test Method:	ANSI C63.10:2013, FCC Part 2.1055
Limit:	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
Test Procedure:	The EUT was setup to ANSI C63.4, 2003; tested to 2.1055 for compliance to FCC Part 15.407(g) requirements.
Test setup:	 Note : Measurement setup for testing on Antenna connector
Test Instruments:	Refer to section 6 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data:

Test Condition	Test Mode	Test Frequency [MHz]	Ant	Result [ppm]	Limit [ppm]	Verdict
NTNV	Carrier	5745	1	1.40	≤ 20	PASS
		5755	1	1.41	≤ 20	PASS
		5775	1	1.41	≤ 20	PASS
		5785	1	1.42	≤ 20	PASS
		5795	1	1.40	≤ 20	PASS
		5825	1	1.41	≤ 20	PASS

8 Test Setup Photo

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

9 EUT Constructional Details

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

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