FCC Test Report

Applicant	:	**Grastron Technology CO., LTD**
Address	:	**401 Building#B Dingxin Science and Technology Park,Honglangbei #2 Road,Xin'an street,Baoan district, Shenzhen, Guangdong Province, 518101, China**
Product Name	:	**BYOM Wireless Conference System**
Report Date	:	**Jan. 19, 2024**

Shenzhen Anbotek Compliance Laboratory Limited

Contents

TEST REPORT

Applicant	:	Grastron Technology CO., LTD
Manufacturer	:	Grastron Technology CO., LTD
Product Name	:	BYOM Wireless Conference System
Test Model No.	:	WMB-P35
Reference Model No.	:	WU-20, WU-21, WU-22, WU-23, WU-24,WU-25, WU-26, WU-27, WU-28, WU-29, WMB-P30, WMB-P31, WMB-P32, WMB-P33, WMB-P34, WMB-P36, WMB-P37, WMB-P38, WMB-P39
Trade Mark	:	N/A
Rating(s)	:	Input: 12V⎓ 3A
Test Standard(s)	:	**47 CFR Part 15E** **ANSI C63.10-2020** **KDB 662911 D01 Multiple Transmitter Output v02r01** **KDB 789033 D02 General UNII Test Procedures New Rules v02r01**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with above listed standard(s) requirements. This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt: Dec. 12, 2023

Date of Test: Dec. 12, 2023 ~ Jan. 05, 2024

Prepared By: Nian xiu Chen

(Nianxiu Chen)

Approved & Authorized Signer: Edward pan

(Edward Pan)

Revision History

Report Version	Description	Issued Date
R00	Original Issue.	Jan. 19, 2024

1. General Information

1.1. Client Information

Applicant	:	Grastron Technology CO., LTD
Address	:	401 Building#B Dingxin Science and Technology Park,Honglangbei #2 Road,Xin'an street,Baoan district, Shenzhen, Guangdong Province, 518101, China
Manufacturer	:	Grastron Technology CO., LTD
Address	:	401 Building#B Dingxin Science and Technology Park,Honglangbei #2 Road,Xin'an street,Baoan district, Shenzhen, Guangdong Province, 518101, China
Factory	:	Grastron Technology CO., LTD
Address	:	401 Building#B Dingxin Science and Technology Park,Honglangbei #2 Road,Xin'an street,Baoan district, Shenzhen, Guangdong Province, 518101, China

1.2. Description of Device (EUT)

Product Name	:	BYOM Wireless Conference System
Test Model No.	:	WMB-P35
Reference Model No.	:	WU-20, WU-21, WU-22, WU-23, WU-24,WU-25, WU-26, WU-27, WU-28, WU-29, WMB-P30, WMB-P31, WMB-P32, WMB-P33, WMB-P34, WMB-P36, WMB-P37, WMB-P38, WMB-P39 (Note: All samples are the same except the model number and appearance color, so we prepare "WMB-P35" for test only.)
Trade Mark	:	N/A
Test Power Supply	:	AC 120V/60Hz for Adapter
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)
Adapter	:	Manufacturer: Dong Guan City GangQi Electronic Co., Ltd Model: GQ36-120300-AX Input: 100-240V~ 50/60Hz 1.0A Max Output: 12.0V⎓ 3.0A 36.0W
RF Specification		
Operation Frequency	:	802.11a/n(HT20)/ac(HT20): NII Band 1: 5180MHz to 5240MHz; NII Band 3: 5745MHz to 5825MHz; 802.11n(HT40)/ac(HT40): NII Band 1: 5190MHz to 5230MHz; NII Band 3: 5755MHz to 5795MHz; 802.11ac(HT80): NII Band 1: 5210MHz; U-NII Band 3: 5775MHz
Number of Channel	:	802.11a/n(HT20)/ac(HT20): NII Band 1: 4;

		NII Band 3: 5; 802.11n(HT40)/ac(HT40): NII Band 1: 2; NII Band 3: 2; 802.11ac(HT80): NII Band 1: 1; U-NII Band 3: 1
Modulation Type	:	802.11a: OFDM(BPSK, QPSK, 16QAM, 64QAM); 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM); 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM);
Antenna Type	:	Rod Antenna
Antenna Gain(Peak)	:	WiFi 5.2G: 1.75 dBi WiFi 5.8G: 3.88 dBi
Remark: (1) All of the RF specification are provided by customer. (2) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.		

1.3. Auxiliary Equipment Used During Test

Title	Manufacturer	Model No.	Serial No.
/	/	/	/

1.4. Operation channel list

Operation Band: U-NII Band 1

Bandwidth:	20MHz	Bandwidth:	40MHz	Bandwidth:	80MHz
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230	/	/
44	5220	/	/	/	/
48	5240	/	/	/	/

Operation Band: U-NII Band 3

Bandwidth:	20MHz	Bandwidth:	40MHz	Bandwidth:	80MHz
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	151	5755	155	5775
153	5765	159	5795	/	/
157	5785	/	/	/	/
161	5805	/	/	/	/
165	5825	/	/	/	/

1.5. Description of Test Modes

Pretest Modes	Descriptions
TM1	Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11a modulation type. All data rates has been tested and found the data rate @ 6Mbps is the worst case. Only the data of worst case is recorded in the report.
TM2	Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11n modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.
TM3	Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11ac modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.

1.6. Measurement Uncertainty

Parameter	Uncertainty
Conducted emissions (AMN 150kHz~30MHz)	3.4dB
Conducted Output Power	0.76dB
Power Spectral Density	0.76dB
Occupied Bandwidth	925Hz
Radiated spurious emissions (above 1GHz)	1G-6GHz: 4.78dB; 6G-18GHz: 4.88dB 18G-40GHz: 5.68dB
Radiated emissions (Below 30MHz)	3.53dB
Radiated spurious emissions (30MHz~1GHz)	Horizontal: 3.92dB; Vertical: 4.52dB
The measurement uncertainty and decision risk evaluated according to AB/WI-RF-F-032. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

1.7. Test Summary

Test Items	Test Modes	Status
Conducted Emission at AC power line	Mode1,2,3	P
Duty Cycle	Mode1,2,3	P
Maximum conducted output power	Mode1,2,3	P
Power spectral density	Mode1,2,3	P
Emission bandwidth and occupied bandwidth	Mode1,2,3	P
Band edge emissions (Radiated)	Mode1,2,3	P
Undesirable emission limits (below 1GHz)	Mode1,2,3	P
Undesirable emission limits (above 1GHz)	Mode1,2,3	P
Note: P: Pass N: N/A, not applicable		

1.8. Description of Test Facility

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

FCC-Registration No.: 434132
Shenzhen Anbotek Compliance Laboratory Limited, 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 our files. Registration No. 434132.

ISED-Registration No.: 8058A
Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A.

Test Location
Shenzhen Anbotek Compliance Laboratory Limited.
1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.

1.9. Disclaimer

1. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
2. The test report is invalid if there is any evidence and/or falsification.
3. The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
4. This document may not be altered or revised in any way unless done so by Anbotek and all revisions are duly noted in the revisions section.
5. Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
6. The authenticity of the information provided by the customer is the responsibility of the customer and the laboratory is not responsible for its authenticity.

The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

1.10. Test Equipment List

Conducted Emission at AC power line						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due Date
1	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	2023-10-12	2024-10-11
2	Three Phase V-type Artificial Power Network	CYBERTEK	EM5040DT	E215040DT001	2023-07-05	2024-07-04
3	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	2023-10-12	2024-10-11
4	Software Name EZ-EMC	Farad Technology	ANB-03A	N/A	/	/

Duty Cycle Maximum conducted output power Power spectral density Emission bandwidth and occupied bandwidth						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due Date
1	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80B	N/A	2023-10-16	2024-10-15
2	DC Power Supply	IVYTECH	IV3605	1804D360510	2023-10-20	2024-10-19
3	Spectrum Analyzer	Rohde & Schwarz	FSV40-N	101792	2023-05-26	2024-05-25
4	MXA Spectrum Analysis	KEYSIGHT	N9020A	MY50531823	2023-02-23	2024-02-22
5	Oscilloscope	Tektronix	MDO3012	C020298	2023-10-12	2024-10-11
6	MXG RF Vector Signal Generator	Agilent	N5182A	MY47420647	2023-02-23	2024-10-22

Band edge emissions (Radiated) Undesirable emission limits (above 1GHz)						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due Date
1	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	2023-10-12	2024-10-11
2	EMI Preamplifier	SKET Electronic	LNPA-0118G-45	SKET-PA-002	2023-10-12	2024-10-11
3	Double Ridged Horn Antenna	SCHWARZBECK	BBHA 9120D	02555	2022-10-16	2025-10-15
4	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	/	/
5	Horn Antenna	A-INFO	LB-180400-KF	J211060628	2023-10-12	2024-10-11
6	Spectrum Analyzer	Rohde & Schwarz	FSV40-N	101792	2023-05-26	2024-05-25
7	Amplifier	Talent Microwave	TLLA18G40G-50-30	23022802	2023-05-25	2024-05-24

Undesirable emission limits (below 1GHz)						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due Date
1	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	2023-10-12	2024-10-11
2	Pre-amplifier	SONOMA	310N	186860	2023-10-12	2024-10-11
3	Bilog Broadband Antenna	Schwarzbeck	VULB9163	345	2022-10-23	2025-10-22
4	Loop Antenna (9K-30M)	Schwarzbeck	FMZB1519B	00053	2023-10-12	2024-10-11
5	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	/	/

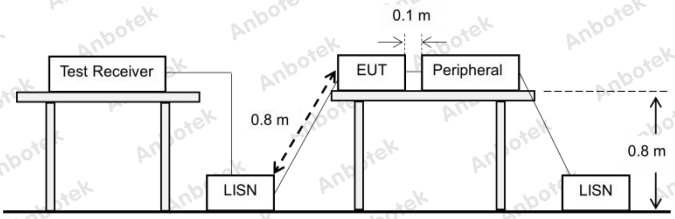
2. Conducted Emission at AC power line

Test Requirement:	47 CFR Part 15.207(a)
Test Limit:	Frequency of emission (MHz) / Conducted limit (dBμV): 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 Method:	ANSI C63.10-2020 section 6.2

2.1. EUT Operation

Operating Environment:	
Test mode:	1: 802.11a mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11a modulation type. All data rates has been tested and found the data rate @ 6Mbps is the worst case. Only the data of worst case is recorded in the report. 2: 802.11n mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11n modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report. 3: 802.11ac mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11ac modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.

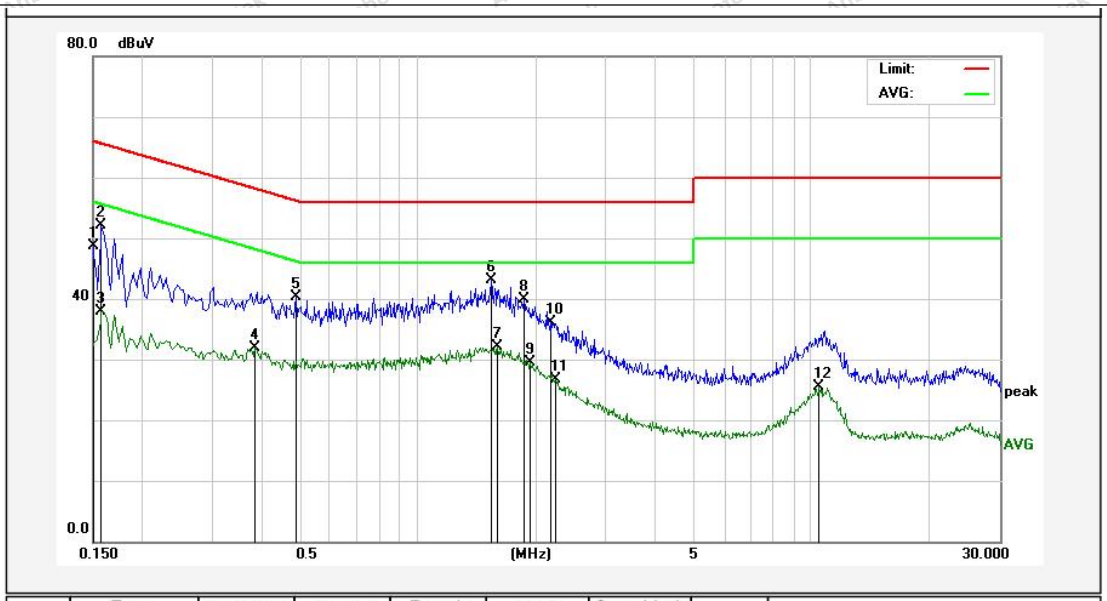
2.2. Test Setup



2.3. Test Data

Temperature:	23.6 °C	Humidity:	54 %	Atmospheric Pressure:	101 kPa

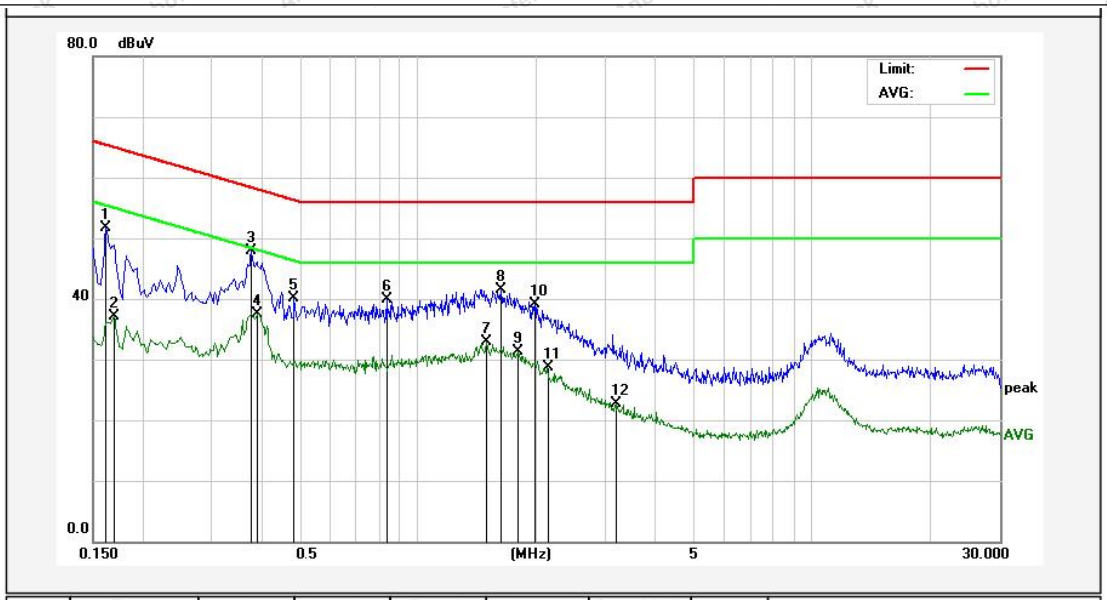
TM1 / Line: Line / Band: 5150-5250 MHz / BW: 20 / CH: M



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1499	30.89	17.82	48.71	66.00	-17.29	QP	
2	0.1580	34.19	17.83	52.02	65.56	-13.54	QP	
3	0.1580	20.15	17.83	37.98	55.56	-17.58	AVG	
4	0.3860	14.11	17.81	31.92	48.15	-16.23	AVG	
5	0.4900	22.39	17.85	40.24	56.17	-15.93	QP	
6	1.5420	25.23	17.84	43.07	56.00	-12.93	QP	
7	1.5940	14.30	17.84	32.14	46.00	-13.86	AVG	
8	1.8660	22.17	17.83	40.00	56.00	-16.00	QP	
9	1.9340	11.62	17.83	29.45	46.00	-16.55	AVG	
10	2.1780	18.28	17.83	36.11	56.00	-19.89	QP	
11	2.2460	8.81	17.83	26.64	46.00	-19.36	AVG	
12	10.4779	7.50	17.99	25.49	50.00	-24.51	AVG	

Temperature:	23.6 °C	Humidity:	54 %	Atmospheric Pressure:	101 kPa

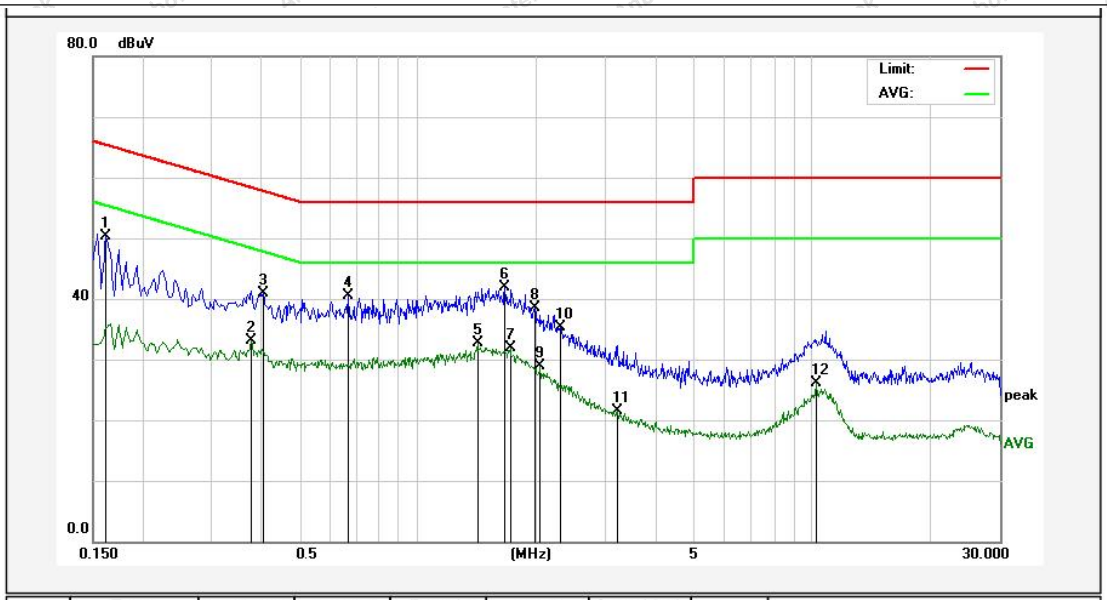
TM1 / Line: Neutral / Band: 5150-5250 MHz / BW: 20 / CH: M



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1620	33.95	17.83	51.78	65.36	-13.58	QP	
2	0.1700	19.26	17.83	37.09	54.96	-17.87	AVG	
3	0.3780	30.08	17.81	47.89	58.32	-10.43	QP	
4	0.3899	19.75	17.81	37.56	48.06	-10.50	AVG	
5	0.4860	22.27	17.84	40.11	56.24	-16.13	QP	
6	0.8380	21.96	17.86	39.82	56.00	-16.18	QP	
7	1.4980	15.00	17.83	32.83	46.00	-13.17	AVG	
8	1.6300	23.63	17.84	41.47	56.00	-14.53	QP	
9	1.8060	13.52	17.84	31.36	46.00	-14.64	AVG	
10	1.9820	21.26	17.83	39.09	56.00	-16.91	QP	
11	2.1340	10.88	17.83	28.71	46.00	-17.29	AVG	
12	3.2060	4.83	17.84	22.67	46.00	-23.33	AVG	

Temperature:	23.6 °C	Humidity:	54 %	Atmospheric Pressure:	101 kPa

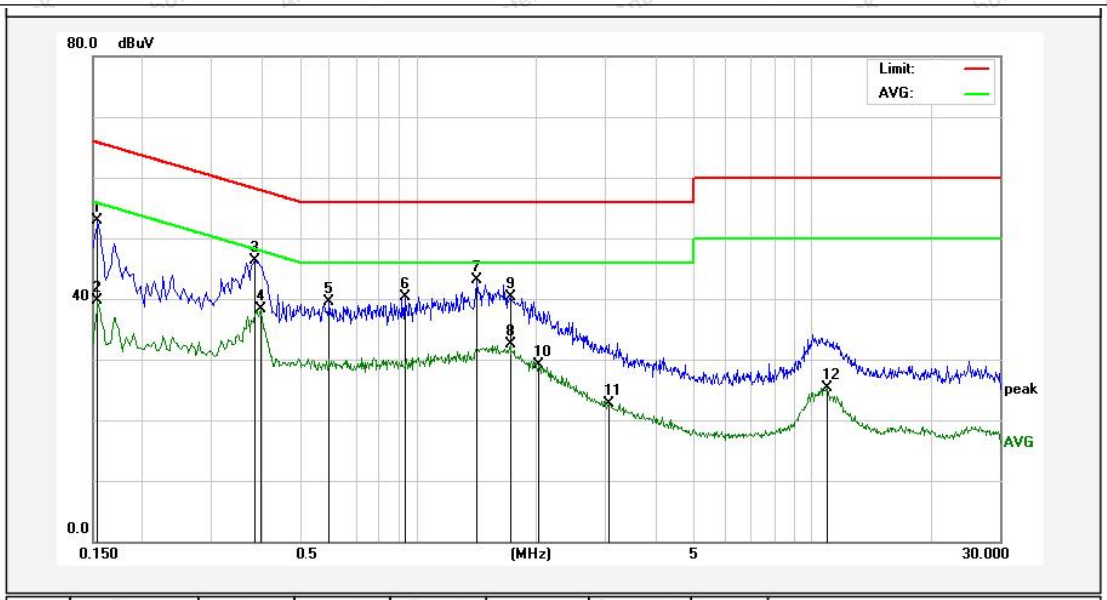
TM1 / Line: Line / Band: 5725-5850 MHz / BW: 20 / CH: H



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1620	32.42	17.83	50.25	65.36	-15.11	QP	
2	0.3780	15.32	17.81	33.13	48.32	-15.19	AVG	
3	0.4060	23.16	17.81	40.97	57.73	-16.76	QP	
4	0.6700	22.72	17.87	40.59	56.00	-15.41	QP	
5	1.4220	14.93	17.84	32.77	46.00	-13.23	AVG	
6	1.6660	24.02	17.84	41.86	56.00	-14.14	QP	
7	1.7220	14.08	17.84	31.92	46.00	-14.08	AVG	
8	1.9820	20.72	17.83	38.55	56.00	-17.45	QP	
9	2.0500	11.01	17.83	28.84	46.00	-17.16	AVG	
10	2.2980	17.44	17.83	35.27	56.00	-20.73	QP	
11	3.2139	3.68	17.84	21.52	46.00	-24.48	AVG	
12	10.2899	8.06	17.99	26.05	50.00	-23.95	AVG	

Temperature:	23.6 °C	Humidity:	54 %	Atmospheric Pressure:	101 kPa

TM1 / Line: Neutral / Band: 5725-5850 MHz / BW: 20 / CH: H



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1539	35.04	17.83	52.87	65.78	-12.91	QP	
2	0.1539	21.82	17.83	39.65	55.78	-16.13	AVG	
3	0.3860	28.51	17.81	46.32	58.15	-11.83	QP	
4	0.3980	20.44	17.81	38.25	47.89	-9.64	AVG	
5	0.5980	21.55	17.86	39.41	56.00	-16.59	QP	
6	0.9300	22.45	17.85	40.30	56.00	-15.70	QP	
7	1.4140	25.30	17.84	43.14	56.00	-12.86	QP	
8	1.7180	14.61	17.84	32.45	46.00	-13.55	AVG	
9	1.7300	22.42	17.84	40.26	56.00	-15.74	QP	
10	2.0260	11.19	17.83	29.02	46.00	-16.98	AVG	
11	3.0579	4.96	17.84	22.80	46.00	-23.20	AVG	
12	10.9819	7.25	18.02	25.27	50.00	-24.73	AVG	

Note:Only record the worst data in the report.

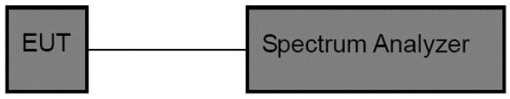
3. Duty Cycle

Test Requirement:	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.
Test Limit:	No limits, only for report use.
Test Method:	ANSI C63.10-2020 section 12.2 (b)
Procedure:	i) Set the center frequency of the instrument to the center frequency of the transmission. ii) Set RBW >= EBW if possible; otherwise, set RBW to the largest available value. iii) Set VBW >= RBW. iv) Set detector = peak. v) The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T, where T is defined in item a1) of 12.2, and the number of sweep points across duration T exceeds 100.

3.1. EUT Operation

Operating Environment:	
Test mode:	1: 802.11a mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11a modulation type. All data rates has been tested and found the data rate @ 6Mbps is the worst case. Only the data of worst case is recorded in the report. 2: 802.11n mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11n modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report. 3: 802.11ac mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11ac modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.

3.2. Test Setup



3.3. Test Data

Temperature:	25.4 °C	Humidity:	46 %	Atmospheric Pressure:	101 kPa

Please Refer to Appendix for Details.

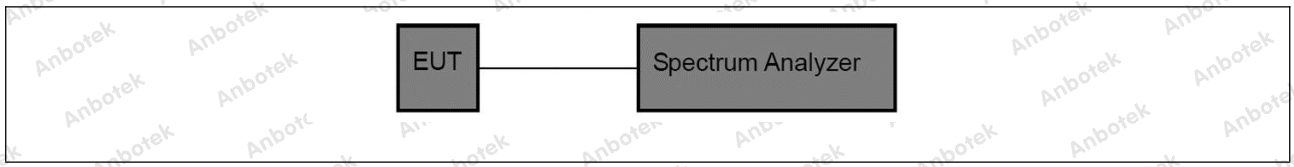
4. Maximum conducted output power

Test Requirement:	47 CFR Part 15.407(a)(1)(iv) 47 CFR Part 15.407(a)(3)(i)
Test Limit:	For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi 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.
Test Method:	ANSI C63.10-2013, section 12.4
Procedure:	Refer to ANSI C63.10-2020 section 12.4

4.1. EUT Operation

Operating Environment:	
Test mode:	1: 802.11a mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11a modulation type. All data rates has been tested and found the data rate @ 6Mbps is the worst case. Only the data of worst case is recorded in the report. 2: 802.11n mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11n modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report. 3: 802.11ac mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11ac modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.

4.2. Test Setup



4.3. Test Data

Temperature:	25.4 °C	Humidity:	46 %	Atmospheric Pressure:	101 kPa

Please Refer to Appendix for Details.

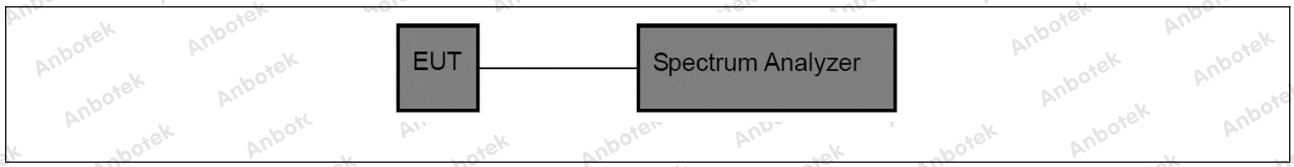
5. Power spectral density

Test Requirement:	47 CFR Part 15.407(a)(1)(iv) 47 CFR Part 15.407(a)(3)(i)
Test Limit:	For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For the band 5.725-5.850 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi 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.
Test Method:	ANSI C63.10-2020, section 12.6
Procedure:	Refer to ANSI C63.10-2020, section 12.6

5.1. EUT Operation

Operating Environment:	
Test mode:	1: 802.11a mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11a modulation type. All data rates has been tested and found the data rate @ 6Mbps is the worst case. Only the data of worst case is recorded in the report. 2: 802.11n mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11n modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report. 3: 802.11ac mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11ac modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.

5.2. Test Setup



5.3. Test Data

Temperature:	25.4 °C	Humidity:	46 %	Atmospheric Pressure:	101 kPa

Please Refer to Appendix for Details.

6. Emission bandwidth and occupied bandwidth

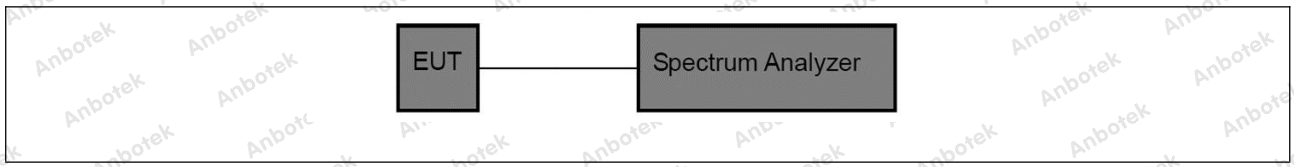
Test Requirement:	U-NII 1, U-NII 2A, U-NII 2C: No limits, only for report use. U-NII 3, U-NII 4: 47 CFR Part 15.407(e)
Test Limit:	U-NII 1, U-NII 2A, U-NII 2C: No limits, only for report use. U-NII 3, U-NII 4: Within the 5.725-5.850 GHz and 5.850-5.895 GHz bands, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.
Test Method:	ANSI C63.10-2020, section 6.9 & 12.5 KDB 789033 D02, Clause C.2
Procedure:	Emission bandwidth: a) Set RBW = approximately 1% of the emission bandwidth. b) Set the VBW > RBW. c) Detector = peak. d) Trace mode = max hold. e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the instrument. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%. Occupied bandwidth: a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. d) Step a) through step c) might require iteration to adjust within the specified range. e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used. f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth. g) If the instrument does not have a 99% power bandwidth function, then the trace data points are

	recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies. h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s). 6 dB emission bandwidth: 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.

6.1. EUT Operation

Operating Environment:	
Test mode:	1: 802.11a mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11a modulation type. All data rates has been tested and found the data rate @ 6Mbps is the worst case. Only the data of worst case is recorded in the report. 2: 802.11n mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11n modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report. 3: 802.11ac mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11ac modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.

6.2. Test Setup



6.3. Test Data

Temperature:	25.4 °C	Humidity:	46 %	Atmospheric Pressure:	101 kPa

Please Refer to Appendix for Details.

7. Band edge emissions (Radiated)

Test Requirement:	47 CFR Part 15.407(b)(1) 47 CFR Part 15.407(b)(4) 47 CFR Part 15.407(b)(10)
Test Limit:	For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. For transmitters operating solely in the 5.725-5.850 GHz band: 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.

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2]Above 38.6

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35apply to these measurements.

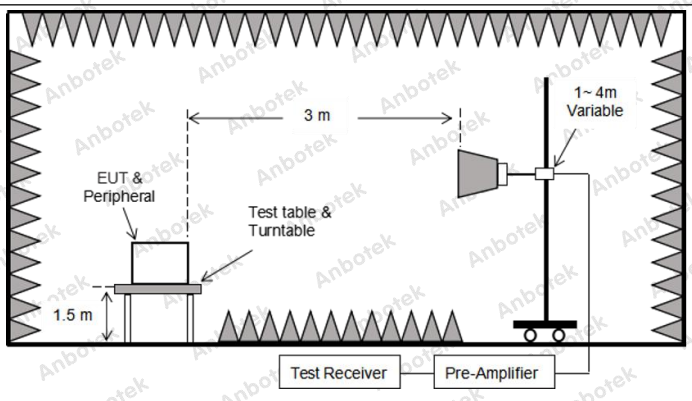
<table>
<tr><td></td><td>Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:
<table>
<tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</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>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
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.</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020, section 12.7.4, 12.7.6, 12.7.7</td></tr>
<tr><td>Procedure:</td><td>Above 1GHz:
a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.</td></tr>
</table>

	i. Repeat above procedures until all frequencies measured was complete. Remark: 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report. 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

7.1. EUT Operation

Operating Environment:	
Test mode:	1: 802.11a mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11a modulation type. All data rates has been tested and found the data rate @ 6Mbps is the worst case. Only the data of worst case is recorded in the report. 2: 802.11n mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11n modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report. 3: 802.11ac mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11ac modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.

7.2. Test Setup



7.3. Test Data

Temperature:	25.4 °C	Humidity:	46 %	Atmospheric Pressure:	101 kPa

WiFi 5.2G:

TM1 / L							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
5150.00	37.12	15.99	53.11	68.20	-15.09	H	Peak
5150.00	39.22	15.99	55.21	68.20	-12.99	V	Peak
5150.00	27.02	15.99	43.01	54.00	-10.99	H	AVG
5150.00	29.11	15.99	45.10	54.00	-8.90	V	AVG
TM1 / H							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
5250.00	37.53	16.43	53.96	68.20	-14.24	H	Peak
5250.00	40.56	16.43	56.99	68.20	-11.21	V	Peak
5250.00	28.90	16.43	45.33	54.00	-8.67	H	AVG
5250.00	29.75	16.43	46.18	54.00	-7.82	V	AVG

Remark: 1. Result=Reading + Factor

TM2 / L							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
5150.00	36.01	15.99	52.00	68.20	-16.20	H	Peak
5150.00	37.44	15.99	53.43	68.20	-14.77	V	Peak
5150.00	26.73	15.99	42.72	54.00	-11.28	H	AVG
5150.00	27.71	15.99	43.70	54.00	-10.30	V	AVG
TM2 / H							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
5250.00	37.86	16.43	54.29	68.20	-13.91	H	Peak
5250.00	38.87	16.43	55.30	68.20	-12.90	V	Peak
5250.00	27.90	16.43	44.33	54.00	-9.67	H	AVG
5250.00	29.40	16.43	45.83	54.00	-8.17	V	AVG

Remark: 1. Result=Reading + Factor

TM3 / L							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
5150.00	37.10	15.99	53.09	68.20	-15.11	H	Peak
5150.00	38.87	15.99	54.86	68.20	-13.34	V	Peak
5150.00	26.64	15.99	42.63	54.00	-11.37	H	AVG
5150.00	28.89	15.99	44.88	54.00	-9.12	V	AVG
TM3 / H							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
5250.00	37.96	16.43	54.39	68.20	-13.81	H	Peak
5250.00	38.20	16.43	54.63	68.20	-13.57	V	Peak
5250.00	27.90	16.43	44.33	54.00	-9.67	H	AVG
5250.00	28.52	16.43	44.95	54.00	-9.05	V	AVG

Remark: 1. Result=Reading + Factor

WiFi 5.8G:

TM1 / L							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
5725.00	38.23	16.37	54.60	68.20	-13.60	H	Peak
5725.00	39.63	16.37	56.00	68.20	-12.20	V	Peak
5725.00	29.08	16.70	45.78	54.00	-8.22	H	AVG
5725.00	30.19	16.70	46.89	54.00	-7.11	V	AVG
TM1 / H							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
5850.00	39.19	17.21	56.40	68.20	-11.80	H	Peak
5850.00	39.56	17.21	56.77	68.20	-11.43	V	Peak
5850.00	29.16	17.21	46.37	54.00	-7.63	H	AVG
5850.00	29.16	17.21	46.37	54.00	-7.63	V	AVG

Remark: 1. Result=Reading + Factor

TM2 / L							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
5725.00	38.21	17.05	55.26	68.20	-12.94	H	Peak
5725.00	38.80	17.05	55.85	68.20	-12.35	V	Peak
5725.00	27.63	17.05	44.68	54.00	-9.32	H	AVG
5725.00	28.17	17.05	45.22	54.00	-8.78	V	AVG
TM2 / H							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
5850.00	37.43	17.21	54.64	68.20	-13.56	H	Peak
5850.00	38.02	17.21	55.23	68.20	-12.97	V	Peak
5850.00	27.71	17.21	44.92	54.00	-9.08	H	AVG
5850.00	28.52	17.21	45.73	54.00	-8.27	V	AVG

Remark: 1. Result=Reading + Factor

TM3 / L							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
5725.00	37.42	17.05	54.47	68.20	-13.73	H	Peak
5725.00	37.55	17.05	54.60	68.20	-13.60	V	Peak
5725.00	28.33	17.05	45.38	54.00	-8.62	H	AVG
5725.00	29.16	17.05	46.21	54.00	-7.79	V	AVG
TM3 / H							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
5850.00	38.16	17.21	55.37	68.20	-12.83	H	Peak
5850.00	39.04	17.21	56.25	68.20	-11.95	V	Peak
5850.00	28.03	17.21	45.24	54.00	-8.76	H	AVG
5850.00	29.12	17.21	46.33	54.00	-7.67	V	AVG

Remark: 1. Result=Reading + Factor

8. Undesirable emission limits (below 1GHz)

<table>
<tr><td>Test Requirement:</td><td>47 CFR Part 15.407(b)(9)</td></tr>
<tr><td>Test Limit:</td><td>Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209.

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:
<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>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
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.</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020, section 12.7.4, 12.7.5</td></tr>
<tr><td>Procedure:</td><td>Below 1GHz:
a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin</td></tr>
</table>

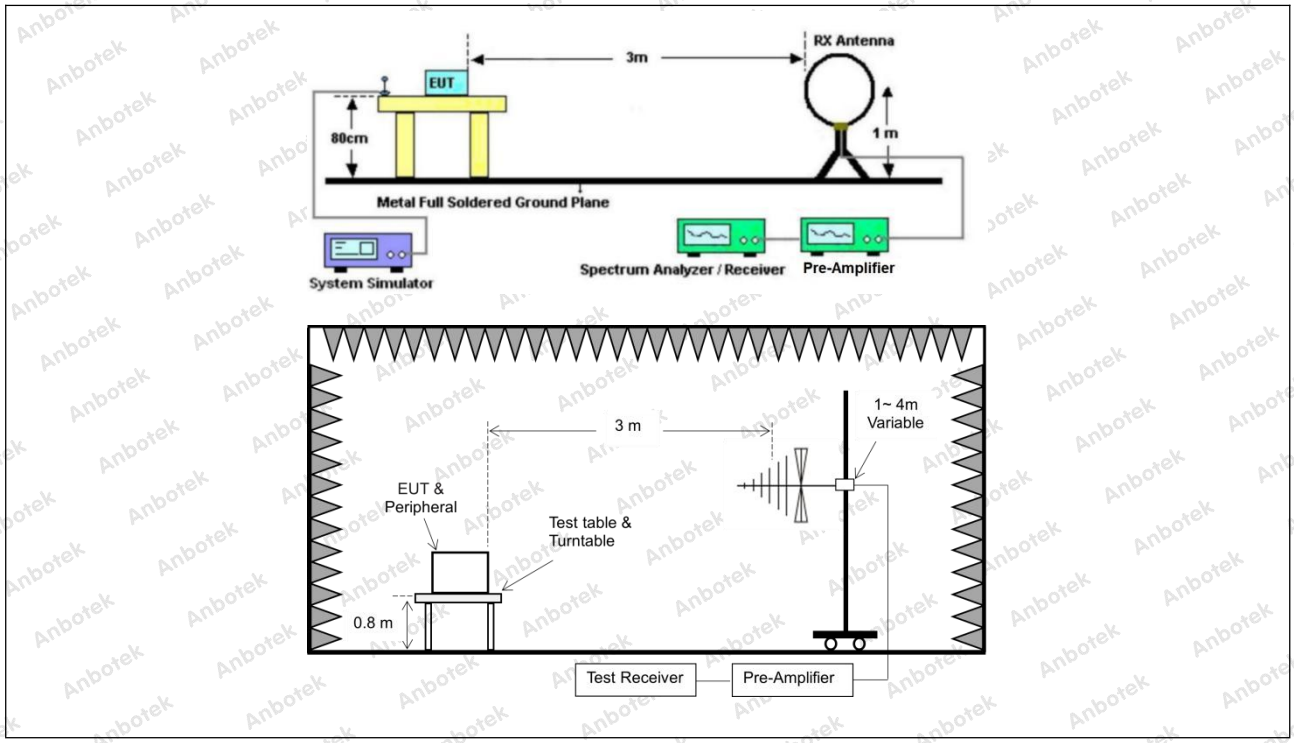
	would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel, the middle channel, the Highest channel. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete. Remark: 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor 2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. 3. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. Above 1GHz: a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel, the middle channel, the Highest channel. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete. Remark: 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB

	below the limit need not be reported. 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report. 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

8.1. EUT Operation

Operating Environment:	
Test mode:	1: 802.11a mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11a modulation type. All data rates has been tested and found the data rate @ 6Mbps is the worst case. Only the data of worst case is recorded in the report. 2: 802.11n mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11n modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report. 3: 802.11ac mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11ac modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.

8.2. Test Setup

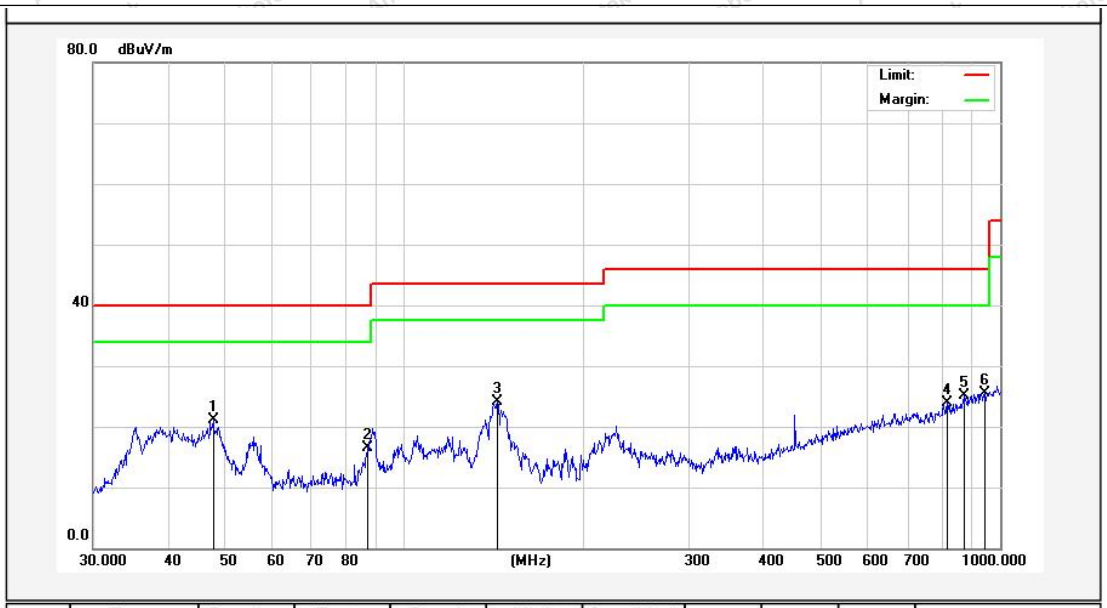


8.3. Test Data

The test results of 9kHz-30MHz was attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Temperature:	22.5 °C	Humidity:	48 %	Atmospheric Pressure:	101 kPa

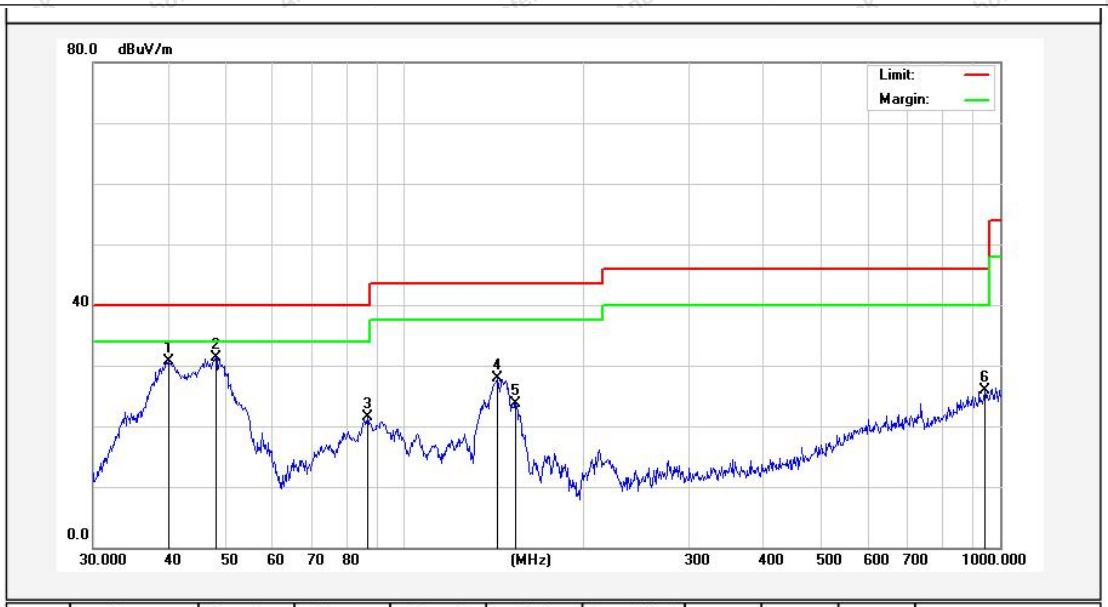
TM1 / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 20 / CH: M



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	47.6584	36.52	-15.50	21.02	40.00	-18.98	QP			
2	86.8067	38.58	-22.13	16.45	40.00	-23.55	QP			
3	143.3260	47.10	-23.00	24.10	43.50	-19.40	QP			
4	815.9678	31.90	-8.01	23.89	46.00	-22.11	QP			
5	872.1832	32.01	-6.93	25.08	46.00	-20.92	QP			
6	942.1304	31.33	-5.74	25.59	46.00	-20.41	QP			

Temperature:	22.5 °C	Humidity:	48 %	Atmospheric Pressure:	101 kPa

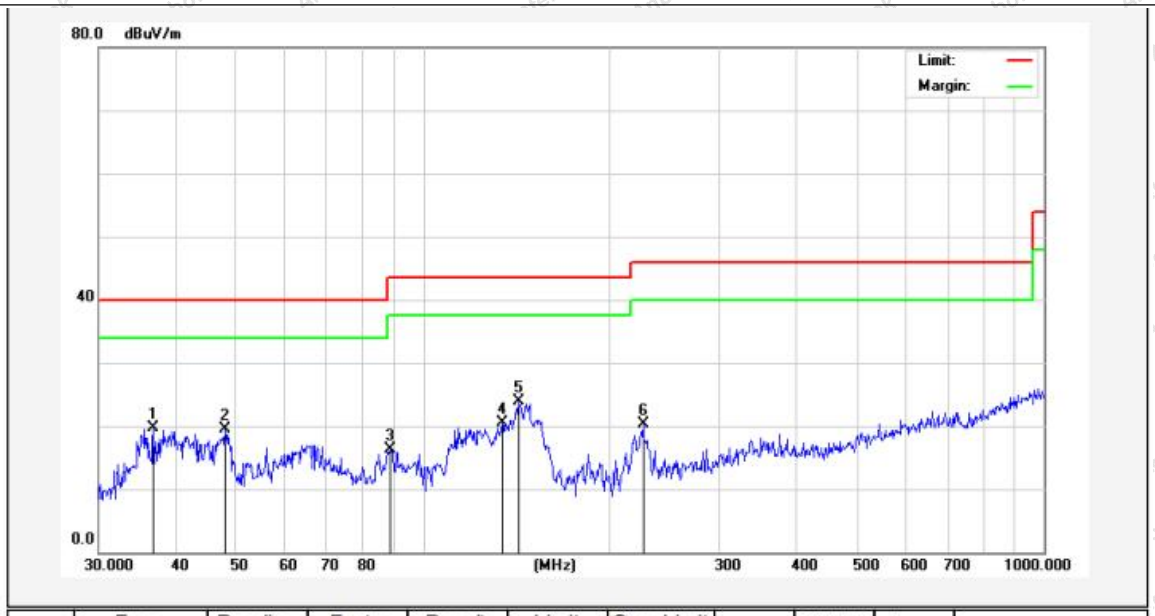
TM1 / Polarization: Vertical / Band: 5150-5250 MHz / BW: 20 / CH: M



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	40.1347	45.32	-14.57	30.75	40.00	-9.25	QP			
2	48.1625	46.86	-15.51	31.35	40.00	-8.65	QP			
3	86.8067	39.76	-18.19	21.57	40.00	-18.43	QP			
4	143.3260	50.01	-22.16	27.85	43.50	-15.65	QP			
5	153.7384	45.68	-21.93	23.75	43.50	-19.75	QP			
6	942.1304	31.62	-5.74	25.88	46.00	-20.12	QP			

Temperature:	22.5 °C	Humidity:	48 %	Atmospheric Pressure:	101 kPa

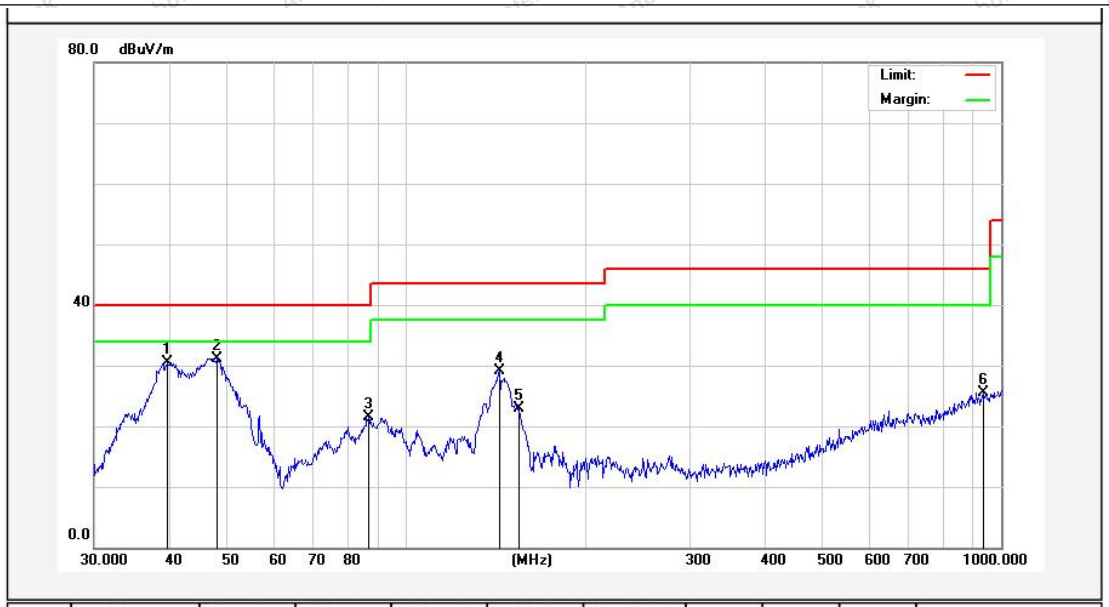
TM1 / Polarization: Horizontal / Band: 5725-5850 MHz / BW: 20 / CH: H



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	36.7661	37.20	-17.59	19.61	40.00	-20.39	QP			
2	47.9938	35.00	-15.54	19.46	40.00	-20.54	QP			
3	88.6524	38.67	-22.33	16.34	43.50	-27.16	QP			
4	134.0882	43.16	-22.74	20.42	43.50	-23.08	QP			
5	142.3241	47.00	-23.02	23.98	43.50	-19.52	QP			
6	226.0994	42.15	-21.90	20.25	46.00	-25.75	QP			

Temperature:	22.5 °C	Humidity:	48 %	Atmospheric Pressure:	101 kPa

TM1 / Polarization: Vertical / Band: 5725-5850 MHz / BW: 20 / CH: H



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	39.8541	45.20	-14.63	30.57	40.00	-9.43	QP			
2	48.1625	46.67	-15.51	31.16	40.00	-8.84	QP			
3	86.8067	39.74	-18.19	21.55	40.00	-18.45	QP			
4	143.8294	51.24	-22.15	29.09	43.50	-14.41	QP			
5	154.8204	44.72	-21.88	22.84	43.50	-20.66	QP			
6	932.2714	31.32	-5.85	25.47	46.00	-20.53	QP			

Note:Only record the worst data in the report.

9. Undesirable emission limits (above 1GHz)

Test Requirement:	47 CFR Part 15.407(b)(1) 47 CFR Part 15.407(b)(4) 47 CFR Part 15.407(b)(10)
Test Limit:	For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. For transmitters operating solely in the 5.725-5.850 GHz band: 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.

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2]Above 38.6

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35apply to these measurements.

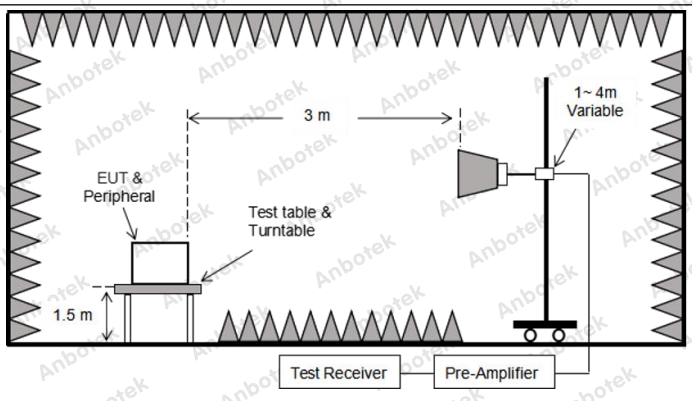
<table>
<tr><td></td><td>Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:
<table>
<tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</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>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
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.</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020, section 12.7.4, 12.7.6, 12.7.7</td></tr>
<tr><td>Procedure:</td><td>Above 1GHz:
a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.</td></tr>
</table>

	i. Repeat above procedures until all frequencies measured was complete. Remark: 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report. 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

9.1. EUT Operation

Operating Environment:	
Test mode:	1: 802.11a mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11a modulation type. All data rates has been tested and found the data rate @ 6Mbps is the worst case. Only the data of worst case is recorded in the report. 2: 802.11n mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11n modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report. 3: 802.11ac mode: Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11ac modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.

9.2. Test Setup



9.3. Test Data

Temperature:	22.5 °C	Humidity:	48 %	Atmospheric Pressure:	101 kPa

WiFi 5.2G:

TM1 / CH: L							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
10360.00	31.51	23.81	55.32	68.20	-12.88	V	Peak
15540.00	32.87	28.68	61.55	68.20	-6.65	V	Peak
10360.00	31.95	23.81	55.76	68.20	-12.44	H	Peak
15540.00	32.94	28.68	61.62	68.20	-6.58	H	Peak
10360.00	20.924	23.81	44.73	54.00	-9.27	V	AVG
15540.00	22.036	28.68	50.72	54.00	-3.28	V	AVG
10360.00	21.135	23.81	44.95	54.00	-9.05	H	AVG
15540.00	21.612	28.68	50.29	54.00	-3.71	H	AVG
TM1 / CH: M							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
10400.00	30.87	23.81	54.68	68.20	-13.52	V	Peak
15600.00	32.40	29.13	61.53	68.20	-6.67	V	Peak
10400.00	31.44	23.81	55.25	68.20	-12.95	H	Peak
15600.00	32.46	29.13	61.59	68.20	-6.61	H	Peak
10400.00	21.194	23.81	45.00	54.00	-9.00	V	AVG
15600.00	22.156	29.13	51.29	54.00	-2.71	V	AVG
10400.00	21.125	23.81	44.94	54.00	-9.06	H	AVG
15600.00	21.692	29.13	50.82	54.00	-3.18	H	AVG
TM1 / CH: H							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
10480.00	30.44	23.80	54.24	68.20	-13.96	V	Peak
15720.00	31.88	30.03	61.91	68.20	-6.29	V	Peak
10480.00	31.08	23.80	54.88	68.20	-13.32	H	Peak
15720.00	31.37	30.03	61.40	68.20	-6.80	H	Peak
10480.00	19.86	23.80	43.66	54.00	-10.34	V	AVG
15720.00	20.92	30.03	50.95	54.00	-3.05	V	AVG
10480.00	20.34	23.80	44.14	54.00	-9.86	H	AVG
15720.00	20.48	30.03	50.51	54.00	-3.49	H	AVG

Remark: 1. Result =Reading + Factor
2. During the test, pre-scan the all modulation, only the worst case(802.11a) is recorded in the report.

WiFi 5.8G:

TM1 / CH: L							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
11490.000	28.53	23.36	51.89	68.20	-16.31	V	Peak
17235.000	29.88	31.97	61.85	68.20	-6.35	V	Peak
11490.000	28.99	23.36	52.35	68.20	-15.85	H	Peak
17235.000	30.10	31.97	62.07	68.20	-6.13	H	Peak
11490.000	17.83	23.36	41.19	54.00	-12.81	V	AVG
17235.000	18.60	31.97	50.57	54.00	-3.43	V	AVG
11490.000	18.02	23.36	41.38	54.00	-12.62	H	AVG
17235.000	18.06	31.97	50.03	54.00	-3.97	H	AVG
TM1 / CH: M							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
11570.000	29.11	23.42	52.53	68.20	-15.67	V	Peak
17355.000	29.76	32.18	61.94	68.20	-6.26	V	Peak
11570.000	29.19	23.42	52.61	68.20	-15.59	H	Peak
17355.000	30.19	32.18	62.37	68.20	-5.83	H	Peak
11570.000	19.103	23.42	42.52	54.00	-11.48	V	AVG
17355.000	18.924	32.18	51.10	54.00	-2.90	V	AVG
11570.000	19.014	23.42	42.43	54.00	-11.57	H	AVG
17355.000	18.442	32.18	50.62	54.00	-3.38	H	AVG
TM1 / CH: H							
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit (dB)	Antenna Pol.	Detector
11650.000	28.62	23.49	52.11	68.20	-16.09	V	Peak
17475.000	30.00	32.39	62.39	68.20	-5.81	V	Peak
11650.000	28.93	23.49	52.42	68.20	-15.78	H	Peak
17475.000	29.80	32.39	62.19	68.20	-6.01	H	Peak
11650.000	18.17	23.49	41.66	54.00	-12.34	V	AVG
17475.000	18.72	32.39	51.11	54.00	-2.89	V	AVG
11650.000	18.19	23.49	41.68	54.00	-12.32	H	AVG
17475.000	18.41	32.39	50.80	54.00	-3.20	H	AVG

Remark: 1. Result =Reading + Factor

3. During the test, pre-scan the all modulation, only the worst case(802.11a) is recorded in the report.

APPENDIX I -- TEST SETUP PHOTOGRAPH

Please refer to separated files Appendix I -- Test Setup Photograph_RF

APPENDIX II -- EXTERNAL PHOTOGRAPH

Please refer to separated files Appendix II -- External Photograph

APPENDIX III -- INTERNAL PHOTOGRAPH

Please refer to separated files Appendix III -- Internal Photograph

---------- End of Report ----------