TEST REPORT

Applicant	:	Shenzhen Liandianchuang Technology Co., Ltd
Address	:	Room 903, Building 3, Jincheng Industrial Park, Laiwushan Community, Dalang Street, Longhua District, Shenzhen, China
Manufacturer	:	Shenzhen Jiexinhua Technology Co., Ltd
Address	:	Room 1006, Building 3, Jincheng Industrial Park, Tongsheng Community, Dalang Street, Longhua District, Shenzhen, China
Product Name	:	FDM multi-head 3D printer
Model Number	:	M1D, M2, M3, M500, D500, D4, D800, D1000
Trademark	:	SOVOL
FCC ID	:	2BXGP-M1D
Test Date	:	Jul. 15, 2026 - Aug. 25, 2026
Date of Report	:	Aug. 25, 2026
Test Result	:	This device described above has been tested by BKC, and the test results show that the equipment under test (EUT) is in compliance with the FCC CFR47 Part 15 Section 15.407 requirements. And it is applicable only to the tested sample identified in the report.

Test Procedure Used:

Standards	:	FCC CFR47 Part 15 Section 15.407 ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024

Prepared by(Test Engineer):
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Reviewer(Supervisor):
Casey Wang

Approved(Manager):
Jerry Liao

TABLE OF CONTENT

1. General Information 4
1.1. Customer basic information 4
1.2. Description of Device (EUT) 4
1.3. Channel List 4
1.4. Summary of test result 5
1.5. Special Accessories and Auxiliary Equipment 5
1.6. Test mode 5
1.7. Block Diagram 6
1.8. Test configuration 6
1.9. Test Conditions 6
1.10. Measurement Uncertainty (95% confidence levels, k=2) 6
1.11. Test Facility 7
1.12. Test Equipment 7
2. Conducted emission at the mains terminals test 9
2.1. Limit 9
2.2. Test Setup 9
2.3. Test Procedure 9
2.4. Test Result 10
3. Radiated Spurious Emissions 12
3.1. Limit 12
3.2. Test Setup 14
3.3. Test Procedure 16
3.4. Test Result 17
4. Maximum conducted Output Power(EIRP) 22
4.1. Limit 22
4.2. Test Setup 22
4.3. Test Procedure 22
4.4. Test Result 22
5. -26 dB Bandwidth,-6dB Bandwidth and 99% Bandwidth Measurement23
5.1. Limit 23
5.2. Test Setup 23
5.3. Test Procedure 23
5.4. Test Result 24
6. Power Spectral Density 25
6.1. Limit 25
6.2. Test Setup 26
6.3. Test Procedure 26
6.4. Test Result 27
7. Frequency Stability Measurement 28
7.1. Limit 28
7.2. Test setup 28
7.3. Test Procedure 28
7.4. Test Result 29
8. Antenna Requirement 31
9. Test Photographs 32
10. Appendix I: Photos of the EUT 33

Revision History of This Test Report		
Report Number	Description	Issued Date
BKC26074138GE-3	Initial Issue	2026-08-25

1. General Information

1.1.Customer basic information

Contacts	:	/
E-Mail	:	/
Telephone	:	/

1.2.Description of Device (EUT)

EUT Name	:	FDM multi-head 3D printer
Model No.	:	M1D, M2, M3, M500, D500, D4, D800, D1000
Model Difference	:	Only the model names are different. The main test model is M1D
Power supply	:	100-240V~ 50/60Hz
Wi-Fi Specification	:	IEEE 802.11a/n/ac
Operation frequency	:	IEEE 802.11a/n/ac(20M): 5745-5825MHz/ 5 channel IEEE 802.11n/ac(40M): 5755-5795MHz/ 2 channel
Max. RF output power:	:	12.30dBm
Modulation	:	Orthogonal Frequency Division Multiplexing(OFDM)
Antenna Type	:	FPC Antenna, Maximum Gain is 3.43dBi
Hardware version	:	V1.0
software version	:	V1.0

1.3.Channel List

U-NII-3 (5.725-5.85GHz)			
channel	**Frequency(MHz)**	**channel**	**Frequency(MHz)**
149	5745	151	5755
153	5765	/	/
157	5785	159	5795
161	5805	165	5825

1.4.Summary of test result

RF PART		
Test Items	**Test Requirement**	**Result**
15.407(b), 15.209	Radiated Spurious Emission	PASS
15.207	Conducted Emission	PASS
15.407 (a) 15.407 (e)	99% , 6dB and 26dB Bandwidth	PASS
15.407 (a)	Maximum Conducted Output Power	PASS
15.407(b)	Band Edge	PASS
15.407 (a)	Power Spectral Density	PASS
15.407(g)	Frequency Stability	PASS
15.203	Antenna Requirement	PASS
Remark: N/A is an abbreviation for Not Applicable. Measurement Uncertainty is not taken into account for conformity statement		

1.5.Special Accessories and Auxiliary Equipment

Description	Manufacturer	Model No.	Hardware Version	Software Version
Serial port board	-	USB-TTL-01	-	-
PC	-	DELL	-	-

1.6.Test mode

The special RF test software was used to control EUT work in Continuous WIFI TX mode, and select test channel, wireless mode.

For 802.11a/n/ac(HT20):

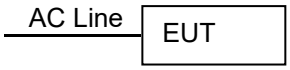
channel	Frequency(MHz)	channel	Frequency(MHz)
149	5745	157	5785
165	5825		

For 802.11n/ac(HT40):

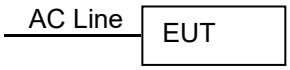
channel	Frequency(MHz)	channel	Frequency(MHz)
151	5755		
159	5795		

1.7.Block Diagram

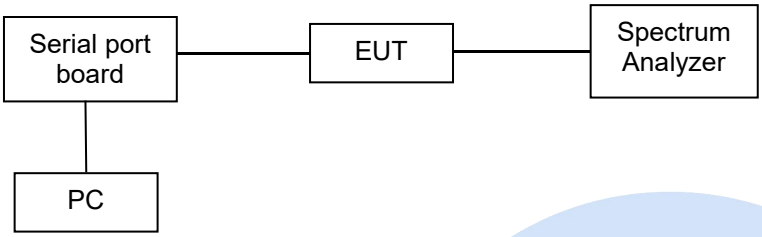
Conducted Emission



Radiated Emission



RF Conducted Test



1.8.Test configuration

Test Software	adb
Power level setup	Default

1.9.Test Conditions

Category	Normal Conditions	Extreme Conditions
Temperature range	15-35°C	N/A
Humidity range	20-75%	N/A
Pressure range	86-106kPa	N/A
Power supply	AC 120V/60Hz	N/A
Note: N/A is an abbreviation for Not Applicable.		

1.10.Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for radio frequency	±7×10-8	
Conducted Emissions (150kHz~30MHz)	±2.54dB	
Radiated Emission(9KHz~30MHz)	±1.6 dB	
Radiated Emission(30MHz~1GHz)	Vertical:±4.14dB Horizontal:±4.25dB	
Radiated Emission(1GHz~6GHz)	±3.9dB	
Radiated Emission(6GHz~18GHz)	±4.3dB	
Radiated Emission(18GHz~40GHz)	±3.38dB	
Uncertainty for conducted RF Power	±0.20dB	

Conducted spurious emissions	±0.24dB	
Power Spectral Density	±0.21dB	
Uncertainty for temperature	0.6℃	
Uncertainty for humidity	1%	
Bandwidth	± 1.5 x 10-6	
Time	±2%	
Duty Cycle	±2%	
Remark: The coverage Factor (k=2), and measurement Uncertainty for a level of Confidence of 95%		

1.11.Test Facility

Site Description		
Name of Firm	:	Shenzhen BKC Testing Co., Ltd.
Site Location	:	Room 103, 1/F, Huaya Building, Huaya Industrial Park, Longhua Community, Longhua District, Shenzhen, Guangdong, China.
CAB identifier	:	CN0188
Company Number	:	34333

1.12.Test Equipment

Conducted Test Site

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	LISN	R&S	ENV216	102762	Mar. 11, 2026	Mar. 10, 2027
2	EMI Test Receiver	R&S	ESCI	101424	Mar. 11, 2026	Mar. 10, 2027
3	Rf cables	HTEC	HCE 2M-CE	N/A	Mar. 11, 2026	Mar. 10, 2027
4	Coupling/ Decoupling Network	Diamond	CX210	N/A	Mar. 11, 2026	Mar. 10, 2027
5	CE Testing software	EZ	EZ-EMC	/	/	/

Radiated Test Site(Below 1G and Above 1G)

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Antenna	Schwarzbeck	VULB 9168	01321	Mar. 20, 2025	Mar. 19, 2028
2	EMI Test Receiver	R&S	ESRP	101478	Mar. 11, 2026	Mar. 10, 2027
3	Preamplifier	HP	8447D	2727A05345	Mar. 11, 2026	Mar. 10, 2027
4	Double Ridged Broadband	SCHWARZBECK	BBHA 9120D	02621	Mar. 11, 2026	Mar. 10, 2027
5	Preamplifier	Schwarzbeck	BBV 9718D	00041	Mar. 11, 2026	Mar. 10, 2027
6	Rf cables	HUBER+SUHNER	8M-RE	N/A	Mar. 11, 2026	Mar. 10, 2027
7	Rf cables	HUBER+SUHNER	1.5M-RE	N/A	Mar. 11, 2026	Mar. 10, 2027
8	Rf cables	HUBER+SUHNER	1.5M-AP-RE	N/A	Mar. 11, 2026	Mar. 10, 2027

9	Loop antenna	ANRF	ANRF-6603	091802	Mar. 13, 2026	Mar. 12, 2027
10	Spectrum analyzer	R&S	FSP40	200061	Mar. 11, 2026	Mar. 10, 2027
11	Double Ridged Broadband Horn Antenna	COM-POWER	AH-1840	10100009	Mar. 11, 2026	Mar. 10, 2027
12	Spectrum	Agilent	N9020A	MY50510311	Mar. 11, 2026	Mar. 10, 2027
13	Band Stop Filter	Bafang	BSF5G	2024052610	Mar. 11, 2026	Mar. 10, 2027
14	RE Testing software	EZ	EZ-EMC	/	/	/

RF Test Site

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum	Agilent	N9020A	MY50510311	Mar. 11, 2026	Mar. 10, 2027
2	Vector source	Agilent	N5182A	MY47420223	Mar. 11, 2026	Mar. 10, 2027
3	All instrument	Rohde & Schwarz	CMW 500	101131	Mar. 11, 2026	Mar. 10, 2027
4	control unit	MW	MW100-RFCB	MW200411BK-34	Mar. 11, 2026	Mar. 10, 2027
5	RF Testing software	MW	MTS 8310	/	/	/
6	Spectrum analyzer	R&S	FSP40	200061	Mar. 11, 2026	Mar. 10, 2027

Test software

Software name	RF Testing software
Software version	2.0.0.0
Software name	RE Testing software
Software version	EMEC-03A2 RE+
Software name	CE Testing software
Software version	EMEC-3A1+

2. Conducted emission at the mains terminals test

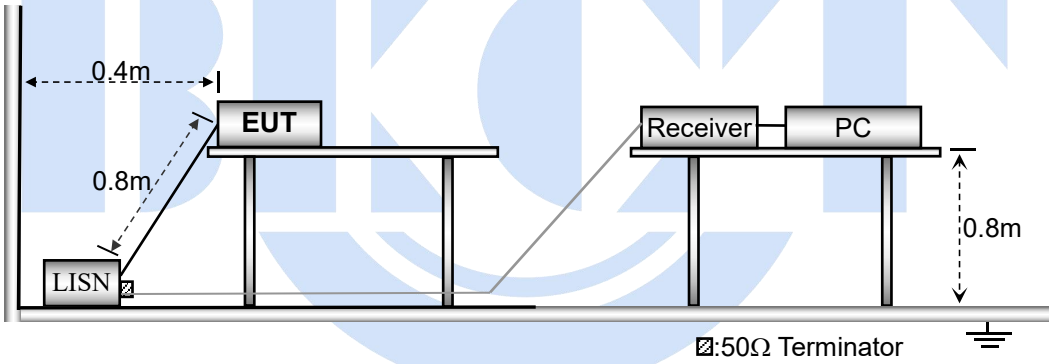
2.1.Limit

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

2.2.Test Setup

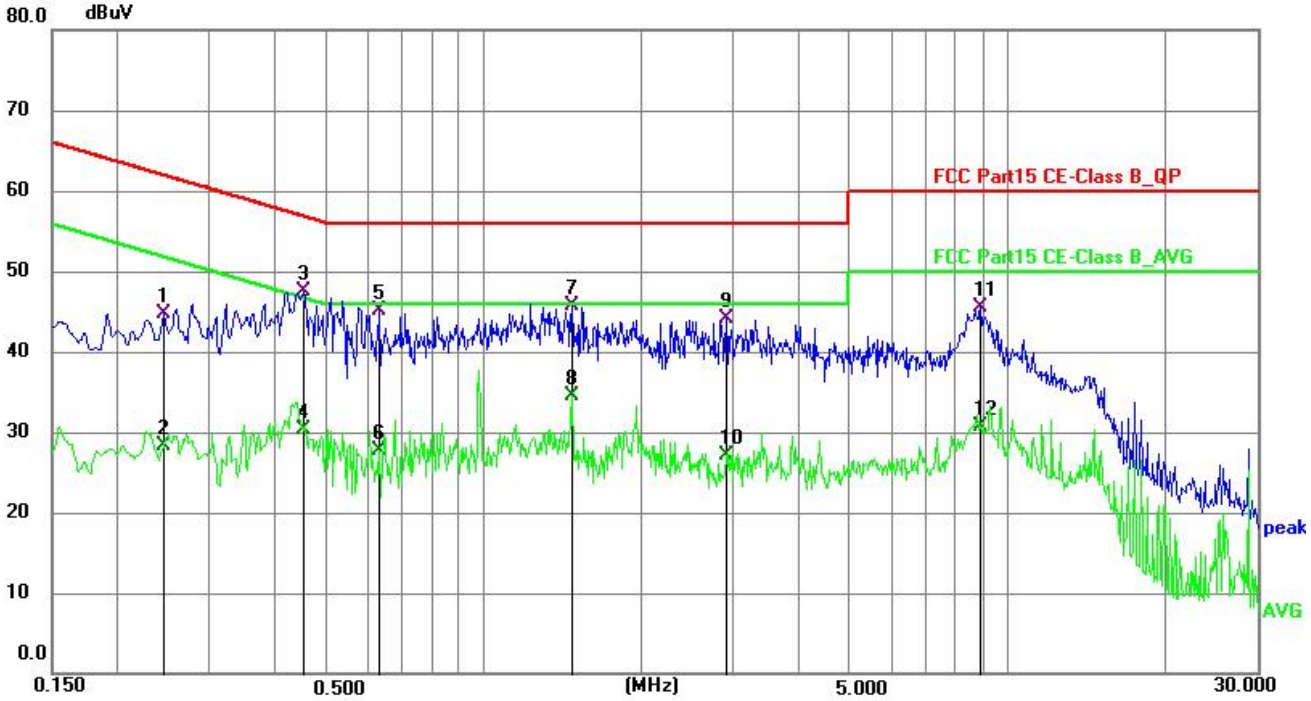


2.3.Test Procedure

1. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
2. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
3. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
4. LISN at least 80 cm from nearest part of EUT chassis.
5.For the actual test configuration, please refer to the related Item – EUT Test Photos.

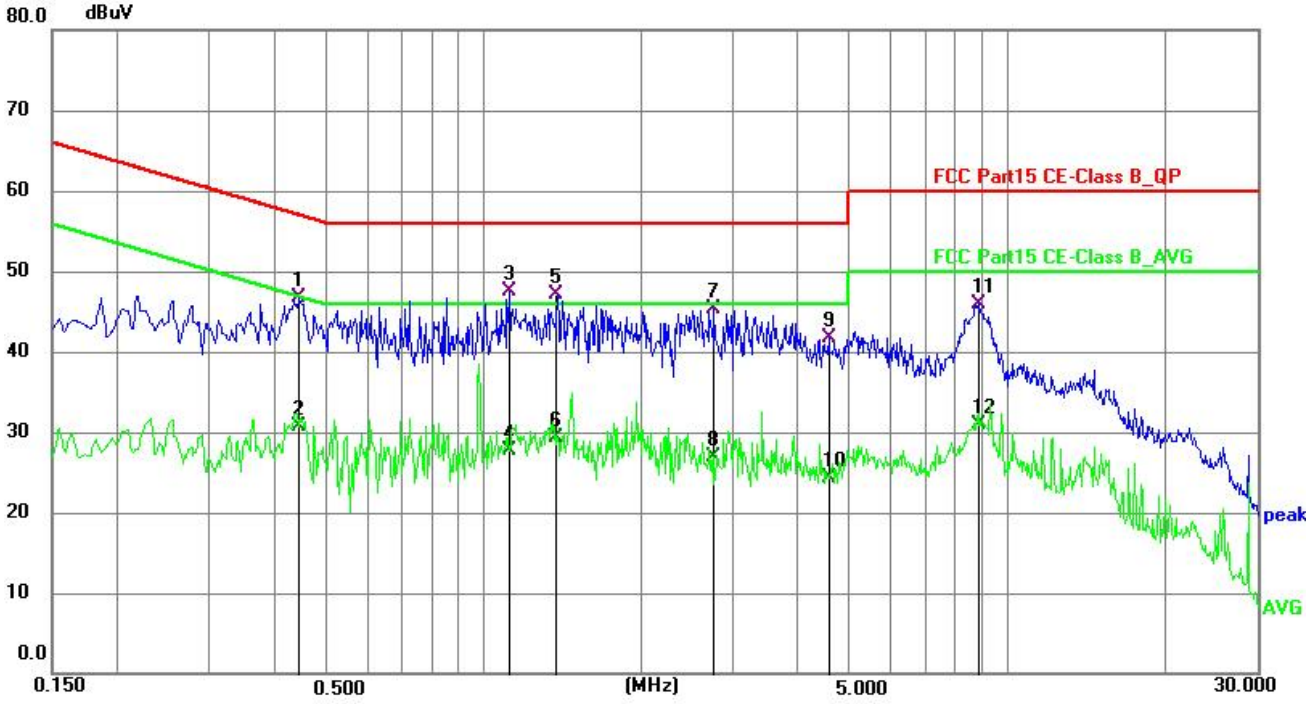
2.4.Test Result

Conducted Emission At The Mains Terminals Test Data			
Temperature:	25.1℃	Relative Humidity:	56%
Pressure:	1008hPa	Phase :	Line
Test Voltage :	AC 120V/60Hz	Test Mode:	Transmitting



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.2442	34.88	9.80	44.68	61.95	-17.27	QP	P
2	0.2442	18.51	9.80	28.31	51.95	-23.64	AVG	P
3 *	0.4515	37.65	9.77	47.42	56.85	-9.43	QP	P
4	0.4515	20.54	9.77	30.31	46.85	-16.54	AVG	P
5	0.6310	35.36	9.77	45.13	56.00	-10.87	QP	P
6	0.6310	17.99	9.77	27.76	46.00	-18.24	AVG	P
7	1.4730	35.90	9.75	45.65	56.00	-10.35	QP	P
8	1.4730	24.85	9.75	34.60	46.00	-11.40	AVG	P
9	2.9085	34.24	9.78	44.02	56.00	-11.98	QP	P
10	2.9085	17.36	9.78	27.14	46.00	-18.86	AVG	P
11	8.9070	35.79	9.75	45.54	60.00	-14.46	QP	P
12	8.9070	20.96	9.75	30.71	50.00	-19.29	AVG	P

Conducted Emission At The Mains Terminals Test Data			
Temperature:	25.1˚C	Relative Humidity:	56%
Pressure:	1008hPa	Phase :	Neutral
Test Voltage :	AC 120V/60Hz	Test Mode:	Transmitting



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.4425	36.98	9.70	46.68	57.01	-10.33	QP	P
2	0.4425	21.00	9.70	30.70	47.01	-16.31	AVG	P
3 *	1.1220	37.77	9.68	47.45	56.00	-8.55	QP	P
4	1.1220	17.95	9.68	27.63	46.00	-18.37	AVG	P
5	1.3829	37.45	9.68	47.13	56.00	-8.87	QP	P
6	1.3829	19.65	9.68	29.33	46.00	-16.67	AVG	P
7	2.7644	35.50	9.71	45.21	56.00	-10.79	QP	P
8	2.7644	17.23	9.71	26.94	46.00	-19.06	AVG	P
9	4.5644	31.91	9.72	41.63	56.00	-14.37	QP	P
10	4.5644	14.68	9.72	24.40	46.00	-21.60	AVG	P
11	8.8483	36.28	9.70	45.98	60.00	-14.02	QP	P
12	8.8483	21.25	9.70	30.95	50.00	-19.05	AVG	P

Remark:
1. Margin = Limit – Level, Correct Factor = Cable lose + LISN insertion loss, Level= Reading + Correct factor
2. Only the worst Data 802.11n20/5825MHz Record in the report.

3. Radiated Spurious Emissions

3.1.Limit

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.407
Test Method: KDB 789033 D02 General UNII Test Procedures New Rules v02r01; ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024
Test Result: PASS
Measurement Distance: 3m

Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120KHz	360KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	20log(2400/F(kHz)) + 80
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	20log(24000/F(kHz)) + 40
1.705 ~ 30	30	30	100 * 30	20log(30) + 40
30 ~ 88	100	3	100	20log(100)
88 ~ 216	150	3	150	20log(150)
216 ~ 960	200	3	200	20log(200)
Above 960	500	3	500	20log(500)

Undesirable emission limits

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with

the following limits:

(1) For transmitters operating in the 5.15-5.25 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.

(2) For transmitters operating in the 5.25-5.35 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.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27

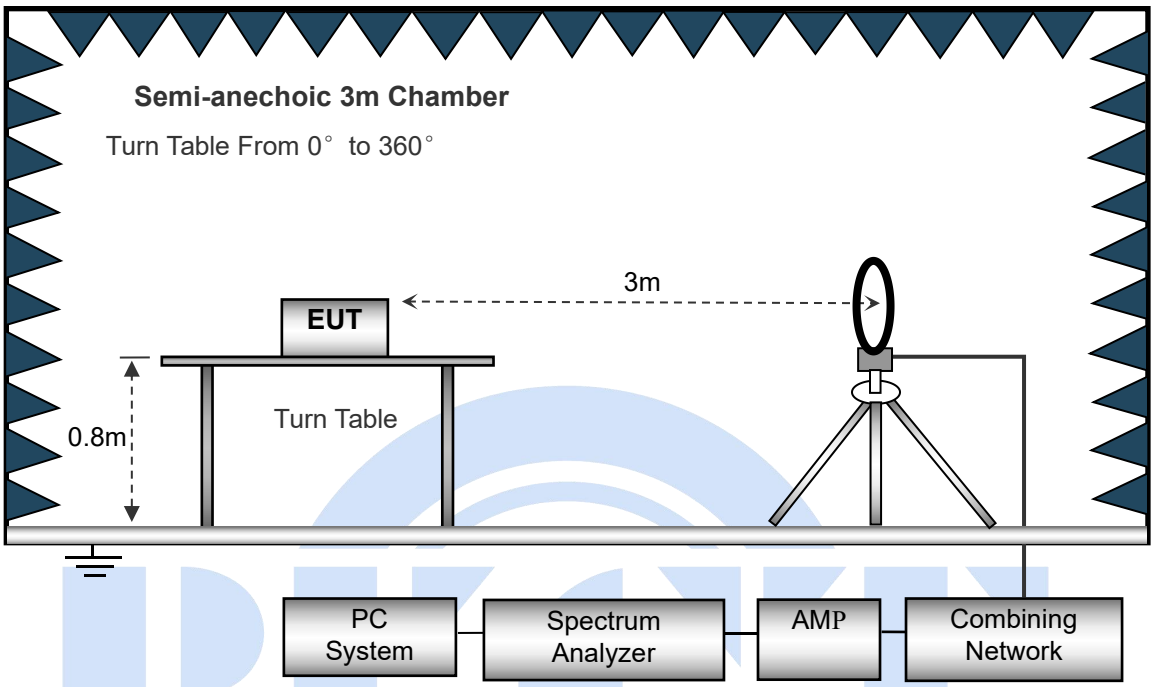
dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge

Requirement	Limit(EIRP)	Limit (Field strength at 3m)
15.407(b)(1)	PK:-27(dBm/MHz)	PK:68.2(dBμV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)		

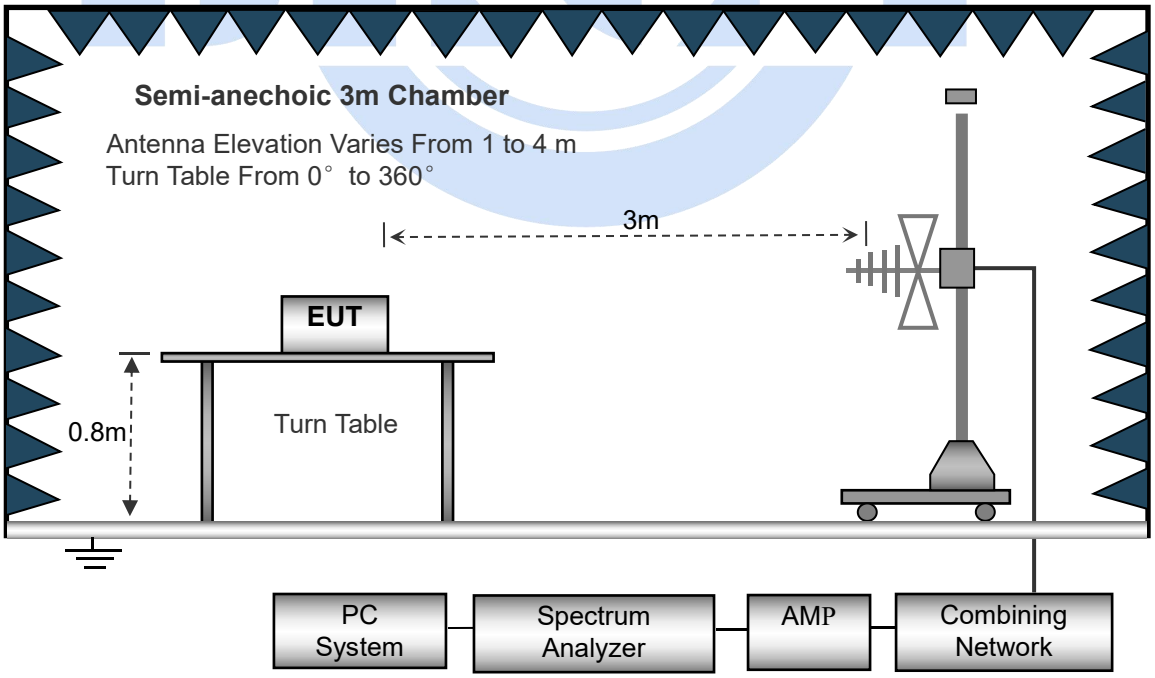
3.2.Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

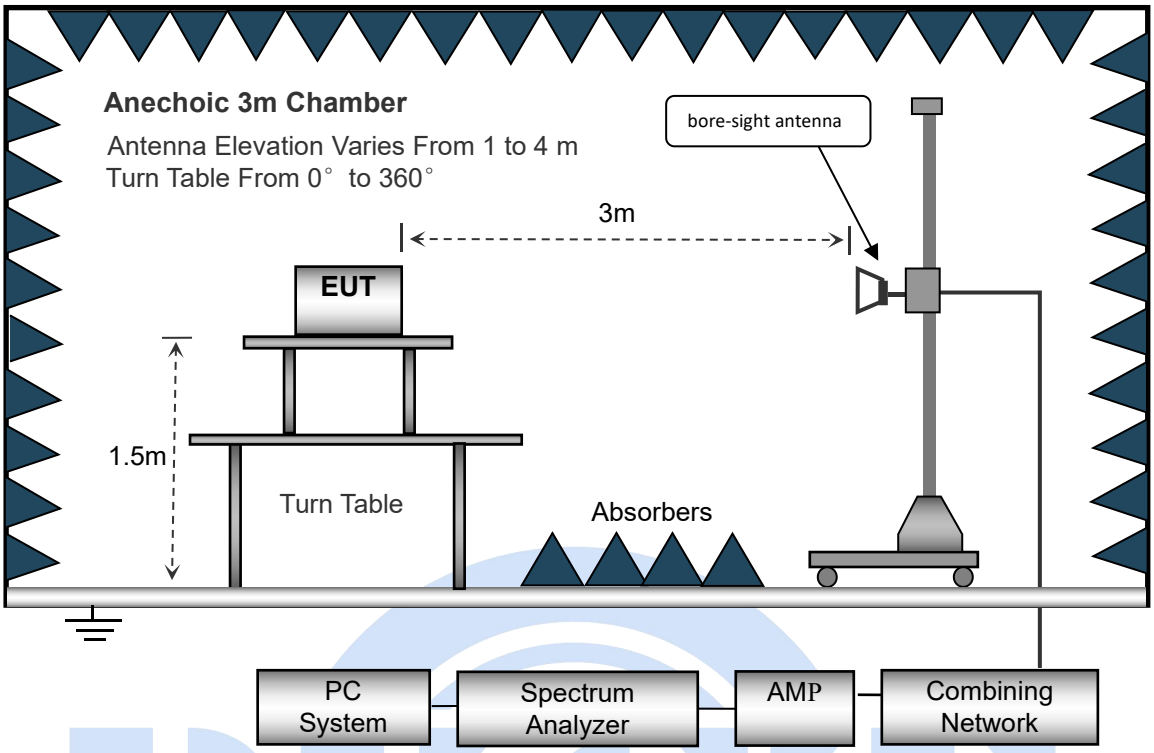
The test setup for emission measurement below 30MHz.

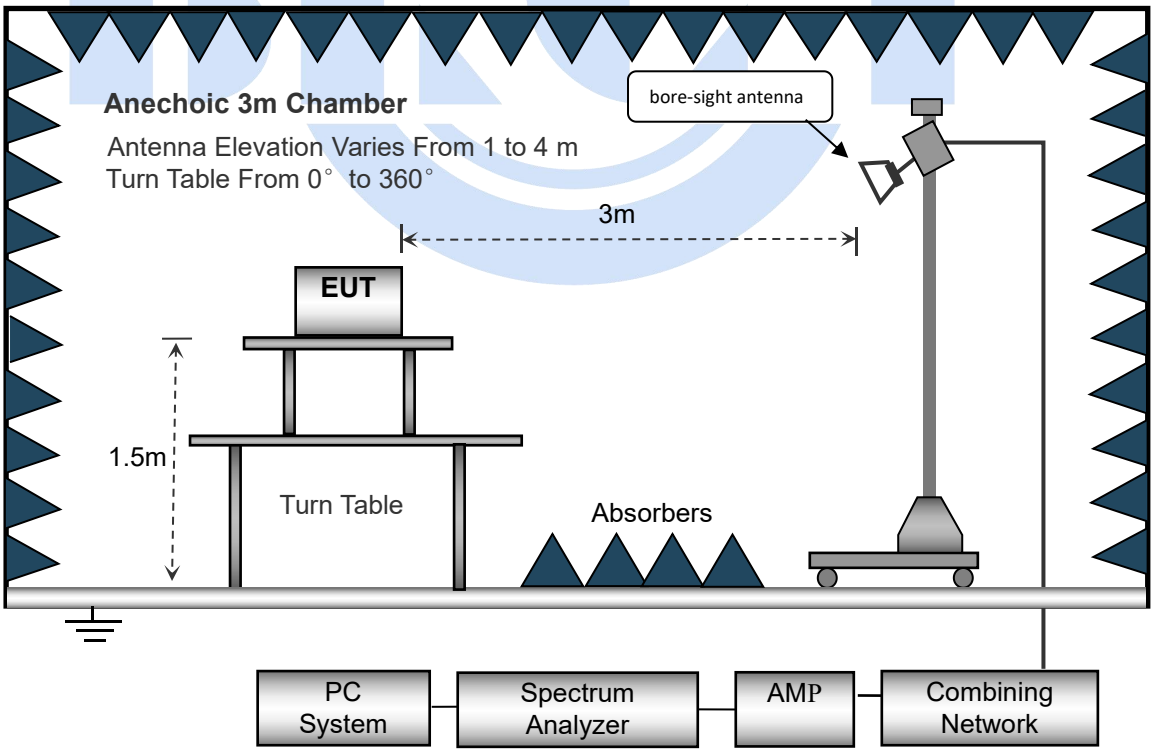


The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.





3.3.Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.

2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.

4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

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

6. Repeat above procedures until the measurements for all frequencies are complete.

7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in Z axis,so the worst data were shown as follow.

8. A 5.8GHz high - pass filter is used druing radiated emissions above 1GHz measurement.

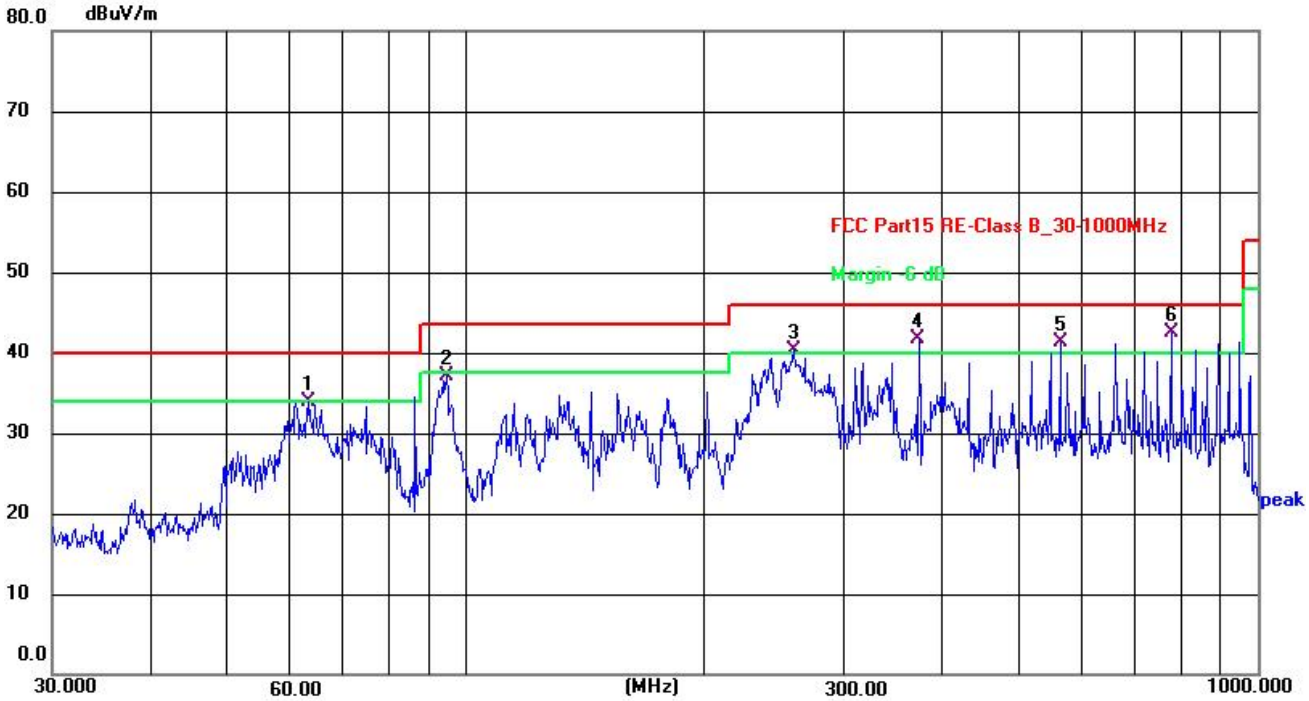
3.4.Test Result

Test Frequency: 9KHz~30MHz

The measurements were more than 20 dB below the limit and not reported.

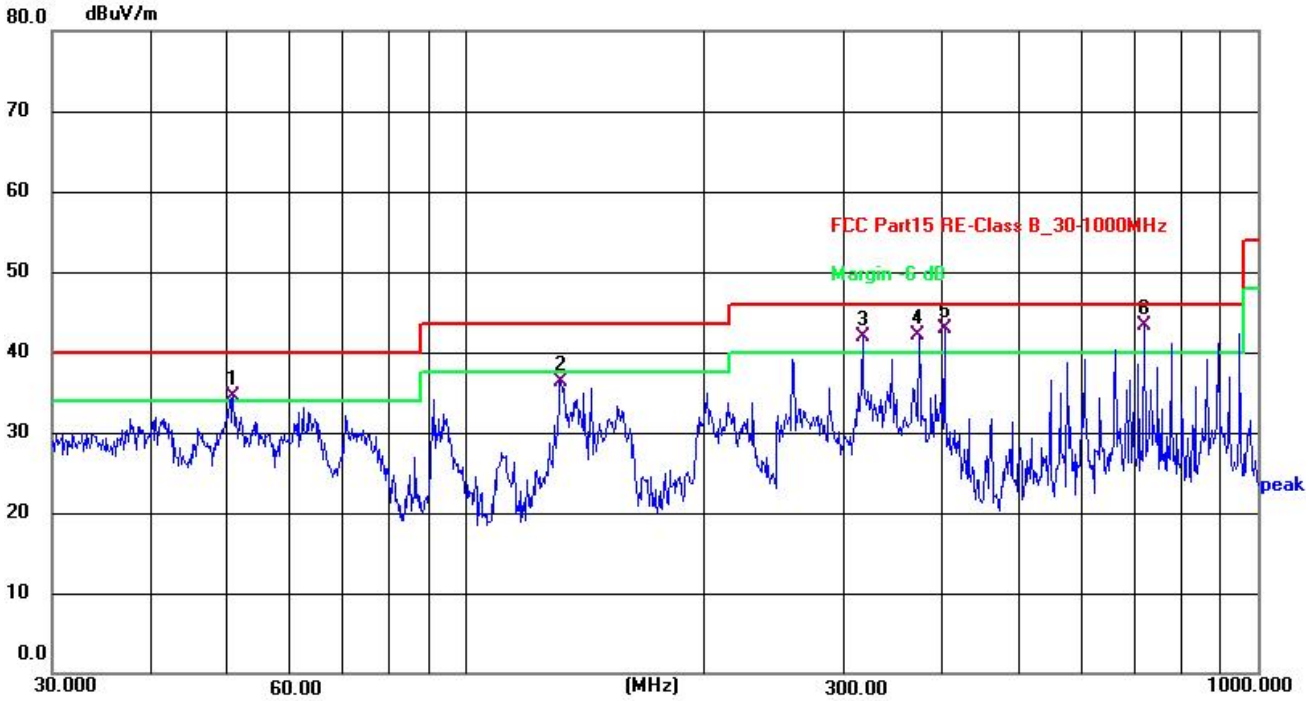
Test Frequency : 30MHz ~ 1GHz

Radiation Emission Test Data			
Temperature:	25.1℃	Relative Humidity:	56%
Pressure:	1008hPa	Phase :	Horizontal
Test Voltage :	AC 120V/60Hz	Test Mode	Transmitting



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	63.3132	51.54	-17.58	33.96	40.00	-6.04	QP
2	94.4282	56.91	-19.78	37.13	43.50	-6.37	QP
3 !	259.2336	56.81	-16.41	40.40	46.00	-5.60	QP
4 !	373.3110	55.50	-13.71	41.79	46.00	-4.21	QP
5 !	562.6621	51.65	-10.43	41.22	46.00	-4.78	QP
6 *	776.8777	49.42	-6.94	42.48	46.00	-3.52	QP

Radiation Emission Test Data			
Temperature:	25.1°C	Relative Humidity:	56%
Pressure:	1008hPa	Phase :	Vertical
Test Voltage :	AC 120V/60Hz	Test Mode	Transmitting



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 !	50.7635	50.88	-16.29	34.59	40.00	-5.41	QP
2	131.7572	52.60	-16.39	36.21	43.50	-7.29	QP
3 !	316.5890	56.58	-14.74	41.84	46.00	-4.16	QP
4 !	373.3110	55.78	-13.71	42.07	46.00	-3.93	QP
5 !	401.8383	56.05	-13.18	42.87	46.00	-3.13	QP
6 *	719.1992	51.11	-7.85	43.26	46.00	-2.74	QP

Remark:
1. Level = Reading + Correct Factor
2. Correct Factor=Antenna Factor + Cable Loss - Preamplifier Factor
3. Only the worst Data 802.11n20/5825MHz Record in the report.

U-NII-3 802.11n20

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:5745MHz									
V	11490.00	52.94	33.13	2.73	32.61	55.15	74	-18.85	PK
V	11490.00	43.05	33.13	2.73	32.61	45.26	54	-8.74	AV
V	17235.00	51.37	32.31	3.31	33.43	55.80	68.2	-12.4	PK
V	17235.00	43.48	32.31	3.31	33.43	47.91	54	-6.09	AV
V	22980.00	52.48	34.84	4.42	34.90	56.96	74	-17.04	PK
V	22980.00	43.05	34.84	4.42	34.90	47.53	54	-6.47	AV
V	28725.00	52.72	36.01	5.39	35.13	57.23	68.2	-10.97	PK
V	28725.00	43.53	36.01	5.39	35.13	48.04	54	-5.96	AV
H	11490.00	50.79	33.13	2.73	32.61	53.00	74	-21	PK
H	11490.00	43.93	33.13	2.73	32.61	46.14	54	-7.86	AV
H	17235.00	51.09	32.31	3.31	33.43	55.52	68.2	-12.68	PK
H	17235.00	43.86	32.31	3.31	33.43	48.29	54	-5.71	AV
H	22980.00	53.43	34.84	4.42	34.90	57.91	74	-16.09	PK
H	22980.00	43.65	34.84	4.42	34.90	48.13	54	-5.87	AV
H	28725.00	54.58	36.01	5.39	35.13	59.09	68.2	-9.11	PK
H	28725.00	43.97	36.01	5.39	35.13	48.48	54	-5.52	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:5785MHz									
V	11570.00	51.55	33.11	2.75	32.62	53.81	74	-20.19	PK
V	11570.00	43.69	33.11	2.75	32.62	45.95	54	-8.05	AV
V	17355.00	53.35	32.27	3.32	33.45	57.85	68.2	-10.35	PK
V	17355.00	43.28	32.27	3.32	33.45	47.78	54	-6.22	AV
V	23140.00	50.89	34.87	4.44	34.93	55.39	68.2	-12.81	PK
V	23140.00	43.12	34.87	4.44	34.93	47.62	54	-6.38	AV
V	28925.00	51.11	36.11	5.41	35.17	55.58	68.2	-12.62	PK
V	28925.00	43.12	36.11	5.41	35.17	47.59	54	-6.41	AV
H	11570.00	52.57	33.11	2.75	32.62	54.83	74	-19.17	PK
H	11570.00	43.15	33.11	2.75	32.62	45.41	54	-8.59	AV
H	17355.00	54.88	32.27	3.32	33.45	59.38	68.2	-8.82	PK
H	17355.00	43.86	32.27	3.32	33.45	48.36	54	-5.64	AV
H	23140.00	51.94	34.87	4.44	34.93	56.44	68.2	-11.76	PK
H	23140.00	43.71	34.87	4.44	34.93	48.21	54	-5.79	AV
H	28925.00	54.23	36.11	5.41	35.17	58.70	68.2	-9.5	PK
H	28925.00	43.75	36.11	5.41	35.17	48.22	54	-5.78	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel:5825MHz									
V	11650.00	53.82	33.13	2.76	32.63	56.08	74	-17.92	PK
V	11650.00	43.29	33.13	2.76	32.63	45.55	54	-8.45	AV
V	17475.00	50.11	32.29	3.33	33.47	54.62	68.2	-13.58	PK
V	17475.00	43.92	32.29	3.33	33.47	48.43	54	-5.57	AV
V	23300.00	50.38	34.90	4.45	34.95	54.88	68.2	-13.32	PK
V	23300.00	43.65	34.90	4.45	34.95	48.15	54	-5.85	AV
V	29125.00	53.55	36.13	5.44	35.19	58.05	68.2	-10.15	PK
V	29125.00	43.17	36.13	5.44	35.19	47.67	54	-6.33	AV
H	11650.00	51.88	33.13	2.76	32.63	54.14	74	-19.86	PK
H	11650.00	43.97	33.13	2.76	32.63	46.23	54	-7.77	AV
H	17475.00	50.89	32.29	3.33	33.47	55.40	68.2	-12.8	PK
H	17475.00	43.36	32.29	3.33	33.47	47.87	54	-6.13	AV
H	23300.00	54.12	34.90	4.45	34.95	58.62	68.2	-9.58	PK
H	23300.00	43.39	34.90	4.45	34.95	47.89	54	-6.11	AV
H	29125.00	54.98	36.13	5.44	35.19	59.48	68.2	-8.72	PK
H	29125.00	43.39	36.13	5.44	35.19	47.89	54	-6.11	AV

Remark:
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
4. All modes have been tested, and found the 802.11n20 mode which it is worse case, so only show the test data for worst case.

Band edge emission measurement

U-NII-3

	Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin(dB)	Detect or Type
802.11n20	Low Channel: 5745MHz									
	H	5725	54.71	34.58	5.61	25.69	51.43	125.26	-73.83	PK
	H	5725	44.21	34.58	5.61	25.69	40.93	125.26	-84.33	AV
	H	5720	54.81	34.57	5.73	25.51	51.48	110.86	-59.38	PK
	H	5720	44.71	34.57	5.73	25.51	41.38	110.86	-69.48	AV
	V	5725	53.31	34.52	7.74	25.69	52.22	125.26	-73.04	PK
	V	5725	44.07	34.52	7.74	25.69	42.98	125.26	-82.28	AV
	V	5720	54.94	34.58	5.61	25.51	51.48	110.86	-59.38	PK
	V	5720	44.84	34.58	5.61	25.51	41.38	110.86	-69.48	AV
	High Channel: 5825MHz									
	H	5850	54.48	34.22	7.85	25.98	54.09	125.26	-71.17	PK
	H	5850	44.82	34.22	7.85	25.98	44.43	125.26	-80.83	AV
	H	5850	54.94	34.19	7.86	25.73	54.34	110.86	-56.52	PK
	H	5850	44.07	34.19	7.86	25.73	43.47	110.86	-67.39	AV
	V	5855	54.98	30.22	7.85	25.98	58.59	125.26	-66.67	PK
	V	5855	44.09	30.22	7.85	25.98	47.70	125.26	-77.56	AV
	V	5855	54.51	30.22	7.86	25.73	57.88	110.86	-52.98	PK
	V	5855	44.10	30.22	7.86	25.73	47.47	110.86	-63.39	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit
2. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
3. All modes have been tested, and found the 802.11n20 mode which it is worse case, so only show the test data for worst case.

4. Maximum conducted Output Power(EIRP)

4.1.Limit

According to FCC §15.407
For an outdoor access point operating in the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
For the band 5.725–5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.
According to RSS-247 6.2
For other devices, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.
For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

4.2.Test Setup

4.3.Test Procedure

a) Set span to encompass the entire 99% OBW of the signal.
b) Set RBW = 1 MHz.
c) Set VBW ≥ 3 MHz.
d) Number of points in sweep ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)
e) Sweep time = auto.
f) Detector = Power averaging (rms), if available. Otherwise, use sample detector mode.
g) If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle ≥ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.”
h) Trace average at least 100 traces in power averaging (rms) mode.
i) Compute power by integrating the spectrum across the 99% OBW of the signal using the instrument’s band-power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band-power function, then sum the spectrum levels (in power units) at 1 MHz intervals extending across the 99% OBW of the spectrum

4.4.Test Result

Please see the attachment for WIFI 5G data.

5. -26 dB Bandwidth,-6dB Bandwidth and 99% Bandwidth Measurement

5.1.Limit

Test Standard	FCC Part15 C Section 15.407
	The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band, the minimum bandwidth 6 dB bandwidth of U-NII devices shall be at least 500KHz. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

5.2.Test Setup

5.3.Test Procedure

a) Set RBW = approximately 1 % of the EBW.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) 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.
The following procedure shall be used for measuring (99 %) power bandwidth:
1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 · RBW
5. 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.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. 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% occupied bandwidth is the difference between these two frequencies.

-6dB OBW
The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max-hold.
e) Sweep = No faster than coupled (auto) time.
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.

5.4.Test Result

Please see the attachment for WIFI 5G data.

6. Power Spectral Density

6.1.Limit

According to FCC § 15.407(3)

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum

power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

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

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

(iv) For client devices in the 5.15-5.25 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, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, 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, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, 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, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 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.

According to RSS-247 6.2

For other devices, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever

power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

For the band 5.725-5.85 GHz,the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band.

6.2.Test Setup

6.3.Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above,
2. The testing follows FCC KDB 789033 D02.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.Not with standing that some regulatory requirements refer to peak power spectral density (PPSD), in some cases the intent is to measure the maximum value of the time average of the power spectral density during a period of continuous transmission. The procedure for this method is as follows:

a) Create an average power spectrum for the EUT operating mode being tested by following the instructions in 12.4.2 for measuring maximum conducted output power using a spectrum analyzer or EMI receiver; that is, select the appropriate test method (SA-1, SA-2, SA-3, or their respective alternatives) and apply it up to, but not including, the step labeled, “Compute power….” (This procedure is required even if the maximum conducted output power measurement was performed using the power meter method PM.)
b) Use the peak search function on the instrument to find the peak of the spectrum.
c) Make the following corrections to the peak value of the spectrum, if applicable:
1) If method SA-2 or SA-2A was used, then add [10 log (1 / D)], where D is the duty cycle, to the peak of the spectrum.
2) If method SA-3A was used and the linear mode was used in step h) of 12.4.2.7, add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
d) The result is the PPSD.
e) The procedure in item a) through item c) requires the use of 1 MHz resolution bandwidth to satisfy the 1 MHz measurement bandwidth specified by some regulatory authorities.85 This requirement also permits use of resolution bandwidths less than 1 MHz “provided that the measured power is integrated to show the total power over the measurement bandwidth” (i.e., 1 MHz). If measurements are performed using a reduced resolution bandwidth and integrated over 1 MHz bandwidth, the following adjustments to the procedures apply:
1) Set RBW ≥ 1 / T, where T is defined in 12.2 a).
2) Set VBW ≥ [3 × RBW].
3) Care shall be taken such that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

4. For U-NII1, U-NII-2A, U-NII-2C Band:
Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-1 with the omission of procedure x, the integration with 26dB EBW bandwidth)
For U-NII-3 Band:

Set RBW=510 kHz, VBW=3*RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = detector rms or sample, traces 100 sweeps of video averaging. (SA-1 with the omission of procedure x, the integration with 26dB EBW bandwidth)
5. User the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add 10 log(1/duty cycle).

6.4.Test Result

Please see the attachment for WIFI 5G data.

7. Frequency Stability Measurement

7.1.Limit

FCC

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band(IEEE802.11n specification).

IC

If the frequency stability of the licence-exempt radio apparatus is not specified in the applicable RSS, the fundamental emissions of the radio apparatus should be kept within at least the central 80% of its permitted operating frequency band in order to minimize the possibility of out-of-band operation. In addition, its occupied bandwidth shall be entirely outside the restricted bands and the prohibited TV bands of 54 72 MHz, 76-88 MHz, 174-216 MHz, and 470-602 MHz, unless otherwise indicated.

7.2.Test setup

7.3.Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 106 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value

Extreme temperature is -30°C~50°C.

7.4.Test Result

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1012 hPa	Test Voltage :	AC 120/60Hz
Test Mode :	5825MHz unmodulated wave		

U-NII-3

Reference Frequency(Middle Channel): 5825 MHz				
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed		
		MCF (Hz)	Error (ppm)	Limit (ppm)
50	120	36	6.22	±20
40	120	29	5.01	±20
30	120	28	4.84	±20
20	120	60	10.37	±20
10	120	54	9.33	±20
0	120	47	8.12	±20
-10	120	40	6.91	±20
-20	120	36	6.22	±20
-30	120	39	6.74	±20

So, Frequency Stability Versus Input Voltage is:

U-NII-3

Reference Frequency(Middle Channel): 5825 MHz				
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed		
		Frequency (Hz)	Error (ppm)	Limit (ppm)
20	120	37	6.40	±20
	110	43	7.43	±20
	125	39	6.74	±20

All the modes have tested and recorded the worst mode(5825MHz unmodulated wave) in the report

8. Antenna Requirement

Test Standard	FCC Part15 Section 15.203
Requirement	1) 15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. According to RSS-GEN section 6.8 The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list. For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below). When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer. The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested. For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location: This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device. Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.
Antenna Connected Construction	The antenna is FPC Antenna which permanently attached, and the best case gain of the antenna is 3.43dBi. It complies with the standard requirement.

9. Test Photographs

Please see Attachment BKC26074138GE-5.

10. Appendix I: Photos of the EUT

Please see Attachment BKC26074138GE-6 and BKC26074138GE-7.