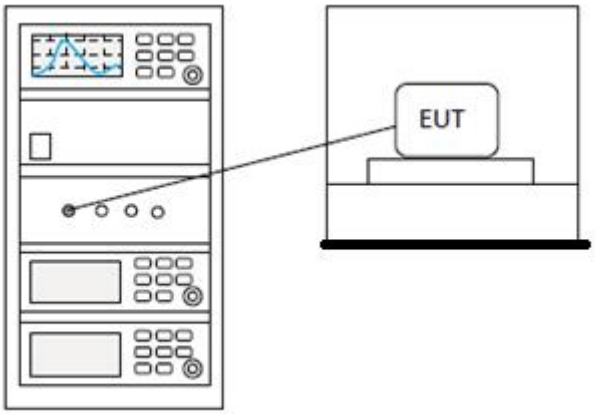
6.4 20dB bandwidth

Test Standard	47 CFR Part 15, Subpart C 15.249
Test Method	ANSI C63.10 (2013) Section 6.9
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.4.1 Limit

N/A

6.4.2 Test setup

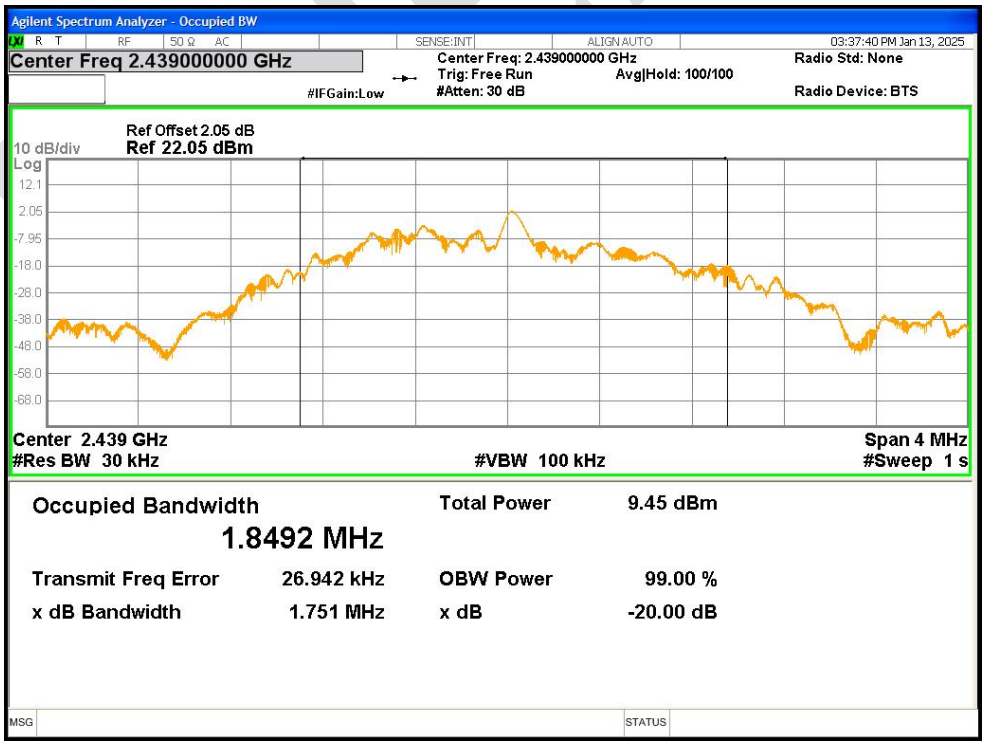


6.4.3 Test data

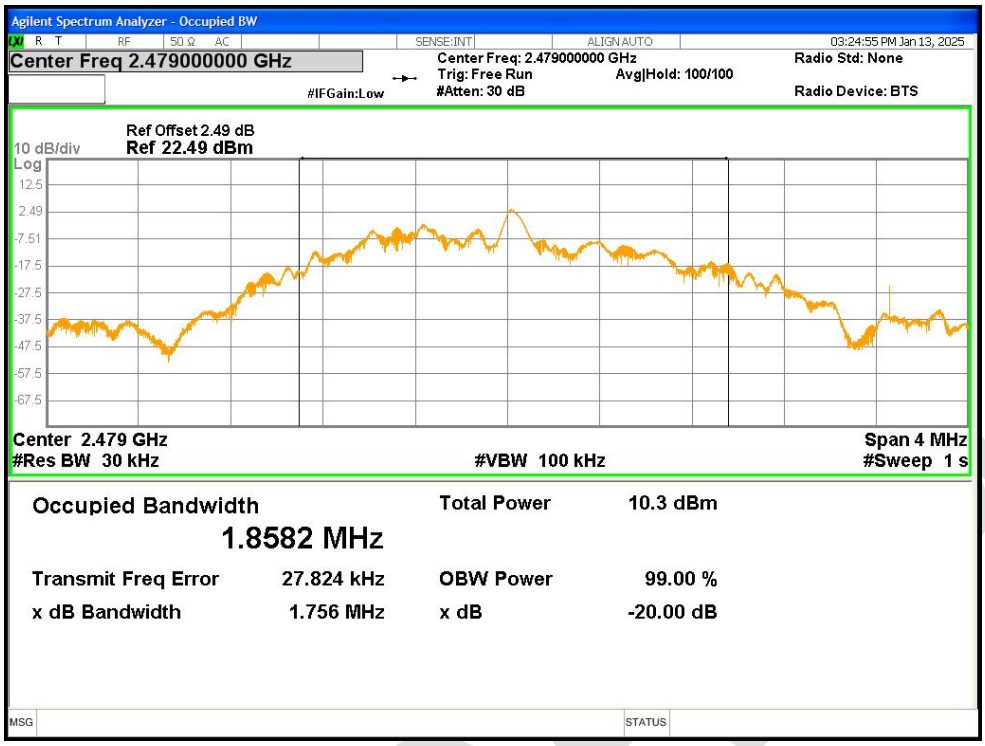
Test Frequency MHz	20dB Bandwidth MHz	Result
2402	1.750	Pass
2439	1.751	Pass
2479	1.756	Pass

2402MHz

2439MHz



2479MHz


Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.479000000 GHz
Center Freq: 2.479000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
03:24:55 PM Jan 13, 2025
Ref Offset 2.49 dB
10 dB/div
Ref 22.49 dBm
Log
12.5
2.49
-7.51
-17.5
-27.5
-37.5
-47.5
-57.5
-67.5
Center 2.479 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 4 MHz
#Sweep 1 s
Occupied Bandwidth
1.8582 MHz
Total Power 10.3 dBm
Transmit Freq Error 27.824 kHz
OBW Power 99.00 %
x dB Bandwidth 1.756 MHz
x dB -20.00 dB
MSG
STATUS

6.5 Radiated spurious emissions

Test Standard	47 CFR Part 15, Subpart C 15.249(d)
Test Method	ANSI C63.10 (2013) Section 6.4,6.5,6.6
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

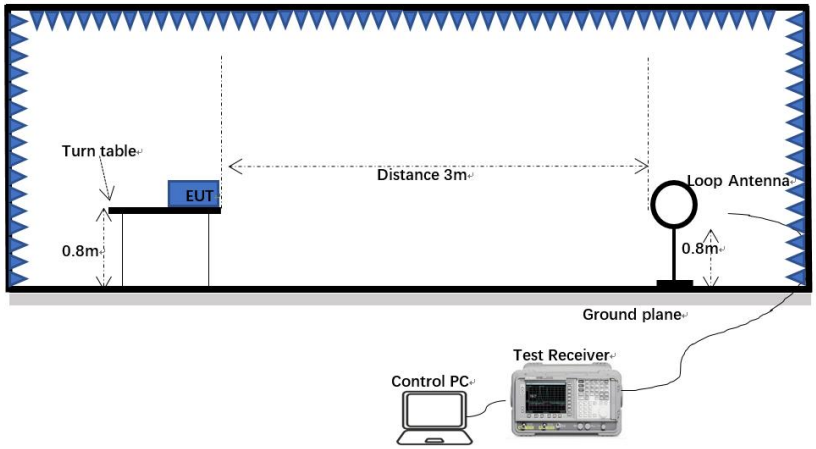
6.5.1 Limit

Frequency(MHz)	Field strength (microvolts/meter)	Limit (dBuV/m)	Detector	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	-	300
0.490-1.705	24000/F(kHz)	-	-	30
1.705-30	30	-	-	30
30-88	100	40.0	QP	3
88-216	150	43.5	QP	3
216-960	200	46.0	QP	3
960-1000	500	54.0	QP	3
Above 1000	500	54.0	AV	3

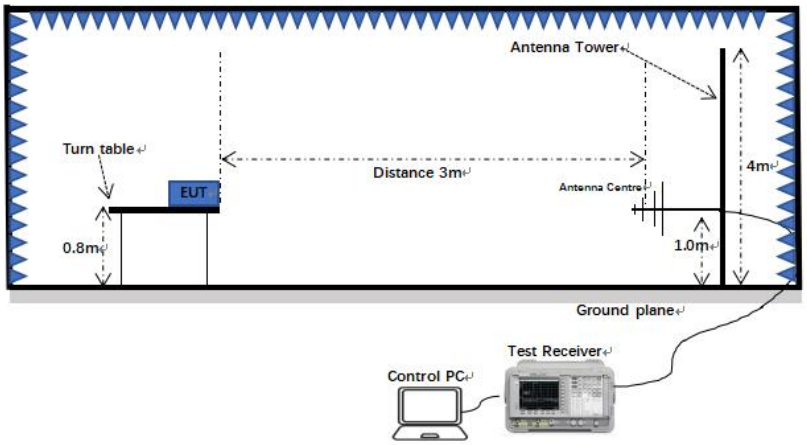
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

6.5.2 Test setup

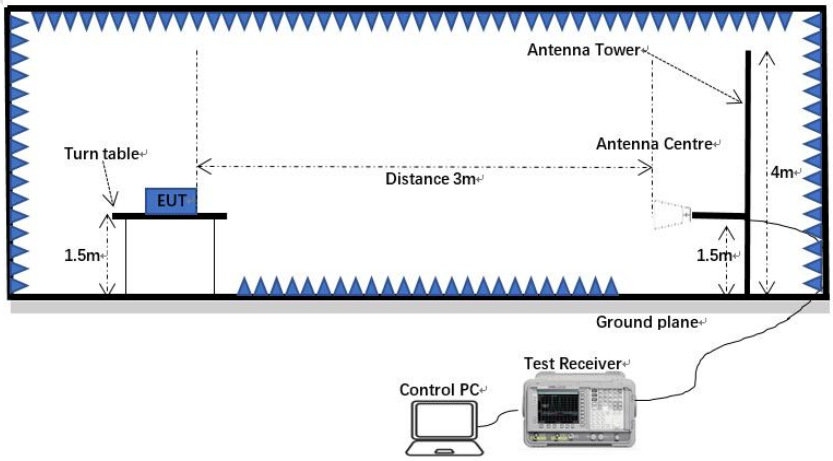
Below 1GHz：



30MHz-1GHz：



Above 1GHz：



6.5.3 Procedure

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of vertical was shown in the report.

Remark:

1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

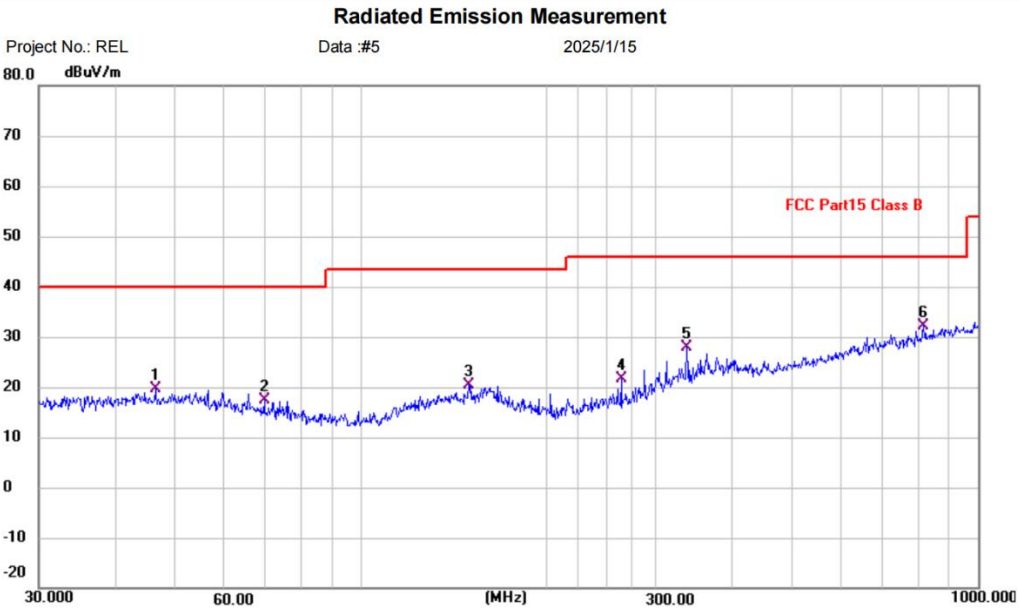
3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. Fundamental frequency is blocked by filter, and only spurious emission is shown.

4) 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.

6.5.4 Test data

Below 1GHz

[Test mode: TX]; [Polarity: Horizontal]



Site
Limit: FCC Part15 Class B
EUT: Wireless Mouse
M/N: Epic Mouse 2
Mode: 2.4G-TX
Note:

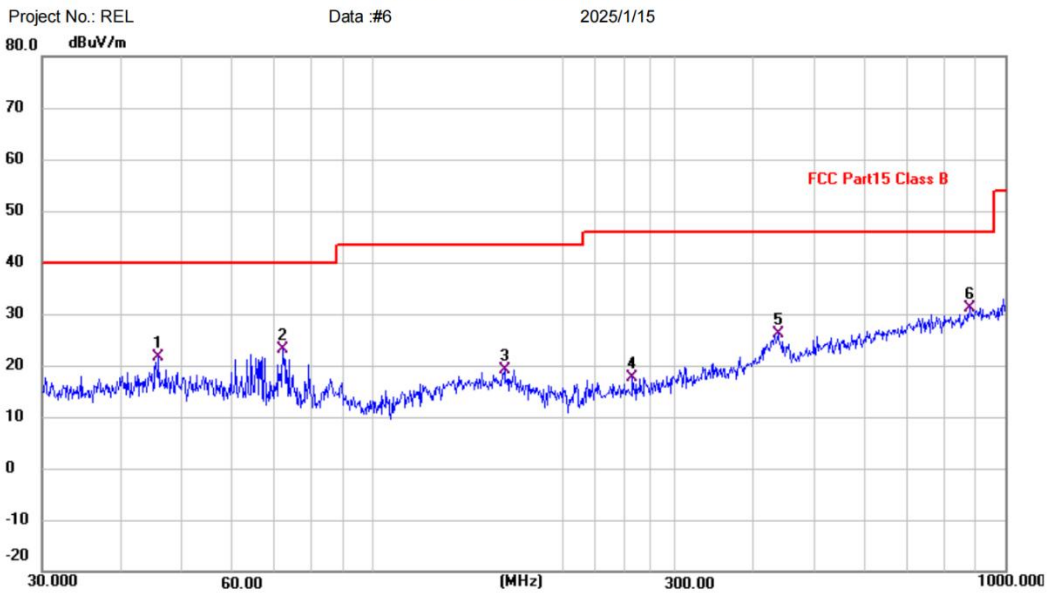
Polarization: *Horizontal*
Power:

Temperature: (C)
Humidity: %RH

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	46.3402	0.11	19.52	19.63	40.00	-20.37	QP	P	
2	69.6004	0.74	16.74	17.48	40.00	-22.52	QP	P	
3	149.4857	-0.18	20.66	20.48	43.50	-23.02	QP	P	
4	263.8190	2.78	18.77	21.55	46.00	-24.45	QP	P	
5	337.2155	6.54	21.40	27.94	46.00	-18.06	QP	P	
6 *	815.9678	2.08	29.97	32.05	46.00	-13.95	QP	P	

Test Result: Pass

[Test mode: TX]; [Polarity: Vertical]



Site
Limit: FCC Part15 Class B
EUT: Wireless Mouse
M/N: Epic Mouse 2
Mode: 2.4G-TX
Note:

Polarization: *Vertical*
Power:

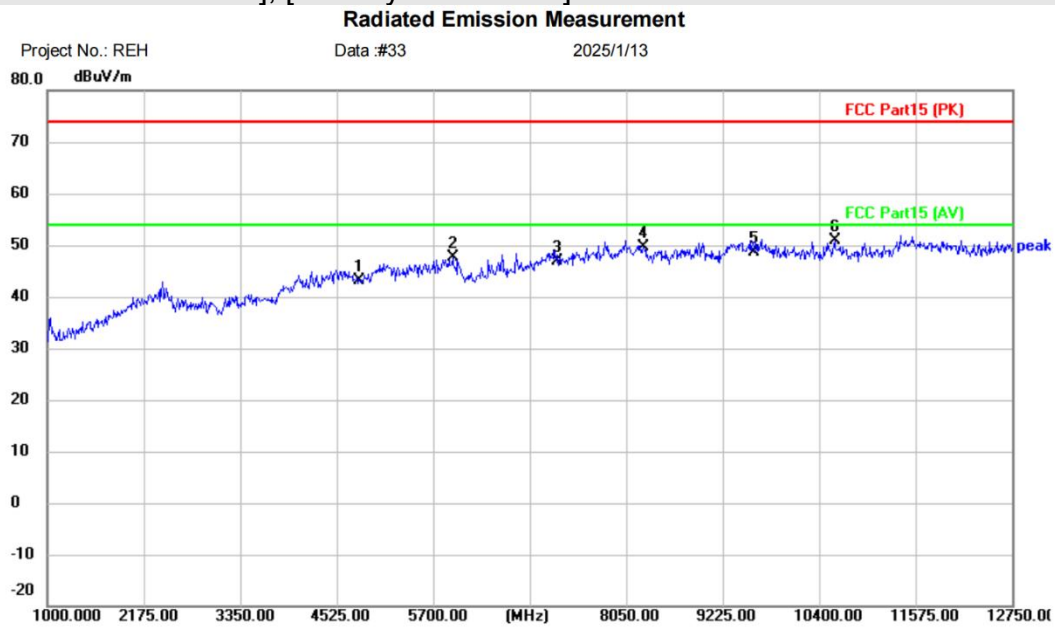
Temperature: (C)
Humidity: %RH

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	45.8553	1.99	19.62	21.61	40.00	-18.39	QP	P	
2	72.0843	6.57	16.45	23.02	40.00	-16.98	QP	P	
3	161.4740	-1.23	20.37	19.14	43.50	-24.36	QP	P	
4	257.4221	-1.02	18.58	17.56	46.00	-28.44	QP	P	
5	437.1200	2.45	23.65	26.10	46.00	-19.90	QP	P	
6 *	878.3214	0.26	30.83	31.09	46.00	-14.91	QP	P	

Test Result: Pass

Above 1GHz:

[Test mode: TX low channel]; [Polarity: Horizontal]



Site
Limit: FCC Part15 (PK)
EUT: Wireless Mouse
M/N: Epic Mouse 2
Mode: 2.4G-TX-L
Note:

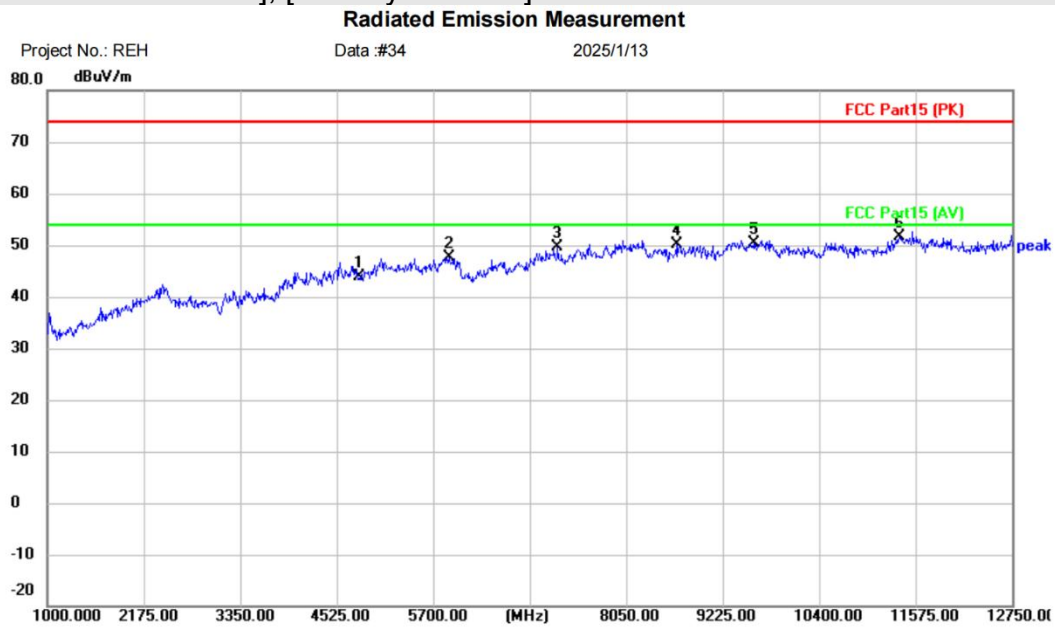
Polarization: *Horizontal*
Power:

Temperature: (C)
Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	36.75	6.31	43.06	74.00	-30.94	peak	
2		5935.000	38.62	9.06	47.68	74.00	-26.32	peak	
3		7206.000	36.56	10.39	46.95	74.00	-27.05	peak	
4		8261.500	38.47	11.15	49.62	74.00	-24.38	peak	
5		9608.000	35.74	13.01	48.75	74.00	-25.25	peak	
6	*	10588.00	37.15	13.61	50.76	74.00	-23.24	peak	

Test Result: Pass

[Test mode: TX low channel]; [Polarity: Vertical]



Site
Limit: FCC Part15 (PK)
EUT: Wireless Mouse
M/N: Epic Mouse 2
Mode: 2.4G-TX-L
Note:

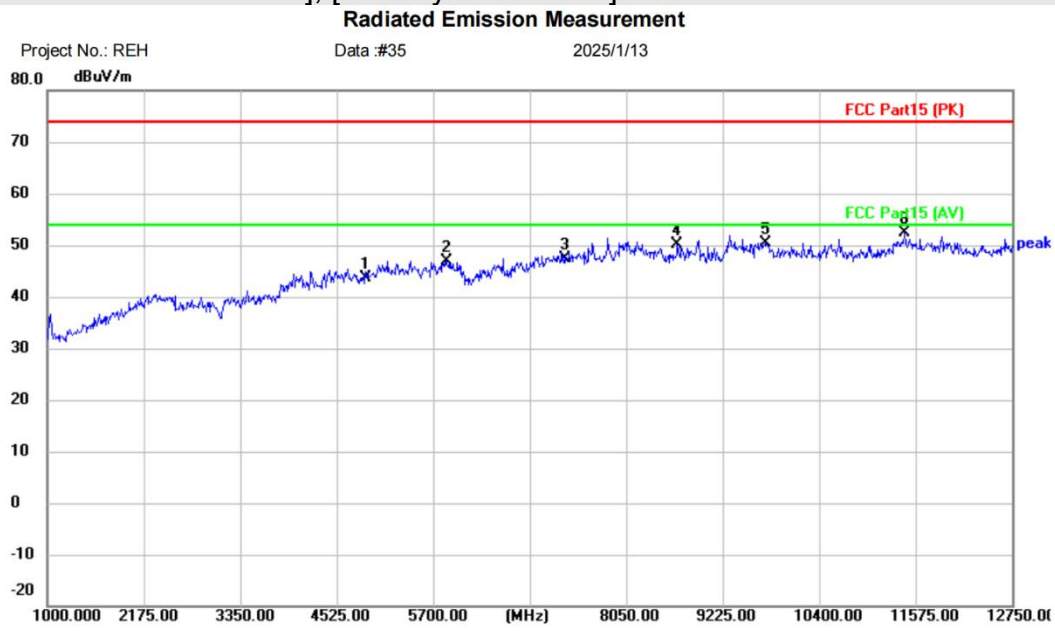
Polarization: *Vertical*
Power:

Temperature: (C)
Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	37.69	6.31	44.00	74.00	-30.00	peak	
2		5888.000	38.60	9.05	47.65	74.00	-26.35	peak	
3		7206.000	39.36	10.39	49.75	74.00	-24.25	peak	
4		8661.000	38.35	11.79	50.14	74.00	-23.86	peak	
5		9608.000	37.33	13.01	50.34	74.00	-23.66	peak	
6	*	11375.25	37.64	13.99	51.63	74.00	-22.37	peak	

Test Result: Pass

[Test mode: TX middle channel]; [Polarity: Horizontal]



Site
Limit: FCC Part15 (PK)
EUT: Wireless Mouse
M/N: Epic Mouse 2
Mode: 2.4G-TX-M
Note:

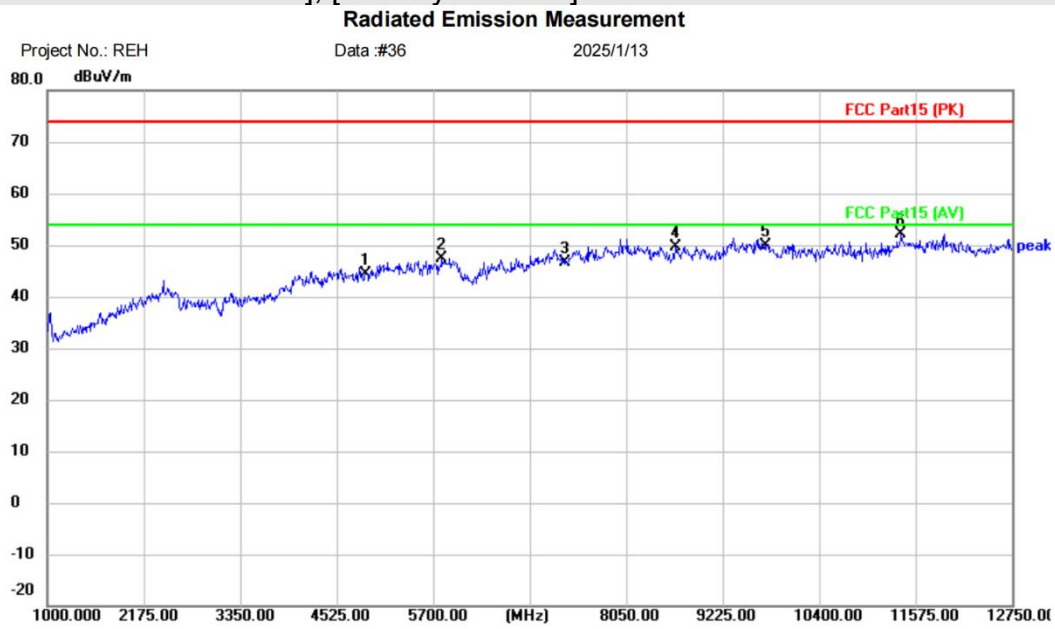
Polarization: *Horizontal*
Power:

Temperature: (C)
Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4878.000	37.33	6.41	43.74	74.00	-30.26	peak	
2		5864.500	37.99	8.93	46.92	74.00	-27.08	peak	
3		7317.000	37.35	10.07	47.42	74.00	-26.58	peak	
4		8672.750	38.23	11.80	50.03	74.00	-23.97	peak	
5		9756.000	36.65	13.80	50.45	74.00	-23.55	peak	
6	*	11445.75	37.84	14.55	52.39	74.00	-21.61	peak	

Test Result: Pass

[Test mode: TX middle channel]; [Polarity: Vertical]



Site
Limit: FCC Part15 (PK)
EUT: Wireless Mouse
M/N: Epic Mouse 2
Mode: 2.4G-TX-M
Note:

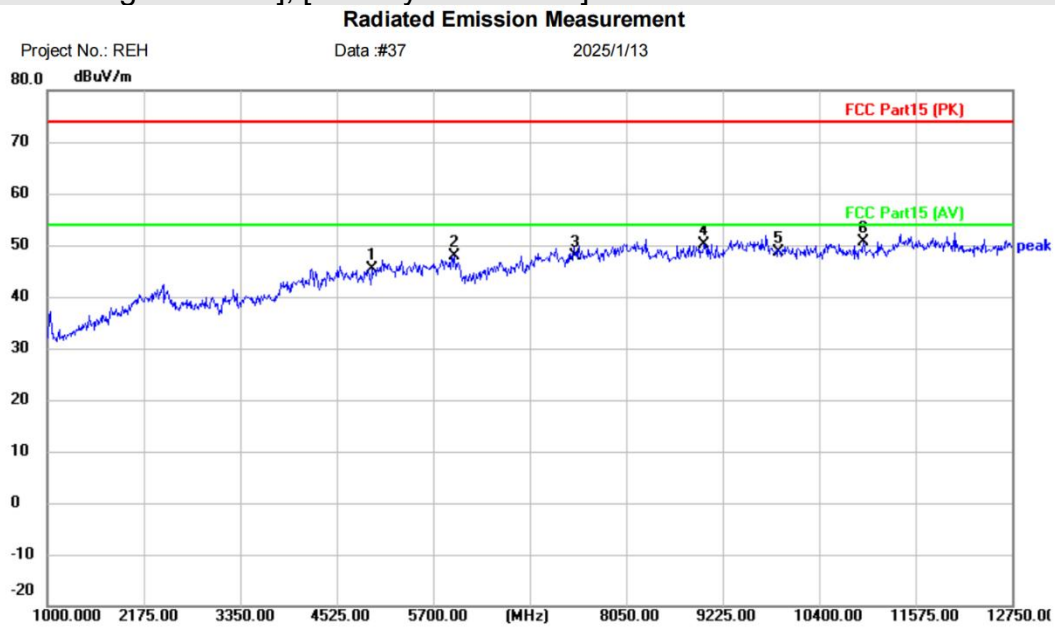
Polarization: *Vertical*
Power:

Temperature: (C)
Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4878.000	38.03	6.41	44.44	74.00	-29.56	peak	
2		5805.750	38.42	9.00	47.42	74.00	-26.58	peak	
3		7317.000	36.64	10.07	46.71	74.00	-27.29	peak	
4		8649.250	37.92	11.79	49.71	74.00	-24.29	peak	
5		9756.000	36.02	13.80	49.82	74.00	-24.18	peak	
6	*	11398.75	37.89	14.26	52.15	74.00	-21.85	peak	

Test Result: Pass

[Test mode: TX High channel]; [Polarity: Horizontal]



Site
Limit: FCC Part15 (PK)
EUT: Wireless Mouse
M/N: Epic Mouse 2
Mode: 2.4G-TX-H
Note:

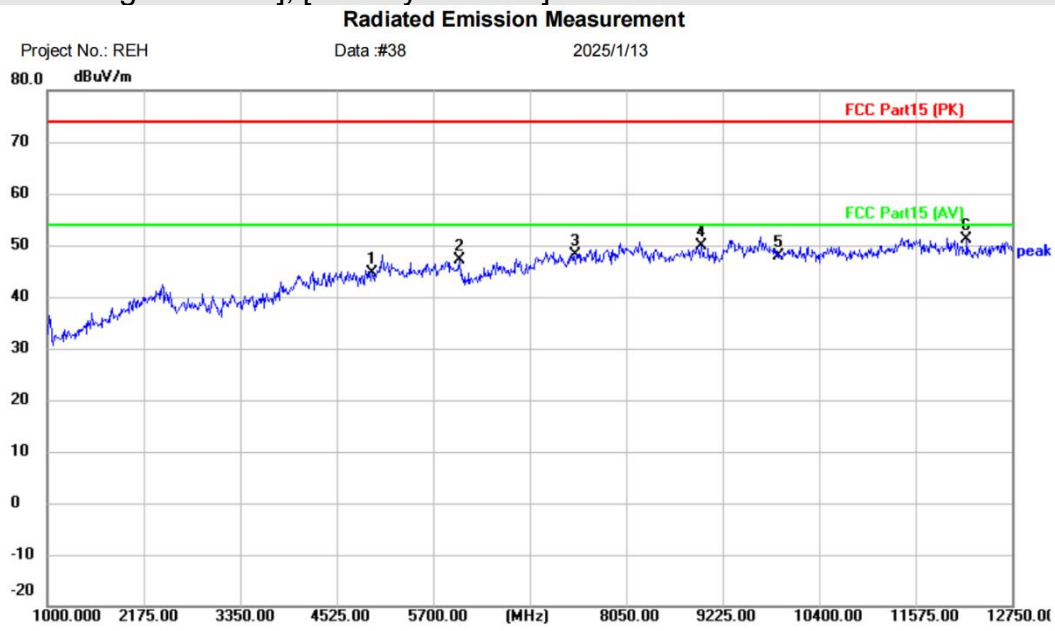
Polarization: ***Horizontal***
Power:

Temperature: (C)
Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4958.000	38.03	7.38	45.41	74.00	-28.59	peak	
2		5958.500	38.88	9.02	47.90	74.00	-26.10	peak	
3		7437.000	36.87	10.98	47.85	74.00	-26.15	peak	
4		9001.750	37.84	12.27	50.11	74.00	-23.89	peak	
5		9916.000	35.35	13.16	48.51	74.00	-25.49	peak	
6	*	10940.50	37.58	13.12	50.70	74.00	-23.30	peak	

Test Result: Pass

[Test mode: TX High channel]; [Polarity: Vertical]



Site
Limit: FCC Part15 (PK)
EUT: Wireless Mouse
M/N: Epic Mouse 2
Mode: 2.4G-TX-H
Note:

Polarization: *Vertical*
Power:

Temperature: (C)
Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4958.000	37.24	7.38	44.62	74.00	-29.38	peak	
2		6017.250	41.15	5.96	47.11	74.00	-26.89	peak	
3		7437.000	37.25	10.98	48.23	74.00	-25.77	peak	
4		8966.500	37.94	12.02	49.96	74.00	-24.04	peak	
5		9916.000	34.68	13.16	47.84	74.00	-26.16	peak	
6	*	12197.75	37.82	13.31	51.13	74.00	-22.87	peak	

Test Result: Pass

6.6 Restricted bands around fundamental frequency

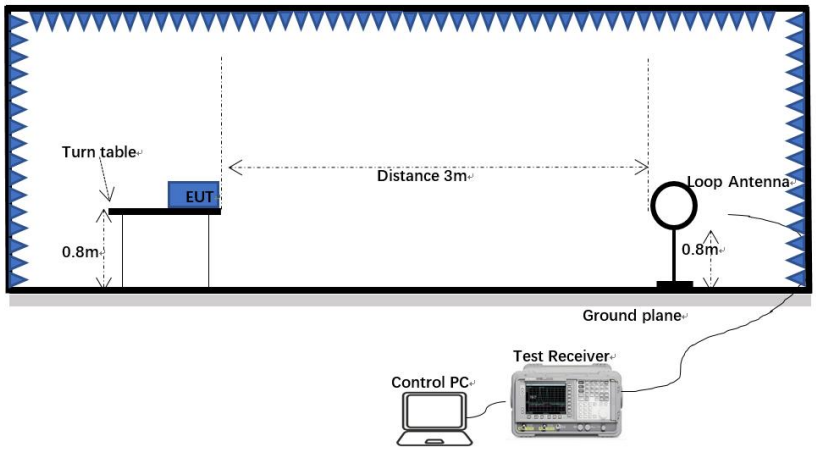
Test Standard	47 CFR Part 15, Subpart C 15.205 & 209
Test Method	ANSI C63.10 (2013) Section 6.4&6.5&6.6
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.6.1 Limit

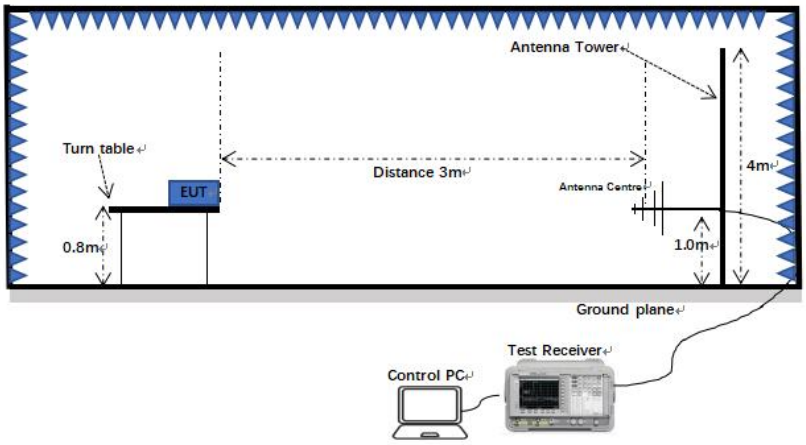
Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
Above 1GHz	74.0	Peak Value
Emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.		

6.6.2 Test setup

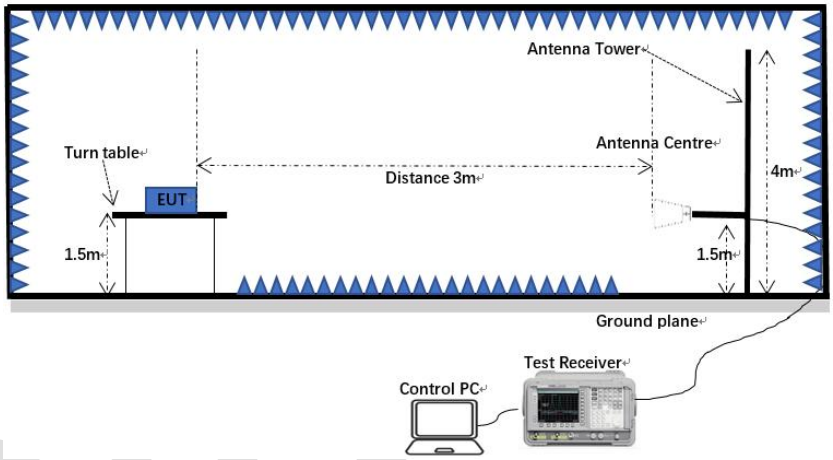
Below 1GHz：



30MHz-1GHz：



Above 1GHz：



6.6.3 Procedure

a) For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b) 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.

c) 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.

d) 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.

e) 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.

f) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g) If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h) Test the EUT in the lowest channel, the middle channel, the highest channel.

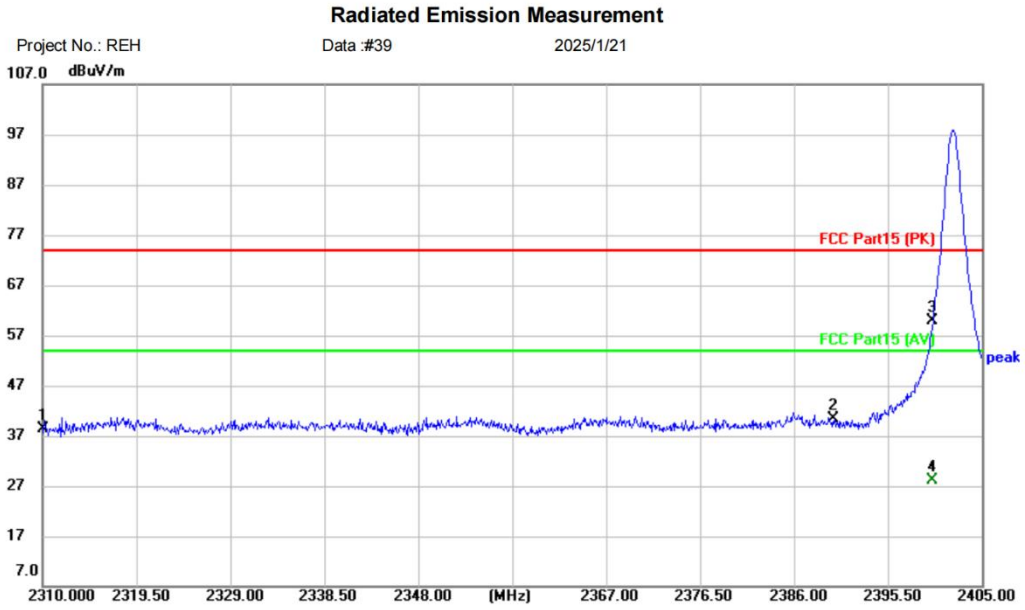
i) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j) Repeat above procedures until all frequencies measured was complete.

Note 1: Level (dBuV) = Reading (dBuV) + Factor (dB/m)
Note 2: 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.

6.6.4 Test data

[Test mode: TX low channel]; [Polarity: Horizontal]



Site
Limit: FCC Part15 (PK)
EUT: Wireless Mouse
M/N: Epic Mouse 2
Mode: 2.4G L
Note:

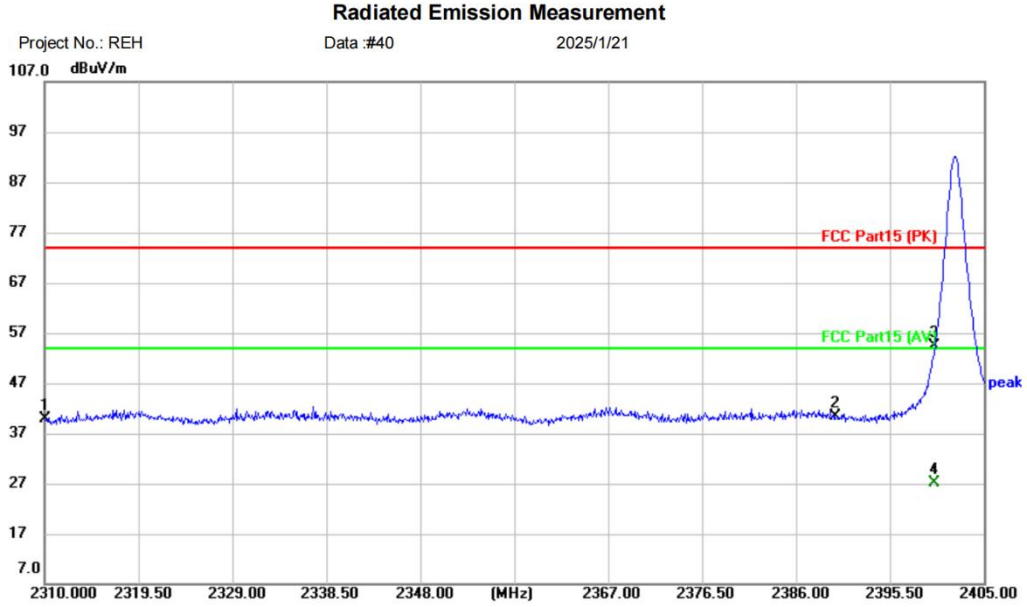
Polarization: *Horizontal*
Power:

Temperature: (C)
Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2310.000	41.35	-2.87	38.48	74.00	-35.52	peak	
2		2390.000	42.82	-2.44	40.38	74.00	-33.62	peak	
3	*	2400.000	62.17	-2.37	59.80	74.00	-14.20	peak	
4		2400.000	30.48	-2.37	28.11	54.00	-25.89	AVG	

Test Result: Pass

[Test mode:TX low channel]; [Polarity: Vertical]



Site
Limit: FCC Part15 (PK)
EUT: Wireless Mouse
M/N: Epic Mouse 2
Mode: 2.4G L
Note:

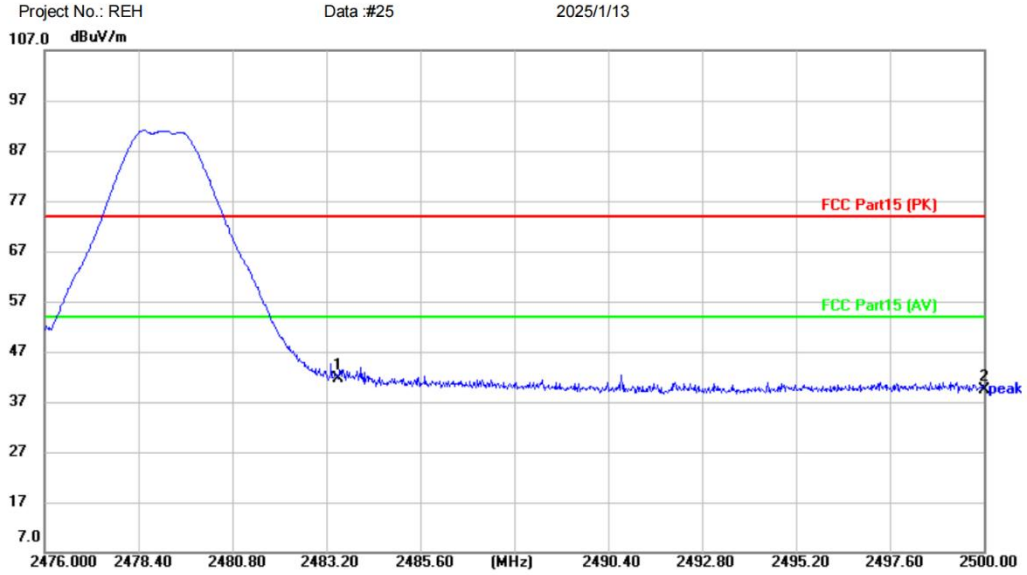
Polarization: *Vertical*
Power:

Temperature: (C)
Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2310.000	42.74	-2.87	39.87	74.00	-34.13	peak	
2		2390.000	42.94	-2.44	40.50	74.00	-33.50	peak	
3	*	2400.000	56.81	-2.37	54.44	74.00	-19.56	peak	
4		2400.000	29.62	-2.37	27.25	54.00	-26.75	AVG	

Test Result: Pass

[Test mode: TX High channel]; [Polarity: Horizontal]



Site
Limit: FCC Part15 (PK)
EUT: Wireless Mouse
M/N: Epic Mouse 2
Mode: 2.4G H
Note:

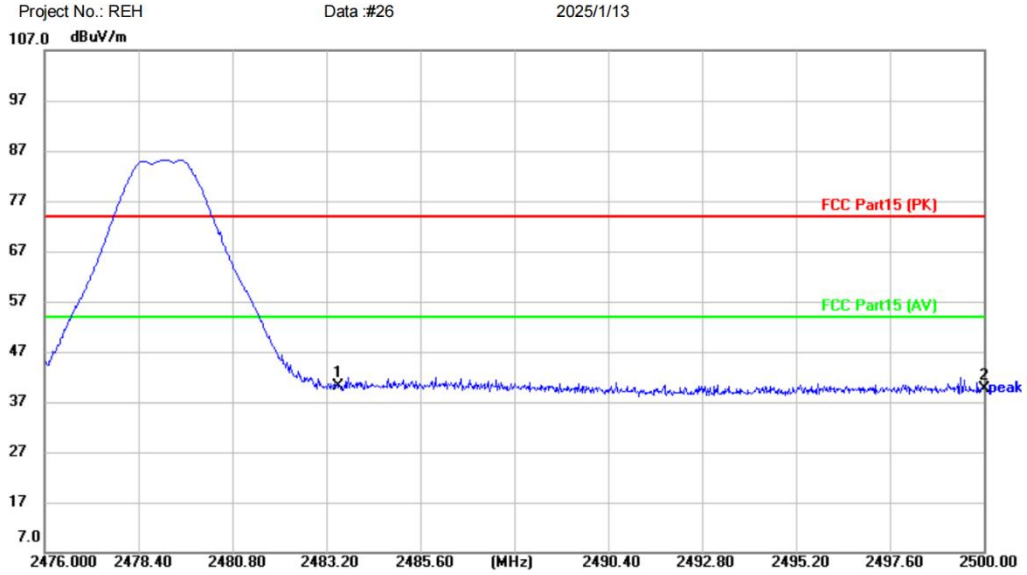
Polarization: ***Horizontal***
Power:

Temperature: (C)
Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2483.500	44.60	-2.91	41.69	74.00	-32.31	peak	
2		2500.000	42.47	-3.00	39.47	74.00	-34.53	peak	

Test Result: Pass

[Test mode:TX High channel]; [Polarity: Vertical]



Site
Limit: FCC Part15 (PK)
EUT: Wireless Mouse
M/N: Epic Mouse 2
Mode: 2.4G H
Note:

Polarization: *Vertical*
Power:

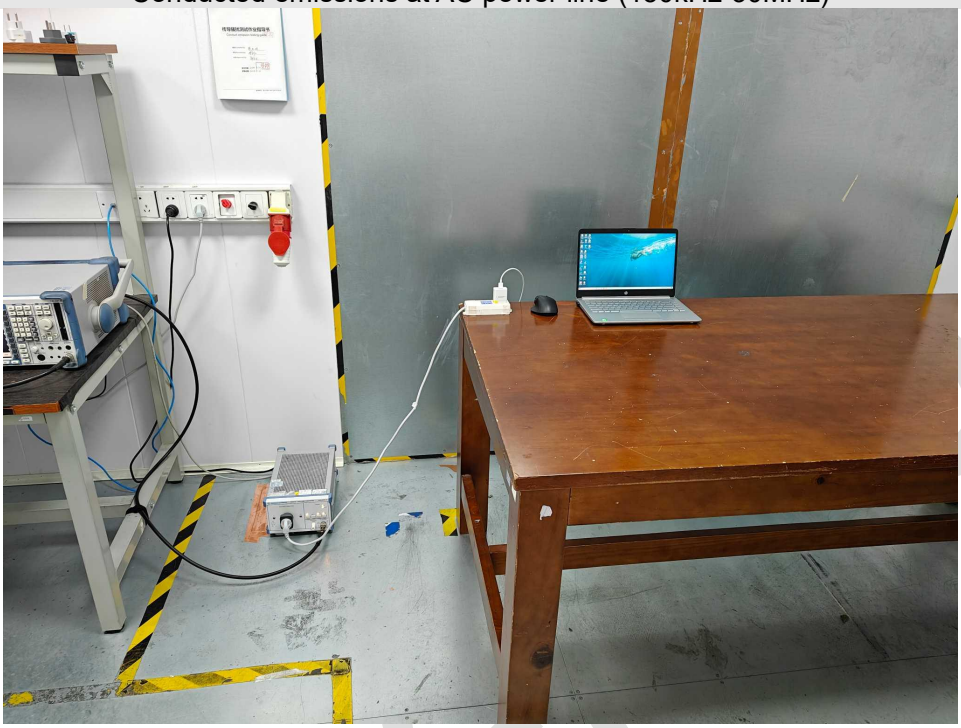
Temperature: (C)
Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	2483.500	43.15	-2.91	40.24	74.00	-33.76	peak	
2		2500.000	42.59	-3.00	39.59	74.00	-34.41	peak	

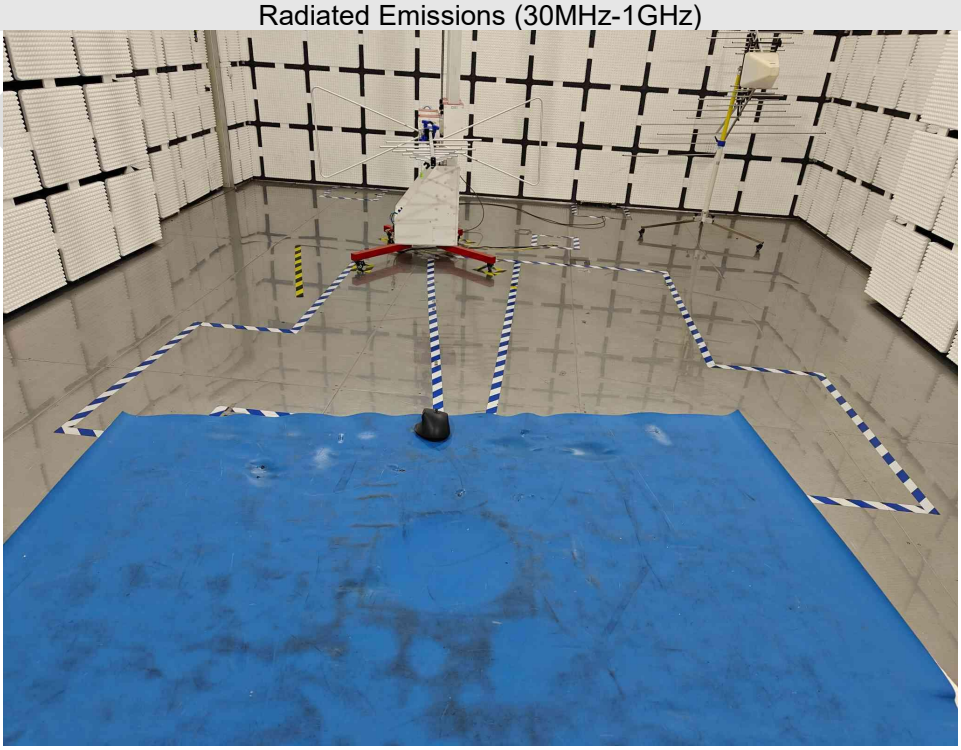
Test Result: Pass

7 Appendix A photographs of test setup

Conducted emissions at AC power line (150kHz-30MHz)



Radiated Emissions (30MHz-1GHz)



Radiated Emissions (above 1GHz)

8 Appendix B: photographs of EUT

Reference to the test report no. BLA-EMC-202501-A1001

----END OF REPORT----