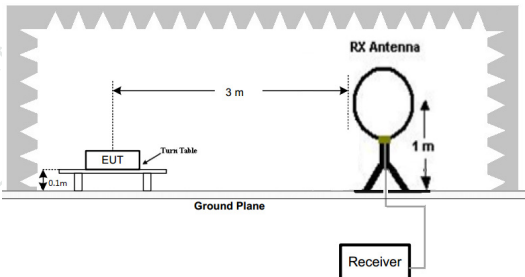




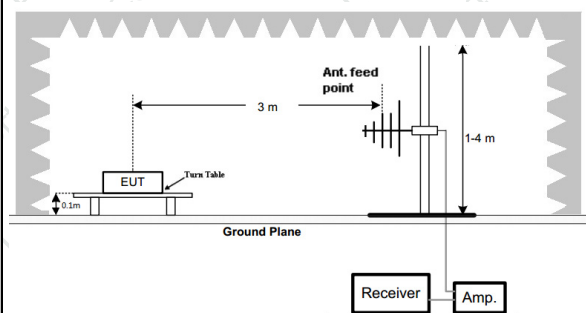
5.6 Radiated Spurious Emission Measurement

Test Specification

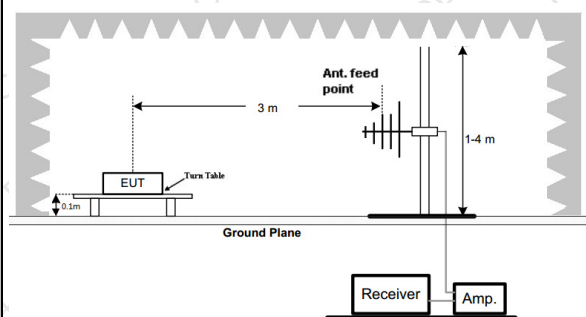
Test Requirement:	FCC Part15 C Section 15.209			
Test Method:	ANSI C63.10: 2020			
Frequency Range:	9 kHz to 26 GHz			
Measurement Distance:	3 m			
Antenna Polarization:	Horizontal & Vertical			
Operation Mode:	Transmitting mode with modulation			
Receiver Setup:	Frequency	Detector	RBW	VBW
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz
	150kHz- 30MHz	Quasi-peak	9kHz	30kHz
	30MHz-1GHz	Quasi-peak	120KHz	300KHz
	Above 1GHz	Peak	1MHz	3MHz
Limit:				Remark
				Quasi-peak Value
				Quasi-peak Value
				Quasi-peak Value
				Peak Value
Test Setup:				Average Value
	Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)	
	0.009-0.490	2400/F(KHz)	300	
	0.490-1.705	24000/F(KHz)	30	
	1.705-30	30	30	
Test Setup:	30-88	100	3	
	88-216	150	3	
	216-960	200	3	
	Above 960	500	3	
Test Setup:	Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)	Detector
	Above 1GHz	500	3	Average
		5000	3	Peak
For radiated emissions below 30MHz				
				



30MHz to 1GHz



Above 1GHz

**Test Procedure:**

1. For the radiated emission test below 1GHz:
The EUT was placed on a turntable with 0.1 meter above ground. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high PASS filter are used for the test in order to get better signal level.
2. For the radiated emission test above 1GHz:
Place the measurement antenna on a turntable with 0.1 meter above ground, which is away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal.



	The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. 3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level 4. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported. 5. Use the following spectrum analyzer settings: (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=120 kHz for $f < 1$ GHz; $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold; (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement. 6. For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent. $VBW \geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Test Results:	PASS

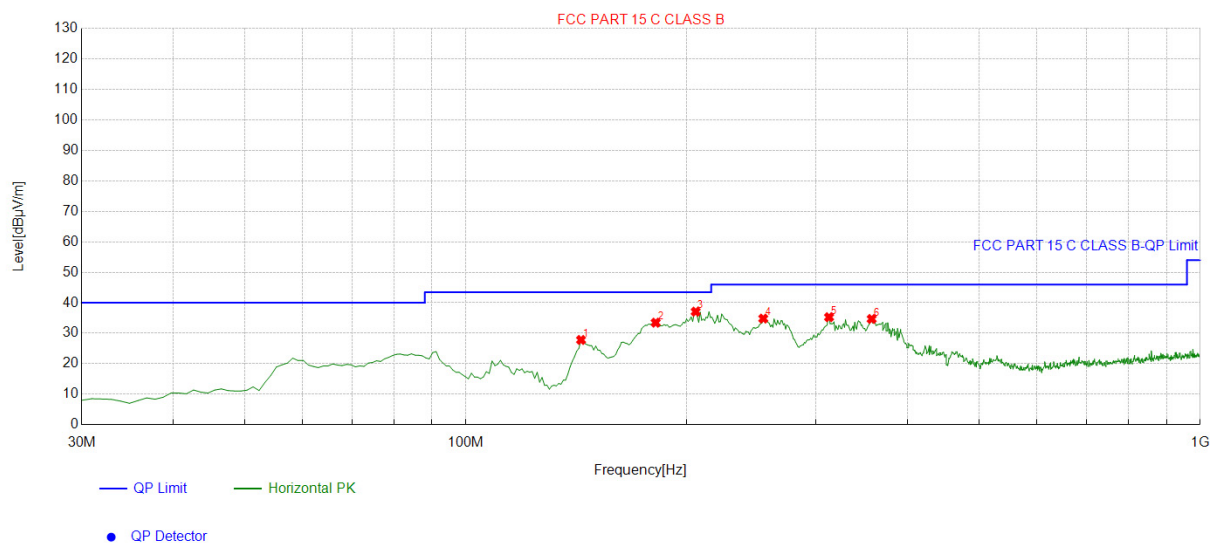


Test Data

Below 1GHz Test Results

All modes have been tested, only the worst mode of 802.11b Low channel TX is reflected.

Antenna polarity: Horizontal

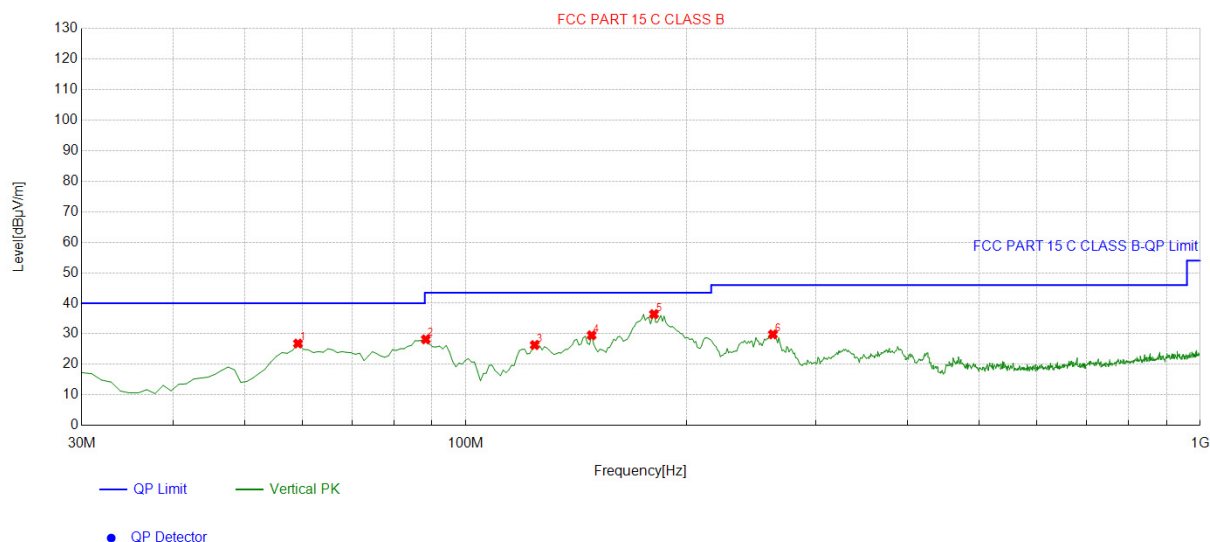


Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	143.604	-18.41	46.23	27.82	43.50	15.68	100	360	Horizontal
2	181.471	-16.28	49.75	33.47	43.50	10.03	100	9	Horizontal
3	205.746	-14.62	51.70	37.08	43.50	6.42	100	174	Horizontal
4	254.294	-12.96	47.78	34.82	46.00	11.18	100	145	Horizontal
5	312.553	-11.77	47.05	35.28	46.00	10.72	100	149	Horizontal
6	357.217	-10.52	45.22	34.70	46.00	11.30	100	145	Horizontal

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level



Antenna polarity: Vertical



Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	59.129	-14.11	40.95	26.84	40.00	13.16	100	2	Vertical
2	88.258	-16.83	45.03	28.20	43.50	15.30	100	152	Vertical
3	124.184	-17.12	43.46	26.34	43.50	17.16	100	277	Vertical
4	148.458	-18.23	47.77	29.54	43.50	13.96	100	73	Vertical
5	180.501	-16.33	52.79	36.46	43.50	7.04	100	101	Vertical
6	262.062	-12.72	42.56	29.84	46.00	16.16	100	120	Vertical

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level

Harmonics and Spurious Emissions

Frequency Range (9kHz-30MHz)

Frequency (MHz)	Level@3m (dBμV/m)	Limit@3m (dBμV/m)
--	--	--
--	--	--
--	--	--
--	--	--

Note: 1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor.

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement.

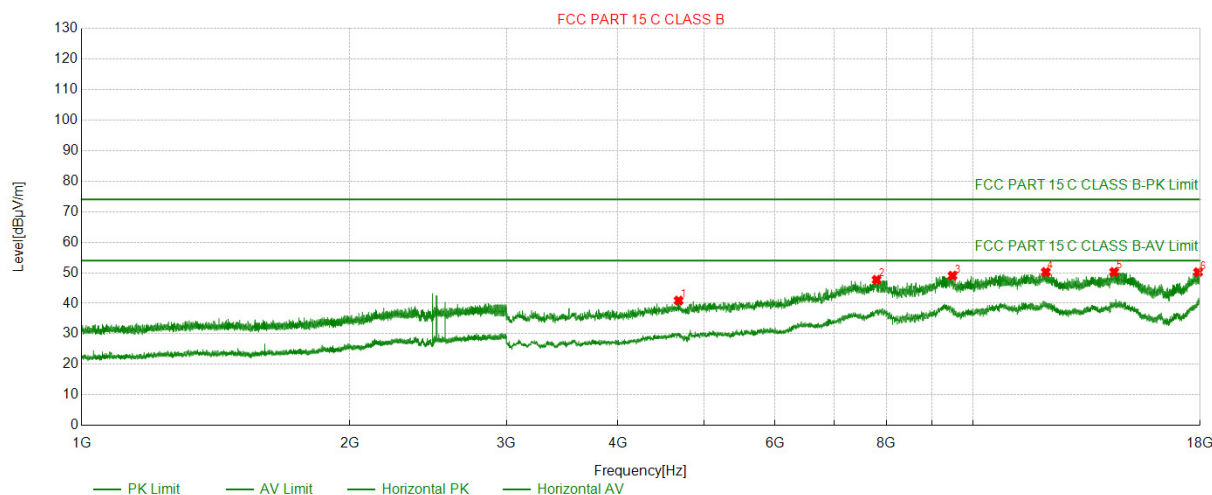


Above 1GHz Test Results

All the test modes completed for test. Only the worst result was reported as below:

For 1GHz to 18GHz

Antenna polarity: Horizontal

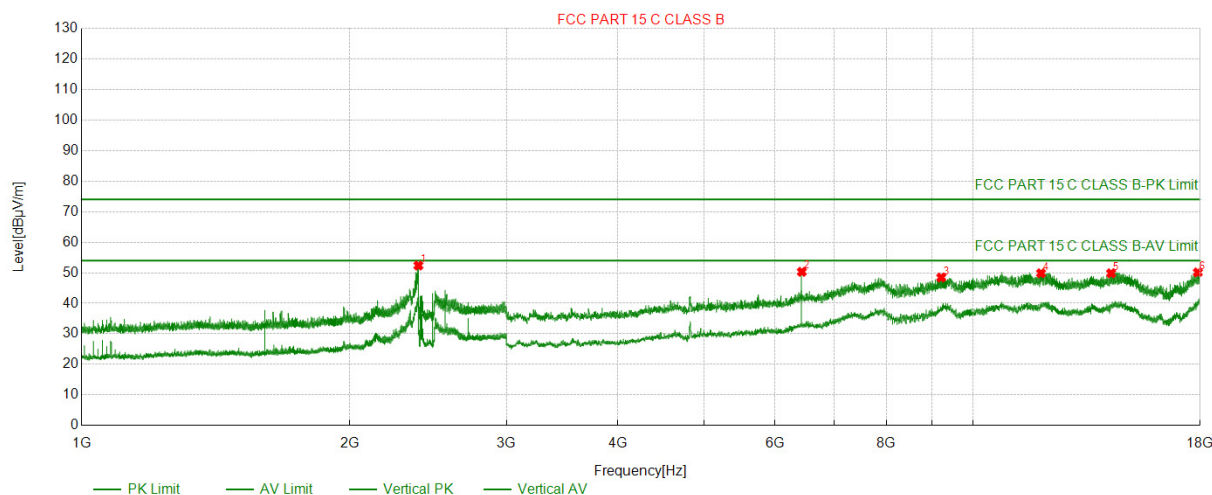


Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4678.668	52.10	40.89	-11.21	74.00	33.11	150	290	Horizontal
2	7803.480	50.55	47.70	-2.85	74.00	26.30	150	250	Horizontal
3	9494.149	49.68	49.03	-0.65	74.00	24.97	150	240	Horizontal
4	12084.908	47.37	50.25	2.88	74.00	23.75	150	280	Horizontal
5	14417.642	46.70	50.25	3.55	74.00	23.75	150	320	Horizontal
6	17909.991	43.91	50.19	6.28	74.00	23.81	150	210	Horizontal

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level



Antenna polarity: Vertical



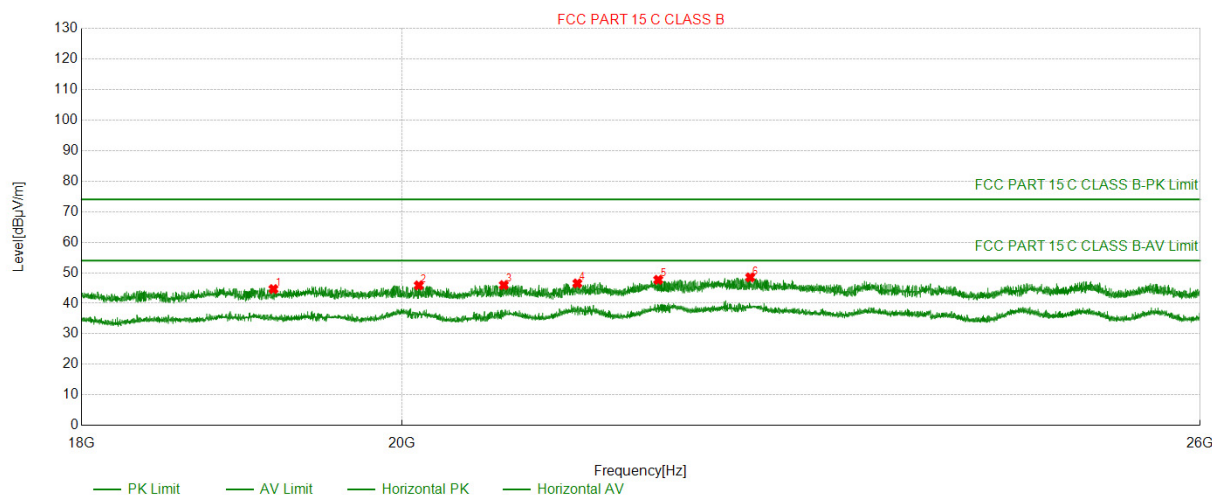
Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2388.139	66.88	52.37	-14.51	74.00	21.63	150	130	Vertical
2	6432.343	57.74	50.32	-7.42	74.00	23.68	150	50	Vertical
3	9222.622	49.53	48.44	-1.09	74.00	25.56	150	60	Vertical
4	11934.893	46.96	49.86	2.90	74.00	24.14	150	160	Vertical
5	14305.131	46.68	49.84	3.16	74.00	24.16	150	180	Vertical
6	17897.990	43.97	50.11	6.14	74.00	23.89	150	0	Vertical

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level



For 18GHz to 26GHz

Antenna polarity: Horizontal

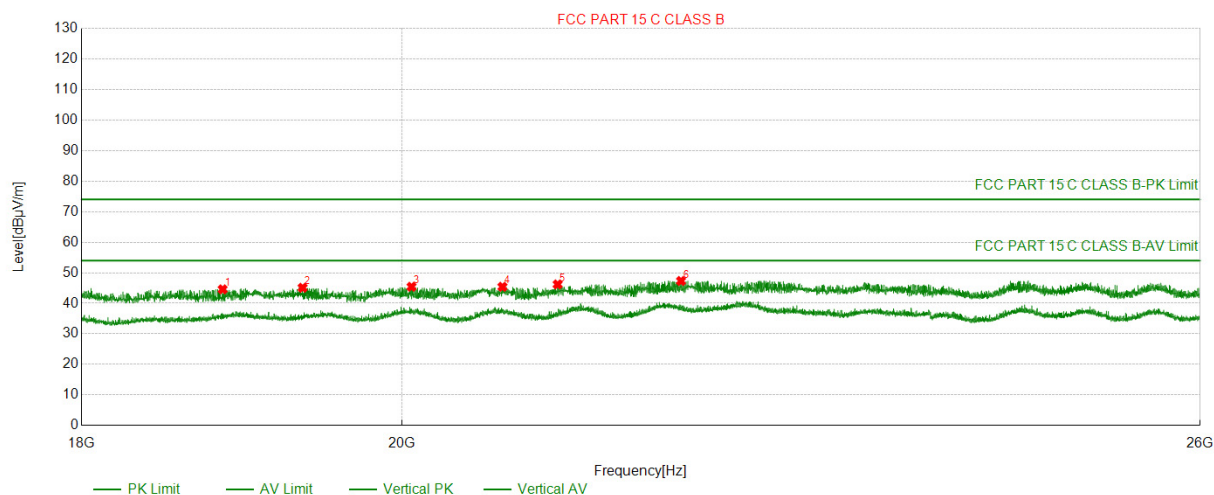


Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	19172.117	38.77	44.66	5.89	74.00	29.34	150	120	Horizontal
2	20110.611	39.73	45.87	6.14	74.00	28.13	150	80	Horizontal
3	20680.268	40.17	45.96	5.79	74.00	28.04	150	60	Horizontal
4	21186.719	41.24	46.53	5.29	74.00	27.47	150	260	Horizontal
5	21757.976	42.16	47.69	5.53	74.00	26.31	150	300	Horizontal
6	22425.243	42.83	48.50	5.67	74.00	25.50	150	240	Horizontal

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level



Antenna polarity: Vertical



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	18854.485	39.00	44.58	5.58	74.00	29.42	150	50	Vertical
2	19356.936	39.07	45.10	6.03	74.00	28.90	150	120	Vertical
3	20062.606	39.26	45.43	6.17	74.00	28.57	150	130	Vertical
4	20671.467	39.62	45.42	5.80	74.00	28.58	150	210	Vertical
5	21049.905	40.87	46.20	5.33	74.00	27.80	150	310	Vertical
6	21921.192	41.66	47.33	5.67	74.00	26.67	150	340	Vertical

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level



5.7 Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, 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. And according to FCC 47 CFR Section 15.247, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

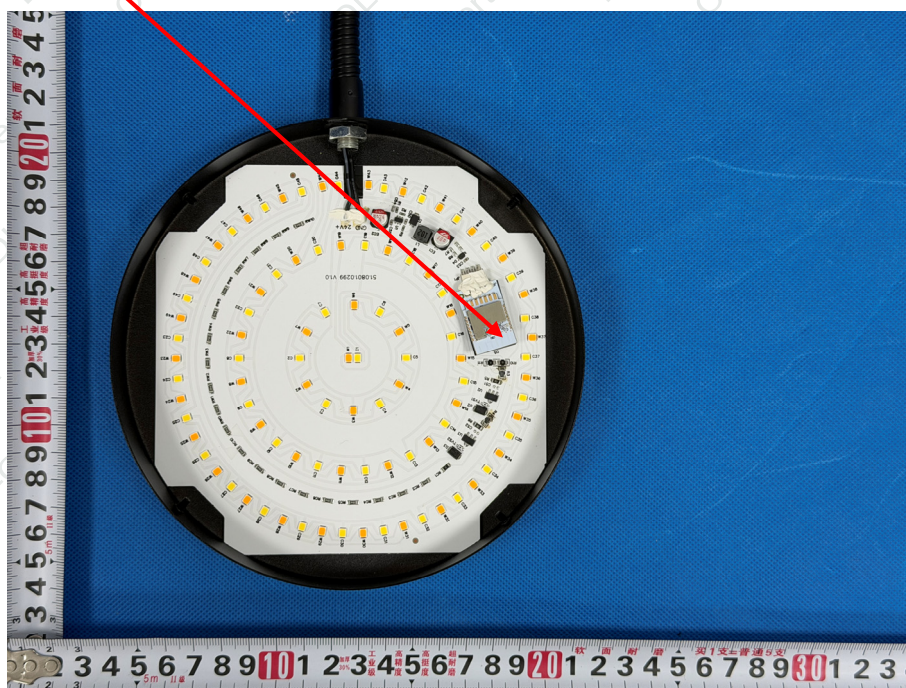
Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

The antenna used in this product is a PCB Antenna, is a permanently attached antenna on the PCB. It conforms to the standard requirements. The gain of antenna used for transmitting is 2.21dBi.

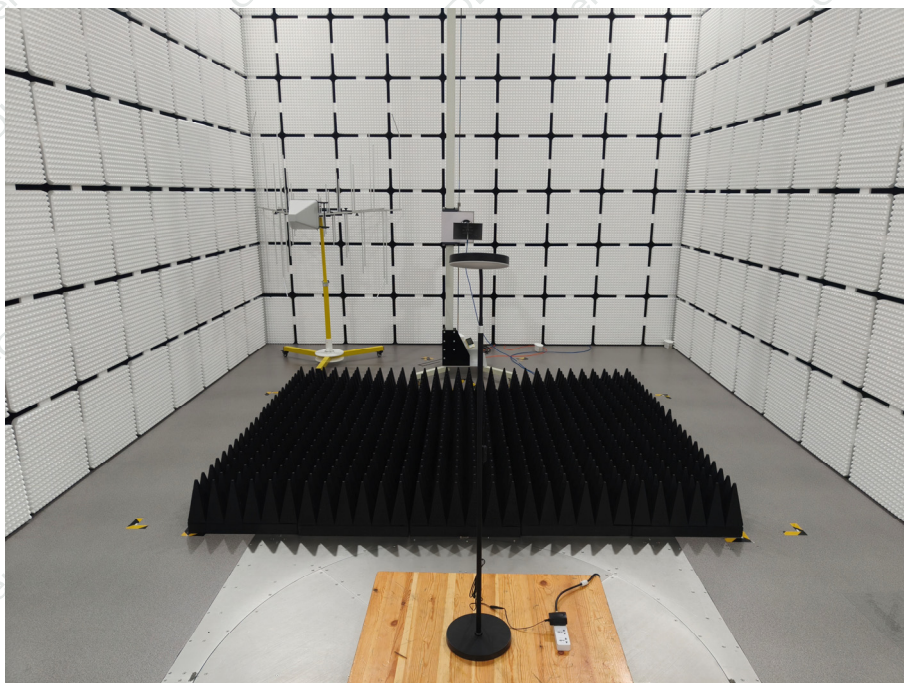
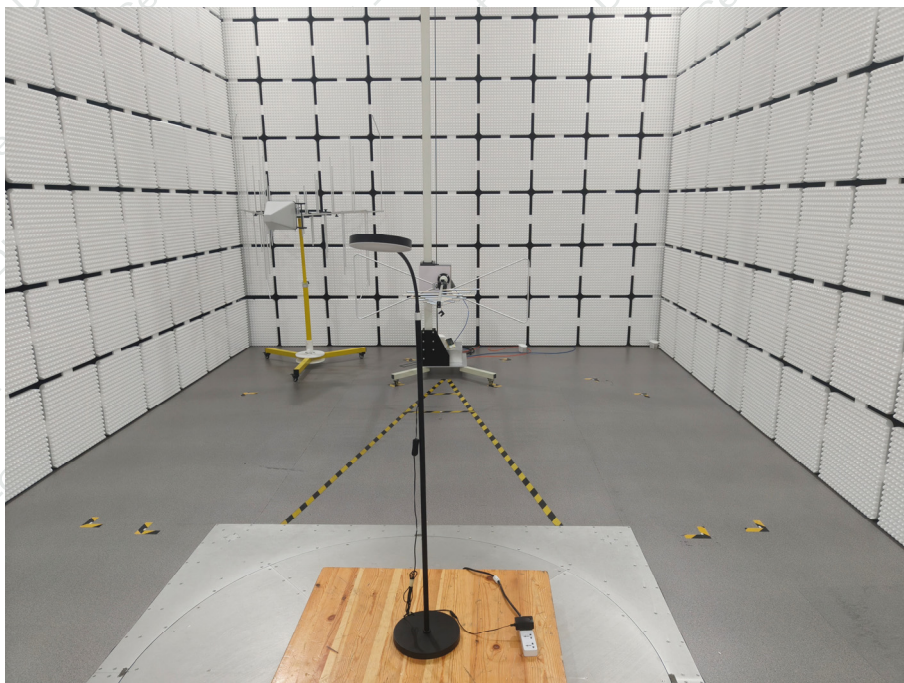
WIFI ANTENNA





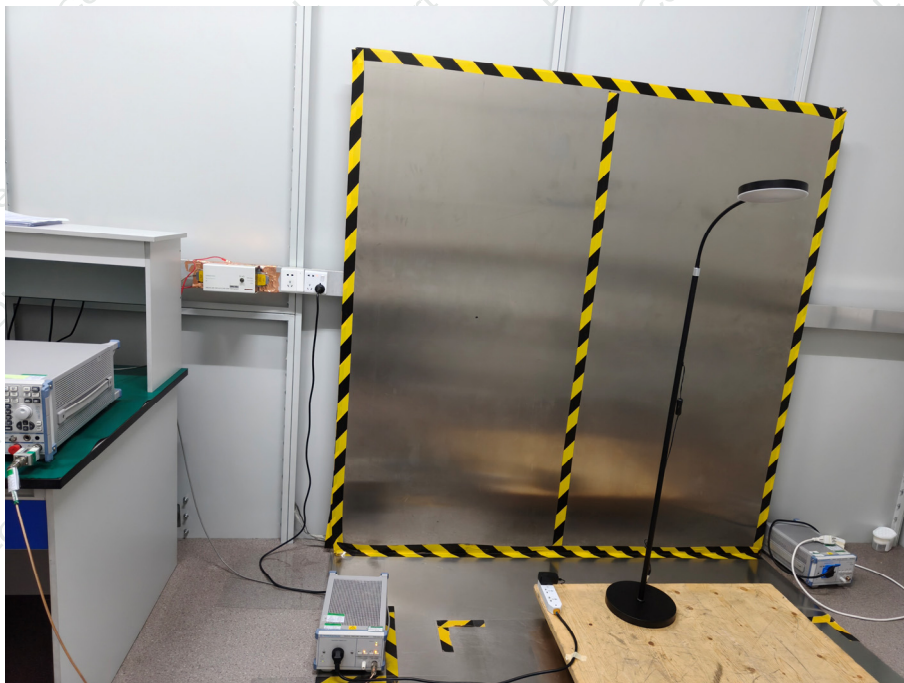
6. Test Setup Photos of the EUT

Radiated Emission

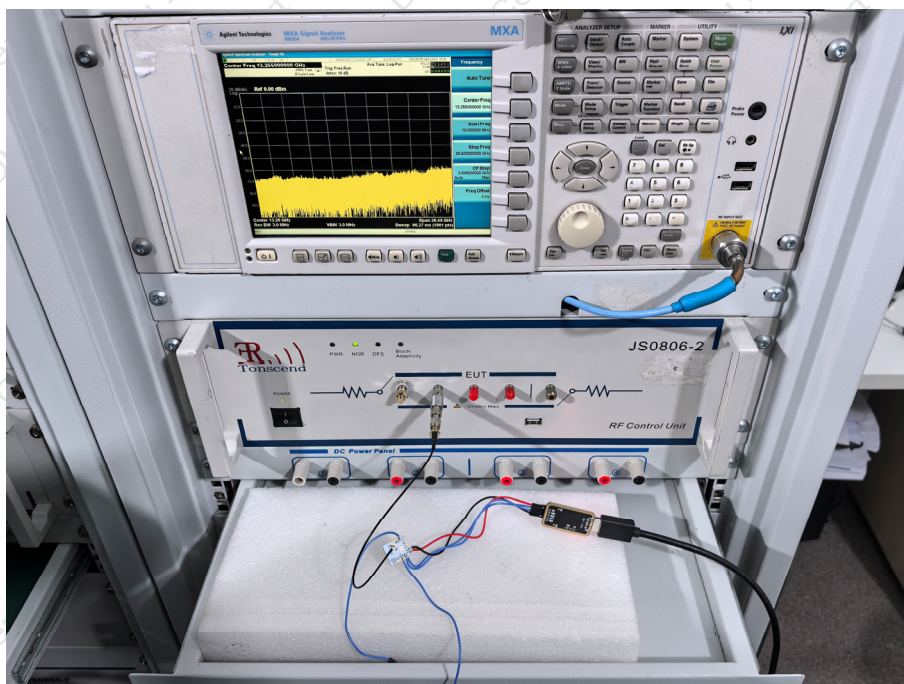




AC Conducted Emission



RF Conducted Emission





7. Photos of the EUT

Reference to the report: ANNEX A of external photos and ANNEX B of internal photos.

-----End of test report-----