



5.6 Band Edge

5.6.1 Test Specification

Test Requirement:	FCC CFR47 Part 15E Section 15.407
Test Method:	ANSI C63.10: 2020
Limit:	For band I&II&III: $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2 = 68.2 \text{ dB}\mu\text{V}/\text{m}$, for $\text{EIRP}(\text{dBm}) = -27\text{dBm}$ For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of $-27 \text{ dBm}/\text{MHz}$ at 75 MHz or more above or below the band edge increasing linearly to $10 \text{ dBm}/\text{MHz}$ 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 $15.6 \text{ dBm}/\text{MHz}$ 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 $27 \text{ dBm}/\text{MHz}$ at the band edge. For band IV(5715-5725MHz&5850-5860MHz): $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2 = 78.2 \text{ dB}\mu\text{V}/\text{m}$, for $\text{EIRP}(\text{dBm}) = -27\text{dBm}$; For band IV(other un-restricted band): $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2 = 68.2 \text{ dB}\mu\text{V}/\text{m}$, for $\text{EIRP}(\text{dBm}) = -27\text{dBm}$
Test Setup:	The diagram illustrates the test setup within an anechoic chamber. An Equipment Under Test (EUT) is placed on a turn table at a height of 1.5m. An antenna feed point is positioned 3m away from the EUT at a height of 1-4m. The setup is on a ground plane. A receiver and amplifier (Amp.) are connected to the antenna feed point.
Test Mode:	Transmitting mode with modulation

**Test Procedure:**

1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi peak or average method as specified and then reported in a data sheet.

Test Result:

PASS

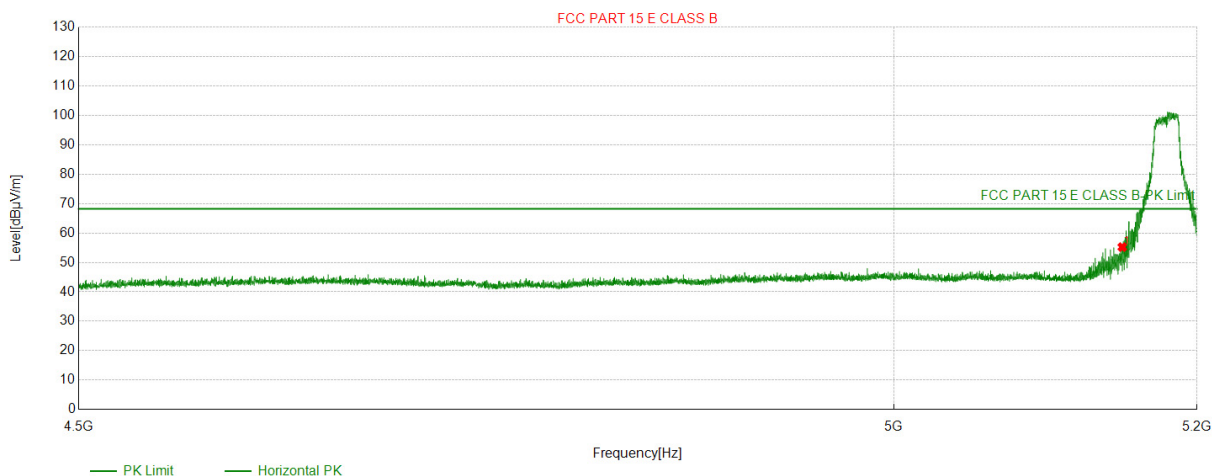


5.6.2 Test Data

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

802.11n(HT20)-5180

Antenna polarity: Horizontal

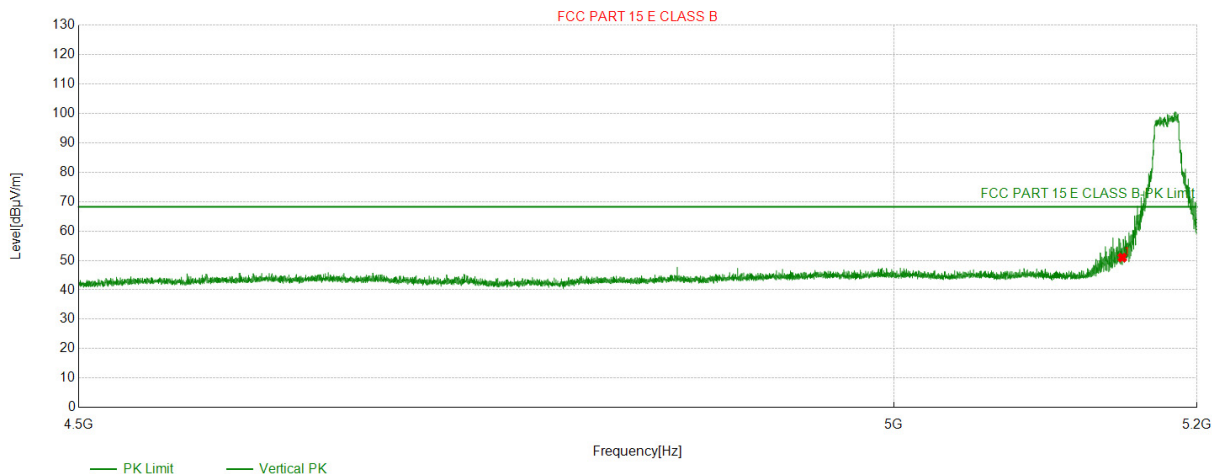


Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5150.000	59.50	55.22	-4.28	68.20	12.98	150	253	Horizontal

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



Antenna polarity: Vertical



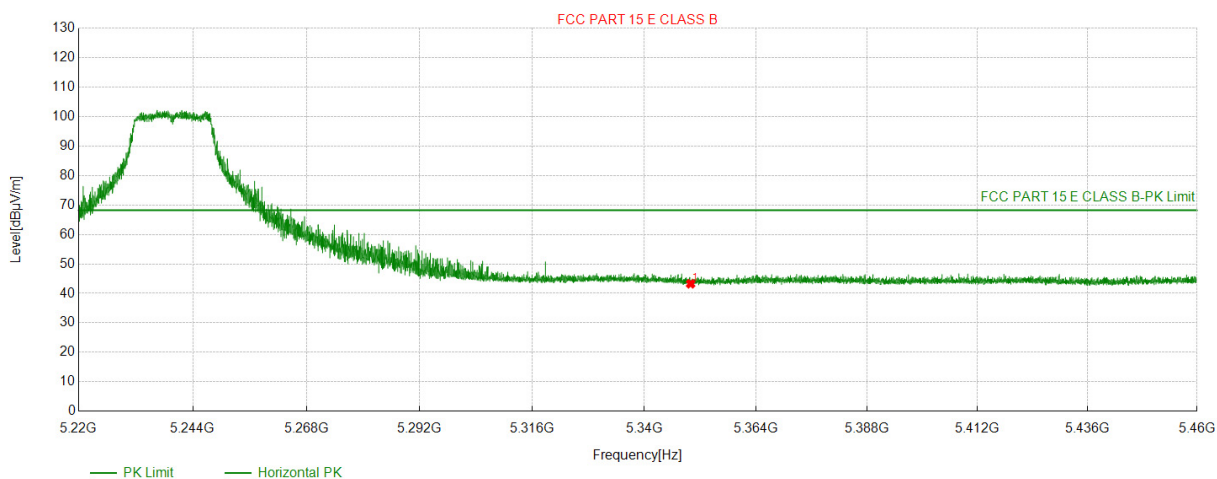
Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5150.000	55.26	50.98	-4.28	68.20	17.22	150	250	Vertical

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



802.11n(HT20)-5240

Antenna polarity: Horizontal

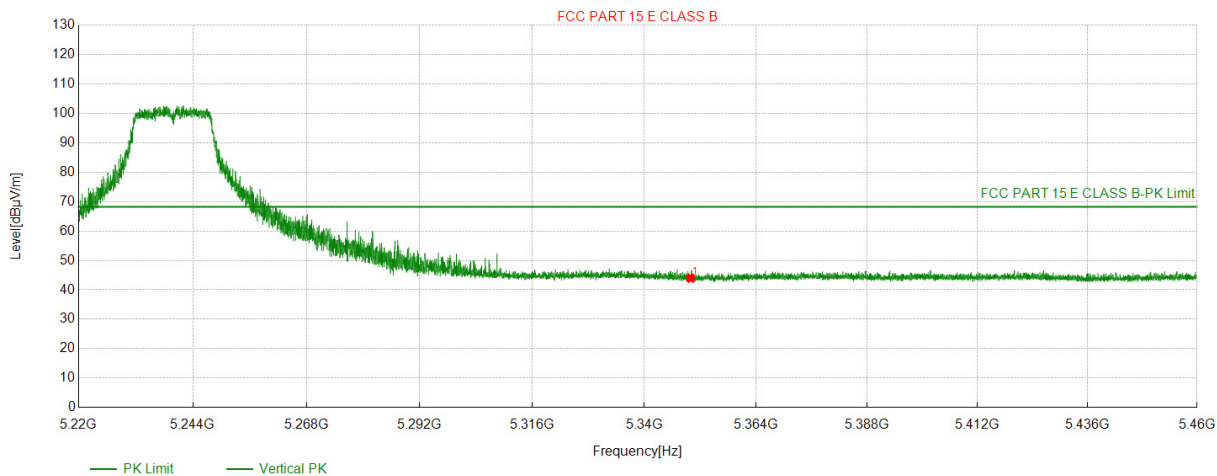
**Suspected Data List**

NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5350.000	48.40	43.26	-5.14	68.20	24.94	150	162	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	5350.000	49.11	43.97	-5.14	68.20	24.23	150	274	Vertical

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



5.7 Frequency Stability Measurement

5.7.1 Test Specification

Test Requirement:	FCC Part15 Section 15.407(g)
Test Method:	ANSI C63.10: 2020
Limit:	The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 0 degrees to 35 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.
Test Setup:	<pre>graph LR; SA[Spectrum Analyzer] --- TC[Temperature Chamber]; subgraph TC; EUT[EUT]; end; EUT --- P[AC/DC Power supply];</pre>
Test Procedure:	- The EUT was placed inside the environmental test chamber and powered by nominal AC/DC voltage. - Turn the EUT on and couple its output to a spectrum analyzer. - Turn the EUT off and set the chamber to the highest temperature specified. - Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. - Repeat step 2 and 3 with the temperature chamber set to the lowest temperature. - The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
Test Result:	PASS
Remark:	N/A



5.7.2 Test Result

TestMode	Frequency [MHz]	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)
802.11a	5180	NV	NT	-49200.00	-9.498069	20
802.11a	5180	LV	NT	-48900.00	-9.440154	20
802.11a	5180	HV	NT	-48900.00	-9.440154	20
802.11a	5200	NV	NT	-50000.00	-9.615385	20
802.11a	5200	LV	NT	-49900.00	-9.596154	20
802.11a	5200	HV	NT	-49600.00	-9.538462	20
802.11a	5240	NV	NT	-50000.00	-9.541985	20
802.11a	5240	LV	NT	-50000.00	-9.541985	20
802.11a	5240	HV	NT	-49900.00	-9.522901	20

TestMode	Frequency [MHz]	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)
802.11a	5180	NV	-30	-48600.00	-9.382239	20
802.11a	5180	NV	-20	-48900.00	-9.440154	20
802.11a	5180	NV	-10	-48900.00	-9.440154	20
802.11a	5180	NV	0	-48600.00	-9.382239	20
802.11a	5180	NV	10	-48600.00	-9.382239	20
802.11a	5180	NV	20	-48900.00	-9.440154	20
802.11a	5180	NV	30	-48900.00	-9.440154	20
802.11a	5180	NV	40	-48600.00	-9.382239	20
802.11a	5180	NV	50	-48600.00	-9.382239	20
802.11a	5200	NV	-30	-49600.00	-9.538462	20
802.11a	5200	NV	-20	-49200.00	-9.461538	20
802.11a	5200	NV	-10	-49600.00	-9.538462	20
802.11a	5200	NV	0	-49400.00	-9.500000	20
802.11a	5200	NV	10	-49300.00	-9.480769	20
802.11a	5200	NV	20	-49200.00	-9.461538	20
802.11a	5200	NV	30	-49100.00	-9.442308	20
802.11a	5200	NV	40	-49000.00	-9.423077	20
802.11a	5200	NV	50	-49000.00	-9.423077	20
802.11a	5240	NV	-30	-49500.00	-9.446565	20
802.11a	5240	NV	-20	-49300.00	-9.408397	20
802.11a	5240	NV	-10	-49200.00	-9.389313	20
802.11a	5240	NV	0	-49300.00	-9.408397	20
802.11a	5240	NV	10	-49300.00	-9.408397	20
802.11a	5240	NV	20	-49300.00	-9.408397	20
802.11a	5240	NV	30	-49300.00	-9.408397	20
802.11a	5240	NV	40	-49200.00	-9.389313	20
802.11a	5240	NV	50	-48900.00	-9.332061	20



5.8 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.

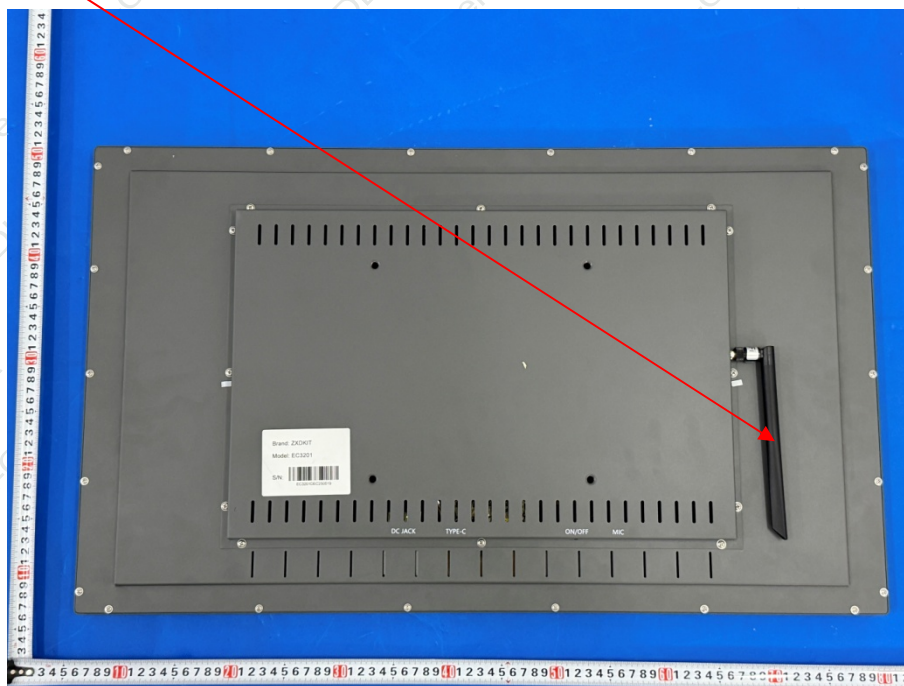
Refer to statement below for compliance.

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 an External Antenna, with non-standard SMA connector, need professional installation. It conforms to the standard requirements. The directional gains of antenna used for transmitting is 6.81dBi.

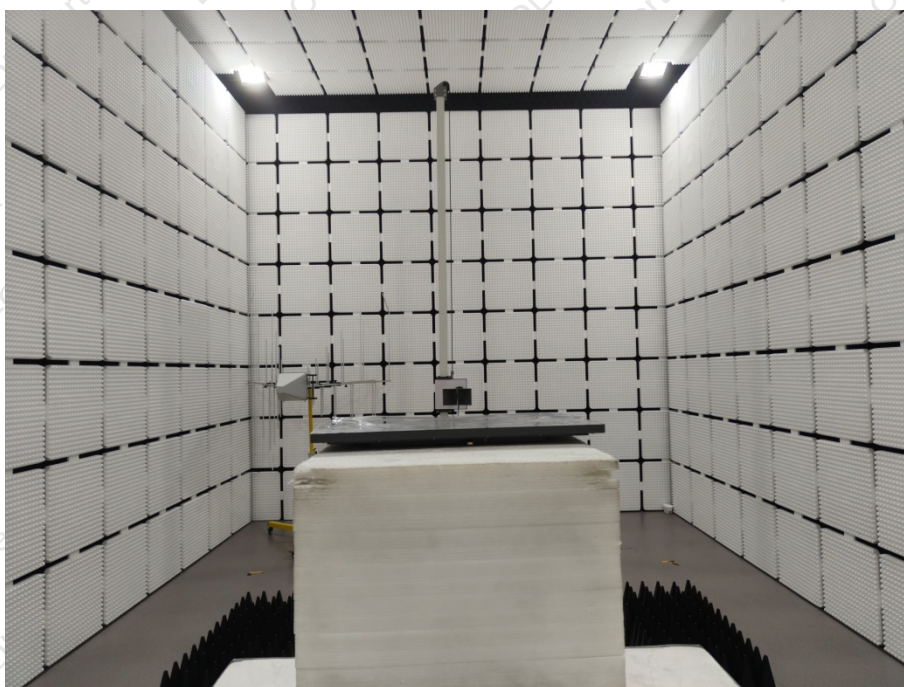
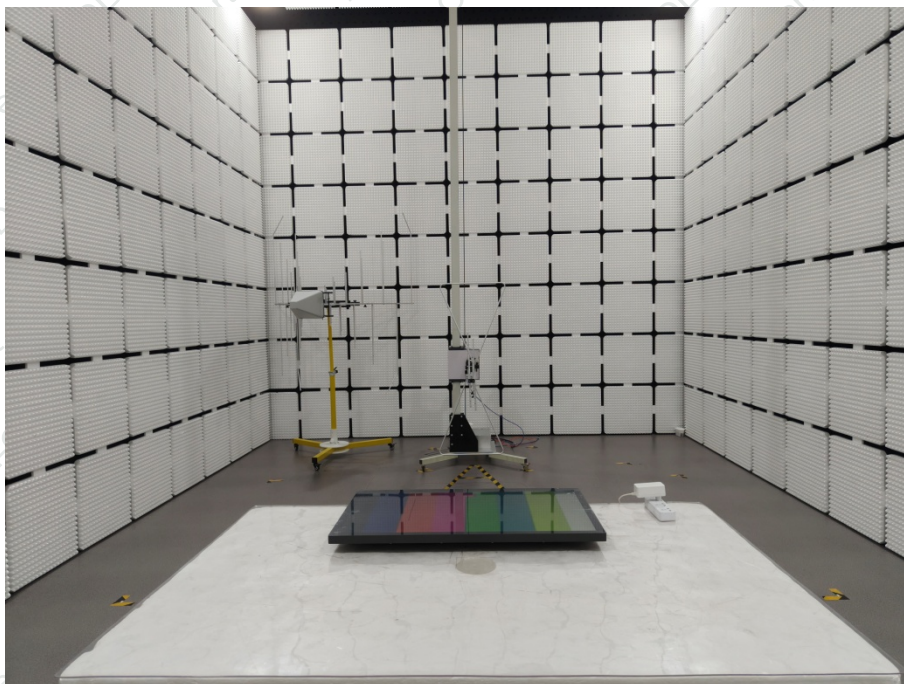
WIFI Antenna





6. Test Setup Photos of the EUT

Radiated Emissions

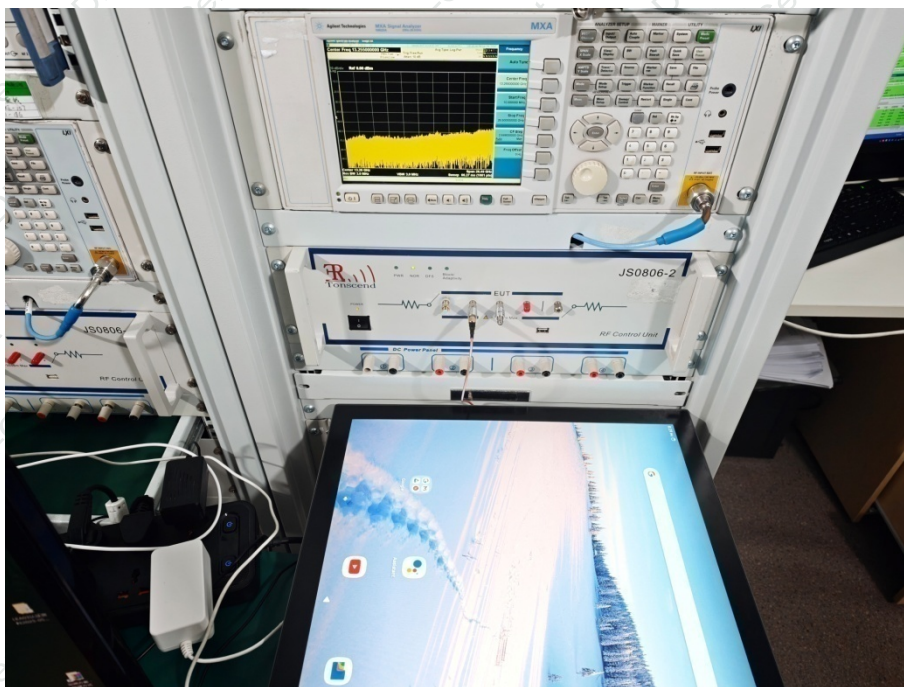




AC Conducted Emission



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-----