



4.6 Band Edge

4.6.1 Test Specification

Test Requirement:	FCC CFR47 Part 15E Section 15.407
Test Method:	ANSI C63.10: 2020
Limit:	For band I&II&III: $E[dB\mu V/m] = EIRP[dBm] + 95.2 = 68.2 \text{ dB}\mu V/m$, for $EIRP(dBm) = -27dBm$ 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. For band IV(5715-5725MHz&5850-5860MHz): $E[dB\mu V/m] = EIRP[dBm] + 95.2 = 78.2 \text{ dB}\mu V/m$, for $EIRP(dBm) = -27dBm$; For band IV(other un-restricted band): $E[dB\mu V/m] = EIRP[dBm] + 95.2 = 68.2 \text{ dB}\mu V/m$, for $EIRP(dBm) = -27dBm$ The limit of frequency below 1GHz and which fall in restricted bands should complies 15.209.
Test Setup:	The diagram illustrates the test setup. An EUT (Equipment Under Test) is placed on a test table at a height of 1.5m. An antenna feed point is positioned 3m away from the EUT. The antenna is mounted on a vertical stand at a height of 1.4m. The entire 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

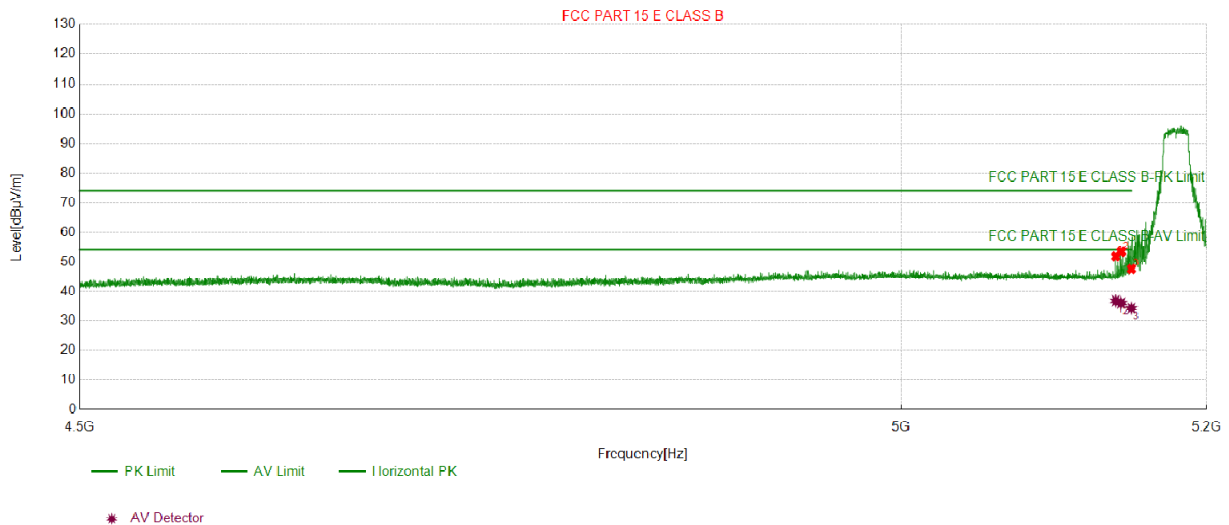


4.6.2 Test Data

All the test modes completed for test. Only the worst mode of 802.11a low channel TX is reflected.

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	5139.584	56.13	51.87	-4.26	74.00	22.13	150	296	Horizontal
2	5143.154	57.65	53.38	-4.27	74.00	20.62	150	224	Horizontal
3	5150.000	51.86	47.58	-4.28	74.00	26.42	150	265	Horizontal

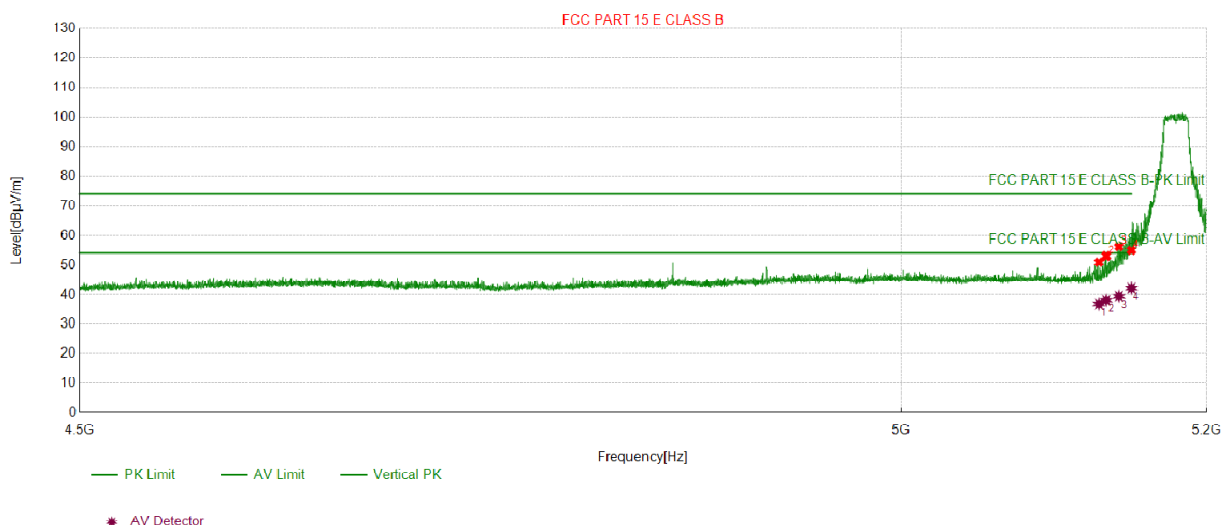
AV Final Data List

NO	Freq. [MHz]	Factor [dB]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5139.584	-4.26	36.82	54.00	17.18	150	296	Horizontal
2	5143.154	-4.27	36.11	54.00	17.89	150	224	Horizontal
3	5150.000	-4.28	34.37	54.00	19.63	150	265	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	5128.523	55.14	50.90	-4.24	74.00	23.10	150	312	Vertical
2	5133.353	57.27	53.02	-4.25	74.00	20.98	150	185	Vertical
3	5141.754	60.43	56.17	-4.26	74.00	17.83	150	27	Vertical
4	5150.000	59.22	54.94	-4.28	74.00	19.06	150	171	Vertical

AV Final Data List

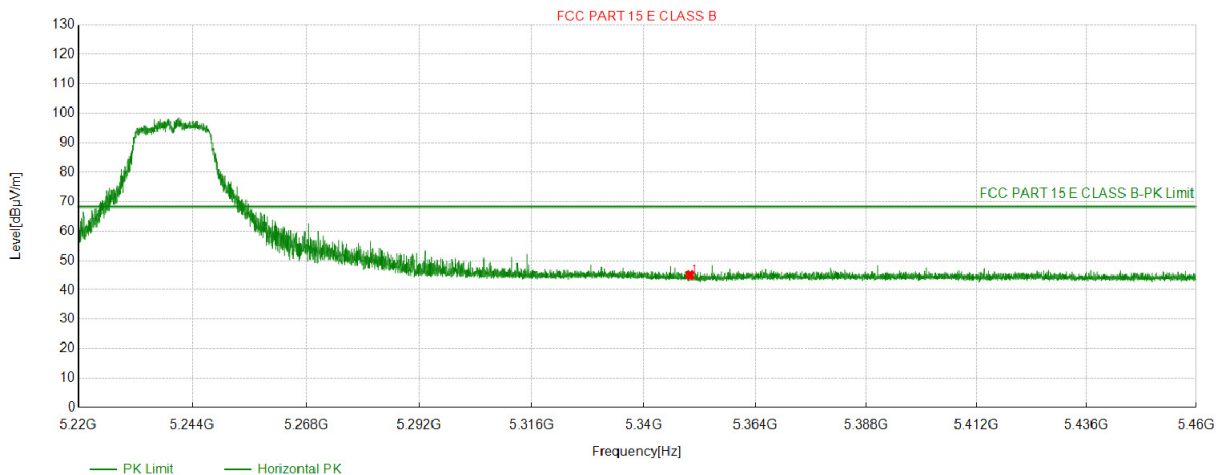
NO	Freq. [MHz]	Factor [dB]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5128.523	-4.24	36.81	54.00	17.19	150	312	Vertical
2	5133.353	-4.25	38.08	54.00	15.92	150	185	Vertical
3	5141.754	-4.26	39.45	54.00	14.55	150	27	Vertical
4	5150.000	-4.28	42.16	54.00	11.84	150	171	Vertical

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



802.11n(HT20)-5240

Antenna polarity: Horizontal



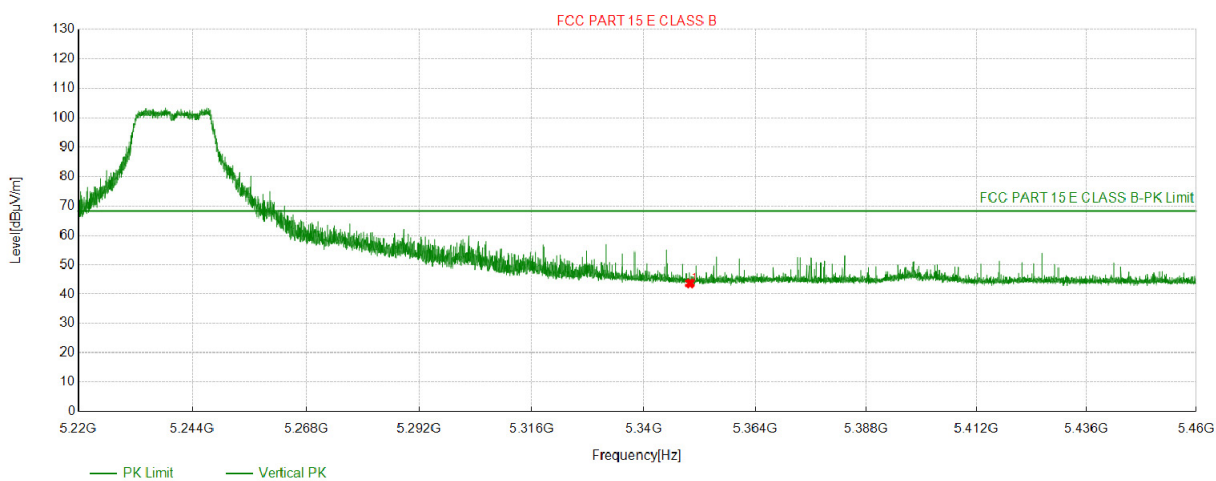
Suspected Data List

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	50.21	45.07	-5.14	68.20	23.13	150	273	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	48.78	43.64	-5.14	68.20	24.56	150	243	Vertical

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



4.7 Frequency Stability Measurement

4.7.1 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] --- EUT[EUT]; EUT --- TCh[Temperature Chamber]; TCh --- 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



4.7.2 Test Result

Test Mode	Frequency [MHz]	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)
802.11a	5180	NV	NT	3500.00	0.675676
802.11a	5180	LV	NT	3500.00	0.675676
802.11a	5180	HV	NT	3600.00	0.694981
802.11a	5200	NV	NT	4700.00	0.903846
802.11a	5200	LV	NT	4300.00	0.826923
802.11a	5200	HV	NT	4000.00	0.769231
802.11a	5240	NV	NT	5500.00	1.049618
802.11a	5240	LV	NT	5000.00	0.954198
802.11a	5240	HV	NT	4600.00	0.877863

Test Mode	Frequency [MHz]	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)
802.11a	5180	NV	-30	3400.00	0.656371
802.11a	5180	NV	-20	3400.00	0.656371
802.11a	5180	NV	-10	3300.00	0.637066
802.11a	5180	NV	0	3200.00	0.617761
802.11a	5180	NV	10	3200.00	0.617761
802.11a	5180	NV	20	3000.00	0.579151
802.11a	5180	NV	30	3200.00	0.617761
802.11a	5180	NV	40	3200.00	0.617761
802.11a	5180	NV	50	3100.00	0.598456
802.11a	5200	NV	-30	3800.00	0.730769
802.11a	5200	NV	-10	3800.00	0.730769
802.11a	5200	NV	0	3500.00	0.673077
802.11a	5200	NV	10	3600.00	0.692308
802.11a	5200	NV	20	3500.00	0.673077
802.11a	5200	NV	30	3300.00	0.634615
802.11a	5200	NV	40	3400.00	0.653846
802.11a	5200	NV	50	3400.00	0.653846
802.11a	5200	NV	-20	3600.00	0.692308
802.11a	5240	NV	-30	4400.00	0.839695
802.11a	5240	NV	-20	4300.00	0.820611
802.11a	5240	NV	-10	4200.00	0.801527
802.11a	5240	NV	0	3900.00	0.744275
802.11a	5240	NV	10	4100.00	0.782443
802.11a	5240	NV	20	4100.00	0.782443
802.11a	5240	NV	30	3900.00	0.744275
802.11a	5240	NV	40	3900.00	0.744275
802.11a	5240	NV	50	4000.00	0.763359



4.8 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 3.87dBi.

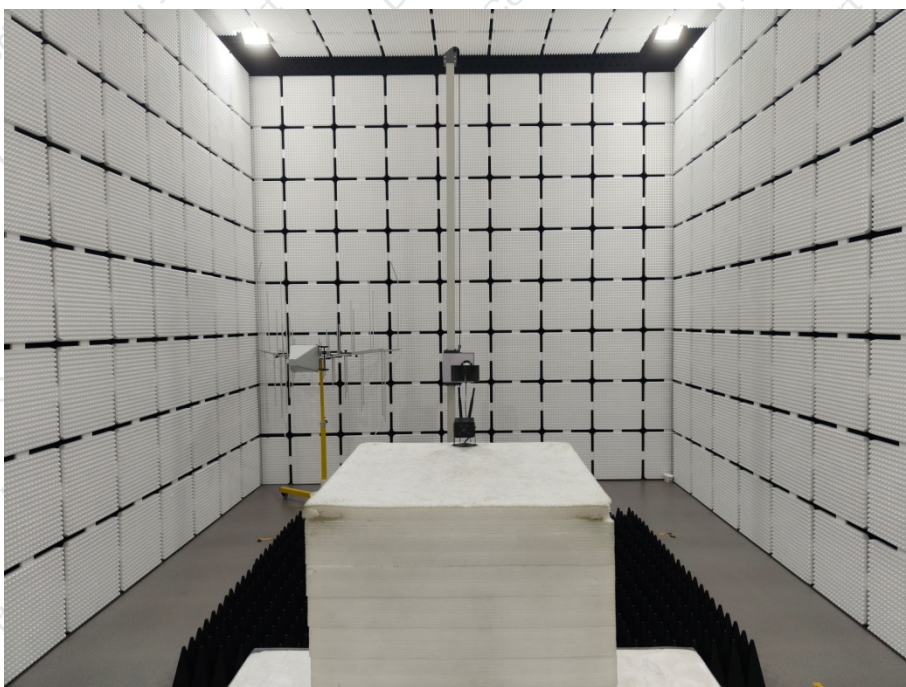
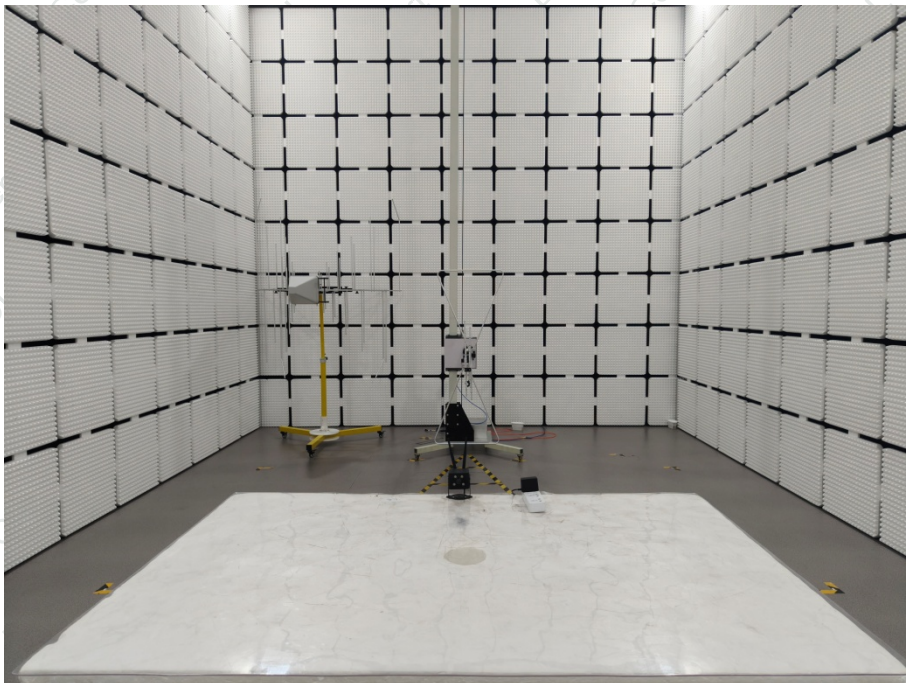
WIFI Antenna





5. Test Setup Photos of the EUT

Radiated Emissions

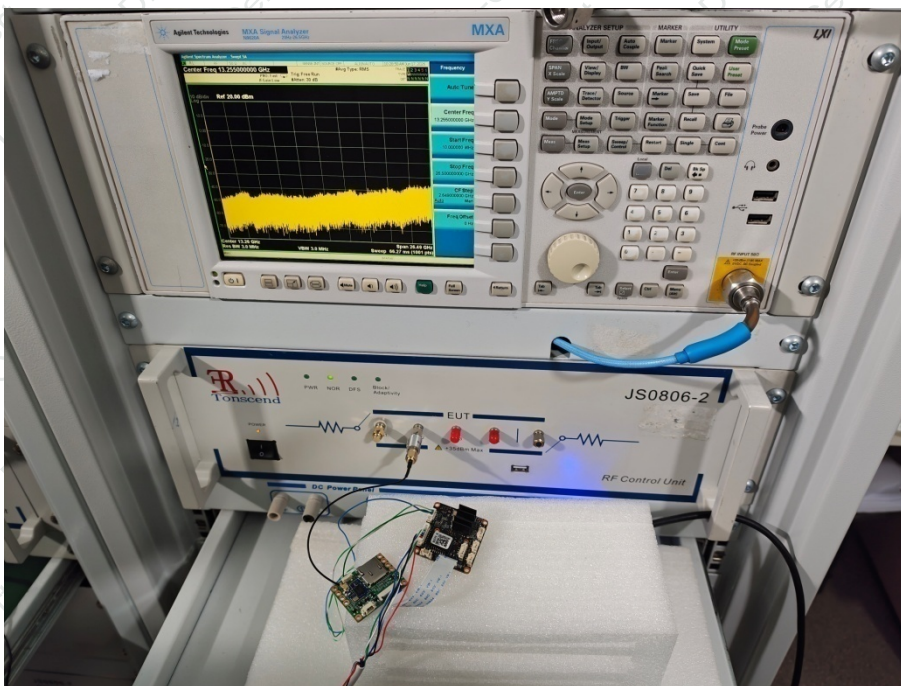




AC Conducted Emission



RF Conducted Emission





6. Photos of the EUT

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

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