



FCC ID: 2APQQ-MT7921AU-FRX

RF Exposure Evaluation

Limits

The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz

Friis transmission formula: $Pd = (Pout * G) / (4 * \pi * r^2)$

Where

Pd = power density in mW/cm², **Pout** = output power to antenna in mW;

G = gain of antenna in linear scale, **Pi** = 3.1416;

R = distance between observation point and center of the radiator in cm

Pd is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, and highest channel individually.

Test Result of RF Exposure Evaluation

BT (Worst case)

Antenna gain=1.5dBi

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Target power (dBm)	Target power (mW)	Antenna Gain (Numeric)	Power Density Limit (mW/cm ²)	Power Density At 20 cm (mW/cm ²)	Test Results
2402	20	4.449	4±1	3.162	1.41	1	0.0009	Pass
2441	20	3.419	4±1	3.162	1.41	1	0.0009	Pass
2480	20	4.4	4±1	3.162	1.41	1	0.0009	Pass

BLE (Worst case)

Antenna gain=1.5dBi

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Target power (dBm)	Target power (mW)	Antenna Gain (Numeric)	Power Density Limit (mW/cm ²)	Power Density At 20 cm (mW/cm ²)	Test Results
2402	20	2.857	3±1	2.512	1.41	1	0.0007	Pass
2440	20	1.843	2±1	1.995	1.41	1	0.0006	Pass
2480	20	3.414	3±1	2.512	1.41	1	0.0007	Pass

WIFI 2.4GHz (Antenna-A Worst case)

Antenna gain=4.82dBi, Directional gain=7.83dBi

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Target power (dBm)	Target power (mW)	Antenna Gain (Numeric)	Power Density Limit (mW/cm ²)	Power Density At 20 cm (mW/cm ²)	Test Results
2412	20.00	14.978	15±1	39.81	3.03	1	0.024	Pass
2422	20.00	14.829	15±1	39.81	3.03	1	0.024	Pass
2437	20.00	14.702	15±1	39.81	3.03	1	0.024	Pass
2452	20.00	14.666	15±1	39.81	3.03	1	0.024	Pass
2462	20.00	15.038	15±1	39.81	3.03	1	0.024	Pass



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WIFI 2.4GHz (Antenna-B Worst case)

Antenna gain=4.82dBi, Directional gain=7.83dBi

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Target power (dBm)	Target power (mW)	Antenna Gain (Numeric)	Power Density Limit (mW/cm ²)	Power Density At 20 cm (mW/cm ²)	Test Results
2412	20.00	15.134	15±1	39.81	3.03	1	0.024	Pass
2422	20.00	15.182	15±1	39.81	3.03	1	0.024	Pass
2437	20.00	15.177	15±1	39.81	3.03	1	0.024	Pass
2452	20.00	14.233	15±1	39.81	3.03	1	0.024	Pass
2462	20.00	14.244	15±1	39.81	3.03	1	0.024	Pass

WIFI 5GHz (Antenna-A Worst case)

Frequency Range: 5180-5240 MHz

Antenna gain=3.43dBi, Directional gain=6.44dBi

Frequency Range: 5745-5825 MHz

Antenna gain=4.62dBi, Directional gain=7.63dBi

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Target power (dBm)	Target power (mW)	Antenna Gain (Numeric)	Power Density Limit (mW/cm ²)	Power Density At 20 cm (mW/cm ²)	Test Results
5180	20	13.453	14±1	31.62	2.20	1	0.0139	Pass
5190	20	14.016	14±1	31.62	2.20	1	0.0139	Pass
5200	20	13.216	14±1	31.62	2.20	1	0.0139	Pass
5210	20	11.328	12±1	19.95	2.20	1	0.0087	Pass
5230	20	13	13±1	39.81	2.20	1	0.0174	Pass
5240	20	13.034	13±1	25.12	2.20	1	0.0110	Pass
5745	20	15.313	15±1	39.81	2.90	1	0.0229	Pass
5755	20	15.105	15±1	39.81	2.90	1	0.0229	Pass
5775	20	12.57	12±1	19.95	2.90	1	0.0115	Pass
5785	20	15.673	15±1	39.81	2.90	1	0.0229	Pass
5795	20	14.792	15±1	39.81	2.90	1	0.0229	Pass
5825	20	15.277	15±1	39.81	2.90	1	0.0229	Pass

WIFI 5GHz (Antenna-B Worst case)

Frequency Range: 5180-5240 MHz

Antenna gain=3.43dBi, Directional gain=6.44dBi

Frequency Range: 5745-5825 MHz

Antenna gain=4.62dBi, Directional gain=7.63dBi

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Target power (dBm)	Target power (mW)	Antenna Gain (Numeric)	Power Density Limit (mW/cm ²)	Power Density At 20 cm (mW/cm ²)	Test Results
5180	20	12.899	13±1	25.12	2.20	1	0.011	Pass
5190	20	13.973	14±1	31.62	2.20	1	0.0139	Pass
5200	20	13.358	14±1	31.62	2.20	1	0.0139	Pass
5210	20	13.026	14±1	31.62	2.20	1	0.0139	Pass
5230	20	13.918	14±1	31.62	2.20	1	0.0139	Pass
5240	20	13.768	14±1	31.62	2.20	1	0.0139	Pass
5745	20	14.573	15±1	39.81	2.90	1	0.0229	Pass
5755	20	14.271	15±1	39.81	2.90	1	0.0229	Pass
5775	20	11.072	11±1	15.85	2.90	1	0.0091	Pass
5785	20	14.421	14±1	31.62	2.90	1	0.0182	Pass
5795	20	13.456	14±1	31.62	2.90	1	0.0182	Pass
5825	20	15.104	15±1	39.81	2.90	1	0.0229	Pass

For the max simultaneous transmission MPE (Worst case):

Power Density (mW/cm ²) BT ANT	Power Density (mW/cm ²) ANT A	Power Density (mW/cm ²) ANT B	Total	Power Density Limit (mW/cm ²)	Test Results
BT	2.4GHz	2.4GHz	0.0489	1.000	Pass
0.0009	0.024	0.024			

Note: 1. The Bluetooth function can transmit at the same time with the Wi-Fi function.

2. When the ANT 1 and ANT 2 transmit simultaneously (MIMO Mode), the formula of calculated the exposure is:

$$(MPE1 / Limit) + (MPE2 / Limit) + \dots \leq 1$$

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure.