

FCC ID: 2AQSN-DCPHUB

1. RF EXPOSURE

1.1.The Requirement

System operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See Section 15.247(b)(4) and Section 1.1307(b)(1)

1.2.Limit For Maximum Permissible Exposure (MPE)

Limits for General Population/ Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time $ E ^2, H ^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	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, * Plane-wave equivalent power density

1.3.MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S=PG/4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the wifi antenna is 4.0dBi and the gain of the BT antenna is 1.0dBi ,the RF power density can be obtained.

1.4.TEST RESULTS

BT & WIFI can't transmit simultaneously

Maximum measured transmitter power

BT mode

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	20.00	17.169	18 ±1	79.43	1.26	1.000	0.020	Pass
2440	20.00	17.166	18±1	79.43	1.26	1.000	0.020	Pass
2480	20.00	16.648	17±1	63.10	1.26	1.000	0.016	Pass

WIFI mode (Worst Case)

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	16.853	17±1	63.10	2.512	1.000	0.032	Pass
2437	20.00	15.723	16 ±1	50.12	2.512	1.000	0.025	Pass
2462	20.00	15.329	16 ±1	50.12	2.512	1.000	0.025	Pass

WIFI Mode (MIMO Worst Case)

Test Frequency (MHz)	Minimum Separation Distance (cm)	Antenna	Output Power (dBm)	Target power (dBm)	Target power (mW)	Antenna Gain (Numeric)	Power Density At 20 cm (mW/cm ²)
2412	20.00	A	12.283	13±1	25.12	2.512	0.013
		B	12.295	13±1	25.12	2.512	0.013
2437	20.00	A	11.228	12 ±1	19.95	2.512	0.010
		B	11.109	12 ±1	19.95	2.512	0.010
2462	20.00	A	11.087	12 ±1	19.95	2.512	0.010
		B	10.891	11 ±1	15.85	2.512	0.008

When the ANT A and ANT B transmit simultaneously(MIMO Mode), the formula of calculated the exposure is:

$$(MPE1 / \text{Limit}) + (MPE2 / \text{Limit}) + \dots \text{etc.} \leq 1$$

Therefore, the calculation of this situation is $(0.013/ 1) + (0.013/1) = 0.026$ (Worst case), which is less than the “1” limit.

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

1.5.FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, Human proximity to the antenna shall not be less than 20cm(8 inches) during normal operation. Proposed RF exposure safety information to include in User’s Manual.