

8. RADIO FREQUENCY EXPOSURE

8.1. Limit

According to §1.1310 and §2.1091 RF exposure is calculated.

Table: Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Power Density (S) (mW/cm ²)
0.3–1.34	*(100)
1.34–30	*(180/f ²)
30–300	0.2
300–1500	f/1500
1500–100,000	1.0

F = frequency in MHz

* = Plane-wave equivalent power density

Maximum Permissible Exposure

The MPE was calculated at 20cm to show compliance with the power density limit.

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

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.

Note:

1. Manufacturer declared that the maximum antenna gain is 2.0 dBi(Max.) for bluetooth and WIFI.
2. Manufacturer declared that the nearest distance between human and the EUT is 20cm.
3. Only record worst case data.

8.2 Test Results

Standalone MPE

5G WIFI

Test	Channel	ANT Power (dBm)	ANT Max. Tune Up Power (dBm)	ANT Max. Tune Up Power (mW)	ANT MPE (mW/cm ²)	Limit (mW/cm ²)
802.11a	36	16.57	18.0±1.0	79.4328	0.0251	1.0
	40	16.69	18.0±1.0	79.4328	0.0251	1.0
	48	16.91	18.0±1.0	79.4328	0.0251	1.0
	149	18.33	20.0±1.0	125.8925	0.0397	1.0
	157	18.36	20.0±1.0	125.8925	0.0397	1.0
	165	18.54	20.0±1.0	125.8925	0.0397	1.0
802.11n20	36	17.63	19.0±1.0	100.0000	0.0315	1.0
	40	17.28	19.0±1.0	100.0000	0.0315	1.0
	48	17.47	19.0±1.0	100.0000	0.0315	1.0
	149	17.39	19.0±1.0	100.0000	0.0315	1.0
	157	17.57	19.0±1.0	100.0000	0.0315	1.0
	165	17.12	19.0±1.0	100.0000	0.0315	1.0
802.11n40	38	15.91	18.0±1.0	79.4328	0.0251	1.0
	46	15.86	18.0±1.0	79.4328	0.0251	1.0
	151	16.37	19.0±1.0	100.0000	0.0315	1.0
	159	16.15	19.0±1.0	100.0000	0.0315	1.0
802.11ac20	36	17.66	19.0±1.0	100.0000	0.0315	1.0
	40	17.61	19.0±1.0	100.0000	0.0315	1.0
	48	17.75	19.0±1.0	100.0000	0.0315	1.0
	149	17.24	19.0±1.0	100.0000	0.0315	1.0
	157	17.56	19.0±1.0	100.0000	0.0315	1.0
	165	17.77	19.0±1.0	100.0000	0.0315	1.0
802.11ac40	38	15.94	19.0±1.0	100.0000	0.0315	1.0
	46	16.05	19.0±1.0	100.0000	0.0315	1.0
	151	17.35	20.0±1.0	125.8925	0.0397	1.0
	159	17.41	20.0±1.0	125.8925	0.0397	1.0
802.11ac80	42	14.74	18.0±1.0	79.4328	0.0251	1.0
	155	15.32	19.0±1.0	100.0000	0.0315	1.0

2.4G wifi:

Test	Channel	ANT Power (dBm)	ANT Max. Tune Up Power (dBm)	ANT Max. Tune Up Power (mW)	ANT MPE (mW/cm ²)	Limit (mW/cm ²)
802.11b	1	17.64	17.0±1.0	63.0957	0.0198	1.0
	6	17.55	17.0±1.0	63.0957	0.0198	1.0
	11	17.78	17.0±1.0	63.0957	0.0198	1.0
802.11g	1	16.82	16.0±1.0	50.1187	0.0158	1.0
	6	16.52	16.0±1.0	50.1187	0.0158	1.0
	11	16.31	16.0±1.0	50.1187	0.0158	1.0
802.11n20	1	16.12	16.0±1.0	50.1187	0.0158	1.0
	6	16.34	16.0±1.0	50.1187	0.0158	1.0
	11	16.66	16.0±1.0	50.1187	0.0158	1.0

2.4G Bluetooth:

Test	Channel	ANT Power (dBm)	ANT Max. Tune Up Power (dBm)	ANT Max. Tune Up Power (mW)	ANT MPE (mW/cm ²)	Limit (mW/cm ²)
1M	00	0.935	0.0±1.0	1.2589	0.0004	1.0
	39	0.831	0.0±1.0	1.2589	0.0004	1.0
	78	0.420	0.0±1.0	1.2589	0.0004	1.0
2M	00	0.176	0.0±1.0	1.2589	0.0004	1.0
	39	0.153	0.0±1.0	1.2589	0.0004	1.0
	78	-0.256	0.0±1.0	1.2589	0.0004	1.0
3M	00	0.497	0.0±1.0	1.2589	0.0004	1.0
	39	0.447	0.0±1.0	1.2589	0.0004	1.0
	78	0.011	0.0±1.0	1.2589	0.0004	1.0
BLE	00	-0.28	0.0±1.0	1.2589	0.0004	1.0
	19	0.24	0.0±1.0	1.2589	0.0004	1.0
	39	0.35	0.0±1.0	1.2589	0.0004	1.0

Note: The estimation distance is 20cm

Simultaneous MPE

Not required as the 5GWifi, 2.4GWifi and Bluetooth can't transmit simultaneously.

Conclusion

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