

RF EXPOSURE EVALUATION

According to FCC 1.1310: 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)

FCC ID: 2ABC5-E0007

EUT Specification

EUT	Android all in one
Frequency band (Operating)	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input checked="" type="checkbox"/> WLAN: 5.18GHz ~ 5.24GHz <input checked="" type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz <input checked="" type="checkbox"/> Others: 2.402GHz~2.480GHz (BLE)
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others ____
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm ²) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna diversity	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
Max. output power	2.4GHz WiFi: 15.14dBm (0.0327W) BLE: 2.678dBm (0.0019W) 5.1GHz WIFI: 15.21dBm (0.0332W) 5.8GHz WIFI: 15.80dBm (0.0380W)
Antenna gain (Max)	2.4GHz WiFi & BLE: 1.5 dBi; 5.1GHz&5.8GHz WIFI:1.8dBi
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation

Limits for Maximum Permissible Exposure(MPE)

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density(mW/cm ²)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300-1500	--	--	F/1500	6
1500-100000	--	--	1	30

Friis transmission formula: $P_d = \frac{P_{out} \cdot G}{4 \cdot \pi \cdot R^2}$

Where

P_d = Power density in mW/cm^2

P_{out} = 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

P_d the limit of MPE, $1mW/cm^2$. If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

Measurement Result

2.4GHz WiFi & BLE:

Operating Mode	Channel Frequency	Measured Power	Tune up tolerance	Max. Tune up Power	Antenna Gain	Power density at 20cm	Power density Limits (mW/cm^2)
	(MHz)	(dBm)	(dBm)	(dBm)	(dBi)	(mW/cm^2)	
802.11b	2412	14.18	14.18±1	15.18	1.5	0.0093	1
	2437	14.48	14.48±1	15.48	1.5	0.0099	1
	2462	14.21	14.21±1	15.21	1.5	0.0093	1
802.11g	2412	15.14	15.14±1	16.14	1.5	0.0116	1
	2437	15.06	15.06±1	16.06	1.5	0.0113	1
	2462	14.87	14.87±1	15.87	1.5	0.0109	1
802.11n (HT20)	2412	14.83	14.83±1	15.83	1.5	0.0108	1
	2437	14.94	14.94±1	15.94	1.5	0.0110	1
	2462	14.59	14.94±1	15.59	1.5	0.0102	1
802.11n (HT40)	2422	14.41	14.41±1	15.41	1.5	0.0098	1
	2437	14.95	14.95±1	15.95	1.5	0.0111	1
	2452	15.00	15.00±1	16	1.5	0.0112	1
BLE	2402	1.921	1.921±1	2.921	1.5	0.0006	1
	2440	2.678	2.678±1	3.678	1.5	0.0007	1
	2480	2.158	2.678±1	3.158	1.5	0.0006	1

5.1GHz &5.8GHz WiFi:

Operating Mode	Channel Frequency	Measured Power	Tune up tolerance	Max. Tune up Power	Antenna Gain	Power density at 20cm	Power density Limits
	(MHz)	(dBm)	(dBm)	(dBm)	(dBi)	(mW/ cm ²)	
802.11a	5180	15.21	15.21±1	16.21	1.8	0.0126	1
	5200	14.77	14.77±1	15.77	1.8	0.0114	1
	5240	14.45	14.45±1	15.45	1.8	0.0106	1
802.11n20	5180	14.47	14.47±1	15.47	1.8	0.0106	1
	5200	14.22	14.22±1	15.22	1.8	0.0100	1
	5240	14.01	14.01±1	15.01	1.8	0.0095	1
802.11ac20	5180	14.51	14.51±1	15.51	1.8	0.0107	1
	5200	14.24	14.24±1	15.24	1.8	0.0101	1
	5240	14.12	14.12±1	15.12	1.8	0.0098	1
802.11n40	5190	14.01	14.01±1	15.01	1.8	0.0095	1
	5230	13.73	13.73±1	14.73	1.8	0.0089	1
802.11ac40	5190	14.52	14.52±1	15.52	1.8	0.0107	1
	5230	13.70	13.70±1	14.7	1.8	0.0089	1
802.11ac80	5210	11.10	11.10±1	12.1	1.8	0.0049	1
802.11a	5745	15.18	15.18±1	16.18	1.8	0.0125	1
	5785	15.63	15.63±1	16.63	1.8	0.0139	1
	5825	15.72	15.72±1	16.72	1.8	0.0141	1
802.11n20	5745	14.67	14.67±1	15.67	1.8	0.0111	1
	5785	15.09	15.09±1	16.09	1.8	0.0122	1
	5825	15.25	15.25±1	16.25	1.8	0.0127	1
802.11ac20	5745	14.91	14.91±1	15.91	1.8	0.0117	1
	5785	14.96	14.96±1	15.96	1.8	0.0119	1
	5825	15.57	15.57±1	16.57	1.8	0.0137	1
802.11n40	5755	14.89	14.89±1	15.89	1.8	0.0117	1
	5795	15.8	15.8±1	16.8	1.8	0.0144	1
802.11ac40	5755	14.99	14.99±1	15.99	1.8	0.0120	1
	5795	15.33	15.33±1	16.33	1.8	0.0129	1
802.11ac80	5775	14.99	14.99±1	15.99	1.8	0.0120	1