

FCC ID:2A9FT-Z400H

Maximum Permissible Exposure (MPE)

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)

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 Exposure				
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
300-1,500			f/300	6
1,500-100,000			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
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 * P * G}}{d}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Average RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 * P * G}{377 * D^2}$$

From the EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

BT

Measurement Result

Operation Frequency: 2402MHz~2480MHz

Power density limited: 1mW/ cm²

Antenna Type: External Antenna

Antenna gain:1.45 dBi

R=20cm

mW=10^{^(dBi/10)}

antenna gain Numeric=10^{^(dBi/10)}= 10^{^(1.45/10)}=1.40

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain		(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	(dBi)	Numeric		
2402	DH5	2.09	3±1	4	2.512	1.45	1.40	0.0007	1
2441		3.92	3±1	4	2.512	1.45	1.40	0.0007	1
2480		3.09	3±1	4	2.512	1.45	1.40	0.0007	1
2402	2DH5	1.29	2.5±1	3.5	2.239	1.45	1.40	0.0006	1
2441		3.11	2.5±1	3.5	2.239	1.45	1.40	0.0006	1
2480		2.26	2.5±1	3.5	2.239	1.45	1.40	0.0006	1
2402	3DH5	1.29	2.5±1	3.5	2.239	1.45	1.40	0.0006	1
2441		3.1	2.5±1	3.5	2.239	1.45	1.40	0.0006	1
2480		2.26	2.5±1	3.5	2.239	1.45	1.40	0.0006	1

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)	(mW/cm2)
2402	GFSK(1M)	-4.63	-4±1	-3	0.501	1.45	1.40	0.0001	1
2440		-2.95	-2±1	-1	0.794	1.45	1.40	0.0002	1
2480		-3.83	-3±1	-2	0.631	1.45	1.40	0.0002	1
2402	GFSK(2M)	-4.7	-4±1	-3	0.501	1.45	1.40	0.0001	1
2440		-2.94	-2±1	-1	0.794	1.45	1.40	0.0002	1
2480		-3.62	-3±1	-2	0.631	1.45	1.40	0.0002	1

2.4G WIFI:

Operation Frequency: WIFI 802.11b/g/n HT20: 2412-2462MHz,

WIFI 802.11n HT40:2422-2452MHz

Power density limited: 1mW/ cm²

Antenna Type: External Antenna

Antenna gain:1.45 dBi

R=20cm

mW=10^{^(dBi/10)}

antenna gain Numeric=10^{^(dBi/10)}= 10^{^(1.45/10)}=1.40

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)	(mW/cm2)
2412	802.11b	19.46	19±1	20	100.000	1.45	1.40	0.0278	1
2437		19.22	19±1	20	100.000	1.45	1.40	0.0278	1
2462		18.98	19±1	20	100.000	1.45	1.40	0.0278	1
2412	802.11g	14.74	15.5±1	16.5	44.668	1.45	1.40	0.0124	1
2437		16.01	15.5±1	16.5	44.668	1.45	1.40	0.0124	1
2462		15.53	15.5±1	16.5	44.668	1.45	1.40	0.0124	1
2412	802.11n H20	13.65	15.5±1	15.5	35.481	1.45	1.40	0.0099	1
2437		15.1	15.5±1	15.5	35.481	1.45	1.40	0.0099	1
2462		14.74	15.5±1	15.5	35.481	1.45	1.40	0.0099	1
2422	802.11n(H T40)	15.22	15.5±1	15.5	35.481	1.45	1.40	0.0099	1
2437		15.14	15.5±1	15.5	35.481	1.45	1.40	0.0099	1
2452		15.03	15.5±1	15.5	35.481	1.45	1.40	0.0099	1

5G WIFI:

Operation Frequency: WIFI 802.11a/ac/n(HT20): 5180-5240MHz;5260-5320MHz,5500-5700MHz,5745-5825MHz;WIFI 802.11ac/n(HT40): 5190-5230MHz;5270-5310MHz,5510-5670MHz5755-5795MHz; WIFI 802.11ac80:5210-5210MHz;5290-5290MHz;5530-5610MHz; 5775-5775MHz

Power density limited: 1mW/cm

Antenna Type: External Antenna

Antenna gain: 3.86 dBi

R=20cm

$mW=10^{(dBm/10)}$

antenna gain Numeric= $10^{(dBi/10)}=10^{(3.86/10)}=2.43$

5.2G

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
5180	a	14.8	14±1	15	31.623	3.86	2.43	0.0153	1
5200	a	14.92	14±1	15	31.623	3.86	2.43	0.0153	1
5240	a	14.91	14±1	15	31.623	3.86	2.43	0.0153	1
5180	n20	13.84	13±1	14	25.119	3.86	2.43	0.0122	1
5200	n20	13.75	13±1	14	25.119	3.86	2.43	0.0122	1
5240	n20	13.73	13±1	14	25.119	3.86	2.43	0.0122	1
5190	n40	12.29	13±1	14	25.119	3.86	2.43	0.0122	1
5230	n40	13.81	13±1	14	25.119	3.86	2.43	0.0122	1
5180	ac20	13.89	13±1	14	25.119	3.86	2.43	0.0122	1
5200	ac20	13.93	13±1	14	25.119	3.86	2.43	0.0122	1
5240	ac20	13.72	13±1	14	25.119	3.86	2.43	0.0122	1
5190	ac40	13.11	13±1	14	25.119	3.86	2.43	0.0122	1
5230	ac40	13.75	13±1	14	25.119	3.86	2.43	0.0122	1
5210	ac80	12.68	13±1	14	25.119	3.86	2.43	0.0122	1

5.3G

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain			(mW/cm2)
				(dBm)	(mW)	(dBi)	Numeric		
5260	a	14.99	14.5±1	15.5	35.481	3.86	2.43	0.0172	1
5280	a	15.22	14.5±1	15.5	35.481	3.86	2.43	0.0172	1
5320	a	15.49	14.5±1	15.5	35.481	3.86	2.43	0.0172	1
5260	n20	14.1	14±1	15	31.623	3.86	2.43	0.0153	1
5280	n20	14.15	14±1	15	31.623	3.86	2.43	0.0153	1
5320	n20	14.34	14±1	15	31.623	3.86	2.43	0.0153	1
5270	n40	13.93	13.5±1	14.5	28.184	3.86	2.43	0.0136	1
5310	n40	12.56	13.5±1	14.5	28.184	3.86	2.43	0.0136	1
5260	ac20	14.15	13.5±1	14.5	28.184	3.86	2.43	0.0136	1
5280	ac20	14.17	13.5±1	14.5	28.184	3.86	2.43	0.0136	1
5320	ac20	14.19	13.5±1	14.5	28.184	3.86	2.43	0.0136	1
5270	ac40	13.69	13±1	14	25.119	3.86	2.43	0.0122	1
5310	ac40	13.12	13±1	14	25.119	3.86	2.43	0.0122	1
5290	ac80	12.97	12±1	13	19.953	3.86	2.43	0.0097	1

5.6G

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)	(mW/cm2)
5500	a	14.73	14±1	15	31.623	3.86	2.43	0.0153	1
5600	a	14.88	14±1	15	31.623	3.86	2.43	0.0153	1
5700	a	14.59	14±1	15	31.623	3.86	2.43	0.0153	1
5500	n20	13.66	13±1	14	25.119	3.86	2.43	0.0122	1
5600	n20	13.65	13±1	14	25.119	3.86	2.43	0.0122	1
5700	n20	13.35	13±1	14	25.119	3.86	2.43	0.0122	1
5510	n40	11.99	12±1	13	19.953	3.86	2.43	0.0097	1
5590	n40	12.76	12±1	13	19.953	3.86	2.43	0.0097	1
5670	n40	12.94	12±1	13	19.953	3.86	2.43	0.0097	1
5500	ac20	14.2	13.5±1	14.5	28.184	3.86	2.43	0.0136	1
5600	ac20	14	13.5±1	14.5	28.184	3.86	2.43	0.0136	1
5700	ac20	13.84	13.5±1	14.5	28.184	3.86	2.43	0.0136	1
5510	ac40	13.1	13.5±1	13.5	22.387	3.86	2.43	0.0108	1
5590	ac40	12.81	13.5±1	13.5	22.387	3.86	2.43	0.0108	1
5670	ac40	12.85	13.5±1	13.5	22.387	3.86	2.43	0.0108	1
5530	ac80	13.22	13.5±1	13.5	22.387	3.86	2.43	0.0108	1
5610	ac80	12.94	13.5±1	13.5	22.387	3.86	2.43	0.0108	1

5.8G

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)	(mW/cm2)
5745	a	14.91	14.5±1	15.5	35.481	3.86	2.43	0.0172	1
5785	a	15.14	14.5±1	15.5	35.481	3.86	2.43	0.0172	1
5825	a	15.01	14.5±1	15.5	35.481	3.86	2.43	0.0172	1
5745	n20	14.48	14±1	15	31.623	3.86	2.43	0.0153	1
5785	n20	14.82	14±1	15	31.623	3.86	2.43	0.0153	1
5825	n20	14.76	14±1	15	31.623	3.86	2.43	0.0153	1
5755	n40	14.73	14±1	15	31.623	3.86	2.43	0.0153	1
5795	n40	14.66	14±1	15	31.623	3.86	2.43	0.0153	1
5745	ac20	14.64	14±1	15	31.623	3.86	2.43	0.0153	1
5785	ac20	14.97	14±1	15	31.623	3.86	2.43	0.0153	1
5825	ac20	14.9	14±1	15	31.623	3.86	2.43	0.0153	1
5755	ac40	14.7	14±1	15	31.623	3.86	2.43	0.0153	1
5795	ac40	14.58	14±1	15	31.623	3.86	2.43	0.0153	1
5775	ac80	15.03	14.5±1	15.5	35.481	3.86	2.43	0.0172	1

GSM/WCDMA/LTE

GSM850: TX824.2MHz~848.8MHz /RX869.2MHz~893.8MHz;

UMTS FDD Band V: TX826.4MHz~846.6MHz /RX871.4MHz~891.6MHz;

PCS1900: TX1850.2MHz~1909.8MHz /RX1930.2MHz~1989.8MHz;

UMTS FDD Band II: TX1852.4MHz~1907.6MHz /RX1932.4MHz~1987.6MHz;

UMTS-FDD Band IV:TX1710MHz~1755MHz /RX2110MHz~2155MHz

LTE FDD Band 2 Uplink: 1850MHz-1910MHz, Downlink: 1930MHz-1990MHz;

LTE FDD Band 4 Uplink: 1710MHz-1755MHz, Downlink: 2110MHz-2155MHz;

LTE FDD Band 5 Uplink: 824MHz-849MHz, Downlink: 869MHz-894MHz;

LTE-FDD Band 7 Uplink: 2500MHz-2570MHz, Downlink: 2620MHz-2690MHz;

LTE FDD Band 12 Uplink: 699MHz-716MHz, Downlink: 729MHz-746MHz;

LTE FDD Band 13 Uplink: 777MHz-787MHz, Downlink: 746MHz-756MHz;

LTE FDD Band 14 Uplink: 788MHz-798MHz, Downlink: 758MHz-768MHz;

LTE FDD Band 17 Uplink: 704MHz-716MHz, Downlink: 734MHz-746MHz;

LTE FDD Band 25 Uplink: 1850MHz-1915MHz, Downlink: 1930MHz-1995MHz;

LTE FDD Band 26A Uplink: 814MHz-824MHz, Downlink: 859MHz-869MHz;

LTE FDD Band 26B Uplink: 824MHz-849MHz, Downlink: 869MHz-894MHz;

LTE TDD Band 41 Uplink& Downlink: 2496MHz-2690MHz

LTE FDD Band 66 Uplink: 1710MHz-1780MHz, Downlink: 2110MHz-2200MHz;

LTE FDD Band 71 Uplink: 663MHz-698MHz, Downlink: 617MHz-652MHz

Antenna Type: External

Antenna antenna gain: 1 dBi

Maximum Permissible Exposure:

Channel Freq. (MHz)	mode	EIRP power (dBm)	EIRP power (mW)	Tune-up power (dBm)	Max tune-up power (dBm)	Evaluation result (mW/cm2)	Power density Limits mW/cm2)
824.2	GSM 850	31.94	1563.148	31±1	32	0.3110	0.5495
1880	GSM 1900	29.32	855.067	29±1	30	0.1701	1.0000
1852.4	WCDMA B2	22.31	0.17022	22±1	23	0.0339	1.0000
1732.6	WCDMA B4	22.16	0.16444	22±1	23	0.03271	1.000
835	WCDMA B5	22.23	0.16711	22±1	23	0.03324	0.5567
1880	LTE B2	23.72	235.505	23±1	24	0.04685	1.0000
1745	LTE B4	23.79	239.332	23±1	24	0.04761	1.00
836.5	LTE B5	23.83	241.546	23±1	24	0.0481	0.5577
2560	LTE B7	23.96	248.886	23±1	24	0.0495	1.0000
707.5	LTE B12	22.72	187.068	22±1	23	0.0372	0.4717
782	LTE B13	23.24	210.863	23±1	24	0.04195	0.521
793	LTE B14	22.74	187.932	22±1	23	0.03739	0.5287
711	LTE B17	22.04	159.956	22±1	23	0.03182	0.4740
1905	LTE B25	23.45	221.309	23±1	24	0.04403	1.00
819	LTE B26(814-824)	22.39	173.380	22±1	23	0.03449	0.55
841.5	LTE B26(824-849)	23.46	221.82	23±1	24	0.04413	0.56
2680.00	LTE B41	24.15	260.016	24±1	25	0.05173	1.00
1745	LTE B66	22.59	181.552	22±1	23	0.03612	1.00
688	LTE B71	22.90	194.984	22±1	23	0.03879	0.46

SIMULTANEOUS TRANSMISSIONS

When a number of sources at different frequencies, and/or broadband sources, contribute to the total exposure, it becomes necessary to weigh each contribution relative to the MPE. To comply with the MPE, the fraction of the MPE in terms of E^2 , H^2 (or power density) incurred within each frequency interval should be determined and the sum of all such fractions should not exceed unity. In order to ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity. That is

$$\sum_{i=1}^n \frac{S_i}{MPE_i} \leq 1$$

Worst case is Simultaneous Transmissions for GSM + WIFI2.4G

Band	Mode	Tune up (dBm)	Tune up (mW)	Standalone	Standalone	Simultaneous		Verdict
				Evaluation result	Power density Limits	Evaluation result	Limit	
				(mW/cm2)	(mW/cm2)	raio		
2.4G Wi-Fi+GSM	LTE	32	1584.89	0.3153	1	0.3352	1	PASS
	2.4G WIFI	20	100.00	0.0199	1			

Note:

1. NO simultaneous transmissions are possible for this device of BT+WIFI2.4G/5G

Signature:

Date: 2025-12-12



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