

FCC ID: 2ADQN-DR3201A

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

$$E \text{ (V/m)} = \frac{\sqrt{30 * P * G}}{d} \qquad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

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: $1\text{mW}/\text{cm}^2$

Antenna Type: FPC antenna

Antenna gain: 4.75dBi;

R=20cm

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

antenna gain Numeric= $10^{(\text{dBi}/10)}=10^{(4.75/10)}=2.99$

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density
		(dBm)		tune-up power		Gain		(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	(dBi)	Numeric		
2402	DH5	2.49	2±1	3	1.995	4.75	2.99	0.0012	1
2441		2.57	2±1	3	1.995	4.75	2.99	0.0012	1
2480		2.46	2±1	3	1.995	4.75	2.99	0.0012	1
2402	2DH5	3.57	3±1	4	2.512	4.75	2.99	0.0015	1
2441		3.66	3±1	4	2.512	4.75	2.99	0.0015	1
2480		3.62	3±1	4	2.512	4.75	2.99	0.0015	1
2402	3DH5	3.63	3±1	4	2.512	4.75	2.99	0.0015	1
2441		3.74	3±1	4	2.512	4.75	2.99	0.0015	1
2480		3.63	3±1	4	2.512	4.75	2.99	0.0015	1

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density
		(dBm)		tune-up power		Gain			
				(dBm)	(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)
2402	GFSK(1M)	-8.11	-8±1	-7	0.200	4.75	2.99	0.0001	1
2440		-7.2	-8±1	-7	0.200	4.75	2.99	0.0001	1
2480		-9.03	-9±1	-8	0.158	4.75	2.99	0.0001	1

2.4G WIFI:

Operation Frequency: WIFI 802.11b/g/n HT20: 2412-2462MHz,
WIFI 802.11n HT40:2422-2452MHz
Power density limited: $1\text{mW}/\text{cm}^2$

Antenna Type: FPC antenna

Antenna gain: 4.75dBi;

R=20cm

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

antenna gain Numeric= $10^{(\text{dBi}/10)}=10^{(4.75/10)}=2.99$

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density
		(dBm)		tune-up power		Gain		(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	(dBi)	Numeric		
2412	802.11b	16.11	16±1	17	50.119	4.75	2.99	0.0298	1
2437		15.74	16±1	17	50.119	4.75	2.99	0.0298	1
2462		15.91	16±1	17	50.119	4.75	2.99	0.0298	1
2412	802.11g	12.74	13±1	14	25.119	4.75	2.99	0.0149	1
2437		13.29	13±1	14	25.119	4.75	2.99	0.0149	1
2462		12.74	13±1	14	25.119	4.75	2.99	0.0149	1
2412	802.11n H20	11.27	11±1	12	15.849	4.75	2.99	0.0094	1
2437		10.91	11±1	12	15.849	4.75	2.99	0.0094	1
2462		10.84	11±1	12	15.849	4.75	2.99	0.0094	1
2422	802.11n(H T40)	10.34	10±1	11	12.589	4.75	2.99	0.0075	1
2437		10.11	10±1	11	12.589	4.75	2.99	0.0075	1
2452		10.42	10±1	11	12.589	4.75	2.99	0.0075	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: FPC antenna

Antenna gain:1.71dBi;

R=20cm

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

antenna gain Numeric= $10^{(dBi/10)}=10^{(1.71/10)}=1.48$

5.2G

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density
		(dBm)		tune-up power		Gain			
				(dBm)	(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)
5180	802.11a	10.919	11±1	12	15.849	1.71	1.48	0.0047	1
5200		11.03	11±1	12	15.849	1.71	1.48	0.0047	1
5240		10.848	11±1	12	15.849	1.71	1.48	0.0047	1
5180	802.11ac20	10.394	10±1	11	12.589	1.71	1.48	0.0037	1
5200		10.426	10±1	11	12.589	1.71	1.48	0.0037	1
5240		10.692	10±1	11	12.589	1.71	1.48	0.0037	1
5190	802.11ac40	10.636	11±1	12	15.849	1.71	1.48	0.0047	1
5230		11.104	11±1	12	15.849	1.71	1.48	0.0047	1
5210	802.11ac80	10.699	10±1	11	12.589	1.71	1.48	0.0037	1
5180	802.11n H20	10.26	10±1	11	12.589	1.71	1.48	0.0037	1
5200		10.47	10±1	11	12.589	1.71	1.48	0.0037	1
5240		10.824	10±1	11	12.589	1.71	1.48	0.0037	1
5190	802.11n H40	10.665	11±1	12	15.849	1.71	1.48	0.0047	1
5230		11.022	11±1	12	15.849	1.71	1.48	0.0047	1

5.3G

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density
		(dBm)		tune-up power		Gain			
				(dBm)	(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)
5260	802.11a	10.719	10±1	11	12.589	1.71	1.48	0.0037	1
5280		10.787	10±1	11	12.589	1.71	1.48	0.0037	1
5320		10.807	10±1	11	12.589	1.71	1.48	0.0037	1
5260	802.11ac20	10.652	10±1	11	12.589	1.71	1.48	0.0037	1
5280		10.715	10±1	11	12.589	1.71	1.48	0.0037	1
5320		10.644	10±1	11	12.589	1.71	1.48	0.0037	1
5270	802.11ac40	10.701	10±1	11	12.589	1.71	1.48	0.0037	1
5310		10.55	10±1	11	12.589	1.71	1.48	0.0037	1
5290	802.11ac80	11.207	11±1	12	15.849	1.71	1.48	0.0047	1
5260	802.11n H20	10.745	10±1	11	12.589	1.71	1.48	0.0037	1
5280		10.817	10±1	11	12.589	1.71	1.48	0.0037	1
5320		10.592	10±1	11	12.589	1.71	1.48	0.0037	1
5270	802.11n H40	10.695	10±1	11	12.589	1.71	1.48	0.0037	1
5310		10.601	10±1	11	12.589	1.71	1.48	0.0037	1

5.6G

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)	(mW/cm2)
5500	802.11a	10.349	10±1	11	12.589	1.71	1.48	0.0037	1
5600		10.101	10±1	11	12.589	1.71	1.48	0.0037	1
5700		9.725	10±1	11	12.589	1.71	1.48	0.0037	1
5500	802.11ac20	10.86	10±1	11	12.589	1.71	1.48	0.0037	1
5600		10.583	10±1	11	12.589	1.71	1.48	0.0037	1
5700		10.302	10±1	11	12.589	1.71	1.48	0.0037	1
5510	802.11ac40	10.675	10±1	11	12.589	1.71	1.48	0.0037	1
5590		10.345	10±1	11	12.589	1.71	1.48	0.0037	1
5670		10.483	10±1	11	12.589	1.71	1.48	0.0037	1
5530	802.11ac80	10.716	11±1	12	15.849	1.71	1.48	0.0047	1
5610		11.023	11±1	12	15.849	1.71	1.48	0.0047	1
5500	802.11n(HT20)	10.239	10±1	11	12.589	1.71	1.48	0.0037	1
5600		10.024	10±1	11	12.589	1.71	1.48	0.0037	1
5700		9.8	10±1	11	12.589	1.71	1.48	0.0037	1
5510	802.11n(HT40)	10.62	10±1	11	12.589	1.71	1.48	0.0037	1
5590		10.458	10±1	11	12.589	1.71	1.48	0.0037	1
5670		10.542	10±1	11	12.589	1.71	1.48	0.0037	1

5.8G

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm2)	Power density (mW/cm2)
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
5745	802.11a	10.341	10±1	11	12.589	1.71	1.48	0.0037	1
5785		10.541	10±1	11	12.589	1.71	1.48	0.0037	1
5825		10.589	10±1	11	12.589	1.71	1.48	0.0037	1
5745	802.11ac20	10.923	10±1	11	12.589	1.71	1.48	0.0037	1
5785		10.461	10±1	11	12.589	1.71	1.48	0.0037	1
5825		10.513	10±1	11	12.589	1.71	1.48	0.0037	1
5755	802.11ac40	11.075	11±1	12	15.849	1.71	1.48	0.0047	1
5795		10.998	11±1	12	15.849	1.71	1.48	0.0047	1
5775	802.11ac80	10.973	10±1	11	12.589	1.71	1.48	0.0037	1
5745	802.11n H20	10.766	10±1	11	12.589	1.71	1.48	0.0037	1
5785		10.484	10±1	11	12.589	1.71	1.48	0.0037	1
5825		10.591	10±1	11	12.589	1.71	1.48	0.0037	1
5755	802.11n H40	10.89	10±1	11	12.589	1.71	1.48	0.0037	1
5795		10.795	10±1	11	12.589	1.71	1.48	0.0037	1

Signature:

Date: 6/19/2023

A handwritten signature in cursive script that reads "Alex".

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