

FCC ID:2AX5VHUB2PLNA2

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.

Operation Frequency: GFSK: 905 MHz~926.5MHz

Antenna Type: Antenna 1: Planar Inverted L- Antenna(ocw=120k)

Antenna 2: Planar Inverted F- Antenna(ocw=120k)

Antenna 3: Planar Inverted F- Antenna(ocw=140k)

Antenna 4: Planar Inverted F- Antenna(ocw=140k)

Antenna gain: Antenna1:-5 dBi

Antenna2:-6 dBi

Antenna3:-6 dBi

Antenna4:-6 dBi

R=20cm

SRD

ant 1

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
905.00	GFSK-120K	14.837	15±1	16	39.811	-5.00	0.32	0.0025	0.60
915.85		14.908	15±1	16	39.811	-5.00	0.32	0.0025	0.61
926.50		15.058	15±1	16	39.811	-5.00	0.32	0.0025	0.62

ant 2

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
905.00	GFSK-120K	11.957	12±1	13	19.953	-6.00	0.25	0.0010	0.60
915.85		10.999	11±1	12	15.849	-6.00	0.25	0.0008	0.61
926.50		10.511	11±1	12	15.849	-6.00	0.25	0.0008	0.62

ant 3

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
905.00	GFSK-120K	14.136	13.5±1	14.5	28.184	-6.00	0.25	0.0014	0.60
915.85		12.893	13±1	14	25.119	-6.00	0.25	0.0013	0.61
926.50		11.952	12.5±1	13.5	22.387	-6.00	0.25	0.0011	0.62

ant 4

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
905.00	GFSK-120K	13.879	13.5±1	14.5	28.184	-6.00	0.25	0.0014	0.60
915.85		13.355	13.5±1	14.5	28.184	-6.00	0.25	0.0014	0.61
926.50		13.343	13.5±1	14.5	28.184	-6.00	0.25	0.0014	0.62

Conclusion:

For the max result : $0.0025 \leq 0.60$ for Max Power Density, compliance RF exposure..

Note: This product does not support simultaneous delivery.

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: Planar Flexible Inverted-F Antenna

Antenna gain: 2dBi;

R=20cm

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

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

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density (mW/cm ²)
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2412	802.11b	15.58	16±1	17	50.119	2.00	1.58	0.0158	1
2437		15.74	16±1	17	50.119	2.00	1.58	0.0158	1
2462		16.12	16±1	17	50.119	2.00	1.58	0.0158	1
2412	802.11g	15.34	15.5±1	16.5	44.668	2.00	1.58	0.0141	1
2437		15.78	15.5±1	16.5	44.668	2.00	1.58	0.0141	1
2462		15.59	15.5±1	16.5	44.668	2.00	1.58	0.0141	1
2412	802.11n H20	15.46	15.5±1	16.5	44.668	2.00	1.58	0.0141	1
2437		15.66	15.5±1	16.5	44.668	2.00	1.58	0.0141	1
2462		15.53	15.5±1	16.5	44.668	2.00	1.58	0.0141	1
2422	802.11n(H T40)	14.96	15.5±1	16.5	44.668	2.00	1.58	0.0141	1
2437		15.52	15.5±1	16.5	44.668	2.00	1.58	0.0141	1
2452		15.38	15.5±1	16.5	44.668	2.00	1.58	0.0141	1

GSM/LTE

GSM/LTE Antenna Type: Flexible multiband Antenna
 Antenna Gain: GSM/WCDMA: -2dBi
 LTE:3 dBi

modulation	Max		Antenna		Evaluation result	Power density
	tune-up power		Gain			
	(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)	(mW/cm2)
GPRS850	33	1995.262	-2	0.63	0.2504	0.558
GPRS1900	30.5	1122.018	-2	0.63	0.1408	1
WCDMA B1	24.5	281.838	-2	0.63	0.0354	1
WCDMA B8	24	251.189	-2	0.63	0.0315	1
LTE Band 2	23	199.526	3	2.00	0.0792	1
LTE Band 4	23.5	223.872	3	2.00	0.0889	1
LTE Band 5	24	251.189	3	2.00	0.0997	0.55
LTE Band 7	24	251.189	3	2.00	0.0997	1
LTE Band 40	23	199.526	3	2.00	0.0792	1

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 E², H² (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

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

Max. SIMULTANEOUS TRANSMISSIONS MODE

Band	SISO					MIMO		Verdict
	Max power	Antenna	Separation distance (cm)	Evaluation result	Power density	Evaluation result	Power density Limits	
	(dBm)	Gain (dBi)		(mW/cm2)	(mW/cm2)			
SRD ant1 926.5	15.058	-5	20	0.006376	0.6	0.680348	1	PASS
+ant3 905+	14.136	-6	20	0.005156	0.6			
GPRS 850+2.4g	32.69	-2	20	0.36959	0.566			
wifi	16.12	2	20	0.008142	1			

Signature:
Date: 2024-6-20



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