

FCC ID: XUJDS408

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) § 2.1091(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.

Measurement Result

Operation Frequency: BT: 2402-2480MHz

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

Antenna Type: FPC antenna

Antenna gain: 3.7dBi;

R=20cm

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

antenna gain Numeric= $10^{(\text{dBi}/10)}=10^{(3.7/10)}=2.34$

BT3.0:

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	GFSK	-3.83	-3±1	-2	0.631	3.70	2.34	0.0003	1
2441		-3.69	-3±1	-2	0.631	3.70	2.34	0.0003	1
2480		-3.66	-3±1	-2	0.631	3.70	2.34	0.0003	1
2402	π/4-DQPSK	-3.56	-3±1	-2	0.631	3.70	2.34	0.0003	1
2441		-3.4	-3±1	-2	0.631	3.70	2.34	0.0003	1
2480		-3.37	-3±1	-2	0.631	3.70	2.34	0.0003	1
2402	8-DPSK	-3.2	-3±1	-2	0.631	3.70	2.34	0.0003	1
2441		-3.11	-3±1	-2	0.631	3.70	2.34	0.0003	1
2480		-2.95	-3±1	-2	0.631	3.70	2.34	0.0003	1

BLE:

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		
2402	GFSK	-2.22	-2±1	-1	0.794	3.70	2.34	0.0004	1
2440		-2.1	-2±1	-1	0.794	3.70	2.34	0.0004	1
2480		-2.09	-2±1	-1	0.794	3.70	2.34	0.0004	1

Conclusion:

The conclusion should be $0.0004 < 1$ for Max Power Density, Compliance the RF Exposure requirement.

Signature:

Date: 2024-11-25



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