

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)

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: GFSK: 905 MHz~926.5MHz

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

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

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

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

R=20cm

Module 1:

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain		(mW/cm ²)	(mW/cm ²)
				(dBm)	(mW)	(dBi)	Numeric		
905.00	GFSK-120K	13.282	12.5±1	13.5	22.387	-5.00	0.32	0.0014	0.60
915.85		11.788	12.5±1	13.5	22.387	-5.00	0.32	0.0014	0.61
926.50		11.448	12±1	13	19.953	-5.00	0.32	0.0013	0.62

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
905.00	GFSK-120K	15.26	15±1	16	39.811	-6.00	0.25	0.0020	0.60
915.85		14.837	15±1	16	39.811	-6.00	0.25	0.0020	0.61
926.50		14.323	15±1	16	39.811	-6.00	0.25	0.0020	0.62

Module 2:

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)
905.00	GFSK-140K	14.932	14±1	15	31.623	-6.00	0.25	0.0016	0.60
915.85		14.091	14±1	15	31.623	-6.00	0.25	0.0016	0.61
926.50		13.372	14±1	15	31.623	-6.00	0.25	0.0016	0.62

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		
905.00	GFSK-140K	12.653	12±1	13	19.953	-6.00	0.25	0.0010	0.60
915.85		12.043	12±1	13	19.953	-6.00	0.25	0.0010	0.61
926.50		11.574	12±1	13	19.953	-6.00	0.25	0.0010	0.62

Conclusion:

For the max result : $0.0020 \leq 0.60$ for Max Power Density, compliance RF exposure..

Note: This product does not support simultaneous delivery.



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