

FCC ID: XFT-AIRDIAL2

KDB447498 D01 General RF Exposure Guidance v06

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: 2402MHz~2480MHz

Power density limited: 1mW/ cm²

Antenna Type:PCB antenna

Antenna gain:-0.56dBi;

R=20cm

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

antenna gain Numeric= $10^{(dBi/10)}=10^{(-0.56/10)}=0.88$

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	GFSK	7.52	7.5±1	8.5	7.079	-0.56	0.88	0.0012	1
2441		7.68	7.5±1	8.5	7.079	-0.56	0.88	0.0012	1
2480		8.16	7.5±1	8.5	7.079	-0.56	0.88	0.0012	1

Note: BLE Test data reference to FCC ID: X8WBM833

Antenna Type: External antenna

Antenna 1 gain:WCDMA:B2:3.95dBi,B4:4.17dBi,B5:3.42dBi

LTE:B2:4.17dBi,B4:3.95dBi,B5:3.42dBi,B12:2.87dBi,B13:2.87dBi,B14:2.87dBi,B66:3.95dBi,
B71:-0.92dBi

The gain of external antenna 1 is the highest, so the gain of external antenna 1 is selected.

R=20cm

Channel Freq. (MHz)	modulation	conducted power	Tune-up pow er (dBm)	Max		Antenna		Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
		tune-up power		Gain					
		(dBm)		(mW)	(dBi)	Numeric			
1852.4	WCDMA B2	22.98	23±1	24	251.189	3.95	2.48	0.1241	1
1712.4	WCDMA B4	22.89	23±1	24	251.189	4.17	2.61	0.1305	1
826.4	WCDMA B5	22.11	23±1	24	251.189	3.42	2.20	0.1098	0.5509
1880	LTE Band 2	22.89	23±1	24	251.189	4.17	2.61	0.1305	1
1720	LTE Band 4	22.41	23±1	24	251.189	3.95	2.48	0.1241	1
829	LTE Band 5	23.36	23±1	24	251.189	3.42	2.20	0.1098	0.5527
704	LTE Band 12	22.85	23±1	24	251.189	2.87	1.94	0.0968	0.4693
782	LTE Band 13	22.89	23±1	24	251.189	2.87	1.94	0.0968	0.5213
793	LTE Band 14	22.38	23±1	24	251.189	2.87	1.94	0.0968	0.5287
1770	LTE Band 66	22.44	23±1	24	251.189	3.95	2.48	0.1241	1
683	LTE Band 71	22.77	23±1	24	251.189	-0.95	0.80	0.0402	0.4553

Operation Frequency: NFC: 13.56MHz
Antenna Type: Induction coil
R=20cm
Transmit power
NFC

Frequency (MHz)	Max Output power (dBuV/m)	EIRP power (dBm)
13.56	57.54	-37.69

$EIRP = E - 104.8 + 20 \log(D)$

Mode	Channel Freq. (MHz)	EIRP power (dBm)	EIRP power (mW)	Tune-up power (dBm)	Max tune-up power (dBm)	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
NFC	13.56	-37.69	0.00017	-37±1	-36	0.000000050	0.98

$BLE + LTE \text{ Band 4} + NFC = 0.0012 + 0.1305 + 0.000000050 = 0.13170005 < 0.98$

Conclusion:

For the max result : $0.13170005 \leq 0.98$ for Max field strength, compliance RF exposure..

Signature:



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