

**RF Exposure Compliance Requirement****1. Standard requirement**

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

(a) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S)(mW/cm ²)	Averaging Times $ E ^2, H ^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100000			5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S)(mW/cm ²)	Averaging Times $ E ^2, H ^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/500	30
1500-100000			1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density



2. MPE Calculation Method

$$S \text{ (mW/cm}^2\text{)} = P * G / 4\pi * R^2$$

S= Power Density (mW/cm²)

P=Peak RF conducted output Power (mW)

G=EUT Antenna numeric gain (numeric)

R= Separation distance between radiator and human body (cm);

$$R = \sqrt{(P * G) / 4\pi * S}$$

From the maximum EUT RF output power, as well as the gain of the used antenna, according to the RF power density limit above, the minimum distance between the antenna and human body will be calculated.

3. Calculated Result

3.1 For downlink: 728MHz to 757MHz

LTE:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
Lowest	12.5	17.8	46.4	43651.5832	2.443	159.1305
Middle	12.5	17.8	46.3	42657.9518	2.475	156.2887
Highest	12.5	17.8	46.2	41686.9383	2.507	153.5105



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Application No.: GZEM1701000495CR

Page: 3 of 6

FCC ID: PX8HRU01-6800

3.2 For downlink: 862MHz to 869MHz:

CDMA:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
Lowest	12.5	17.8	46.1	40738.0277	2.8767	141.6667
Middle	12.5	17.8	46.7	46773.5141	2.8850	151.5801
Highest	12.5	17.8	46.4	43651.5832	2.8933	146.2239

WCDMA:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
Lowest	12.5	17.8	46.5	44668.3592	2.8833	148.1734
Middle	12.5	17.8	46.5	44668.3592	2.8850	148.1734
Highest	12.5	17.8	46.5	44668.3592	2.8867	148.1734

LTE:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
Lowest	12.5	17.8	46.1	40738.0277	2.8827	144.8156
Middle	12.5	17.8	46.3	42657.9518	2.8850	141.5192
Highest	12.5	17.8	46.4	43651.5832	2.8873	146.3758



SGS-CSTC Standards Technical Services Co., Ltd.

Application No.: GZEM1701000495CR

Page: 4 of 6

FCC ID: PX8HRU01-6800

3.3 For downlink: 869MHz to 894MHz:

GSM:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
Lowest	12.5	17.8	46.6	45708.8189	2.899	149.4827
Middle	12.5	17.8	46.6	45708.8189	2.938	148.4872
Highest	12.5	17.8	46.2	41686.9383	2.978	140.8497

CDMA:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
Lowest	12.5	17.8	46.5	44668.3592	2.903	147.6698
Middle	12.5	17.8	46.7	46773.5141	2.938	150.2067
Highest	12.5	17.8	46.3	42657.9518	2.973	142.5994

WCDMA:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
Lowest	12.5	17.8	46.6	45708.8189	2.907	149.2769
Middle	12.5	17.8	46.7	46773.5141	2.938	150.2066
Highest	12.5	17.8	46.3	42657.9518	2.970	142.6714

LTE:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
Lowest	12.5	17.8	46.7	46773.5141	2.913	149.1231
Middle	12.5	17.8	46.6	45708.8189	2.938	148.4873
Highest	12.5	17.8	46.3	42657.9518	2.963	142.8398



SGS-CSTC Standards Technical Services Co., Ltd.

Application No.: GZEM1701000495CR

Page: 5 of 6

FCC ID: PX8HRU01-6800

3.4 For downlink: 1930MHz ~ 1995MHz

GSM:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
Lowest	12.5	17.8	46.8	47863.0092	5.0	116.4743
Middle	12.5	17.8	46.8	47863.0092	5.0	116.4743
Highest	12.5	17.8	46.4	43651.5832	5.0	111.2321

CDMA:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
Lowest	12.5	17.8	46.6	45708.8189	5.0	113.8230
Middle	12.5	17.8	46.4	43651.5832	5.0	111.2321
Highest	12.5	17.8	46.2	41686.9383	5.0	108.7002

WCDMA:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
Lowest	12.5	17.8	46.7	46773.5141	5.0	115.1410
Middle	12.5	17.8	46.3	42657.9518	5.0	109.9588
Highest	12.5	17.8	46.1	40738.0277	5.0	107.4559

LTE:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
Lowest	12.5	17.8	46.4	43651.5832	5.0	111.2321
Middle	12.5	17.8	46.6	45708.8189	5.0	113.8230
Highest	12.5	17.8	46.2	41686.9383	5.0	108.7001



SGS-CSTC Standards Technical Services Co., Ltd.

Application No.: GZEM1701000495CR

Page: 6 of 6

FCC ID: PX8HRU01-6800

3.5 For downlink: 2110 MHz to 2180MHz

CDMA:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
Lowest	12.5	17.8	46.3	42657.9518	5.0	109.9588
Middle	12.5	17.8	46.1	40738.0277	5.0	112.5210
Highest	12.5	17.8	46.3	42657.9518	5.0	112.5210

WCDMA:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
Lowest	12.5	17.8	46.1	40738.0277	5.0	107.4559
Middle	12.5	17.8	46.5	44668.3592	5.0	112.5201
Highest	12.5	17.8	46.2	41686.9383	5.0	108.7001

LTE:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
Lowest	12.5	17.8	46.6	45708.8189	5.0	113.8230
Middle	12.5	17.8	46.2	41686.9383	5.0	108.7001
Highest	12.5	17.8	46.1	40738.0277	5.0	107.4559

Conclusion:

So the recommend use distance away from EUT external antenna is larger than 1.591305 meter.