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 radia 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 $\lvert E \rvert^2$, $\lvert H \rvert^2$ 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 $\lvert E \rvert^2$, $\lvert H \rvert^2$ 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

$S\ (mW/cm^2) = P*G/4Pi*R^2$

S= Power Density (mW/cm^2)

P=Peak RF conducted output Power (mW)

G=EUT Antenna numeric gain (numeric)

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

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

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: 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	46.3	42657.9519	2.8767	144.9666
Middle	12.5	17.8	46.1	40738.0277	2.8850	141.4628
Highest	12.5	17.8	46.2	41686.9383	2.8933	142.8955

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	46.3	42657.9519	2.8833	144.8006
Middle	12.5	17.8	46.4	43651.5832	2.8850	146.4341
Highest	12.5	17.8	46.2	41686.9383	2.8867	143.0587

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	141.5192
Middle	12.5	17.8	46.3	42657.9519	2.8850	144.7579
Highest	12.5	17.8	46.2	41686.9383	2.8873	143.0439

3.2 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	46.4	43651.5832	5.0	111.2321
Middle	12.5	17.8	46.3	42657.9519	5.0	109.9588
Highest	12.5	17.8	46.5	44668.3592	5.0	112.5201

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	46.2	41686.9383	5.0	108.7002
Middle	12.5	17.8	46.3	42657.9519	5.0	109.9588
Highest	12.5	17.8	46.5	44668.3592	5.0	112.5201

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	5.0	113.8230
Middle	12.5	17.8	46.3	42657.9519	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	46.2	41686.9383	5.0	108.7002
Middle	12.5	17.8	46.4	43651.5832	5.0	111.2321
Highest	12.5	17.8	46.5	44668.3592	5.0	112.5201

3.3 For downlink: 2110 MHz to 2155MHz

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	46.4	43651.5832	5.0	111.2321
Middle	12.5	17.8	46.3	42657.9519	5.0	109.9588
Highest	12.5	17.8	46.1	40738.0277	5.0	107.4559

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	46.2	41686.9383	5.0	108.7002
Middle	12.5	17.8	46.3	42657.9519	5.0	109.9588
Highest	12.5	17.8	46.4	43651.5832	5.0	111.2321

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	46.3	42657.9519	5.0	109.9588
Middle	12.5	17.8	46.2	41686.9383	5.0	108.7002
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 1.4497 meter.