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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 $\|E\|^2$, $\|H\|^2$ 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

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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.

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3. Calculated Result

3.1 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	10.0	10.0	32.81	1910.0	1.7392	29.56971
Middle	10.0	10.0	32.16	1644.0	1.7630	27.24771
Highest	10.0	10.0	32.78	1897.0	1.7868	29.07374

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	10.0	10.0	33.08	2032.0	1.742	30.47495
Middle	10.0	10.0	33.11	2046.0	1.763	30.39708
Highest	10.0	10.0	32.73	1875.0	1.784	28.92733

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	10.0	10.0	33.09	2037.0	1.744	30.49492
Middle	10.0	10.0	33.17	2075.0	1.763	30.61174
Highest	10.0	10.0	32.96	1977.0	1.782	29.72040

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3.2 For Uplink: 824MHz to 849MHz:

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	10.0	10.0	22.63	183.0	1.6492	9.399269
Middle	10.0	10.0	23.35	216.0	1.6730	10.13874
Highest	10.0	10.0	22.27	167.0	1.6968	8.852136

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	10.0	10.0	22.24	183.0	1.652	9.39130
Middle	10.0	10.0	22.52	179.0	1.673	9.229618
Highest	10.0	10.0	22.18	165.0	1.694	8.806239

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	10.0	10.0	23.04	201.0	1.654	9.836384
Middle	10.0	10.0	23.46	222.0	1.673	10.27859
Highest	10.0	10.0	22.38	173.0	1.692	9.022524

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3.3 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	10.0	10.0	32.74	1879.0	1.0	38.67841
Middle	10.0	10.0	32.23	1671.0	1.0	36.47484
Highest	10.0	10.0	32.68	1854.0	1.0	38.42024

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	10.0	10.0	33.15	2066.0	1.0	40.55742
Middle	10.0	10.0	33.16	2070.0	1.0	40.59666
Highest	10.0	10.0	32.59	1816.0	1.0	38.02446

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	10.0	10.0	33.21	2094.0	1.0	40.83133
Middle	10.0	10.0	33.35	2163.0	1.0	41.4986
Highest	10.0	10.0	32.39	1734.0	1.0	37.15607

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3.4 For Uplink: 1850MHz ~ 1915MHz

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	10.0	10.0	22.54	179.0	1.0	11.9380
Middle	10.0	10.0	23.31	214.0	1.0	13.05305
Highest	10.0	10.0	22.14	164.0	1.0	11.42687

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	10.0	10.0	22.36	172.0	1.0	11.70225
Middle	10.0	10.0	22.78	190.0	1.0	12.29934
Highest	10.0	10.0	22.39	173.0	1.0	11.73622

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	10.0	10.0	22.54	179.0	1.0	11.9380
Middle	10.0	10.0	23.52	225.0	1.0	13.38432
Highest	10.0	10.0	22.48	177.0	1.0	11.87112

Conclusion:

So the recommend use distance away from EUT external antenna is larger than 0.414986meter.