

5.9 RF Exposure Evaluation

5.9.1 Regulation

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)	Average Time
(A) Limits for Occupational /Control Exposures				
300 – 1 500			F/300	6
1 500 – 100 000			5	6
(B) Limits for General Population/Uncontrol Exposures				
300 – 1 500			F/1 500	30
1 500 – 100 000			1	30

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to The antenna, through the calculation, we will know the distance where the MPE limit is reached.

5.6.3 Test Result of RF Exposure Evaluation

CDMA800 1xRTT

Channel	Frequency [MHz]	Ant Gain [dBm]	power [dBm]	Power Density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
Low	824.70	2.99	24.54	0.112 65	0.549 80
Middle	836.52	2.99	24.33	0.107 33	0.557 68
High	848.31	2.99	24.48	0.111 10	0.565 54

Mode	Frequency [MHz]	Ant Gain [dBm]	power [dBm]	Power Density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
Maximum Tune up tolerance	824.70	2.99	25.0	0.125 24	0.549 80

* CDMA1 900 1xRTT

Channel	Frequency [MHz]	Ant Gain [dBm]	power [dBm]	Power Density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
Low	1 851.25	5.09	23.92	0.158 39	1
Middle	1 880.00	5.09	23.98	0.160 59	1
High	1 908.75	5.09	23.60	0.147 14	1

Mode	Frequency [MHz]	Ant Gain [dBm]	power [dBm]	Power Density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
Maximum Tune up tolerance	1 880.00	5.09	25.0	0.203 11	1

*** CDMA800 1xEV-DO**

Channel	Frequency [MHz]	Ant Gain [dBm]	power [dBm]	Power Density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
Low	824.70	2.99	24.81	0.119 88	0.549 80
Middle	836.52	2.99	24.48	0.111 10	0.557 68
High	848.31	2.99	24.46	0.110 59	0.565 54

Mode	Frequency [MHz]	Ant Gain [dBm]	power [dBm]	Power Density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
Maximum Tune up tolerance	824.70	2.99	25.0	0.125 24	0.549 80

*** CDMA800 1xEV-DO**

Channel	Frequency [MHz]	Ant Gain [dBm]	power [dBm]	Power Density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
Low	1 851.25	5.09	24.21	0.169.33	1
Middle	1 880.00	5.09	24.44	0.178 54	1
High	1 908.75	5.09	24.34	0.174 47	1

Mode	Frequency [MHz]	Ant Gain [dBm]	power [dBm]	Power Density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
Maximum Tune up tolerance	1 880.00	5.09	25.0	0.203 11	1

RF Exposure Compliance for simultaneous operations

*** configurations for simultaneous operations**

configuration 1 : CDMA 1x + 2.4 GHz WLAN + Bluetooth

configuration 2 : CDMA EVDO + 2.4 GHz WLAN + Bluetooth

RF funtion	CDMA EVDO		CDMA 1x		802.11b	802.11g	802.11n	BT	Total Power Densityc (mW/cm2)
Band	Cellular	PCS	Cellular	PCS	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz	
Power Density (mW/cm2)	0.125 24	0.203 11	0.125 24	0.203 11	0.006 45	0.002 49	0.002 34	0.000 15	
Configuration 1				0.20311	0.00645			0.00015	0.20971
Configuration 2		0.20311			0.00645			0.00015	0.20971