

## 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 <sup>2</sup> )	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/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi$  = 3.1416

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

$P_d$  the limit of MPE, 1 mW/cm<sup>2</sup>. 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 <sup>2</sup> ]	Limit [mW/cm <sup>2</sup> ]
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 <sup>2</sup> ]	Limit [mW/cm <sup>2</sup> ]
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 <sup>2</sup> ]	Limit [mW/cm <sup>2</sup> ]
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 <sup>2</sup> ]	Limit [mW/cm <sup>2</sup> ]
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 <sup>2</sup> ]	Limit [mW/cm <sup>2</sup> ]
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 <sup>2</sup> ]	Limit [mW/cm <sup>2</sup> ]
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 <sup>2</sup> ]	Limit [mW/cm <sup>2</sup> ]
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 <sup>2</sup> ]	Limit [mW/cm <sup>2</sup> ]
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	<b>PCS</b>	Cellular	<b>PCS</b>	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	<b>0.203 11</b>	<b>0.006 45</b>	0.002 49	0.002 34	<b>0.000 15</b>	
Configuration 1				0.20311	<b>0.00645</b>			<b>0.00015</b>	0.20971
Configuration 2		<b>0.20311</b>			<b>0.00645</b>			<b>0.00015</b>	0.20971