RF Exposure Measurement

1. Introduction
The maximum Gain measured in Fully Anechoic Chamber is 5.00dBi or 3.16 (numeric).

Because this deivce is transmitting the high power signal, it is regarded specially as a dangerous band for its heating harmfulness to the human body. The manufacturer whose product is working in this frequency band is obligatory to prove the harmfulness of his product.

In this document, we try to prove the safety of radiation harmfulness to the human body for our product. The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The Gain of the antenna used in this product is measured in a Fully Anechoic Chamber (FAC), and the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product,

2. Classification
MODE: CDMA

The antenna of the product, under normal use condition, is at least 20cm away from the body of the user. Warning statement for keeping 20cm separation distance and the prohibition of operating next to a person has been printed on the user's manual. So, this product is classified as the Mobile Device.

3. RF Exposure Limit

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio- frequency(RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE) - **Class A**

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm^2)	Average Time (minutes)
0.3 - 3.0	614	1.63	*(100)	6
3.0 - 30	1842/f	4.89/f	*(900/f^2)	6
30 - 300	61.4	0.163	1.0	6
300 - 1500			F/300	6
1500 - 100,000			5	6

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE) - **Class B**

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm^2)	Average Time (minutes)
0.3 - 1.34	614	1.63	*(100)	30
1.34 - 30	824/f	2.19/f	*(180/f^2)	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	-	-	F/1500	30
1500 - 100,000	-	-	1.0	30

F = Frequency in MHz

4. Friis Formula

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

The maximum Gain measured in Fully Anechoic Chamber is 5.00dBi or 3.16 (numeric).

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

MODE: CDMA

Pd is the limit of MPE, 1mW/cm^2. 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 r where the MPE limit is reached.

The software provided by Manufacturer enabled the EUT to transmit with max power at lowest, middle and highest channel individually.

6. Test Results

6.1 Antenna Gain

The maximum Gain measured in Fully Anechoic Chamber is 5.00dBi or 3.16 (numeric).

6.2 Output Power into Antenna & RF Exposure value at distance 20cm:

MODE: PCS(Uplink)

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
25	1851.25	310.46	0.30881	1.0
600	1880.00	313.33	0.31167	1.0
1175	1908.75	314.05	0.31239	1.0

MODE: PCS(Down Link)

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
25	1931.25	9.84	0.00979	1.0
600	1960.00	10.05	0.00999	1.0
1175	1988.75	9.89	0.00983	1.0

The minimum allowable distance is very close to the enclosure of the antenna and is very far away from the human beign under normal use condition.

MODE: CDMA

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1013	824.70	303.39	0.30179	0.5
363	835.89	305.49	0.30388	0.6
777	848.31	316.23	0.31456	0.6

MODE: DOWN Link

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1013	869.70	9.77	0.00972	0.6
363	880.89	9.82	0.00977	0.6
777	893.31	10.00	0.00995	0.6

The minimum allowable distance is very close to the enclosure of the antenna and is very far away from the human beign under normal use condition.