

RF Exposure Measurement

1. Introduction

The maximum Gain measured in Fully Anechoic Chamber is 7.0dBi or 5.011 (numeric).

Because this device 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: iDEN(QAM)

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)
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)
30 - 300	27.5	0.073	0.2	30

4. Friis Formula

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

$$R = \sqrt{\frac{PG}{4 \pi S}}$$

The maximum Gain measured in Fully Anechoic Chamber is 7.0dBi or 5.011 (numeric).

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

MODE: iDEN(QAM)

P_d is the limit of MPE, $1\text{mW}/\text{cm}^2$. 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.

5. Test Results

5.1 Antenna Gain

The maximum Gain measured in Fully Anechoic Chamber is 7.0dBi or 5.011 (numeric).

5.2 Output Power into Antenna & Distance at RF Exposure value(1mW/cm²) :

MODE: 800 Down Link

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	S (cm)
First ch	851.00	287.078	12.64572
Middle ch	860.00	329.610	13.55013
Last ch	869.00	300.608	12.94028

MODE: 900 Down Link

First ch	935.00	263.633	12.11835
Middle ch	938.00	285.759	12.61664
Last ch	940.00	271.019	12.28694

MODE: 800 Up Link

First ch	806.00	277.332	12.42921
Middle ch	815.00	325.087	13.45686
Last ch	824.00	317.687	13.30282

MODE: 900 Up Link

First ch	896.00	349.140	13.94580
Middle ch	899.00	328.095	13.51897
Last ch	901.00	349.945	13.96187

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