RF Exposure Report

RF Exposure Measurement

The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The gain of the antennas used in the product is extracted from the Antenna data sheets provided and also 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, where the limit of MPE is reached.

Although the Friis Transmission formula is far field assumption, the calculated result of that is an over-prediction for near field power density. It is taken as worst case to specify the safety range.

RF Exposure Limit

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of the 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/cm²)
Limits for Occupational / controlled Exposures			
300 - 1500	--	--	F/300
1500 – 100000	--	--	5.0
Limits for General population / Uncontrolled Exposure			
300 - 1500	--	--	F/1500
1500 – 100000	--	--	1.0

F= Frequency in MHz

For RFID Reader

The highest RF output power of the EUT at 125 kHz was measured -42.68 dBm which is less than 20mW.

Since maximum peak output power of the transmitter is <60/f (GHz) mW, i.e. 0.00000005418W<480000(=60/0.000125) mW, hence the EUT is excluded from SAR evaluation according to FCC KDB publication 447498 D01: Mobile Portable RF Exposure.

Maximum Output power of the RFID Transmitter:

$P = (E \times d)$ squared $/ (30 \times G)$

Where: E = the measured maximum field strength in V/m = 0.000425

   G = the numeric gain of the transmitting antenna over an isotropic radiator = 1

   d = the distance in meters from which the field strength was measured = 3

   P = the power in watts

   P= (0.000425×3) ^2/ (30×1)

     = 0.00000005418 W

For Wi-Fi

The highest RF output power of the EUT was found at data rate of 1Mbps in 802.11b protocol at frequency of 2413.9MHz with measured value 87.72dBuV/m (Average).
87.25dBuV/m = 0.0243V/m

Note: The measurement was done with highest possible duty cycle of EUT. The average values given are actual measured values and there is no extrapolation involved.

Maximum Output power of the Wi-Fi Transmitter:

$P = (E \times d)$ squared $/ (30 \times G)$

Where: E = the measured maximum field strength in V/m = 0.023

   G = the numeric gain of the transmitting antenna over an isotropic radiator =2

   d = the distance in meters from which the field strength was measured = 3

   P = the power in watts

   P= (0.0243×3) ^2/ (30×2)

     = 0.00008857 W

     =0.08857 mW

Since the maximum output power (0.08857mW) is less than 20mW, the product is excluded from SAR evaluation according to FCC KDB publication 447498 D01: Mobile Portable RF Exposure