RF Exposure Report

FCC ID:2AUL3-MINE-M4

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)

F= Frequency in MHz

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

Friss Formula

Friss Transmission Formula: Pd = (Pout * G) / (4*pi*r²)

Where
Pd = power density in mW/cm²
Pout = output power to antenna in mW
G = gain of antenna in linear scale
Pi = 3.1416
R = Distance between observation point and the center of radiator in cm

If we know the maximum gain of the antenna and the total output power to the antenna, through calculation, we will know MPE value at distance 20cm.

EUT Operation condition

EUT was enabled to transmit and receive at lowest, middle and highest channels.

Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance from the antenna should be included in the User manual. So, this device is classified as Mobile device.

2.4G WIFI:

Gain of antenna in Logarithmic=0 dBi
Gain of antenna in linear scale=1 dBi
2412-2462MHz:

Protocol	Channel Frequency (MHz)	Output Power to Antenna (dBm)	Output Power to Antenna (mW)	Power Density (mW/cm²)	Limit (mW/cm²)
802.11b	2437	16.82	48.0839	0.0096	1.000
802.11g	2437	15.55	35.8922	0.0071	1.000
802.11n HT20	2412	15.44	34.9945	0.0070	1.000
802.11n HT40	2422	14.59	28.7740	0.0091	1.000

5.8G WIFI

Gain of antenna in Logarithmic=0 dBi
Gain of antenna in linear scale=1 dBi
5150-5250MHz,5725-5850MHz:

Protocol		Channel Frequency (MHz)	Output Power to Antenna (dBm)	Output Power to Antenna (mW)	Power Density (mW/cm²)	Limit (mW/cm²)
802.11a	5150-5250MHz	5180	12.83	19.1867	0.0038	1.000
	5725-5850MHz	5745	13.49	22.3357	0.0044	1.000
802.11ac-HT20	5150-5250MHz	5180	12.74	18.7932	0.0037	1.000
	5725-5850MHz	5805	13.52	22.4905	0.0071	1.000

Then SAR evaluation is not required