

RF EXPOSURE REPORT

REPORT NO.: SA971118L17 MODEL NO.: SDGOB-0892

ACCORDING: FCC Guidelines for Human Exposure IEEE C95.1

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RF EXPOSURE MEASUREMENT (MOBILE DEVICE)

1. INTRODUCTION

In this document, we try to prove the safety of radiation harmfulness to the human body for our product. The limit for Maximum Per missible Exposure (MPE) specified in FCC 1.1310 is followed. The Gain of the antenna used in this product is measured in a F ully Anechoic Chamber (F AC) calibrated for antenna measurement in ADT, 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 calculat e the dist ance, away from the product, where the limit of MPE is reached.

Although the Friis transmission formula is a far fi eld assumption, the calculated result of that is an over-prediction for near field pow er density. We will t ake that as the worst case to specify the safety range.

2. RF EXPOSURE LIMIT

According to FCC 1.1310: The criteria list ed 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)

FREQUENCY RANGE (MHz)	ELECTRIC FIELD STRENGTH (V/m)	MAGNETIC FIELD STRENGTH (A/m)	POWER DENSITY (mW/cm ²)	AVERAGE TIME (minutes)			
(A)LIMITS FOR OCCUPATIONAL / CONTROL EXPOSURES							
300-1500			F/300	6			
1500-100,000			5	6			
(B)LIMITS FOR GENERAL POPULATION / UNCONTROLLED EXPOSURE							
300-1500			F/1500	30			
1500-100,000			1.0	30			

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

F = Frequency in MHz



3. FRIIS FORMULA

Friis transmission formula : $Pd = (Pout^{*}G) / (4^{*}pi^{*}r^{2})$

where

Pd = power density in mW/cm^2

Pout = 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

If we know the maximum Gain of the ant enna and the total power input to the antenna, through the calculation, we will know the MPE value at distance r.

Ref.: David K. Cheng, Field and Wave Electromagnetics, Second Edition,

Page 640, Eq. (11-133).

4. EUT OPERATING CONDITION

The software provided by Manufacturer enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

5. CLAS SIFICATION

This device is fixed inside the host equipment. W arning statement to the user for keeping at least 20cm or more separation distance with the antenna should be included in users manual. So, this device is classified as **Mobile Device**.



6. TEST RESULTS

6.1 ANTENNA GAIN

The maximum Gain measured in Fully Anechoic Chamber is 2.2dBi or 1.6596 (numeric).

6.2 OUTPUT POWER INTO ANTENNA & RF EXPOSURE VALUE AT DISTANCE 20cm:

802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
1 2412		161.808	22.09	0.053	1.000
6 2437		159.956	22.04	0.053	1.000
11 2462		143.549	21.57	0.047	1.000

802.11g OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
1 2412		233.346	23.68	0.077	1.000
6 2437		320.627	25.06	0.106	1.000
11 2462		179.473	22.54	0.059	1.000

DRAFT 802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
1 2412		230.144	23.62	0.076	1.000
6 2437		322.849	25.09	0.107	1.000
11 2462		181.134	22.58	0.060	1.000

DRAFT 802.11n (40MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
1 2412		283.792	24.53	0.094	1.000
4 2437		287.078	24.58	0.095	1.000
7 2452		227.510	23.57	0.075	1.000



6.3 CO-LOCATED EVALUATION:

The EUT (FCC ID: B94SDGOB0892) can be use with the Bluetooth module (FCC ID: B94SDGOB0891) are incorporated in a mobile host device.

The output power is listed on the FCC grant for the Bluetooth module B94SDGOB0891 as 0.0009 Watts (-0.5dBm). The application lists the antenna gain as being 0.48 dBi so the eirp is also 0.995mW(-0.02dBm).

6.4 WIFI AND BLUETOOTH MODULE INSTALLED TOGETHER – MPE EVALUATION

References are made to the following FCC documents: FCC KDB 447498 D01 Mobile Portable RF Exposure v03r02.

For body exposure, the following MPE calculation is being submitted to demonstrate compliance with RF exposure requirements for a separation distance of at least 20cm from the body/head:

FCC ID	MODULE	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	ANTENNA GAIN (dBi)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
B94SDGOB0892 W	Fi	322.849	25.09	2.2	0.107	1.000
B94SDGOB0891 BI	uetooth	0.9 -0.	5	0.48	0.0002	1.000

Both of the modules can transmit simultaneously, the formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 +etc. < 1

CPD = Calculation power density

LPD = Limit of power density

WiFi + Bluetooth = 0.107+0.0002=0.1072

Therefore, the maximum calculation of this situation is 0.1072, which is less than the "1" limit.

NOTE: Co-transmitting EMC has been investigated and continue complying with relevant FCC rule/regulation and was documented in separate report