RF EXPOSURE REPORT

REPORT NO.: SA971218L04B

MODEL NO.: ESR6650, ERB9250, ECB9300, RNX-N4-3G, OBA-6800

ACCORDING: FCC Guidelines for Human Exposure
IEEE C95.1

APPLICANT: Senao Networks Inc.

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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 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) 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 calculate the distance, away from the product, where the limit of MPE is reached.

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

2. 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)

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

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 antenna 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. 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 with the antenna should be included in users manual. So, this device is classified as **Mobile Device**.

6. TEST RESULTS

6.1 OUTPUT POWER & RF EXPOSURE VALUE AT DISTANCE 20cm:

WCDMA 850

For 3G USB Dongle Model: 888U (FCC ID: N7NC88)

CHANNEL	CHANNEL FREQUENCY (MHz)	OUTPUT POWER (erp)	OUTPUT POWER (eirp)	POWER DENSITY (mW/cm^2)	LIMIT OF POWER DENSITY (mW/cm^2)
4132	826.4	26.20	28.35	0.136	0.558

For 3G USB Dongle Model: E176 (FCC ID: QISE176)

CHANNEL	CHANNEL FREQUENCY (MHz)	OUTPUT POWER (erp)	OUTPUT POWER (eirp)	POWER DENSITY (mW/cm^2)	LIMIT OF POWER DENSITY (mW/cm^2)
4182	836.4	17.19	19.34	0.017	0.551

For 3G USB Dongle Model: MD300 (FCC ID: PY7F3232021)

CHANNEL	CHANNEL FREQUENCY (MHz)	OUTPUT POWER (erp)	OUTPUT POWER (eirp)	POWER DENSITY (mW/cm^2)	LIMIT OF POWER DENSITY (mW/cm^2)
4182	836.4	26.10	28.25	0.133	0.558

WCDMA 1900

For 3G USB Dongle Model: 888U (FCC ID: N7NC88)

CHANNEL	CHANNEL FREQUENCY (MHz)	OUTPUT POWER (eirp)	POWER DENSITY (mW/cm^2)	LIMIT OF POWER DENSITY (mW/cm^2)
9262	1852.40	28.70	0.147	1.000

FOR EUT (FCC ID: U2M-SR97908005)

ANT GAIN	2.0 dBi			
BAND	**CONDUCTED POWER (dBm)**	**OUTPUT POWER (eirp)**	**MPE**	**LIMIT**
2.4GHz	25.06	27.06	0.101	1.000

CONCULSION:

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

1. WLAN 2.4G + WCDMA 850 = 0.101 + 0.136 = 0.237
2. WLAN 2.4G + WCDMA 850 = 0.101 + 0.017 = 0.118
3. WLAN 2.4G + WCDMA 850 = 0.101 + 0.133 = 0.234
4. WLAN 2.4G + WCDMA 1900 = 0.101 + 0.147 = 0.248

Therefore, the maximum calculation of this situation is 0.248, which is less than the “1” limit.