RF EXPOSURE REPORT

REPORT NO.: SA950124A18B

MODEL NO.: HS-39W

VERSION: HW: V2.4 SW: RC-2.6 MV: V4
Proto vers: B4.2-DVT2

ACCORDING: FCC Guidelines for Human Exposure
IEEE C95.1

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RF Exposure Measurement

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	6
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 20cm.

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 data at lowest, middle and highest channel individually.

5. Conclusion

No Evaluation Required if power is below this threshold:

F(GHz)		mW
Low	2.402	24.58
High	2.480	

Maximum measured transmitter power:

Pout (dBm)		Pout (mW)
Conducted Power	0.60	1.148
EIRP Power	0.67	1.167

Note: The antenna is Inverted-F antenna with 0.07dBi gain

Threshold for no SAR evaluation is 24.58mW
Transmitter power is 1.167mW

Conclusion: No SAR evaluation required since Transmitter Pout is below FCC threshold