

# **FCC ID :2AW9M-S1**

## **RF EXPOSURE EVALUATION**

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment 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 <sup>2</sup> )	Average Time
<b>(A) Limits for Occupational/Control Exposures</b>				
<b>300-1500</b>	--	--	<b>F/300</b>	<b>6</b>
<b>1500-100000</b>	--	--	<b>5</b>	<b>6</b>
<b>(B) Limits for General Population/Uncontrol Exposures</b>				
<b>300-1500</b>	--	--	<b>F/1500</b>	<b>6</b>
<b>1500-100000</b>	--	--	<b>1</b>	<b>30</b>

### **11.1 Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$**

Where

$P_d$ = Power density in mW/cm<sup>2</sup>

$P_{out}$ =output power to antenna in mW

$G$ = Numeric gain of the antenna relative to isotropic antenna

$\pi$ =3.1416

$R$ = distance between observation point and center of the radiator in cm

$P_d$  the limit of MPE, 1mW/cm<sup>2</sup>, If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

RF Exposure Information: The radiated output power of this device meets the limits of FCC/IC radio frequency exposure limits. This device should be operated with a minimum separation distance of 20cm between the equipment and a person's body.

## 11.2 Measurement Result

BLE

Antenna :0.77dBi

Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm <sup>2</sup> )	Power density Limits (mW/cm <sup>2</sup> )
-5.18	-4 to -5	-4	1.19	0.00009	1

LTE

Band 2Antenna :3.92dBi

Band 4Antenna :4.39dBi

Band 5Antenna :3.71dBi

Band 12Antenna :2.99dBi

Band 13Antenna :3.16dBi

Band 66Antenna :4.39dBi

	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm <sup>2</sup> )	Power density Limits (mW/cm <sup>2</sup> )
Band 2	24.65	23 to 25	25	2.47	0.1553	1
Band 4	25.11	24 to 26	26	2.75	0.2178	1
Band 5	24.67	23 to 25	25	2.35	0.1478	0.5493
Band 12	24.67	23 to 25	25	1.99	0.1252	0.4660
Band 13	23.65	22 to 24	24	2.07	0.1034	0.5180
Band 66	25.69	24 to 26	26	2.75	0.2178	1

CONCLUSION of simultaneous transmitter

Both of the module 1 and module 2 can transmit simultaneously, the formula of calculated the MPE is:

$$CPD1/LPD1+CPD2/LPD2+\cdots\cdots\text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

Therefore the worst-case situation is

$$0.00009/1.00+0.1252/0.4660=0.2688\text{which is less than "0.2688",}$$

This confirmed that the device comply with FCC 1.1310 MPE limit.