Maximum Permissible Exposure Evaluation

FCC ID: 2APN5-MINIRBS

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).

EUT Specification

Product Name:	**Smart Roller Shutter Switch**
Trade Mark:	SONOFF, Sonoff
Model/Type Reference:	MINI-RBS
Listed Model(s):	MINI-RBS-MS
Model Differences:	All these models are identical in the same PCB, layout, electrical circuit and enclosure. The difference is the model name.
Frequency Band (Operating)	BLE: 2402MHz ~ 2480MHz WLAN: 2412MHz ~ 2462MHz
Device Category	☐Portable (<5mm separation) ☐Mobile (>20cm separation) ☒Fixed (>20cm separation) ☐Others ___
Exposure Classification	☐Occupational/Controlled exposure (S=5mW/cm^2) ☒General Population/Uncontrolled exposure (S=1mW/cm^2)
Antenna Diversity	☒Single antenna ☐Multiple antennas ☐Tx diversity ☐Rx diversity ☐Tx/Rx diversity
Antenna Gain (Max)	2.4GHz: 0.77dBi
Evaluation Applied	☒MPE Evaluation ☐SAR Evaluation

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
(A) Limits for Occupational/Controlled Exposure				
300-1500	--	--	F/300	<6
1500-100000	--	--	5	<6
(B) Limits for General Population/Uncontrolled Exposure				
300-1500	--	--	F/1500	<30
1500-100000	--	--	1	<30

Calculation Method

Friis transmission formula: $Pd=(P_{out}*G)/(4*Pi*R^2)$
Where:
Pd= Power density in mW/cm^2
P_{out}= 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

Pd limit of MPE is $1mW/cm^2$. 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.

Measurement Result

Mode	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Tune Up Tolerance (dB)	Max. Tune Up Power (dBm)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)
BLE	2440	0.77	8.63	±1	9	0.0019	1
WLAN 802.11b	2412	0.77	17.44	±1	18	0.0145	1

The WLAN and BT can transmit simultaneously.

BT Power density at 20cm (mW/cm^2)	RLAN Power density at 20cm (mW/cm^2)	Total Power density at 20cm (mW/cm^2)	Power density Limit (mW/cm^2)
0.0019	0.0145	0.0164	1

Note:
1. Calculate in the worst-case mode.
2. Max. Tune Up Power is declared by manufacturer, and used to calculate.
3. For a more detailed features description, please refer to the RF Test Report.

**************************THE END**************************