

## RF EXPOSURE EVALUATION

### EUT Specification

<b>EUT</b>	Photoelectric Smoke Alarm
<b>Model Number</b>	S1-M
<b>FCC ID</b>	2AK7XS1-M
<b>Antenna gain (Max)</b>	0 dBi
<b>Operation Frequency</b>	Matter: 2405 MHz to 2480 MHz BLE: 2402 MHz to 2480 MHz
<b>Input Rating</b>	DC 3 V
<b>Max. output power</b>	BLE: 8.97dBm Matter: 8.98dBm

### Test Requirement:

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>				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
<b>(B) Limits for General Population/Uncontrol Exposures</b>				
300-1500	--	--	F/1500	6
1500-100000	--	--	1	30

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

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 = 20cm

Under the limit of MPE,  $1\text{mW}/\text{cm}^2$ . If we know the maximum gain of the antenna total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

### 11.2 Measurement Result

Antenna gain: 0dBi

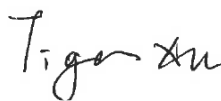
BLE:

Mode	Channel Freq. (MHz)	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> )
GFSK	2402	8.78	9±1	10	1	0.001989	1
GFSK	2440	8.89	9±1	10	1	0.001989	1
GFSK	2480	8.97	9±1	10	1	0.001989	1

Matter:

Mode	Channel Freq. (MHz)	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> )
O-QPSK	2405	8.71	9±1	10	1	0.001989	1
	2440	8.89	9±1	10	1	0.001989	1
	2480	8.98	9±1	10	1	0.001989	1

Signature:



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Date: 2023-08-25

