

RF EXPOSURE EVALUATION

EUT Specification

EUT	Sensor Light
Model Number	MSC-5578
FCC ID	2A3KU-MSC-5578
Antenna gain (Max)	0dBi
Operation Frequency	2402-2480MHz
Input Rating	DC 4.5V Battery
Classification Per Stipulated Test Standard	§15.247(i), §2.1093
Modulation	BLE: GFSK BR+EDR: GFSK, $\pi/4$ -DQPSK, 8DPSK
Max. output power	BLE: 0.46dBm(0.0025W) BR+EDR: 3.95dBm(0.0008W)

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 ²)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300-1500	--	--	F/1500	6
1500-100000	--	--	1	30

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

Where

P_d = Power density in mW/cm^2

P_{out} =output power to antenna in mW

G = Numeric gain of the antenna relative to isotropic antenna

$P_i=3.1416$

R = distance between observation point and center of the radiator in $\text{cm}=20\text{cm}$

P_d the limit of MPE, $1\text{mW}/\text{cm}^2$. 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.

11.2 Measurement Result

BLE:

Mode	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm^2)	Power density Limits (mW/cm^2)
GFSK	2402	-1.16	-1 ± 1	0	1	0.000199	1
GFSK	2441	-1	-1 ± 1	0	1	0.000199	1
GFSK	2480	-1.58	-1 ± 1	0	1	0.000199	1

BR+EDR:

Mode	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm^2)	Power density Limits (mW/cm^2)
GFSK	2402	3.5	3 ± 1	4	1	0.000500	1
GFSK	2441	3.07	3 ± 1	4	1	0.000500	1
GFSK	2480	3.52	3 ± 1	4	1	0.000500	1
$\pi/4$ -DQPSK	2402	3.53	3 ± 1	4	1	0.000500	1
$\pi/4$ -DQPSK	2441	3.27	3 ± 1	4	1	0.000500	1
$\pi/4$ -DQPSK	2480	3.06	3 ± 1	4	1	0.000500	1
8DPSK	2402	3.87	4 ± 1	5	1	0.000629	1

8DPSK	2441	3.95	4±1	5	1	0.000629	1
8DPSK	2480	3.90	4±1	5	1	0.000629	1

According to KDB 447498, no stand-alone required for BT antenna, and no simultaneous SAR measurement is required.

Signature:



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Date: 2021-11-10