

RF EXPOSURE EVALUATION

EUT Specification

EUT	Bluetooth speaker
Model Number	LKS028X
FCC ID	2BGYK-LKS028X
Antenna gain (Max)	-0.68dBi
Operation Frequency	2402-2480MHz
Input Rating	DC 12V
Standard	47 CFR Part 1.1307 47 CFR Part 1.1310 KDB447498D01 General RF Exposure Guidance v06
Modulation	GFSK, $\pi/4$ DQPSK, 8DPSK

Limits

According to FCC Part1.1310: 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 part1.1307(b)

TABLE 1—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 Exposures				
0.3–3.0	614	1.63	*(100)	
3.0–30	1842/f	4.89/f	*(900/f ²)	
30–300	61.4	0.163	1.0	
300–1500			f/300	
1500–100,000			5	
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

F= Frequency in MHz

Friis Formula

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

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

Test Procedure:

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

Calculated Result and Limit

BT:

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Maximum tune-up Power (mW)	Antenna gain		Power Density (S) (mW /cm ²)	Limited of Power Density (S) (mW /cm ²)	Test Result
						(dBi)	(Linear)			
GFSK	2402	1.532	1.422	1±1	1.58	-0.68	0.86	0.0027	1	Complies
	2441	2.618	1.827	1±1	1.58	-0.68	0.86	0.0027	1	Complies
	2480	2.673	1.850	1±1	1.58	-0.68	0.86	0.0027	1	Complies
8DPSK	2402	0.179	1.042	1±1	1.58	-0.68	0.86	0.0027	1	Complies
	2441	1.346	1.363	1±1	1.58	-0.68	0.86	0.0027	1	Complies
	2480	2.337	1.712	1±1	1.58	-0.68	0.86	0.0027	1	Complies

Remark: The Max Conducted Peak Output Power data refer to report Report No.:
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