

**Maximum Permissible Exposure Report****1. Product Information**

FCC ID:	2A05F-LXCONNECT
Product name	Wireless Speaker System
Test Model	LX Connect, LX Connect HUB
Additional Model	LX Connect DAC
Model Declaration	PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Power supply	Input: DC 12V,1.0A For AC Adapter Model: S018BAM1200100 Input: 100-240V, 50/60Hz, 0.5A Output: DC 12.0V, 1.0A, 12.0W
Hardware Version	A00
Software Version	V0.63
Bluetooth	
Frequency Range	2402MHz ~ 2480MHz
Channel Number	79 channels for Bluetooth V4.2(DSS)
Channel Spacing	1MHz for Bluetooth V4.2 (DSS)
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth V4.2(DSS)
Bluetooth Version	V4.2
Antenna Description	PCB Antenna, 0dBi (max.)
5.8G WLAN	
Frequency Range	5736MHz-5814MHz
Channel Number	3 channels (5736MHz, 5762MHz, 5814MHz)
Modulation Type	ASK
Antenna Description	Antenna 0: PCB Antenna, 3.2dBi (max.) Antenna 1: PCB Antenna, 3.2dBi (max.)
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Mobile Devices





2. Evaluation Method

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3. Limit

3.1 Refer Evaluation Method

[ANSI C95.1-1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: Mobile Devices





3. 2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f ²)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 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

*=Plane-wave equivalent power density

4. MPE Calculation Method

Predication of MPE limit at a given distance
Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

5. Antenna Information

Wireless Speaker System can only use antennas certificated as follows provided by manufacturer;

Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Notes
PCB Antenna	2400MHz ~ 2500MHz	0dBi	BT Antenna
PCB Antenna 0	5725MHz ~ 5850MHz	3.2dBi	5.8G Antenna
PCB Antenna 1	5725MHz ~ 5850MHz	3.2dBi	5.8G Antenna





6. Conducted Power

[BT Max Conducted Power]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
GFSK	0	2402	1.95
	39	2441	2.18
	78	2480	2.15
$\pi/4$ DQPSK	0	2402	2.2
	39	2441	2
	78	2480	1.95
8DPSK	0	2402	2.22
	19	2441	2.06
	39	2480	2.09

[5.8G Max Conducted Power]

Mode	Channel	Frequency (MHz)	Ant 0 Max Conducted Power(dBm)	Ant 1 Max Conducted Power(dBm)
5.8G	1	5736	10.94	10.32
	2	5762	10.77	10.79
	3	5814	11.26	11.19

7. Measurement Results

BT

GFSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	2.0	2.0	2.0
Tolerance \pm (dB)	1.0	1.0	1.0
$\pi/4$ DQPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	2.0	2.0	2.0
Tolerance \pm (dB)	1.0	1.0	1.0
8DPSK (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	2.0	2.0	2.0
Tolerance \pm (dB)	1.0	1.0	1.0

5.8G

ANT 0 (Peak)			
Channel	Channel 1	Channel 2	Channel 3
Target (dBm)	11.0	11.0	11.0
Tolerance \pm (dB)	1.0	1.0	1.0
ANT 1 (Peak)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	11.0	11.0	11.0
Tolerance \pm (dB)	1.0	1.0	1.0





8. Evaluation Results

8.1 Standalone MPE Evaluation

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, r =20cm, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

BT

Band/Mode	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm2)	MPE Limits (mW/cm2)
	dBm	mW				
GFSK	3.0	1.995	0	1.0000	0.0004	1.0000
$\pi/4$ DQPSK	3.0	1.995	0	1.0000	0.0004	1.0000
8DPSK	3.0	1.995	0	1.0000	0.0004	1.0000

5.8G

Band/Mode	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm2)	MPE Limits (mW/cm2)
	dBm	mW				
5.8G_ANT0	12.0	15.85	3.2	2.09	0.0066	1.0000
5.8G_ANT1	12.0	15.85	3.2	2.09	0.0066	1.0000

8.2 Simultaneous Transmission MPE

The sample support one BT transmit antenna and two 5.8G transmit antenna. The Bluetooth and 5.8G can transmit at the same time, the 5.8G can't transmit at the same time. So need consider simultaneous transmission;

Simultaneous transmission MPE

According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

Σ of MPE ratios \leq 1.0

Mode	MPE1 (mW/cm2)	MPE2 (mW/cm2)	Σ MPE ratios	Limit	Results
BT+5.8G	0.0004	0.0066	0.007	1.0	PASS

Remark:

1. Output power including turn-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer;
3. MPE values = $PG/4\pi R^2$

9. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

-----THE END OF REPORT-----

