REPORT No.: SZ21020081S01

RF EXPOSURE EVALUATION REPORT

APPLICANT	:	Linkplay Technology Inc.
PRODUCT NAME	:	Wireless Smart Audio Module
MODEL NAME	:	A98M, A98M-12, A98M-22, A98MG
BRAND NAME	:	Linkplay
FCC ID	:	2ANOG-A98M
STANDARD(S)	:	47CFR 2.1091 KDB 447498
RECEIPT DATE	:	2021-02-22
TEST DATE	:	2021-03-04 to 2021-03-06
ISSUE DATE	:	2021-03-25

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DIRECTORY

Change History		
Version	**Date**	**Reason for Change**
1.0	2021-03-25	First edition

1. Technical Information

Note: Provide by applicant.

1.1 Applicant and Manufacturer Information

Applicant:	Linkplay Technology Inc.
Applicant Address:	8F-8036, Qianren Building, No.7, Yingcui Road, Jiangning District, Nanjing, China
Manufacturer:	Linkplay Technology Inc.
Manufacturer Address:	8F-8036, Qianren Building, No.7, Yingcui Road, Jiangning District, Nanjing, China

1.2 Equipment under Test (EUT) Description

Product Name:	Wireless Smart Audio Module	
Serial No.:	(N/A, marked #1 by test site)	
Hardware Version:	V02	
Software Version:	Linkplay.3.6.7430	
Frequency Bands:	Bluetooth	2402MHz-2480MHz
	WLAN 2.4GHz	2412MHz–2462MHz
	WLAN 5GHz	5180MHz-5240MHz
		5260MHz-5320MHz
		5500MHz-5720MHz
		5745MHz-5825MHz
Modulation Mode:	Bluetooth	GFSK(1Mbps), π/4-DQPSK(EDR 2Mbps), 8-DPSK(EDR 3Mbps)
	WLAN 2.4GHz	DSSS, OFDM
	WLAN 5GHz	OFDM
Antenna Type:	PIFA Antenna	
Antenna Gain:	Bluetooth	2.14dBi
	WLAN 2.4GHz	2.14dBi
	WLAN 5GHz	2.41dBi

Note 1: This test report is variant from the original report (Report No.: SZ20110203S01, FCC ID: 2ANOG-A98M), based on the similarity between before, changed the antenna from External Rod Antenna to PIFA Antenna, BT&WiFi gain is smaller than the original, no other changes. The changes only affect the results of RF Exposure Assessment in this report.

Note 2: According to the certificate holder, they declared that the models A98M, A98M-12, A98M-22 and A98MG have different ROM and RAM density, different brands or different vendors. The differences do not affect BT/Wi-Fi RF performance. The detailed information of differences is listed below. The main measuring model is A98M, only the results for A98M were recorded in this report.

A98M: 128MB RAM, 128MB FLASH

A98M-12: 128MB RAM, 256MB FLASH

A98M-22: 256MB RAM, 256MB FLASH

A98MG: 512MB RAM, 512MB FLASH

1.3 Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title	Method determination /Remark
1	47 CFR§2.1091	Radio Frequency Radiation Exposure Assessment: mobile devices	No deviation
2	KDB 447498 D01v06	General RF Exposure Guidance	No deviation
Note 1: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table. **Note 2:** When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% risk level.			

2. Device Category and RF Exposure Limit

Per user manual, Based on 47CFR 2.1091, this device belongs to mobile device category with General Population/Uncontrolled exposure.

Mobile Devices:

47CFR 2.1091(b)

For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. In this context, the term “fixed location” means that the device is physically secured at one location and is not able to be easily moved to another location. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

General Population/Uncontrolled Exposure:

The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.

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)
(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* = Plane-wave equivalent power density

3. RF Output Power

Mode	Channel	Frequency (MHz)	Average power (dBm)
			GFSK
Bluetooth LE (1Mbps)	CH 00	2402	7.09
	CH 19	2440	6.77
	CH 39	2480	6.31
Bluetooth LE (2Mbps)	CH 00	2402	**7.24**
	CH 19	2440	7.24
	CH 39	2480	6.61
Tune-up Limit			7.50

Mode	Channel	Frequency (MHz)	Average power (dBm)		
			GFSK	π/4-DQPSK	8-DPSK
Bluetooth classic	CH 00	2402	**7.91**	5.02	4.99
	CH 39	2441	7.88	5.08	5.04
	CH 78	2480	7.73	4.89	4.74
Tune-up Limit			8.50	5.50	5.50

2.4GHz WLAN					
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-up Power	Duty Cycle %
802.11b	CH 1	2412	14.26	15.00	100.00
	CH 7	2442	14.32		
	CH 13	2472	**14.44**		
802.11g	CH 1	2412	13.56	14.50	98.47
	CH 7	2442	13.92		
	CH 13	2472	13.72		
802.11n (HT20)	CH 1	2412	14.17	15.00	98.36
	CH 7	2442	14.32		
	CH 13	2472	14.28		

5GHz WLAN, 5150MHz-5250MHz					
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-up Power	Duty Cycle %
802.11a	CH 36	5180	11.33	14.00	98.47
	CH 44	5220	13.15		
	CH 48	5240	13.92		
802.11n (HT20)	CH 36	5180	10.61	12.00	98.37
	CH 44	5220	11.69		
	CH 48	5240	11.45		
802.11n (HT40)	CH 38	5190	7.50	11.00	97.93
	CH 46	5230	10.67		
802.11ac (VHT20)	CH 36	5180	10.49	13.00	98.36
	CH 44	5220	12.45		
	CH 48	5240	12.28		
802.11ac (VHT40)	CH 38	5190	7.93	11.50	98.43
	CH 46	5230	10.92		
802.11ac (VHT80)	CH 42	5210	3.66	4.00	97.02

5GHz WLAN, 5250MHz-5350MHz					
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-up Power	Duty Cycle %
802.11a	CH 52	5260	13.67	14.00	98.47
	CH 60	5300	13.72		
	CH 64	5320	13.02		
802.11n (HT20)	CH 52	5260	11.54	15.00	98.37
	CH 60	5300	13.65		
	CH 64	5320	**14.76**		
802.11n (HT40)	CH 54	5270	12.18	13.00	97.93
	CH 62	5310	12.66		
802.11ac (VHT20)	CH 52	5260	12.43	14.00	98.36
	CH 60	5300	11.63		
	CH 64	5320	13.61		
802.11ac (VHT40)	CH 54	5270	10.81	11.50	98.43
	CH 62	5310	10.75		
802.11ac (VHT80)	CH 58	5290	7.76	8.50	97.02

5GHz WLAN, 5470MHz-5725MHz					
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-up Power	Duty Cycle %
802.11a	CH 100	5500	12.42	13.50	97.47
	CH 120	5600	12.43		
	CH 144	5720	12.81		
802.11n (HT20)	CH 100	5500	12.61	13.00	98.37
	CH 120	5600	12.38		
	CH 144	5720	10.65		
802.11n (HT40)	CH 102	5510	11.09	12.50	97.93
	CH 126	5630	11.94		
	CH 142	5710	11.55		
802.11ac (VHT20)	CH 100	5500	13.54	14.50	98.36
	CH 120	5600	14.12		
	CH 144	5720	10.29		
802.11ac (VHT40)	CH 102	5510	11.93	13.00	98.43
	CH 126	5630	12.15		
	CH 142	5710	10.63		
802.11ac (VHT80)	CH 106	5530	10.95	12.50	97.02
	CH 122	5610	11.71		
	CH 138	5690	11.69		

5GHz WLAN, 5725MHz-5825MHz					
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-up Power	Duty Cycle %
802.11a	CH 149	5745	11.09	12.00	98.47
	CH 157	5785	11.32		
	CH 165	5825	11.70		
802.11n (HT20)	CH 149	5745	10.81	11.50	98.37
	CH 157	5785	10.75		
	CH 165	5825	10.65		
802.11n (HT40)	CH 151	5755	10.54	11.00	97.93
	CH 159	5795	10.12		
802.11ac (VHT20)	CH 149	5745	10.41	11.50	98.36
	CH 157	5785	10.65		
	CH 165	5825	11.01		
802.11ac (VHT40)	CH 151	5755	10.33	11.00	98.43
	CH 159	5795	10.44		
802.11ac (VHT80)	CH 155	5775	11.13	11.50	97.02

Note 1: According to KDB 447498 Section 4.3, MPE assessment is based on source-based time-averaged maximum conducted output power of the RF channel requiring assessment, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.

Note 2: The output power refers to report (Report No.: SZ20110203W01/W02/W03/W04).

4. RF Exposure Assessment

➢ **Standalone Transmission Assessment:**

Bands	Frequency (MHz)	Tune-up Power(dBm)	Antenna Gain(dBi)	E.I.R.P. (mW)	Power Density (mW/cm²)	Limit for MPE (mW/cm²)
Bluetooth	2402	8.50	2.14	11.59	0.002	1.0
WLAN 2.4GHz	2472	15.00	2.14	51.76	0.010	1.0
WLAN 5GHz	5320	15.00	2.41	55.08	0.011	1.0

Note:

1. The WLAN 2.4G, WLAN 5G and Bluetooth transmitter share the same antenna, Therefore simultaneous transmission assessment is not required.
2. For 5GHz WLAN, only the worst case will be used for calculating the power density.
3. MPE calculate method

$$\text{Power Density} = \text{E.I.R.P.}/4\pi R^2$$

Where: E.I.R.P. = P+G

P = Output Power (dBm)

G = Antenna Gain (dBi)

R = Separation Distance (20cm)

➢ **Simultaneous Transmission Assessment:**

According to the user manual, both the WLAN and Bluetooth transmitters in the device cannot operate simultaneously, therefore simultaneous transmission analysis is not required.

➢ **Conclusion:**

According to 47 CFR §2.1091, this device complies with human exposure basic restrictions.

Annex A Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Laboratory Address:	FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone:	+86 755 36698555
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2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.

END OF REPORT