RF EXPOSURE REPORT

FOR

Applicant	**:**	Harman International Industries, Incorporated
Address	**:**	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES
Equipment under Test	**:**	Wireless Adaptor and 120W Digital Amplifier
Model No.	**:**	ADAPT+AMP
Trade Mark	**:**	Harman Kardon
FCC ID	**:**	APIHKADAPTAMP
IC	**:**	6132A-HKADAPTAMP
Manufacturer	**:**	Harman International Industries, Incorporated
Address	**:**	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES

Issued By: Dongguan Dongdian Testing Service Co., Ltd.

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808

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TEST REPORT DECLARE

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Address	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES

Standard Used: KDB447498 D01 General RF Exposure Guidance v06.

We Declare:

The equipment described above is assessed by Dongguan Dongdian Testing Service Co., Ltd and in the configuration assessed the equipment complied with the standards specified above. The assessed results are contained in this report and Dongguan Dongdian Testing Service Co., Ltd is assumed of full responsibility for the accuracy and completeness of these assess.

After evaluation, our opinion is that the equipment In Accordance with above standard.

Report No.:	DDT-RQ17090505-1E6		
Date of Receipt:	Sep. 05, 2017	**Date of Test:**	Sep. 05, 2017 ~ Oct. 25, 2017

Prepared By: ***Approved By:***

Toby Ren/Engineer ***Kevin Feng/EMC Manager***

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

1. General information

1.1. Description of Equipment

EUT* Name	:	Wireless Adaptor and 120W Digital Amplifier
Model Number	:	ADAPT+AMP
EUT function description	:	Please reference user manual of this device
Power supply	:	AC 100-240V,50/60Hz, 120W
Radio Specification	:	Bluetooth V4.1 (BDR/EDR/BLE) IEEE802.11b/g/n/a/ac
Operation frequency	:	2402MHz-2480MHz, 2412MHz-2462MHz, 5150MHz-5250MHz, 5250MHz-5350MHz, 5470MHz-5725MHz, 5725MHz-5850MHz
Modulation	:	GFSK, π/4 QPSK, 8-DPSK IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20, HT40: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11ac: HT20, HT40, HT80: OFDM (256QAM, 64QAM, 16QAM, QPSK,BPSK)
Data rate	:	1Mbps, 2Mbps, 3Mbps IEEE 802.11b: 1, 2, 5.5, 11 Mbps IEEE 802.11g, 11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps IEEE 802.11n HT20: up to 150 Mbps, HT40: up to 300Mbps IEEE 802.11ac VHT20: up to 150 Mbps, VHT40: up to 300 Mbps VHT80: up to 886.7 Mbps
Antenna Type	:	Integrated antenna 1: 2.4G band maximum PK gain 2.60dBi; 5G band maximum PK gain 2.81dBi Integrated antenna 2: 2.4G band maximum PK gain 4.20dBi; 5G band maximum PK gain 5.41dBi
Sample Type	:	Series production

1.2. Assess laboratory

Dongguan Dongdian Testing Service Co., Ltd.

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808 Tel: +86-0769-89201699 http://www.dgddt.com Email: ddt@dgddt.com

2. RF Exposure evaluation

2.1. Requirement

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.

Limits for General Population/Uncontrolled Exposure

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $|E|^2$,$|H|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2. Calculation Method

$$E(V/m) = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } S(mW/cm^2) = \frac{E^2}{377}$$

E = Electric field (V/m)
P = Peak RF output power (mW)
G = EUT Antenna numeric gain (numeric)=
d = Separation distance between radiator and human body (m)
The formula can be changed to

We can change the formula to:

$$S = \frac{30 \times P \times G}{377 \times d^2} \quad \text{or, } d = \sqrt{\frac{30 \times P \times G}{377 \times S}}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

2.3. Estimation Result

Standalone MPE

Antenna 1

2.4G Wifi

Mode	Output power (Including tune-up tolerance)		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	(dBm)	(mW)					
IEEE 802.11 b	22	158.4893	2.60	1.8197	100%	0.0574	1.0000
IEEE 802.11 g	22	158.4893	2.60	1.8197	100%	0.0574	1.0000
IEEE 802.11 n HT20	22	158.4893	2.60	1.8197	100%	0.0574	1.0000

IEEE 802.11 n HT40	22	158.4893	2.60	1.8197	100%	0.0574	1.0000

5G Wifi

Mode	Output power (Including tune-up tolerance)		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	(dBm)	(mW)					
IEEE 802.11 a	14	25.1189	2.81	1.9099	100%	0.0095	1.0000
IEEE 802.11 n HT20	14	25.1189	2.81	1.9099	100%	0.0095	1.0000
IEEE 802.11 n HT40	14	25.1189	2.81	1.9099	100%	0.0095	1.0000
IEEE 802.11 ac VHT20	14	25.1189	2.81	1.9099	100%	0.0095	1.0000
IEEE 802.11 ac VHT40	14	25.1189	2.81	1.9099	100%	0.0095	1.0000
IEEE 802.11 ac VHT80	14	25.1189	2.81	1.9099	100%	0.0095	1.0000

Antenna 2

2.4G Wifi

Mode	Output power (Including tune-up tolerance)		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	(dBm)	(mW)					
IEEE 802.11 b	22	158.4893	4.20	1.8197	100%	0.0830	1.0000
IEEE 802.11 g	22	158.4893	4.20	1.8197	100%	0.0830	1.0000
IEEE 802.11 n HT20	22	158.4893	4.20	1.8197	100%	0.0830	1.0000
IEEE 802.11 n HT40	22	158.4893	4.20	1.8197	100%	0.0830	1.0000

5G Wifi

Mode	Output power (Including tune-up tolerance)		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	(dBm)	(mW)					
IEEE 802.11 a	14	25.1189	5.41	3.4754	100%	0.0174	1.0000
IEEE 802.11 n HT20	14	25.1189	5.41	3.4754	100%	0.0174	1.0000
IEEE 802.11 n HT40	14	25.1189	5.41	3.4754	100%	0.0174	1.0000
IEEE 802.11 ac VHT20	14	25.1189	5.41	3.4754	100%	0.0174	1.0000
IEEE 802.11 ac VHT40	14	25.1189	5.41	3.4754	100%	0.0174	1.0000
IEEE 802.11 ac VHT80	14	25.1189	5.41	3.4754	100%	0.0174	1.0000

BT

Mode	Output power (Including tune-up tolerance)		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	(dBm)	(mW)					
BT Classic(GFSK)	4	2.5119	4.20	2.6303	100%	0.0013	1.0000
BT Classic (Pi/4 QPSK)	4	2.5119	4.20	2.6303	100%	0.0013	1.0000
BT Classic (8-DPSK)	4	2.5119	4.20	2.6303	100%	0.0013	1.0000
BT LE	4	2.5119	4.20	2.6303	100%	0.0013	1.0000

Remark:

Maximum average power including tune-up tolerance;
MPE use distance is 20cm from manufacturer declaration of user manual.
We choose 2402MHz (lowest frequency operate at 2.4GHz) and 5180MHz(lowest frequency operate at 5GHz) to calculate MPE limit as higher frequency will have higher MPE limits.

According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;
$\sum$ of MPE ratios ≤ 1.0

Antenna 1 and Antenna 2

Max. MPE Antenna1 (mW/cm2)	Max. MPE Antenna 2 (mW/cm2)	$\sum$ MPE ratios	Limit	Results
0.0574	0.0830	0.1404	1.000	Pass

Note: The estimation distance is 20cm

Conclusion

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

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