RF Exposure Evaluation Report

APPLICANT	:	**Amazon.com Services, LLC**
EQUIPMENT	:	**Digital Media Receiver**
FCC ID	:	**2AZ5B21A01**
STANDARD	:	**47 CFR Part 2.1091** **FCC KDB 447498 D01 v06**

We, Sporton International (Kunshan) Inc., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Nick Hu

Reviewed by: Nick Hu / Supervisor

Kat Yin

Approved by: Kat Yin / Manager

Sporton International (Kunshan) Inc.
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA082617-01	Rev. 01	Initial issue of report	Jun. 25, 2021

1. Administration Data

1.1. Testing Laboratory

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory		
Test Firm	Sporton International (Kunshan) Inc.	
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958	
Test Site No.	**FCC Designation No.**	**FCC Test Firm Registration No.**
	CN1257	314309

Applicant	
Company Name	Amazon.com Services, LLC
Address	410 Terry Ave N Seattle, WA 98109

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Digital Media Receiver
FCC ID	2AZ5B21A01
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
Antenna Type	WLAN/Bluetooth : Fixed internal Antenna
Antenna Gain	Ant1: WLAN2.4G : gain 3.8 dBi WLAN5.2G : gain 4.6 dBi WLAN5.8G : gain 3.4 dBi Ant2: WLAN2.4G : gain 3.2 dBi WLAN5.2G : gain 4.4 dBi WLAN5.8G : gain 5.3 dBi Bluetooth: gain 3.2 dBi
Remark: 1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description. 2. The 2.4GHz/5GHz WLAN can transmit in MIMO antenna mode only and it has no SISO antenna mode.	

Comments and Explanations:
1. The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification. 2. The maximum RF output tune up power, antenna gain also the safe distance used for evaluate RF exposure were declared by manufacturer.

3. Maximum RF Tune Up power among production units

<2.4GHz WLAN >

Mode		Maximum Average Power (dBm)
WLAN2.4G	802.11b	22.00
	802.11g	21.00
	802.11n-HT20	21.00

<5GHz WLAN >

Mode		Maximum Average Power (dBm)
WLAN5.2G	802.11a	20.00
	802.11n-HT20	20.00
	802.11n-HT40	21.00
	802.11ac-VHT20	20.00
	802.11ac-VHT40	21.00
	802.11ac-VHT80	17.00
WLAN5.8G	802.11a	21.00
	802.11n-HT20	22.00
	802.11n-HT40	22.00
	802.11ac-VHT20	22.00
	802.11ac-VHT40	22.00
	802.11ac-VHT80	20.00

<Bluetooth>

Mode	Maximum Average Power (dBm)
Bluetooth BR/EDR	6.00
Bluetooth LE	6.00

4. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

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)	6
3.0-30	1842/f	4.89/f	*(900/f2)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(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/f2)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:
S = Power Density
P = Output Power at Antenna Terminals
G = Gain of Transmit Antenna (linear gain)
R = Distance from Transmitting Antenna

5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)	Power Density/ Limit
2.4GHz WLAN	2412	3.80	22.00	25.800	0.380	380.189	0.076	1.000	**0.076**
WLAN 5.2GHz	5180	4.60	21.00	25.600	0.363	363.078	0.072	1.000	0.072
WLAN 5.8GHz	5745	5.30	22.00	27.300	0.537	537.032	0.107	1.000	**0.107**
Bluetooth	2402	3.20	6.00	9.200	0.008	8.318	0.002	1.000	**0.002**

Note:
1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. The MIMO gain choose max ANT gain to do MPE analysis.
3. Chose the maximum power to do MPE analysis.
4. According to the EUT characteristic, WLAN 2.4GHz and Bluetooth can transmit simultaneously.
5. According to the EUT characteristic, WLAN 5GHz and Bluetooth can transmit simultaneously.
6. According to the EUT characteristic, WLAN 2.4GHz and WLAN 5GHz cannot transmit simultaneously.

5.2. Collocated Power Density Calculation

WLAN2.4GHz Power Density / Limit	Bluetooth Power Density / Limit	Σ(Power Density / Limit) of WLAN2.4GHz+Bluetooth
0.076	0.002	0.078
WLAN5GHz Power Density / Limit	**Bluetooth Power Density / Limit**	**Σ (Power Density / Limit) of WLAN5GHz+Bluetooth**
0.107	0.002	0.109

Note:
1. Σ(Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WLAN + Bluetooth.
2. Considering the WLAN and Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 2 collocated transmitters is compliant

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.

------THE END------