

RF Exposure Evaluation Report

APPLICANT : Amazon.com Services LLC
EQUIPMENT : Digital Media Player
MODEL NAME : C2H4R9
FCC ID : 2A4DH-4689
STANDARD : 47 CFR Part 2.1091

The product evaluation date was started from Oct. 14, 2022 and completed on Dec. 07, 2022. We, Sporton International Inc. (Kunshan), 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 Inc. (Kunshan), the test report shall not be reproduced except in full.



Approved by: Si Zhang

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1. Administration Data

1.1. Testing Laboratory

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

Testing Laboratory			
Test Firm	Sporton International Inc. (Kunshan)		
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.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR01-KS	CN1257	314309

Applicant	
Company Name	Amazon.com Services LLC
Address	410 Terry Avenue N Seattle, WA 98109-5210 United States



2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Digital Media Player
Model Name	C2H4R9
FCC ID	2A4DH-4689
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2472 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5720 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 Gain	WLAN2.4GHz: 3.4 dBi Bluetooth: 3.6 dBi WLAN5.2GHz: 2.8 dBi WLAN5.3GHz: 3.0 dBi WLAN5.5GHz: 3.7 dBi WLAN5.8GHz: 3.4 dBi
Antenna Type	WLAN: PCB IFA Antenna Bluetooth: PCB IFA Antenna

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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 average output tune up power among production units

<2.4GHz WLAN >

Mode		Maximum Average Power (dBm)
2.4GHz	802.11b	19.50
	802.11g	17.50
	802.11n-HT20	17.00

<Bluetooth>

Mode		Maximum Average power(dBm)
Bluetooth	BR/EDR	10.50
	LE	6.50

<5GHz WLAN >

Mode		Maximum Average Power (dBm)
5.2GHz	802.11a	18.00
	802.11n-HT20	17.00
	802.11n-HT40	16.00
	802.11ac-VHT20	17.00
	802.11ac-VHT40	16.00
	802.11ac-VHT80	14.00
5.3GHz	802.11a	18.00
	802.11n-HT20	17.00
	802.11n-HT40	16.00
	802.11ac-VHT20	17.00
	802.11ac-VHT40	16.00
	802.11ac-VHT80	13.50
5.5GHz	802.11a	17.00
	802.11n-HT20	16.00
	802.11n-HT40	15.00
	802.11ac-VHT20	16.00
	802.11ac-VHT40	15.00
	802.11ac-VHT80	14.50
5.8GHz	802.11a	17.50
	802.11n-HT20	16.00
	802.11n-HT40	15.50
	802.11ac-VHT20	16.00
	802.11ac-VHT40	15.50
	802.11ac-VHT80	15.00

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/f ²)	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/f ²)	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)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
Bluetooth	2402.0	3.60	10.50	14.100	25.704	0.005	1.000	0.005
2.4GHz WLAN	2412.0	3.40	19.50	22.900	194.984	0.039	1.000	0.039
5.2GHz WLAN	5180.0	2.80	18.00	20.800	120.226	0.024	1.000	0.024
5.3GHz WLAN	5260.0	3.00	18.00	21.000	125.893	0.025	1.000	0.025
5.5GHz WLAN	5500.0	3.70	17.00	20.700	117.490	0.023	1.000	0.023
5.8GHz WLAN	5745.0	3.40	17.50	20.900	123.027	0.024	1.000	0.024

Note:

- For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
- Chose the maximum power to do MPE analysis.

5.2. Collocated Power Density Calculation

WLAN 2.4GHz Power Density / Limit	Bluetooth Power Density / Limit	Σ(Power Density / Limit) of WLAN 2.4GHz+ Bluetooth
0.039	0.005	0.044
WLAN 5GHz Power Density / Limit	Bluetooth Power Density / Limit	Σ(Power Density / Limit) of WLAN 5GHz+ Bluetooth
0.025	0.005	0.030

Note:

- According to the EUT characteristic, WLAN 2.4GHz and WLAN 5GHz cannot transmit simultaneously.
- 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.
- Considering the WLAN module collocation with the 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-----