



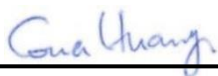
RF EXPOSURE EVALUATION REPORT

FCC ID : A4R-H2D
Equipment : Interactive internet streaming device
Model Name : H2D
Applicant : Google LLC
1600 Amphitheatre Parkway,
Mountain View, California, 94043 USA
Manufacturer : Google LLC
1600 Amphitheatre Parkway,
Mountain View, California, 94043 USA
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated this product in accordance with 47 CFR Part 2.1091 and it complies with applicable limit.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Cona Huang / Deputy Manager

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



Table of Contents

1. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	4
2. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS	5
3. RF EXPOSURE LIMIT INTRODUCTION	6
4. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION	7
4.1. Standalone Power Density Calculation	7
4.2. Collocated Power Density Calculation.....	8



History of this test report

Report No.	Version	Description	Issued Date
FA960558	Rev. 01	Initial issue of report	Aug. 07, 2019
FA960558	Rev. 02	1. Update BT tune up value 2. Update section 2 & 4.1 & 4.2	Aug. 24, 2019

**1. Description of Equipment Under Test (EUT)**

Product Feature & Specification	
EUT Type	Interactive internet streaming device
Model Name	H2D
FCC ID	A4R-H2D
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 802.15.4: 2405 MHz ~ 2475 MHz
Mode	WLAN: 802.11a/b/g/n/ac HT20 / HT40 / VHT20 / VHT40 / VHT80 Bluetooth BR/EDR/LE 802.15.4: O-QPSK
EUT Stage	Identical Prototype

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

Reviewed by: Jason Wang

Report Producer: Daisy Peng

2. Maximum RF average output power among production units

Bluetooth / 802.15.4			
Mode / Band	Tune-up Limit (dBm)		
	LE	BDR	EDR
2.4GHz Bluetooth	17.5	18.5	14.0
802.15.4	20.2		

WLAN (CDD / TxBF) 2.4GHz		
Mode / Band	Tune-up Limit (dBm)	
	CDD (dBm) (1+2)	TxBF (dBm) (1+2)
11b	28.5	No Supported
11g	28.0	No Supported
HT20	27.0	No Supported
HT40	20.0	No Supported
VHT20	27.0	No Supported
VHT40	19.50	No Supported

WLAN (CDD / TxBF) 5GHz				
Mode / Band	Tune-up Limit (dBm)			
	CDD (1+2+3+4)		TxBF (1+2+3+4)	
	5.2GHz	5.8GHz	5.2GHz	5.8GHz
11a	25.0	30.0	-	-
HT20	25.5	30.0	-	-
HT40	26.5	29.5	-	-
VHT20	25.5	30.0	25.0	27.97
VHT40	26.0	29.5	26.0	27.97
VHT80	19.00	25.0	18.0	25.0

3. 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 25.5 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

4. Radio Frequency Radiation Exposure Evaluation

4.1. Standalone Power Density Calculation

<Non-beamforming mode>

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Power Density at 25.5cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
802.15.4	2405.0	2.96	20.00	22.960	0.198	0.024	1.000	0.024
Bluetooth	2402.0	3.01	18.50	21.510	0.142	0.017	1.000	0.017
2.4GHz WLAN	2412.0	3.82	28.50	32.320	1.706	0.209	1.000	0.209
5GHz WLAN	5180.0	4.82	26.50	31.320	1.355	0.166	1.000	0.166
5GHz WLAN	5745.0	5.40	30.00	35.400	3.467	0.425	1.000	0.425

<Beamforming mode>

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Power Density at 25.5cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
5GHz WLAN	5180.0	7.28	26.00	33.280	2.128	0.261	1.000	0.261
5GHz WLAN	5745.0	8.03	27.97	36.000	3.981	0.487	1.000	0.487

Note:

1. This device supports Beamforming for WLAN 5GHz VHT20/VHT40/VHT80 only; therefore, in the table above which consider maximum directional Gain 7.28dBi for WLAN 5.2GHz and 8.03dBi for WLAN 5.8GHz Beamforming mode.

**4.2. Collocated Power Density Calculation**

Simultaneous Transmission Table				
Coexistence	WLAN 2.4GH (2Tx)	BT	802.15.4	WLAN 5GHz (4Tx)
WLAN 2.4GH (2Tx)	-	X	X	V
BT	X	-	X	V
802.15.4	X	X	-	V
WLAN 5GHz (4Tx)	V	V	V	-

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 each Sim-Tx configuration.
2. Considering the all 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

2.4GHz WLAN Max Power Density / Limit	5GHz WLAN Max Power Density / Limit	Σ (Power Density / Limit)
0.209	0.487	0.696

BT Max Power Density / Limit	5GHz WLAN Max Power Density / Limit	Σ (Power Density / Limit)
0.017	0.487	0.504

802.15.4 Max Power Density / Limit	5GHz WLAN Max Power Density / Limit	Σ (Power Density / Limit)
0.024	0.487	0.511

Conclusion:

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