



RF EXPOSURE EVALUATION REPORT

FCC ID : A4R-H2E
Equipment : Interactive internet streaming device
Model Name : H2E
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.)



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History of this test report

| Report No. | Version | Description | Issued Date |
|------------|---------|------------------------------|---------------|
| FA960638 | Rev. 01 | Initial issue of report | Sep. 05, 2019 |
| FA960638 | Rev. 02 | Update section2 and section4 | Sep. 11, 2019 |
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1. Description of Equipment Under Test (EUT)

| Product Feature & Specification | |
|---|--|
| EUT Type | Interactive internet streaming device |
| Model Name | H2E |
| FCC ID | A4R-H2E |
| Wireless Technology and Frequency Range | WLAN 2.4GHz Band: 2412 MHz ~ 2462 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 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

| Mode / Band | Tune-up Limit (dBm) | | |
|------------------|---------------------|------|-----|
| | LE | BDR | EDR |
| 2.4GHz Bluetooth | 11.0 | 10.0 | 9.0 |
| 802.15.4 | 20.0 | | |

WLAN (CDD / TxBF) 2.4GHz

| Mode / Band | Tune-up Limit (dBm) | |
|-------------|---------------------|---------------------|
| | CDD (dBm) (1+2) | TxBF (dBm) (1+2) |
| 11b | 27.0 | Not Supported |
| 11g | 26.5 | Not Supported |
| HT20 | 26.5 | Not Supported |
| HT40 | 17.0 | Not Supported |
| VHT20 | 26.5 | Not Supported |
| VHT40 | 17.0 | Not Supported |

WLAN (CCD/TxBF) 5GHz Mesh Mode

| Mode / Band | Tune-up Limit (dBm) | | | | | | | |
|-------------|---------------------|---------|---------|---------|------------|---------|---------|---------|
| | CDD (1+2) | | | | TxBF (1+2) | | | |
| | 5.2 GHz | 5.3 GHz | 5.6 GHz | 5.8 GHz | 5.2 GHz | 5.3 GHz | 5.6 GHz | 5.8 GHz |
| 11a | 25.0 | - | - | 26.0 | - | - | - | - |
| HT20 | 25.0 | - | - | 26.0 | - | - | - | - |
| HT40 | 26.5 | - | - | 27.0 | - | - | - | - |
| VHT20 | 25.0 | - | - | 26.0 | 24.5 | - | - | 26.0 |
| VHT40 | 26.0 | - | - | 26.5 | 25.0 | - | - | 26.5 |
| VHT80 | 19.0 | - | - | 23.0 | 19.5 | - | - | 23.5 |

WLAN (CCD/TxBF) 5GHz Client Mode

| Mode / Band | Tune-up Limit (dBm) | | | | | | | |
|-------------|---------------------|---------|---------|---------|------------|---------|---------|---------|
| | CDD (1+2) | | | | TxBF (1+2) | | | |
| | 5.2 GHz | 5.3 GHz | 5.6 GHz | 5.8 GHz | 5.2 GHz | 5.3 GHz | 5.6 GHz | 5.8 GHz |
| 11a | 18.5 | 20.0 | 20.0 | 26.0 | - | - | - | - |
| HT20 | 18.5 | 19.5 | 19.5 | 26.0 | - | - | - | - |
| HT40 | 22.0 | 22.0 | 23.0 | 27.0 | - | - | - | - |
| VHT20 | 18.5 | 19.0 | 19.5 | 26.0 | 18.5 | 19.0 | 20.0 | 26.0 |
| VHT40 | 22.0 | 22.0 | 23.0 | 26.5 | 19.0 | 19.5 | 22.0 | 26.5 |
| VHT80 | 19.0 | 20.0 | 24.0 | 23.0 | 19.5 | 21.5 | 22.0 | 23.5 |



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.

Table with 5 columns: Frequency range (MHz), Electric field strength (V/m), Magnetic field strength (A/m), Power density (mW/cm²), Averaging time (minutes). It is divided into two sections: (A) Limits for Occupational/Controlled Exposures and (B) Limits for General Population/Uncontrolled Exposure.

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 = PG / (4πR²)

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. Power Density Calculation

<Non-beamforming mode>

| 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 |
|-------------|-----------------|--------------------|---------------------|--------------------|------------------|-------------------|---|-----------------------------|-----------------------|
| 802.15.4 | 2405.0 | 5.18 | 20.00 | 25.180 | 0.330 | 329.610 | 0.066 | 1.000 | 0.066 |
| Bluetooth | 2402.0 | 1.50 | 11.00 | 12.500 | 0.018 | 17.783 | 0.004 | 1.000 | 0.004 |
| 2.4GHz WLAN | 2412.0 | 2.39 | 27.00 | 29.390 | 0.869 | 868.960 | 0.173 | 1.000 | 0.173 |
| 5.2GHz WLAN | 5180.0 | 7.48 | 26.50 | 33.980 | 2.500 | 2500.345 | 0.498 | 1.000 | 0.498 |
| 5.3GHz WLAN | 5250.0 | 7.30 | 22.00 | 29.300 | 0.851 | 851.138 | 0.169 | 1.000 | 0.169 |
| 5.5GHz WLAN | 5500.0 | 6.33 | 24.00 | 30.330 | 1.079 | 1078.947 | 0.215 | 1.000 | 0.215 |
| 5.8GHz WLAN | 5745.0 | 5.48 | 27.00 | 32.480 | 1.770 | 1770.109 | 0.352 | 1.000 | 0.352 |

Note: For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band

<Beamforming mode>

| 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 |
|-------------|-----------------|--------------------|---------------------|--------------------|------------------|-------------------|---|-----------------------------|-----------------------|
| 5.2GHz WLAN | 5180.0 | 8.78 | 24.50 | 33.280 | 2.128 | 2128.139 | 0.424 | 1.000 | 0.424 |
| 5.3GHz WLAN | 5250.0 | 8.56 | 21.50 | 30.060 | 1.014 | 1013.911 | 0.202 | 1.000 | 0.202 |
| 5.5GHz WLAN | 5500.0 | 8.37 | 22.00 | 30.370 | 1.089 | 1088.930 | 0.217 | 1.000 | 0.217 |
| 5.8GHz WLAN | 5745.0 | 8.15 | 26.50 | 34.650 | 2.917 | 2917.427 | 0.581 | 1.000 | 0.581 |

Note:

- For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.
- This device supports Beamforming for WLAN 5GHz VHT20/VHT40/VHT80 only; therefore, in the table above which consider directional Gain 8.78 / 8.56 / 8.37 / 8.15dBi for WLAN 5.2 / 5.3 / 5.5 / 5.8GHz Beamforming mode.



4.2. Collocated Power Density Calculation

| | | |
|---|--------------------|---------|
| Simultaneous Transmission Configuration | WLAN 5G + 802.15.4 | Support |
| | WLAN5G + WLAN 2.4G | Support |
| | WLAN5G+ BT | Support |

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) |
|--|--|----------------------------------|
| 0.173 | 0.581 | 0.754 |

| BT Max Power Density / Limit | 5GHz WLAN Max Power Density / Limit | Σ (Power Density / Limit) |
|---------------------------------|--|----------------------------------|
| 0.004 | 0.581 | 0.585 |

| 802.15.4 Max Power Density / Limit | 5GHz WLAN Max Power Density / Limit | Σ (Power Density / Limit) |
|---------------------------------------|--|----------------------------------|
| 0.066 | 0.581 | 0.647 |

Conclusion:

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