



# RF EXPOSURE EVALUATION REPORT

FCC ID : A4RG454V  
Equipment : Wireless Device  
Model Name : G454V  
Applicant : 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 Part2.1091 and it complies with applicable limit.

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC evaluation.

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.

*Cona Huang*

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

Product Feature & Specification	
EUT Type	Wireless Device
Model Name	G454V
FCC ID	A4RG454V
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5250 MHz WLAN 5.3GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.6GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8GHz Band: 5725 MHz ~ 5850 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz
Mode	WLAN: 802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE

**Reviewed by: Jason Wang**

**Report Producer: Paula Chen**

**2. Maximum RF average output power among production units**

2.4 GHz BLE MAXIMUM OUTPUT POWER (incl. Tune Up tolerance) Unit:(dBm)		
Frequency Range (MHz)	Mode	Output Power (dBm)
2402 - 2480	BT	7.6
2402 - 2480	BLE (1M)	8.5
2402 - 2480	BLE (2M)	8.1

2.4 GHz Wifi MAXIMUM OUTPUT POWER (incl. Tune Up tolerance) Unit:(dBm)		
Frequency Range (MHz)	Mode	Output Power (dBm)
2412 - 2462	802.11b	16.9
2412 - 2462	802.11g	16.8
2412 - 2462	802.11n HT20	16.8

5GHz Wifi MAXIMUM OUTPUT POWER (incl. Tune Up tolerance) Unit:(dBm)		
Frequency Range (MHz)	Mode	Output Power (dBm)
5180 - 5825	802.11a	16.4
5180 - 5825	802.11n HT20	16.5
5190 - 5795	802.11n HT40	16.5
5180 - 5825	802.11ac VHT20	16.5
5190 - 5795	802.11ac VHT40	16.5
5210 - 5775	802.11ac VHT80	16.2



### 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 <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	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



### 4. Radio Frequency Radiation Exposure Evaluation

#### 4.1. Standalone Power Density Calculation

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Power Density / Limit
WLAN 2.4GHz	3.03	16.9	19.9	0.10	98.40	0.020	1.000	0.020
WLAN 5GHz	6.33	16.5	22.8	0.19	191.87	0.038	1.000	0.038
Bluetooth	3.03	8.5	11.5	0.01	14.22	0.003	1.000	0.003

#### 4.2. Collocated Power Density Calculations

Maximum Bluetooth Power Density / Limit	Maximum 5GHz Power Density / Limit	Σ(Power Density / Limit) of Bluetooth + WLAN 5GHz
0.003	0.038	0.041

**Note:**

- 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 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.