

RF EXPOSURE REPORT



Applicant: GOOGLE LLC
1600 Amphitheatre Parkway Mountain View, CA 94043
Manufacturer: GOOGLE LLC
1600 Amphitheatre Parkway Mountain View, CA 94043
Product Name: Wireless product
Brand Name: GOOGLE
Model No.: G6ZUC
Model Difference: N/A
Report Number: ES/2022/30005
FCC ID A4R-G6ZUC
Issue Date: May 23, 2022
Date of EUT Received: March 10, 2022

Approved By

John Yeh

We hereby certify that:

The above equipment was evaluate by SGS Taiwan Ltd. The evaluation in this report is in compliance with FCC Rule Part §1.1307.

The results of this report relate to the specific sample identified in this report.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
ES/2022/30005	00	Original	May 23, 2022	Ruby Ou	

Note:

- 1、The remark "*" indicates modification of the report upon requests from certification body.

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1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

1.1 Product Description

Product Name:	Wireless product
Brand Name:	Google
Model No.:	G6ZUC
Model Difference:	N/A
EUT Series No.:	GG1937366 / GG1935428

1.2 Evaluation site

Laboratory	Site Address		FCC Designation number
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	<input checked="" type="checkbox"/>	No. 134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, 24803, Taiwan.	TW0027
	<input type="checkbox"/>	No. 2, Keji 1st Rd., Guishan Township, Taoyuan County, 333 Taiwan.	TW0028
	<input type="checkbox"/>	1F, No. 8, Alley 15, Lane 120, Sec. 1, Nei Hu Road, Neihu District, Taipei City, 222 Taiwan.	TW0029

1.3 Antenna Information

The antenna information is provided by the applicant.

Antenna Type	Supplier	Operating Frequency (MHz)	Peak Antenna Gain (dBi)					
			Ant 1	Ant 2	Ant 3	Ant 4	Ant 5	Ant 6
PIFA	Google	2.4GHz	3.30	N/A	3.20	N/A	2.40	2.30
		5150.0 ~ 5250.0	4.80	3.70	4.50	3.70	N/A	N/A
		5725.0 ~ 5850.0	5.00	3.30	3.30	3.30	N/A	N/A
		5850.0 ~ 5895.0	5.00	3.30	3.30	3.30	N/A	N/A
		5925.0 ~ 6425.0	N/A	N/A	N/A	N/A	6.00	5.30
		6425.0 ~ 6525.0	N/A	N/A	N/A	N/A	5.50	5.20
		6525.0 ~ 6875.0	N/A	N/A	N/A	N/A	5.50	5.20
		6875.0 ~ 7125.0	N/A	N/A	N/A	N/A	3.40	3.30

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2 DETERMINATION OF MPE EXEMPTION

2.1 Single RF Source

As per §1.1307(b)(3)(i),

- (A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);
- (B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

Note: when 10-g extremity SAR applies, SAR test exemption may be considered by applying a factor of 2.5 to the SAR-based exemption thresholds.

- (C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

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**Table 1 to § 1.1307(b)(3)(i)(C) –
Single RF Sources Subject to Routine Environmental Evaluation**

RF Source frequency (MHz)			Minimum Distance			Threshold ERP (W)
fL		fH	$\lambda L / 2\pi$		$\lambda H / 2\pi$	
0.3	-	1.34	159m	-	35.6m	1920 R ²
1.34	-	30	35.6m	-	1.6m	3450 R ² /f ²
30	-	300	1.6m	-	159mm	3.83 R ²
300	-	1500	159mm	-	31.8mm	0.0128 R ² f
1500	-	100000	31.8mm	-	0.5mm	19.2R ²

R= minimum separation distance in meter

f = frequency in MHz

2.2 Multiple RF Sources

In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

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2.3 Single RF Source Evaluation Results

MPE Based

Operation Mode	Frequency (MHz)	Max. tune-up power (dBm)	Peak gain (dBi)	ERP (dBm)	ERP (W)	Permissible Minimum separation distance ($\lambda/2\pi$) (m)	R = actual Minimum separation distance (m)	ERP _{th} (W)	ERP/ERP _{th}	Simultaneous transmission modes		
										1	2	3
WiFi 6GHz	6825	23.04	5.5	26.39	0.436	0.0070	0.300	1.728	0.252	V	V	V

SAR Based

Operation Mode	Frequency (MHz)	Distance (cm)	Max. tune-up power (dBm)	Max. tune-up power (mW)	Peak gain (dBi)	ERP (dBm)	ERP (mW)	x	ERP _{20cm} (mW)	P _{th} (mW)	P or ERP / P _{th}	Simultaneous transmission modes		
												1	2	3
WiFi 2.4GHz	2437	30	29	794.328	2.4	29.25	841.395	1.901	3060.00	3060.00	0.275	V		
WiFi 5GHz	5795	30	28.55	716.143	5	31.4	1380.384	2.089	3060.00	3060.00	0.451	V	V	V
BLE	2480	30	14.16	26.062	3.2	15.21	33.189	1.905	3060.00	3060.00	0.011		V	
Thread	2475	30	20.25	105.925	3.3	21.4	138.038	1.904	3060.00	3060.00	0.045			V

Note: All the single RF source results (P or ERP) are less than their corresponding threshold (P_{th} or ERP_{th}), so they are exempt from SAR testing.

2.4 Multiple RF Sources Evaluation Results

Simultaneous transmission modes	Σ P or ERP / P _{th}	Criteria
1	0.978	1
2	0.714	1
3	0.748	1

Note:

1. $\Sigma(ERP/ERP_{th})$: This is a summation of [(ERP of RF source / exemption threshold ERP for RF source)].
Considering the collocated transmitters, the aggregated (ERP/ERP_{th}) is smaller than 1, and MPE of collocated transmitters is compliant

~ End of Report ~

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