

RF Exposure Exemption Report

Apple Inc.
Model: A3204



In accordance with FCC CFR 47 Pt 1.1307

Prepared for: Apple Inc
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SIGNATURE

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
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EXECUTIVE SUMMARY

The wireless device described within this report are compliant with the exemption criteria related to human exposure to electromagnetic fields laid out in FCC CFR Title 47 Part 1.1307.



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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	25-April-2024

Table 1

1.2 Introduction

Applicant	Apple Inc
Manufacturer	Apple Inc
Model Number(s)	A3204
Hardware Version(s)	REV1.0
Software Version(s)	2.5
Specification/Issue/Date	FCC 47 CFR Part 1.1307: 2022
Related Document(s)	<ul style="list-style-type: none">• KDB 447498 D04 v01• FCC 47 CFR Part 2.1093: 2022



1.3 Brief Summary of Results

The wireless devices described within this report are compliant with the exemption criteria related to human exposure to electromagnetic fields laid out in FCC CFR Title 47 Part 1.1307.

The calculations shown in this report were made in accordance with the procedures specified in the applied test specification(s).



1.4 Application Form

RF Exposure Calculation FCC ISED

Product Description	Wireless Mouse
Model number:	A3204

Frequency Band 1 (Bluetooth)

Antenna length:	20.4	Millimetres (mm)
Frequency range:	2400 – 2483.5	MHz
Bottom frequency:	2402	MHz
Middle frequency:	2441	MHz
Top frequency:	2480	MHz

Maximum power (input to the antenna including tolerance):	5.5	(dBm)
Antenna gain (or maximum gain allowed):	-2.63	dBi
EIRP	2.87	(dBm)

Separation distance from antenna to the user/bystander:	5	mm
Transmitter Duty Cycle:	76.9	%

1.5 Product Information

1.5.1 Technical Description

The equipment under test (EUT) is a Wireless Mouse.

The testing was performed with an integral battery supplied and manufactured by Apple Inc.

Supported technology for this device is Bluetooth.

1.5.2 Transmitter Description

The following radio access technologies and frequency bands are supported by the equipment under test.

Radio Access Technology	Frequency Band (MHz)	Minimum Frequency (MHz)	Output Power (dBm)	Duty Cycle (%)
Bluetooth	2400 – 2483.5	2402	5.5	76.9

Table 2 – Transmitter Description- FCC

Note: Transmitter power includes upper bounds of uncertainty therefore maximum values are used.



1.5.3 Antenna Description

The following antennas are supported by the equipment under test.

Radio Access Technology	Antenna Model	Gain (dBi)	Antenna length (cm)	Minimum Separation Distance (mm)
Bluetooth	N/A	-2.63	20.4	5

Table 3 – Antenna description

In the case of more than one type of antenna being supported by the equipment, the calculation is based on the maximum of the antenna gains. If other antennas can be used that have greater gains, the minimum separation distances will need to be recalculated.

Note: Antenna gain includes upper bounds of uncertainty therefore maximum values are used.



2 Assessment Details

2.1 Single RF Source options for determination of exemption.

Option	Reference	RF Exposure Test Exemptions for Single Source												
A (1-mW Test Exemption)	FCC 1.1307(b)(3)(i)(A)	The available maximum time averaged power is no more than 1 mW, regardless of separation distance.												
B (SAR-Based Exemption)	FCC 1.1307(b)(3)(i)(B)	<p>The available maximum timeaveraged 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> $P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}}(d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$ <p>Where</p> $x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$ <p>and</p> $ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$ <p><i>d</i> = the separation distance (cm);</p>												
C (MPE-Based Exemption)	FCC 1.1307(b)(3)(i)(C)	<p>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).</p> <p>TABLE 1 TO § 1.1307(b)(3)(i)(C)—SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION</p> <table border="1"> <thead> <tr> <th>RF Source frequency (MHz)</th> <th>Threshold ERP (watts)</th> </tr> </thead> <tbody> <tr> <td>0.3–1.34</td> <td>1,920 R².</td> </tr> <tr> <td>1.34–30</td> <td>3,450 R²/f².</td> </tr> <tr> <td>30–300</td> <td>3.83 R².</td> </tr> <tr> <td>300–1,500</td> <td>0.0128 R²f.</td> </tr> <tr> <td>1,500–100,000</td> <td>19.2R².</td> </tr> </tbody> </table>	RF Source frequency (MHz)	Threshold ERP (watts)	0.3–1.34	1,920 R ² .	1.34–30	3,450 R ² /f ² .	30–300	3.83 R ² .	300–1,500	0.0128 R ² f.	1,500–100,000	19.2R ² .
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1,500–100,000	19.2R ² .													



2.1.1 Single Source Calculation of Exposure at Specified Separation Distance FCC 1.1307(b)(3)(i)(B) ‘Option B’ (SAR Based Exemption)

RAT	Frequency (MHz)	Conducted Power Output mW	Duty Cycle %	Time Average Conducted Power Output mW	Antenna Gain Ratio	Maximum Power (EIRP) mW	Maximum Power (ERP) mW	Minimum Antenna to User Separation Distance (mm)	Pth (mW) 1.1307 (b)(2.8(i)(B))	Greater of Max time averaged conducted power or ERP?	1.1307(b)(3)(i)(B) Exemption (Yes/No) (300 MHz to 6 GHz, 0.5 cm to 20 cm)
Bluetooth	2400 – 2483.5	3.548	76.9	2.728	0.546	1.490	0.910	5	2.8	2.728	Yes

Table 4 –Transmitter Result

The calculations show that the individual transmitters comply with FCC 1.1307(b)(3)(i)(B) SAR-based exemption at a minimum distance of 5 mm.

The Low Power exclusion threshold has been evaluated using the method described above from information supplied by the manufacturer.

Based on the evaluation above, the EUT is excluded from SAR/RF exposure testing.