

FCC SAR Exclusion Report

Report No. : SABERD-WTW-P21060039 R1

Applicant : Xiaomi Communications Co., Ltd.

Address : #019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

Product : Xiaomi Smart Pen

Brand : Xiaomi

FCC ID : 2AFZZK81PC

Model No. : M2107K81PC

Standards : FCC 47 CFR Part 2 (2.1093), IEEE C95.1:1992, IEEE Std 1528:2013
KDB 865664 D01 v01r04, KDB 865664 D02 v01r02
FCC-19-126
KDB 447498 D01 v06

Sample Received Date : Jun. 02, 2021

Date of Evaluation : Jul. 28, 2021

Lab Address : No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location : No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City, Taiwan

CERTIFICATION: The above equipment have been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch – Lin Kou Laboratories**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's SAR characteristics under the conditions specified in this report. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product certification, approval, or endorsement by TAF or any government agencies.

Prepared By :


Lena Wang / Specialist

Approved By :


Gordon Lin / Manager

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

Table of Contents

Release Control Record	3
1. Summary of Maximum SAR Value	4
2. Description of Equipment Under Test	5
3. SAR Measurement Evaluation.....	6
3.1 Maximum Target Conducted Power	6
3.2 SAR Testing Exclusions(FCC-19-126)	6
3.3 SAR Testing Exclusions(KDB 447498 D01 v06)	7
4. Information on the Testing Laboratories.....	8
Appendix A. Maximum Target Conducted Power	



FCC SAR Exclusion Report

Release Control Record

Issue No.	Reason for Change	Date Issued
SABERD-WTW-P21060039	Initial release	Jul. 29, 2021
SABERD-WTW-P21060039 R1	Add Low Power Transmitter data	Aug. 18, 2021

FCC SAR Exclusion Report

1. Summary of Maximum SAR Value

Mode	Highest Reported SAR _{1g} (W/kg)
Bluetooth	Not Required
Low Power Transmitter	Not Required

Note:

1. The SAR limit (**Head & Body: SAR_{1g} 1.6 W/kg**) for general population / uncontrolled exposure is specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992.

FCC SAR Exclusion Report

2. Description of Equipment Under Test

EUT Type	Xiaomi Smart Pen
Brand Name	Xiaomi
FCC ID	2AFZZK81PC
Model Name	M2107K81PC
Tx Frequency Bands (Unit: MHz)	Bluetooth : 2402 ~ 2480 Low Power Transmitter : 0.1442
Uplink Modulations	Bluetooth : GFSK Low Power Transmitter : ASK
Maximum Tune-up Conducted Power (Unit: dBm)	Please refer to section 3.1 of this report
Antenna Type	Chip Antenna
EUT Stage	Engineering Sample

Note:

1. The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

FCC SAR Exclusion Report

3. SAR Measurement Evaluation

3.1 Maximum Target Conducted Power

Refer to Appendix A.

3.2 SAR Testing Exclusions(FCC-19-126)

According to FCC-19-126, the SAR test exclusion condition is based on source-based time-averaged maximum conducted output power, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions. The SAR exclusion threshold is determined by the following formula.

1. 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).

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

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);

Mode	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Exclusion (dBm) Require	SAR Testing?
BT	-4	0.4	4.34	No

Note:

1. When separation distance ≤ 50 mm and the calculated result shown in above table is ≤ 3.0 , the SAR testing exclusion is applied.
2. When separation distance > 50 mm and the device output power is less than the calculated result (power threshold, mW) shown in above table, the SAR testing exclusion is applied.
3. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Summary:

Since the SAR testing for all device orientations apply SAR test exclusion per KDB 447498, SAR testing for this device is not required.

FCC SAR Exclusion Report

3.3 SAR Testing Exclusions(KDB 447498 D01 v06)

According to KDB 447498 D01, the SAR test exclusion condition is based on source-based time-averaged maximum conducted output power, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions. The SAR exclusion threshold is determined by the following formula.

- For the 100 MHz to 6 GHz and test separation distance ≤ 50 mm

$$\frac{\text{Max. Tune up Power}_{(\text{mW})}}{\text{Min. Test Separation Distance}_{(\text{mm})}} \times \sqrt{f_{(\text{GHz})}} \leq 3.0$$

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

- For the test separation distance > 50 mm, and the frequency at 100 MHz to 1500 MHz

$$\left[(\text{Threshold at 50 mm in Step 1}) + (\text{Test Separation Distance} - 50 \text{ mm}) \times \left(\frac{f_{(\text{MHz})}}{150} \right) \right]_{(\text{mW})}$$

- For the test separation distance > 50 mm, and the frequency at > 1500 MHz to 6 GHz

$$[(\text{Threshold at 50 mm in Step 1}) + (\text{Test Separation Distance} - 50 \text{ mm}) \times 10]_{(\text{mW})}$$

- For frequencies below 100 MHz,

- For test separation distances > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step 2) is multiplied by $[1 + \log(100/f(\text{MHz}))]$
- For test separation distances ≤ 50 mm, the power threshold determined by the equation in 4) a) for 50 mm and 100 MHz is multiplied by $\frac{1}{2}$

Mode	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Loop Surface		
			Ant. to Surface (mm)	Calculated Result(mW)	Require SAR Testing?
Low Power Transmitter	-26	0.003	5	24175	No

Note:

- When separation distance ≤ 50 mm and the calculated result shown in above table is ≤ 3.0 , the SAR testing exclusion is applied.
- When separation distance > 50 mm and the device output power is less than the calculated result (power threshold, mW) shown in above table, the SAR testing exclusion is applied.

Summary:

Since the SAR testing for all device orientations apply SAR test exclusion per KDB 447498, SAR testing for this device is not required.

FCC SAR Exclusion Report

4. Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Taiwan Huaya Lab:

Add: No. 19, Huaya 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan

Tel: +886-(0)3-318-3232

Fax: +886-(0)3-211-5834

Taiwan Linkou Lab:

Add: No. 47-2, Baodoucuokeng, Linkou Dist., New Taipei City 244, Taiwan

Tel: +886-(0)2-2605-2180

Fax: +886-(0)2-2605-2943

Taiwan Hsinchu Lab1:

Add: E-2, No. 1, Lixing 1st Rd., East Dist., Hsinchu City 300, Taiwan

Tel: +886-(0)3-666-8565

Fax: +886-(0)3-666-8323

Taiwan Hsinchu Lab2:

Add: No. 49, Ln. 206, Wende Rd., Qionglin Township, Hsinchu County 307, Taiwan

Tel: +886-(0)3-512-0595

Fax: +886-(0)3-512-0568

Taiwan Xindian Lab:

Add: B2F, No. 215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan

Tel: +886-(0)2-8914-5882

Fax: +886-(0)2-8914-5840

Email: service.adt@tw.bureauveritas.com

Web Site: <https://ee.bureauveritas.com.tw/BVInternet/Default>

The road map of all our labs can be found in our web site also.

---END---