

# **Philips Oral Healthcare** LLC **RF Exposure Exemption Report**

#### SCOPE OF WORK

RF Exposure Exemption Evaluation – Rechargeable Electric Toothbrush Handle, Model: Cairo (HX742A)

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# **RF Exposure Exemption Evaluation Report**

(FULL COMPLIANCE)

Report Number: 105786504MPK-007 Project Number: G105786504

Report Issue Date: June 25, 2024 Report Revision Date: January 8, 2024

Product Designation: Rechargeable Electric Toothbrush Handle Model: Cairo (HX742A)

> Standards: 47CFR 1.1307(b)(3) RSS-102 Issue 6

> > for

### **Philips Oral Healthcare LLC**

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### **1** Introduction and Conclusion

The evaluation indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining sections are the verbatim text from the actual evaluation during the investigation. These sections include the evaluation name, the specified Method, and Results. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product evaluated **complies** with the requirements of the standard(s) indicated. The results obtained in this report pertain only to the item(s) evaluated. Intertek does not make any claims of compliance for samples or variants which were not evaluated.

#### 2 Evaluation Summary

Section	Test full name	Result
3	Client Information	-
4	Description of Equipment Under Evaluation and Variant Models	-
5	FCC SAR Test Exclusion	Compliant
6	ISED Canada SAR Test Exclusion	Compliant
7	Revision History	-

#### 3 Client Information

#### This EUT was evaluated at the request of:

Client:	Philips Oral Healthcare LLC 22100 Bothell Everett Highway Bothell, WA 98021 USA
Contact:	David Rodriguez
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# 4 Description of Equipment Under Test and Variant Models

# 4.1 Description of Equipment Under Test (provided by client)

Philips Oral Healthcare LLC supplied the following description of the EUT:

The Philips HX742A is a rechargeable electric toothbrush that is inductively charged. Bluetooth connectivity allows the toothbrush to be connected to an app which provides real-time guidance on pressure, motion, position, duration and frequency of brushing. The toothbrush also tracks the brush head usage through RFID to alert the user when the heads need to be replaced.

## 4.2 Variant Models

The following variant models have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

Description	Model	Remarks
Full Set product	HX710n, HX711n,	Full Set is identified by type reference HX710n, HX711n, HX740n,
type reference	HX740n, HX741n,	HX/410, HX/420 Where the last character nois an alphanumeric character which
	11/14211	differences are only for marketing nurnoses
Power	HX710x. HX711x.	Handle HX742A is the representative model for testing.
Toothbrush	HX740x, HX741x,	Toothbrush handles HX710x, HX711x, HX740x, HX741x, HX742x, Where
Handles Codes	HX742x	x, is an alphanumeric character which differences are only for the
		handle color.
Toothbrush	HX6100 ABA1	HX6100 ABA1 is the representative model for testing for:
Base		HX6100 AFA1, HX6100 AFA2 models.
Charger		Where F can be B or C or blank, which are for different factory purposes.
		When B is for factory Bao Hui Science & Technology Co., Ltd.
		When blank is for factory PLELECTRONICS (VIETNAM) COMPANY LIMITED
Toothbrush	HX6110 ABA3	Model HX6110 ABA3 is representative model of testing for: HX6110
Base DC Charger		AFA3 models.
		Model of HX6110 AFA3 explanation, where F can be B or C or blank are
		not safety or EMC relevant, they are for different factories.
		When F = B is for factory of Bao Hui Science & Technology Co., Ltd.
		When F= C is for factory of PI ELECTRONICS (VIETNAM) COMPANY
To a the law solu		When F = blank is for factory of PI Electronics (China Plant)
Rose DC Charger	HX0110 ADB3	Model HX6110 AFB2, where E can be D or E are not safety or EMC
Dase DC Charger		relevant they are the for different manufacturing locations:
		When $F = D$ . Dongguan Aohai Technology Co.,Ltd
		Jiaoyitang No 2 Yinyuan Road, No 2 Yinyuan Road, Dongguan,
		Guangdong Sheng, 523723, China
		When F = E. Pt Aohai Technology Indonesia
		Kawasan Industri Tunas 1 No.C, Belian Batam Kota, Kota Batam
		Kepulauan Riau, Kepulauan Riau, Indonesia
Toothbrush	HYTC02	HYTC02 is the representative model for testing for: HYTC01. HYTC01 is
Travel Charger		electrically and mechanically identical the only difference is the color: 01 - white
		02 = Black
Wall Adaptor	WAA2001	Model WAA2001 is the representative model for testing.
		Model WAA1001 (SSW-2924xx-WH), WAA2001 (SSW-2924xx-BK).
		The xx can be EU, UK2, UK3, AU, US, JP, TW, CN which represents
		different plug portion.
		All models are identical to WWA1001 (SSW-29254EU-WH) except for
		the differences of plug portion and PCB layout version.

## 5 RF Exposure Exemption Evaluation (FCC)

### 5.1 Determination of exemption [FCC KDB 447498 D01 v06]

According to FCC KDB 447498 D01 v06 Appendix A and C, at separation distance of  $\leq$  5 mm, at frequency 2450 MHz, the SAR Exemption limit is 8 mW, and at frequency 13.56 MHz, the SAR exemption limit is 308 mW.

- a) For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following: [(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR, 30 where
  - f(GHz) is the RF channel transmit frequency in GHz
  - Power and distance are rounded to the nearest mW and mm before calculation
  - The result is rounded to one decimal place for comparison
  - The values 3.0 and 7.5 are referred to as numeric thresholds in step b) below
- b) For 100 MHz to 6 GHz and test separation distances > 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following (also illustrated in Appendix B): 32 1) {[Power allowed at numeric threshold for 50 mm in step a)] + [(test separation distance 50 mm)·(f(MHz)/150)]} mW, for 100 MHz to 1500 MHz 2) {[Power allowed at numeric threshold for 50 mm in step a)] + [(test separation distance 50 mm)·10]} mW, for > 1500 MHz and ≤ 6 GHz
- c) For frequencies below 100 MHz, the following may be considered for SAR test exclusion (also illustrated in Appendix C): 33 1) For test separation distances > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by [1 + log(100/f(MHz))] 2) For test separation distances ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by ½ 3) SAR measurement procedures are not established below 100 MHz. When SAR test exclusion cannot be applied, a KDB inquiry is required to determine SAR evaluation requirements for any SAR test results below 100 MHz to be acceptable.34</p>

# 5.2 Exemption Evaluation

Frequency (MHz)	Conducted RF Power <sup>1</sup> (mW)	On-time during 30-minute period <sup>2</sup> (s)	Duty Cycle	Time-averaged power (mW)	Limit (mW)
13.56	1000	130	0.0722	72.22	308

<sup>1</sup>As declared by the manufacturer, from submitted component data sheet.

<sup>2</sup> As declared by manufacturer, from submitted operational description.

The worst case power from the RFID radio is 72.22 mW. The SAR Exemption limit per Annex C in 447498 D01 General RF Exposure Guidance v06 is 308mW. Therefore, SAR is exempted.

Frequency (MHz)	Conducte d Output Power (dBm)	Antenna Gain <sup>1</sup> (dBi)	EIRP (dBm)	EIRP (mW)	On-time during 30- minute period <sup>2</sup> (s)	Duty Cycle	Time- averaged power (mW)	Limit (mW)
2402 – 2480	-0.2	1.443	1.243	1.3314	130	0.0722	0.0961	8

<sup>1</sup>As declared by the manufacturer, per component datasheet.

The worst case power from the BLE radio is 0.0961 mW. The SAR Exemption limit per Annex A in 447498 D01 General RF Exposure Guidance v06 is 8mW. Therefore, SAR is exempted.

# 5.3 Evaluation Results

SAR evaluation is not required since the higher of the maximum conducted or equivalent isotopically radiated power (EIRP) source-based, time averaged output power is below the exemption limit.

## 6 RF Exposure Exemption Evaluation (ISED)

## 6.1 Determination of exemption [RSS-102 Issue 6]

RSS-102 Issue 6 Section 7.1.8 SAR estimation for exempted transmitters:

$$SAR_{estimated} = rac{P_{max}}{P_{max,exemption}} imes 0.25 imes SAR_{limit} W/kg$$

where:

- $P_{max}$  is the maximum power level including tune-up tolerance for the exempted transmitter
- $P_{max,exemption}$  is the maximum power level of exemption at the same frequency and distance for the exempted transmitter
- $SAR_{limit}$  is the applicable SAR limit (e.g. 1.6 W/kg for 1 g or 4 W/kg for 10 g)

RSS-102 Issue 6 Section 6.3 SAR exemption limits:

Devices operating at or below the applicable output power levels (adjusted for tune-up tolerance) specified in table 11, based on the separation distance, are exempt from SAR evaluation. The separation distance, defined as the distance between the user and/or bystander and the antenna and/or radiating element of the device or the outer surface of the device, shall be less than or equal to 20 cm for these exemption limits to apply.

The exemption limits in table 11 are based on measurements and simulations of half-wave dipole antennas at separation distances of 5 mm to 50 mm from a flat phantom, which provides a SAR value of approximately 0.4 W/kg for 1 g of tissue.

For limb-worn devices where the 10 gram of tissue applies, the exemption limits for routine evaluation in table 11 are multiplied by a factor of 2.5.

For controlled-use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in table 11 are multiplied by a factor of 5.

When the operating frequency of the device is between two frequencies located in table 11, linear interpolation shall be applied for the applicable separation distance. If the separation distance of the device is between two distances located in table 11, linear interpolation may be applied for the applicable frequency. Alternatively, the limit corresponding to the smaller distance may be employed. For example, in case of a 7 mm separation distance, either use the exception value for a 5 mm separation distance or interpolate between the limits corresponding to 5 mm and 10 mm separation distances.

For implanted medical devices, the exemption limit for routine SAR evaluation is set at an output power of 1 mW, regardless of frequency.

The SAR levels from exempted transmitters shall be included in the compliance assessment and the determination of the TER. Detailed guidance is included in sections 7.1.8 and 8.2.2.1.

# Intertek

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Frequency (MHz)	≤ 5 mm (mW)	10 mm (mW)	15 mm (mW)	20 mm (mW)	25 mm (mW)	30 mm (mW)	35 mm (mW)	40 mm (mW)	45 mm (mW)	> 50 mm (mW)
≤ 300	45	116	139	163	189	216	246	280	319	362
450	32	71	87	104	124	147	175	208	248	296
835	21	32	41	54	72	96	129	172	228	298
1900	6	10	18	33	57	92	138	194	257	323
2450	3	7	16	32	56	89	128	170	209	245
3500	2	6	15	29	50	72	94	114	134	158
5800	1	5	13	23	32	41	54	74	102	128

## 6.2 Exemption Evaluation

RFID:

Frequency Range	P <sub>max</sub> <sup>1</sup>	Distance	<b>SAR</b> limit	SAR <sub>estimated</sub>	P <sub>max, exemption</sub>
(MHz)	(mW)	(mm)	(W/kg)	(W/kg)	(W/kg)
13.56	1000	5	1.6	8.9	45

<sup>1</sup> Conducted output power provided by manufacturer in component datasheet. Antenna has negative gain so this is worst case value.

No duty cycle was considered, assumed radio is always on.

SARestimated is less than Pmax, exemption, therefore EUT is exempt from routine evaluation.

BLE:

Frequency Range	Peak RF Power <sup>1</sup>	Antenna Gain <sup>2</sup>	EIRP	P <sub>max</sub>	Distance	<b>SAR</b> limit	SAR estimated	P <sub>max,</sub> exemption
(MHz)	(dBm)	(dBi)	(dBm)	(mW)	(mm)	(W/kg)	(W/kg)	(W/kg)
2402 - 2480	-0.2	1.443	1.243	1.331	5	1.6	0.178	2

<sup>1</sup>Conducted power measurements were taken from report #105786504MPK-020.

<sup>2</sup>As provided by manufacturer, per component datasheet.

No duty cycle was considered, assumed radio is always on.

SARestimated is less than Pmax, exemption, therefore EUT is exempt from routine evaluation.

### 6.3 Evaluation Results

SAR evaluation is not required since the estimated SAR value is less than the maximum power level of exemption at the same frequency and distance for the exempted transmitter.

# 7 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
1.0	June 25, 2024	105786504MPK-007	EC	AS	Original Issue
2.0	January 8, 2024	105786504MPK-007	EC	AS	Updated evaluation based on RFID conducted output power and updated BLE antenna gain