ANTENNA TEST REPORT

Report Number: 105786504MPK-073
Project Number: G105786504
Issue Date: February 14, 2025

Testing performed on

Rechargeable Toothbrush Handle's Antenna

Model Number: HX742A

FCC Guidance:
KDB412172 D01 Determining ERP and EIRP

For

Philips Oral Healthcare LLC

Test Performed by:	**Test Authorized by:**
Intertek	Philips Oral Healthcare LLC
1365 Adams Court	22100 Bothell Everett Highway
Menlo Park, CA 94025 USA	Bothell, WA 98021 USA

Prepared by: _____ **Date:** February 14, 2025
Erica Chan

Reviewed by: _____ **Date:** February 14, 2025
Anderson Soungpanya

Report No. 105786504MPK-073	
Equipment Under Test:	Rechargeable Toothbrush Handle
Model Number:	HX742A
Applicant:	Philips Oral Healthcare LLC
Contact:	David Rodriguez
Address:	Philips Oral Healthcare LLC 22100 Bothell Everett Highway Bothell, WA 98021 USA
Country:	USA
Tel. Number:	(425) 487-7000
Email:	david.rodriguez@philips.com
Date of Test:	February 11, 2024

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1.0 Summary of Tests

Test	Result
Antenna Gain Measurement	Completed

AUT receive date: April 15, 2024

AUT receive condition: The pre-production version of the AUT was received in good condition with no apparent damage. As declared by the Applicant, it is identical to the production units.

Test start date: February 11, 2025

Test completion date: February 13, 2025

The test results in this report pertain only to the item tested.

2.0 General Information

2.1 Product Description

This test report covers only the 2.45GHz Antenna used in the **HX742A** .

Antenna Information	
Applicant	Philips Oral Healthcare LLC
Model Number	Rechargeable Toothbrush Handle
Frequency Range	2402 – 2480 MHz
Antenna(s)	Internal Antenna
Highest Antenna Gain	-3.89 dBi
Applicant Name & Address	Philips Oral Healthcare LLC 22100 Bothell Everett Highway Bothell, WA 98021 USA

2.2 Related Submittal(s) Grants

None.

2.3 Test Facility

The test site used to collect the radiated data is site 1 (10-m semi-anechoic chamber). This test facility and site measurement data have been fully placed on file with the FCC, IC and A2LA accredited.

2.4 Test Methodology

Antenna conducted measurements were performed according to the FCC documents "GUIDELINES FOR DETERMINING THE EFFECTIVE RADIATED POWER (ERP) AND EQUIVALENT ISOTROPICALLY RADIATED POWER (EIRP) OF AN RF TRANSMITTING SYSTEM" (412172 D01 Determining ERP and EIRP v01r01).

2.5 Measurement Uncertainty

Compliance with the limits was based on the results of the measurements and doesn't take into account the measurement uncertainty.

Estimated Measurement Uncertainty

Measurement	Expanded Uncertainty (k=2)		
	0.15 MHz – 1 GHz	1 GHz – 2.5 GHz	> 2.5 GHz
RF Power and Power Density – antenna conducted	-	0.7 dB	-

Measurement	Expanded Uncertainty (k=2)			
	0.15 MHz – 30MHz	30 – 200 MHz	200 MHz – 1 GHz	1 GHz – 18 GHz
Radiated emissions	-	4.7	4.6	5.1 dB

3.0 System Test Configuration

3.1 Antenna Under Test (AUT)

Equipment Under Test			
Description	**Manufacturer**	**Model**	**Serial Number/ID**
Rechargeable Toothbrush Handle – Radiated Unit	Philips Oral Healthcare LLC	HX742A	BLE-007

3.2 Variant Models

The following variant models were not tested as part of this evaluation but 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 type reference	HX710n, HX711n, HX740n, HX741n, HX742n	Full Set is identified by type reference HX710n, HX711n, HX740n, HX741n, HX742n Where the last character n, is an alphanumeric character which differences are only for marketing purposes.
Power Toothbrush Handles Codes	HX710x, HX711x, HX740x, HX741x, HX742x	Handle HX742A is the representative model for testing. Toothbrush handles HX710x, HX711x, HX740x, HX741x, HX742x, Where x, is an alphanumeric character which differences are only for the handle color.
Toothbrush Base Charger	HX6100 ABA1	HX6100 ABA1 is the representative model for testing for: HX6100 AFA1, HX6100 AFA2 models. 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 C is for factory PI ELECTRONICS (VIETNAM) COMPANY LIMITED When blank is for factory PI Electronics (China Plant)
Toothbrush Base DC Charger	HX6110 ABA3	Model HX6110 ABA3 is representative model of testing for: HX6110 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 LIMITED When F = blank is for factory of PI Electronics (China Plant)
Toothbrush Base DC Charger	HX6110 ADB3	Model ADB3 is representative model of testing for: HX6110 AFB3. Model HX6110 AFB3, where F can be D or E are not safety or EMC 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 Travel Charger	HYTC02	HYTC02 is the representative model for testing for: HYTC01. HYTC01 is 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.

AUT Photos

3.3 Justification

The AUT is placed on a non-conductive table. The AUT was configured to continuously transmit. Different orientations of the AUT were tested and only the worse-case emissions were reported.

The AUT was tested in X, Y and Z orientation

3.4 Software Exercise Program

The AUT exercise program used during radiated and conducted testing was provided by Philips Oral Healthcare LLC.

3.5 Mode of Operation During Test

During transmitter testing, the transmitter was setup to transmit continuously using the RF power setting provided by the manufacturers using a laptop with proprietary software. The corresponding output power in dBm can be found in section 4.2 of report 105786504MPK-001.

The table below reflects the RF power setting used for testing.

Mode	Frequency (MHz)	Channel	AUT RF Setting
Low	2402	37	21 (hex15)
Mid	2440	17	21 (hex15)
High	2480	39	21 (hex15)

4.0 Measurement Results

4.1 Antenna Gain Measurement

4.1.1 Procedure

The AUT is placed on a plastic turntable that is 1.5m in height. The signal is maximized through rotation 0-360 degress. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

All measurements were made with a Peak Detector.

AUT was tested in X, Y, Z orientations. Data included is of the worst-case configuration and antenna orientation (the configuration which resulted in the highest emission levels).

Spectrum Analyzer Settings used:

RBW	1 MHz
VBW	3 MHz
Sweep time	Auto
Detector Type	Peak
Trace type	Max Hold

4.1.2 Test Result

AUT orientation	Frequency (MHz)	FS at 3m (dBuV/m)	EIRP (dBm)	Conducted Output Power (dBm)[1]	Antenna Gain (dBi)
X	2402	90.05	-5.18	-0.3	-4.88
X	2440	88.81	-6.42	-0.6	-5.82
X	2480	87.92	-7.31	-0.9	-6.41
Y	2402	88.60	-6.63	-0.3	-6.33
Y	2440	87.95	-7.28	-0.6	-6.68
Y	2480	87.22	-8.01	-0.9	-7.11
Z	2402	89.61	-5.62	-0.3	-5.32
Z	2440	89.71	-5.52	-0.6	-4.92
Z	2480	90.44	-4.79	-0.9	-3.89

[1] Conducted output power is from report 105786504MPK-001.

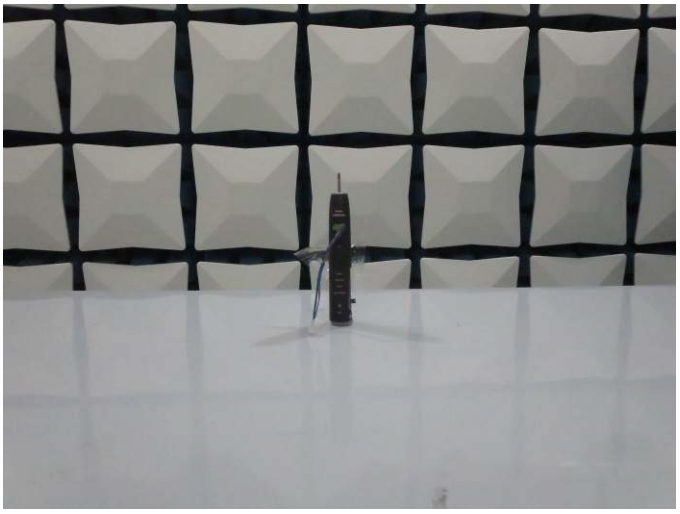
EIRP (dBm) = FS at 3m (dBuV/m) + 20*LOG (3) - 104.77

Antenna Gain (dBi) = EIRP (dBm) - Conducted Output Power (dBm)

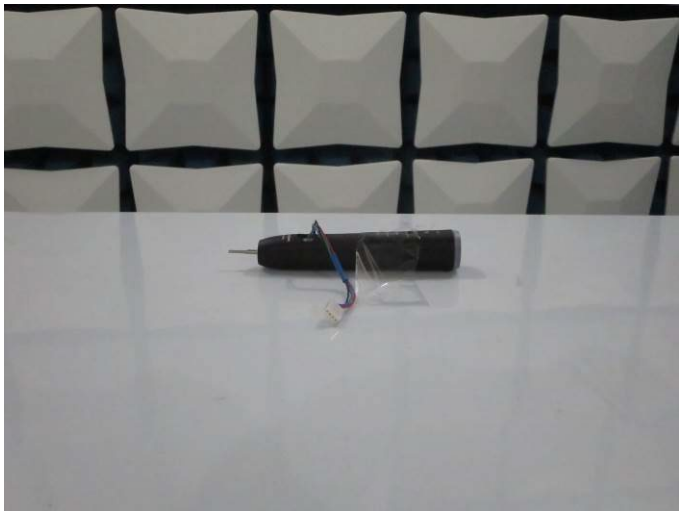
4.1.3 Test Setup Photos

General Setup

X-Axis



Y-Axis



Z-Axis

5.0 List of Test Equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

Asset #	Description	Manufacturer	Model	Cal Date	Cal Due
02016	EMI Test Receiver 1Hz-44GHz	Rohde & Schwarz	ESW44	05/30/2024	05/30/2025
02099	1-40GHz SMA RF Cable 3 Meter	Absolute EMC	50586-197	08/19/2024	08/19/2025
02114	1-18GHz Horn Antenna	RF Spin	DRH18-E	10/02/2024	10/02/2025
02160	3m Chamber	AP Americas	None	01/06/2025	01/06/2028

Calibration not required.

Software used for emission compliance testing utilized the following:

Name	Manufacturer	Version	Template/Profile
BAT-EMC	Nexio	3.20.0.23	5G Chamber Emissions Template
UCPI	Philips Oral Healthcare LLC	1.4.0.0	Not applicable. Used to control AUT

6.0 Document History

Revision/ Job Number	Writer Initials	Reviewers Initials	Date	Change
1.0 / G105786504	EC	AS	February 14, 2025	Original document

END OF TEST REPORT