

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

Test Report No. : OT-206-RED-149

AGR No. : A205A-294

Applicant : LG Electronics USA, Inc.

Address : 111 Sylvan Ave, North Building, Englewood Cliffs, New Jersey, 07632, United States

Manufacturer : LG Electronics Inc.

Address : 222 LG-ro Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, Korea

Type of Equipment : Bluetooth Earbud

FCC ID. : ZNFHBSFN6

Model Name : HBS-FN6

Multiple Model Name : HBS-FN5W, HBS-FN5U, HBS-FN4

Serial number : N/A

Total page of Report : 13 pages (including this page)

Date of Incoming : June 12, 2020

Date of Issuing : June 18, 2020

SUMMARY

The equipment complies with the requirement of *FCC CFR 47 PART 15 SUBPART B, Section 15.101 and IC ICES-003 Issue 6.*

This test report contains only the results of a single test of the sample supplied for the examination.

Reviewed by: _____

Seung-Hyun, Park / Manager
EMC Testing Div.
ONETECH Corp.

Approved by: _____

Eung-Chan, Kim / General Manager
EMC Testing Div.
ONETECH Corp..

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Revision History

Rev. No.	Issued Report No.	Issued Date	Revisions	Section Affected
0	OT-204-RED-133	April 29, 2020	Initial Issue	All
1	OT-206-RED-149	June 18, 2020	Change RF Matching Part Class II Permissive Change	All

1. VERIFICATION OF COMPLIANCE

- Applicant : LG Electronics USA, Inc.
- Address : 111 Sylvan Ave, North Building, Englewood Cliffs, New Jersey, 07632, United States
- Contact Person :
- Telephone No. : +82-10-3294-4994
- FCC ID : ZNFHBSFN6
- Model Name : HBS-FN6
- Brand Name : -
- SERIAL NUMBER : N/A
- DATE : June 18, 2020

EQUIPMENT CLASS	Other Class B digital devices & peripherals
E.U.T. DESCRIPTION	Bluetooth Earbud
MEASUREMENT PROCEDURES	ANSI C63.4: 2014 and ICES-003 ISSUE 6
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Supplier’s Declaration of Conformity (SDoC)
STANDARDS	FCC PART 15 (Class B) ICES-003 ISSUE 6 Class B Apparatus
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None
FINAL TEST WAS CONDUCTED ON	Conducted Emission chamber

ONETECH Corp. tested the above equipment in accordance with the requirements set forth in the above standard. The test results show that equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

2. TEST FACILITY

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025 by Radio Research Agency as accreditation body. The Onetech Corp. is accredited for measuring devices subject to Declaration of Conformity (DOC) under Parts 15 & 18 as a Conformity Assessment Body (CAB) with designation number KR0013.

These measurement tests were conducted at Onetech Corp.

The 10 m semi anechoic chamber and conducted measurement facilities are located at

- 1) 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea.
- 2) 12-5, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea.



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 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea
 Tel: +82-31-799-9500
 Fax: +82-31-799-9599

3. PRODUCT INFORMATION

3.1 Description of EUT

The LG Electronics USA, Inc., Model HBS-FN6 (referred to as the EUT in this report) is a Bluetooth Earbud. Product specification described herein was obtained from product data sheet or user’s manual.

CHASSIS TYPE	Plastic
LIST OF EACH OSC. or CRY. FREQ. (FREQ. >= 1 MHz)	40 MHz
RF FREQ.	2 402 MHz ~ 2 480 MHz
ELECTRICAL RATING	DC 5 V (Adapter) DC 3.7 V (Built-in battery)
NUMBER OF PCB LAYERS	-
EXTERNAL CONNECTOR	USB Type C (Charge port)

3.2 Model Differences

-. The following lists consist of the added model and their differences.

Model Name		Differences			Tested
		Wireless Charging	UV-C LED	C-type Charging	
Basic	HBS-FN6	O	O	O	<input checked="" type="checkbox"/>
Multiple	HBS-FN5W	O	X	O	<input type="checkbox"/>
	HBS-FN5U	X	O	O	<input type="checkbox"/>
	HBS-FN4	X	X	O	<input type="checkbox"/>

Note: 1. Applicant consigns only basic model to test, therefore this test report just guarantees the units which have been tested.

2. The Applicant/manufacturer is responsible for the compliance of all variants.

3.3 Support Equipment

The model numbers for all the equipments that were used in the tested system is:

Description	Model	Manufacturer	Connected to
Bluetooth Earbud (EUT)	HBS-FN6	LG Electronics Inc.	Adapter
Adapter	MCS-V01WR	SUNLIN	EUT, Wireless Charger

3.4 System Configuration

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Bluetooth Earbud	LG Electronics Inc.	HBS-FN6	ZNFHBSFN6

3.5 Cable Description for the EUT

Cable	Shielded	Ferrite Bead	Metal Shell	Length (m)	Connected to
USB Type C	Y	N	N	1.0	Adapter

3.6 Equipment Modifications

-. None

4. DESCRIPTION OF TESTS

4.1 Test Methodology

Conducted testing was performed according to the procedures in ANSI C63.4: 2014.

4.2 Test Condition

The test conditions of the noted test mode(s) in this test report are;

1) Test Voltage / Frequency

- AC 120 V / 60 Hz

2) Test condition

- The USB Type C port on the EUT was connected to the adapter and then the EUT was operated while charging.

3) Test Mode(s)

Operating Mode	Charging
-----------------------	----------

4.3 Conducted Emission

The EUT was placed on a non-conductive 1.0 m × 1.5 m table, which is 0.8 m in height above the reference ground plane and 0.4 m away from the vertical conducting plane (over 2 m × 2 m) that is bonded to the reference ground plane.

The power of EUT is fed through a 50 Ω/ 50 μH + 5 Ω LISN and all support equipment is powered from another LISN.

Powers to the LISN are filtered by high-current high insertion loss power line filter.

Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

The RF output of the LISN was connected to the EMI test receiver.

Exploratory measurements were conducted to identify the highest emission by operating the EUT in a range of typical modes of operation, cable positions, system configuration and arrangement.

Based on exploratory measurements, the final measurements were conducted at the worst test conditions.

Exploratory measurements were scanned using Peak mode of EMI Test receiver from 150 kHz to 30 MHz with 20 ms sweep time. The final measurements were measured with Quasi-Peak and CISPR Average mode.

The bandwidth of EMI Test Receiver was set to 9 kHz. Interface cables were connected to the available interface ports of the test unit. Excess cable lengths were bundled at center with 30 cm ~ 40 cm.

5. FINAL RESULT OF MEASUREMENT

Exploratory measurement was done in normal operation mode. And the final measurement was selected for the maximized emission level.

5.1 Conducted Emission Test

5.1.1 Operating Environment

Ambient temperature : 21.9 °C
 Relative humidity : 43.7 % R.H.

5.1.2 Test Setup

The EUT and other support equipment were placed on a non-conductive table, 0.8 m height above the reference ground plane. The power of EUT was fed through a 50 Ω/ 50 μH + 5 Ω LISN. The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

5.1.3 Measurement uncertainty

Conducted emission, quasi-peak detection : ± 2.28 dB
 Conducted emission, CISPR-average detection : ± 2.28 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, k = 2.

5.1.4 Limit

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	CISPR Average
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

5.1.5 Test Equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ - ESCI	Rohde & Schwarz	Test Receiver	101420	Mar. 23, 2020 (1Y)
■ - NSLK 8126	Schwarzbeck	LISN	8126-480	Oct. 21, 2019 (1Y)
□ - 3825/2	EMCO	AMN	9109-1867	Mar. 23, 2020 (1Y)
■ - 11947A	Hewlett Packard	Transient Limiter	3107A02762	Mar. 23, 2020 (1Y)

All test equipment used is calibrated on a regular basis.

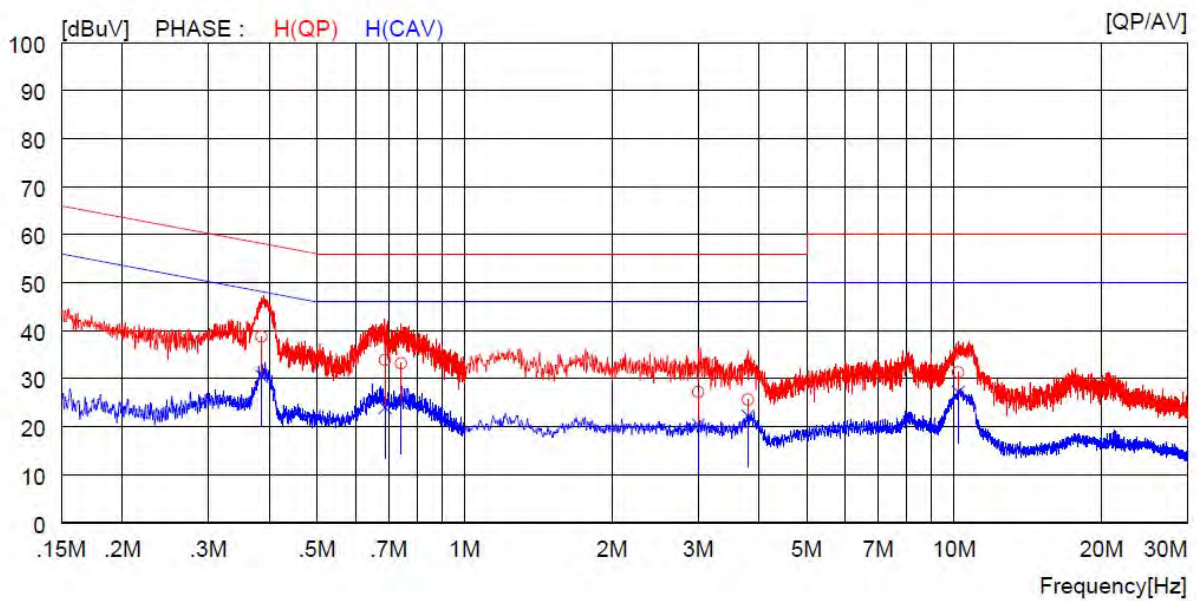
5.1.6 Test Data

. Test Result : Pass

김재연

Tested by: Jae-Yeon, Kim / Engineer

Operating Mode (Charging)			
Frequency range	: 0.15 MHz ~ 30 MHz	Test Date	: June 15, 2020
Resolution bandwidth	: 9 kHz	Tested Line	: HOT LINE

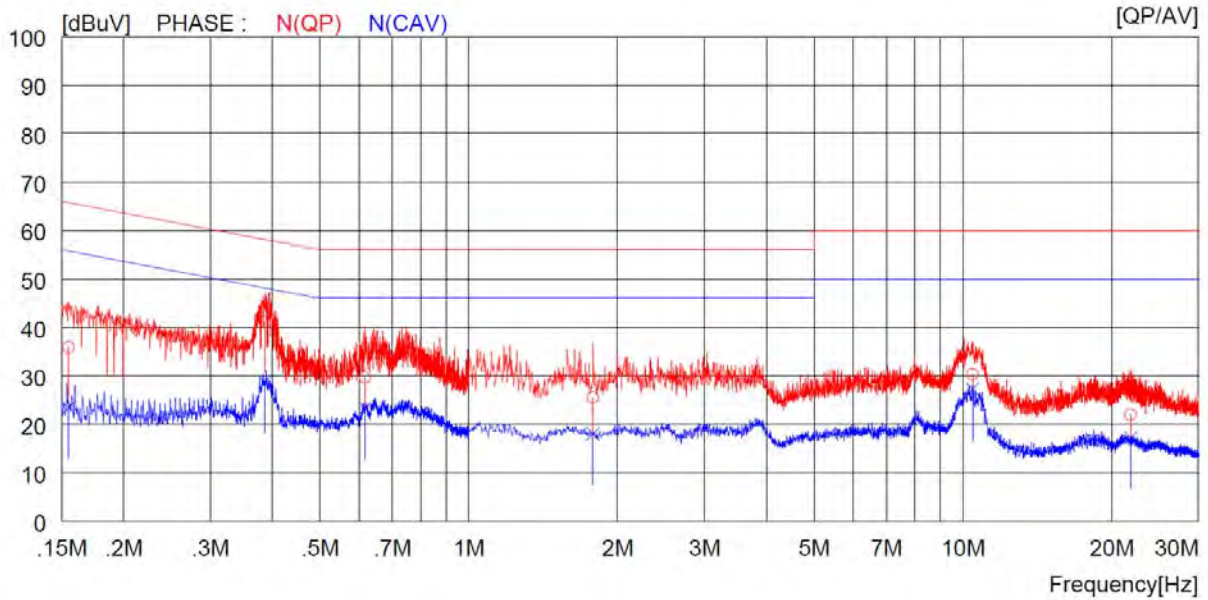


NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.38500	28.6	----	10.2	38.8	----	58.2	----	19.4	----	H (QP)
2	0.68800	23.7	----	10.2	33.9	----	56.0	----	22.1	----	H (QP)
3	0.74200	23.0	----	10.2	33.2	----	56.0	----	22.8	----	H (QP)
4	3.00400	16.9	----	10.3	27.2	----	56.0	----	28.8	----	H (QP)
5	3.79200	15.3	----	10.3	25.6	----	56.0	----	30.4	----	H (QP)
6	10.20000	21.0	----	10.3	31.3	----	60.0	----	28.7	----	H (QP)
7	0.38500	----	20.3	10.2	----	30.5	----	48.2	----	17.7	H (CAV)
8	0.68800	----	13.8	10.2	----	24.0	----	46.0	----	22.0	H (CAV)
9	0.74200	----	14.8	10.2	----	25.0	----	46.0	----	21.0	H (CAV)
10	3.00400	----	10.1	10.3	----	20.4	----	46.0	----	25.6	H (CAV)
11	3.79200	----	11.9	10.3	----	22.2	----	46.0	----	23.8	H (CAV)
12	10.20000	----	16.9	10.3	----	27.2	----	50.0	----	22.8	H (CAV)

Remark: Margin (dB) = Limit – Level (Result)

The result level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

Operating Mode (Charging)			
Frequency range	: 0.15 MHz ~ 30 MHz	Test Date	: June 15, 2020
Resolution bandwidth	: 9 kHz	Tested Line	: NEUTRAL LINE



NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.15500	25.7	----	10.2	35.9	----	65.7	----	29.8	----	N (QP)
2	0.38700	30.9	----	10.2	41.1	----	58.1	----	17.0	----	N (QP)
3	0.61700	19.4	----	10.2	29.6	----	56.0	----	26.4	----	N (QP)
4	1.78400	15.2	----	10.3	25.5	----	56.0	----	30.5	----	N (QP)
5	10.45000	20.0	----	10.3	30.3	----	60.0	----	29.7	----	N (QP)
6	21.85000	11.4	----	10.6	22.0	----	60.0	----	38.0	----	N (QP)
7	0.15500	----	13.2	10.2	----	23.4	----	55.7	----	32.3	N (CAV)
8	0.38700	----	18.6	10.2	----	28.8	----	48.1	----	19.3	N (CAV)
9	0.61700	----	13.1	10.2	----	23.3	----	46.0	----	22.7	N (CAV)
10	1.78400	----	7.7	10.3	----	18.0	----	46.0	----	28.0	N (CAV)
11	10.45000	----	16.9	10.3	----	27.2	----	50.0	----	22.8	N (CAV)
12	21.85000	----	6.6	10.6	----	17.2	----	50.0	----	32.8	N (CAV)

Remark: Margin (dB) = Limit – Level (Result)

The result level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

6. SAMPLE CALCULATIONS

$$\text{dB}\mu\text{V} = 20 \text{ Log}_{10}(\mu\text{V})$$

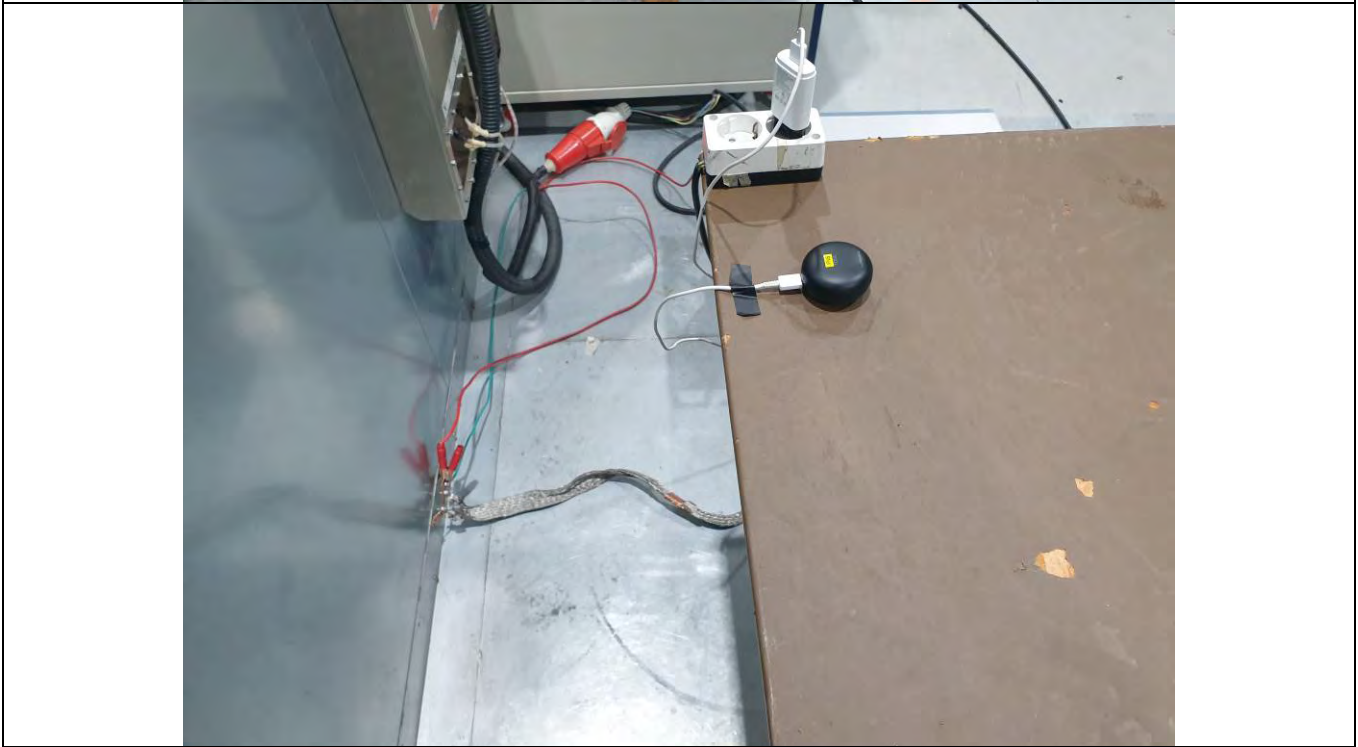
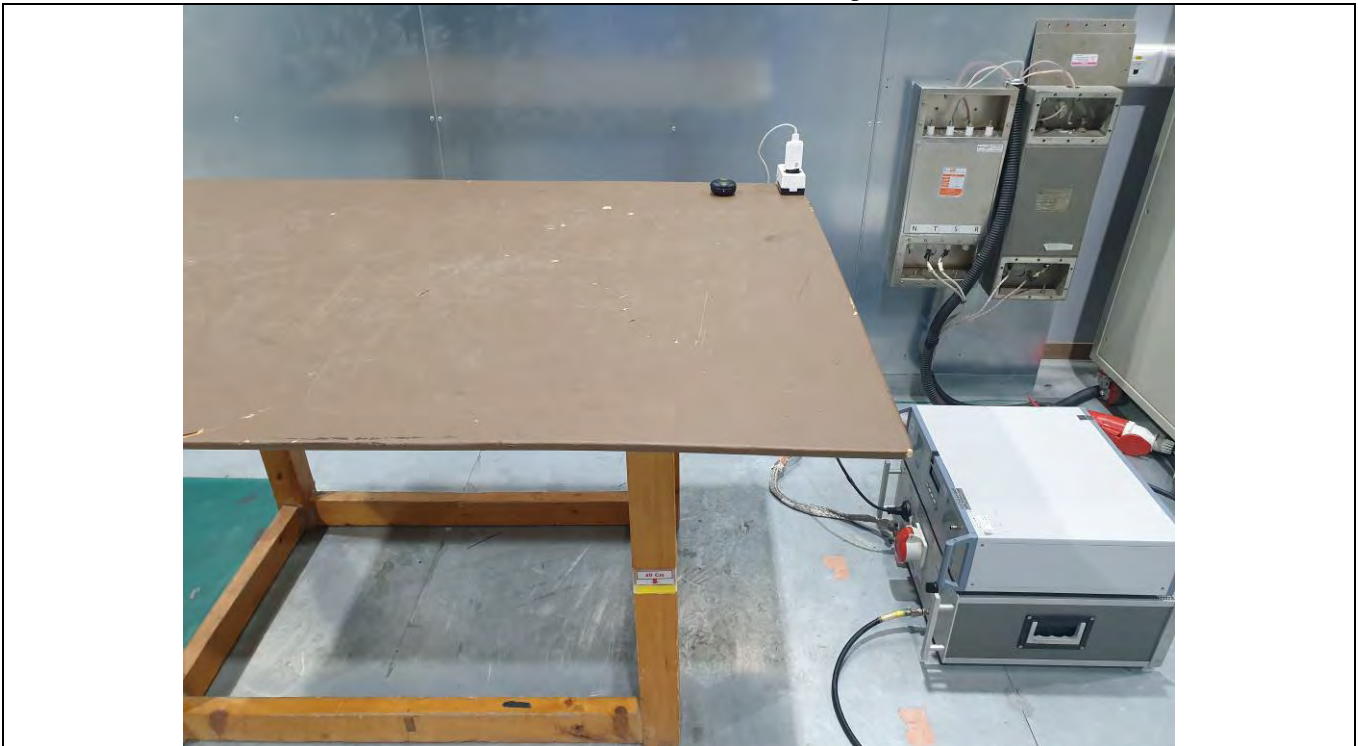
$$\text{Margin} = \text{Limit} - \text{Result}$$

-. Example 1: 0.38800 MHz

Class B Limit	= 58.1 dB μ V (Quasi-peak)
Reading	= 30.9 dB μ V
Correction Factor	= Cable Loss + Pulse Limiter
	= 10.2 dB
Total	= 41.1 dB μ V
Margin	= 58.1 dB μ V – 41.1 dB μ V
	= 17.0 dB

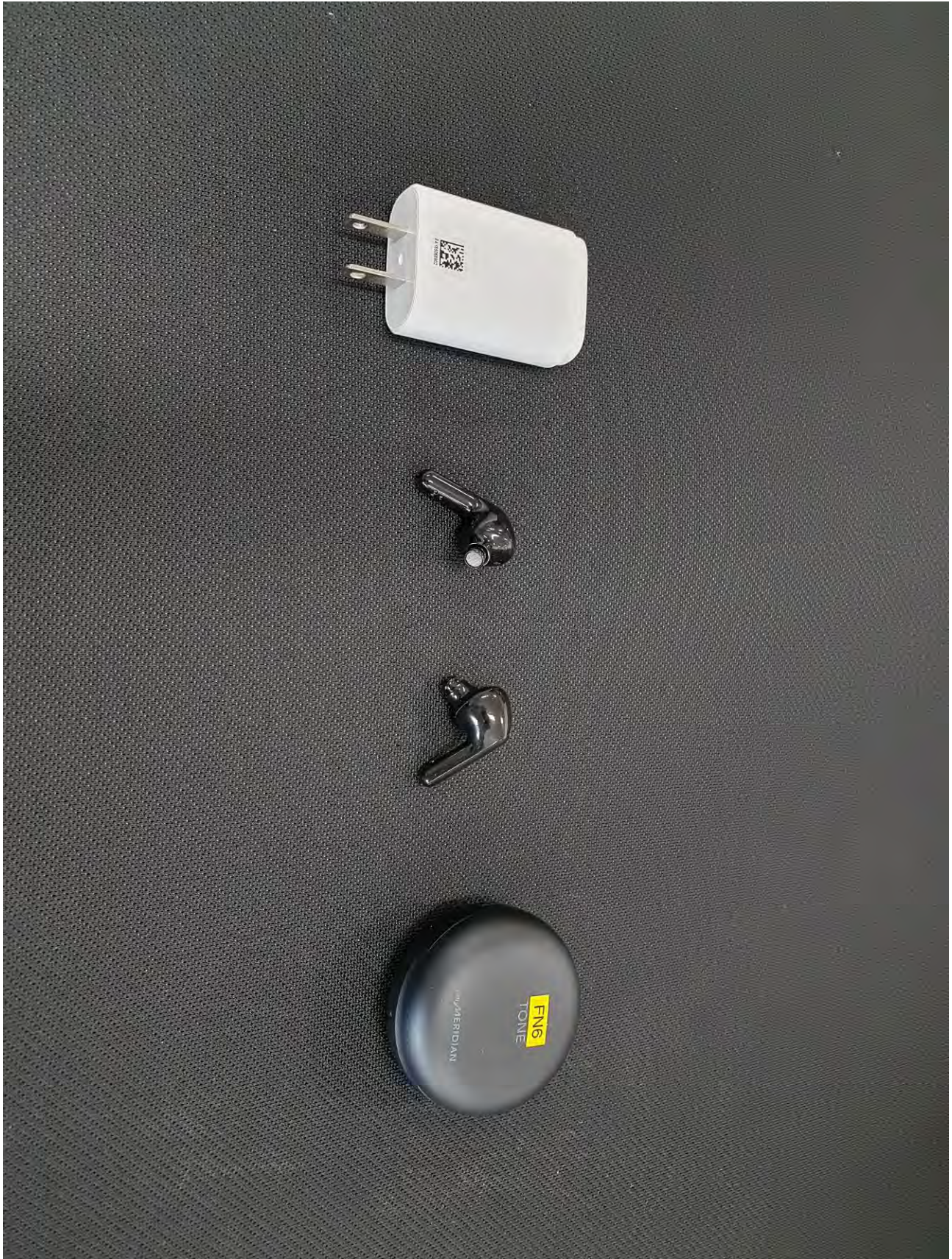
APPENDIX A
[TEST SET UP PHOTOGRAPHS]

Conducted Emission Test Set Up



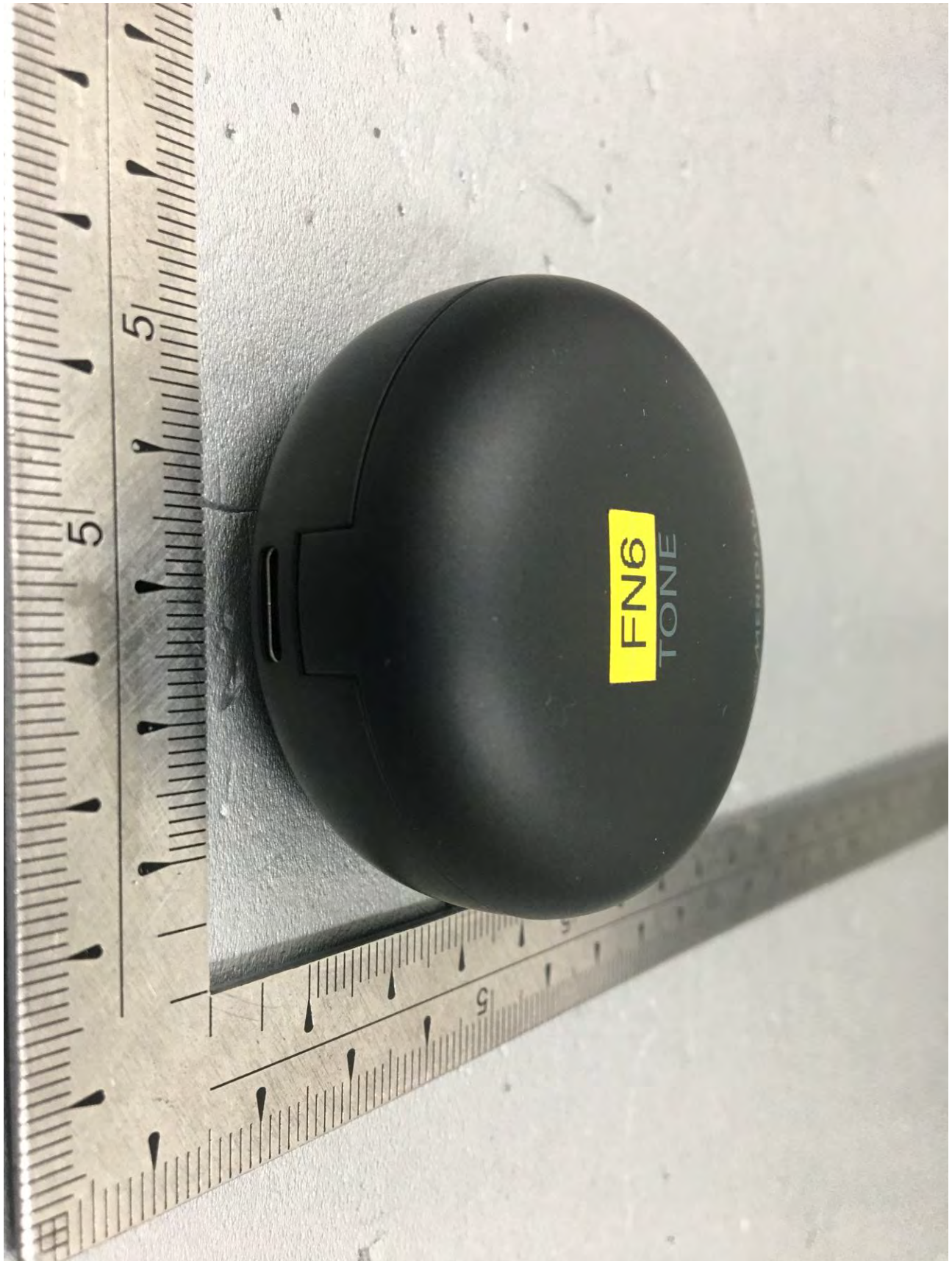
Operating Mode (Charging)

APPENDIX B
[EXTERNAL PHOTOGRAPHS]



























APPENDIX C
[INTERNAL PHOTOGRAPHS]

