EMI TEST REPORT

Test Report No.: 12652966S-I-R2

Applicant	:	**Foster Electric Company, Limited**
Type of Equipment	:	**Bluetooth Headphone**
Model No.	:	**MB WHP 1**
FCC ID	:	**2ASG7614997**
Test regulation	:	**FCC Part 15 Subpart B:2018, Class B** **ICES-003 Issue 6: 2016+Amendment 1: 2017, Class B**
Test result	:	**Complied (Refer to Section 3.2)**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
7. This test report covers EMC technical requirements.
   It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)
8. The information provided from the customer for this report is identified in Section 1
9. This report is a revised version of 12652966S-I-R1. 12652966S-I-R1 is replaced with this report.

Date of test: March 14 to 18, 2019

Representative test engineer:

Yusuke Ohnuma
Engineer
Consumer Technology Division

Approved by:

Toyokazu Imamura
Leader
Consumer Technology Division

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

RTL02610

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN
Telephone: +81 463 50 6400
Facsimile: +81 463 50 6401

REVISION HISTORY

Original Test Report No.: 12652966S-I

Revision	Test report No.	Date	Page revised	Contents
-(Original)	12652966S-I	April 11, 2019	-	-
1	12652966S-I-R1	April 12, 2019	3	Deletion of description about Appendix 4
2	12652966S-I-R2	April 22, 2019	1 to 17	Addition of FCC ID
			5	Update of Worst margin for Radiated emission: 12.2 dB → 12.1 dB
			18 to 20	Update of data: Rearrange the data order
			21 to 26	Modification of limit of RE data

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN
Telephone: +81 463 50 6400
Facsimile: +81 463 50 6401

CONTENTS

Section 1 : Customer information

Company Name	:	Foster Electric Company, Limited
Address	:	1-1-109, Tsutsujigaoka, Akishima City, Tokyo, 196-8550, Japan
Telephone Number	:	+81-42-546-2311
Facsimile Number	:	+81-42-546-2317
Contact Person	:	Hidehito Miho

The information provided from the customer is as follows;
- Applicant, Type of Equipment, Model No. on the cover and other relevant pages
- Section 1: Customer information
- Section 2: Equipment under test (E.U.T.)
- Section 4: Operation of E.U.T. during testing

* The laboratory is exempted from liability of any test results affected from the information in Section 2 and 4.

Section 2 : Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of equipment	:	Bluetooth Headphone
Model No.	:	MB WHP 1
Serial No.	:	Refer to Section 4.2
Rating	:	DC 3.2 V (DC 3.0 V - 3.7 V) (Battery)
Country of Mass-production	:	China
Condition of EUT	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No modification by the test lab.
Receipt Date of Sample (Information from test lab.)	:	February 28, 2019

2.2 Product description

Model: MB WHP 1 (referred to as the EUT in this report) is a Bluetooth Headphone.

Clock frequencies used in the EUT: 26 MHz

Radio Specification

Bluetooth

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	GFSK, π/4 DQPSK
Antenna type	:	Monopole Antenna
Antenna Gain	:	1.37 dBi
Operating Temperature	:	-20 deg. C to +60 deg. C

NFC (Passive Tag)

Radio Type	:	Receiver
Frequency of Operation	:	13.56 MHz
Modulation	:	ASK

Section 3 : Test specification, procedures and results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart B FCC Part 15 final revised on March 12, 2018 and effective April 11, 2018
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart B Unintentional Radiators
Test Specification	:	ICES-003 Issue 6: 2016+Amendment 1: 2017
Title	:	Spectrum Management and Telecommunications Interference-Causing Equipment Standard Information Technology Equipment (ITE) – Limits and methods of measurement

3.2 Procedures & results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4: 2014 7. AC powerline conducted emission measurements	Class B	N/A	14.0 dB (13.55939 MHz, AV, L1, NFC + Charge + BT Standby)	Complied a)
Radiated emission	ANSI C63.4: 2014 8. Radiated emission measurements	Class B	N/A	12.1 dB (2279.800 MHz, AV, Vertical, BT Communication + Charge)	Complied b)
Note: UL Japan's EMI Work Procedures 13-EM-W0420. a) Refer to Appendix 2 (data of Conducted emission) b) Refer to Appendix 2 (data of Radiated emission)					
Symbols: Complied The data of this test item has enough margin, more than the measurement uncertainty. Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.					

3.3 Addition to standard

No addition, exclusion nor deviation has been made from the standard.

3.4 Confirmation

UL Japan, Inc. hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart B: 2018, Class B and ICES-003 Issue 6: 2016+Amendment 1: 2017, Class B.

3.5 Uncertainty

There is no applicable rule of uncertainty in this applied standard. Therefore, the results are derived depending on whether or not laboratory uncertainty is applied.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor *k*=2.

Item	Frequency range	No.1 SAC*1/SR*2 (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Conducted emission (AC Mains) AMN/LISN	150 kHz-30 MHz	2.9 dB	2.8 dB	2.9 dB
Radiated emission (Measurement distance: 3 m)	30 MHz-200 MHz	4.6 dB	4.6 dB	4.7 dB
	200 MHz-1 GHz	6.0 dB	6.0 dB	6.1 dB
	1 GHz-6 GHz	4.8 dB	4.8 dB	4.8 dB
	6 GHz-18 GHz	5.4 dB	5.4 dB	5.4 dB

*1: SAC=Semi-Anechoic Chamber
*2: SR= Shielded Room is applied besides radiated emission

3.6 Test Location

UL Japan, Inc. Shonan EMC Lab.
1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN
Telephone number : +81 463 50 6400
Facsimile number : +81 463 50 6401
JAB Accreditation No. : RTL02610
FCC Test Firm Registration Number: 839876

	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.7 Shielded room	-	2.76 x 3.76 x 2.4	2.76 x 3.76	-
No.8 Shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	-	2.55 x 4.1 x 2.5	2.55 x 4.1	-

3.7 Test setup, Data of EMI & Test instruments

Refer to Appendix 1 to 3.

Section 4 : Operation of E.U.T. during testing

4.1 Operating modes

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

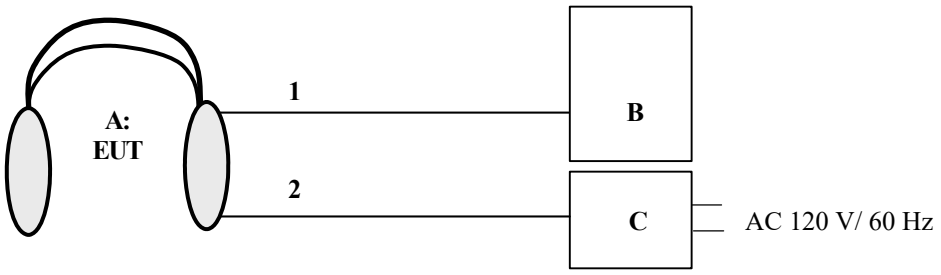
Test sequence is used: 1) Analog Audio In + Charge
2) BT Communication + Charge
3) NFC + Charge + BT Standby

Software (Firmware): V1.0

Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals

[Analog Audio In + Charge]



*Cabling and setup were taken into consideration and test data was taken under worse case conditions.

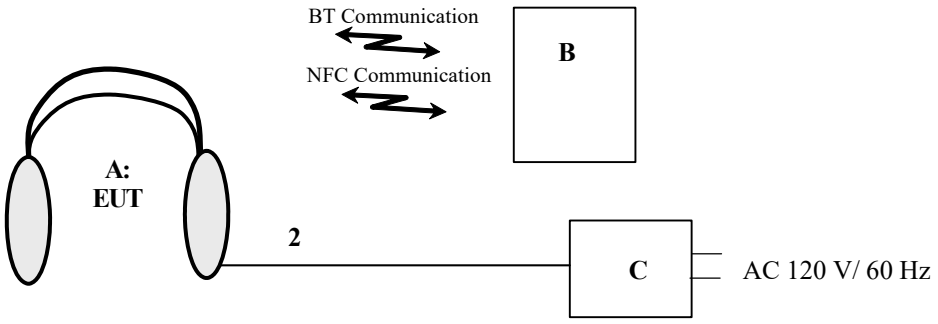
Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Bluetooth Headphone	MB WHP 1	15	Foster Electric Company	EUT
B	Smartphone	E6653	-	Sony	-
C	AC Adaptor	A2014	AFZFD51903100759	Anker Technology	-

List of cable used

No.	Item	Length (m)	Shield	Remark
1	AUX	1.3	Unshielded	-
2	USB Type C	1.3	Shielded	-

[BT Communication + Charge]
[NFC + Charge + BT Standby]



*Cabling and setup were taken into consideration and test data was taken under worse case conditions.
* (NFC) During the test, the installation interval of the EUT and R/W (Smartphone) was taken 5 mm.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Bluetooth Headphone	MB WHP 1	15	Foster Electric Company	EUT
B	Smartphone	E6653	-	Sony	-
C	AC Adaptor	A2014	AFZFD51903100759	Anker Technology	-

List of cable used

No.	Item	Length (m)	Shield	Remark
2	USB Type C	1.3	Shielded	-

Section 5 : Conducted emission

5.1 Operating environment

Test room	:	Refer to data
Temperature	:	Refer to data
Humidity	:	Refer to data

5.2 Test configuration

EUT was placed on a platform of normal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane. The rear of table top was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals was aligned and was flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. The EUT was located 0.8 m from Line Impedance Stabilization Network (LISN). Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through an LISN to the input power source.
Photographs of the set up are shown in Appendix 1.

5.3 Test conditions

Frequency range	:	0.15 MHz - 30 MHz
EUT position	:	Table top

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT in shielded room.
The EUT was connected to a Line Impedance Stabilization Network (LISN).
An overview sweep with peak detection has been performed.
The measurements had been performed with a quasi-peak detector and if required, with a CISPR average detector (CAV).
The conducted disturbance measurements were made with the following detector function of the test receiver.

Detector Type	:	QP / CAV
IF Bandwidth	:	9 kHz / 9 kHz

5.5 Results

Summary of the test results: Pass

Section 6 : Radiated emission

6.1 Operating environment

Test room : Refer to data
Temperature : Refer to data
Humidity : Refer to data

6.2 Test configuration

EUT was placed on a platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane. The table is made of expanded polystyrol and expanded polypropylene and the table top is covered with polycarbonate. That has very low permittivity. The rear of EUT, including its peripherals was aligned and flushed with rear of tabletop. I/O cables that were connected to the peripherals were bundled in center.
Photographs of the set up are shown in Appendix 1.

6.3 Test conditions

Frequency range : 30 MHz – 13 GHz
EUT position : Table top

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on a Semi-Anechoic Chamber with a ground plane at a distance of 3 m*(below 1 GHz) and 3 m (above 1 GHz).
* Measuring distance
The boundary of the EUT is defined by an imaginary circular periphery.

The radiated emission measurements were made with the following detector function.

		30 MHz -1000 MHz (Test receiver)	1 GHz – 13 GHz (Spectrum analyzer) *2)	
Detector Type	:	QP	AV *1)	PK
IF Band width	:	120 kHz	RBW 1 MHz/ VBW 10 Hz	RBW 1 MHz/ VBW 3 MHz

*1) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.
*2) The measurement data was adjusted to a 3 m distance using the following Distance Factor base on FCC subpart A Section 15.31 (f). Distance Factor: 20 x log (3.75 m / 3 m) (BT Communication + Charge , NFC + Charge + BT Standby)
20 x log (3.60 m / 3 m) (Analog Audio In + Charge)

The noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

6.5 Results

Summary of the test results: Pass

Figure 1. Antenna angle