



EMI TEST REPORT

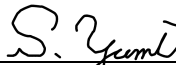
Test Report No.: 13163439S-F-R1

Applicant : Foster Electric Company, Limited
Type of Equipment : Bluetooth Headphone
Model No. : KT001 WH 01
FCC ID : 2ASG7619755
Test regulation : FCC Part 15 Subpart B:2020, Class B
ICES-003 Issue 6: 2016 (SMSE-005-19), Class B
Test result : Complied (Refer to Section 3.2)

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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 13163439S-F. 13163439S-F is replaced with this report.

Date of test: July 3 to 8, 2019

Representative test engineer:


Shunsaku Yumi

Engineer

Consumer Technology Division

Approved by:



Toyokazu Imamura

Leader

Consumer Technology Division



Testing LAB
RTL02610

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

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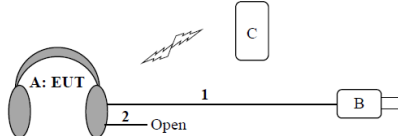
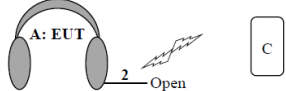
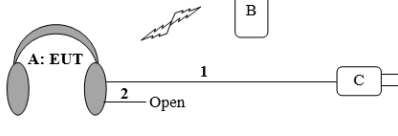
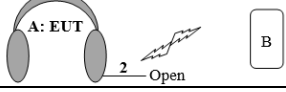
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Report Cover Page - 13-EM-F0429 Issue # 17.0

REVISION HISTORY

Original Test Report No.: 13163439S-F

Revision	Test report No.	Date	Page revised	Contents
-(Original)	13163439S-F	August 3, 2020	-	-
1	13163439S-F-R1	August 20, 2020	8	<p>Correction of items No. shown in 4.2 Configuration and peripherals:</p> <p>From</p> <p>[BT connection + Charge mode]</p>  <p>[BT connection mode]</p>  <p>To</p> <p>[BT connection + Charge mode]</p>  <p>[BT connection mode]</p> 
			10	<p>Addition of description to Section 6:</p> <p>“Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.”</p>

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Reference: Abbreviations (Including words undescribed in this report)

AAN	Asymmetric Artificial Network	ILAC	International Laboratory Accreditation Conference
AC	Alternating Current	ISED	Innovation, Science and Economic Development Canada
AM	Amplitude Modulation	ISN	Impedance Stabilization Network
AMN	Artificial Mains Network	ISO	International Organization for Standardization
Amp, AMP	Amplifier	JAB	Japan Accreditation Board
ANSI	American National Standards Institute	LAN	Local Area Network
Ant, ANT	Antenna	LCL	Longitudinal Conversion Loss
AP	Access Point	LIMS	Laboratory Information Management System
ASK	Amplitude Shift Keying	LISN	Line Impedance Stabilization Network
Atten., ATT	Attenuator	MRA	Mutual Recognition Arrangement
AV	Average	N/A	Not Applicable
BPSK	Binary Phase-Shift Keying	NIST	National Institute of Standards and Technology
BR	Bluetooth Basic Rate	NS	No signal detect.
BT	Bluetooth	NSA	Normalized Site Attenuation
BT LE	Bluetooth Low Energy	NVLAP	National Voluntary Laboratory Accreditation Program
BW	BandWidth	OBW	Occupied Band Width
C.F	Correction Factor	OFDM	Orthogonal Frequency Division Multiplexing
Cal Int	Calibration Interval	PK	Peak
CAV	CISPR AV	P _{LT}	long-term flicker severity
CCK	Complementary Code Keying	POHC(A)	Partial Odd Harmonic Current
CDN	Coupling Decoupling Network	Pol., Pola.	Polarization
Ch., CH	Channel	PR-ASK	Phase Reversal ASK
CISPR	Comite International Special des Perturbations Radioelectriques	P _{ST}	short-term flicker severity
Corr.	Correction	QAM	Quadrature Amplitude Modulation
CPE	Customer premise equipment	QP	Quasi-Peak
CW	Continuous Wave	QPSK	Quadri-Phase Shift Keying
DBPSK	Differential BPSK	r.m.s., RMS	Root Mean Square
DC	Direct Current	RBW	Resolution Band Width
DET	Detector	RE	Radio Equipment
D-factor	Distance factor	REV	Reverse
Dmax	maximum absolute voltage change during an observation period	RF	Radio Frequency
DQPSK	Differential QPSK	RFID	Radio Frequency Identifier
DSSS	Direct Sequence Spread Spectrum	RSS	Radio Standards Specifications
EDR	Enhanced Data Rate	Rx	Receiving
e.i.r.p., EIRP	Equivalent Isotropically Radiated Power	SINAD	Ratio of (Signal + Noise + Distortion) to (Noise + Distortion)
EM clamp	Electromagnetic clamp	S/N	Signal to Noise ratio
EMC	ElectroMagnetic Compatibility	SA, S/A	Spectrum Analyzer
EMI	ElectroMagnetic Interference	SG	Signal Generator
EMS	ElectroMagnetic Susceptibility	SVSWR	Site-Voltage Standing Wave Ratio
EN	European Norm	THC(A)	Total Harmonic Current
e.r.p., ERP	Effective Radiated Power	THD(%)	Total Harmonic Distortion
EU	European Union	TR	Test Receiver
EUT	Equipment Under Test	Tx	Transmitting
Fac.	Factor	VBW	Video BandWidth
FCC	Federal Communications Commission	Vert.	Vertical
FHSS	Frequency Hopping Spread Spectrum	WLAN	Wireless LAN
FM	Frequency Modulation	xDSL	Generic term for all types of DSL technology (DSL: Digital Subscriber Line)
Freq.	Frequency		
FSK	Frequency Shift Keying		
Fund	Fundamental		
FWD	Forward		
GFSK	Gaussian Frequency-Shift Keying		
GNSS	Global Navigation Satellite System		
GPS	Global Positioning System		
Hori.	Horizontal		
ICES	Interference-Causing Equipment Standard		
I/O	Input/Output		
IEC	International Electrotechnical Commission		
IEEE	Institute of Electrical and Electronics Engineers		
IF	Intermediate Frequency		

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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. : KT001 WH 01
Serial No. : Refer to SECTION 4, SECTION 4.2
Rating : DC 3.2 V (DC 3.0 V - 3.7 V) (Battery)
DC 5 V (USB)
Receipt Date of Sample : June 16, 2020
(Information from test lab.)
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.

2.2 Product description

Model: KT001 WH 01 (referred to as the EUT in this report) is a Bluetooth Headphone.

Clock frequency(ies) in the system : 26 MHz

Radio Specification

Bluetooth

Radio Type : Transceiver
Frequency of Operation : 2402 MHz - 2480 MHz
Modulation : GFSK, $\pi/4$ DQPSK
Antenna type : Monopole Antenna
Antenna Gain : 4.84 dBi (MAX)
Operating Temperature : -15 deg. C to + 55 deg. C

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Section 3 : Test specification, procedures and results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart B
FCC Part 15 final revised on May 26, 2020 and effective July 27, 2020 except 15.258
Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators

* The revision does not affect the test result conducted before its effective date.

Test Specification : ICES-003 Issue 6: 2016 (SMSE-005-19)
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 +A1:2017 7. AC powerline conducted emission measurements	Class B	N/A	7.9 dB (0.15000 MHz, AV, N, BT connection + Charge mode, AC 240 V / 60 Hz)	Complied a)
Radiated emission	ANSI C63.4:2014 +A1:2017 8. Radiated emission measurements	Class B	N/A	12.2 dB (63.999 MHz, AV, Vertical, QP, BT connection + Charge mode) *1)	Complied b)
Note: UL Japan's EMI Work Procedures 13-EM-W0420. *1) Measurements have been performed up to 13 GHz since the highest frequency of internal source of the EUT is 2480 MHz. 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: 2020, Class B and ICES-003 Issue 6: 2016 (SMSE-005-19), 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 (±)	No.4/5/6/8 SR ^{*1} (±)
Conducted emission (AC Mains) AMN/LISN	150 kHz-30 MHz	2.6 dB	2.6 dB	2.5 dB	2.6 dB
Radiated emission (Measurement distance: 3 m)	30 MHz-200 MHz	4.6 dB	4.6 dB	4.6 dB	-
	200 MHz-1 GHz	6.0 dB	6.0 dB	6.0 dB	-
	1 GHz-6 GHz	4.9 dB	4.9 dB	4.9 dB	-
	6 GHz-18 GHz	5.5 dB	5.5 dB	5.5 dB	-

*1: SAC=Semi-Anechoic Chamber

*2: SR= Shielded Room is applied besides radiated emission

3.6 Test Location

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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 measuremen t 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.

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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.

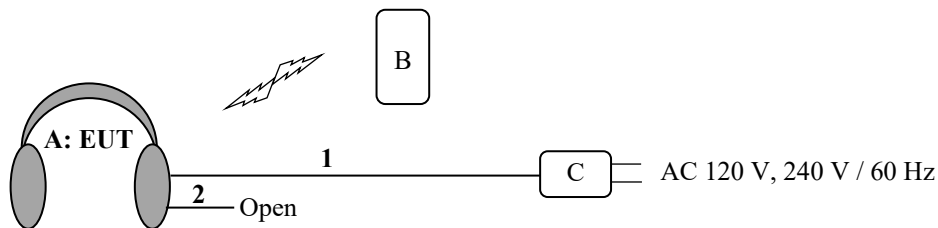
Test sequence is used: 1) BT connection + Charge mode
2) BT connection mode

Software (Firmware) : G02_Kate_V0.5.1
Version : V0.5.1

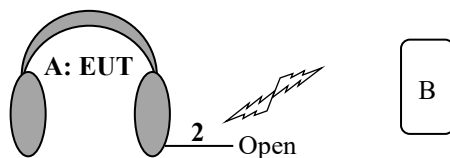
Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals

[BT connection + Charge mode]



[BT connection mode]



*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	KT001 WH 01	6	Foster Electric Company	EUT
B	Smartphone	CLT-L29	WCR7N18523000926	HUAWEI	-
C	AC Adaptor	A1882	-	Apple	-

List of cable used

No.	Item	Length (m)	Shield	Remark
1	USB Type C	1.3	Shielded	-
2	DC	0.05	Unshielded	*1)

*1) This cable is used for battery discharge, not supplied with the product.

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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 1.5 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.

Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

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

	<u>30 MHz -1000 MHz (Test receiver)</u>	<u>1 GHz – 13 GHz (Spectrum analyzer) *2)</u>
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: $20 \times \log (3.80 \text{ m} / 3 \text{ m})$ (BT connection + Charge mode)
 $20 \times \log (3.87 \text{ m} / 3 \text{ m})$ (BT connection mode)

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

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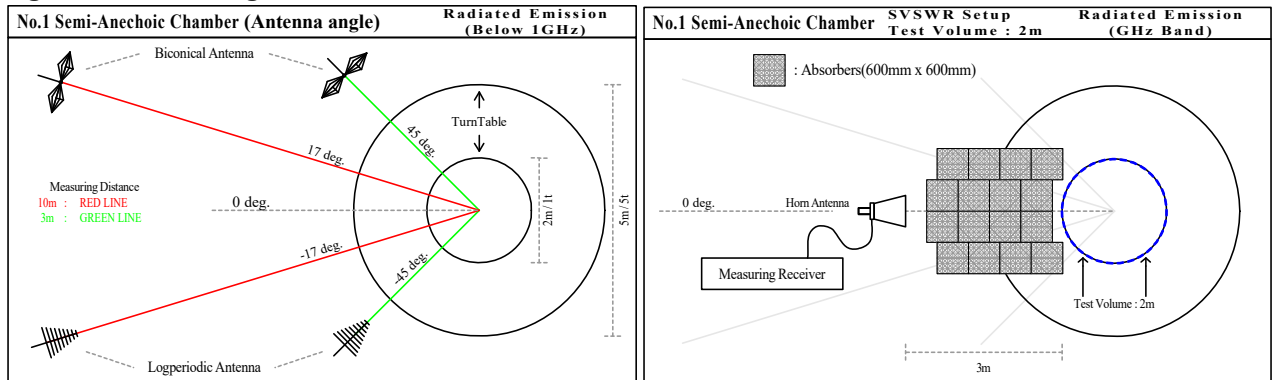
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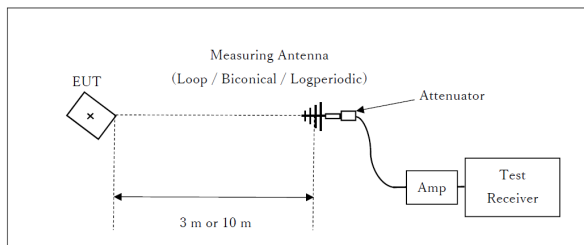
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Figure 1. Antenna angle



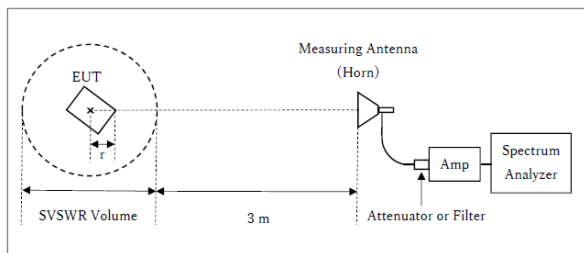
Below 1 GHz



x : Center of turn table

Test Distance: 3 m

1 GHz - 13 GHz



r : Radius of an outer periphery of EUT

x : Center of turn table

[BT connection + Charge mode]

Distance Factor: $20 \times \log (3.80 \text{ m}^*/3.0 \text{ m}) = 2.06 \text{ dB}$

* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.80 \text{ m}$

SVSWR Volume: 2 m

(SVSWR Volume has been calibrated based on CISPR 16-1-4.)

$r = 0.20 \text{ m}$

[BT connection mode]

Distance Factor: $20 \times \log (3.87 \text{ m}^*/3.0 \text{ m}) = 2.22 \text{ dB}$

* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.87 \text{ m}$

SVSWR Volume: 2 m

(SVSWR Volume has been calibrated based on CISPR 16-1-4.)

$r = 0.13 \text{ m}$

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