

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

No. 1 Workshop, M-10, Middle section, Science & Technology Park,

Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053 Report No.: SZEM170700767705

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RF Exposure Evaluation Report

Application No.: SZEM1707007677CR(GZEM1707004470CR)

Applicant: Harman International Industries, Inc.

Address of Applicant: 8500 Balboa Boulevard Northridge California 91329 United States

Manufacturer: Harman International Industries, Inc.

Address of Manufacturer: 8500 Balboa Boulevard Northridge California 91329 United States

Factory: Guoguang Electric Co., Ltd.

Address of Factory: No.8 Jinghu Road, Xinya Street, Huadu Reg, Guangzhou, China

EUT Name: Voice-activated Speaker

Model No.: LINK 500
Trade mark: JBL

FCC ID: APIJBLLINK500

Standards: 47 CFR Part 1.1307 (2016)

47 CFR Part 1.1310 (2016)

Date of Receipt: 2017-07-20

Date of Test: 2017-08-01 to 2017-08-09

Date of Issue: 2017-08-17

Test Result : PASS*



Jack Zhang EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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^{*} In the configuration tested, the EUT complied with the standards specified above.



SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

Report No.: SZEM170700767705

Page: 2 of 9

2 Version

Revision Record						
Version	Chapter	Date	Modifier	Remark		
01		2017-08-17		Original		

Authorized for issue by:		
	Benson Wang	
	Benson Wang /Project Engineer	
	Eric Fu	
	Eric Fu /Reviewer	



Shenzhen Branch

Report No.: SZEM170700767705

Page: 3 of 9

3 Contents

	Page
COVER PAGE	1
VERSION	2
CONTENTS	3
GENERAL DESCRIPTION OF EUT	4
4.1 TEST LOCATION	6
4.2 Test Facility	6
4.3 DEVIATION FROM STANDARDS	6
4.4 ABNORMALITIES FROM STANDARD CONDITIONS	6
4.5 OTHER INFORMATION REQUESTED BY THE CUSTOMER	6
RF EXPOSURE EVALUATION	
5.1 RF Exposure Compliance Requirement	7
5.1.1 Limits	7
5.1.2 Test Procedure	7
4.1.3 EUT RF Exposure Evaluation	8-9
	VERSION



SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

Report No.: SZEM170700767705

Page: 4 of 9

4 General Description of EUT

Product Name:	Portable Wire	eless Speaker				
Model No.:	LINK500	eless Opeakei				
Trade mark:	JBL					
For BLE:	JDL					
Operation Frequency:	2402MHz~24	180MHz				
Bluetooth Version:	V 4.2 Dual m					
Modulation Type:	GFSK					
Number of Channel:	40					
Antenna Type:	PIFA					
Antenna Gain:	Antenna 1: 1.5dBi; Antenna 2: 1.5dBi					
For BT:						
Operation Frequency:	2402MHz~2480MHz					
Bluetooth Version:	V 4.2 Dual m	ode				
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)					
Modulation Type:	GFSK, π/4DQPSK, 8DPSK					
Number of Channel:	79					
Hopping Channel Type:	Adaptive Fre	quency Hopping systems				
Antenna Type:	PIFA					
Antenna Gain:	Antenna 1: 1	.5dBi; Antenna 2: 1.5dBi				
For 2.4G wifi:						
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz					
		n(HT40): 2422MHz to 2452MI				
Channel Numbers:		b/g, IEEE 802.11n HT20: 11 (n HT40: 7 Channels	channels			
Channel Separation:	5MHz	ITHT40. 7 Channels				
Type of Modulation:		.11b: DSSS(CCK,DQPSK,DB	DSK)			
Type of Woodilation.		.11g : OFDM(64QAM, 16QAM	•			
		.11n(HT20 and HT40) : OFDN		L		
	QPSK,BPSK	,	(,		
Antenna Type:	PIFA	,				
Antenna Gain:	Antenna 1: 1	.5dBi; Antenna 2: 1.5dBi				
For 5G wifi:						
	Band	Mode	Frequency	Number		
	Range(MHz) of chann					
	UNII Band	IEEE 802.11a	5180-5240	4		
Operation Frequency:	'	IEEE 802.11n/ac 20MHz	5180-5240	4		
		IEEE 802.11n/ac 40MHz	5190-5230	2		
		IEEE 802.11ac 80MHz	5210	1		
	UNII Band	IEEE 802.11a	5260-5320	4		
	II-A IEEE 802.11n/ac 20MHz 5260-5320 4					
		I .	1			

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Shenzhen Branch

Report No.: SZEM170700767705

Page: 5 of 9

		IEEE 802.11n/ac 40MHz	5270-5310	2
		IEEE 802.11ac 80MHz	5290	1
	UNII Band	IEEE 802.11a	5500-5700	11
	II-C	IEEE 802.11n/ac 20MHz	5500-5700	11
		IEEE 802.11n/ac 40MHz	5510-5670	5
		IEEE 802.11ac 80MHz	5530-5610	2
	UNII Band	IEEE 802.11a	5745-5825	5
	III	IEEE 802.11n/ac 20MHz	5745-5825	5
		IEEE 802.11n/ac 40MHz	5755-5795	2
		IEEE 802.11ac 80MHz	5775	1
Type of Modulation:	IEEE 802.11a: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE 802.11n: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE 802.11ac: OFDM (BPSK/QPSK/16QAM/64QAM/256QAM)			М)
Antenna type:	PIFA			
Antenna gain	Antenna 1:2.	5dBi; Antenna 2:2.5dBi		



Shenzhen Branch

Report No.: SZEM170700767705

Page: 6 of 9

4.1 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

VCCI

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

Industry Canada (IC)

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

4.3 Deviation from Standards

None.

4.4 Abnormalities from Standard Conditions

None.

4.5 Other Information Requested by the Customer

None.



Shenzhen Branch

Report No.: SZEM170700767705

Page: 7 of 9

5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

Table 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
(A) Lim				
0.3–3.0 3.0–30 30–300 300–1500 1500–100,000	614 1842/f 61.4	1.63 4.89/f 0.163	*(100) *(900/f²) 1.0 f/300 5	6 6 6 6
(B) Limits	for General Populati	ion/Uncontrolled Exp	posure	
0.3–1.34 1.34–30 30–300 300–1500 1500–100,000	614 824/f 27.5	1.63 2.19/f 0.073	*(100) *(180/f²) 0.2 f/1500 1.0	30 30 30 30 30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4*Pi*R^2)$

Where

Pd = power density in mW/cm2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

Pd id the limit of MPE, 1 mW/cm2. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

5.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.



Shenzhen Branch

Report No.: SZEM170700767705

Page: 8 of 9

4.1.3 EUT RF Exposure Evaluation

Remark: The Bluetooth and Wifi function can't synchronous transmission.

For BT

Antenna: 1.5dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.68 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Antenna	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)	Limit (mW/cm²)	Result
Lowest	2	2402MHz	3.69	2.34	0.0007	1.0	PASS

Note: Refer to report No. SZEM170700767702 for EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For BLE

Antenna: 1.5dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.68 in linear scale

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Antenna	Frequency	Max Conducted	Output Power	Power Density	Limit	Result
		(MHz)	Peak Output	to Antenna	at R = 20 cm	(mW/cm ²)	
			Power (dBm)	(mW)	(mW/cm²)		
Lowest	2	2402MHz	1.68	1.47	0.0004	1.0	PASS

Note: Refer to report No. SZEM170700767703 for EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 2.4G WIFI

Antenna: 1.5dBi;

The maximum Gain measured in fully anechoic chamber is 1.41 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Antenna	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm²)	Result
Lowest	1	2412MHz	23.01	199.99	0.0561	1.0	PASS

Note: Refer to report No. SZEM170700767704 for EUT test Max Conducted Peak Output Power value. The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

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Shenzhen Branch

Report No.: SZEM170700767705

Page: 9 of 9

For 5GHz

Antenna Gain:2.5dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.78 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Max Conducted Peak Output	Output Power to Antenna	Power Density at R = 20 cm	Limit (mW/cm²)	Result
	Power (dBm)	(mW)	(mW/cm²)		
5580MHz	11.87	15.38	0.0055	1.0	PASS

Note: Refer to report No. SZEM170700767705 for EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.