

Report No.: GZCR221200158306

Page: 1 of 11 FCC ID: APIJBL4329P

## RF EXPOSURE EVALUATION REPORT

Application No.: GZCR2212001583TX

**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

**Equipment Under Test (EUT):** 

**EUT Name:** STUDIO MONITOR

Model No.: 4329P Trade Mark: JBL

Standard(s): 47 CFR Part 1.1307

47 CFR Part 1.1310 47 CFR Part 2.1091

 Date of Receipt:
 2023-02-03

 Date of Evaluation:
 2023-02-03

 Date of Issue:
 2023-02-07

Evaluation Result: Pass\*

Ricky Liu



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<sup>\*</sup> In the configuration evaluated, the EUT complied with the standards specified above.



EMC-TRF-03 Rev 1.0

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	Revision Record					
Version	Chapter	Date	Modifier	Remark		
01		2023-02-07		Original		

Authorized for issue by		
	Cof Vhu	
	Curry Wu/Project Engineer	
	Riday Liu	
	Ricky Liu/Reviewer	



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### 2 Evaluation Summary

#### Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.



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#### 4 **General Information**

#### 4.1 Details of E.U.T.

Main speaker: AC 100-240V, 50/60Hz Power supply:

Speaker: AC 100-240V, 50/60Hz

3.0V DC (1.5V x 2 "AAA" Size Batteries) for remote controller

Cable(s): LAN cable:300cm shielded (Two magnetic rings)

AC cable:170cm\*2

**QCC Module** 

For BT:

Operation Frequency: 2402MHz to 2480MHz Bluetooth Version: V5.3 Dual mode (QCC) Modulation Type: GFSK, π/4-DQPSK, 8DPSK

Number of Channels: 79 1MHz Channel Spacing:

Spectrum Spread

Frequency Hopping Spread Spectrum(FHSS) Technology:

Antenna Type: Integral Antenna

Antenna Gain: 2.54dBi declared by applicant

For BLE:

Operation Frequency: 2402MHz to 2480MHz Bluetooth Version: V5.3 Dual mode (QCC)

**GFSK** Modulation Type: Number of Channels: 40 Channel Spacing: 2MHz

Rate data: 1Mbps and 2Mbps Antenna Type: Integral Antenna

Antenna Gain: QCC: 2.54dBi declared by applicant

**Ampak Module** 

For BLE:

Operation Frequency: 2402MHz to 2480MHz Bluetooth Version: V4.2 LE (Ampak);

**GFSK** Modulation Type: Number of Channels: 40 Channel Spacing: 2MHz

Rate data: 1Mbps and 2Mbps Antenna Type: Integral Antenna

Antenna Gain: Ampak(Ant 1): 2.46dBi declared by applicant

For 2.4G:

Operation Frequency: 802.11b/g/n(HT20): 2412MHz to 2462MHz

802.11b: DSSS (CCK, DQPSK, DBPSK);802.11g/n: OFDM (64QAM, Modulation Type:

16QAM, QPSK, BPSK)

Number of Channels: 802.11b/g/n(HT20):11



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Channel Spacing: 5MHz

Antenna Type: Integral Antenna

Ant 1: 2.46dBi; Ant 2: 2.80dBi (Two antennas can simultaneous

transmission)

For 5G:

EMC-TRF-03

Operation Frequency U-NII-1: 5180-5240MHz; U-NII-2A: 5260-5320MHz; U-NII-2C: 5500-

(20MHz): 5700MHz; U-NII-3: 5745-5825MHz

Operation Frequency U-NII-1: 5190-5230MHz; U-NII-2A: 5270-5310MHz; U-NII-2C: 5510-

(40MHz): 5670MHz; U-NII-3: 5755-5795MHz

Operation Frequency U-NII-1: 5210MHz; U-NII-2A: 5290MHz; U-NII-2C: 5530-5610MHz; U-NII-3:

(80MHz): 5775MHz

802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK); 802.11n: OFDM (BPSK,

Modulation Type: QPSK, 16QAM, 64QAM); 802.11ac: OFDM (BPSK, QPSK, 16QAM,

64QAM, 256QAM)

Channel Spacing: 802.11a/n(HT20)/ac(HT20): 20MHz; 802.11n(HT40)/ac(HT40): 40MHz;

802.11ac(HT80): 80MHz

DFS Function: Slave without Radar detection

TPC Function: Support TPC function
Antenna Type: Integral Antenna

Antenna Gain: Ant 1: 3.51dBi; Ant 2: 3.93dBi

Remark: Two antennas can simultaneous transmission

#### For SWM908SD module:

Operation Frequency:	Band	Mode	Frequency Range(MHz)	Number of channels	
	Band I	802.11a	5180-5240	4	
	Band II-A	802.11a	5260-5320	4	
	Band II-C	802.11a	5500-5700	11	
	Band III 802.11a 5745-5825 5				
Modulation Type:	802.11a: OFDM	(64QAM, 16QAM, QPSK, BPSK)			
Channel Spacing:	802.11a: 20MHz				
DFS Function:	Master with Rada	ar detection			
Antenna Type:	Integral Antenna	itegral Antenna			
Antenna Gain:	0.77dBi				



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### 4.2 Evaluating Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory, 198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

#### 4.3 Facility

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

#### • NVLAP (Lab Code: 200611-0)

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

#### ACMA

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

#### SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

#### FCC Recognized Accredited Test Firm(Registration No.: 486818)

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

#### • ISED (Registration No.: 4620B, CAB identifier: CN0052)

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

#### VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)

The 10m Semi-anechoic chamber, 966 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.: R-12460, C-12584, G-20107 and T-11179 respectively.

#### • CBTL (Lab Code: TL129)

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

#### 4.4 Deviation from Standards

None

#### 4.5 Abnormalities from Standard Conditions

None



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## 5 Radio Spectrum Technical Requirement

### 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	its for Occupational	/Controlled Exposu	res					
0.3–3.0								
3.0–30	1842/f	4.89/f	*(900/f²)	6				
300–1500	61.4	0.163	1.0 f/300	6				
1500–100,000			5	6				
(B) Limits	for General Populati	on/Uncontrolled Ex	oosure					
0.3–1.34	614	1.63	*(100)	30				
1.34–30	824/f	2.19/f	*(180/f <sup>2</sup> )	30				
30–300	27.5	0.073	0.2	30				
300-1500			f/1500	30				
1500–100,000			1.0	30				

F= Frequency in MHz

Friis Formula

Friis transmission formula: Pd = (Pout\*G)/(4\*Pi\*R2)

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.



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#### 5.1.3 EUT RF Exposure Evaluation

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Distance to human body (r): 20cm

Remark: Ampak module, QCC module, SWM908SD module can simultaneous transmission at the same time.

QCC module:

EMC-TRF-03

For BT/BLE

Antenna: 2.54dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.79 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Max Conducted Output Power (including tune-up tolerance) (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)	Limit	MPE Ratios	Result
7.93	6.21	0.0022	1.0	0.0022	PASS

Ampak module:

For BLE

Antenna: 2.46dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.76 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Max Conducted Output Power (including tune-up tolerance) (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)	Limit	MPE Ratios	Result
9.00	7.94	0.0028	1.0	0.0028	PASS

#### For 2.4G WIFI

Antenna 1: 2.46dBi; Antenna 2: 2.80dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.76 / 1.91 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Max Conducted Output Power (including tune-up tolerance) (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)	Sum of Power Density (mW/cm2)	Limit	MPE Ratios	Result
13.90	24.55	0.0086	0.0170	1.0	0.0172	PASS
13.54	22.59	0.0086	0.0172	1.0	0.0172	PASS



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#### For 5G WIFI

Antenna 1: 3.51dBi; Antenna 2: 3.93dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.24 / 2.47 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Max Conducted Output Power (including tune-up tolerance) (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)	Sum of Power Density (mW/cm²)	Limit	MPE Ratios	Result
13.27	21.23	0.0095	0.018	1.0	0.010	DACC
12.27	16.87	0.0083	0.016	1.0	0.018	PASS

The distancer (3RD column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

SWM908SD module:

Antenna: 1dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.26 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Max Conducted Output Power	Output Power	Power Density	Limit	MPE	Result
(including tune-up tolerance)	to Antenna	at R = 20 cm		Ratios	
(dD)					
(dBm)	(mW)	(mW/cm <sup>2</sup> )			

Max Conducted Output Power is from FCC ID: UA9800, the issue date on 02/08/2017.

The distancer (3RD column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.



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### exposure conditions for simultaneous transmission operations

The EUT has three modules: Ampak module, QCC module, and SWM908SD module, they can simultaneous transmission at the same time.

For QCC module: There is only one antenna to transmit.

#### For Ampak module:

- 1. The Bluetooth only support one antenna to transmit.
- 2. The WIFI has two antenns to transmit and they can simultaneous transmission.
- 3. The antenna of Bluetooth and antennas of WIFI can't simultaneous transmission.

For SWM908SD module: There is only one antenna to transmit.

So, Simultaneous transmission SAR test is not required, because the Max. sum of the MPE ratios is 0.0022+0.018+0.006=0.0262<1.

### 6 EUT Constructional Details (EUT Photos)

Refer to Appendix - External and Internal Photos for GZCR2212001583AT

- End of the Report -

