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***

* In the configuration evaluated, the EUT complied with the standards specified above.

Ricky Liu
Manager

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

Authorized for issue by				
		 **Curry Wu/Project Engineer**		
		 **Ricky Liu/Reviewer**		

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.

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	Main speaker: AC 100-240V, 50/60Hz 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
Channel Spacing:	1MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
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)
Modulation Type:	GFSK
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);
Modulation Type:	GFSK
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
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK);802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channels:	802.11b/g/n(HT20):11

Channel Spacing:	5MHz
Antenna Type:	Integral Antenna
Antenna Gain:	Ant 1: 2.46dBi; Ant 2: 2.80dBi (Two antennas can simultaneous transmission)
For 5G:	
Operation Frequency (20MHz):	U-NII-1: 5180-5240MHz; U-NII-2A: 5260-5320MHz; U-NII-2C: 5500-5700MHz; U-NII-3: 5745-5825MHz
Operation Frequency (40MHz):	U-NII-1: 5190-5230MHz; U-NII-2A: 5270-5310MHz; U-NII-2C: 5510-5670MHz; U-NII-3: 5755-5795MHz
Operation Frequency (80MHz):	U-NII-1: 5210MHz; U-NII-2A: 5290MHz; U-NII-2C: 5530-5610MHz; U-NII-3: 5775MHz
Modulation Type:	802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK); 802.11n: OFDM (BPSK, 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 Radar detection			
Antenna Type:	Integral Antenna			
Antenna Gain:	0.77dBi			

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

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/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	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 * 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.

5.1.3 EUT RF Exposure Evaluation

Distance to human body (r): 20cm

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

QCC module:

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/cm^2)	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/cm^2)	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	0.0172	1.0	0.0172	PASS
13.54	22.59	0.0086				

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/cm^2)	Sum of Power Density (mW/cm^2)	Limit	MPE Ratios	Result
13.27	21.23	0.0095	0.018	1.0	0.018	PASS
12.27	16.87	0.0083				

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 (including tune-up tolerance) (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	MPE Ratios	Result
13.5	22.39	0.006	1.0	0.006	PASS

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.

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 -