FCC MPE Evaluation Report

Report No: WD-RF-R-240316-B0

Product Name	:	Wireless Speaker
Model Name	:	WS-X3A
FCC ID	:	A6R-WSX3A
Applicant	:	Yamaha Corporation
Received Date	:	Sep. 06, 2024
Tested Date	:	Sep. 25, 2024 ~ Oct. 18, 2024
Applicable Standard	:	47 CFR FCC Part 2.1091 47 CFR FCC Part 1.1310 KDB 447498 D01 OET Bulletin 65 Supplement C

ilac-MRA TAF Testing Laboratory 2965

Wendell Industrial Co., Ltd
Wendell EMC & RF Laboratory

Test Report

Issued Date: October 21, 2024

Project No.: 24Q083002

Product Name	Wireless Speaker
Trade Name	YAMAHA
Model Name	WS-X3A
FCC ID	A6R-WSX3A
Contains FCC ID	NKR-SWA52
Applicant	Yamaha Corporation
Manufacturer	Yamaha Corporation
EUT Rated Voltage	5Vdc/2A or 7.4V from battery
EUT Test Voltage	AC 120V / 60Hz
EUT Supports Radios Application	Bluetooth BR/EDR SDR 5.8 GHz
Applicable Standard	47 CFR FCC Part 2.1091 47 CFR FCC Part 1.1310 KDB 447498 D01 OET Bulletin 65 Supplement C
RF Evaluation	0.00995 mW/cm^2
Test Result	Complied

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Document Revision History

Report No.	Issue date	Description
WD-RF-R-240316-B0	October 21, 2024	Initial report

Reference Testing Standard

Standard	Description	Version
47 CFR FCC Part 2.1091	Radiofrequency radiation exposure evaluation: mobile devices.	--
47 CFR FCC Part 1.1310	Radiofrequency radiation exposure limits.	--
KDB 447498 D01	RF Exposure procedures and equipment authorization policies for mobile and portable devices.	V06
OET Bulletin 65 Supplement C	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields.	Edition 01-01

1 Generation Information

1.1 Applicant

Yamaha Corporation
10-1,Nakazawa-cho, Chuo-ku,Hamamatsu-shi, Shizuoka-ken, 430-8650, Japan

1.2 Manufacturer

Yamaha Corporation
10-1,Nakazawa-cho, Chuo-ku,Hamamatsu-shi, Shizuoka-ken, 430-8650, Japan

1.3 Description of Equipment under Test

Product Name	Wireless Speaker
Model No.	WS-X3A
FCC ID	A6R-WSX3A
Contains FCC ID	NKR-SWA52
Frequency Range	Bluetooth BR/EDR：2402 ~ 2480 MHz SRD 5.8 G：5150~5250 MHz 5725~5850 MHz 5850~5895 MHz
Antenna Information	Refer to the table “Antenna List”
EUT Rated Voltage	5Vdc/2A or 7.4V from battery
EUT Test Voltage	AC 120V / 60Hz
EUT Serial Number	Z004614UW / Z005934UW / Z005864UW

The above equipment was tested by Wendell EMC & RF Laboratory For compliance with the requirements set forth in 47 CFR § 2.1091 / 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties

Antenna List

No.	Manufacturer	Model No.	Antenna Type	Peak Gain
1	INPAQ TECHNOLOGY CO., LTD.,	RFPCA320808IMAB301	PCB Antenna	2.5 dBi for 2.4GHz
	LITE-ON Technology Corporation	RFPCA320808IMAB301/SBA801	FPC Antenna	2.5dBi for 2.4GHz
2	KINGRF/KINGRF TECHNOLOGY CO., LTD.	IA.0355.LA.2FI (IA.0397.LB.03FI)	FPC Antenna	4.23 dBi for SRD 5.8GHz
3	WNC	WNC	Printed Antenna	3.5 dBi for SRD 5.8GHz

1.4 Test Facility

Items	Required (IEC 60068-1)
Temperature (°C)	15-35
Humidity (% RH)	25-75
Barometric pressure (mbar)	860-1060

Description: Accredited by TAF
Accredited Number: 2965

Issued by: Wendell Industrial Co., Ltd

Company Address: 6F/6F-1, No.188, Baoqiao Rd., Xindian Dist.,
New Taipei City 23145, Taiwan R.O.C

Test Lab: Wendell EMC & RF Laboratory

Lab Address: 5F-1, No.188, Baoqiao Rd., Xindian Dist.,
New Taipei City 23145, Taiwan R.O.C

Test Location: No. 119, Wugong 3rd Rd., Wugu Dist.,
New Taipei City 248, Taiwan (R.O.C.)

Designation Number: TW0025

Test Firm Registration Number: 665221

2 Mobile device Assessment Procedure

In 47 CFR § 2.1091, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. In this context, the term “fixed location” means that the device is physically secured at one location and is not able to be easily moved to another location.

3 RF Exposure Assessment

Estimation of the expected exposure in power density can be made with the following equation:

$$S = \frac{P \times G}{4\pi \times R^2} = \frac{EIRP}{4\pi \times R^2}$$

S: power density

P: power input to the antenna

G: power gain of the antenna in the direction of interest relative to an isotropic radiator.

R: distance to the center of radiation of the antenna.

EIRP: Effective Isotropic Radiated Power

4 Limit Requirement

In 47 CFR § 1.1310, use of the device as based upon the user's awareness and ability to exercise control over human exposure. The two categories defined are Occupational/Controlled Exposure and General Population/Uncontrolled. These two categories are defined as follow:

Occupational/Controlled Exposure:

Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure.

General Population/Uncontrolled:

General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Limits for Occupational / Controlled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/ cm²)**	**Averaging Time|E|²,|H|² or S (minutes)**
0.3-3.0	614	1.63	(100)*	6
3.0-30	1,842 / f	4.89 / f	(900 / f^2)*	6
30-300	61.4	0.163	1.0	6
300-1,500	--	--	f / 300	6
1,500-100,000	--	--	5	6

Note：

(1) f = frequency in MHz

(2) * = Plane-wave equivalent power density

Limits for General Population / Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/ cm²)**	**Averaging Time|E|²,|H|² or S (minutes)**
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 / 1,500	30
1,500-100,000	--	--	1.0	30

Note：

(1) f = frequency in MHz

(2) * = Plane-wave equivalent power density

5 Test Results

Mode	Max. Power (E.I.R.P)		Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Result
	dBm	mW				
BT	7.84	6.08	20	0.00121	1	Pass
SRD 5.8G	16.43	43.95	20	0.00874	1	Pass

Note：

＊ Each Function of the max power which perform MPE of any configurations.

＊ The total power of BT and SRD 5.8G transmission at the same time is the largest.

＊ The SRD 5.8G output power (EIRP) comes from the module report (Report No. : FR5N2023-03).

＊ Source of data from reports P11 & P80, EIRP = output power + antenna gain = 12.2 + 4.23 = 16.43 dBm

＊ The frequency (range) used by the radio frequency function is 1.5GHz~100GHz, the RF field strength limits is e.i.r.p. less than or equal to 1mW/cm^2.

＊ The limit is equal to the minimum value.

＊ The Max total MPE = BT + SRD 5G = 0.00995 (mW/cm^2)

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