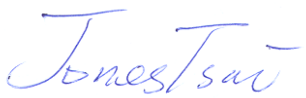
RF Exposure Evaluation Report

APPLICANT	**:**	**Yamaha Corporation**
EQUIPMENT	**:**	**Bluetooth® Wireless Audio Receiver**
BRAND NAME	**:**	**YAMAHA**
MODEL NAME	**:**	**YBA-11**
FCC ID	**:**	**A6R-YBA11A**
FILING TYPE	**:**	**Certification**
STANDARD	**:**	**OET Bulletin 65 Supplement C (Edition 01-01)**

We, SPORTON INTERNATIONAL INC., would like to declare that the device has been evaluated in accordance with FCC OET Bulletin 65 Supplement C (Edition 01-01), and pass the limit. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:



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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA311715	Rev. 01	Initial issue of report	Mar. 08, 2013

1. Administration Data

1.1. Testing Laboratory

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978

1.2. Applicant

Company Name	Yamaha Corporation
Address	10-1 Nakazawa-cho, Naka-ku, Hamamatsu Shizuoka, 430-8650, Japan

1.3. Manufacturer

Company Name	MERRY ELECTRONICS (SHENZHEN) CO., LTD.
Address	Merry Ind. Park Hua Rong Rd., DaLang, BaoAn ShenZhen 518109 China

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Bluetooth® Wireless Audio Receiver
Brand Name	YAMAHA
Model Name	YBA-11
FCC ID	A6R-YBA11A
Tx Frequency	2402 MHz ~ 2480 MHz
Antenna Type	PIFA Antenna
HW Version	R2
SW Version	Ver 1.2.6
Antenna Gain	1.55dBi
Uplink Modulation	Bluetooth: GFSK Bluetooth +EDR: π/4-DQPSK / 8-DPSK
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

3. RF Exposure Limit Introduction

The FCC categorizes the RF exposure limit based on the intended usage of the device and the user's awareness and ability to exercise control over his or her exposure. This is a consumer product to be used in the home, hence this device was evaluated by mobile device with general population/uncontrolled exposure condition. The definition of these category are shown as follows:

▪ **Mobile Devices:**

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to be generally used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitters' radiating structures and the body of the user or nearby persons. Transmitters designed to be used by consumers or workers that can be easily re-located are considered mobile devices if they meet the 20 centimeter separation requirement. The FCC rules for evaluating mobile devices for RF compliance are found in 47 CFR 2.1091.

▪ **General Population/Uncontrolled Exposure:**

The general population / uncontrolled exposure limits are applicable to 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 made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category and the general population/uncontrolled exposure limits apply to these devices.

Per OET Bulletin 65, the power density limit for General Population/Uncontrolled Exposure summary here:

Table: Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Power Density (S) (mW/cm2)
0.3–1.34	*(100)
1.34–30	*($180/f^2$)
30–300	0.2
300–1500	f/1500
1500–100,000	1.0

f = frequency in MHz

* = Plane-wave equivalent power density

4. Maximum RF average output power among production units

Bluetooth Average power (dBm)			
Mode/Band	1Mbps (GMSK)	2Mbps (π/4-DQPSK)	3Mbps (8-DPSK)
2.4 GHz Bluetooth	4	4	4

5. Conducted RF Output Power (Unit: dBm)

Channel	Frequency (MHz)	Average power (dBm)		
		Mode		
		GFSK	π/4-DQPSK	8-DPSK
CH 0	2402	2.95	**3.22**	**3.22**
CH 39	2441	3.06	3.06	3.02
CH 78	2480	2.64	2.26	2.28

6. Radio Frequency Radiation Exposure Evaluation

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:
S = Power Density
P = Output Power at Antenna Terminals
G = Gain of Transmit Antenna (linear gain)
R = Distance from Transmitting Antenna

For this device, the calculation is as follows:

Bluetooth Operating Frequency > 1.5GHz

Function	Freq. (MHz)	Antenna Gain (dBi)	Burst-Based Time-Average Power (dBm	Source-Based Time-Average Power (dBm)	Source-Based Time-Average EIRP (mW)	Calculated RF Exposure (mW/cm^2)	Limit (mW/cm^2)
Bluetooth 2.4GHz	2402.00	1.55	4.00	4.00	3.59	0.00	1.00

Note:
According to “Maximum RF average output power among production units” to evaluate radiation exposure.

Conclusion:

Per part 2.1091(c), EUT source-based time-averaged ERP < 1.5W for RF operating frequency ≤ 1.5GHz, EUT source-based time-averaged EIRP < 3W for RF operating frequency > 1.5GHz, routine evaluation of MPE is not required; MPE calculation is sufficient to show compliance. The MPE calculation results indicate that the EUT complies with the RF exposure limit of FCC OET Bulletin 65 Supplement C (Edition 01-01).