

Project No: TM-2404000099P  
Report No.: TMWK2404001159KS

FCC ID: Y4O-HG12

Page 1 / 15  
Rev.: 00

# RF Exposure Evaluation Report

**FCC 47 CFR § 2.1091**

for  
**Audio Device**

**Model Name.: HG12**

Prepared for:  
**inMusic Brands, Inc.**  
**200 Scenic View Drive, Cumberland, RI 02864, U.S.A.**

Prepared by  
**Compliance Certification Services Inc.**  
**Wugu Laboratory**  
**No.11, Wugong 6th Rd., Wugu Dist.,**  
**New Taipei City, Taiwan. (R.O.C.)**  
**Issue Date: May 30, 2024**

**Note: This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document. The client should not use it to claim product endorsement by TAF, NIST or any government agencies. The test results in the report only apply to the tested sample.**

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



Report No.:        TMWK2404001159KS

Page    2 / 15  
Rev.:    00

**Revision History**

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	May 30, 2024	Initial Issue	ALL	Polly Wang



**Table of Contents**

**1    ATTESTATION OF TEST RESULTS .....4**

**2    TEST SPECIFICATION, METHODS AND PROCEDURES .....5**

**3    DEVICE UNDER TEST (DUT) INFORMATION.....6**

     3.1    DUT DESCRIPTION .....6

     3.2    WIRELESS TECHNOLOGIES .....7

**4    MAXIMUM PERMISSIBLE EXPOSURE .....9**

     4.1    LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE) .....9

     4.2    MPE CALCULATION METHOD .....10

     4.3    MPE EXEMPTION .....11

     4.4    MULTIPLE RF SOURCES .....12

**5    MPE EXEMPTION OPTION B.....13**

**6    SIMULTANEOUS TRANSMISSION ANALYSIS .....14**


**7    FACILITIES .....15**



Report No.: TMWK2404001159KS

Page 4 / 15  
Rev.: 00

1 Attestation of Test Results

Applicant Name	inMusic Brands, Inc.
Model Name	HG12
Applicable Standards	FCC 47 CFR § 2.1091 FCC 47 CFR § 1.1307 FCC 47 CFR § 1.1310 Published RF exposure KDB procedures
Receive EUT Date:	April 09, 2024
<p>Compliance Certification Services Inc. , tested the above equipment in accordance with the requirements set forth in the above standards. Determination of compliance is based on the results of the compliance measurement,not taking into account measurement instrumentation uncertainty.All indications of Pass/Fail in this report are opinions expressed by Compliance Certification Services Inc, based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.</p>	
<p>Approved &amp; Released By:</p> <div></div>	
<p>Sky Zhou Asst. Section Manager Compliance Certification Services Inc.</p>	



Report No.: TMWK2404001159KS

Page 5 / 15

Rev.: 00

## 2 Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1091, the following FCC Published RF exposure [KDB](#) procedures:

- 447498 D04 Interim General RF Exposure Guidance v01
- 865664 D02 RF Exposure Reporting v01r02



Report No.: TMWK2404001159KS

Page 6 / 15  
Rev.: 00

### 3 Device Under Test (DUT) Information

#### 3.1 DUT Description

Product	Audio Device
Trade Name	HEADRUSH
Model No.	HG12
Model Discrepancy	N/A
Hardware Version	INM-HG12-Rear Panel
Software Version	N/A
Sample Stage	Identical prototype

### 3.2 Wireless Technologies

Frequency bands	<input checked="" type="checkbox"/> Bluetooth 5.0: 2402MHz-2480MHz <input checked="" type="checkbox"/> 802.11b/g, 802.11n HT20: 2412MHz ~ 2462 MHz <input type="checkbox"/> 802.11n HT40/ac (VHT40)/ax (HE40): 2422MHz ~ 2452MHz <input type="checkbox"/> 802.11a/n HT20: 5180MHz ~ 5240MHz / 5260MHz ~ 5320MHz / 5500MHz ~ 5720MHz / 5745MHz ~ 5825MHz <input type="checkbox"/> 802.11ac VHT20: 5180MHz ~ 5240MHz / 5260MHz ~ 5320MHz / 5500MHz ~ 5720MHz / 5745MHz ~ 5825MHz <input type="checkbox"/> 802.11ax HE20: 5180MHz ~ 5240MHz / 5260MHz ~ 5320MHz / 5500MHz ~ 5720 MHz / 5745MHz ~ 5825MHz <input type="checkbox"/> 802.11n HT40: 5190MHz ~ 5230MHz / 5270MHz ~ 5310MHz / 5510MHz ~ 5710MHz / 5755MHz ~ 5795MHz <input type="checkbox"/> 802.11ac VHT 40: 5190MHz ~ 5230MHz / 5270MHz ~ 5310MHz / 5510MHz ~ 5710MHz / 5755MHz ~ 5795MHz <input type="checkbox"/> 802.11ax HE40: 5190MHz ~ 5230MHz / 5270MHz ~ 5310MHz / 5510MHz ~ 5710MHz / 5755MHz ~ 5795MHz <input type="checkbox"/> 802.11ac VHT80: 5210MHz / 5290MHz / 5530MHz ~ 5690 MHz / 5775MHz <input type="checkbox"/> 802.11ax HE80: 5210MHz / 5290MHz / 5530MHz ~ 5690 MHz / 5775MHz <input type="checkbox"/> Others																											
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm2) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm2)																											
Antenna Specification	<b>WLAN EMBEDDED ANTENNA</b>  2.4GHz: Direction Gain: 4.63 dBi (Numeric gain: 2.90) Worst																											
Maximum Measurement Average Power	<table border="1"> <tr> <td colspan="3"><b>2.4GHz</b></td></tr> <tr> <td>IEEE 802.11b Mode:</td><td>16.17 dBm</td><td>(41.400 mW)</td></tr> <tr> <td>IEEE 802.11g Mode:</td><td>13.73 dBm</td><td>(23.605 mW)</td></tr> <tr> <td>IEEE 802.11n HT 20 Mode:</td><td>12.65 dBm</td><td>(18.408 mW)</td></tr> <tr> <td></td><td></td><td></td></tr> <tr> <td colspan="3"><b>Bluetooth</b></td></tr> <tr> <td>Bluetooth 4.0</td><td>5.10 dBm</td><td>(3.236 mW)</td></tr> <tr> <td>Bluetooth 5.0</td><td>4.99 dBm</td><td>(3.155 mW)</td></tr> <tr> <td></td><td></td><td></td></tr> </table>	<b>2.4GHz</b>			IEEE 802.11b Mode:	16.17 dBm	(41.400 mW)	IEEE 802.11g Mode:	13.73 dBm	(23.605 mW)	IEEE 802.11n HT 20 Mode:	12.65 dBm	(18.408 mW)				<b>Bluetooth</b>			Bluetooth 4.0	5.10 dBm	(3.236 mW)	Bluetooth 5.0	4.99 dBm	(3.155 mW)			
<b>2.4GHz</b>																												
IEEE 802.11b Mode:	16.17 dBm	(41.400 mW)																										
IEEE 802.11g Mode:	13.73 dBm	(23.605 mW)																										
IEEE 802.11n HT 20 Mode:	12.65 dBm	(18.408 mW)																										
<b>Bluetooth</b>																												
Bluetooth 4.0	5.10 dBm	(3.236 mW)																										
Bluetooth 5.0	4.99 dBm	(3.155 mW)																										

Maximum tune up power	<b>2.4GHz</b>		
	IEEE 802.11b Mode:	16.50 dBm	(44.668 mW)
	IEEE 802.11g Mode:	14.50 dBm	(28.184 mW)
	IEEE 802.11n HT 20 Mode:	13.50 dBm	(22.387 mW)
	<b>Bluetooth</b>		
	Bluetooth 4.0	5.50 dBm	(3.548 mW)
	Bluetooth 5.0	5.50 dBm	(3.548 mW)

**Notes:**

1. For more details, please refer to the User's manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.
3. The tune up power referred the AVG power of the test report TMTN2404000332NR for RF Exposure assessment purpose.



## 4 Maximum Permissible Exposure

### 4.1 Limits for Maximum Permissible Exposure (MPE)

**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 <sup>2</sup> )	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	* 100	6
3.0-30	1842/f	4.89/f	* 900/f <sup>2</sup>	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			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 <sup>2</sup>	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
<b><u>1,500-100,000</u></b>			1.0	30

## 4.2 MPE Calculation Method

### Calculation

Given  $E = \frac{\sqrt{30 \times P \times G}}{d}$  &  $S = \frac{E^2}{377}$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{377 d^2}$$

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \text{ Equation 1}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm<sup>2</sup>

If, Substituting the MPE safe distance using d = 20 cm into Equation 1:

$$S = 0.000199 \times P \times G$$

### 4.3 MPE EXEMPTION

- (A) The available maximum time-averaged power is no more than 1 mW
- (B) The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold  $P_{th}$  (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive).  $P_{th}$  is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left( \frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

$d$  = the separation distance (cm);

- (C) Using Table 1 and the minimum separation distance ( $R$  in meters) from the body of a nearby person for the frequency ( $f$  in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply,  $R$  must be at least  $\lambda/2\pi$ , where  $\lambda$  is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of  $\lambda/4$  or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$ .
1.34-30	$3,450 R^2/f^2$ .
30-300	$3.83 R^2$ .
300-1,500	$0.0128 R^2 f$ .
1,500-100,000	$19.2 R^2$ .
Note: $R$ is in meters, $f$ is in MHz.	

#### 4.4 Multiple RF sources

In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation),

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$



Report No.: TMWK2404001159KS

Page 13 / 15

Rev.: 00

## 5 MPE Exemption Option B

### WIFI 2.4GHz

Mode	Frequency (MHz)	R(m)	Max Tune-up EIRP(dBm)	Max Tune-up ERP(dBm)	Max Tune-up ERP(mW)	ERP Threshold(mW)	MPE Exemption
IEEE 802.11b	2462.00	0.2	21.13	18.98	79.068	3060	Complies
IEEE 802.11g	2462.00	0.2	19.13	16.98	49.888	3060	Complies
IEEE 802.11n HT 20	2462.00	0.2	18.13	15.98	39.628	3060	Complies

### Bluetooth

Mode	Frequency (MHz)	R(m)	Max Tune-up EIRP(dBm)	Max Tune-up ERP(dBm)	Max Tune-up ERP(mW)	ERP Threshold(mW)	MPE Exemption
Bluetooth 4.0	2480.00	0.2	10.13	7.98	6.281	3060	Complies
Bluetooth 5.0	2480.00	0.2	10.13	7.98	6.281	3060	Complies

## 6 Simultaneous Transmission Analysis

In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation),

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

N/A



Report No.: TMWK2404001159KS

Page 15 / 15  
Rev.: 00

## 7 Facilities

All measurement facilities used to collect the measurement data are located at

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan. (R.O.C.)

**END OF REPORT**