# 1. RF Exposure Requirements

## 1.1 General Information

**Client Information** 

Applicant: ZHUHAI MEDING TECHNOLOGY CO.,LTD

Address of applicant: Floor 2,Building 6A,ZHIZAO DAJIE,JINHE ROAD,HONGQI

TOWN, JINWAN DISTRICT, ZHUHAI, GUANGDONG, China

Manufacturer: ZHUHAI MEDING TECHNOLOGY CO.,LTD

Floor 2,Building 6A,ZHIZAO DAJIE,JINHE ROAD,HONGQI Address of manufacturer:

TOWN, JINWAN DISTRICT, ZHUHAI, GUANGDONG, China

**General Description of EUT:** 

Product Name: AM/FM/SW/BT PORTABLE RADIO

Trade Name /

Model No.: A11

Adding Model(s): A21, A22, A23

Rated Voltage: DC3.7V Battery Capacity: 4000mAh

Adapter Model: /

FCC ID: 2A9FO-A11
Equipment Type: Mobile device

**Technical Characteristics of EUT:** 

Bluetooth Version: V5.4 (BR/EDR mode)

Frequency Range: 2402-2480MHz

RF Output Power: 2.21dBm (Conducted)

Data Rate: 1Mbps, 2Mbps
Modulation: GFSK, π/4 DQPSK

Quantity of Channels: 79
Channel Separation: 1MHz

Type of Antenna: PCB Antenna
Antenna Gain: -0.68dBi

Bluetooth Version: V5.4 (BLE mode) Frequency Range: 2402-2480MHz

RF Output Power: 1.39dBm (Conducted)

Data Rate: 1Mbps
Modulation: GFSK
Quantity of Channels: 40
Channel Separation: 2MHz

Type of Antenna: PCB Antenna
Antenna Gain: -0.68dBi

# 1.2 RF Exposure Exemption

According to §1.1307(b)(3) and KDB 447498 D04 Interim General RF Exposure Guidance v01, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

**Option A:** FCC Rule Part 1.1307 (b)(3)(i)(A):The available maximum time-averaged power is no more than 1mW, regardless of separation distance.

**Option B:** FCC Rule Part 1.1307 (b)(3)(i)(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.  $P_{th}$  is given by:

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

Where

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

and

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

d = the separation distance (cm);

**Option C:** FCC Rule Part 1.1307 (b)(3)(i)(C): 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. R must be at least  $\lambda/2\pi$ , where  $\lambda$  is the free-space operating wavelength in meters.

Single RF Sources Subject to Routine Environmental Evaluation				
RF Source frequency (MHz) Threshold ERP (watts)				
0.3-1.34	1,920 R <sup>2</sup>			
1.34-30	3,450 R <sup>2</sup> /f <sup>2</sup>			
30-300	3.83 R <sup>2</sup>			
300-1,500	0.0128 R <sup>2</sup> f			
1,500-100,000	19.2R <sup>2</sup>			

#### For Multiple RF sources: FCC Rule Part 1.1307(b)(3)(ii):

- (A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required).
- (B) 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.

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

## 1.3 Calculated Result

Radio	Prediction	Output	Antenna	Duty	Tune-Up	ERP	
Access	Frequency	Power	Gain	Cycle	Time-Averaged Power		
Technology	(MHz)	(dBm)	(dBi)	(%)	(dBm)	(dBm)	
Bluetooth	2402	2.21	-0.68	100	3.00	0.17	

Frequency	Ontion	Min. Distance			Ratio	Result	
(MHz)	Option	(cm)	(dBm)	(mW)	(mW)	Kallo	Pass/Fail
2402	В	0.5	3.00	2.00	2.788	0.72	Pass

Note: 1. Time-Averaged Power=Output Power \* Duty Cycle; ERP= Time-Averaged Power+ Antenna gain-2.15dB

- 2. Option A, B and C refers as clause 1.2.
- 3. For option B, Max (time-averaged power, effective radiated power (ERP)) converts to Max. Power. For option C, ERP converts to Max. Power;
- 4. For option B, P<sub>th</sub> (mW) converts to Exposure Limit (mW); For option C, ERP (W) converts to Exposure Limit (mW).
  - 5. Ratio= Tune-Up ERP (mW)/ Exposure Limit (mW)

#### **Mode for Simultaneous Multi-band Transmission:**

Radio Access	Dotio 4	Ratio 2	Simultaneous	Limit	Result
Technology	Ratio 1		Ratio		Pass/Fail

Result: Pass