

1. RF Exposure Requirements

1.1 General Information

Client Information

Applicant: Shenzhen AngSi Technology Co., Ltd.
Address of applicant: 6/F, Block B, Ding Xin Science Park, Hong Lang North No.2 Road, Bao An District, ShenZhen PRC

Manufacturer: Shenzhen AngSi Technology Co., Ltd.
Address of manufacturer: 6/F, Block B, Ding Xin Science Park, Hong Lang North No.2 Road, Bao An District, ShenZhen PRC

General Description of EUT:

Product Name: BUDS01
Trade Name: Pioneer
Model No.: BUDS01-BK
BUDS01-WH, BUDS01-TN, BUDS01-BE, BUDS01-BN, BUDS01-RD, BUDS01-GR, BUDS01-SL, BUDS01-MT, BUDS01-BL, BUDS01-NB, BUDS01-YL, BUDS01-PK, BUDS01-GD, BUDS01-CG, BUDS01-PU, BUDS01-OR, BUDS02-BK, BUDS02-WH, BUDS02-TN, BUDS02-BE, BUDS02-BN, BUDS02-RD, BUDS02-GR, BUDS02-SL, BUDS02-MT, BUDS02-BL, BUDS02-NB, BUDS02-YL, BUDS02-PK, BUDS02-GD, BUDS02-CG, BUDS02-PU, BUDS02-OR, BUDS03-BK, BUDS03-WH, BUDS03-TN, BUDS03-BE, BUDS03-BN, BUDS03-RD, BUDS03-GR, BUDS03-SL, BUDS03-MT, BUDS03-BL, BUDS03-NB, BUDS03-YL, BUDS03-PK, BUDS03-GD, BUDS03-CG, BUDS03-PU, BUDS03-OR, BUDS04-BK, BUDS04-WH, BUDS04-TN, BUDS04-BE, BUDS04-BN, BUDS04-RD, BUDS04-GR, BUDS04-SL, BUDS04-MT, BUDS04-BL, BUDS04-NB, BUDS04-YL, BUDS04-PK, BUDS04-GD, BUDS04-CG, BUDS04-PU, BUDS04-OR, BUDS05-BK, BUDS05-WH, BUDS05-TN, BUDS05-BE, BUDS05-BN, BUDS05-RD, BUDS05-GR, BUDS05-SL, BUDS05-MT, BUDS05-BL, BUDS05-NB, BUDS05-YL, BUDS05-PK, BUDS05-GD, BUDS05-CG, BUDS05-PU, BUDS05-OR

Adding Model(s):

Rated Voltage: DC 5V
Battery Capacity: Charging compartment: 3.7V 400mAh
Headset: 3.7V 35mAh
Adapter Model: /
FCC ID: 2AGA6-PIBUDS01
Equipment Type: Portable device

Technical Characteristics of EUT:

Bluetooth

Bluetooth Version: V5.3 (BR/EDR mode)

Frequency Range:	2402-2480MHz
RF Output Power:	-2.40dBm (Conducted)
Data Rate:	1Mbps, 2Mbps, 3Mbps
Modulation:	GFSK, $\pi/4$ DQPSK, 8DPSK
Quantity of Channels:	79
Channel Separation:	1MHz
Type of Antenna:	ceramic antenna
Antenna Gain:	2.78dBi

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:

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

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);

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 λ 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	$1,920 R^2$
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	$19.2 R^2$

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.

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

1.3 Calculated Result

Radio Access Technology	Prediction Frequency (MHz)	Output Power (dBm)	Antenna Gain (dBi)	Duty Cycle (%)	Tune-Up Time-Averaged Power (dBm)	ERP (dBm)
Bluetooth	2402	-2.40	2.78	100	-2.00	-1.37

Frequency (MHz)	Option	Min. Distance (cm)	Max. Power (dBm) (mW)		Exposure Limit (mW)	Ratio	Result Pass/Fail
2402	B	0.5	-1.37	0.73	2.788	0.26	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_{th} (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 Technology	Ratio 1	Ratio 2	Simultaneous Ratio	Limit	Result Pass/Fail
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Result: Pass