BODY WORN (BW) HEARING AID or PERSONAL SOUND AMPLIFIER HARDWARE

APPLICATION NOTE

7/2020-BW-HARDWARE



HARDWARE BLOCK DIAGRAM:

InvenSense[®] ICS-43432 MEMS Microphone

Microchip[®] SAMD21E17A Microcontroller

PWM H-bridge Tri-state Drive

Noise Isolating Earbuds

HARDWARE DESIGN DETAILS:

The Body Worn (BW) hardware is powered by a single Alkaline or rechargeable NiMH "AAA" battery. The BW hardware includes 2 buttons for volume up/down control and a green LED light for visual indications. The device powers on when earbuds are plugged in and turns off when earbuds are removed from the 3.5mm headphone jack.

The BW hardware includes provisions for firmware development through a serial wire debug interface (RESET, SWCLK, SWDIO, POWER, and GROUND). The design includes 5 pogo pin receptors spaced on 1/10 inch centers for interface to a programmer/debugger such as the Microchip ATMEL-ICE. Receptors are picture on the top edge of the PCB.

The 2-layer printed circuit board measures: 50 mm by 13 mm. The assembly measures: 19.3 mm tall with alkaline or rechargeable NiMH "AAA" battery installed.



The battery holder is modified before installation. Slide a PCB on to the solder pins of the battery holder and use a narrow tip soldering iron to mark the microphone port location near the negative battery holder terminal then remove the PCB and enlarge the hole with the soldering iron as shown below.



On the positive terminal side of the battery holder; create a channel in the battery holder case with a soldering iron, bend the terminal over, and then trim as shown below.



Solder the battery holder to the PCB assembly with the negative terminal at the through hole and the positive battery holder terminal flush with the large solder pad on the bottom side of the PCB assembly as shown below.



Sound enters the microphone port through the hole in the bottom of the battery holder shown here on the left side of the image between the spring and the battery.



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HARDWARE WARNINGS: (1) Small parts choking hazard. (2) Cords strangulation hazard.

Safety guidance provided for the use of Pixation Corp. firmware follows:

1. Instructions to the end user: Use only the earbuds originally provided with the device. Using any other earbuds may produce sound levels which cause hearing loss.

2. Instructions to the end user shall include recommendations to avoid sound environments where sound levels exceed 85 decibels, A-weighted, as an 8-hour time-weighted average (85 dBA as an 8-hr TWA) using a 3-dB exchange rate (see: https://www.cdc.gov/niosh/topics/noise/default.html).

3. Instructions to the end user shall include recommendations to limit device usage to 8 hours/day.

4. Instructions to the end user shall include recommendations to limit device usage to no more than 40 hours/week.

Contact: Pixation@Pixation.com for firmware or printed circuit board (PCB) files.

See additional Application Notes at www.Pixation.com

Schematic and Bill of Materials (BOM) attached.

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9		Note that the Letrivigit eachuds are connected between two output pins and NOT to ground. This connection forms an H-bridge between the two digital output pins. Current through the eachuds can flow in opposite directors depending which pin is true and which pin is false at any instant. If both pins have the same logic level then no current will flow. This is a 'th-statte' drive. The eachuds are driven with a Pulse Width Modulation signal updated 62.500 times per second. This configuration can drive balanced armature receivers or dynamic speakers.		2220K 100 100 100 100 100 100 100 1	V (BW) HEARING AID L SOUND AMPLIFIER Pixation.com M Sheet: 1/1
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