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**EN 2160 - Electronic Design Realization**

**Report**

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## **Abstract**

This report is about the development of a wireless headphone. It is built using CA6928 Bluetooth module. It receives the digital signal from the device. Additionally, it contains digital to analog converter which converts the digital signal into audio signal. It gets sufficient power from Li-ion battery and a charging circuit is also implemented to charge the battery. Tp4056 module is used for recharging the battery. This report includes about the technical specifications, bill of materials ,enclosure design files and schematic design files.

## **Contents**

- 1 Description of the product
- 2 Specifications
- 3 Block diagrams
- 4 Selections of Materials
- 5 Bill of Materials
- 6 Schematics
- 7 Enclosure design files
- 8 How to test for functionality

## 1 Description of the product

A headphone converts the digital signal into audio signal. Normally, it consists of digital to analog converter, amplifier and speaker. But this headphone is a wireless connection device. So additionally it requires Bluetooth audio receiver, rechargeable battery and recharging module for the battery. But Bluetooth audio receiver itself has a digital to analog converter. So it consists of Bluetooth audio receiver, amplifier, rechargeable battery, charging module and speaker. This device can be connected to any device via Bluetooth and there is no need to think about the connection pin type.

## 2 Specifications

Battery voltage – 3.3V

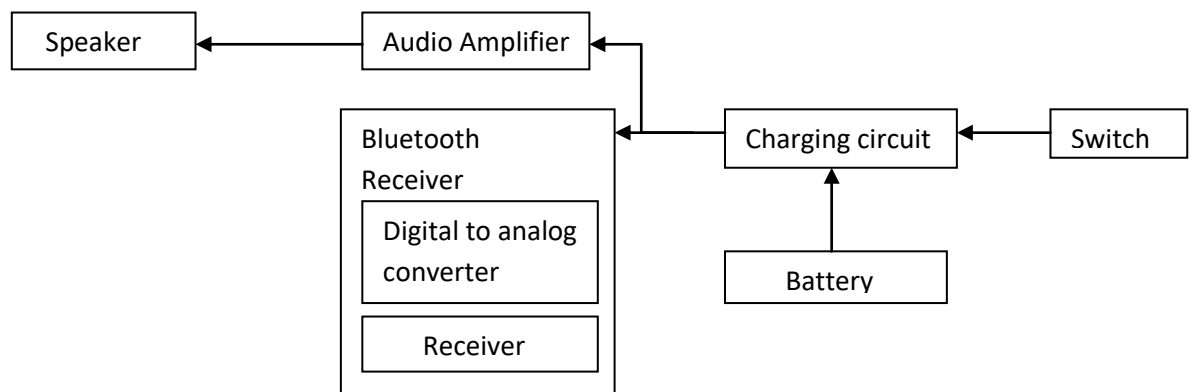
Bluetooth receiver range – 10m

Battery - 3000 mAh

Input voltage: 4.5V- 5V

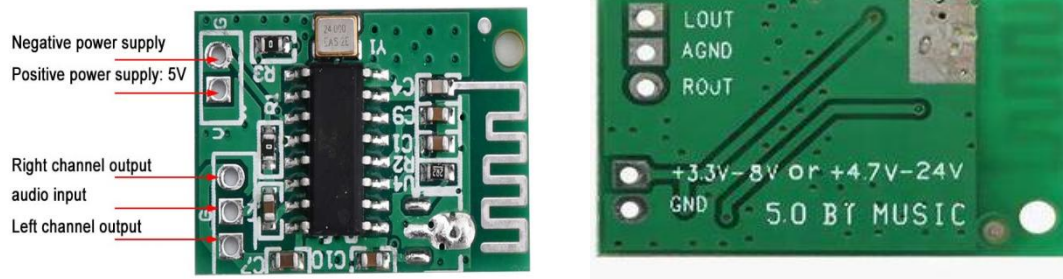
Full charge voltage: 4.2V

## 3 Block Diagram



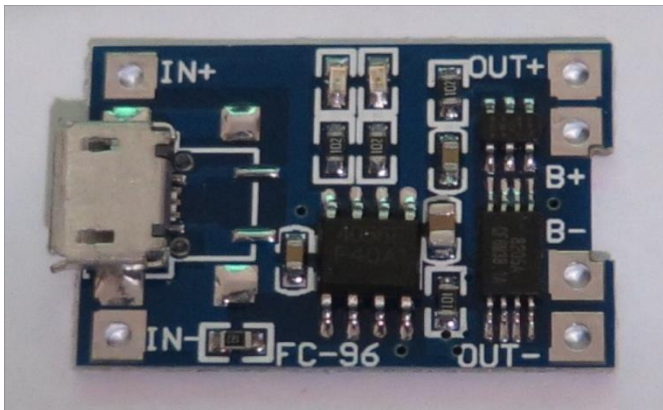
## 4 Selection of materials

Bluetooth receiver module : CA6928



Its operating voltage is between 3.3V – 5V. It consumes low power and it is light weight. It consists of Bluetooth audio receiver as well as digital to analog converter.

Charging module :TP4056



It uses tp4056 controller and charging current 1A. It uses micro-USB for connection. It works with linear charging method.

Input voltage : 4.5V- 5V

Full charge voltage: 4.2V

LED indicator: Red is charging and green is full charge

## Battery



Battery features:

- ❖ Battery type: 18650
- ❖ Battery capacity: 3000mAh
- ❖ Battery voltage: 3.7V
- ❖ Battery chemistry: Li-ion

## **5 Bill of materials**

CA6928 module: 410

Tp4056 module: 80

Battery: 800

Wires: 200

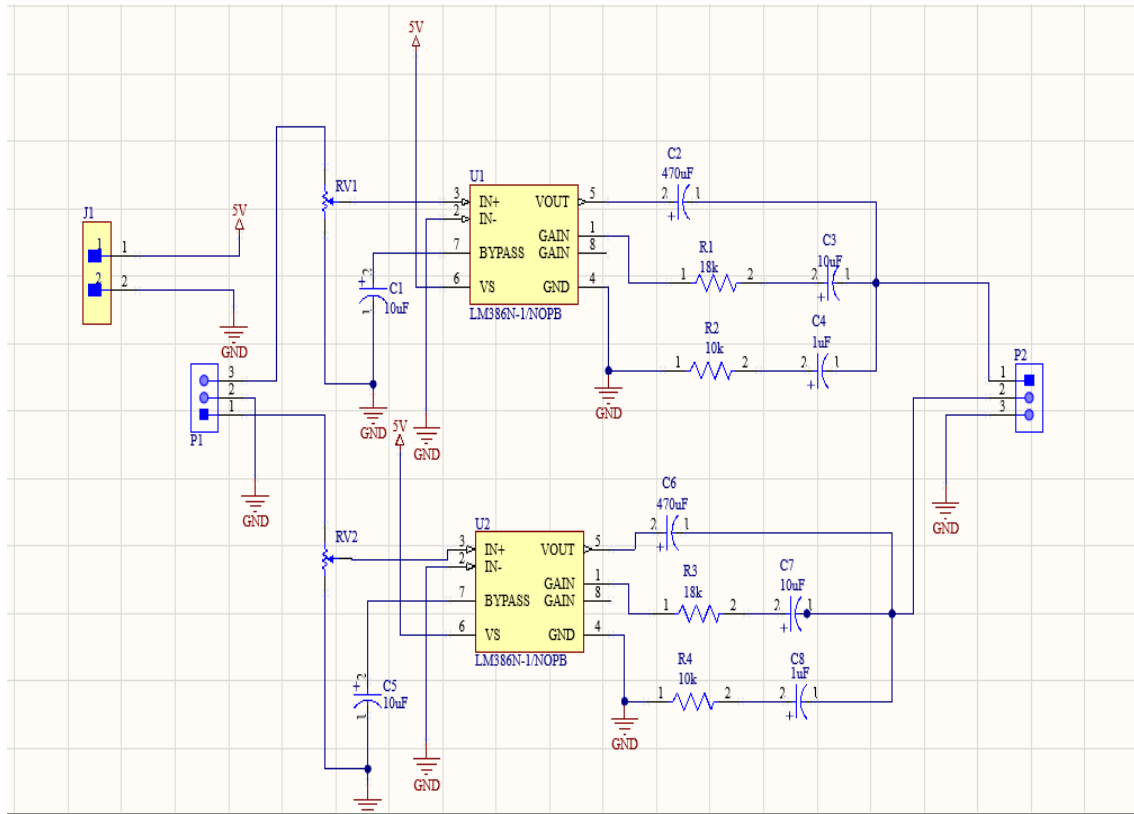
Resistor: 180

Capacitor: 50

Speaker: 100

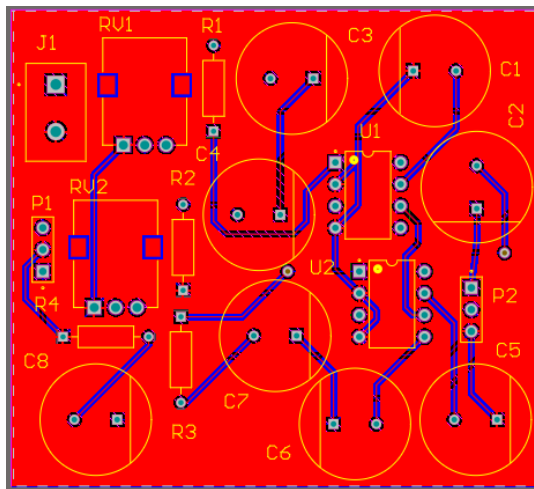
Enclosure: 2900

## 6 Schematics design

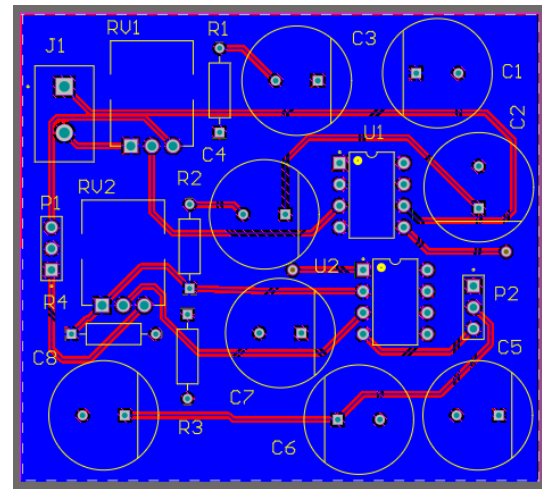


Audio amplifier

The above is the schematics of the audio amplifier circuit. With some resistors and capacitors, LM-386 audio amplifier is used in the circuit. It amplifies the audio output of the CA6928 Bluetooth module and its output is connected to the speakers.

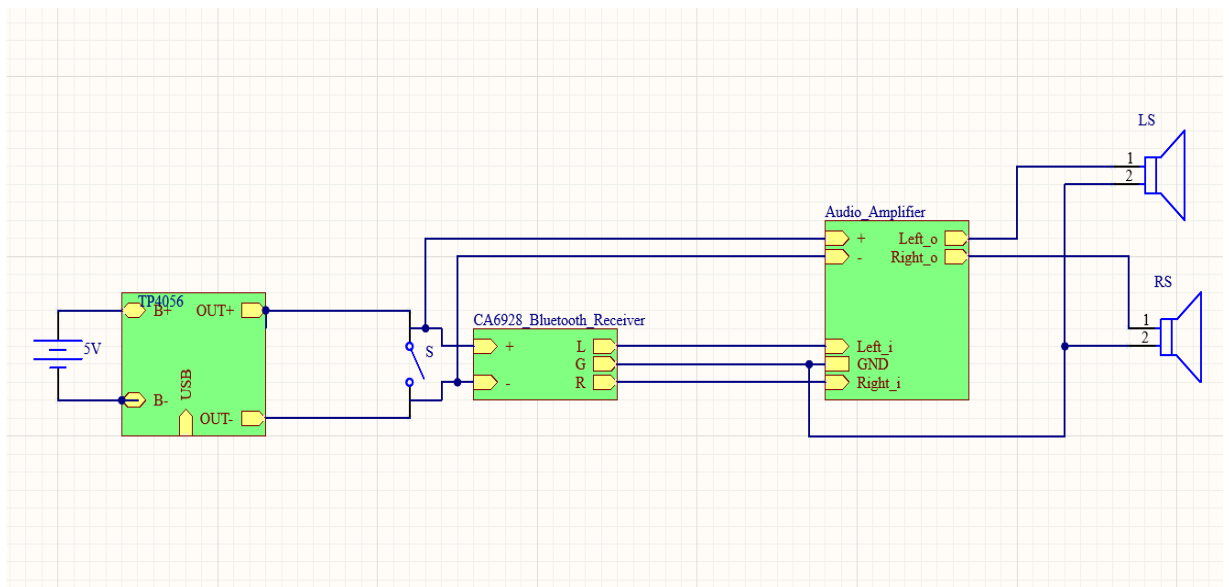


Top Layer



Bottom Layer

The above two are the top and bottom layers of the pcb of the audio amplifier.

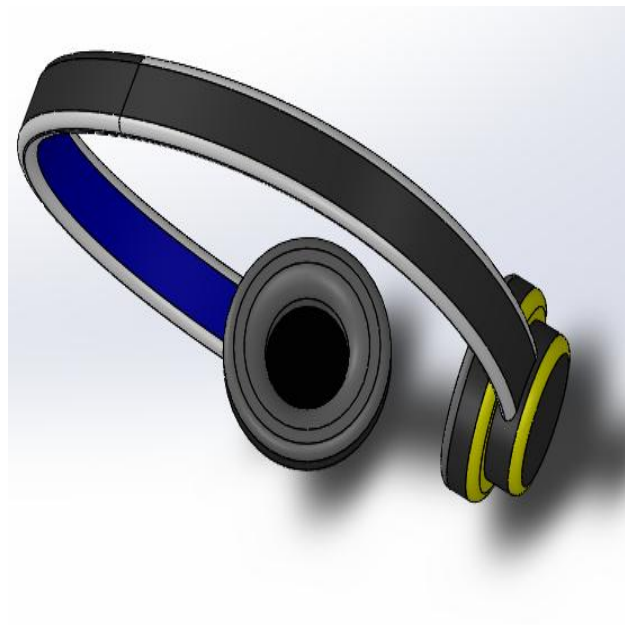


Overall circuit

The above schematics is the overall circuit of the headphone. It consists of Bluetooth receiver, charging circuit and audio amplifier.



## 7 Enclosure design

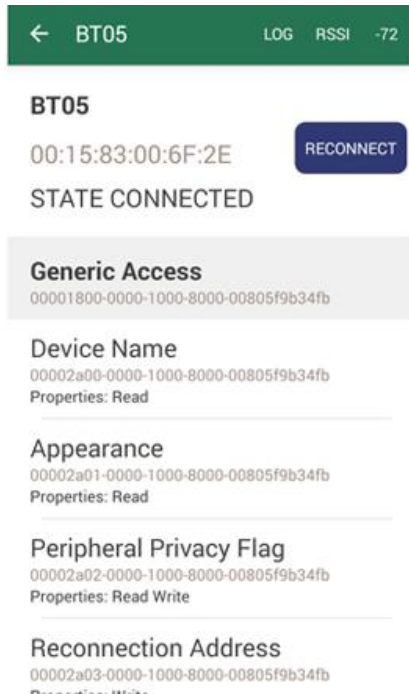


The above are the enclosure design files of the device.

## 8 How to test for functionality

After turning on the switch, turn on the Bluetooth in the phone or computer.

In the Bluetooth connection module name will appear.



Connect with the module and check whether audio played in the phone can be heard from the device.

If you want to connect another device, make sure that your headphone is currently not connected to any other devices. Suppose if that is connected with another device first disconnect from the device and then try to connect to this device.