

## 1 CLIMB TAG FITNESS TRACKER REV 10

### Theory of Operation/Technical Description

The ClimbTag Fitness Tracker is designed to identify passive RFID tags operating at 13.56 MHz and transmitting their unique ID to a smartphone (along with additional sensor information). Upon detection of a tag, the device stores the unique tag identifier on the device memory (EEPROM) and generates a short vibration to indicate to the user that a tag has been detected. When the device is in range of a paired smart phone (Bluetooth Low Energy, 2.4GHz), the list of tags stored in memory is sent to an app running on the smart phone. The device may also save and/or transmit additional sensor information (pressure, motion, battery level) to the app.

The device is battery operated and has a non-removable 3.7V Lithium Polymer rechargeable battery in the enclosure. Battery can be charged via a standard USB port (5V). A battery charging circuit on the main board charges the 60mAh battery at 100mA. The device has an onboard power regulator that regulates the voltage to 3.3V.

The device has two antennas: a PCB trace antenna for BLE communication and a flexible PCB antenna for RFID detection. The PCB trace antenna was tuned for 2.4GHz using a pi-network. The FPCB antenna was tuned for 13.56 MHz with a symmetric matching network. Both share a common ground (PCB ground plane). End users have no access to the built in antennas (i.e., other antennas cannot be connected to the device).