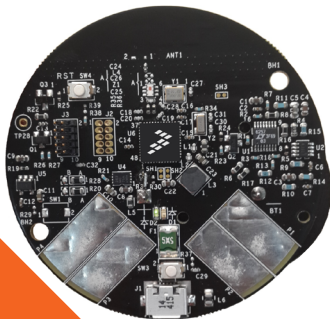




# BLE Heart Rate Monitor Quick Start Guide

Reference Design for  
Kinetis KW40/30 SoC



## Get to know the BLE Heart Rate Monitor

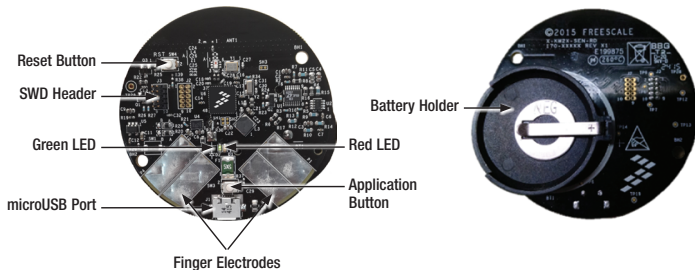
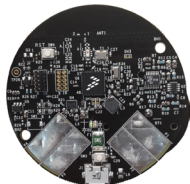


Figure 1: Top and Bottom of the BLE Heart Rate Monitor



### BLE Heart Rate Monitor Reference Design

BLE Heart Rate Monitor reference design demonstrates the implementation of a wireless electrocardiogram (ECG) acquisition system. It features the Freescale MKW40 system on chip (SoC) which includes an ARM® Cortex™ M0+ processor together with a 2.4 GHz radio for BLE and 802.15.4.

## Introduction to BLE Heart Rate Monitor

BLE Heart Rate Monitor reference design demonstrates the implementation of a wireless electrocardiogram (ECG) acquisition system. It features the Freescale MKW40 system on chip (SoC) which includes an ARM® Cortex™ M0+ processor together with a 2.4 GHz radio for BLE and 802.15.4. The ECG signal is obtained from the finger tips and processed by the MKW40 SoC. Then, the user's heart rate is calculated and transmitted to a smartphone application using BLE.

### **This Quick Start Guide help you to:**

- Make use of the pre-loaded demo application.
- Use the smartphone application to register the demo measurements.

### **BLE Heart Rate Monitor Features**

- MKW40Z160 MCU (48 MHz ARM® Cortex-M0+ core, 160KB Flash memory, 20KB SRAM) SoC + 2.4 GHz radio for BLE and 802.15.4.
- Freescale BLE stack for Bluetooth® Low Energy application development.
- MC34671 Li-Ion battery charger.
- Rechargeable battery with up to 40 Hours of continuous use.

### **Tools Required**

- BLE Heart Rate Monitor reference design board.
- Android® or iOS® smartphone enabled with a Bluetooth® Smart Ready.
- Freescale BLE Toolbox application installed.

## Application Setup Instructions

### 1 Download Smartphone Application

Download software and documentation under **“BLE Heart Rate Monitor”** at [freescale.com/medical](http://freescale.com/medical).



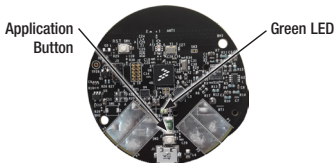
- Access to the Google Play Store (Android devices) or Apple App Store (iOS devices)
- Download and install the Kinetis BLE Toolbox application distributed by Freescale.

### 2 Connect with the device

- Make sure that the battery is properly placed on the board



- Enable the Bluetooth® Smart Ready module on your smartphone.
- Press SW3 on the board. Green LED will start blinking indicating advertisement.



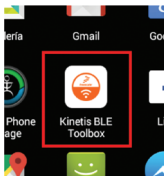
- On your smartphone, start scanning for devices nearby. Select the device reporting as “FSL\_HRS\_RD” and attempt a connection
- When requested for a password, type “123456” and press connect.



## using the Application

### 3 Connecting With the Application

- Open the Kinetis BLE Toolbox application in your smartphone.



- In the application menu tap on the "Heart Rate" icon.



- In the scan window select the device reported as FSL\_HRS\_RD

FSL\_HRS\_RD

FF:30:DE:1E:1B:F5

Unbonded

-42dBm

### 4 Getting Measurements

- In the HRM board place your thumbs on the electrodes trying to cover the most area possible.

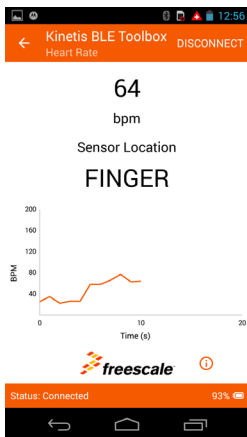


## using the Application (cont.)

- Wait 10 seconds for the signal to stabilize. The red LED will blink on every heartbeat detection.

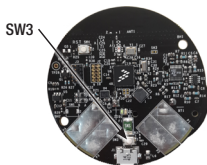
**Note:** If the signal does not stabilize after 10 seconds, remove the fingers during three seconds and try again.

- Results will be reported on the smartphone application.



## 5 Disconnecting from the Application

- During a connection press SW3 at any time.
- Device will enter in battery retention mode.



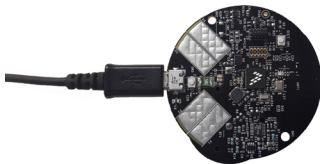
## Charging the Battery

### 6 Charging the Battery

- Battery level can be determined in two ways:
  - See the battery level reported in the application



- Red LED blinking three times indicating low battery when attempting a connection.
- To recharge the battery, connect a Mini USB charger to the USB connector in the board.



- Red LED will start blinking indicating that the battery is being charged.
- Upon completion the red LED will remain on indicating that the battery has been fully charged.

**Note:** All BLE communications from the device are stopped when the battery charger is connected.



## et Started



Download software and documentation under  
“**BLE Heart Rate Monitor**” at [freescale.com/medical](http://freescale.com/medical).

## Support

Visit [freescale.com/support](http://freescale.com/support) for a list of phone numbers within your region.

## Warranty

Visit [freescale.com/warranty](http://freescale.com/warranty) for complete warranty information.

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