Healthcare Meters Kit

Healthcare Meters Kit Quick Start Guide

R12AN0067EU0100
Rev.1.0
Jul 11, 2017

Introduction

This quick start guide describes the Renesas Healthcare Meters Kit set up. Highlighted components in this solution includes a Renesas RL78/G1D Bluetooth Smart, a programmable S3A7 board, and a Renesas USB charger IC. Contact your nearest Renesas sale offices to request a live demonstration or kit for development.

Target Device

RL78/G1D and R7FS3A77C3A01CFP

Contents

1. Kit Contents

The following components are included in the kit:

- Activity Module
- Blood Glucose Module with *ONETOUCH*® Measurement Strip
- Blood Pressure Module with Arm Cuff
- Heart Rate/Pulse Ox Module with Finger Clip
- Micro USB cable
- E1 to PMOD Adapter
- Inductive Wireless Charger
- 5 V AC-DC Adapter
- Firmware
- Mobile Apps – Download “Renesas HC Meters Kit” from iTunes or Google Play
- Quick Start Guide
- User Guide (r12an0068eu0100-rl78g1d-ble-healthcare-meters-kit-user-guide.pdf file can be downloaded from below link)
- https://www.renesas.com/en-us/solutions/home/healthcare/hckit.html
- *ONETOUCH*® Control Solution (not included due to inconvenience of shipping liquid)

2. Features

2.1 Activity Module

- Li-Ion battery with Wireless or USB charging
- Fuel Gauge IC
- Ambient light sensor
- Pressure Sensor
- Humidity Sensor
- Temperature Sensor
- Vibrate motor (optional)
- 9-axis motion sensor (accel, gyro, compass)
- BLE connectivity to the mobile app
- USB output for wired data transfer
- Mobile app displays Steps, Distance, Calories & Light, Temperature, Humidity, Pressure

2.2 Blood Glucose Module

- 1 Coin cell or 5 V DC power operation
- LCD displays blood glucose reading or status
- Cap Touch buttons which can be enabled for additional functionality
- BLE connectivity to the mobile app
- USB output for wired data transfer
- Mobile app displays Blood Glucose level

2.3 Blood Pressure Module

- 3 AAA batteries or 5 V DC power operation
- LCD displays systolic, diastolic, pulse rate readings or status
- Cap Touch buttons which can be enabled for additional functionality
- BLE connectivity to the mobile app
- USB output for wired data transfer
- Mobile app displays Systolic, Diastolic pressure and Pulse rate

2.4 Heart Rate/Pulse Ox Module

- Li-Ion battery or 5 V DC power operation
- LCD displays heart rate, pulse ox readings or status
- Cap Touch buttons which can be enabled for additional functionality
- BLE connectivity to the mobile app
- USB output for wired data transfer
- Mobile app displays Pulse Ox level and Heart rate

3. Images

3.1 Activity Module

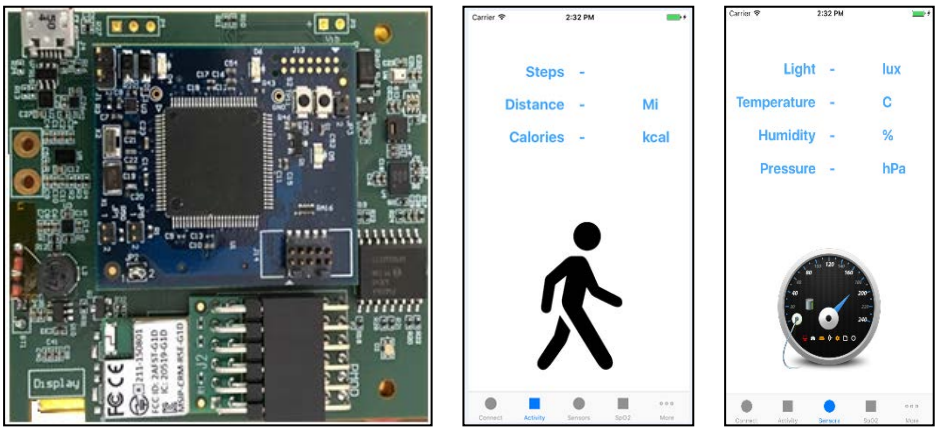


Figure 3-1 Activity Module with Mobile App snapshot

3.2 Blood Glucose Module

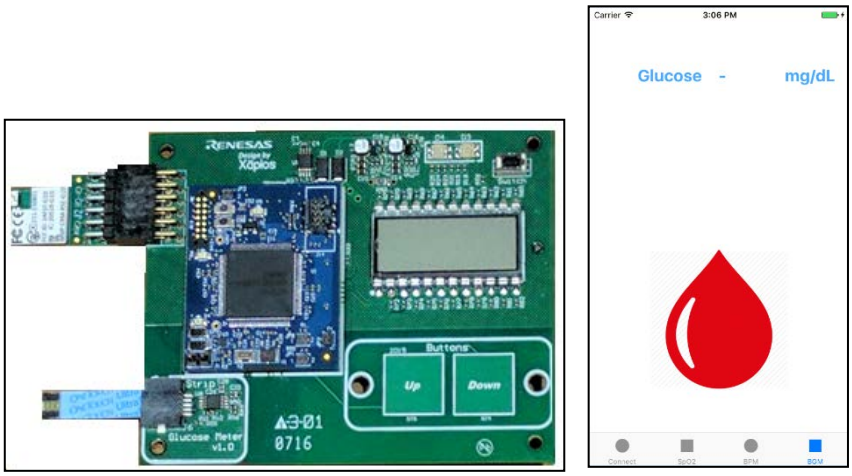


Figure 3-2 Blood Glucose Module with Mobile App snapshot

3.3 Blood Pressure Module

Figure 3-3 Blood Pressure Module with Mobile App snapshot

3.4 Heart Rate/Pulse Ox Module

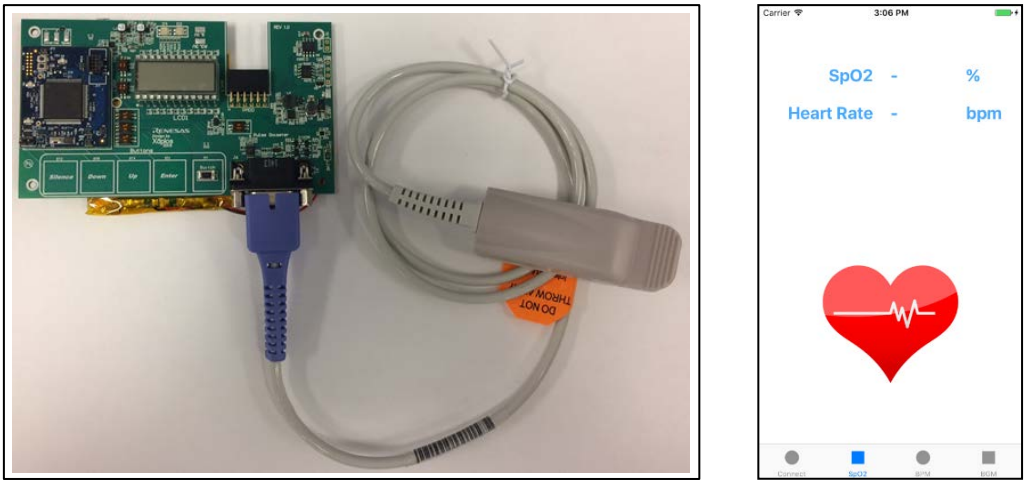


Figure 3-4 Heart Rate/Pulse Ox Module with Mobile App snapshot

3.5 Wireless Charging Unit

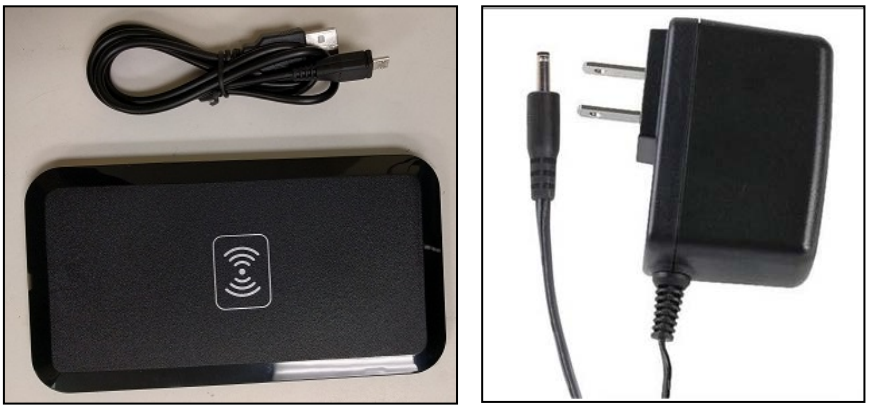
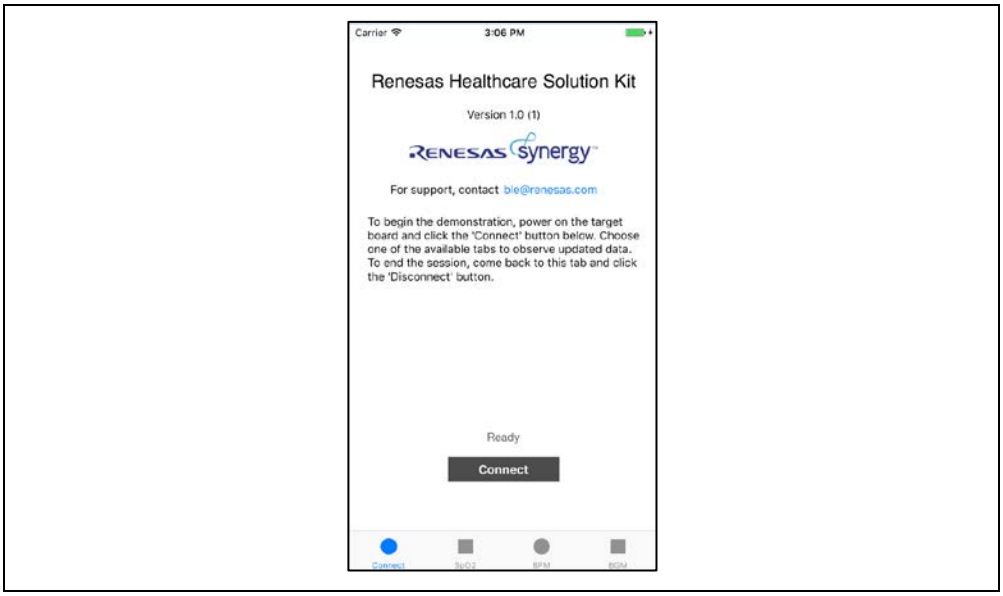


Figure 3-5 Micro USB charging cable with Qi Wireless Inductive Charger & 5V DC Adapter

4. Setting up iOS/Android App

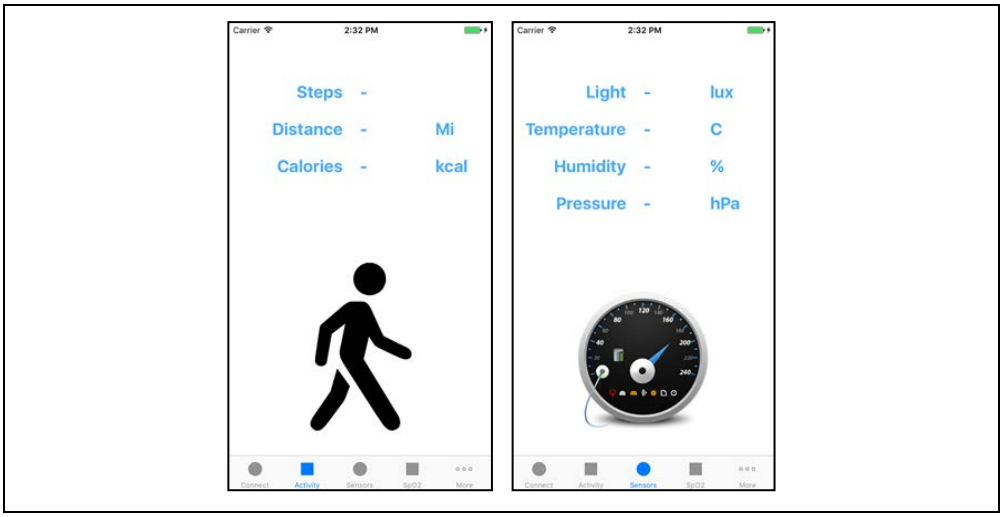
An application (Renesas HC Meters Kit) is available to demonstrate the connectivity portions of the development kit. The iOS version can be downloaded from the Apple iTunes Store, and the Android version from Google Play. Every effort has been made to ensure the apps work on a wide variety of phones but given the wide array of hardware and software it is possible the software may not work with your chosen device.

1. Before launching the application, ensure all apps trying to connect to Renesas HC Meters Kit device is closed. Then turn on Bluetooth for the mobile device. After that turn on any one of the HC Meters Kit module.
2. Launch Renesas HC Meters Kit application The following screen will appear:



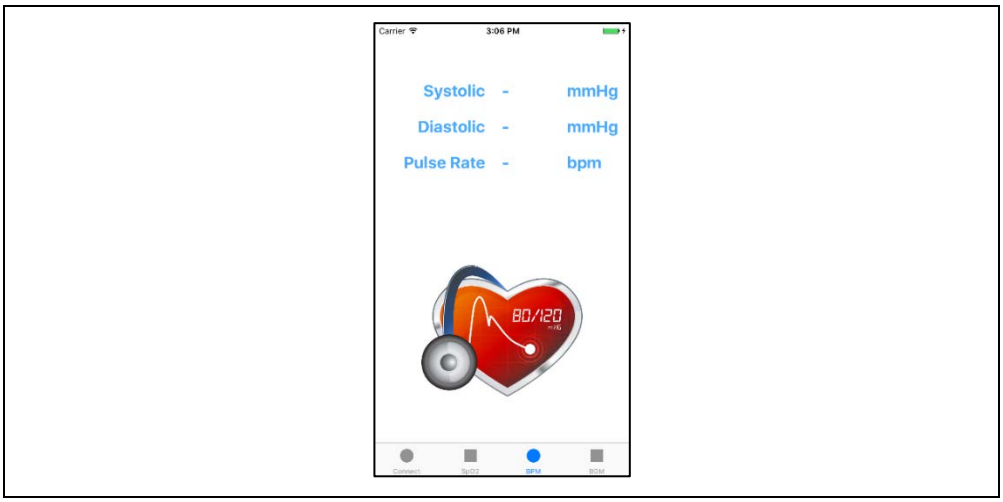
3. Click on Connect to establish Bluetooth link and the message Ready will change to Connected.
4. Depending on which HC Meters Kit module you are working with select the appropriate tab at the bottom of the app. This brings you to the following screen depending on which module you selected:

A. Activity

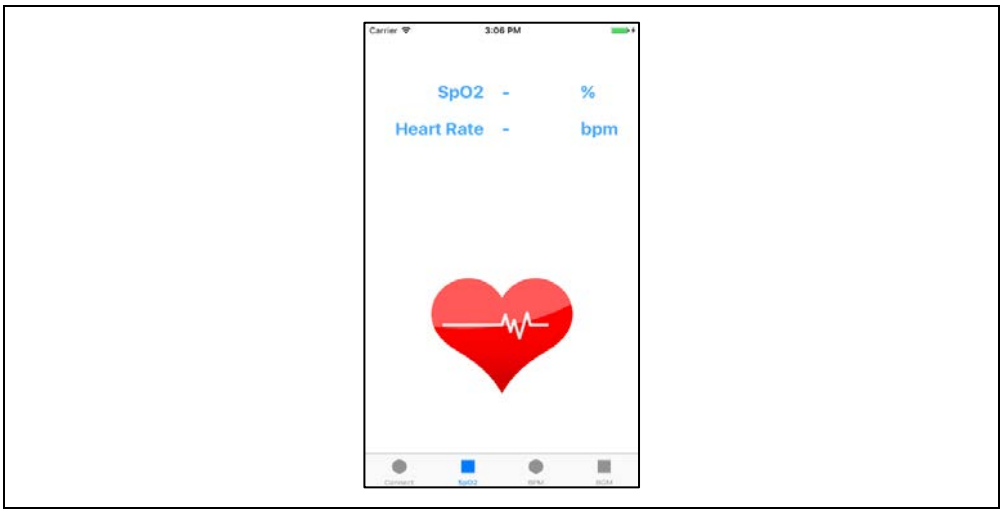


B. BGM (Blood Glucose Meter)

C. BPM (Blood Pressure Meter)



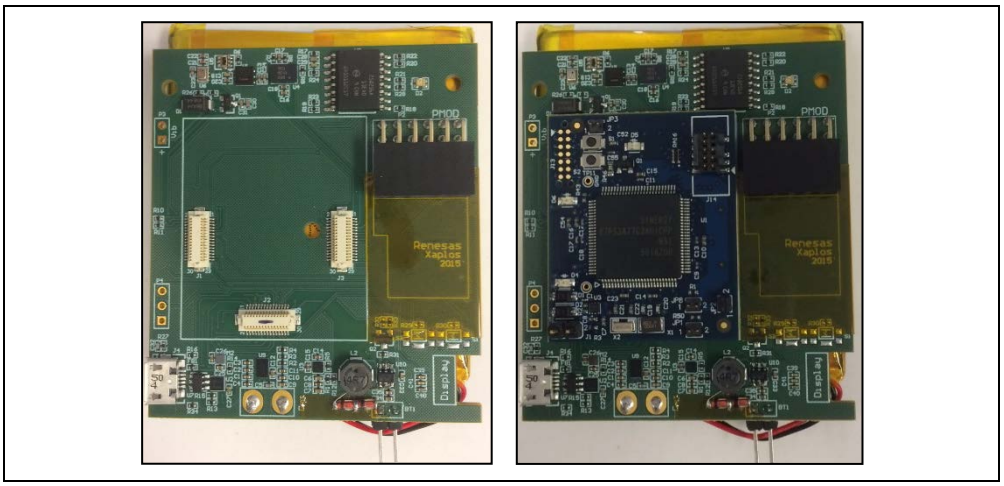
D. HRM/SpO2



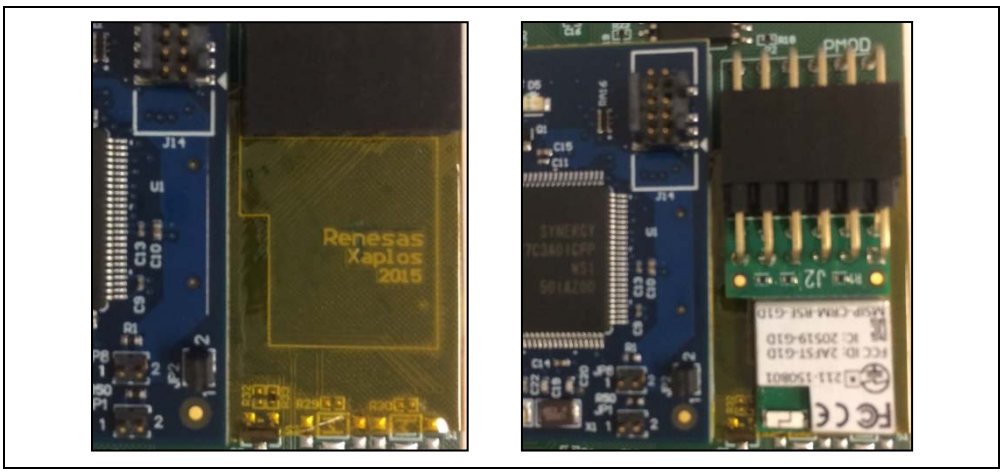
5. Mobile app displays the status of the module, action to be taken by the user or the reading for the vital measurement taken. It is a very intuitive user interface.
6. Once you are done taking the measurement go back to the main screen and click on Disconnect to release the Bluetooth link.

5. Using the Activity Module

Step 1. Attach Synergy S3A7 board (blue) to Activity board (green) and apply pressure until all three connectors are properly attached. The out-of-box S3A7 board is programmed for Activity module functions.



Step 2. Insert RL78/G1D BLE PMOD module into the PMOD connector on Activity board.



Step 3. Connect the battery to the power terminals keeping the polarity in mind (red and black wires to be connected appropriately). If the power is properly available some LEDs will light up.

Step 4. If battery power is diminished, connect to Qi wireless charging pad to charge the battery. Other option to charge the battery is to power the board using USB port.

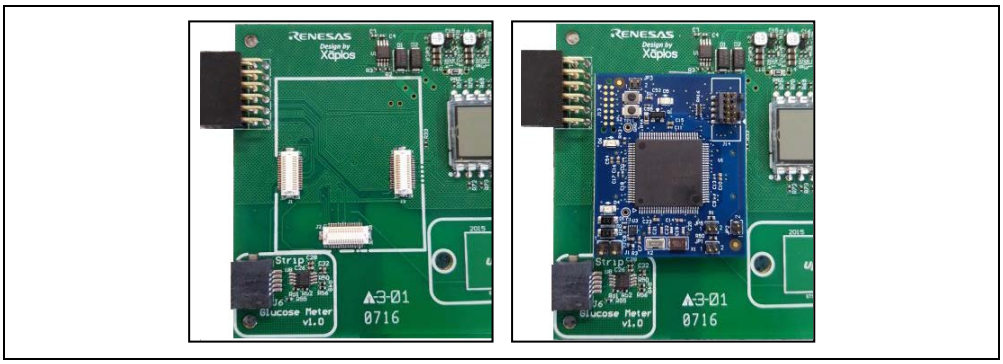
Step 5. Launch Renesas HC Meters Kit smartphone app

1. Connect device to smartphone app and select activity or sensors tab
2. Generate movement with activity board to record steps
3. On the sensors screen raw data from the sensors is displayed

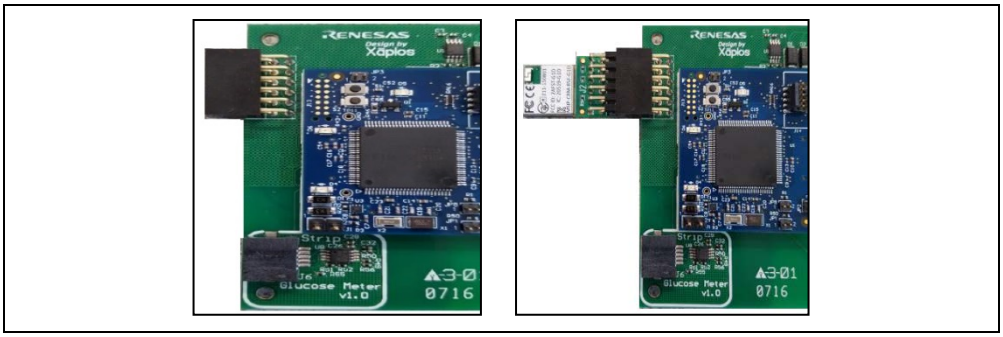
Step 6. Note: Since this kit is setup as a development platform not all the functions are enabled in the demo stage. End user can use the existing project base and add functions which leverage the various sensors preloaded on the activity module.

6. Using the Blood Glucose Module

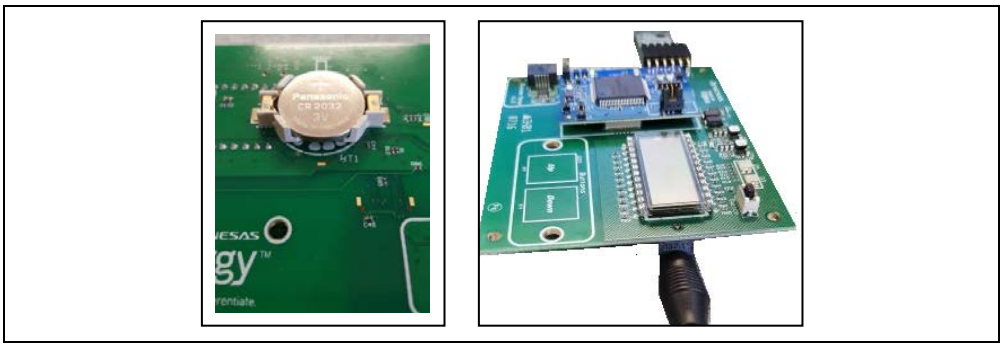
Step 1. Attach the Synergy S3A7 board (blue) to BGM board (green) and apply pressure until all three connectors are properly attached. The out-of-box S3A7 board must be programmed for BGM function. Refer to the User Guide for further details.



Step 2. Insert RL78/G1D BLE PMOD module into the PMOD connector on BGM board.



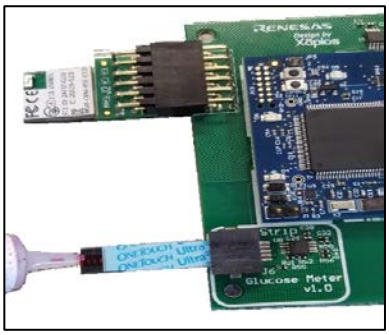
Step 3. Insert coin cell battery or connect DC adapter to the power jack.



Step 4. Launch Renesas HC Meters Kit smartphone app

a. Connect device to smartphone app and select BGM tab
b. Press Switch S4 to start reading operation
c. Insert *ONETOUCH®* Ultra Test Strip into the connector

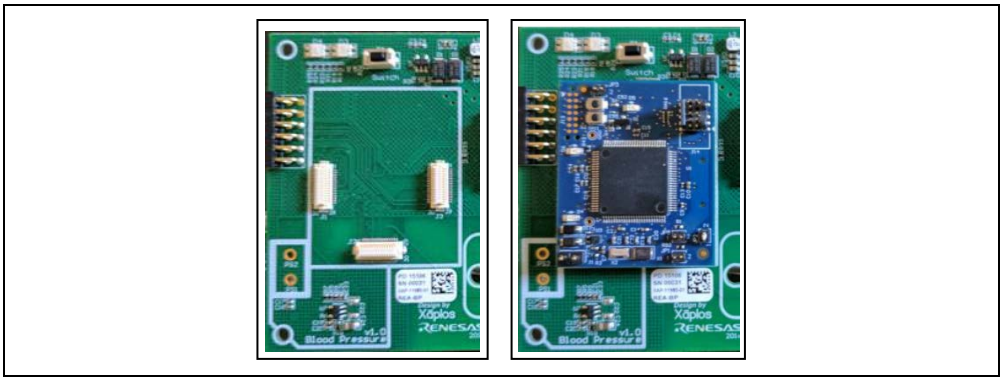
d. Apply *ONETOUCH®* control solution to test strip



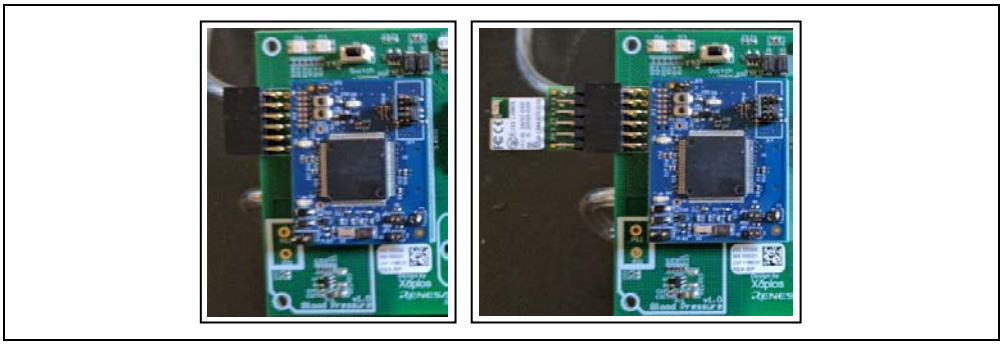
e. After 3 – 5 seconds blood sugar level reported on the mobile app and LCD
f. While not recommended because of biohazard concerns, a lancet could be used to prick finger for a real blood draw and the BGM unit will operate the same way as for a control solution.
g. Restart using switch S4 in case of failed operation.

7. Using the Blood Pressure Module

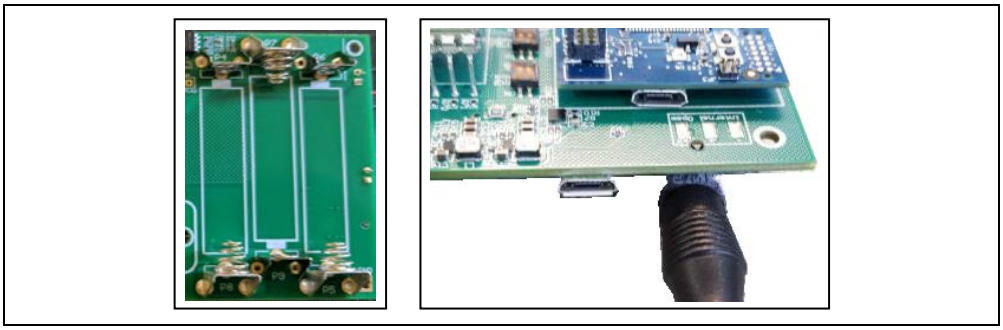
Step 1. Attach Synergy S3A7 board (blue) to BPM board (green) and apply pressure until all three connectors are properly attached. The out-of-box S3A7 board must be programmed for BPM function. Refer to the User Guide for further details.



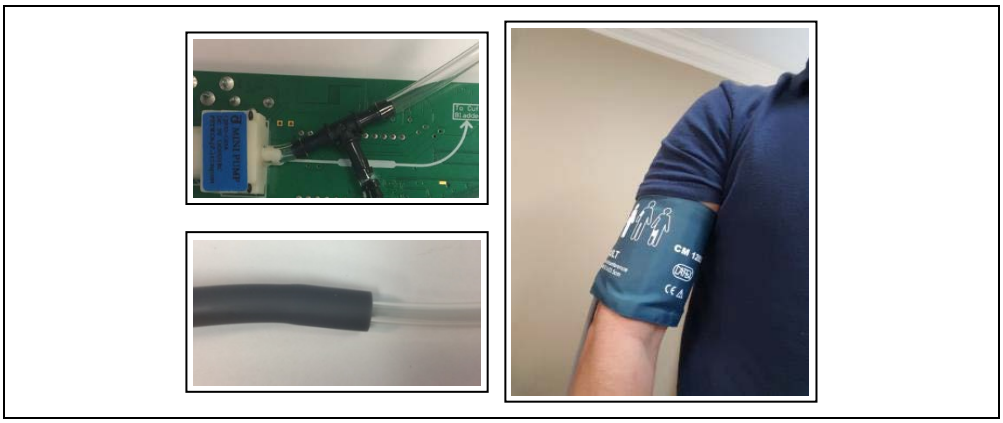
Step 2. Insert RL78/G1D BLE PMOD module into the PMOD connector on BPM board.



Step 3. Insert 3 AAA batteries or connect DC adapter to the power jack.



Step 4. Fully assembled unit should look like below with tubes and arm cuff.



Step 5. Launch Renesas HC Meters Kit smartphone app

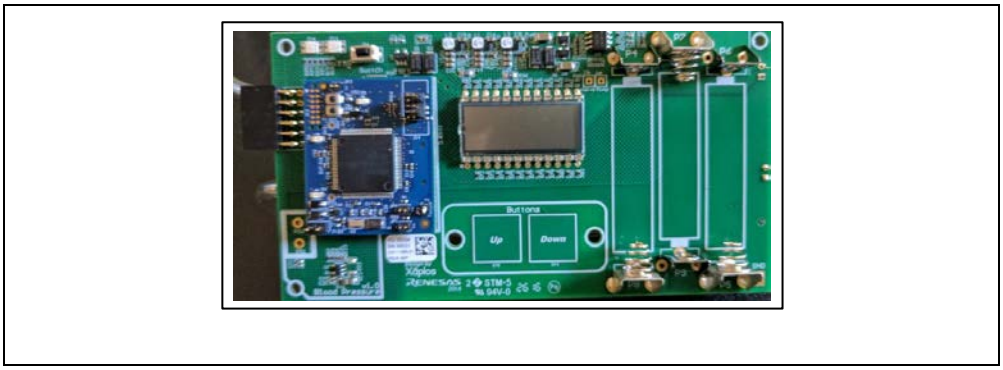
a. Connect device to smartphone app and select BPM tab
b. Wrap the arm cuff around the arm

Note: need to tight enough the Bladder unit at arm to meet 90 seconds interval for building up the pressure. If not, get test result as fail, “FA”.

c. Press switch S4 to begin blood pressure reading

Note: do not move while measuring. If not, the sensor measures wrongly because of the disturbance of human body movement and get test result as fail, “FA”.

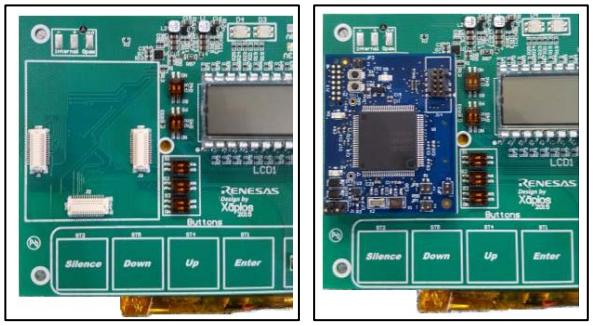
d. After 45-60 seconds systolic pressure, diastolic pressure and pulse rate readings are displayed on the mobile app and LCD.



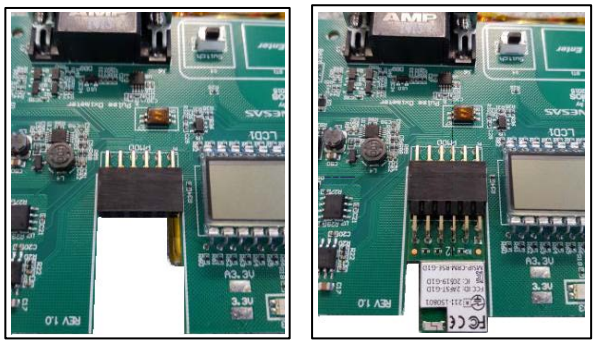
Step 6. Note: There can be variability from unit to unit due to differences in tube lengths and arm cuffs. There is a patch available in the software package to calibrate each unit.

8. Using the Heart Rate/Pulse Ox Module

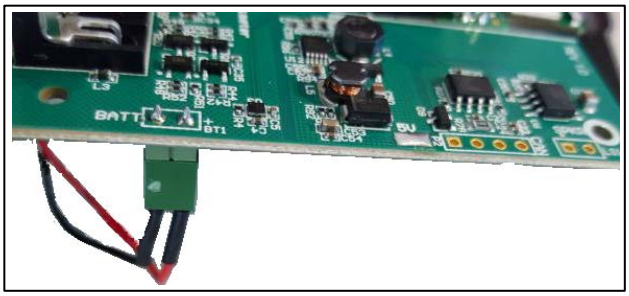
Step 1. Attach Synergy S3A7 board (blue) to HRM/SpO2 board (green) and apply pressure until all three connectors are properly attached. The out-of-box S3A7 board must be programmed for the HRM/SpO2 function. Refer to the User Guide for further details.



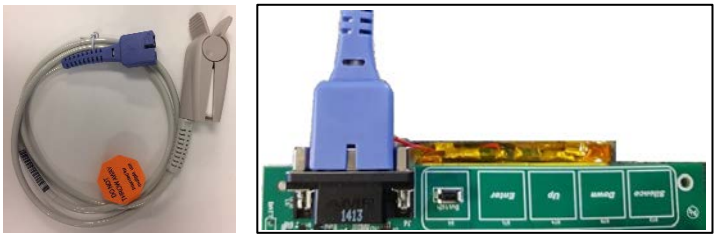
Step 2. Insert RL78/G1D BLE PMOD module into the PMOD connector on HRM/SpO2 board.



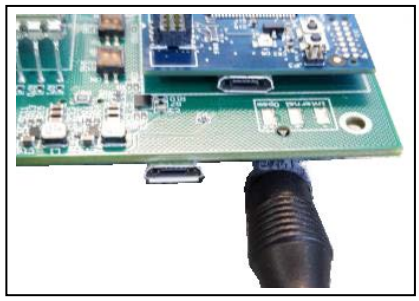
Step 3. Connect the battery to the power terminals keeping the polarity in mind (red and black wires to be connected appropriately, R= +ve, B= -ve).



Step 4. Connect Pulse Oximeter Probe to board using the provided connector.



Step 5. If power is diminished, connect to the DC adapter to the power jack.



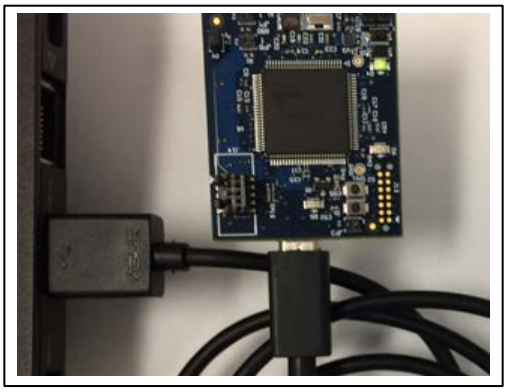
Step 6. Launch Renesas HC Meters Kit smartphone app.

a. Connect device to smartphone app and select SpO2 tab
b. Place finger probe on index finger with the wired side on top of your finger
c. Press Switch S4 to start reading operation
d. Remain still for 5 – 10 seconds
e. Oxygen saturation and heart rate readings displayed on the mobile app and LCD.

Step 7. Restart using switch S4 in case of failed operation.

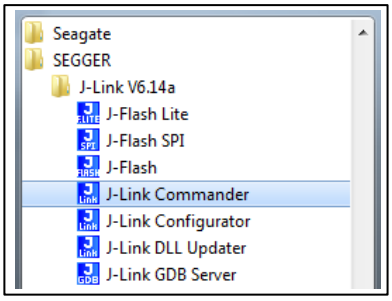
9. Programming to the Synergy add-on board

Step 1. Insert shunt jumper at JP2 to the S3A7 board (blue) and attach to PC USB connector via micro USB cable.
Note: Set up the S3A7 board only (not mounted onto application Module known as application Base Board) for programming with on-board J-Link debugger/programmer



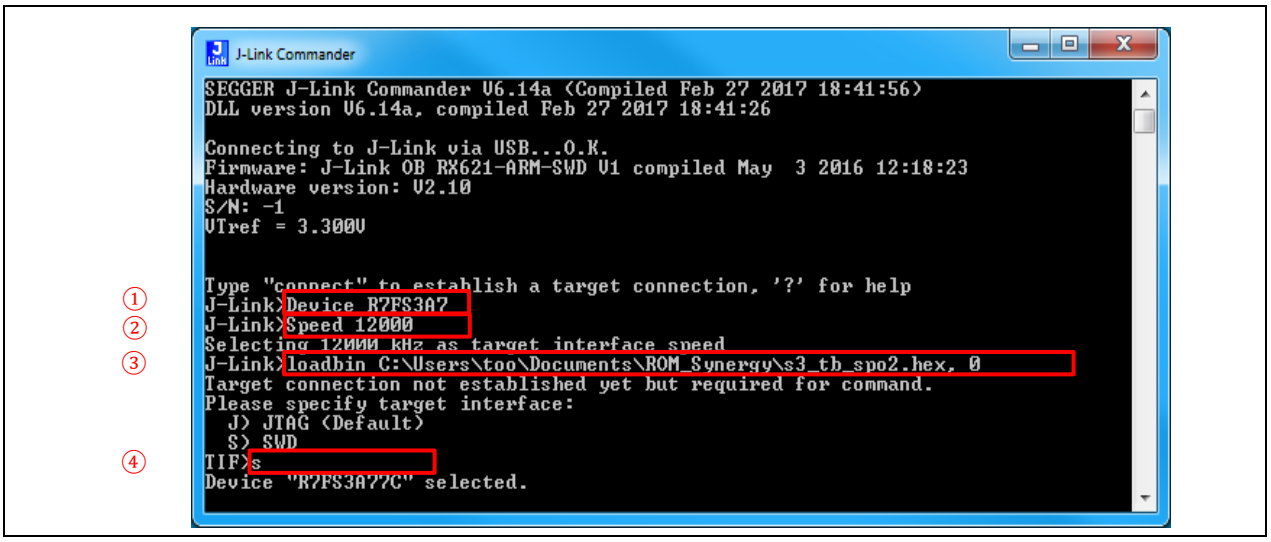
Step 2. Open J-Link Commander from Start menu in All Programs, SEGGER folder.

(Note: SEGGER J-Link download link: https://www.segger.com/downloads/jlink)



Step 3. Enter the below commands to program target device.

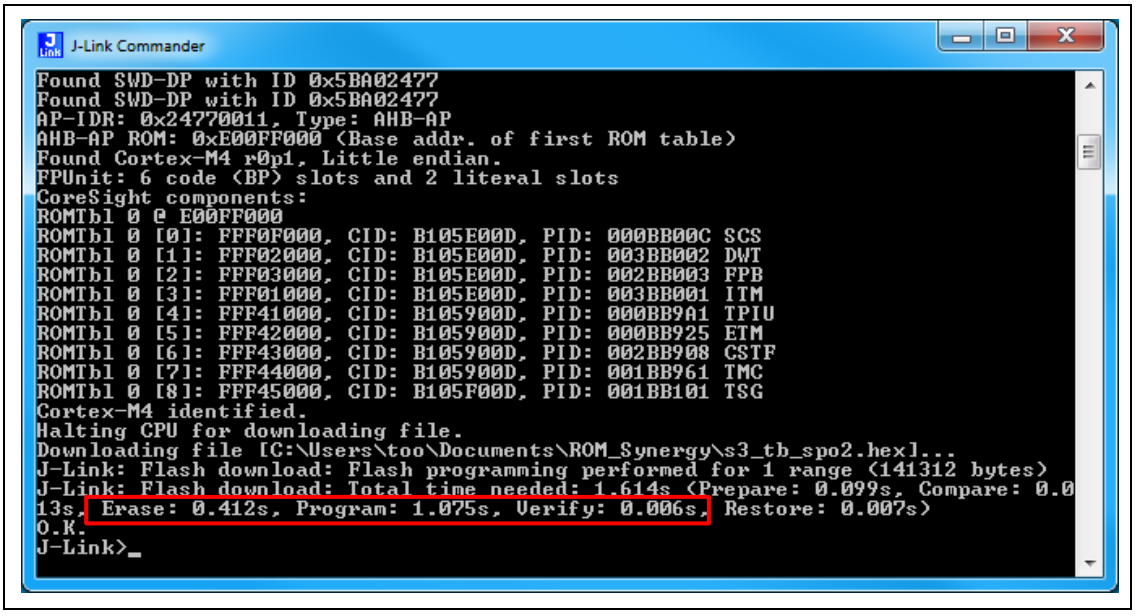
1. Device R7FS3A7
2. Speed 12000
3. loadbin C:\...\ROM_Synergy\file_name.hex, 0
4. s



Step 4. Note: This Healthcare Meters Kit includes following Hex files for respective modules

a. The Activity Module: activity_monitor.hex
b. The Blood Glucose Module: blood_glucose.hex
c. The Blood Pressure Module: blood_pressure.hex
d. The Heart Rate/Pulse Ox Module: pulse_oximeter.hex

Step 5. After programming, disconnect the board from the PC to evaluate.



Website and Support

Renesas Electronics Website
http://www.renesas.com/

Inquiries
http://www.renesas.com/contact/

Revision History

		Description	
Rev.	**Date**	**Page**	**Summary**
1.00	Jul 11, 2017	–	Initial Release

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Handling of Unused Pins

   Handle unused pins in accordance with the directions given under Handling of Unused Pins in the manual.

   — The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.

2. Processing at Power-on

   The state of the product is undefined at the moment when power is supplied.

   — The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.
   In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed.
   In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.

3. Prohibition of Access to Reserved Addresses

   Access to reserved addresses is prohibited.

   — The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.

4. Clock Signals

   After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has stabilized.

   — When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.

5. Differences between Products

   Before changing from one product to another, i.e. to a product with a different part number, confirm that the change will not lead to problems.

   — The characteristics of Microprocessing unit or Microcontroller unit products in the same group but having a different part number may differ in terms of the internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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(Rev.3.0-1 November 2016)

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