

Renesas Synergy™, RL78/G1D

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Rev.1.00

Personal Medication Adherence (PMA) Kit Quick Start Guide

July 12, 2018

1. Introduction

Personal Medication Adherence (PMA), or lack of PMA compliance, is a \$337 billion/annum problem in the U.S. that bogs down the healthcare system. Patients forget to take or may confuse their medication, which can result in being readmitted to the hospital, a skilled nursing home or assisted-living facility, or another visit to the doctor’s office. The advent of the Internet of Things (IoT) has brought various technologies to the forefront that, when applied to PMA devices, can help resolve some of the issues we currently face. The Renesas PMA Solution is one such reference design which enables development of end products to solve the PMA compliance issue.

The solution device demonstration hardware highlights the following:

- The Renesas Synergy™ Platform consisting of the S3A7 microcontroller operating the application using the Synergy Software Package.
- RL78/G1D Bluetooth® Low Energy Microcontroller for communicating blister pack information to mobile platforms.
- R2A20056BM Lithium-Ion Battery Charger IC with Auto Load Current Distribution for recharging using USB.

2. Quick Start Hardware Requirements

- 1x Renesas PMA Demonstration Device:
 - Smart Sleeve
 - Blister Card with RFID tag attached
- 1x mobile device with Bluetooth Connectivity (Android 7.0+ or iOS 9+)

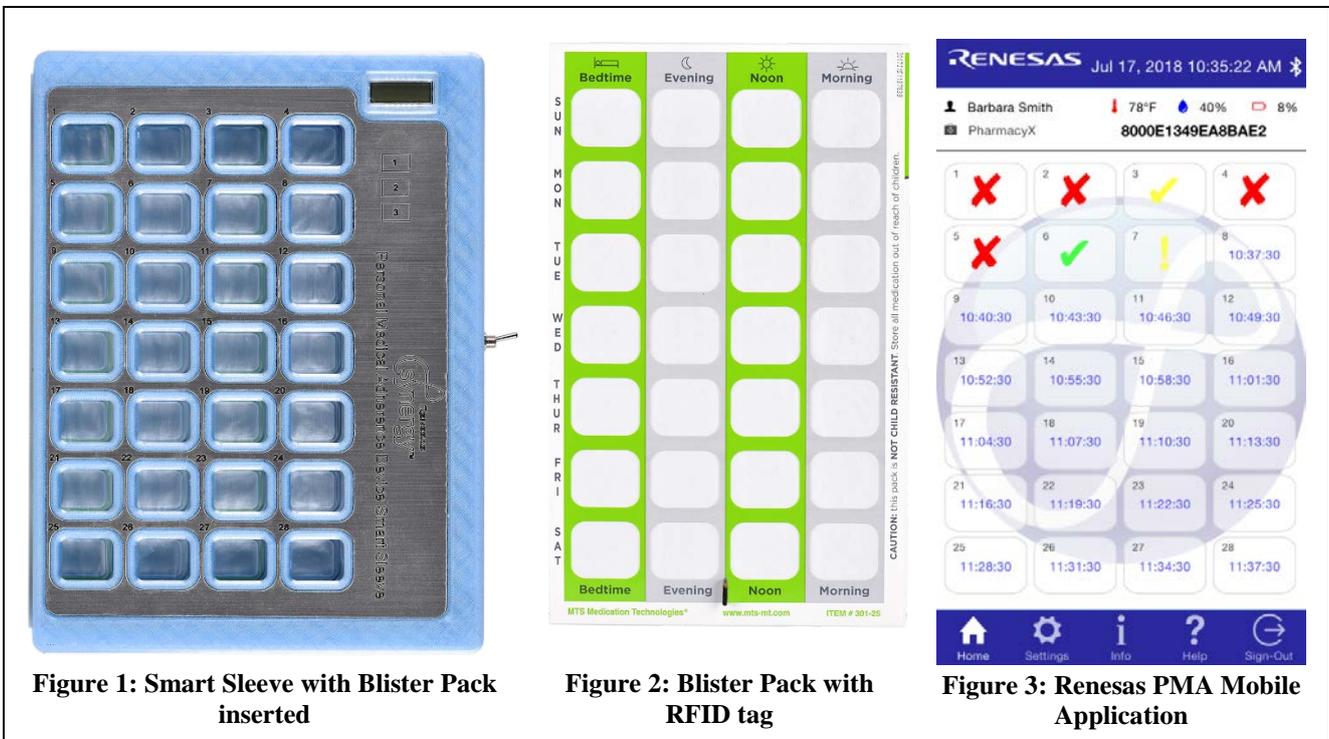


Figure 1: Smart Sleeve with Blister Pack inserted

Figure 2: Blister Pack with RFID tag

Figure 3: Renesas PMA Mobile Application

3. Evaluation Instructions

- Search and Download the **Renesas PMA** reference application from the respective mobile device application store. Links are found on the Renesas Electronics Personal Medical Adherence Website.
 - The Smart Sleeve hardware should be programmed with the reference application to evaluate operation using instructions below. If not, refer to **Reprogramming the S3A7 microcontroller** instructions in the **User Manual**.
1. Insert the Blister pack into the PMA device ensuring the length of the RFID tag installed on the pack is perpendicular to the length of the antenna located at the bottom of the smart sleeve.
 2. Power-On the PMA device using the toggle switch. If the device battery is insufficiently charged, refer to the User Manual section on **Re-charging the Battery**. Upon application of power:
 - a. The device will beep indicating initialization.
 - b. The device will perform a Power-On-Self-Test.
 - c. The device will beep a second time if the POST succeeds.
 - d. The device will show three hyphen symbols '- - -' on the LCD.
 3. If/when a blister pack is detected, a 16-digit identifier will be displayed on the LCD. When complete, the device will revert to show '- - -' on the LCD.
 4. (optional) Keep touch button 2 on the PMA device pressed for 10 seconds to reset the blister pop detection mechanism. The device will beep upon touch detection and release. Upon successful reset, the LCD will show **rSt**.
 5. Sign into the mobile application using the default credentials provided.
 6. Select the **Renesas PMAS** device advertised to connect to the device. Upon successful connection, the mobile application will:
 - a. Load the current time into the Real Time Clock of the device and display **rtc** on the LCD.
 - b. Read all information from the device.
 - c. Show the status of all pills.
 7. To reset the pill slot information using the mobile application ensure step 4 was executed and the follow the steps below in the mobile app:
 - a. Navigate to the Settings Page.
 - b. (optional) adjust the **Take Pills Every** parameter.
 - c. Press the **Reset Slots** button.
 - d. Observe the slots being loaded with **L:XX** being displayed on the LCD.
 - e. Return to the **Home** screen when all slots are loaded.
 8. When it's time to consume a pill:
 - a. The PMA device will beep with **P:XX** being shown on the LCD. **P:XX** indicates the pill slot to pop.
 - b. The mobile application will provide a notification.
 - c. Pop the indicated blister slot by using one or two fingers.
 - d. The PMA device will beep acknowledging a successful blister pop.
 - e. Observe the mobile application blister status update based on the legend below.

HH:MM:SS				
Expected Time to consume	Pill consumed on time	Pill consumed before not after expected time	Time to consume pill	Pill not consumed

9. To end the demonstration:
 - a. Sign out from the mobile application.
 - b. Terminate the mobile application.
 - c. Power-off the PMA device.

Website and Support

Renesas Electronics Website

<http://www.renesas.com/>

Renesas Electronics Personal Medical Adherence Website

<https://www.renesas.com/en-us/solutions/home/healthcare/pmasolutions.html>

Renesas Electronics Healthcare Applications Website

<https://www.renesas.com/en-us/solutions/home/healthcare.html>

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<http://www.renesas.com/contact/>

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Revision History

Rev.	Date	Description	
		Page	Summary
1.00	July 12, 2018		Release

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