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LAB
2

MC9S08MM128

Interfacing with HealthLink
and Google Health



Get to Know the TWR-S08MM128-KIT

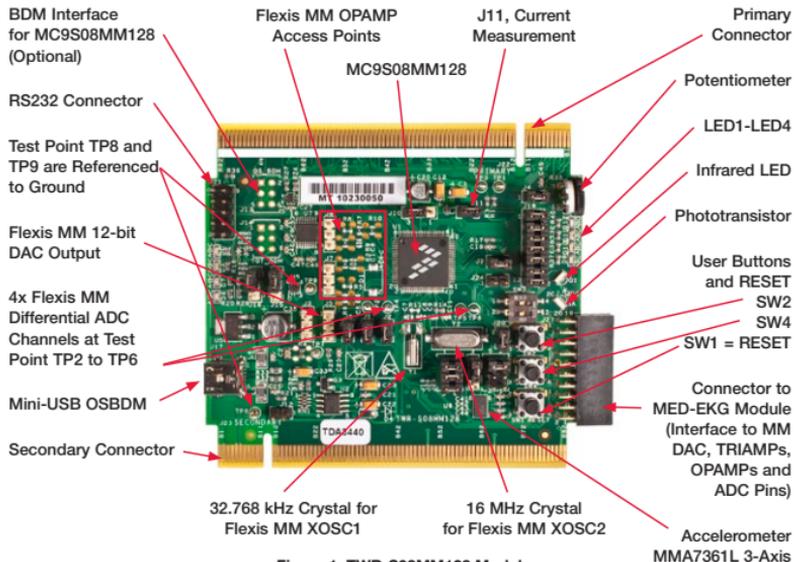
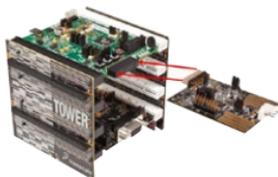


Figure 1: TWR-S08MM128 Module



TWR-S08MM128-KIT Freescale Tower System

The TWR-S08MM128 module is part of the Freescale Tower System, a modular development platform that enables rapid prototyping and tool re-use through reconfigurable hardware. Take your design to the next level and begin constructing your Tower System today.

Introduction

This lab is a step-by-step guide to demonstrate a user case where patients can share health data from an S08MM128 enabled medical device via the Internet without having to visit a doctor's office. In this lab, the S08MM128 transmits various types of emulated personal health data to a computer. The data is displayed in the HealthLink GUI that is provided by LNI (lampreynetworks.com) and is uploaded to your Google Health account for storing and secure sharing. The emulated data for this demo includes weight scale, glucose meter, blood pressure and thermometer transmissions.

Required Material

- Tower System—Built according to the TWR-S08MM128-KIT Quick Start Guide
- Two mini-USB Cables—One for TWR-SER and one for TWR-S08MM128
- Computer—Installed with CodeWarrior for Microcontrollers v6.3 and the latest S08MM128 service pack
- LAB2.zip¹ HealthLink GUI—Located at the “Software” tab, under the “Labs” section on the DVD. Follow the lab guide for installation

- Google Health account from health.google.com—Follow lab guide below for account creation

1) NOTE: This lab is created with the Freescale USB stack with PHDC library. This library is based on USBs, PHDC, IEEE[®] 11073 and Continua[®] Alliance requirements. The library is complimentary source code that provides a standard communication interface for next-generation medical devices. It is portable and easy to use. There is also a version that supports MQX[™] RTOS. To get the most recent version of Freescale's USB stack on both non-RTOS and MQX RTOS, visit freescale.com/s08mm, Featured Software & Tools section.

The following lab assumes the user has loaded the DVD at f:\ and has extracted all zipped files under working folder d:\work. Please replace the path if your environment is different.

Step-by-Step Guide

Configuring the Hardware

1. Assemble the Tower System and configure jumpers to default settings as shown in Step 2 of the Quick Start Guide (QSG). Make sure Jumper J16 on TWR-SER has pins 3 and 4 connected as shown in Figure 2 of the QSG. Make sure that all the boards are pressed securely together.

Connecting to the Computer

2. Connect the first USB cable to the computer and the mini-USB connector on the TWR-SER module. If Windows asks for a driver at this point, just cancel it. We will load the proper driver later in the lab.
3. Connect the second USB cable to the computer and the mini-USB connector on the TWR-S08MM128 module.
4. Optional: Loading Open-Source Background Debug Module (OSBDM) Driver.

Freescale's OSBDM is used to program and debug the main MCU (S08MM128). The first time TWR-S08MM128 mini-USB

connects to the PC, Windows will ask to load the driver. If the OSBDM has already been used on your PC, Windows will not ask for the driver and you can skip to Step 8.

5. At the screen below, select "No, not at this time" and then click "Next."



- At the next screen, select “Install the software automatically,” and click “Next.” Windows will find the driver already installed with CodeWarrior.



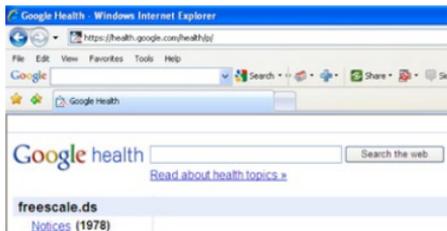
NOTE: If Windows cannot locate the driver automatically, please specify the following path: C:\Program Files\Freescale\CodeWarrior for Microcontrollers V6.3\Drivers\Osbdm-jm60

- On the final screen, choose “Finish.” The OSBDM driver is now loaded.



Creating a Google Health Account

- Go to health.google.com.
- If you already have a Google account, login. Otherwise, click the link “Create a new account now” and sign-up for a free account.
- Once logged in, take note of the user account name. You will need the exact user name shown in your Google Health account (case sensitive) to create a HealthLink profile. For example, in the screen below, the user account is freescale.ds.



Creating a User Profile in HealthLink

Once you have created a Google Health user account, you will need to register with HealthLink and create a user profile.

- Go to **LNIHEALTH.com** to obtain a HealthLink complimentary license key.
- Click on the blue tab that says "HealthLink." In the "enter ticket code" window, enter Freescale's ticket code: FreescaleDemo.
- Submit your info in the HealthLink registration page. Make sure to use your actual e-mail address during registration. An activation key that is required to use the software will be sent your e-mail account. The license agreement/terms will pop up when opening the software. This is a 90-day license. Please contact LNI for full license after expiration.
- After registration, you will be led to a page to download the HealthLink installer. If you have a fast internet connection, go ahead and download it. If not, install HealthLink by clicking "LNI HealthLink Installer (LAB2)" located in the "Third Party Tools and Software" section on the DVD.

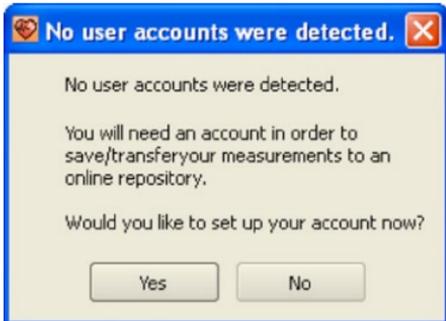
- Run HealthLink after the installation is completed. The wizard may run HealthLink automatically or you can open HealthLink from the Windows Start menu > All Programs > LNI Tools > HealthLink > HealthLink.
- Once you open HealthLink, an activation window will pop up. Copy and paste the activation key that was e-mailed to you from **lampreynetworks.com**. (The e-mail may be filtered in your junk mail folder if you don't see it in your Inbox.) Do not click "Return" or the space bar from your keyboard when pasting the key code as specified in the red box below:



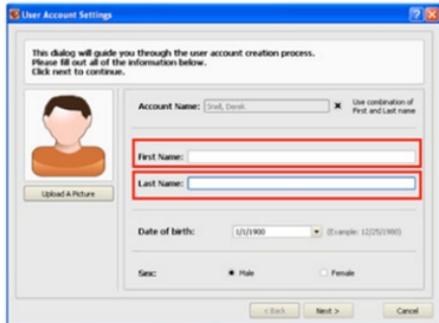
17. Each time you open HealthLink, a pop up window will warn you about the license expiration date. Click "OK."



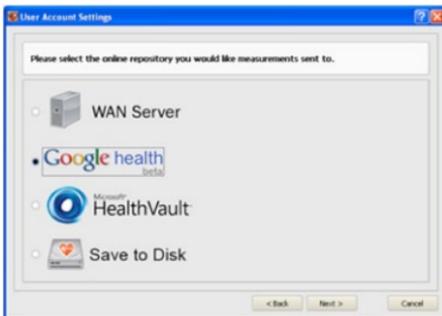
18. You will need to create a user account. Click "Yes" at this screen:



19. Fill in your first and last name, and click "Next."



20. Select Google Health and click "Next."



21. Fill in your e-mail address, Google Health password and Google Health account name for the Profile Name. Then, click “Next.”
NOTE: the Profile Name must be spelled exactly the same as your Google user name and it is case sensitive.



22. For the matching rules settings below, select “Enter my own Person ID:” and enter 1 for the ID. Then, click “Next.” The demo sends measurements with two different Person IDs: 1 and 2. This step in HealthLink associates all measurements with Person ID 1 to your profile.



23. For the remainder of the HealthLink profile setup, keep the defaults (enable history trend data). Select “Next” until the final step to verify your profile settings. Then, select “Finish.”
24. Use this profile as the default profile. Select “Yes.”



25. Unblock this software if your Windows firewall alerts you.

Programming the S08MM128

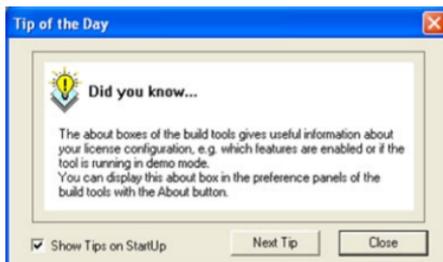
26. Open CodeWarrior for Microcontrollers v6.3. Use the Windows Start Menu > All Programs > Freescale CodeWarrior > CodeWarrior Development Studio for Microcontrollers V6.3 > CodeWarrior IDE.

NOTE: It is important to open the correct CodeWarrior product and version. Multiple CodeWarrior programs can be installed on the same computer.

27. If the Startup screen below appears, click “Start Using CodeWarrior.” This can be disabled so that it does not reappear.



28. If the “Tip of the Day” screen below appears, click “Close.” This can be disabled so that it does not reappear.



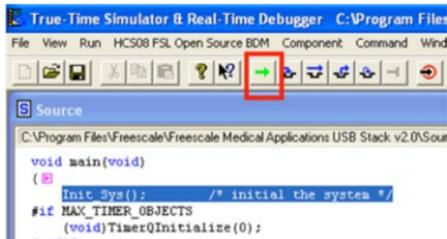
29. Extract “LAB2.zip,” located in the “Software” tab, under the “Labs” section on the DVD. Use the CodeWarrior menu File > Open. Then, browse to the following path and file: d:\work\ LAB2\app\phdc_multi_specialization\codewarrior\s08usbmm128\s08usbmm128.mcp
30. In CodeWarrior, click the Debug icon on the project panel toolbar to compile and download code to the internal flash of the S08MM128.
31. The warning below may appear by default because the OSBDM tries to connect while the MCU is running what is currently programmed in the flash. Click “OK.”



32. The warning below appears by default. Click “OK” to mass erase and program the flash. Wait for the programming to complete.



33. You can now use the debugger. In this lab, we will simply run the program by clicking the Start (green arrow) button shown below.



Loading the Continua Agent Driver

Once the S08MM128 starts running, it will enumerate as a Continua-compliant USB device and Windows will need to load the driver. The HealthLink software from LNI comes with a driver. The steps below detail how to load the LNI driver.

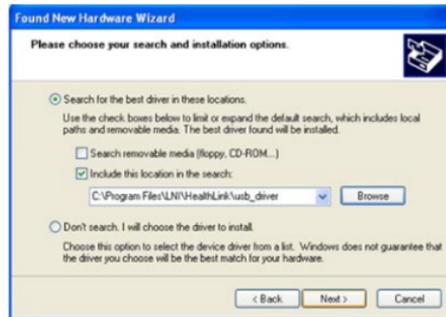
34. At the screen below, select “No, not at this time.” Then, choose “Next.”



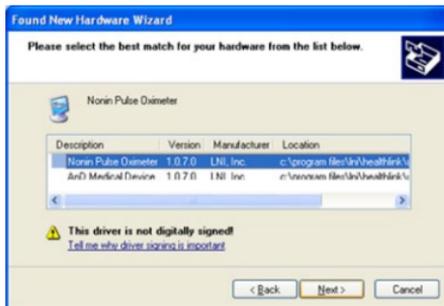
36. In the screen below, select “Install from a list of specific location.”



36. Select the “Browse” button. Navigate to the following path and choose “Next.”
 C:\Program Files\LNiHealthLink\usb_driver



37. The LNI driver includes two devices. Select the “Nonin Pulse Oximeter” and choose “Next.”



38. On the final screen, select “Finish.” The USB Agent driver is now loaded.



39. You may be asked to restart your computer after this step. Save all of your existing work before doing so.

Interacting with HealthLink

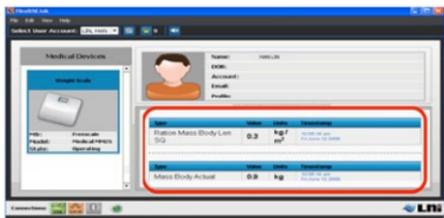
40. If you restart your computer in the previous step, please open HealthLink again. Then, remove and re-insert the USB to the TWR-SER module. Weight Scale, the first health specialization demo, should start running and the HealthLink GUI's left panel should show operating state.

41. It may take several seconds for the device to associate with the HealthLink. If the left panel still shows unknown demo or unassociated state, you may need to:

- Reset the S08MM128 by hitting the RESET button SW1 from the TWR-S08MM128 Module
- Ensure the mini-USB connection from the TWR-SER Module is tight
- Reconnect the mini-USB plug from the TWR-S08MM128 Module

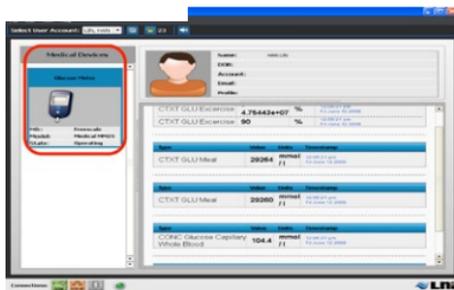
Then, reset again.

42. The first specialization demo is Weight Scale. Press the SW2 button from TWR-S08MM128 to send new data to the HealthLink GUI. New data will be displayed on the right panel of the GUI as indicated by the red highlight below. You can also clear the data by right clicking on the panel then choosing "Clear."



43. Each time you push the SW2 button from the TWR-S08MM128 Module, HealthLink will receive new data from S08MM128 and the data is formatted to the current specialization demo.

44. Push the SW4 button from the TWR-S08MM128 to switch to the next specialization demo, Glucose Meter. You will notice in transition to the next demo, the state becomes unassociated. Wait for several seconds for it to change to operating state again. Then, push SW2 button from TWR-S08MM128 Module to see the new data sent from the S08MM128 device. If the state stays unassociated in a transition for a long time, repeat Step 41.



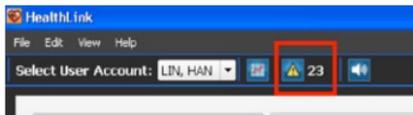
45. Continue the remaining Blood Pressure and Thermometer specialization demos with similar steps above.

Uploading Measurements to Google Health

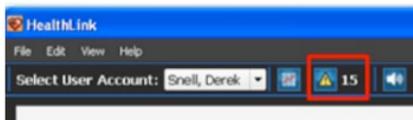
HealthLink will automatically upload the received measurements to Google Health's profile repository.

NOTE: This part of the lab requires an Internet connection without a proxy server. A proxy server is widely used in corporate offices, so you may have to run this demo at a home office. HealthLink will offer proxy support in an upcoming release.

46. Notice the warning box below starts to increment with every measurement. This warning box shows the number of measurements that were not transferred to the profile's repository, in this case, Google Health. This occurs because your PC may be in a proxy network. The results will be saved and updated to your Google Health account as soon as you are in a non-proxy network again. The current version of HealthLink does not support a proxy network.



47. With a non-proxy Internet connection, the warning number will decrement as each measurement is uploaded to Google Health.



48. To see the results updated to the Google Health repository, log back into your Google Health account.

49. Click on “Test Results” in your Google Health home page. Measurements that HealthLink received from the S08MM128 will be shown.

50. HealthLink also supports other online repository such as Microsoft HealthVault. For more information, go to HealthLink’s Help menu and select “Online Repository.”

The screenshot shows the Google Health interface. On the left is a navigation menu with categories like 'Test results', 'Diagnoses', 'Medications', etc. The main area displays a table of test results under the heading 'Test results'. The table has columns for Name, Result, Normal, Test date, Ordered by, Received from, and Record. Three rows of data are visible, all for 'Blood Pressure (systolic)' tests performed on June 10, 2010, with a result of 143 mmHg. The 'Test results' link in the left menu is highlighted with a red box.

Name	Result	Normal	Test date	Ordered by	Received from	Record
Blood Pressure (average)	143 mmHg		Jun 10, 2010	User-entered	Jun 10, 2010	Add record Edit Delete
Blood Pressure (diastolic)	143 mmHg		Jun 10, 2010	User-entered	Jun 10, 2010	Add record Edit Delete
Blood Pressure (systolic)	143 mmHg		Jun 10, 2010	User-entered	Jun 10, 2010	Add record Edit Delete



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