Getting Started with Sample Applications

RM1xx Series

Application Note   *v1.0*

INTRODUCTION

Laird provides a library of sample applications for use with each of our *smart*BASIC modules. These application demonstrate how to use DVK sensors and hardware toward hypothetical use cases. Sample applications like these are also provided for the RM1xx Series. In this guide, we'll cover how to compile, load, and run a few sample applications with the RM1xx DVK.

REQUIREMENTS

- RM1xx Sample Applications Library, available at https://github.com/LairdCP/RM1xx-Applications
- DVK-RM186 or DVK-RM191 board
- UwTerminalX, found at https://github.com/LairdCP/UwTerminalX (v1.03 or later recommended)

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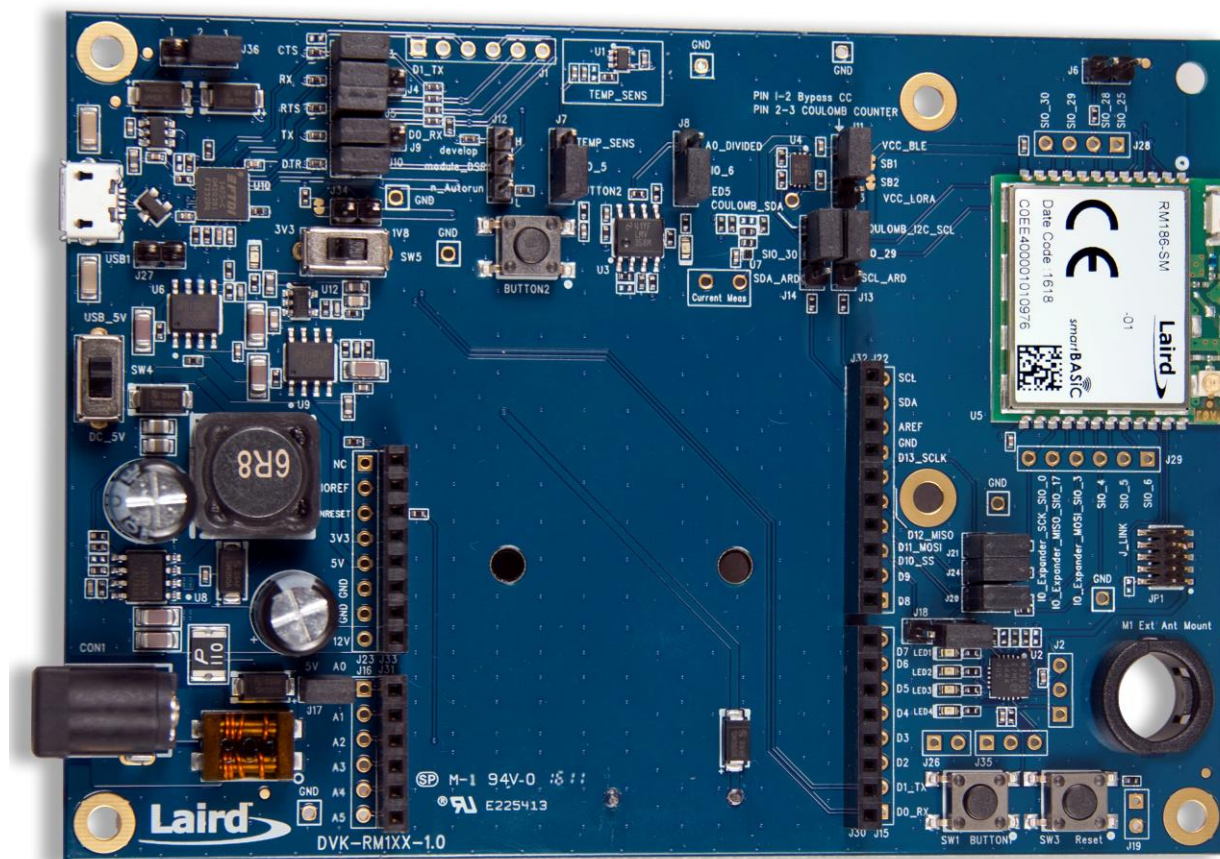Europe: +44-1628-858-940
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Figure 1: DVK-RM1xx

OVERVIEW – APPLICATIONS

This guide focuses on three specific *smart*BASIC sample applications: ioepander, tempsense, and ltc2941. These applications provide the following functions:

- **Ioexpander.rm1xx.sb**: Blinks the LEDs on the bottom right of the board (LED1-4) when the SW1/BUTTON1 is pressed. This application utilizes the SPI bus.
- **Tempsens.rm1xx.sb**: outputs the current temperature on the UART of the TEMP_SENS sensor at the top of the board. This application utilizes the analog I/O bus.
- **ltc2941.sb**: outputs the current consumed by the RM1xx device. This application utilizes the I2C bus.

The following sections detail a generalized procedure for compiling and loading applications in UwTerminalX, as well as how to test and use each of these sample applications.

COMPILING AND LOADING APPLICATIONS IN *SMART*BASIC

UwTerminalX is Laird's terminal software provided for use with *smart*BASIC radios. It includes complete functionality for terminal communication, as well as loading and compiling *smart*BASIC applications. This section covers the generalized procedure for compiling and loading a application. This can be applied to each of the applications mentioned in subsequent sections.

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Note: These applications must all be stored in the same directory as the *rm1xx-defs.h* header file that is included in each module firmware release. RM1xx Series firmware releases can be found on the Software Downloads tab of the RM1xx Product Page.

To compile and load applications to the RM1xx Series modules, complete the following steps:

1. Download the ioexpander, tempsense, and ltc2941 applications to your PC.
2. Connect the RM1xx development board to your PC via the included USB micro cable.
3. Power your development board.
4. Launch UwTerminalX.
5. On the Update tab within the UwTerminalX pane, click **Check for Updates** to ensure you're using the latest version of UwTerminalX with support for the RM1xx Series.
6. In the Config tab, in the Device drop down, select either **RM186** or **RM191** based on your setup.
7. Select the correct port to which your development board is connected.
8. Click **OK** to advance to the Terminal tab.
9. Hit **Enter** on your keyboard. If you see the return *00*, you are connected successfully.
10. Right-click in the terminal window, and in the context menu click **XCompile + Load.**
11. In the file selector window, select the application you wish to compile and click **Open.**
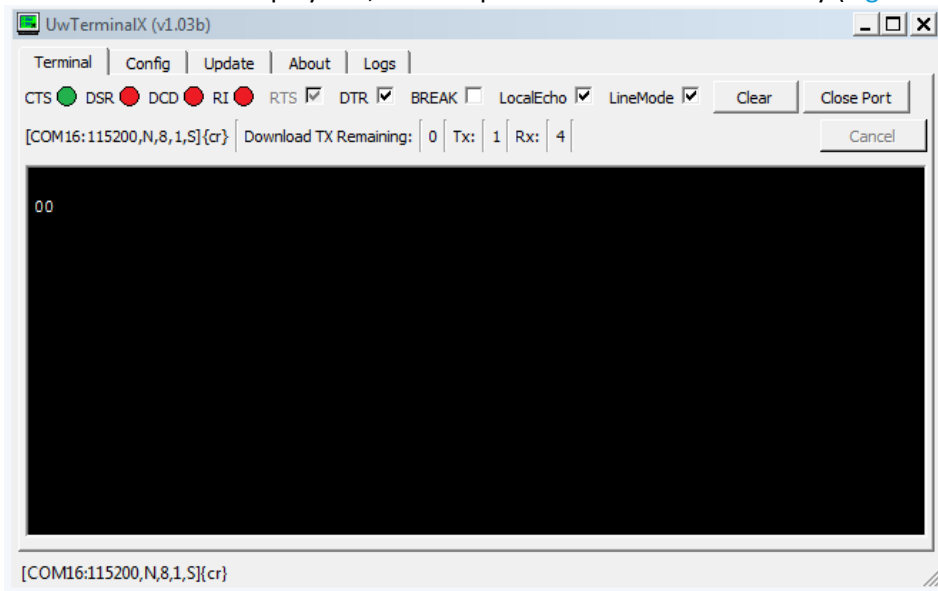12. When the terminal displays *00*, the compiler has finished successfully (Figure 2).

Figure 2: Terminal returns "00" for a successful operation

13. Type **at+dir** and press **Enter**. You should see your application in the file list.

> **Note:** When a application is compiled and loaded in UwTerminalX, the file name is truncated after the first period (.) in the filename. Thus, *ioexpander.sb* becomes *ioexpander*, *tempsense.sb* becomes *tempsense*, etc.

14. To run your application, type its filename and press **Enter.**

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IOEXPANDER.RM1XX.SB

IOExpander is a sample application designed to monitor the I/O Expander Pin 4, which is connected to a push button (SW1) on the development board. When SW1 is pressed, Pin 4 is grounded. Subsequently, the application causes LED1, LED2, LED3, and LED4 to light in a strobe pattern.

Note: For IOExpander to work as expected, you must bridge pins 2 and 3 of J18 with a jumper.
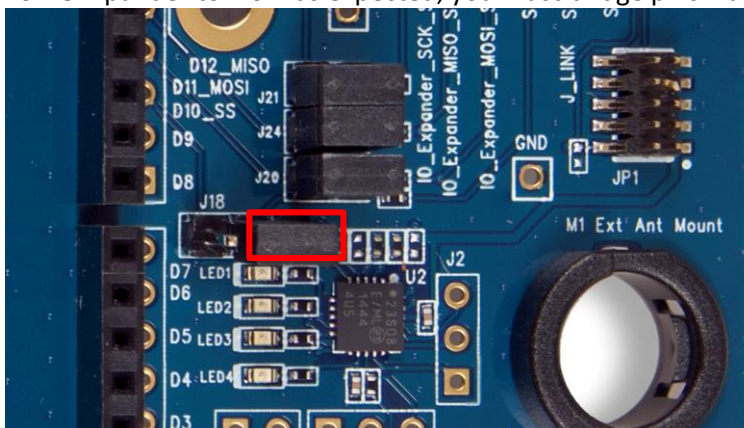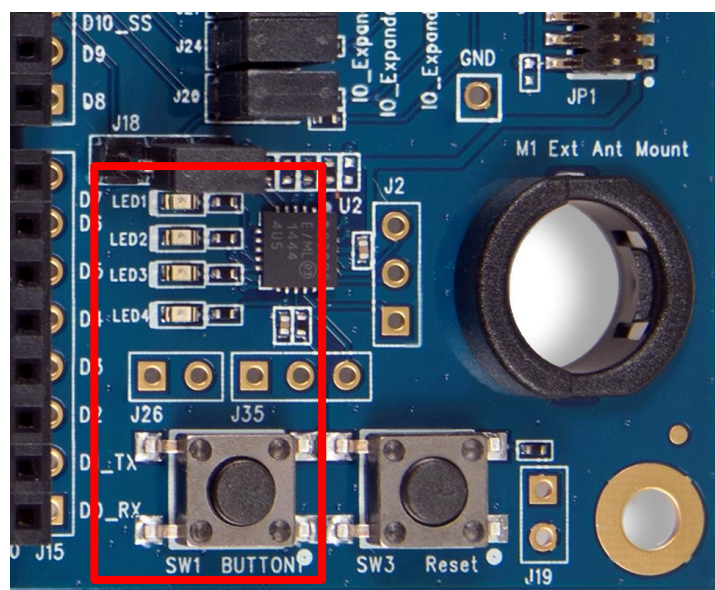

The push button and the LEDs on the development board are highlighted in Figure 3.

Figure 3: LED1 through LED4, and SW1

The nature of *smart*BASIC means that this is performed by the module resting in the WAITEVENT state until IO4 is grounded, at which point the strobeLEDs() function is called. This is followed by a 10 millisecond sleep, whereupon the next WAITEVENT is encountered.

This application presents a very simple and straightforward way of relying on a physical switch to trigger the change of state in a logic line, and subsequently launch a series of events. It is a simple demonstration of the type of automated use case that is so well handled in *smart*BASIC.

TEMPSENS.RM1XX.SB

Tempsens is designed to read the temperature data gathered from the onboard temperature sensor on the development board and output it to the terminal in degrees Celsius. The temperature sensor on the development board is highlighted in Figure 4.

Figure 4: Temperature sensor on DVK-RM1XX

When the tempsens application is running, the temperature recorded by the sensor is echoed to the terminal once every 500 milliseconds. If you place something warm near the temperature sensor, you can see this change reflected in real time in the terminal, as demonstrated in Figure 5.
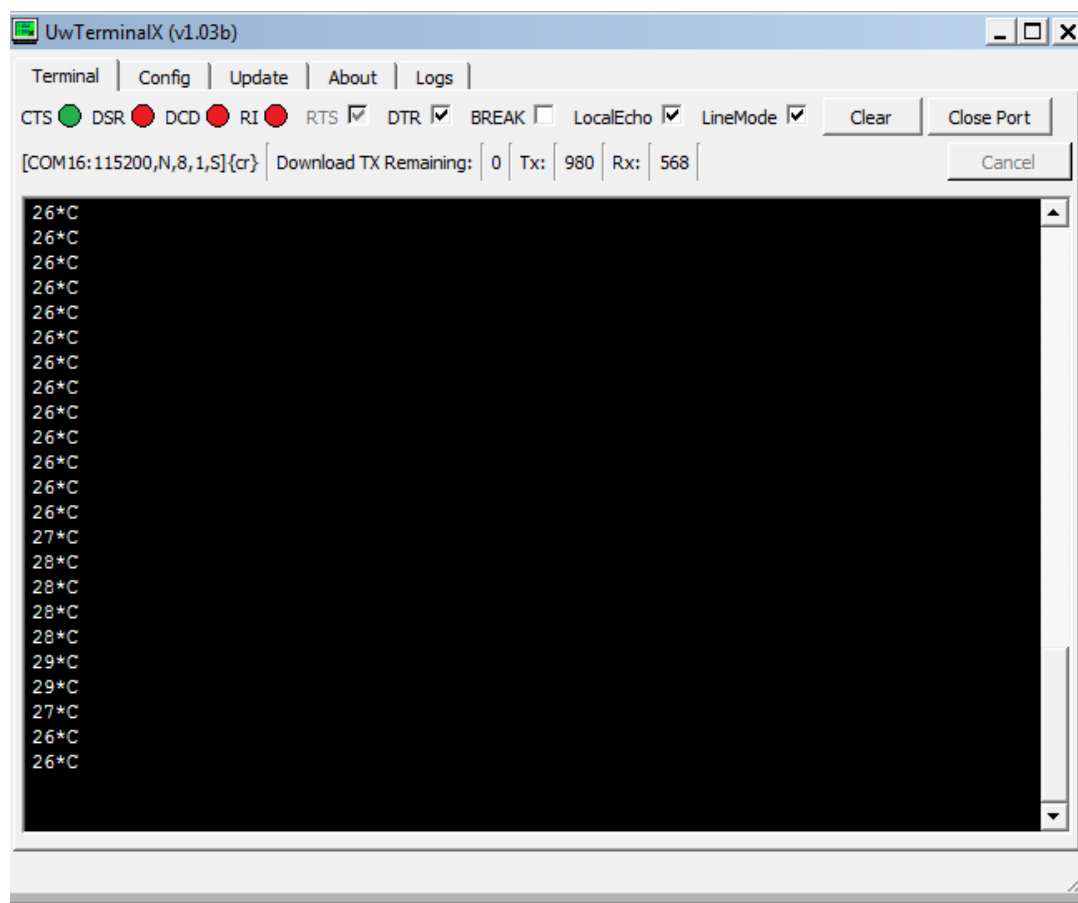

Figure 5: Temperature sensor at ambient temperature, then with heat applied, and later heat removed

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LTC2941.SB

This application is designed to measure the current consumption of the RM1xx development kit. It does so utilizing the onboard LTC2941, which measures cumulative battery charge and discharge to a high degree of accuracy.

Note: For LTC2941 to run as expected, you must bridge the following pins:

- **-** Connect COULOMB_I2C_SCL and SIO_29 via jumper
- Connect COULOMB_SDA and SIO_30 via jumper
- Connect pins 2 and 3 of COULOMB COUNTER (SB2 and VCC_LORA) via jumper
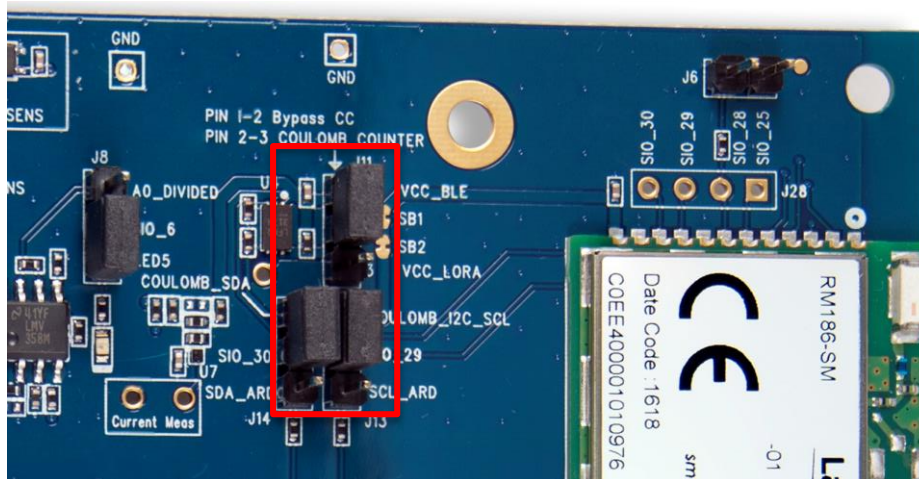
While running, the terminal echoes the ChargeRegVal, or the returned value of total current consumption, once per second, as shown in Figure 6.
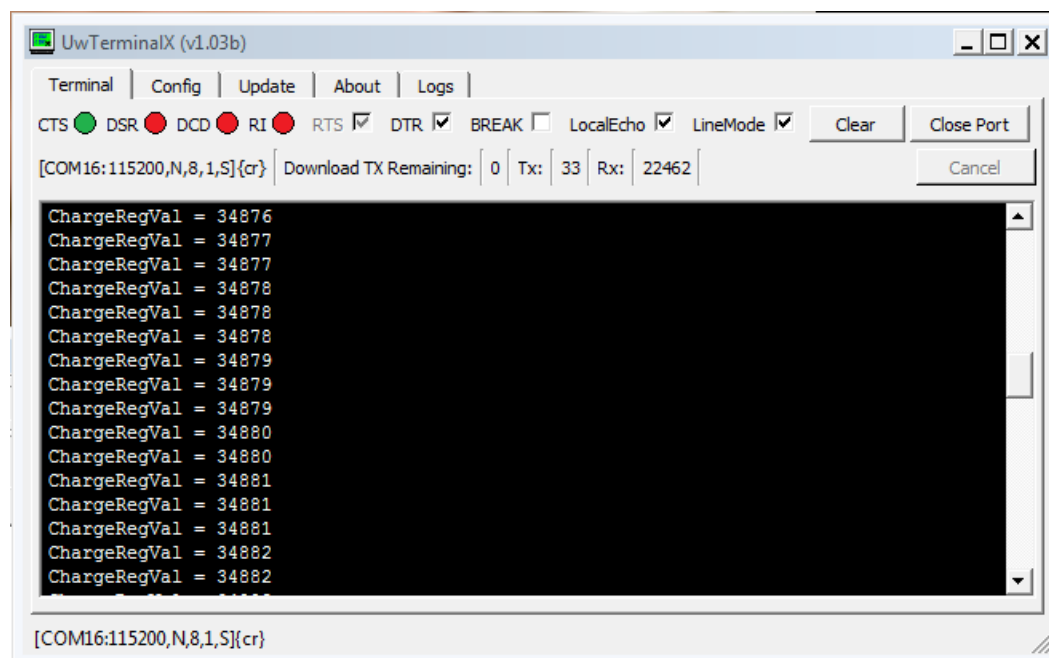
Figure 6: Current consumption logged in real time by LCT2941

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This can be used to calculate the overall power requirements of your application over time, making it easier to make decisions about what kind of power cell is required, what amount of time devices can operate in the field without maintenance, and more.

CONCLUSION

The previously described *smart*BASIC applications are just a few of the many provided by Laird which can help familiarize you with *smart*BASIC and reduce your time to market. Other applications include those for testing BLE and LoRa communications, interfacing with an I2C GPS, opening and working with command interfaces, and much more. All of these applications are provided freely with the RM1xx, and can be used in your design. Learn more at www.lairdtech.com/products/rm1xx-series.

REVISION HISTORY

Version	Date	Notes	Approver
1.0	20 May 2016	Initial Release	Tim Carney

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