



CLICK SENSOR HUB

Alfonso De La Morena, Mohamed Sghari, Dylan Dean
Ingram School of Engineering , Texas State University

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GROUP MEMEBERS: (Dylan, Alfonso, Mohamed)



Project Motivation

NXP does have a MCU extension board for the FRDM-KL46Z called the clickSHIELD. However, the clickSHIELD can only take up to two add-on boards and mounts atop the MCU restricting board access. Currently many other companies offer an MCU extension with capabilities to hold four add-on boards. With no such extension currently existing for the FRDM-KL46Z we saw an opportunity to design one for NXP.

Project Overview

The Click Sensor Hub will be an extension board for the FRDM-KL46Z. The hub will serve as a connection between one KL46Z and four mikroBUS standard sockets. For this project we have selected ten add-on boards. The mikroBUS sockets will be able to take any combination of these boards. Finally, the Click Sensor Hub will either store or transmit the data from the add-on boards to be displayed and used in data analytics.

Project Design Flow

The project is comprised of three phases; Hardware Design, Software Functionality, and some data analytics. Currently the team is in phase one. A prototype design of the PCB is completed. Testing will be conducted and a new design will be implemented accordingly else we move forward to next phase. Phase two is coding for ten (selected) Clicks. Testing the boards modular socketing capabilities as well as transmitting data output to an appropriate data storage (formatted). Phase Three is the use of a data manipulator(Excel) to display analytic information gathered from the sensor readings demonstrating some real world application.

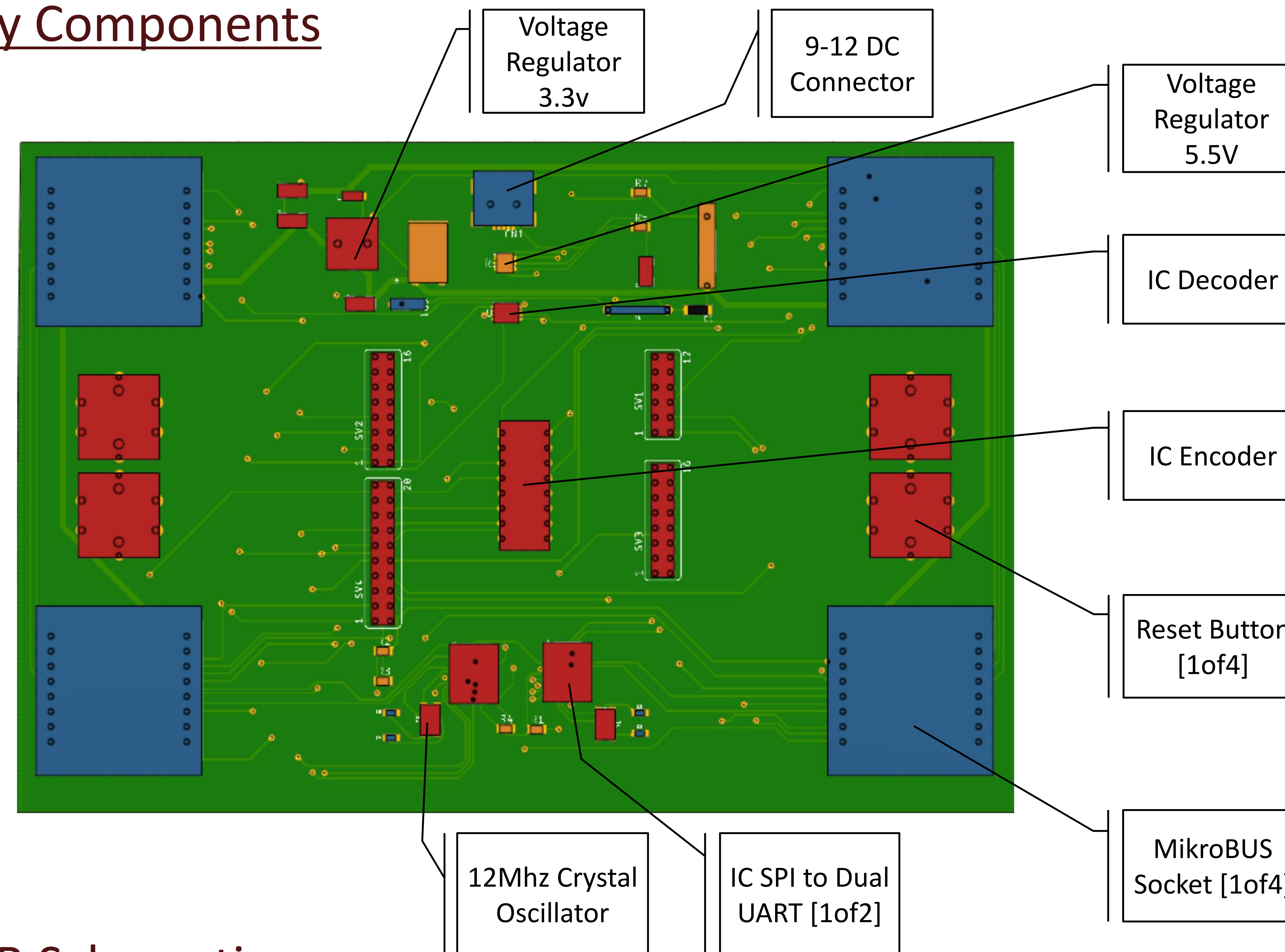
Acknowledgments

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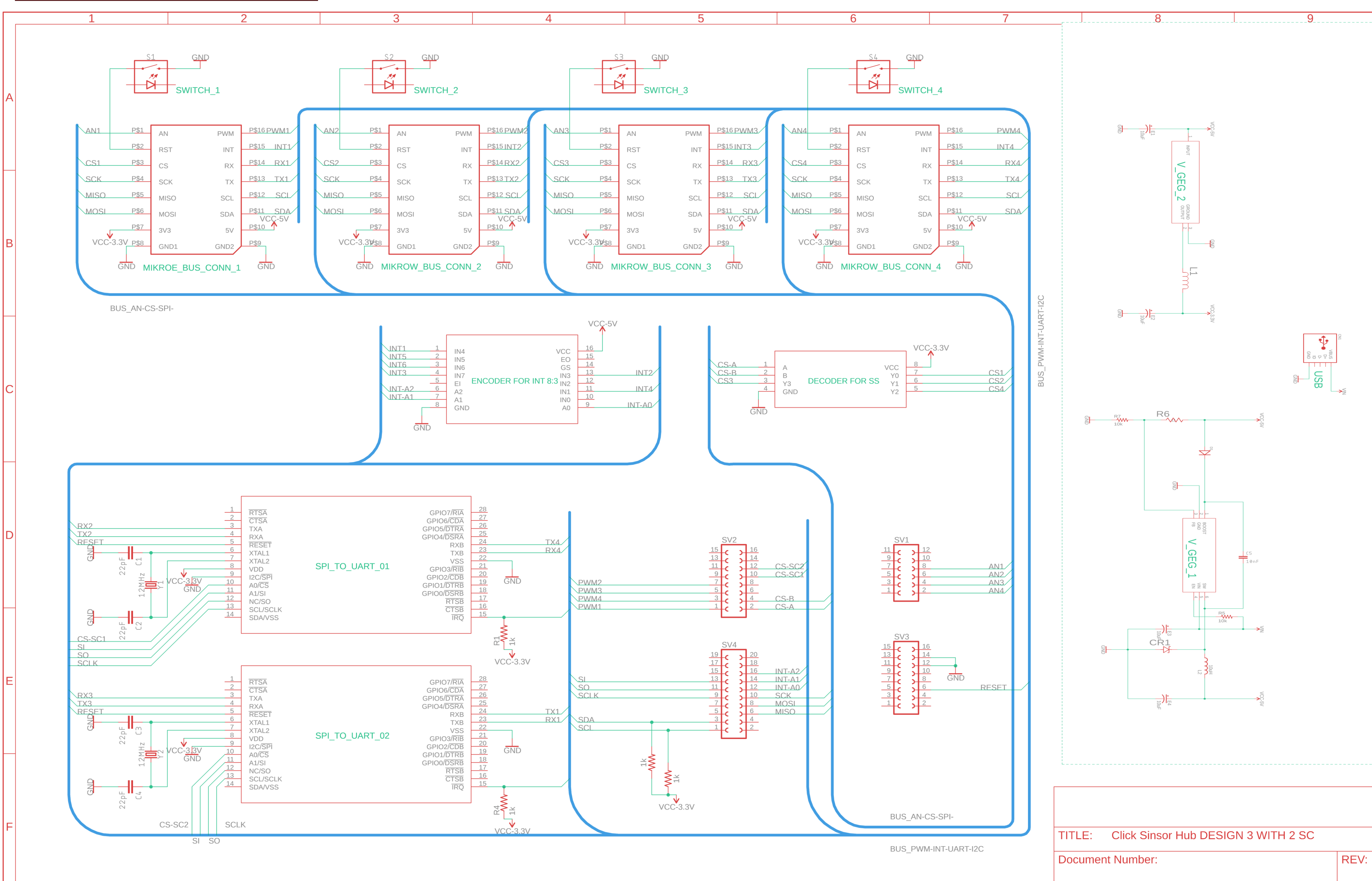
Dr. Kevin Kemp (Sponsor)

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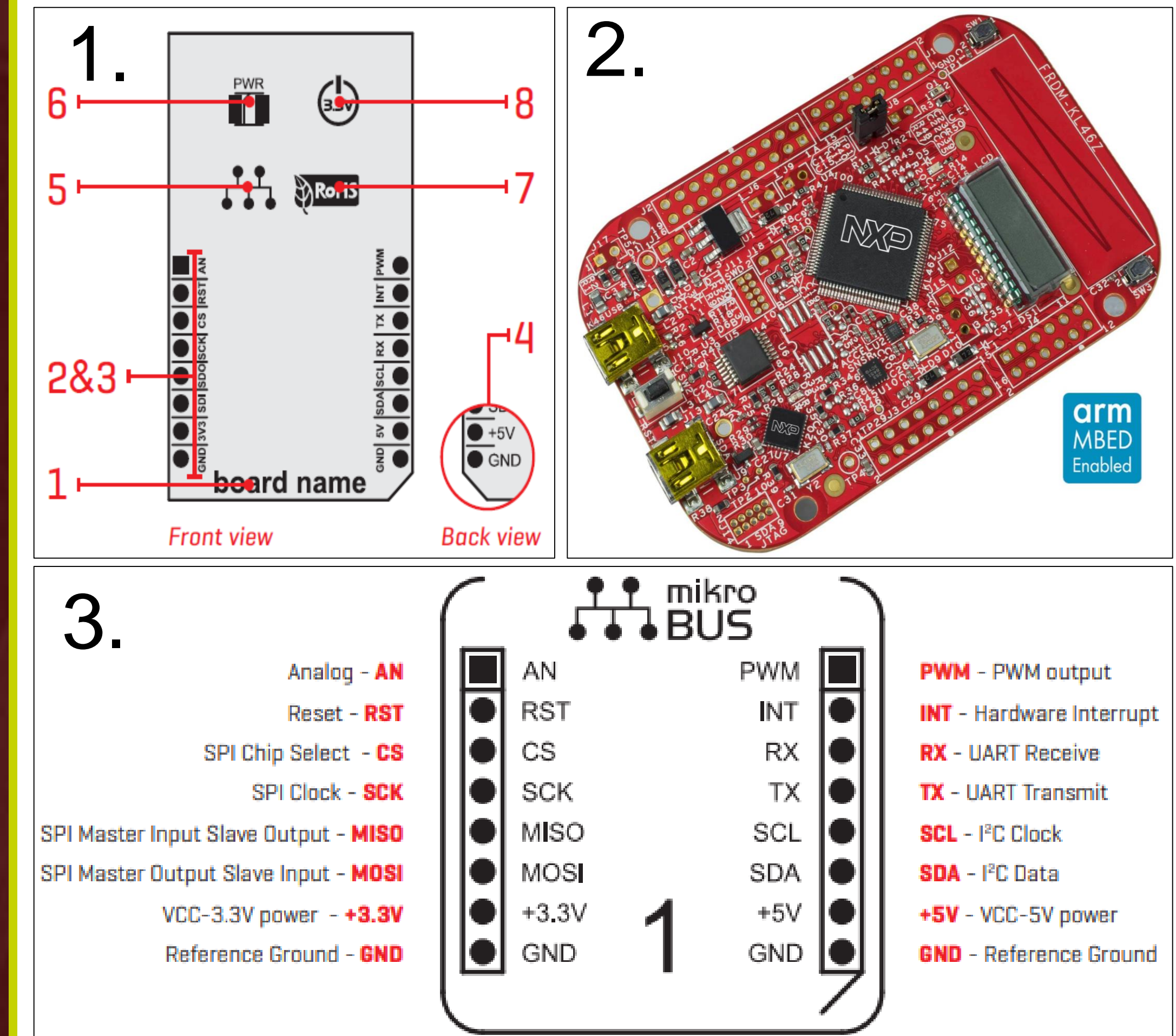
Key Components



PCB Schematic



Click/FRDM-KL46Z/mikroBUS™



1. The Click Sensor Hub will be able to accommodate four small add-on boards also called Clicks. Each one carries a single IC or module that brings a specific functionality to the FRDM-KL46Z. To simplify user interfacing the design meets the mikroBUS™ standard with regard to the size, layout and silkscreen markings.
2. The FRDM-KL46Z is an ultra-low-cost development platform enabled by the Kinetis® L series KL4x MCU family built on the Arm® Cortex®-M0+ processor. Designed and owned by NXP.
3. mikroBUS™ socket - the add-on board standard. Features a pair of 1x8 female headers with a proprietary pin configuration and silkscreen markings. The pinout maintains standardized orientation. Layout consists of three groups of communications pins (SPI, UART and I2C), six additional pins (PWM, Interrupt, Analog input, Reset and Chip select), and two power groups (+3.3V and 5V).

References

- "clicks." What-are-microcontrollers-and-what-are-they-used-for - MikroElektronika. Accessed November 28, 2018. <https://www.mikroe.com/click>.
- "mikroBUS." What-are-microcontrollers-and-what-are-they-used-for - MikroElektronika. Accessed November 28, 2018. <https://www.mikroe.com/mikrobus>.
- "FRDM-KL46Z: Freedom Development Platform for Kinetis® KL3x and KL4x MCUs." PCA9564|NXP. Accessed November 28, 2018. <https://www.nxp.com/support/developer-resources/evaluation-and-development-boards/freedom-development-boards/mcu-boards/freedom-development-platform-for-kinetis-kl3x-and-kl4x-mcus:FRDM-KL46Z>.