EVM430-CAPMINI Getting Started Guide

This guide gives a brief overview of the EVM430-CAPMINI capacitive touch evaluation board for the CapTIvate™ development ecosystem.

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1 Introduction

The EVM430-CAPMINI is an easy-to-use evaluation board for the MSP430FR2512 capacitive-touch-sensing microcontroller. This board demonstrates the key features of CapTIvate technology such as ultra-low power and ease of use. The onboard CapTIvate HID bridge tool lets you tune the touch parameters with CapTIvate Design Center. The board includes four touch buttons and four LEDs to create a simple user interface. It also provides a buzzer for advanced applications. A USB cable or an onboard CR1632 coin battery, which enables a stand-alone portable demonstration, can power the board.

To start development using MSP430™ CapTIvate MCUs, see the MSP CapTIvate MCU Development Kit or the MSP430 CapTIvate Touch Keypad BoosterPack plug-in module.

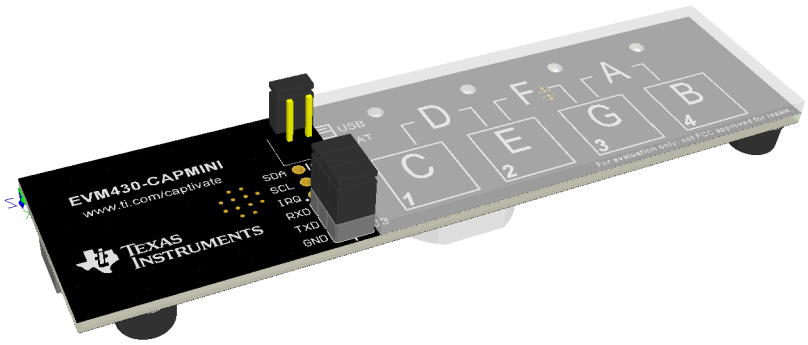

Figure 1. EVM430-CAPMINI

Free software development tools are also available, such as the TI Eclipse-based Code Composer Studio™ IDE (CCS) and the IAR Embedded Workbench® IDE.

1.1 Scope

This guide is a brief overview of how to use the EVM430-CAPMINI. The full EVM user's guide is available in the CapTIvate Design Center integrated documentation. The latest version of the user's guide is also available in the CapTIvate Technology Guide.

1.2 Key Feature

- Four capacitive touch buttons
  - Features the MSP430FR2512 MCU
  - Supports single and multiple touch
  - Includes LEDs to indicate a touch event
- Onboard speaker
  - Plays unique tone for each button or pair
- Two power options for touch evaluation
  - CR1632 battery holder for portable operation
  - USB port for operation without battery
- Dedicated HID serial communications bridge
  - No HID drivers to install
  - Supports I^2C and UART

1.3 What's Included

1.3.1 Kit Content

- 1 EVM430-CAPMINI evaluation board
- 1 Micro USB cable

A CR1632 battery is not included and must be provided by the user

1.3.2 Software Example

- Out-of-Box Software

2 Required Tools and Hardware

The EVM430-CAPMINI requires these tools:

- CapTIvate Design Center tool (see Section 2.1)
- Integrated development environment (IDE) or flashing utility (see Section 2.2)
- MSP-FET or eZ-FET hardware (see Section 2.3)

2.1 CapTIvate Design Center Tool

The CapTIvate Design Center is the one-stop-shop development environment for CapTIvate touch-sensing MCUs. In addition to serving as the CapTIvate development graphical user interface, the design center also contains all of the CapTIvate software examples and relevant technical documentation.

To get the most out of your EVM430-CAPMINI, download and install the latest version of the CapTIvate Design Center. The CapTIvate Design Center supports Microsoft® Windows®, Apple® OS X®, and Linux® host environments. The EVM430-CAPMINI requires CapTIvate Design Center version 1.70.00.00 or later.

2.2 Integrated Development Environment (IDE) or Flashing Utility

From the factory, the MSP430FR2512 contains the out-of-box firmware. This firmware includes the capacitive touch, LED, and speaker drivers. You can use the CapTIvate Design Center to tune the touch parameters and save them to the FRAM of the MSP430FR2512 MCU.

You must use an integrated development environment to write a new program or software example to the MSP430FR2512 MCU on the EVM430-CAPMINI. The CapTIvate software examples support TI Code Composer Studio (CCS) version 7.4 or later and IAR Embedded Workbench for MSP430 IDE version 7.11 or later.

2.3 MSP-FET or eZ-FET Hardware

You must use a hardware debug tool to program the MSPFR2512 MCU. The MSP-FET is a powerful debug probe for application development and supports all MSP430 microcontrollers. The eZ-FET is a powerful onboard emulator and is on LaunchPad™ development kits.

3 Hardware

The following sections describe the EVM430-CAPMINI hardware (see Figure 2). For a detailed description of the hardware, see the EVM430-CAPMINI hardware description in the CapTIvate Technology Guide.

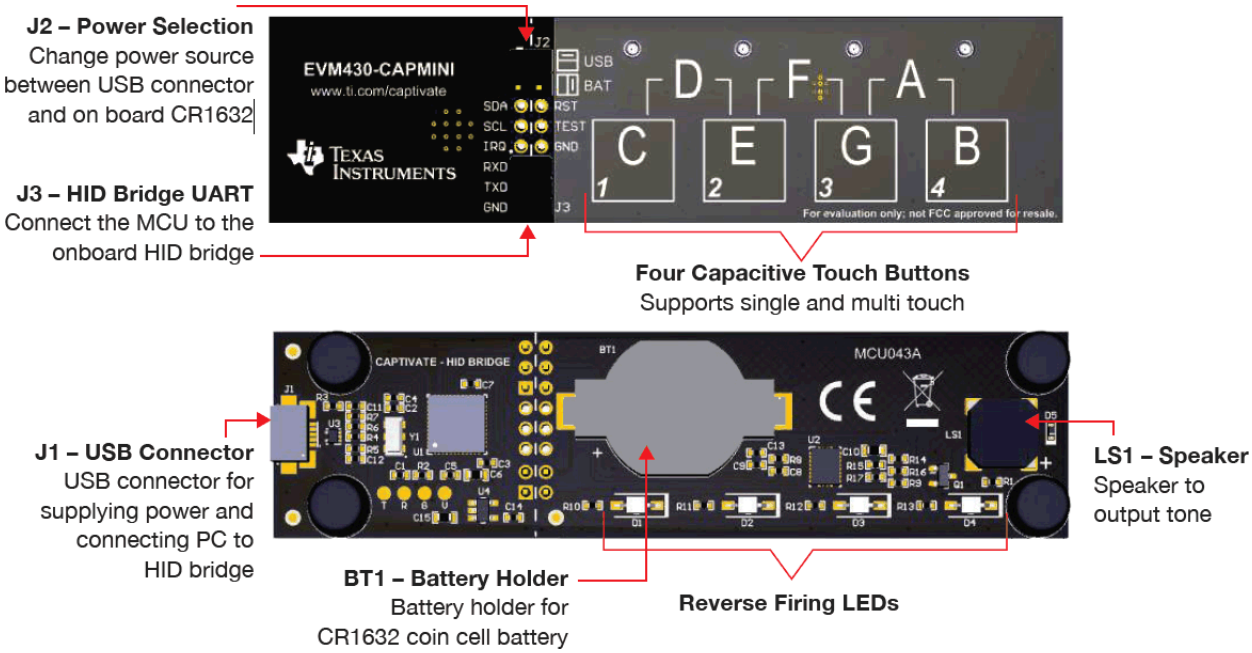

Figure 2. EVM430-CAPMINI Overview

3.1 Function Block Diagram

Figure 3 shows the EVM430-CAPMINI functional block diagram.

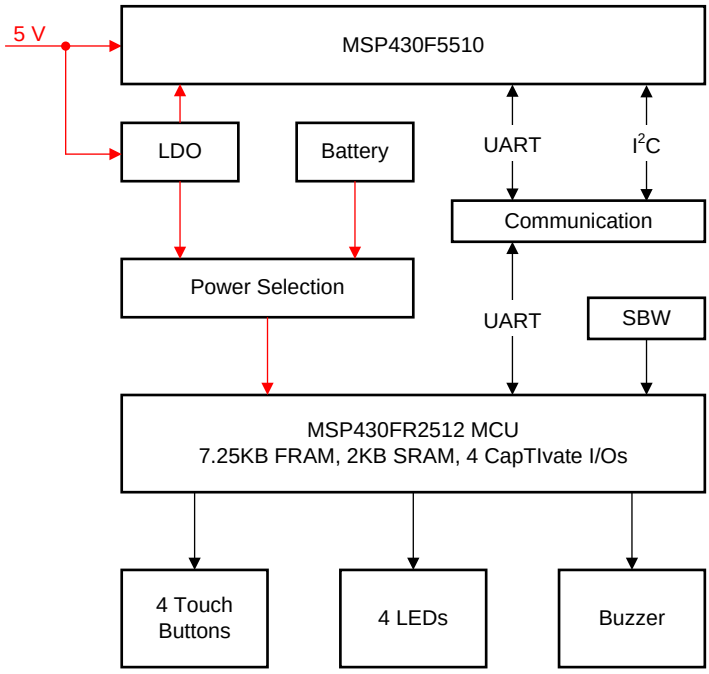

Figure 3. EVM430-CAPMINI Block Diagram

3.2 CapTIvate HID Communication Bridge

The EVM430-CAPMINI has a HID bridge that enumerates as a USB HID device. The bridge does not require any drivers installed on the PC. The bridge supports I^2C and UART interfaces. It is factory programmed with a compact communication protocol that can send sensor data and status between the target MCU and the CapTIvate Design Center. For detailed information about the communication protocol, see HID Bridge section in the CapTIvate Technology Guide.

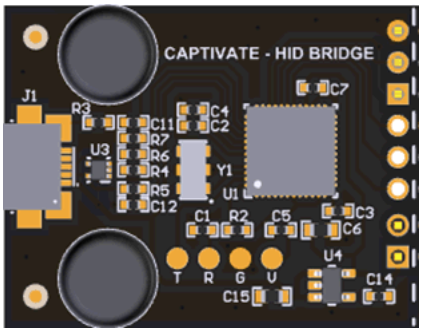

Figure 4. CapTIvate HID Communication Bridge

Key features include:

- Supports UART and I^2C interfaces
- Supports the CapTIvate protocol
- Needs no USB drivers
- Supports easy firmware updates with an onboard test point

4 Getting Started

To get started with the EVM430-CAPMINI, see the EVM430-CAPMINI Getting Started section of the CapTIvate Technology Guide.

An easy way to get started with the EVM is to use the out-of-box code. This code demonstrates key features of the EVM.

4.1 Power the Board

The power supply to the EVM430-CAPMINI can be through the HID Bridge or an onboard CR1632 coin battery. Set jumper J2 to select the power supply (see Figure 5).

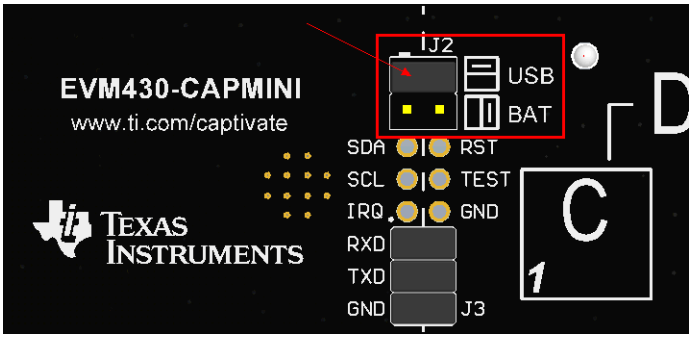

Figure 5. EVM430-CAPMINI Power Supply Jumper

4.1.1 HID Bridge USB Power

The power supply is most often from USB through the HID Bridge. The USB provides 5-V power, and the EVM430-CAPMINI regulates this power rail to 3.3 V for HID Bridge operation and 3.3 V to the target side of the EVM. To use USB power, connect a jumper on the J2 USB terminal. Connect GND on jumper J3.

4.1.2 CR1632 Coin Battery Power

A CR1632 coin battery can provide a 3-V supply to the target. To use the battery, connect a jumper on the J2 BAT terminal.

4.2 Running the Out-of-Box Demo

To run the out-of-box demo:

1. Connect the EVM430-CAPMINI development kit to a computer with the included USB cable.
2. Open an example project in CapTIvate Design Center.
3. Click Communications→Connect (see Figure 6).

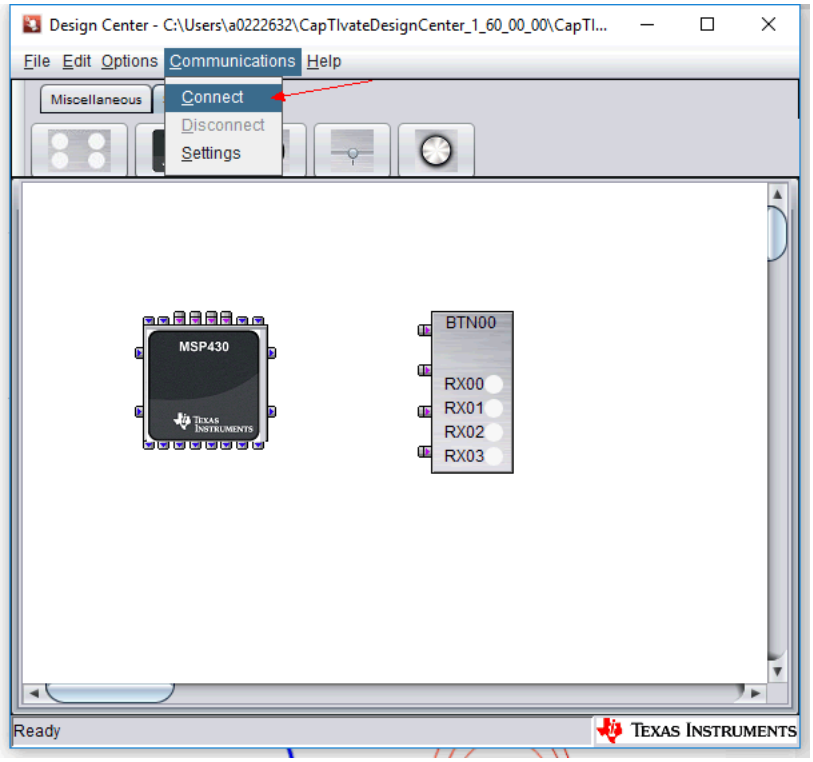

Figure 6. CapTIvate Design Center

By default, the EVM430-CAPMINI development kit enters the wake-on-proximity mode after power up. In this mode, there is no communication with the design center, all of the LEDs on the board are off, and the CPU is in low-power mode 4. The hardware state machine actively scans the touch sensor at 10 Hz until it detects a button touch. The total current in wake-on-proximity mode is approximately 4 µA.

4. Touch any button on the board to wake the EVM430-CAPMINI.

   While the EVM430-CAPMINI detects a touch, an LED is on, the speaker plays a unique tone for each button, and the widget in the design center displays the button state.

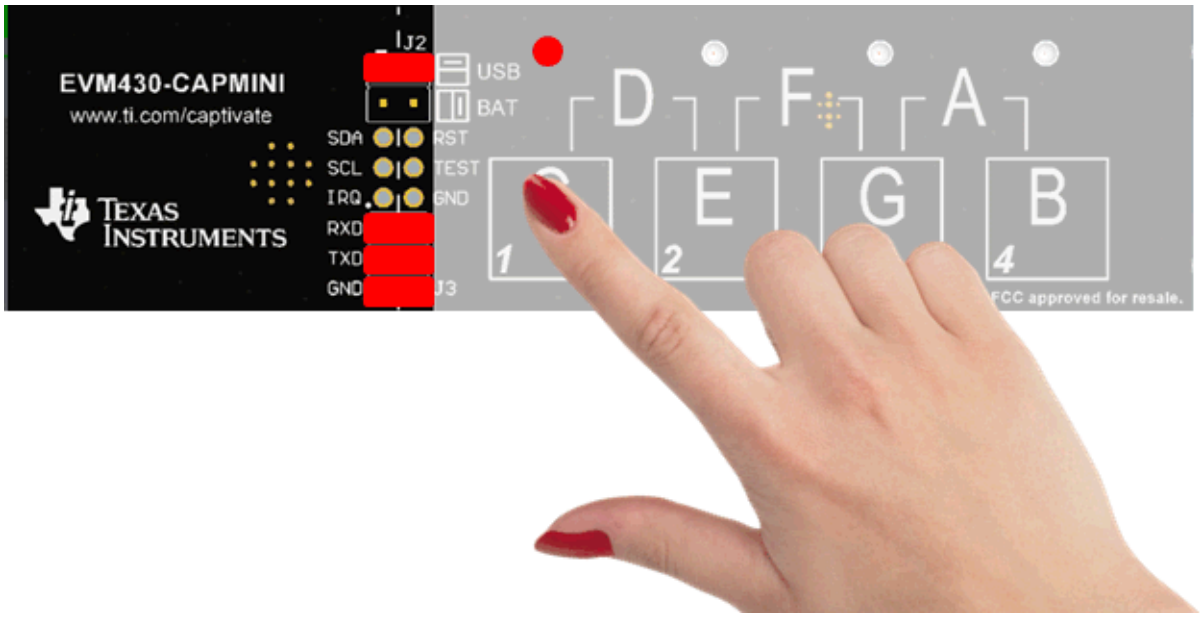

Figure 7. Out-of-Box Demonstration

5. Release the button.

   All of the LEDs turn off, and the EVM430-CAPMINI evaluation kit enters wake-on-proximity mode in 5 seconds.

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- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
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