

# **BOOSTXL-CAPKEYPAD Capacitive Touch BoosterPack Plug-in Module**

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This getting started guide provides a brief overview of the [BOOSTXL-CAPKEYPAD](#) capacitive touch keypad plug-in module for the TI LaunchPad development ecosystem. It describes the common use cases for the BoosterPack module, introduces the required tools and hardware that are needed to develop with it, and provides the relevant links to the detailed [BOOSTXL-CAPKEYPAD EVM user's guide chapter](#) in the [CapTivate™ Technology Guide](#).

## Contents

1	Introduction .....	2
	1.1 Scope .....	2
	1.2 Using the BOOSTXL-CAPKEYPAD .....	2
2	Required Tools and Hardware .....	3
	2.1 CapTivate Design Center Tool.....	3
	2.2 Integrated Development Environment (IDE) or Flashing Utility.....	3
	2.3 CAPTIVATE-PGMR Hardware.....	4
	2.4 Host LaunchPad Development Kit Hardware .....	4
3	Getting Started .....	4
4	Hardware .....	4
	4.1 Functional Block Diagram .....	4
	4.2 BoosterPack Pinout .....	5

## List of Figures

1	BOOSTXL-CAPKEYPAD .....	2
2	BOOSTXL-CAPKEYPAD Block Diagram .....	4
3	BOOSTXL-CAPKEYPAD Pinout.....	5

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## 1 Introduction

The BOOSTXL-CAPKEYPAD is an easy-to-use evaluation module for the [MSP430FR2522](#) capacitive-touch-sensing microcontroller. This BoosterPack module enables you to extend your design for a LaunchPad development kit by adding a 12-key capacitive touch numeric keypad with LED back-lighting and proximity wakeup. Don't have a LaunchPad development kit? The BOOSTXL-CAPKEYPAD can also be used as a simple CapTivate technology evaluation module when coupled with the CAPTIVATE-PGMR for interfacing to a host PC running the CapTivate Design Center. It is even possible to bypass the onboard keypad and connect up to three external capacitive sensors to the BOOSTXL-CAPKEYPAD to test out your own sensor design concepts.



**Figure 1. BOOSTXL-CAPKEYPAD**

### 1.1 Scope

This getting started guide provides a brief overview of how the BOOSTXL-CAPKEYPAD can be used. The full detailed EVM user's guide is available within the CapTivate Design Center integrated documentation. The latest version of the user's guide is also available online within the [CapTivate Technology Guide](#).

### 1.2 Using the BOOSTXL-CAPKEYPAD

While the BOOSTXL-CAPKEYPAD can be operated in a stand-alone fashion by applying external power directly, it is most commonly used with either a host Launchpad development kit or the CAPTIVATE-PGMR module.

#### 1.2.1 Using the BOOSTXL-CAPKEYPAD With a LaunchPad Development Kit

The BOOSTXL-CAPKEYPAD can be used with a host LaunchPad development kit (such as the MSP-EXP430F5529LP) to add capacitive touch keypad functionality to a new or existing design based on a LaunchPad development kit. This use case enables the creation of a larger system in which the BOOSTXL-CAPKEYPAD plays an HMI role.

In this configuration, the BOOSTXL-CAPKEYPAD can be used out of the box with the factory programming. It is not necessary to have a CAPTIVATE-PGMR module to program the onboard MSP430FR2522 microcontroller. The host LaunchPad development kit only needs to be configured to communicate with the BOOSTXL-CAPKEYPAD over the I<sup>2</sup>C interface using the SDA, SCL, and IRQ signals provided on the 40-pin BoosterPack headers. The BOOSTXL-CAPKEYPAD powers up as an I<sup>2</sup>C slave using the factory-programmed example. The host LaunchPad development kit can out the current status of the BoosterPack plug-in module, as well as configure the operation of the BoosterPack plug-in module, using the simple I<sup>2</sup>C register interface. The [I<sup>2</sup>C register interface](#) is documented in the detailed user's guide, along with [I<sup>2</sup>C transaction examples](#).

While the BOOSTXL-CAPKEYPAD can be used with any LaunchPad development kit that supports I<sup>2</sup>C communication in the standard pin locations, TI provides several example projects for the host LaunchPad development kit to enable quick development of an application.

The following software example projects for the host LaunchPad development kit are provided:

1. [MSP-EXP430FR6989 + Segmented LCD](#)
2. [MSP-EXP430F5529LP + BOOSTXL-K350QVG-S1 QVGA LCD](#)
3. [MSP-EXP430F5529 USB Keyboard Example](#)

All of these examples are compatible with the out-of-box BOOSTXL-CAPKEYPAD software.

## 1.2.2 Using the BOOSTXL-CAPKEYPAD With the CAPTIVATE-PGMR and the CapTivate Design Center

The BOOSTXL-CAPKEYPAD can be used with the [CAPTIVATE-PGMR](#) module and CapTivate Design Center to view the real-time sensor data, tune the touch sensor performance, and program the onboard MSP430FR2522 MCU. This use case is for those looking to evaluate CapTivate touch sensing performance or begin development of their own capacitive touch design using MSP430™ CapTivate touch-sensing MCUs.

The following software example projects for the BOOSTXL-CAPKEYPAD target are provided:

1. [BOOSTXL-CAPKEYPAD Out-of-Box Experience](#) (comes preprogrammed on a new BOOSTXL-CAPKEYPAD)
2. [BOOSTXL-CAPKEYPAD-EMC](#) Noise Immunity Software Example
3. [BOOSTXL-CAPKEYPAD-Prototyping](#) External Sensor Example

These example projects may be programmed onto the MSP430FR2522 MCU on the BOOSTXL-CAPKEYPAD using the CAPTIVATE-PGMR module and either Code Composer Studio™ (CCS) or IAR Embedded Workbench® for MSP430.

## 2 Required Tools and Hardware

The following tools and hardware are required to use the BOOSTXL-CAPKEYPAD.

### 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 BOOSTXL-CAPKEYPAD, download and install the latest version of the CapTivate Design Center from the [MSPCAPTDSNCTR tool folder](#). The CapTivate Design Center supports Microsoft® Windows®, Apple® OS X®, and Linux® host environments. The minimum required CapTivate Design Center version with BOOSTXL-CAPKEYPAD support is version 1.60.00.00.

### 2.2 Integrated Development Environment (IDE) or Flashing Utility

To program a software example to either a host LaunchPad development kit or the BOOSTXL-CAPKEYPAD, an integrated development environment is required. CapTivate software examples support [TI Code Composer Studio \(CCS\)](#) and [IAR Embedded Workbench](#) for MSP430. The minimum CCS version with support for the MSP430FR2522 MCU is version 7.4. The minimum IAR EW version is version 7.11.

### 2.3 CAPTIVATE-PGMR Hardware

The [CAPTIVATE-PGMR](#) is required for connecting the BOOSTXL-CAPKEYPAD to a host PC to enable communication with the CapTivate Design Center and programming of the onboard MCU. The CAPTIVATE-PGMR is needed to load code examples other than the out-of-box experience example that comes preprogrammed on the BOOSTXL-CAPKEYPAD. If you already have a CapTivate MCU development kit ([MSP-CAPT-FR2633](#)), a CAPTIVATE-PGMR is included in that development kit and can be used with the BOOSTXL-CAPKEYPAD. The CAPTIVATE-PGMR is not required to use the BOOSTXL-CAPKEYPAD with a LaunchPad development kit to add keypad functionality, and the BOOSTXL-CAPKEYPAD can be used out of the box with the [out-of-box preprogrammed firmware](#).

### 2.4 Host LaunchPad Development Kit Hardware

To run the [host examples for the LaunchPad development kit](#), the appropriate LaunchPad development kit is required. See the specific host example for LaunchPad development kit to determine which kit is needed.

## 3 Getting Started

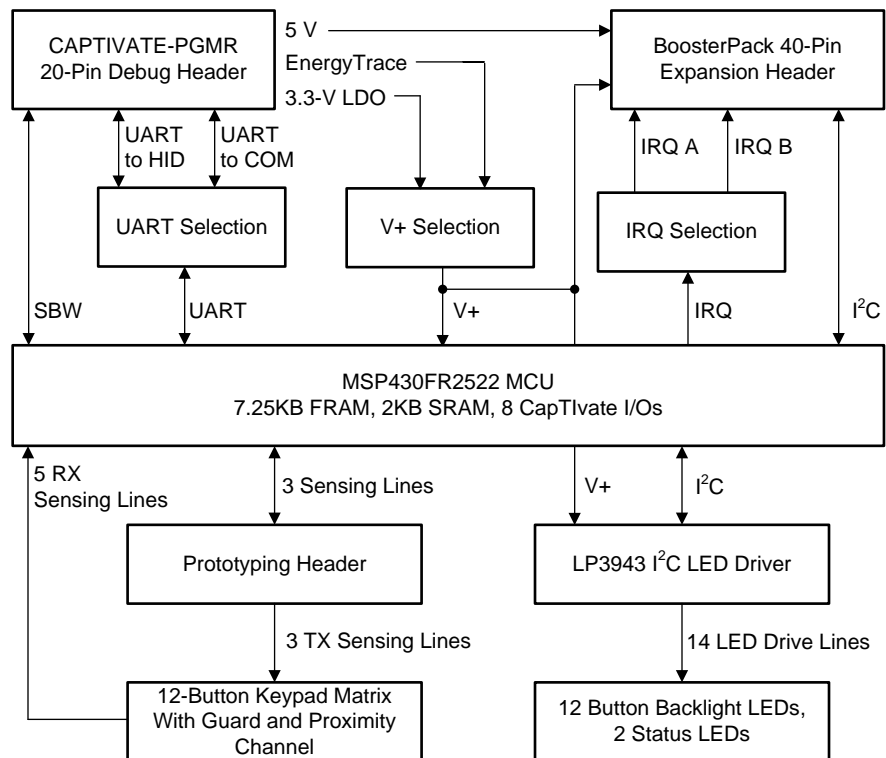
To get started with the BOOSTXL-CAPKEYPAD, see the [BOOSTXL-CAPKEYPAD Getting Started](#) section of the *CapTivate Technology Guide*.

## 4 Hardware

The following sections describe the BOOSTXL-CAPKEYPAD hardware. For a detailed description of the hardware, see the [BOOSTXL-CAPKEYPAD hardware description](#) in the *CapTivate Technology Guide*.

### 4.1 Functional Block Diagram

Figure 2 shows the BOOSTXL-CAPKEYPAD functional block diagram.



**Figure 2. BOOSTXL-CAPKEYPAD Block Diagram**

## 4.2 BoosterPack Pinout

The BOOSTXL-CAPKEYPAD is compatible with the 40-pin BoosterPack plug-in module standard. The BoosterPack plug-in module headers provide I<sup>2</sup>C connectivity to a host LaunchPad development kit (SDA and SCL signals), as well as an open-drain type interrupt request (IRQ) signal, which can be connected to one of two BoosterPack plug-in module pins to alert a host LaunchPad development kit when new data is available from the keypad.

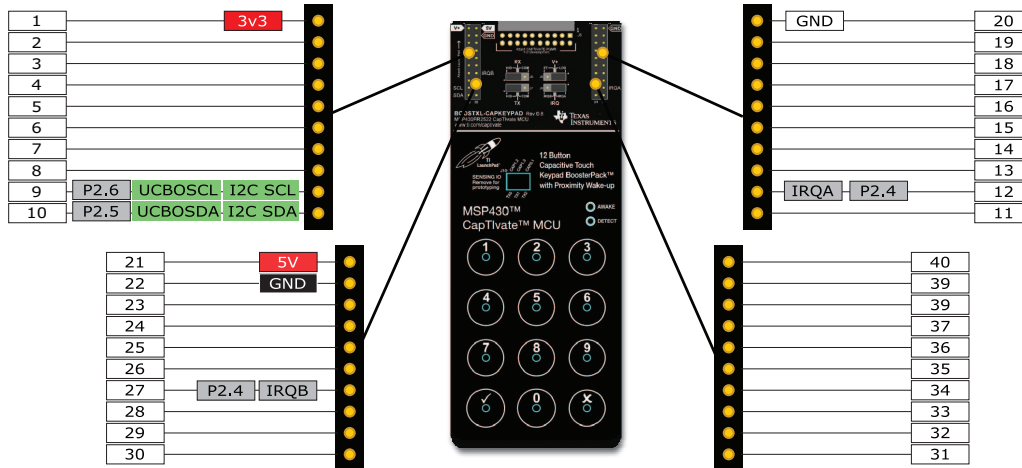


Figure 3. BOOSTXL-CAPKEYPAD Pinout

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- Increase the separation between the equipment and receiver.
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