LaunchPad

Evaluation Kit

Part Number: MSP-EXP430FR5969

Meet the MSP430FR5969

BoosterPack Ecosystem

Sharp® Memory LCD BoosterPack
- 1.3" 96 x 96 pixel LCD (LS013B4DN04)
- 2 capacitive touch sliders
- DC/DC stepper for 5V displays
- Ultra-low-power operation

Sub-GHz RF BoosterPack
- CC1101L RF transceiver
- Great RF range!
- Includes 2x RF BoosterPacks
- Prototyping area
- Send & Receive RF data easily

Only $19

» See them all @ ti.com/boosterpacks

Software Tools

Energia
A simple open-source & community-driven code editor.

Easy-to-use functions for blinking LEDs, buzzing buzzers & sensing sensors.

>> www.energia.nu

Professional Software tools
LaunchPad is also supported by professional IDEs that provide industrial-grade features and full debug-capability. Set breakpoints, watch variables & more with LaunchPad.

>> www.ti.com/ccs

Resources

ti.com/launchpad

- Code examples
- Open Source Design Files
- Documentation
- Example projects
- Videos
- Tutorials
- Other TI products

Below are the pins exposed @ the BoosterPack connector.

Also shown are functions that map with the BoosterPack standard.

* Note that to comply with the I2C channels of the BoosterPack standard, a software-emulated I2C must be used.

(!) Denotes I/O pins that are interrupt-capable.

Light Gray boxes in the BoosterPack standard indicate that some LaunchPads may be missing that functionality.

A closer look at your new LaunchPad

Featured microcontroller: MSP430FR5969

This LaunchPad is great for…

- Battery-operated and even battery-free applications enabled by the Ultra-Low Power MSP430FR5969 MCU.
- Datalogging applications thanks to the MSP430FR5969 device's integrated 64kB of FRAM, which offers the industry's lowest power memory accesses and write speeds. FRAM also offers unprecedented write endurance.
- Power-conscious applications benefit from 100uA/MHz active modes & <500nA low power modes with self-wakeup.

What comes in the box?

MSP-EXP430FR5969 LaunchPad

New open source on-board emulator
enables programming, debugging & application UART via USB.

This Quick Start Guide

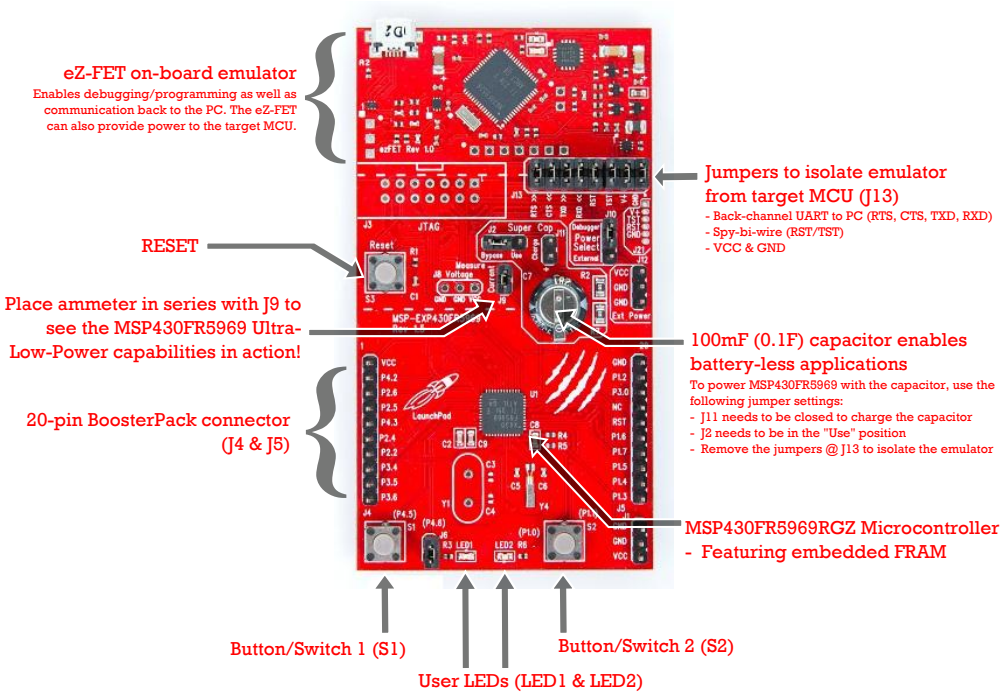
Micro-USB Cable

Software @ ti.com/msp-exp430fr5969

MSP430FR5969 Microcontroller

- 16 MHz CPU
- 64 kB Embedded FRAM
- 32-bit Hardware Multiplier
- Three Channel Internal DMA
- RTC with calendar & alarm
- 5x 16-bit timers
- 16-bit Cyclic Redundancy Checker (CRC)
- 16-channel analog comparator
- 14-channel 12-bit Analog-to-Digital Converter (ADC) 200ksps @ 75uA consumption
- 256-bit AES Encryption/Decryption co-processor
- Serial communication module (eUSCI) UART, SPI, I2C
- HW UART & I2C Bootstrap Loader (BSL)

MSP-EXP430FR5969 Overview



Let's get started!

Find more information @ ti.com/msp-exp430fr5969

The out-of-box demo:

The MSP-EXP430FR5969 LaunchPad features an MSP430FR5969 device that is pre-loaded with some demo functionality.

1. Connect the 430BOOST-SHARP96 Display BoosterPack
The demo code for this LaunchPad requires the 430BOOST-SHARP96 BoosterPack to be connected.

2. Connecting to the computer
Connect the LaunchPad using the included USB cable to a computer. If prompted, install any necessary software. A green power LED should illuminate.

3. It's alive!
When connected to your computer, the LaunchPad will power up and a series of images should cycle on the 430BOOST-SHARP96 BoosterPack. A Red LED (LED1) will also blink during this startup sequence.

4. The MAIN MENU
There are several demo applications. To select one of the modes, simply use the left slider on the 430BOOST-SHARP96 BoosterPack. When the desired mode is highlighted, press button (S2) on the LaunchPad to select it. To exit any of the modes, press button (S1) to return to the MAIN MENU.

Clock
This mode provides an accurate clock using RTC in Low Power Mode 3 (LPM3). Use the slider to change the time settings. Use button (S2) to save your settings.

FRAM Speed
This mode shows the maximum write speed of FRAM on the BoosterPack display. FRAM is written in 1kB blocks. Direct Memory Access (DMA) is used to transfer data and the main clock (MCLK) is set to run @ 8MHz. This application writes data to FRAM @ ~7564 kBps (typical Flash write speeds = 13 kBps). Also shown is the total number of kB written as well as the FRAM write endurance (%).

Battery Free
This mode runs a stopwatch without batteries by leveraging the on-board capacitor. When entering this mode, you are presented with 2 options:

Run App: In this mode, the MSP430FR5969 stays in an ultra-low power LPM3.5 mode consuming ~500 nA. A RTC is available to wake up the MCU once a minute to read the input voltage from the capacitor & stores that data into FRAM. During this time, a stopwatch is continuously updated. When the MCU is asleep in LPM3.5, the display is turned off. To wakeup the MCU to see the remaining charge of the capacitor and the current time on the stopwatch, press button (S2). Press button (S2) again to go back to LPM3.5. Ensure the capacitor is being used by following the jumper settings in the diagram to the left.

Transfer Data: In this mode, the logged voltage readings from a previous "Run App" execution are read from FRAM and sent to a PC via back-channel UART over USB. These readings can be read using any terminal/serial monitor application on your PC.

Active Mode
The active power consumption of the MSP430FR5969 is dependent on three things: the code, data cache hit ratio & clock speed of the CPU. Choose the desired operating frequency of the CPU (1MHz, 2.67MHz, 4MHz or 8MHz). Then, choose your desired cache hit ratio (50%, 66%, 75% or 100%). Pressing button (S2) will allow you to enter/exit the Active Mode code operation. To measure active mode current, remove Jumper J9 & place an ammeter across the J9 terminals.

SliderBall Game
This mode demonstrates the capacitive touch I/O pins available on the MSP430FR5969. Two linear sliders are available on the 430BOOST-SHARP96 BoosterPack, which are used to control two paddles. Move the paddles to keep the ball in play! Your high scores are saved in FRAM & is retained on subsequent power cycles. They are only lost when you re-program the device.