Meet the MSP430FR5969 LaunchPad Evaluation Kit

Part Number: MSP-EXP430FR5969

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
- CC110L 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

Code Composer Studio™ IDE

www.ti.com/ccs

IAR Embedded Workbench ®

www.ti.com/iar

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.

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.

** Some LaunchPads do not 100% comply with the standard, please check your LaunchPad to ensure compatability

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

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

eZ-FET on-board emulator
Enables programming, debugging & application UART via USB.

Introducing EnergyTrace™ technology, enabling power-aware debugging

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
- 16-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)

Out-of-box Demo

Find more information @ ti.com/msp-exp430fr5969

1. Connecting to the computer
Connect the LaunchPad using the included USB cable to a computer. A green power LED should illuminate. For proper operation, drivers are needed. It is recommended to get drivers by installing an IDE such as TI's CCS or IAR EW430. Drivers are also available at ti.com/MSPdrivers.

2. It's alive!
When connected to your computer, the LaunchPad will power up and the Red LED (LED1) and Green LED (LED2) will toggle during the startup sequence. Now the LaunchPad will wait for commands from the GUI.

3. Open the Provided GUI
Download the "MSP-EXP430FR5969 Software Examples" folder (SLAC645) @ ti.com/msp-exp430fr5969
Open the out-of-box GUI executable

Live Temperature Mode
This mode provides live temperature data streaming to the PC GUI. Temperature is measured using the on-chip temperature sensor built into the MSP430FR5969. Data is transferred over the backchannel UART to the PC GUI.

FRAM Logging Mode
This mode shows the FRAM data logging capabilities of the MSP430FR5969. After starting this mode, the GUI provides instructions to configure the LaunchPad to be powered from only the 100mF Super Cap. The LaunchPad will then wake up every 5 seconds (indicated by LED blink) to log both temperature and capacitor voltage values. After plugging the LaunchPad back into the PC, and reconnecting to the GUI, these values can be uploaded and graphed in the GUI.

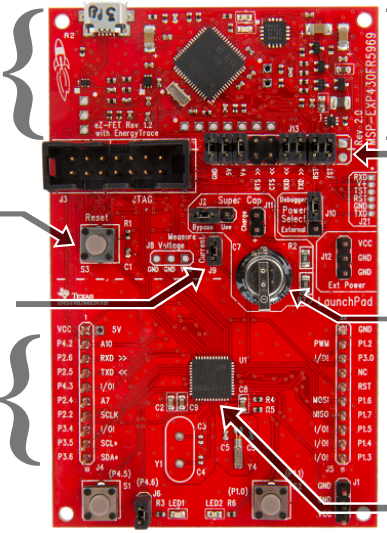
MSP-EXP430FR5969 Overview

eZ-FET on-board emulator
Enables debugging/programming as well as communication back to the PC. The eZ-FET can also provide power to the target MCU.

Reset

Measure Current
Place ammeter in series with J9

20-pin BoosterPack plug-in module connector
(J4 & J5)



Introducing EnergyTrace Technology
Real-time power consumption readings & state updates from the MSP430FR5969 MCU, including CPU and peripheral state are viewable through the EnergyTrace GUI

Jumpers to isolate emulator from target MCU (J13)
- Back-channel UART to PC (RTS, CTS, RXD, TXD)
- Spy-bi-wire debug (RST/TST)
- Power (5V, VCC, & GND)

100mF (0.1F) capacitor enables battery-less applications
To power MSP430FR5969 with the capacitor, use the following jumper settings:
- J11 closed to charge the capacitor
- J2 in the "Use" position
- Remove jumpers @ J13 to isolate emulator

MSP430FR5969 Microcontroller
- Featuring embedded FRAM

Button/Switch S1

User LEDs LED1 & LED2

Button/Switch S2

EnergyTrace++™ Technology

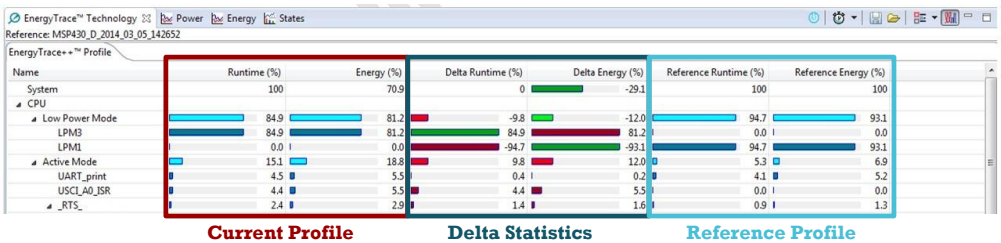
Find more information @ ti.com/EnergyTrace

EnergyTrace technology implements a new method for measuring MCU current consumption. EnergyTrace uses a DC-DC solution to measure the time density of charge pulses. On the MSP430FR5969 device, built in hardware enables EnergyTrace+[CPU States]+[Peripheral States]. The EnergyTrace technology window allows users to view power data and compare power consumption! This makes optimizing the power consumption of an application easier than ever before!

EnergyTrace Profile
EnergyTrace Profile runtime and energy data for low power modes along with each function run during Active Mode.

Graphical Power Data
These three tabs of the EnergyTrace Technology window show a graph over time of power, energy, and device state.

Enable EnergyTrace Technology Window
1. Download CCS version 6.0 and newer
   - ti.com/ccs
2. Enable EnergyTrace Technology Window
   - In CCS, click: Window>> Preferences >> Code Composer Studio >> Advanced Tools >> EnergyTrace Technology
   - Check "Enable" box
   - Select EnergyTrace+[CPU State]+[Peripheral State]
3. Debug your application to launch EnergyTrace Window



IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as “components”) are sold subject to TI’s terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI’s terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers’ products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers’ products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have ***not*** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products		**Applications**	
Audio	www.ti.com/audio	Automotive and Transportation	www.ti.com/automotive
Amplifiers	amplifier.ti.com	Communications and Telecom	www.ti.com/communications
Data Converters	dataconverter.ti.com	Computers and Peripherals	www.ti.com/computers
DLP® Products	www.dlp.com	Consumer Electronics	www.ti.com/consumer-apps
DSP	dsp.ti.com	Energy and Lighting	www.ti.com/energy
Clocks and Timers	www.ti.com/clocks	Industrial	www.ti.com/industrial
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Security	www.ti.com/security
Power Mgmt	power.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com		
OMAP Applications Processors	www.ti.com/omap	**TI E2E Community**	e2e.ti.com
Wireless Connectivity	www.ti.com/wirelessconnectivity		

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265