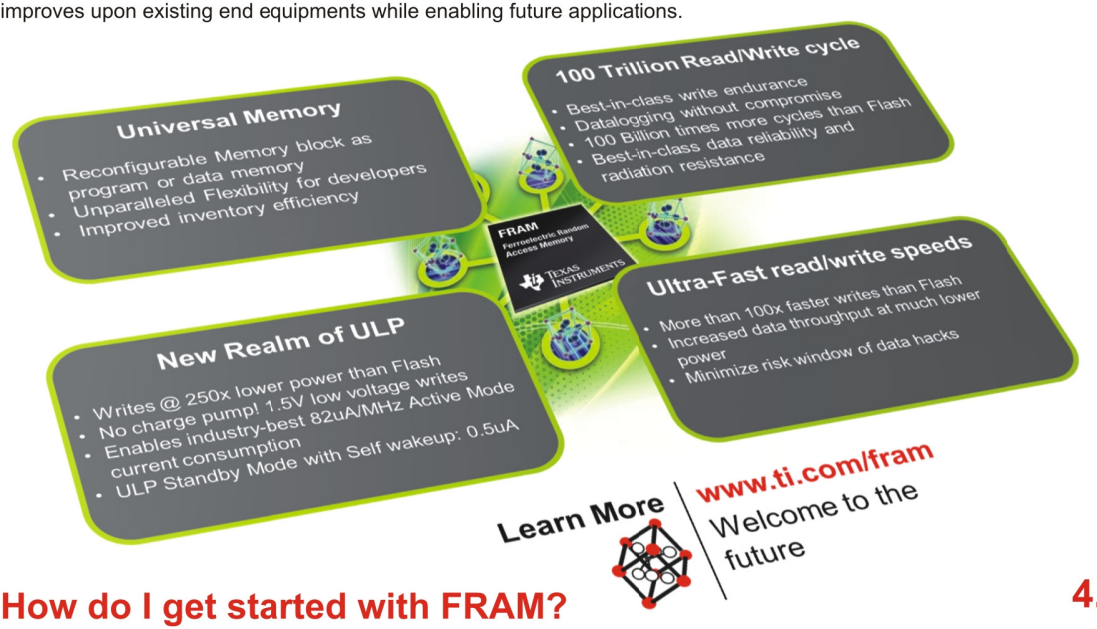
FRAM | MSP-EXP430FR5739 Experimenter's Board

Texas Instruments

Welcome to the future of embedded memory technology.

Ferroelectric Random Access Memory (FRAM) is a non-volatile, next generation memory solution that improves upon existing end equipments while enabling future applications.



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How do I get started with FRAM?

1. Software and Driver Installation

Go to www.ti.com/fram. Here, you can learn more about FRAM and download free code-limited compilers & debuggers, including:

- Code Composer Studio™ version 4 (CCS)
- IAR Embedded Workbench Kickstart

Both will install the necessary drivers for the MSP-EXP430FR5739.

2. Connecting the Hardware

Connect the MSP-EXP430FR5739 Experimenter's Board using the included USB cable to a Windows-enabled PC. If prompted, please allow Windows to install the software automatically. This also supplies power to the MSP-EXP430FR5739 Experimenter's Board.

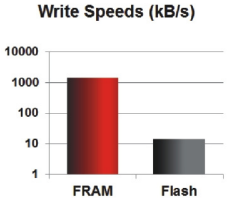
3. The Demo Application

The MSP430FR5739 MCU is pre-programmed with demo firmware, offering 4 operating modes.

- Press S1 to cycle through operating modes (1 - 4)
- 4 LEDs [LED5 - LED8] are used to indicate the selected mode
- Press S2 to enter the selected mode
- Once in a mode,
  - Press S2 to toggle the LED display and UART transmission on/off (This is useful for measuring current consumption. Refer to MSP-EXP430FR5739 User's Guide for more considerations)
  - Press S1 to go back to the mode selection menu
- At anytime, press RST to reset the Experimenter's Board

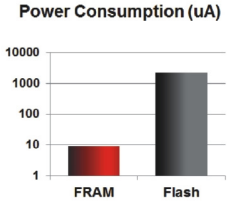
Mode 1) FRAM maximum write speed test

The MSP430FR5739 device writes to FRAM at more than 100x faster than traditional Flash-based devices. To demonstrate this speed, the eight LEDs increment for every 100kB of data that is written to the FRAM block.



Mode 2) FRAM ultra-low current consumption test

This mode writes to FRAM at ~12kB/s, which is the maximum speed of Flash-based devices. The eight LEDs increment for every 100kB of data that is written. This visually demonstrates the speed benefits of FRAM vs Flash (Mode 1 vs Mode 2).



Mode 3) Bubble level accelerometer demo

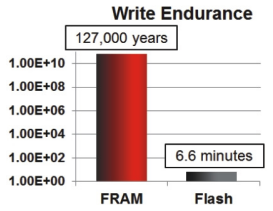
This mode starts with a calibration cycle, so ensure that your MSP430FR5739 Experimenter's Board is set down on a flat surface. The accelerometer is calibrated once the 2 center LEDs are lit. Now, the tilt of the board is reflected by the 8 LEDs. Accelerometer data is measured and written to the FRAM block at speeds significantly faster than Flash.

Mode 4) Temperature sensor demo

This mode starts with a calibration cycle. The temperature sensor is calibrated once the 2 center LEDs are lit. Now, any deviation from the starting temperature is reflected by the 8 LEDs. Temperature data is measured and written to the FRAM block at speeds significantly faster than Flash.

4. FRAM Graphical User Interface (GUI)

In addition to the on-board LEDs, the MSP430FR5739 device has been pre-programmed to send data to the PC via USB using a timer-based UART. When the MSP-EXP430FR5739 Experimenter's Board is plugged into the PC, simply launch FRAM_GUI.exe



In Modes 1 and 2, 2 primary datapoints are displayed:
- Instantaneous write speeds (kB/s) to demonstrate the high write speeds of FRAM
- Remaining endurance of the memory block (%) to demonstrate FRAM's virtually unlimited write endurance

In Modes 3 and 4, the LED display is mimicked on the GUI, based on the data from the accelerometer or temperature sensor.

5. Start your own FRAM-based applications!

You can find more information about FRAM technology, available FRAM-based MSP430 devices, user guide for this kit, videos and more at **www.ti.com/fram**!

FRAM

MSP-EXP430FR5739

Experimenter's Board

- Virtually unlimited write endurance
- New realm of Ultra-Low Power
- Previously impossible write speeds
- Non-volatile, unified memory block

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