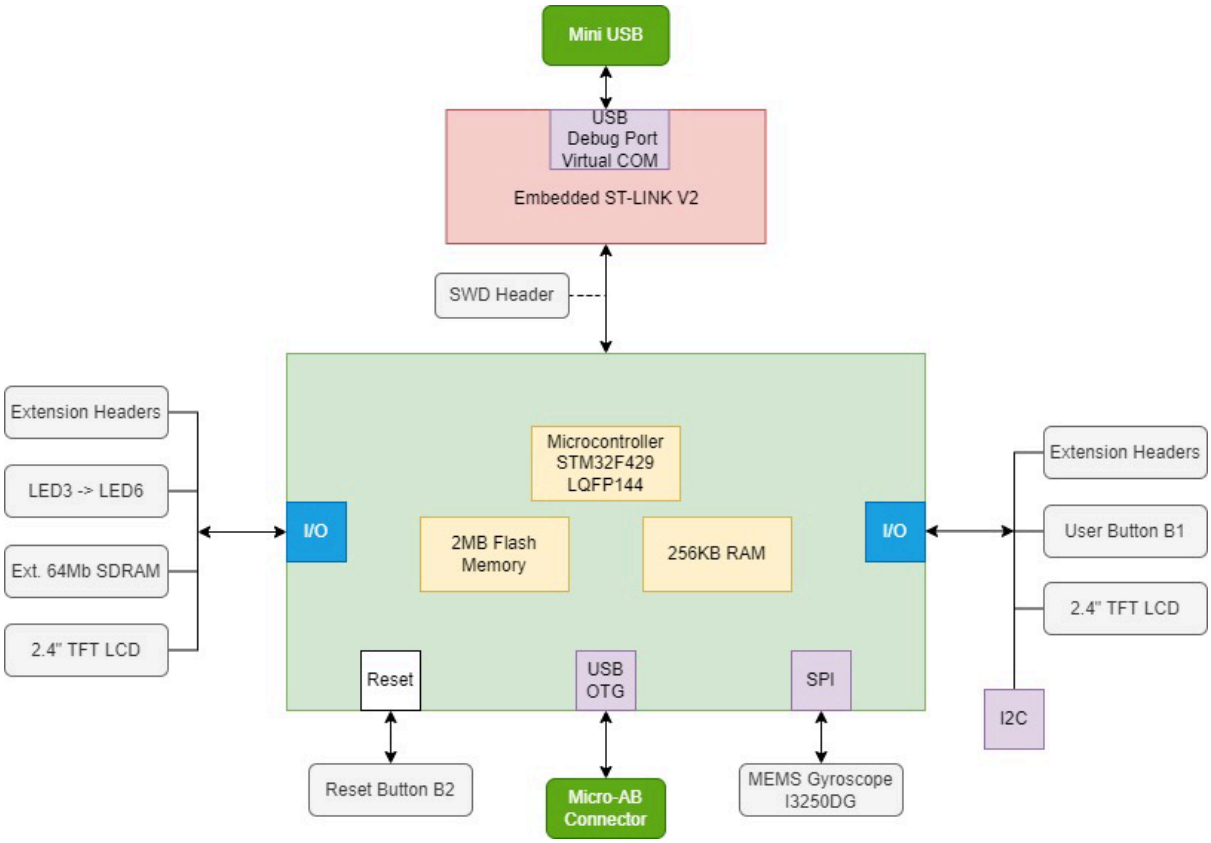
32F429IDISCOVERY Board

Hardware Diagram



What kind of processor is it?

- STM32F429ZIT6
- STM32F429xx devices are based on the high-performance Arm®, Cortex®-M4 32-bit RISC core operating at a frequency of up to 180 MHz.
- Processor Datasheet

How much Flash and RAM does it have? Any other memory types?

- The processor embeds 2MB of Flash memory and 256KB of RAM.
- An external memory of 64Mbits is also available on this board.

Does it have any special peripherals? (List 3-5 that you find interesting.)

I identified three interesting features:

1. The ST-LINK/V2-B Debugger used to program the board and debug the code.
2. The 2.4” QVGA TFT LCD. This screen has a 320x240 pixels resolution. It is directly driven by the microcontroller using the RGB protocol. The display controller is the well-known ILI9341.
3. The I3G44250D MEMS motion sensor and 3D digital gyroscope. This device can be interfaced through I2C or SPI.

If it has an ADC, what are the features?

The STM32F429xx datasheet front page states there are three ADCs:

"3×12-bit, 2.4 MSPS ADC: up to 24 channels and 7.2 MSPS in triple interleaved mode"

Section 3.38 of same document provides more information:

"Three 12-bit analog-to-digital converters are embedded and each ADC shares up to 16 external channels, performing conversions in the single-shot or scan mode. In scan mode, automatic conversion is performed on a selected group of analog inputs.

Additional logic functions embedded in the ADC interface allow:

- *Simultaneous sample and hold*
- *Interleaved sample and hold*

The ADC can be served by the DMA controller. An analog watchdog feature allows very precise monitoring of the converted voltage of one, some or all selected channels. An interrupt is generated when the converted voltage is outside the programmed thresholds. To synchronize A/D conversion and timers, the ADCs could be triggered by any of TIM1, TIM2, TIM3, TIM4, TIM5, or TIM8 timer."

How much does the board cost vs what the processor costs? Is the processor in stock anywhere?

From the **Mouser** website, on March 29:

Dev Board:

- ✓ Unit Cost: 28,30€ ($31.24)
- ✓ In Stock: 46 pieces

Microcontroller:

- ✓ Unit Cost: 18,75€ ($20.70)
- ✓ In Stock: 0 (53wks delivery time!)

From the **Farnell** website, on March 29:

Dev Board:

- ✓ Unit Cost: 26,35€ ($29.09)
- ✓ In Stock: 0 (Next delivery 01/04/2023!)

Microcontroller:

- ✓ In Unit Cost: 22,54€ ($24.88)
- ✓ In Stock: 0 (Next delivery 01/04/2023!)

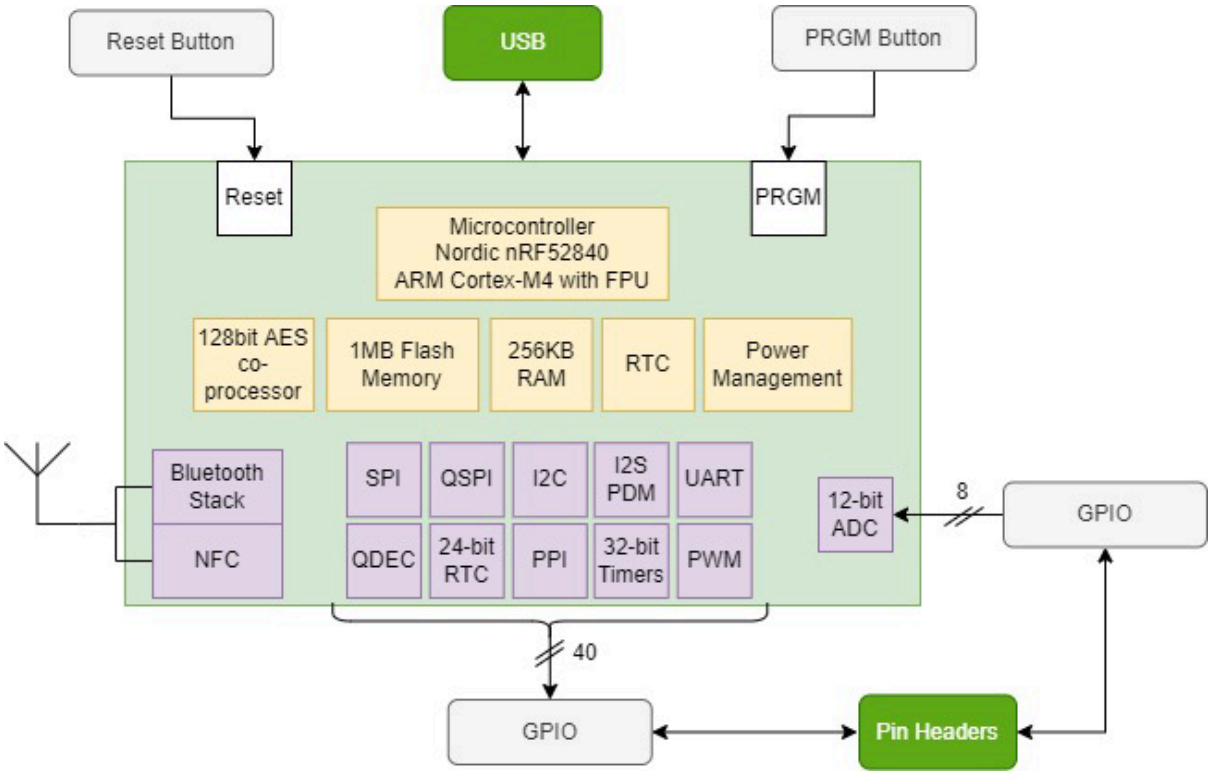
Look at one application note for this board

The application note I looked at is: Using the CRC peripheral in the STM32 family

More STM32 documentation can be found here: https://www.st.com/en/embedded-software/stm32-embedded-software.html#documentation

SparkFun Pro nRF52840 Mini

Hardware Diagram



What kind of processor is it?

- Arm®, Cortex®-M4 32-bit processor with FPU, 64 MHz

How much Flash and RAM does it have? Any other memory types?

- The processor embeds 1MB of Flash memory and 256KB of RAM.
- No other memory.

Does it have any special peripherals? (List 3-5 that you find interesting.)

Among the overabundant peripherals, I identified three interesting features:

1. The Programmable peripheral interconnect (PPI) which enables peripherals to interact autonomously with each other using tasks and events independent of the CPU. The PPI allows precise synchronization between peripherals when real-time application constraints exist and eliminates the need for CPU activity to implement behavior which can be predefined using PPI.
2. The EasyDMA for automated data transfer without CPU processing on peripherals.
3. The Quadrature decoder (QDEC) which provides buffered decoding of quadrature-encoded sensor signals. It is suitable for mechanical and optical sensors. The sample period and accumulation are configurable to match application requirements.

The QDEC provides the following:

- Decoding of digital waveform from off-chip quadrature encoder.
- Sample accumulation eliminating hard real-time requirements to be enforced on application.
- Optional input de-bounce filters.
- Optional LED output signal for optical encoders.

4. Two audio peripherals: I^2S and the digital microphone interface (PDM).
    - The I^2S (Inter-IC Sound) module, supports the original two-channel I2S format, and left or right-aligned formats. It implements EasyDMA for sample transfer directly to and from RAM without CPU intervention.
    - The pulse density modulation (PDM) module enables input of pulse density modulated signals from external audio frontends, for example, digital microphones. The PDM module generates the PDM clock and supports single-channel or dual-channel (Left and Right) data input. Data is transferred directly to RAM buffers using EasyDMA.

If it has an ADC, what are the features?

The Raytac's MDBT50 Q module (which uses the Nordic nRF52840 SoC) datasheet mentions a single 12-bit, 200 ksps ADC – 8 configurable channels with programmable gain.

How much does the board cost vs what the processor costs? Is the processor in stock anywhere?

From the **Digikey** website, on March 29:

Dev Board:

- ✓ Unit Cost: 28,77€ ($31.89)
- ✓ In Stock: 70 pieces

Microcontroller:

- ✓ Unit Cost: 6,83€ ($7.57)
- ✓ In Stock: 0

From the **RS Components** website, on March 29:

Dev Board:

- ✓ Unit Cost: not distributed
- ✓ In Stock: not distributed

Microcontroller:

- ✓ In Unit Cost: 7,35€ ($8.15)
- ✓ In Stock: 0 (Next delivery 06/03/2023!)

Look at one application note for this board

I couldn't find any application notes. The SparkFun Pro nRF52840 Mini is an economical breakout and development board which is a powerful combination of Arm® Cortex-M4 CPU and 2.4GHz Bluetooth radio with expansive pin multiplexing capability. Just about any pin can support any peripheral. This board is perfect for education or proof of concept study.