

# STM32F40x/41x

## High-performance Access lines



### STM32F4 Access lines: performance, less dynamic power, high integration, and rich connectivity for cost-conscious applications

#### Still an STM32F4

The STM32F4 Access lines, made of STM32F401, STM32F410, STM32F411, STM32F412 and STM32F413 MCUs, are the entry level devices of the STM32F4 wseries that target cost-conscious applications. These lines implement STM32 Dynamic Efficiency™ technology and solve the challenge of offering less dynamic power and more performance with high integration and lower cost.

With a new Batch Acquisition Mode (BAM) that optimizes power consumption during sensor data batching, the STM32F4 Access lines take Dynamic Efficiency to a new level.

#### PERFORMANCE

- Up to 100 MHz fCPU delivering 125 DMIPS/ 339 CoreMark performance executing from Flash memory, with 0-wait states using ST's ART Accelerator™

#### POWER EFFICIENCY

- ST's 90-nm process, ART Accelerator and dynamic power scaling enables the current consumption when executing from Flash memory to be as low as 89  $\mu\text{A}/\text{MHz}$ . In Stop mode, the power consumption can be as low as 6  $\mu\text{A}$ .

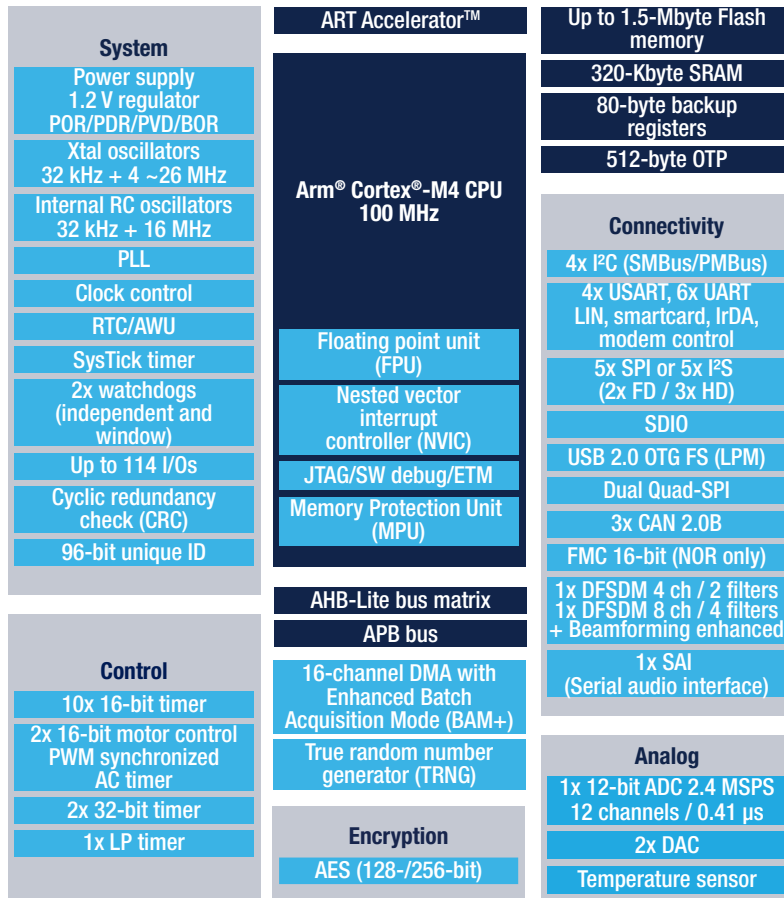
#### INTEGRATION

- Up to 1.5 Mbyte of Flash memory to 320 Kbytes of SRAM
- Available packages range from 36

to 144 pins

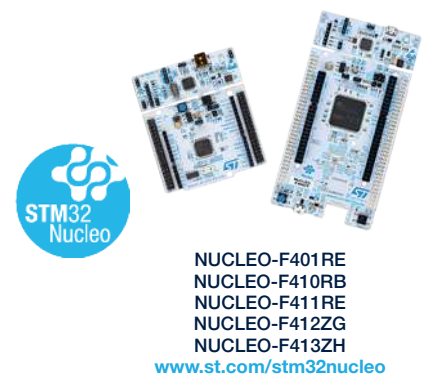
- 10x USARTs up to 12.5 Mbits/s
- Up to 5x SPI (mixed with I2S) up to 50 Mbit/s
- Up to 4x I<sup>2</sup>C up to 1 Mbits/s
- 1x SDIO up to 48 MHz
- 1x USB 2.0 OTG full speed<sup>1</sup>
- Up to 2x full-duplex and 3x simplex I<sup>2</sup>S up to 32-bit/192 kHz
- Up to 3x CAN (2.0B Active)
- 12-bit ADC reaching 2.4 MSPS
- Up to 2x 12-bit DAC<sup>2</sup>
- True random number generator<sup>2</sup>
- Up to 18x 16- and 32-bit
- Flexible external static memory controller with up to 16-bit data bus: SRAM, PSRAM, NOR Flash memory<sup>3</sup>

## STM32F423 BLOCK DIAGRAM



## HARDWARE TOOLS

### Nucleo boards



### Discovery kits



## SOFTWARE TOOLS

In addition to the wide set of partners and Arm® ecosystem solutions, the STM32F4 Access lines benefit from dedicated tools and software including STM32CubeF4 embedded software (HAL, Low-Layer APIs and CMSIS (CORE, DSP, RTOS), and a set of USB, TCP/IP, file system, RTOS, and graphic middleware components) with examples running on STM32 Nucleo, discovery kits and evaluation boards.



[www.st.com/stm32cube](http://www.st.com/stm32cube)

## STM32F4 ACCESS LINES

<b>Arm® Cortex®-M4 (DSP + FPU) – Up to 180 MHz</b> <ul style="list-style-type: none"> <li>• ART Accelerator™</li> <li>• SDIO</li> <li>• USART, SPI, I<sup>2</sup>C</li> <li>• I<sup>2</sup>S + audio PLL</li> <li>• 16 and 32-bit timers</li> <li>• 12-bit ADC (0.41 μs)</li> <li>• True Random Number Generator</li> <li>• Batch Acquisition Mode</li> <li>• Low voltage 1.7 to 3.6 V</li> <li>• Temperature: -40 °C to 125 °C</li> </ul>	<b>Product lines</b>	<b>FCPU (MHz)</b>	<b>Flash (Kbytes)</b>	<b>RAM (KB)</b>	<b>RUN cur rent (μA/MHz)</b>	<b>STOP cur rent (μA)</b>	<b>Small pac- kage (mm)</b>	<b>FSMC (NOR/PS RAM/LCD)</b>	<b>QSPI</b>	<b>DFSDM</b>	<b>CAN 2.0B</b>	<b>DAC</b>	<b>TRNG</b>	<b>DMA Batch Acquisition Mode</b>	<b>USB 2.0 OTG FS</b>
	STM32F401	84	128 to 512	up to 96	Down to 128	Down to 10	Down to 3x3								•
	STM32F410	100	64 to 128	32	Down to 89	Down to 6	Down to 2.553x 2.579					•	•	BAM	-
	STM32F411	100	256 to 512	128	Down to 100	Down to 12	Down to 3.034x 3.22							BAM	•
	STM32F412	100	512 to 1024	256	Down to 112	Down to 18	Down to 3.653x 3.651	•	•	•	•		•	BAM	• +LPM <sup>1</sup>
	STM32F413 <sup>2</sup>	100	1024 to 1536	320	Down to 115	Down to 18	Down to 3.951x 4.039	•	•	•	•	•	•	BAM	• +LPM <sup>1</sup>

Notes:

1. Link Power Management
2. The same devices are also found with embedded HW AES encryption (128-/256-bit) named STM32F423



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