STM32 F4 Series – Cortex M4

http://www.emcu.it/STM32F4xx/STM32F4xx.html

www.emcu.it

STM32 F4

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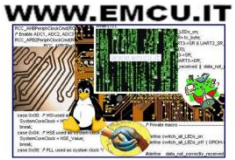

High-performance MCUs with DSP and FPU
608 CoreMark
180 MHz 225 DMIPS

STM32 F4

Main common features

- Cortex™-M4 (DSP + FPU)
- Up to 2x USB 2.0 OTG FS/HS
- SDIO
- USART, SPI, I²C
- I²S + audio PLL
- 16- and 32-bit timers
- Up to 3x 12-bit ADC (0.41 µs)
- Low voltage 1.7[1] to 3.6 V

STM32F429/439

180 MHz 1 to 2-MB Flash 256-KB SRAM	Hardware Crypto /hash² RNG	2x 12-bit DAC	Ethernet IEEE 1588 2x CAN	Camera interface	SDRAM interface FMC	Serial audio interface (SAI)	Chrom-ART™ Accelerator	TFT LCD controller

STM32F427/437

180 MHz 1 to 2-MB Flash 256-KB SRAM	Hardware Crypto /hash² RNG	2x 12-bit DAC	Ethernet IEEE 1588 2x CAN	Camera interface	SDRAM interface FMC	Serial audio interface (SAI)	Chrom-ART™ Accelerator

STM32F407/417

168 MHz 512-KB to 1-MB Flash 192-KB SRAM	Hardware Crypto /hash² RNG	2x 12-bit DAC	Ethernet IEEE 1588 2x CAN	Camera interface

STM32F405/415

168 MHz 512-KB to 1-MB Flash 192-KB SRAM	Hardware Crypto /hash² RNG	2x 12-bit DAC

STM32F401

84 MHz 128-KB to 512-KB Flash 96-KB SRAM	• STM32 Dynamic Efficiency™
	  • Run mode down to 128 µA/MHz
	  • Stop mode down to 9 µA typ
	• Small form factor: down to 3 x 3 mm

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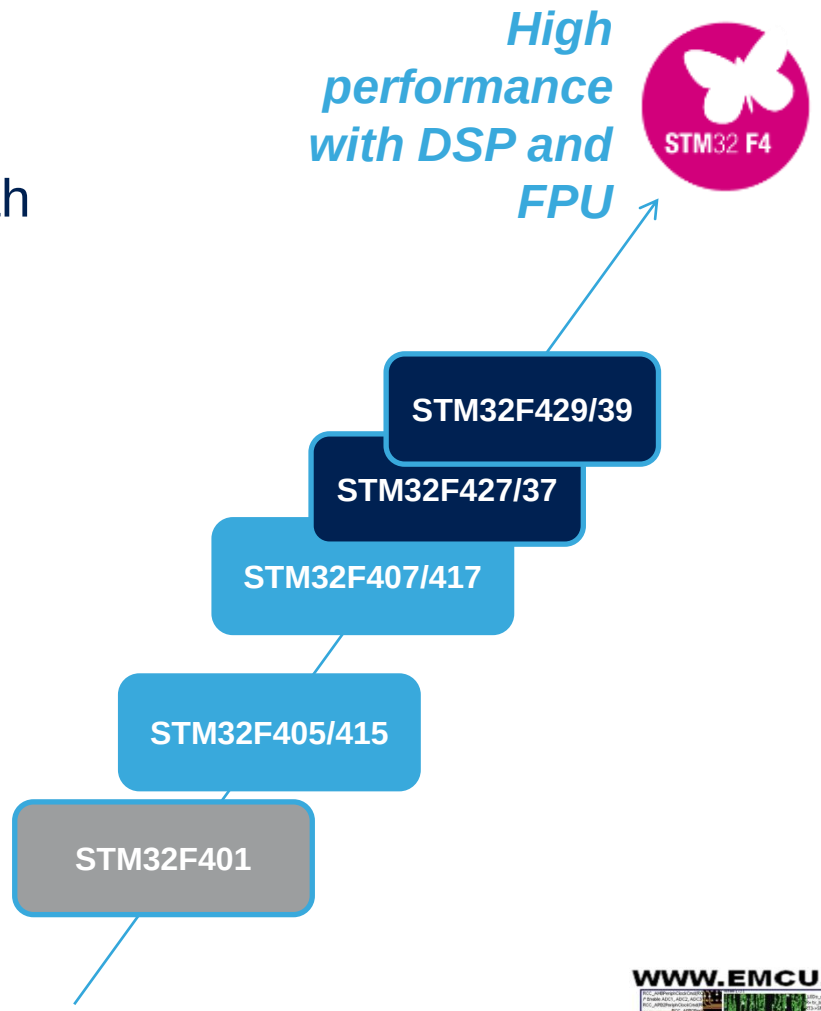
STM32 F4 series
High-performance digital signal controller

168/180 MHz F_{CPU} **210/225** DMIPS – **363-606** Coremark score

- **World's highest performance Cortex-M MCU executing from Embedded Flash**, Cortex-M4 core with Floating Point Unit up to 180 MHz/225 DMIPS
- **High integration** thanks to ST 90nm process (same platform as F2 serie): up to **2MB Flash 256kB SRAM**
- **Advanced connectivity** USB OTG, Ethernet, CAN, SDRAM interface, TFT LCD controller



STM32 F4 Series highlights

More Memory

- Up to **1MB Flash**,
- **192KRAM**: 128kB on bus matrix + 64kB on data bus dedicated to the CPU usage
- **256KRAM** on STM32F4x9/4x9
- **2MB Flash** on STM32F4x9/4x9

Advanced peripherals shared with STM32 F2 Series

- **USB OTG** High speed **480Mbit/s**
- **CAN**
- **Ethernet** MAC 10/100 with IEEE1588
- PWM High speed timers: Now 168Mhz max frequency!
- **Crypto/hash processor** + 32-bit **random number generator** (RNG)
- 32-bit RTC with calendar: Now with sub 1 second accuracy, and <1uA typ.

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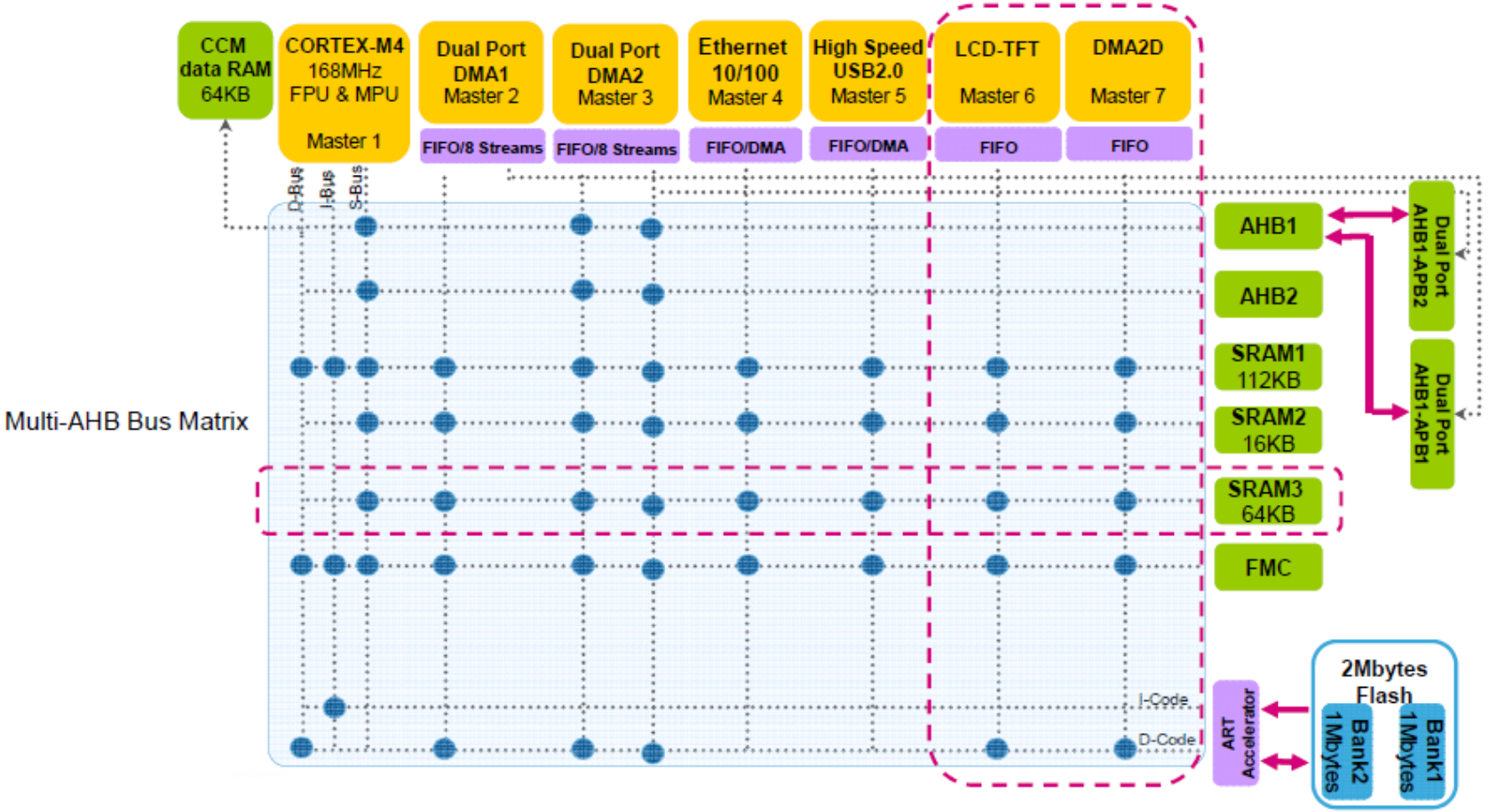
STM32 F42x/43x Series highlights



- **TFT Controller** (800x600 – QVGA-WQVGA-VGA-SVGA) 60fps
- **Chrom ART Accelerator**
- **FMC** (90Mhz) with **SDRAM** + Support and 32-bit data
- **Dual Bank 2 x 1MB Flash**

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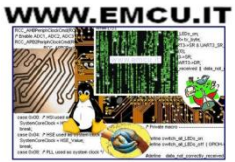


ART Accelerator

Feature	Renesas	NXP	Freescale	Microchip	STM32
Rectangle filling (solid color)	**Partial** (with DMA)	**Partial** (with GPDMA)	**Yes** (with DMA)	**Yes**	**Yes**
Rectangle copy	**Partial** (with DMA)	**Partial** (with GPDMA)	**Yes** (with DMA)	**Yes**	**Yes**
Rectangle copy with Pixel Format Conversion	**No**	**No**	**No**	**No**	**Yes**
Image composition (blending of 2 sources)	**No**	**No**	**No**	**No**	**Yes**

- Some of the competitors can use their system DMA to accelerate few features but none of them can do more than simple data copy
- **DMA2D** is totally independent from system DMA and has been **designed for graphical operations**
- Thanks to its integrated pixel format converter and blender it **accelerates the most CPU consuming tasks**

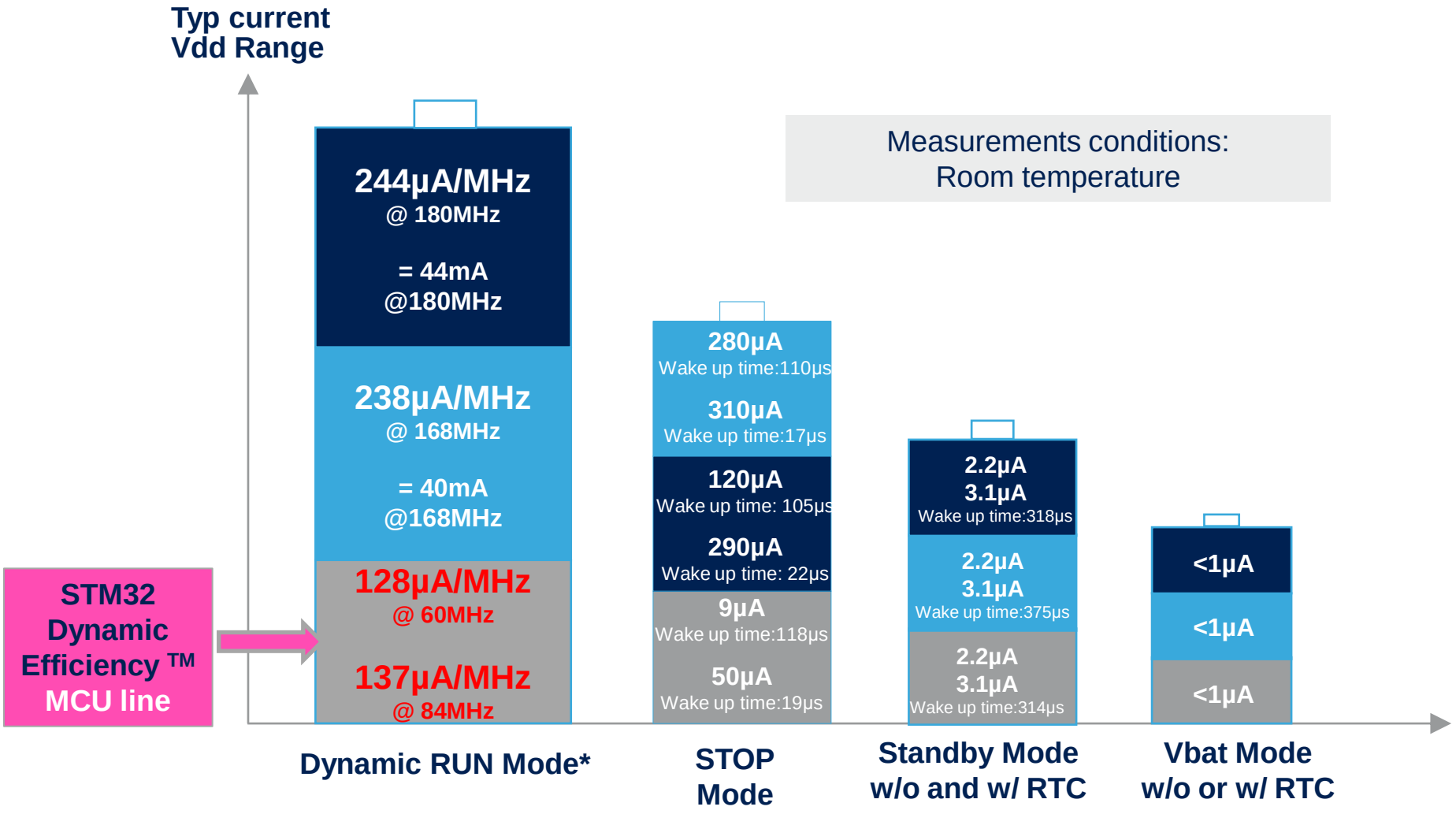
STM32 F4 Series highlights

Further improvements

- Low voltage: 1.8V to 3.6V VDD , down to 1.7*V on most packages
- **Full duplex I2S** peripherals
- **12-bit ADC: 0.41µs conversion/2.4Msps** (**7.2Msps** in interleaved mode)
- High speed **USART** up to **11.25 Mbits/s**
- High speed **SPI** up to **37.5 Mbits/s**
- **Camera interface up to 54 MBytes/s**

*external reset circuitry required to support 1.7V

Power consumption figures



Legend:

* Run mode Conditions: Coremark executed from Flash, peripherals OFF

STM32F427/437 and STM32F429/439 **STM32F405/415** and STM32F407/417 **STM32F401**

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STM32F4 real life applications

Smart watch:
Main application controller or sensor hub

Smart phone, tablets and monitor
sensor hub for MEMS and optical touch

Industrial/home automation panel:
Main application controller

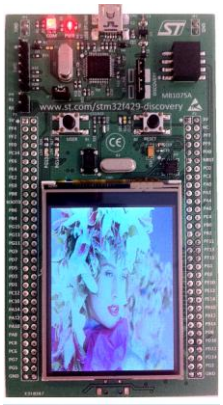
Wi-Fi modules for the
Internet of Things:
Appliance, Door Camera
+
Internet

Large tools offer STM32F4- series

- **Evaluation board** for full product feature evaluation
  - STM3240G-EVAL
  - STM3241G-EVAL
  - STM32429I-EVAL
  - STM32439I-EVAL

STM32F4 discovery kit : low-cost evaluation kit is the cheapest and quickest way to discover the STM32F4 series

STM32F4DISCOVERY
32F401CDISCOVERY
32F429IDISCOVERY



- Large choice of development IDE solutions

RAISONANCE Embbeded Systems Development Tools
aiji system 아이지시스템
hitex DEVELOPMENT TOOLS
IAR SYSTEMS
atollic
SEGGER
KEIL An ARM® Company
LAUTERBACH
SIGNUM SYSTEMS
TASKING
expresslogic
CooCox
1 SYSTEM
Green Hills SOFTWARE, INC.
CMX SYSTEMS

Nucleo F401RE

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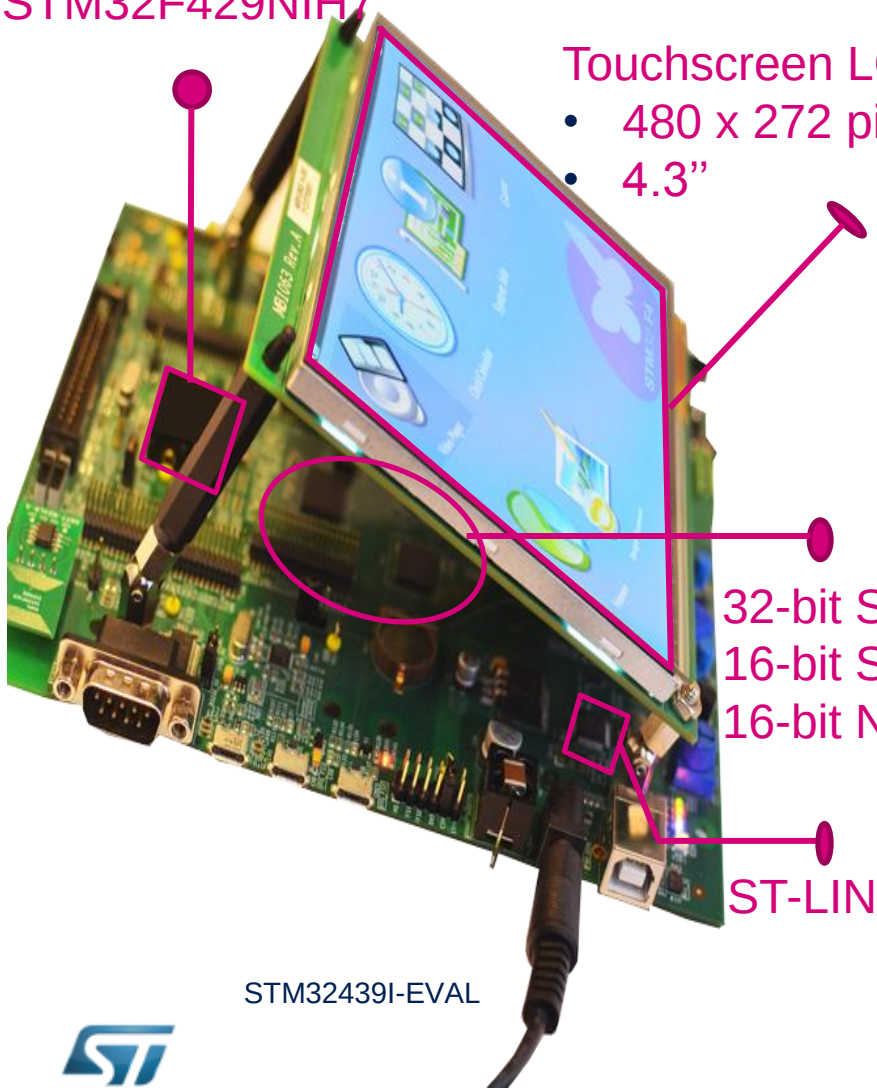
STM32F42x9 HW/SW Tools

Full-featured demonstration and evaluation board with STM32F429NIH7



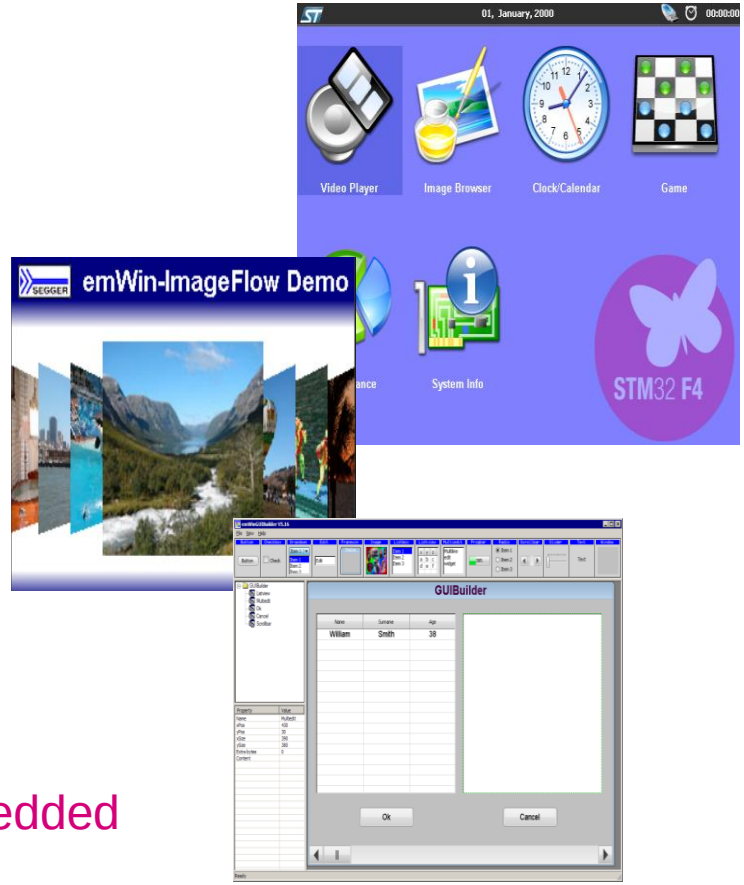
Touchscreen LCD
- 480 x 272 pixels
- 4.3”

32-bit SDRAM
16-bit SRAM
16-bit NOR Flash

ST-LINK/V2 embedded

STM32439I-EVAL

SEGGER and **ST** signed an agreement around **emWin** graphical stack



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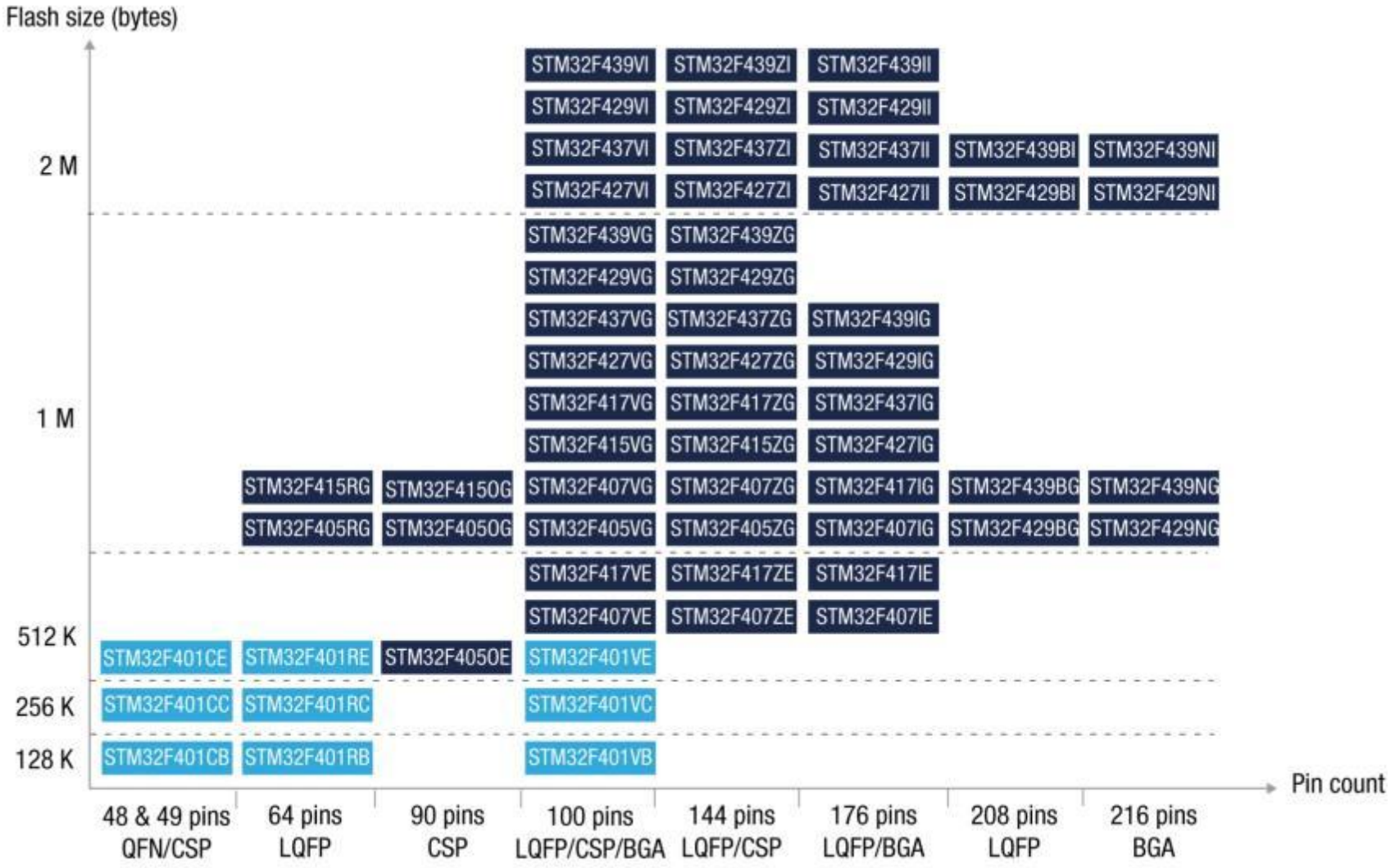
STM32F4xx Portfolio



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