STM MCU Presentation

Oct. 2012

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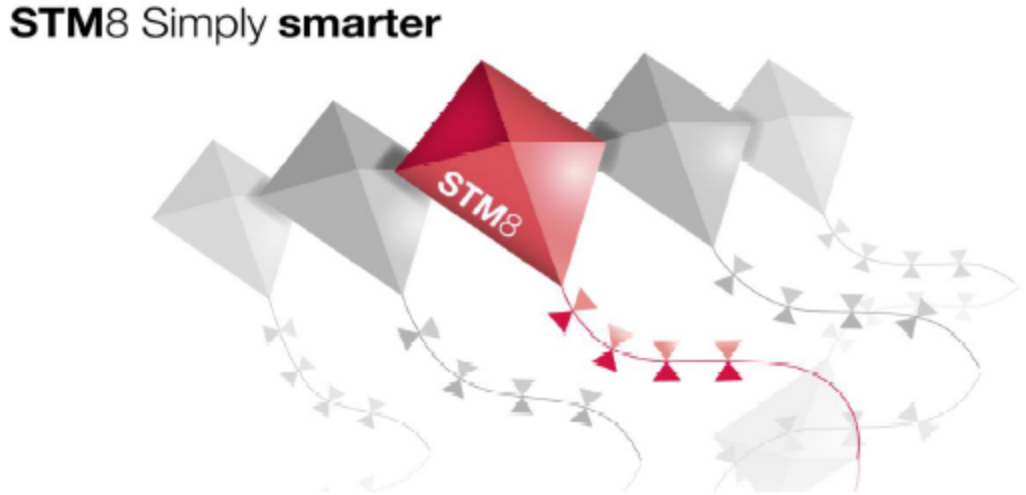
STM8 platform – 8-bit microcontrollers

We shoot for better performance & price



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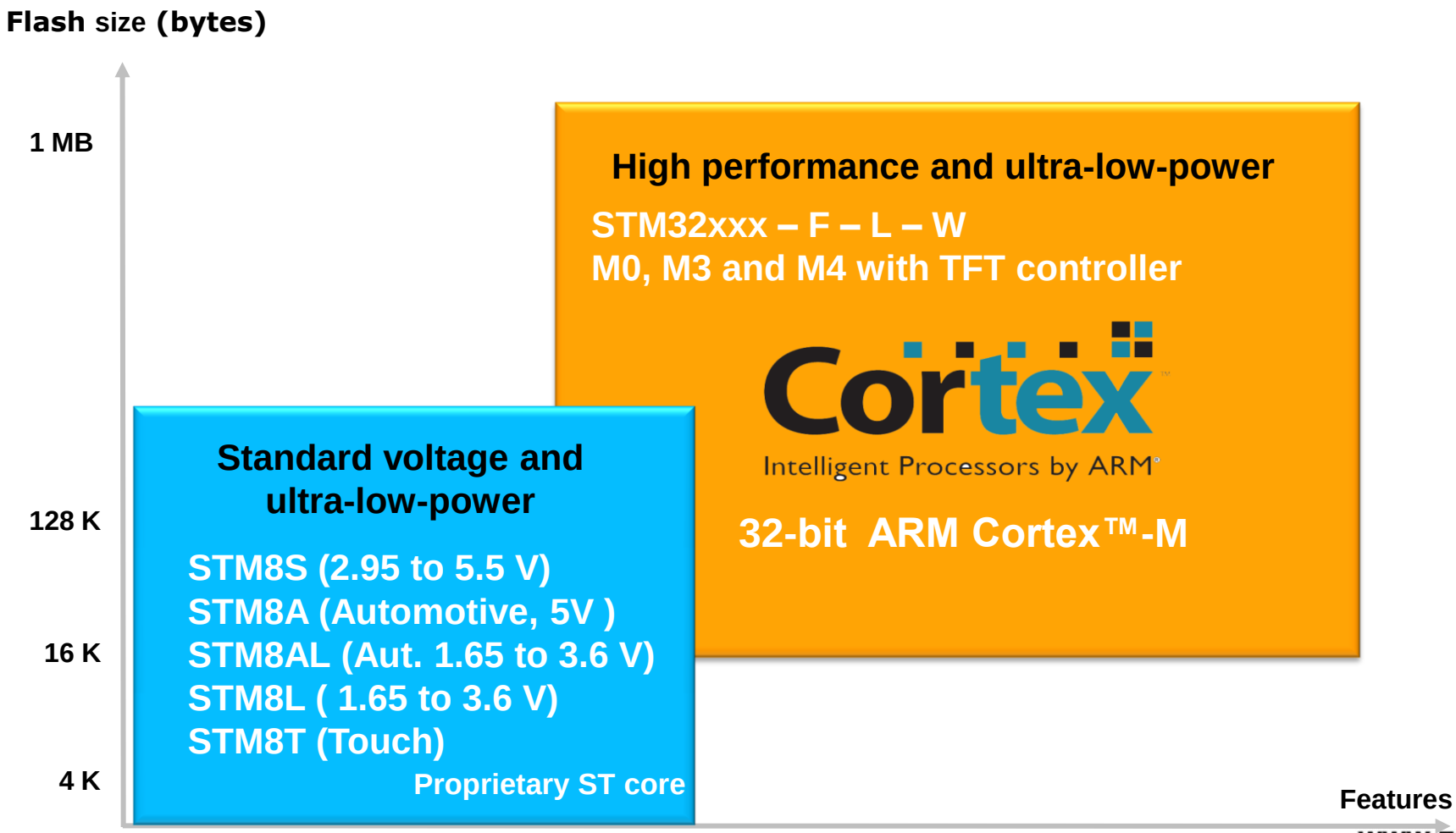
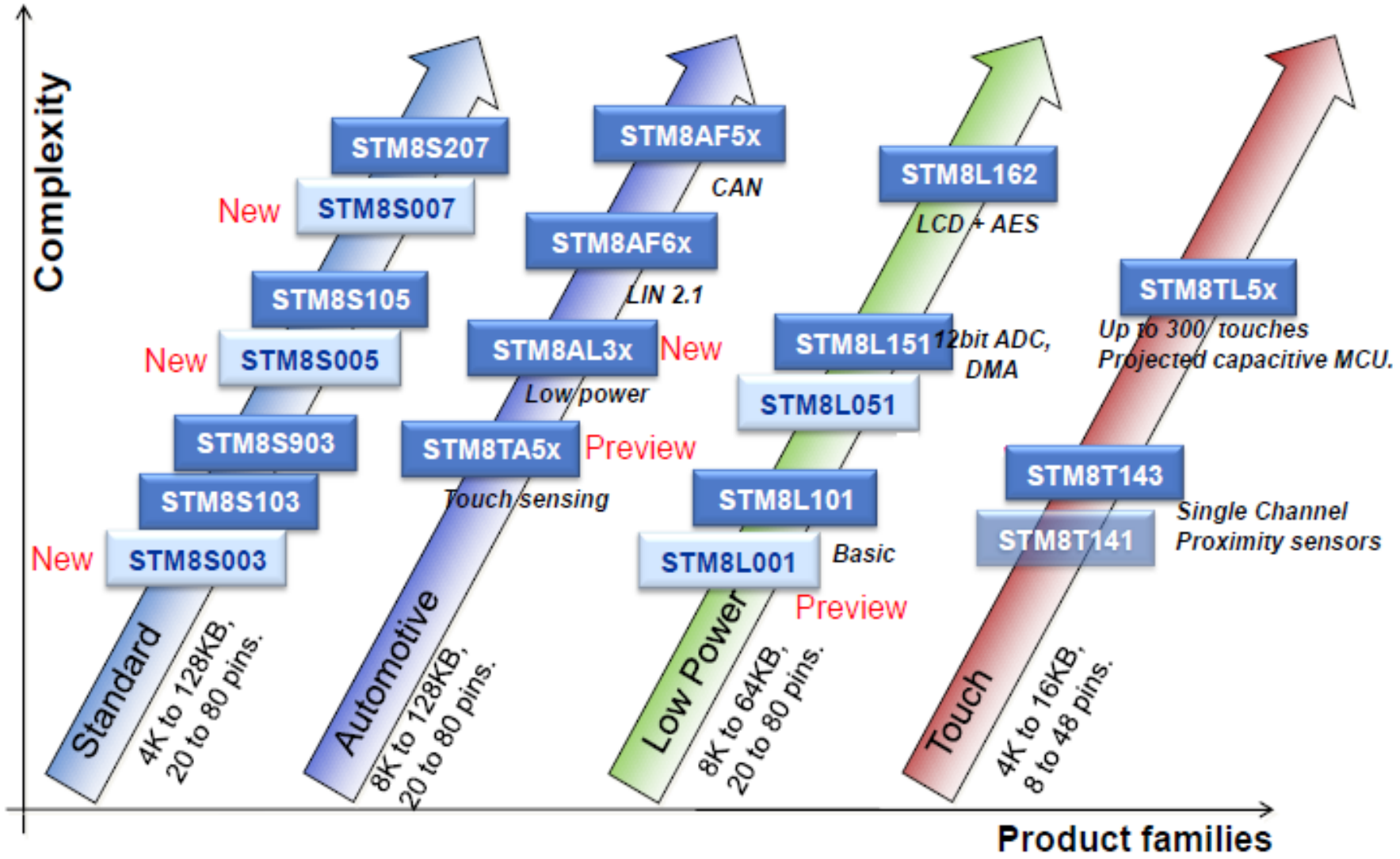
MCD market vision



STM8 Product Lines



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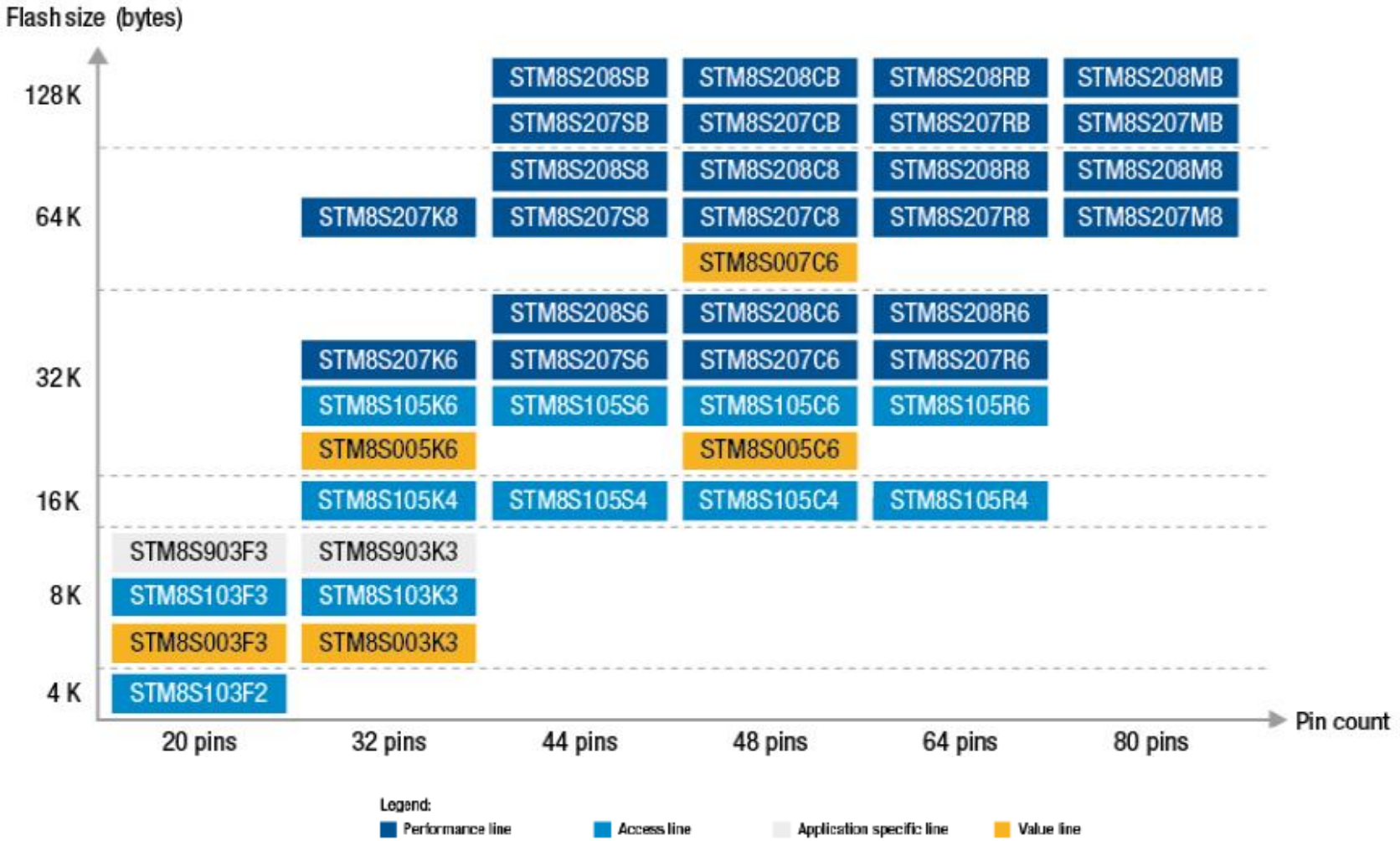
STM8S – Portfolio



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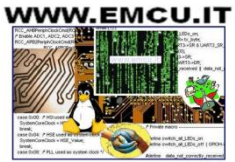
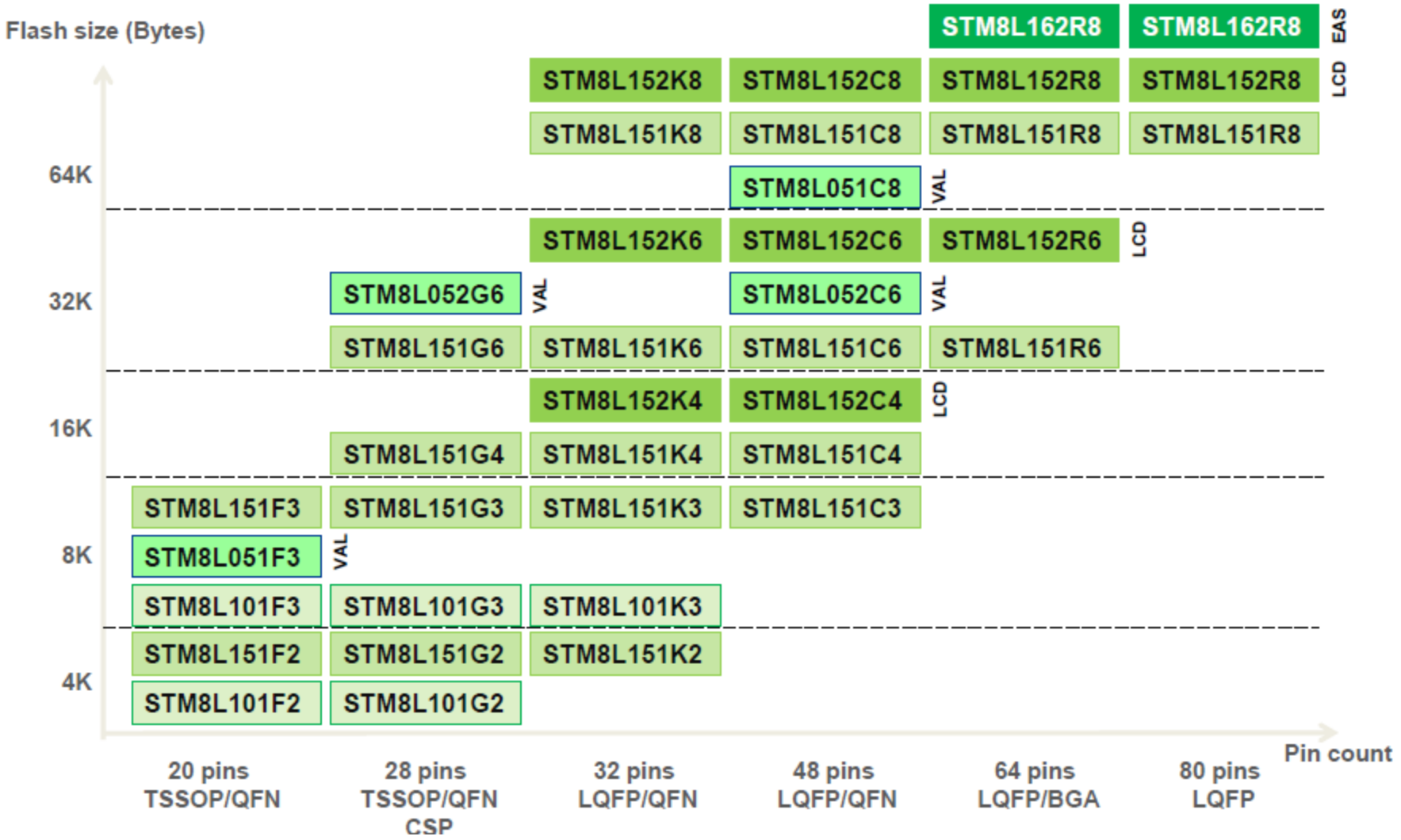


STM8L – Product line



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STMTouch™ portfolio

STM8T series

STM8T143

Single channel
Capacitive Touch & Proximity controllers

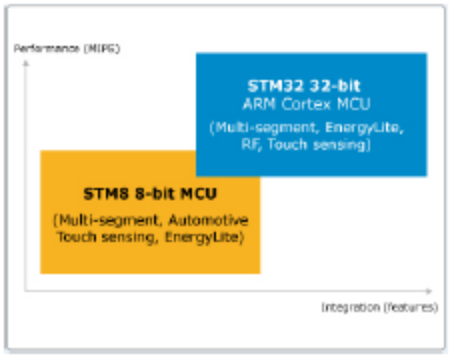
STM8TL5x

Projected capacitive MCU
(Open platform)

General purpose MCUs

STMTouch firmware library
for keys, wheels and sliders

Ported on STM8 and STM32



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Products Listed : 8

Part Number	Marketing Status	General Description	Technology	Number of Channels max	Wheel/Slider	Proximity capability
STM8T143	Active	Single-channel capacitive sensor f...	Capacitive Charge Transfer	1	No	Yes
STM8T141	Active	Single-channel capacitive sensor f...	Capacitive Charge Transfer	1	No	Yes
STM8-TOUCH-LIB	Preview	STM8 touch sensing library	Capacitive RC & Charge Transfer	-	Yes	Yes
STM8TL53G4	Active	8-bit, ultra-low-power, touch-sensi...	ProxSense	72	Yes	Yes
STM8TL53C4	Active	8-bit, ultra-low-power, touch-sensi...	ProxSense	300	Yes	Yes
STM8TL52G4	Active	8-bit, ultra-low-power, touch-sensi...	ProxSense	25	Yes	Yes
STM8TL53F4	Evaluation	8-bit, ultra-low-power, touch-sensi...	ProxSense	30	Yes	Yes
STM8TL52F4	Preview	8-bit, ultra-low-power, touch-sensi...	ProxSense	12	Yes	Yes

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STM8 development tools

A wide choice of solutions.

starter kits
Numerous boards

STM8L101-EVAL
STM8L1526-EVAL

STM8/128-EVAL

STM8-SK/RAIS

ST-ICE

STM8 promotion kits

STM8L-PRIMER

STM8S-DISCOVERY
STM8L-DISCOVERY
STM8SVLDISCOVERY

STM8/128_MCKIT

ST-LINK

IDE solutions

STVD – EWSTM8 – RIDE (*) - IDEA

(*) up to 32 KB C compiler free of charge

Software/Hardware solution providers

CMX SYSTEMS
Proxox
HI-LO SYSTEMS
Data I/O
vector
KAMAMI
SMH Technologies
BP MICROSYSTEMS
FALCON
i SYSTEM
SYSTEM GENERAL

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STM32® Series Presentation

Sept. 2012

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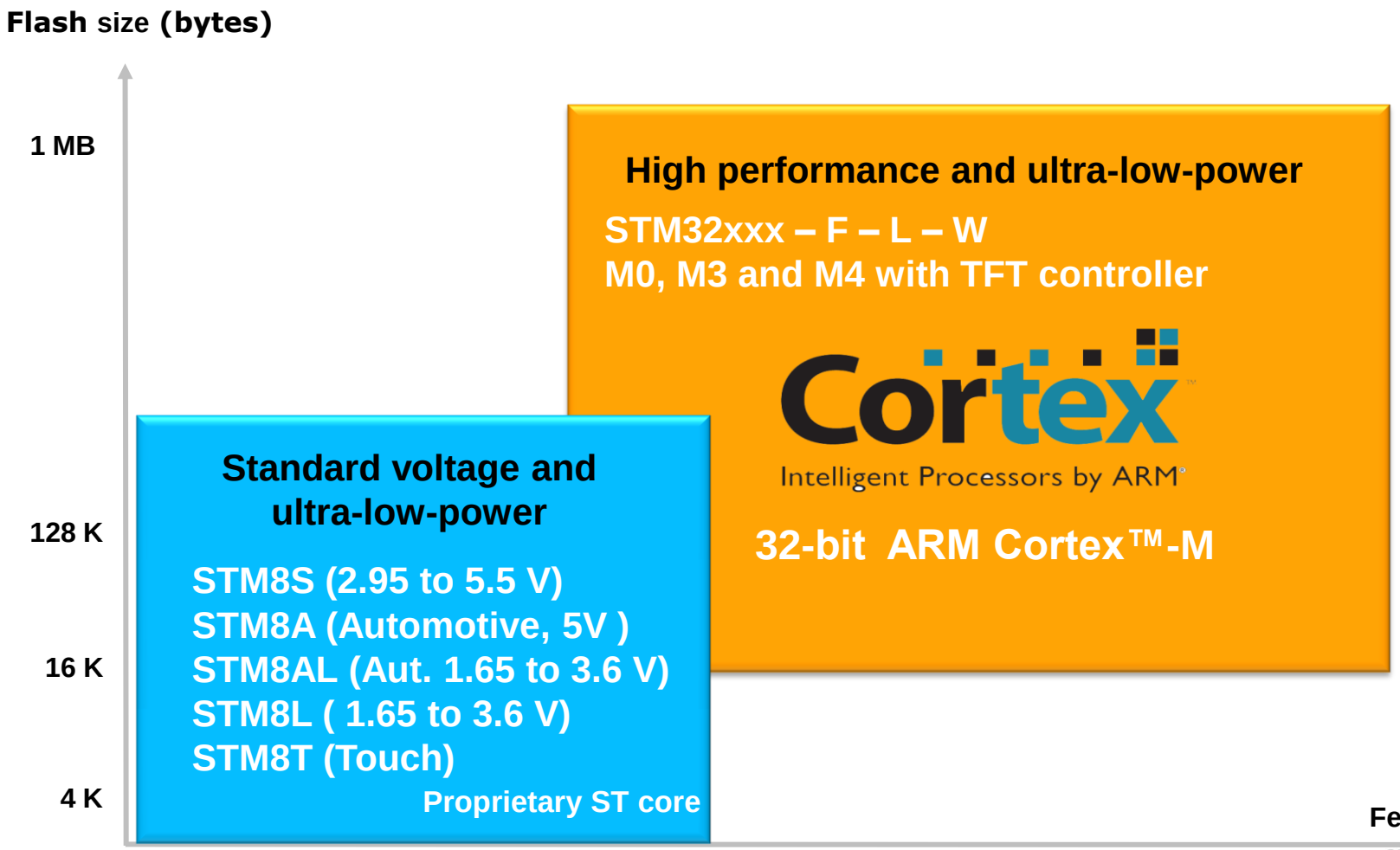
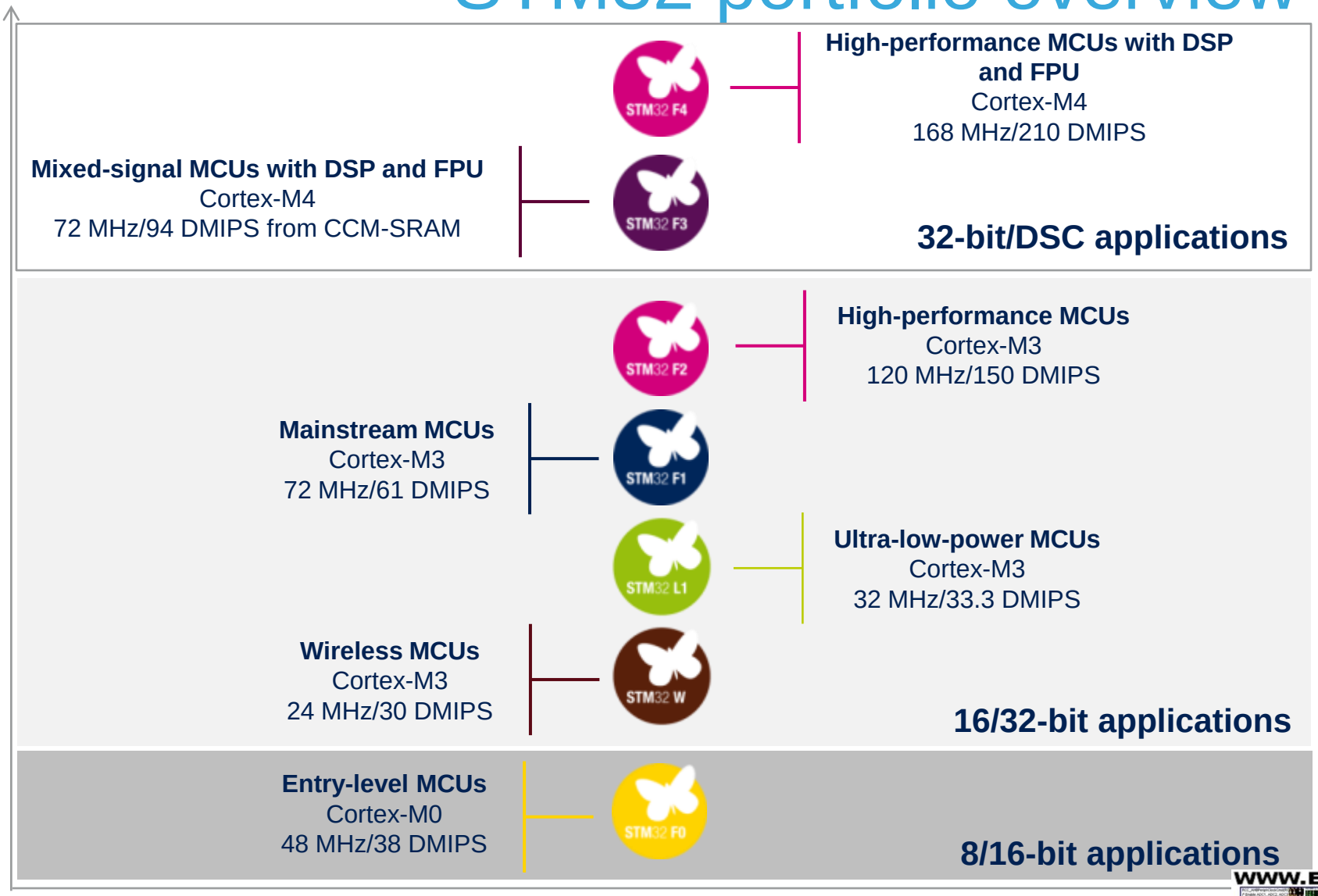
MCD market vision



STM32 portfolio overview



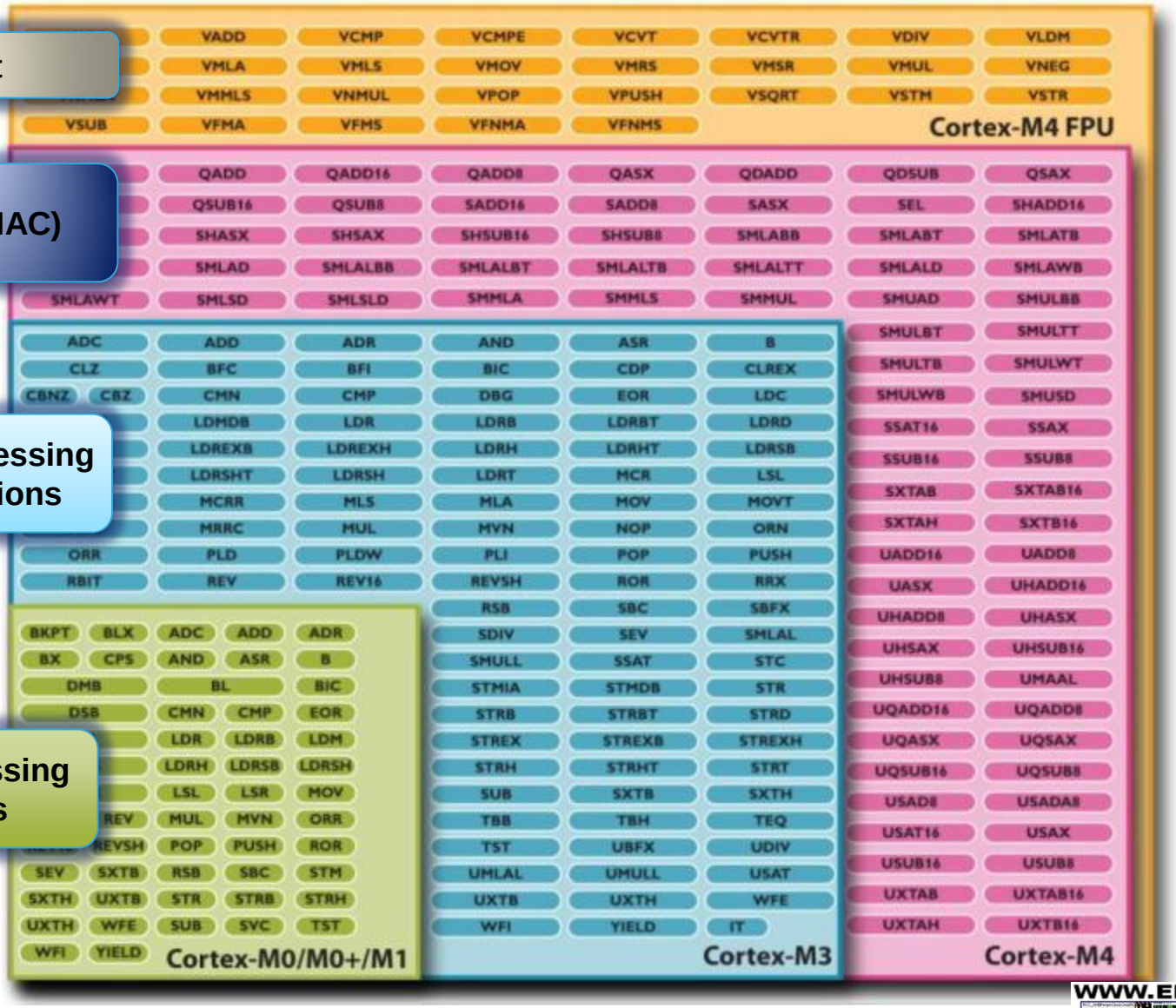
Powerful & scalable instruction set

Floating Point

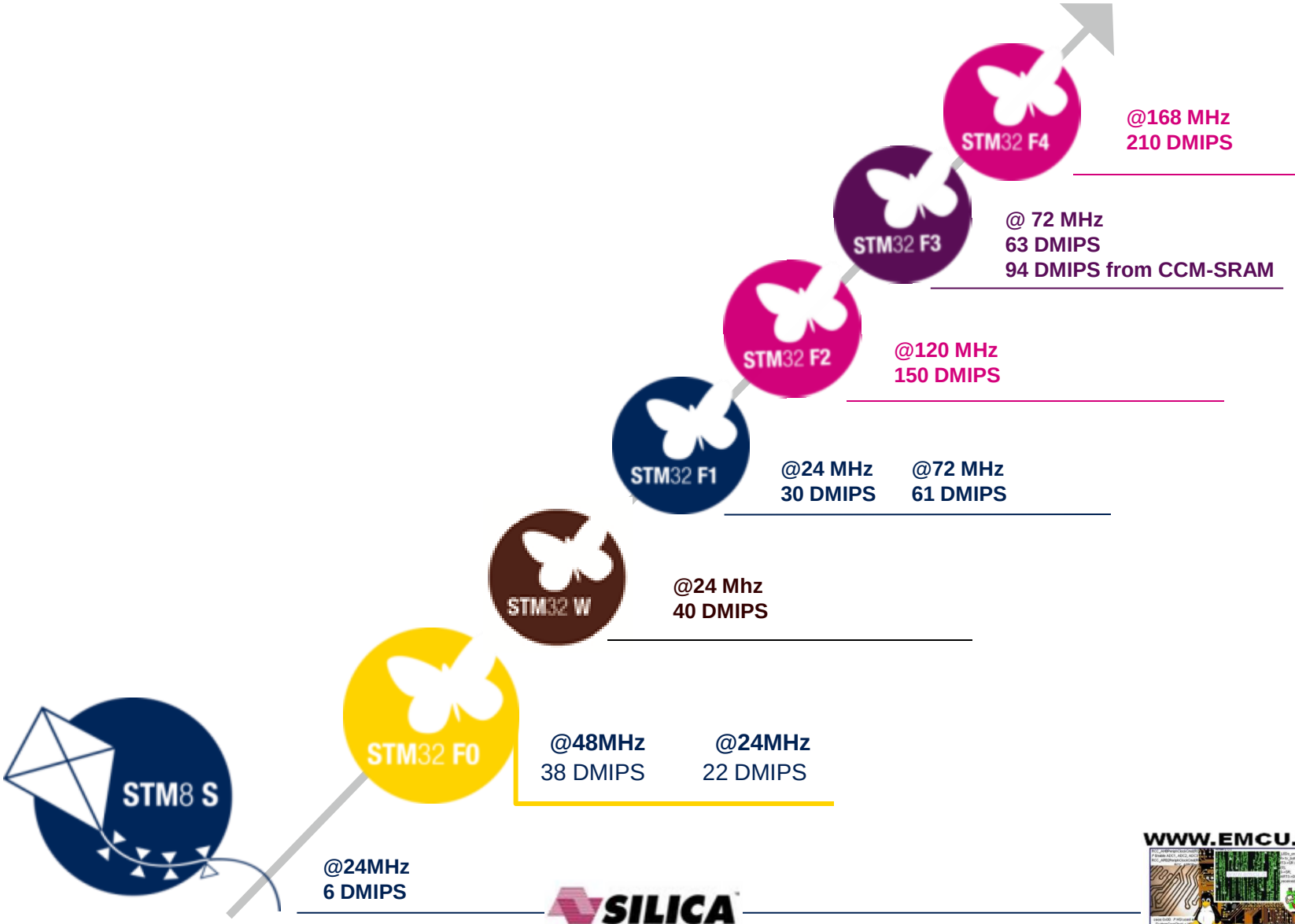
DSP (SIMD, fast MAC)

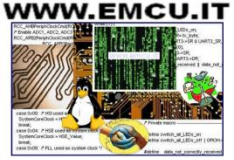
Advanced data processing
Bit field manipulations

General data processing
I/O control tasks



Real-Time Performance





STM32F Complete offer

STM32 F0 Entry	STM32 F1 Mainstream	STM32 F2 Hi Perf	STM32 F3 Analog / DSP	STM32 F4 Hi Perf / DSP
Cortex-M0 48 MHz 1.8 to 3.6V 8/16 bit application	Cortex-M3 24 to 72 MHz 2.0 to 3.6V widest portfolio	Cortex-M3 120 MHz 1.7 to 3.6V High performance	Cortex-M4 72 MHz 1.8V or 2.0 to 3.6V DSP & Analog	Cortex-M4 168 MHz 1.7 to 3.6V High performance & DSP
Platform optimized for cost effectiveness 16KB – 256KB	5 lines Foundation of STM32 Best mix Features / Perf 16KB -1MB	2 lines Advanced connectivity Encryption 128KB -1MB 128kB SRAM	5 lines ADC 5Msps, 16-bit ADC ΣΔ, PGA, Compar., Hi-resol. timer, 32KB – 256KB	2 lines Advanced connectivity Encryption 512KB -4MB 512kB SRAM
Cost Smart	**Broad Range**	**High Performance**	**Advanced & SoC solution**	**High Performance w/ DSP**

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STM32 – 7 product series

Common core peripherals and architecture:

- Communication peripherals: USART, SPI, I²C
- Multiple general-purpose timers
- Integrated reset and brown-out warning
- Multiple DMA
- 2x watchdogs Real-time clock
- Integrated regulator PLL and clock circuit
- External memory interface (FSMC)
- Up to 3x 12-bit DAC
- Up to 4x 12-bit ADC (Up to 5 MSPS)
- Main oscillator and 32 kHz oscillator
- Low-speed and high-speed internal RC oscillators
- -40 to +85 °C and up to 105 °C operating temperature range
- Low voltage 2.0 to 3.6 V or 1.65/1.7 to 3.6 V (depending on series)
- Temperature sensor

+

STM32 F4 series - High performance with DSP (STM32F405/415/407/417)

168 MHz Cortex-M4 with DSP and FPU	Up to 192-Kbyte SRAM	Up to 1-Mbyte Flash	2x USB 2.0 OTG FS/HS	3-phase MC timer	2x CAN 2.0B	SDIO 2x I²S audio Camera IF	Ethernet IEEE 1588	Crypto/ hash processor and RNG

STM32 F3 series - Mixed-signal with DSP (STM32F302/303/313/372/373/383)

72 MHz Cortex-M4 with DSP and FPU	Up to 48-Kbyte SRAM & CCM-SRAM	Up to 256-Kbyte Flash	USB 2.0 FS	2x 3-phase MC timer (144 MHz)	CAN 2.0B	Up to 7x comparator	3x 16-bit ΣΔ ADC	4x PGA

STM32 F2 series - High performance (STM32F205/215/207/217)

120 MHz Cortex-M3 CPU	Up to 128-Kbyte SRAM	Up to 1-Mbyte Flash	2x USB 2.0 OTG FS/HS	3-phase MC timer	2x CAN 2.0B	SDIO 2x I²S audio Camera IF	Ethernet IEEE 1588	Crypto/ hash processor and RNG

STM32 F1 series - Mainstream - 5 product lines (STM32F100/101/102/103 and 105/107)

Up to 72 MHz Cortex-M3 CPU	Up to 96-Kbyte SRAM	Up to 1-Mbyte Flash	USB 2.0 OTG FS	3-phase MC timer	Up to 2x CAN 2.0B	SDIO 2x I²S audio	Ethernet IEEE 1588

STM32 F0 series – Entry level (STM32F050/051)

48 MHz Cortex-M0 CPU	Up to 12-Kbyte SRAM	Up to 128-Kbyte Flash	3-phase MC timer	Comparator	CEC

STM32 L1 series - Ultra-low-power (STM32L151/152/162)

32 MHz Cortex-M3 CPU	Up to 48-Kbyte SRAM	Up to 384-Kbyte Flash	USB FS device	Up to 12-Kbyte EEPROM	LCD 8x40 4x44	Comparator	BOR MSI VScal	AES 128-bit

STM32 W series - Wireless (STM32W108)

24 MHz Cortex-M3 CPU	Up to 16-Kbyte SRAM	Up to 256-Kbyte Flash	2.4 GHz IEEE 802.15.4 Transceiver	Lower MAC Digital baseband	AES 128-bit

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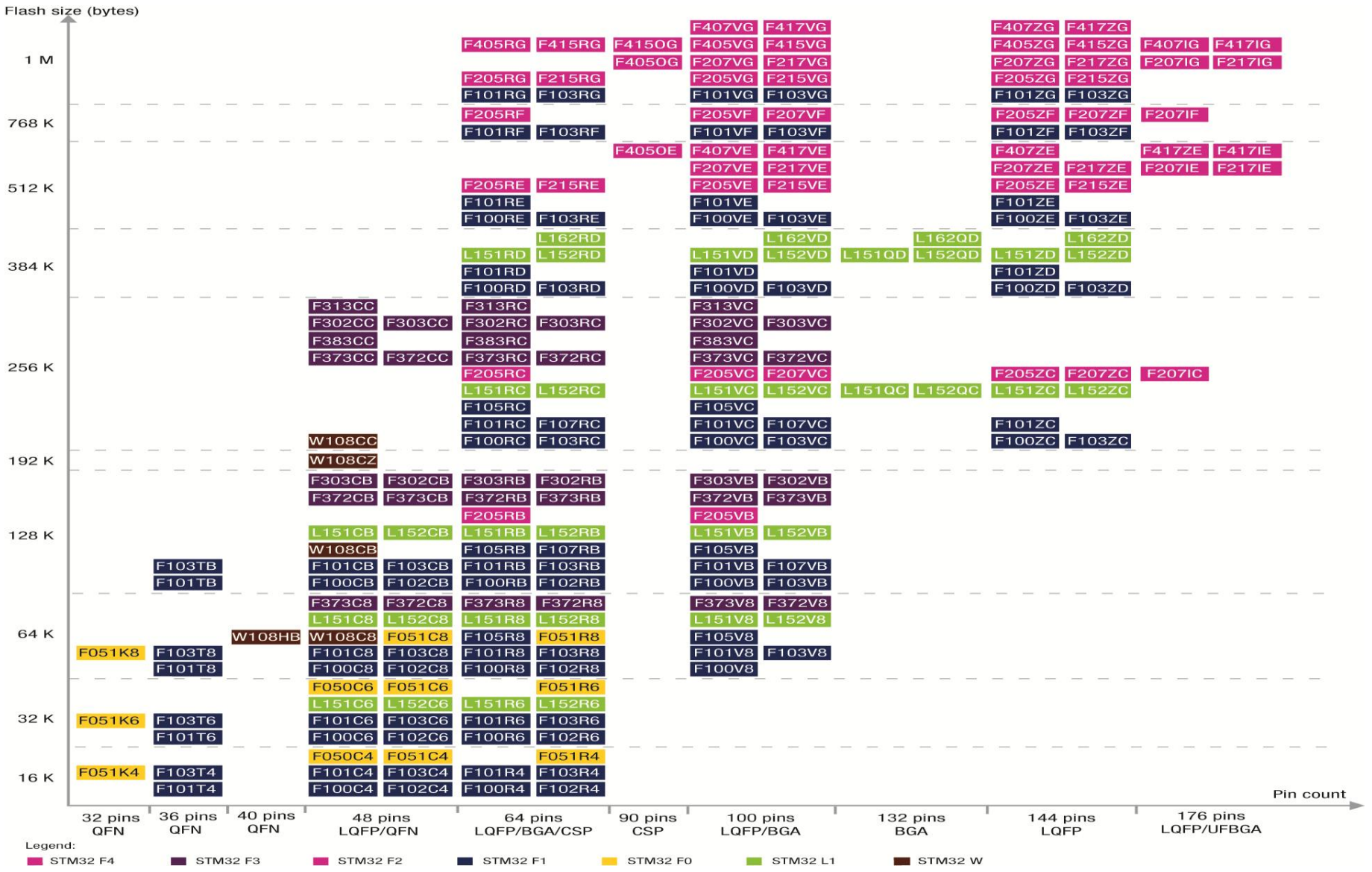
STM32 – leading portfolio *in production*



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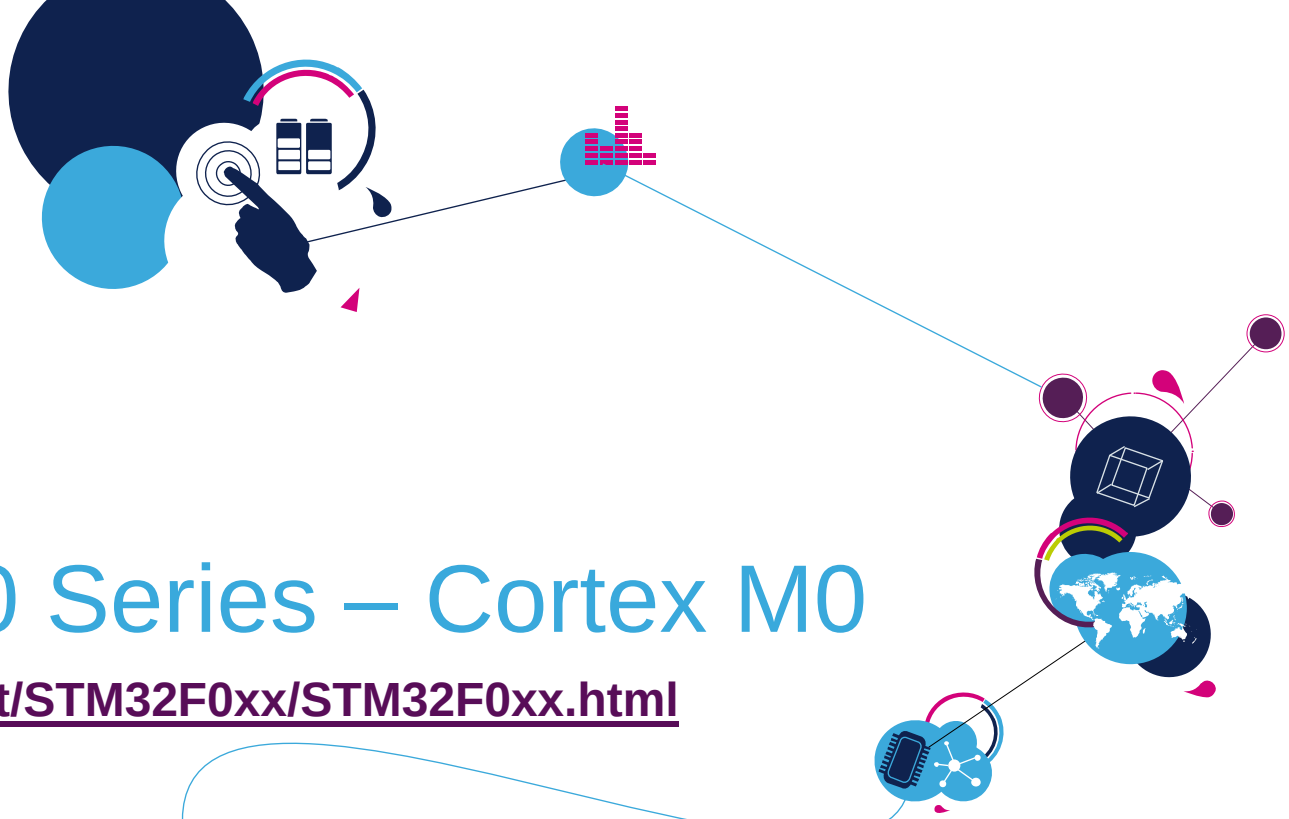

STM32 F0 Series – Cortex M0

http://www.emcu.it/STM32F0xx/STM32F0xx.html

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STM32F051 Fact sheet

- ARM 32-bit Cortex-M0 core
  - 48 MHz max CPU frequency
- 2.0 to 3.6V supply
  - Specific Low voltage mode: 1.8V+/-8% to 3.6V with separate VDD ADC analog supply
- Communication peripherals
  - Up to 4x USART, 2x SPI, 2x I²C
    - I²C fast mode+ (20mA drive capability)
    - SPI (24 Mbit/s) with 4-16 bit programmable bit frame
    - USART with wake-up from STOP and baud rate programming independently from CPU clock freq support, ISO 7816 interface, LIN master, IrDA and modem control support
  - HDMI Consumer Electronics Control (CEC)
- **Remote control receiver** with full software support
- Up to x8 Timers
  - 1x 32-bit timer each with 4 IC/OC/PWM
  - 1x 16-bit PWM motor control AC timer with 4 IC/OC/PWM
  - 1x 16-bit timer with 4 IC/OC/PWM
  - 1x 16-bit timer with IC/OC/PWM
  - 1x 16-bit timer each with 2 IC/OC
  - 2x 16-bit timer with IC/OC/PWM
  - 1x basic16-bit timer
- **RTC** with H/W calendar, alarm functions and two tamper inputs
- **I/O ports**
  - 12 MHz I/O toggling
  - Fast I/O ports
  - Up to 18 touch sensing keys
- **Analog features**
  - 1x 12-bit ADC 1.0 µs with separate analog supply
  - 1x 12-bit DAC
  - 2x Analog comparators
  - 1x Temperature Sensor
- **Debug mode**
  - Serial wire debug (SWD)
- **Power consumption** (TYP)
  - 250 µA/MHz run
  - STOP 1µA
  - 0.43 Standby RTC
- **UFQFN 32 5x5, LQFP32 7x7, LQFP48 7x7, LQFP64 10x10 packages**

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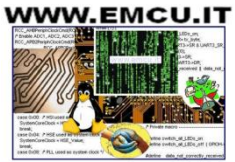

STM32F051 block diagram (64 Kbytes)

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STM32F050 fact sheet

- ARM 32-bit Cortex-M0 core
  - 48 MHz max CPU frequency
- 2.0V to 3.6V supply
  - Specific Low voltage mode: 1.8V+/-8% to 3.6V with separate V_{DD} ADC analog supply
- Communication peripherals
  - 1x USART, 1x SPI, 1x I^2C
    - I^2C fast mode+ (20mA drive capability)
    - SPI (24Mbit/s) with 4-16 bit programmable bit frame
    - USART with wake-up from STOP, auto baud rate detection and baud rate programming independently from CPU clock freq support, ISO 7816 interface, LIN master, IrDA and modem control support
  - Remote control receiver with full software support
- Up to 6x Timers
  - 1x 32-bit timer each with 4 IC/OC/PWM
  - 1x 16-bit PWM motor control AC timer
  - 1x 16-bit timer with 4 IC/OC/PWM
  - 2x 16-bit timer with 1 IC/OC/PWM
  - 1x 16-bit timer each with 2 IC/OC/PWM
- **RTC** with H/W calendar, alarm functions and two tamper inputs
- **I/O ports**
  - 12 MHz I/O toggling Fast I/O ports
- **Analog features**
  - 1x 12-bit ADC 1.0µS with separate analog supply
  - 1x Temperature Sensor
- **Debug mode**
  - Serial wire debug (SWD)
- **Power consumption** (TYP)
  - 250µA/MHz run
  - STOP 1µA
  - 0.43 Standby RTC
- **TSSOP20, UFQFN 28 4x4 , UFQFN 32 5x5, LQFP32 7x7, LQFP48 7x7 packages**

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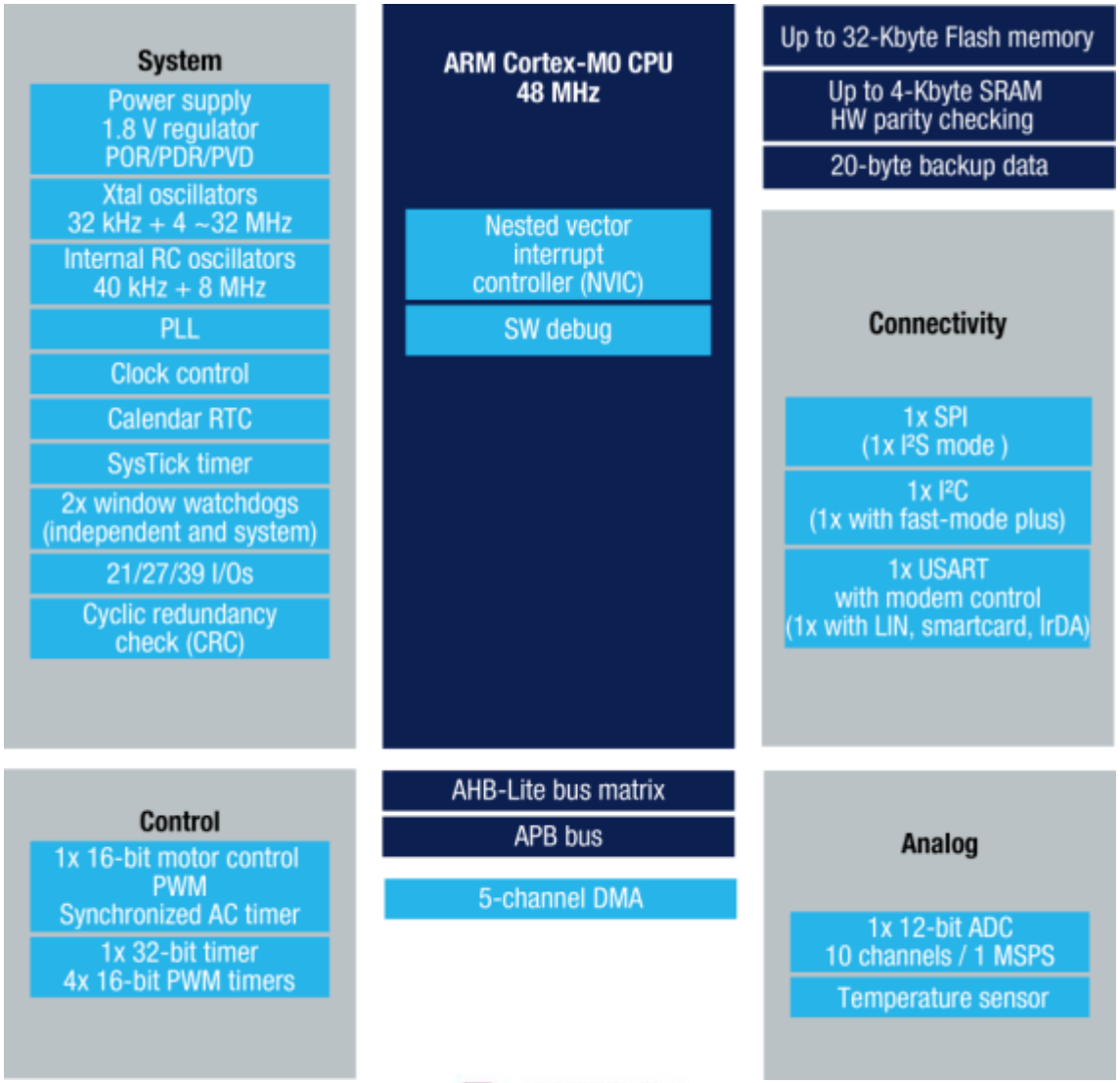
STM32F050 block diagram (32 Kbytes)



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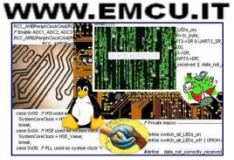


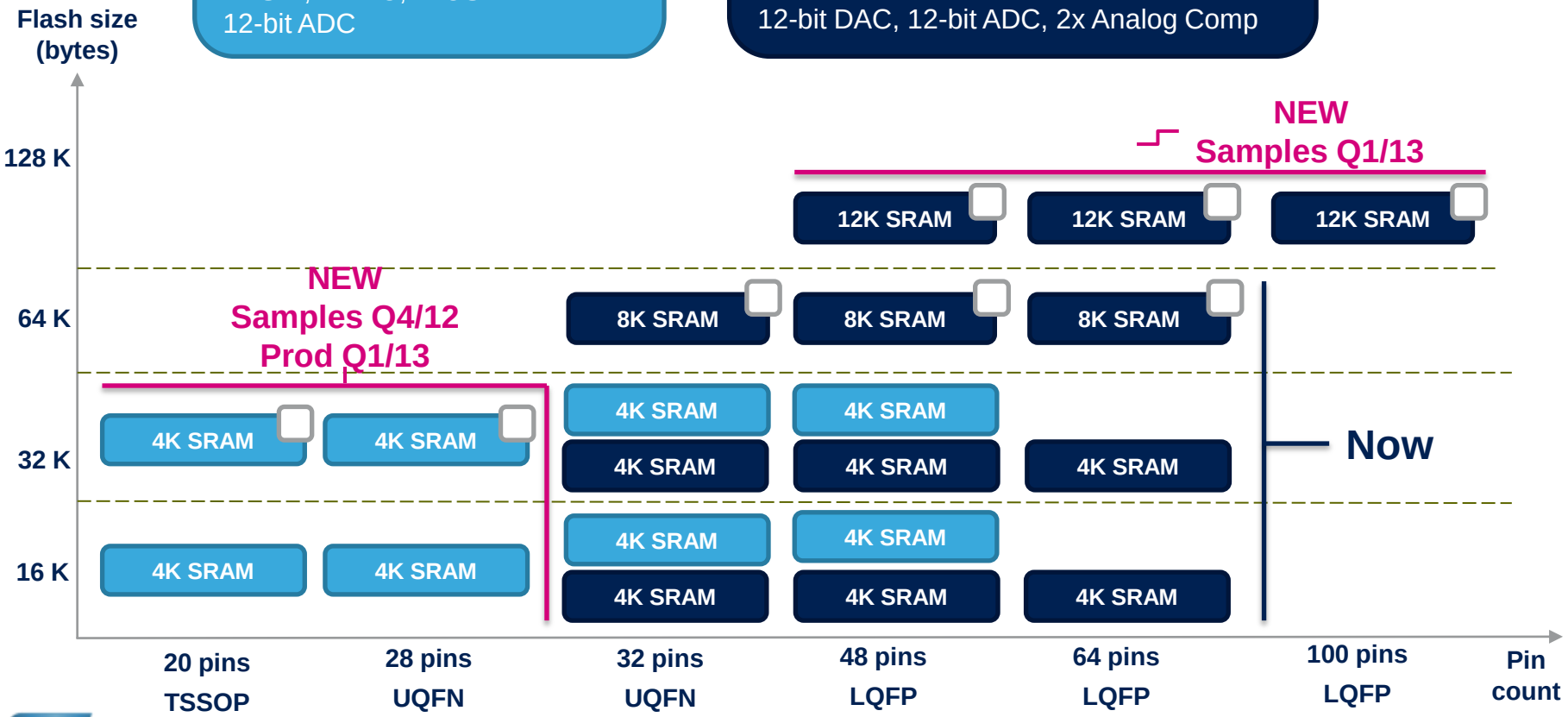
STM32F050/051 Portfolio

STM32F050

16KB-32KB Flash
4KB SRAM
5x 16-bit timer including MC timer
1x 32-bit timer
1x SPI, 1x I2C,1x USART
12-bit ADC

STM32F051

16KB-64KB Flash
4KB-8KB SRAM
6x 16-bit timer including MC timer
1x 32-bit timer
2x SPI, 2x I2C, 2x USART, CEC,
12-bit DAC, 12-bit ADC, 2x Analog Comp



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STM32F052 Fact sheet : H1 2013

- ARM 32-bit Cortex-M0 core
  - 48 MHz max CPU frequency
- 2.0V to 3.6V supply
  - Specific low voltage 1.8V -+8% mode
- Communication peripherals
  - USB 2.0 Full Speed, 1x CAN, 4x USART, 2x SPI, 2x I^2C
    - USB Full Speed USB Charging Class compatible; Link Power Management (LPM)
    - CAN 2.0 B
    - I^2C fast mode+ (20mA drive capability)
    - SPI (24Mbit/s) with 4-16 bit programmable bit frame
    - USART with wake-up from STOP and baud rate programming independently from CPU clock freq support, ISO 7816 interface, LIN master, IrDA and modem control support
- Up to 8x Timers
  - 1x 32-bit timer each with 4 IC/OC/PWM
  - 1x 16-bit PWM motor control AC timer with 4 IC/OC/PWM
  - 1x 16-bit timer with 4 IC/OC/PWM
  - 1x 16-bit timer with IC/OC/PWM
  - 1x 16-bit timer each with 2 IC/OC
  - 2x 16-bit timer with IC/OC/PWM
  - 1x basic16-bit timer
- I/O ports
  - 12 MHz I/O toggling Fast I/O ports
- Analog features
  - 1x 12-bit ADC 1.0µs with separate analog supply from 2.4V to 3.6V
  - 1x 12-bit DAC
  - 2x Analog comparators
- Debug mode
  - Serial wire debug (SWD)
- Power consumption (TYP)
  - 250µA/MHz run
  - STOP 1µA max
  - 2µA max RTC

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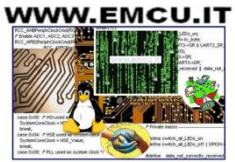

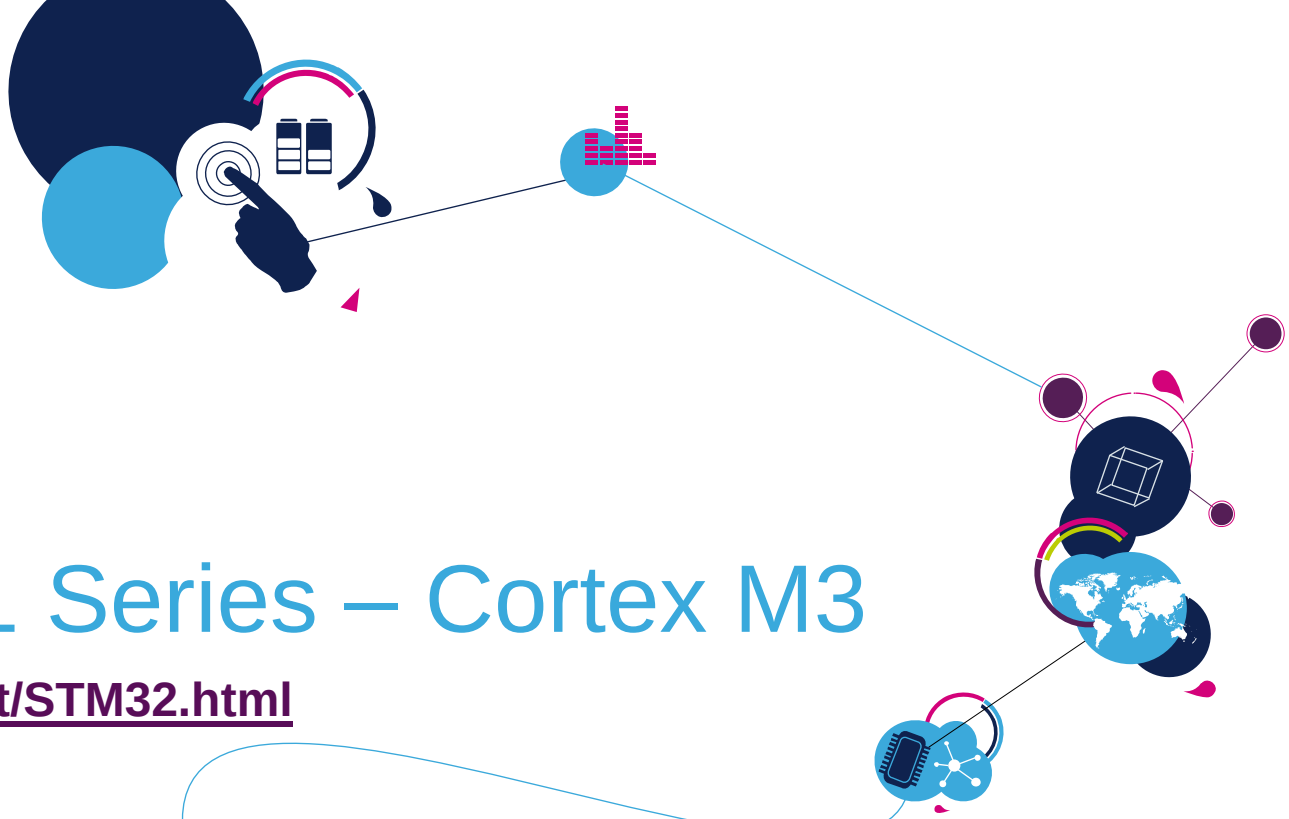

STM32 F1 Series – Cortex M3

http://www.emcu.it/STM32.html

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STM32 F1

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STM32F1 series Product Lines

All lines include:

- Multiple communication peripherals Up to 5 x USART, 3xSPI, 2xI²C
- ETM*
- FSMC**
- Dual 12-bit DAC***
- Multiple 16-bit Timers
- Main Osc 4-16MHz (25MHz on 105/107)
- Internal 8 MHz RC and 40 kHz RC
- Real Time Clock with Battery domain & 32KHz ext osc
- 2 x Watchdogs
- Reset circuitry and Brown Out Warning
- Up to 12 DMA cnls

* Performance/Access Lines 256KB, 384KB, or 512KB devices and ALL Connectivity devices

** 256KB, 384KB, or 512KB Performance and Access devices

*** 256KB, 384KB, or 512KB devices except Value line where present on all memory range

+

Connectivity Line: STM32F107

72MHz CPU	Up to 256 KB Flash / 64KB SRAM	2x12-bit ADC (1µs) TempSensor	USB 2.0 OTG (FS)	2 x Audio Class I2S	2 x CAN	PWM timer	Ethernet IEEE1588

Connectivity Line: STM32F105

72MHz CPU	Up to 256 KB Flash / 64KB SRAM	2x12-bit ADC (1µs) TempSensor	USB 2.0 OTG (FS)	2 x Audio Class I2S	2 x CAN	PWM timer

Performance Line: STM32F103

72MHz CPU	Up to 1MB Flash / 96KB SRAM	2/3x12-bit ADC (1µs) TempSensor	USB–FS Device	SDIO*	I2S*	CAN	PWM timer

USB Access Line: STM32F102

48MHz CPU	Up to 128KB Flash / 16KB SRAM	1x12-bit ADC (1µs) Temp sensor	USB–FS Device

Access Line: STM32F101

36MHz CPU	Up to 1MB Flash / 80KB SRAM	1x12-bit ADC (1µs) Temp sensor

Value Line: STM32F100

24MHz CPU	Up to 512KB Flash / 32KB SRAM	1x12-bit ADC (1.2µs) Temp sensor	HDMI-CEC	PWM timer

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STM32 Discovery kit

- Development Toolchain support
  - **Atollic** TrueSTUDIO®
  - **IAR** EWARM
  - **KEIL** MDK-ARM

Price: $9.90

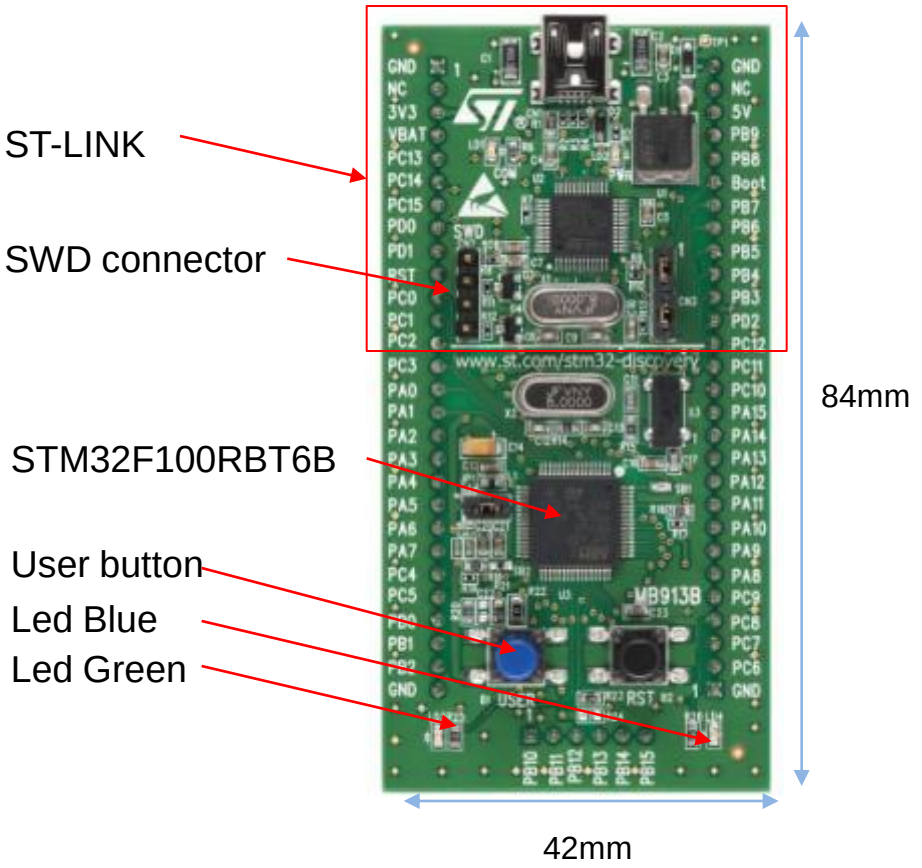
- **What should I use to develop on STM32 ?**

- Large number of software examples available at:

  www.st.com/stm32-discovery
  http://www.emcu.it/STM32.html#TUTORIAL_and_SW_examples

STM32 Value line Discovery Board

- On-board ST-LINK with selection mode switch to use the kit as stand-alone ST-LINK with SWD connector
- Designed to be powered by USB or by external power 5V or 3.3V supply
- Can supply target application with 5 Volts or 3 Volts
- Two User LEDs (Green and Blue)
- One user Push Button
- Extension header for all QFP64 I/Os for quick connection to prototyping board or easy probing
- http://www.emcu.it/STM32Discovery/STM32ValueLineDiscovery.html



F-1 series Tools & Software

- Evaluation board for full product feature evaluation
  - Hardware evaluation platform for all interfaces:
    External memories, Ethernet and 2 USB OTG connectors, touch-screen TFT display, audio output…
  - Possible connection to all I/Os and all peripherals
- Many options of development IDE solutions from the STM32 and ARM ecosystem.

STM3210E-EVAL
(F103,F102,F101)

STM3210C-EVAL

(F105,F107)

STM32100E-EVAL

(F100)

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RAISONANCE Embedded Systems Development Tools
hitex DEVELOPMENT TOOLS
eForce
Computex
横河ディジタルコンピュータ株式会社
Yokogawa Digital Computer Corporation
insight インサイトインターナショナル株式会社
GRAPE SYSTEMS
MiSPO 株式会社ミスポ

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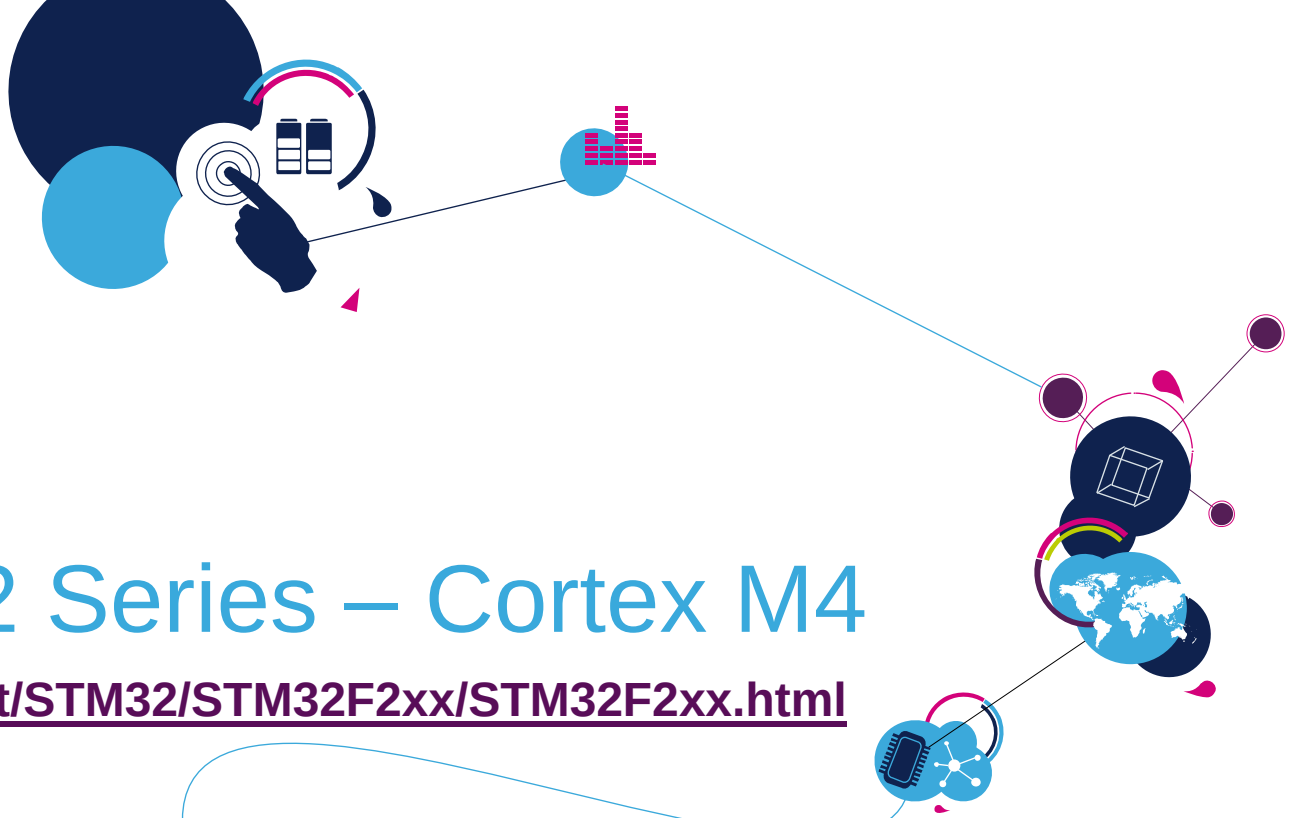

STM32 F2 Series – Cortex M4

http://www.emcu.it/STM32/STM32F2xx/STM32F2xx.html

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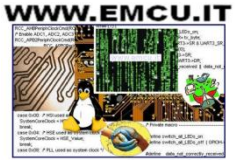

STM32 F-2 Series highlights

- Advanced technology and process from ST:
  - Memory accelerator: **ART Accelerator™**
  - Multi AHB Bus Matrix
  - 90nm process

- Outstanding results:
  - 150DMIPS at 120MHz
  - Execution from Flash equivalent to 0-wait state performance
  - Outstanding dynamic power consumption: 188uA/MHz, less than 23mA in run mode from flash at 120MHz with peripherals OFF (running CoreMark benchmark).

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STM32 F-2 Series highlights 2/2

- More Memory
  - Up to 1MB Flash, up to 128kB SRAM
- New peripherals in the STM32 platform
  - **USB OTG** High speed **480Mbit/s**
  - **Camera interface**
  - **Crypo/hash processor**
  - 32-bit random number generator (**RNG**)
  - 32-bit RTC with calendar
  - **32bit Timers**

STM32 F-2 Series product lines

- 6x USART, 3x SPI, 3x I²C
- 2x CAN
- Multiple 16-bit and 32-bit timers
- 2x advanced timers
- Dual DAC
- EMI
- 2x I²S
- MPU
- ETM with JTAG fuse security
- Main 8-26 MHz oscillator
- Internal 16 MHz (1 %) and 32 kHz RC oscillators
- Real-time clock
- 4-Kbyte battery backed up SRAM
- 2x watchdogs
- Reset circuitry
- Up to 16-channel DMA
- 80 % GPIO ratio, up to 60 MHz
- 3x 12-bit ADC 2 MSPS
- Temperature sensor
- 1.65[3] to 3.6 V V_{DD}

+

STM32F207/217

120 MHz CPU	Up to 128-Kbyte SRAM	Up to 1-Mbyte Flash	USB 2.0 OTG FS/HS[1]	USB 2.0 OTG FS	Camera interface	SDIO	RNG	Crypto/ hash processor[2]	Ethernet IEEE 1588

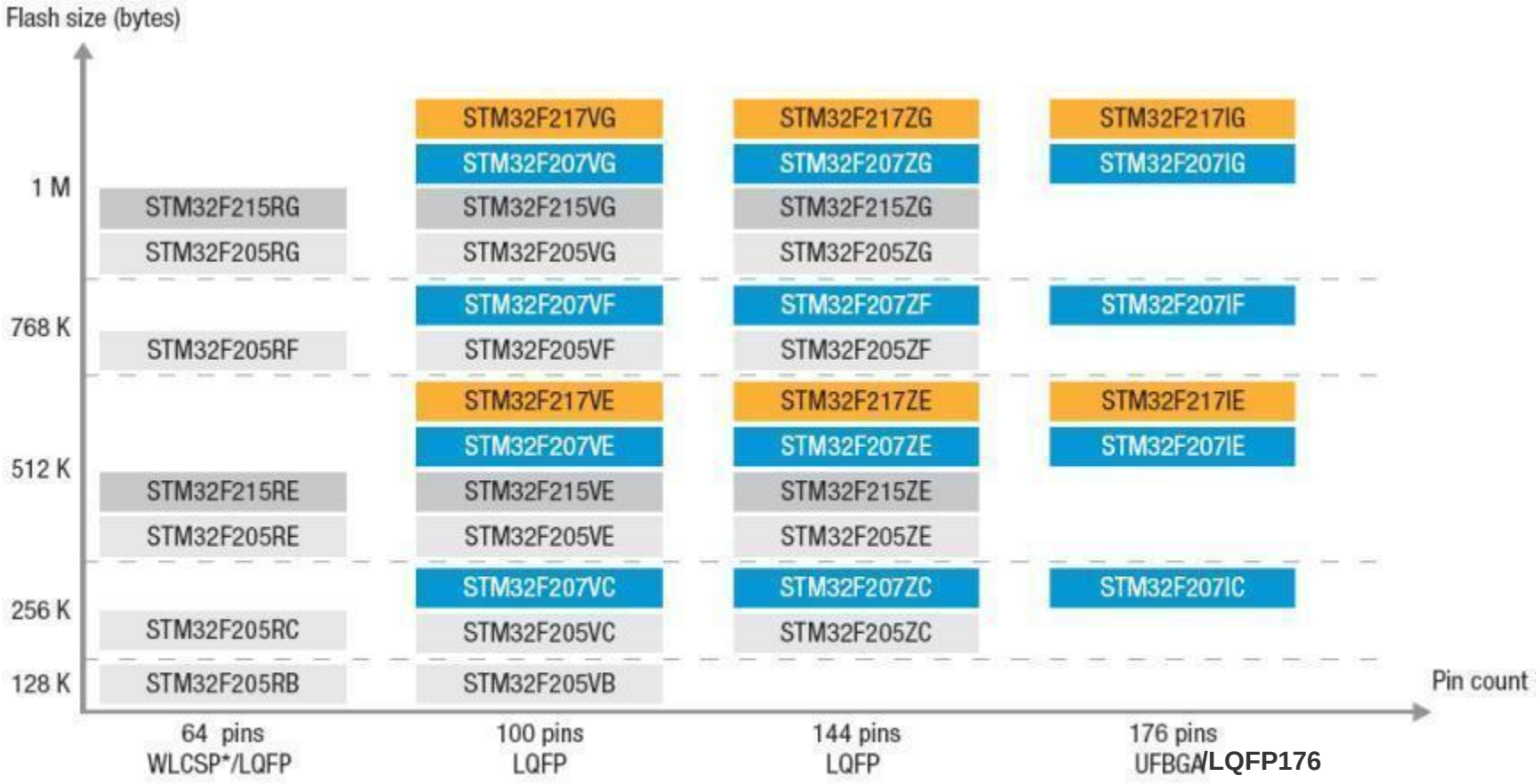
STM32F205/215

120 MHz CPU	Up to 128-Kbyte SRAM	Up to 1-Mbyte Flash	1x USB 2.0 OTG FS/HS[1]	SDIO	RNG	Crypto/ hash processor[2]

Notes:

1. HS requires an external PHY connected to ULPI interface
2. Crypto/hash processor on STM32F217x and STM32F215x
3. 1.65 V for WLCSP64 package only and 1.8 V for all other packages

STM32 F-2 series portfolio



Note:
For STM32F205RGY6 and STM32F205REY6 only

Legend:
- STM32F207 Ethernet, 2x USB OTG, camera interface
- STM32F217 Ethernet, 2x USB OTG, camera interface, crypto/hash processor
- STM32F205 1x USB OTG FS/HS
- STM32F215 1x USB OTG FS/HS, crypto/hash processor

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STM32 F3 Series – Cortex M4

Analog & DSP

http://www.emcu.it/STM32F3xx/STM32F3xx.html

STM32 Releasing your creativity

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STM32 F3 series: Fact sheet

- STM32 F3 series complement the F-1 series with:
  - More performance (Cortex-M4F & more DMips)
  - Richer analog peripherals set
  - Renewed digital peripheral set
  - Pin and SW compatibility w/ F1 series

- Performance
  - Core Cortex M4 + FPU
  - Fmax = 72 MHz
  - Core Coupled Memory (CCM-SRAM) to execute critical loop at full speed (0 WS @ 72 MHz = 90 DMips)

- Safety
  - RAM with parity bit
  - Memory Protection Unit (MPU)
  - HW CRC

- Power supply
  - 2.0 to 3.6 V supply
  - Specific 1.8V -/+8% mode

- Rich analog peripherals
  - **Comparators, DAC, PGA, 12-bit ADC 5Msps, 16-bit ADC ΣΔ, Hi-Resolution timer (<1ns)**

- Renewed digital peripherals
  - I²C, UART, SPI, CRC, RTC, faster I/Os, Capacitive **Touch sensing** (Charge Transfert)

STM32 F3 series combine DSP & High-end Analog set

STM32 F3 series – Product lines

All families include:

- Cortex-M4 + FPU
  Fmax = 72 MHz
- MPU
- PLL
- Low and high speed internal oscillators
- 2x watchdogs + RTC
  Real-time clock
- HW CRC
- Reset circuitry
  POR/PDR
- Multiple DMA
- Communication peripherals
  USART, SPI, I²C
- Multiple 16-bit timers
- 1x 32-bit timer
- Temperature sensor
- Backup registers

+

STM32F302 and STM32F303 lines

Up to 256-Kbyte Flash	Up to 40-Kbyte SRAM	Up to 8-Kbyte 'code' SRAM	ETM	Reset + BOR PVD	2x DAC 12-bit	7x comparator	4x 12-bit ADC 5 Msps SAR	4x PGA	2x16-bit AMC timer	CAN 2.0B	USB 2.0 FS

Number of instance differs between lines

STM32F372 and STM32F373 lines

Up to 256-Kbyte Flash	Up to 32-Kbyte SRAM	ETM	3x 16-bit ADC ΣΔ	Reset + BOR PVD	3x DAC 12-bit	2x comparator	1x 12-bit ADC 1 Msps SAR	CEC	CAN 2.0B	USB 2.0 FS

Number of instance differs between lines

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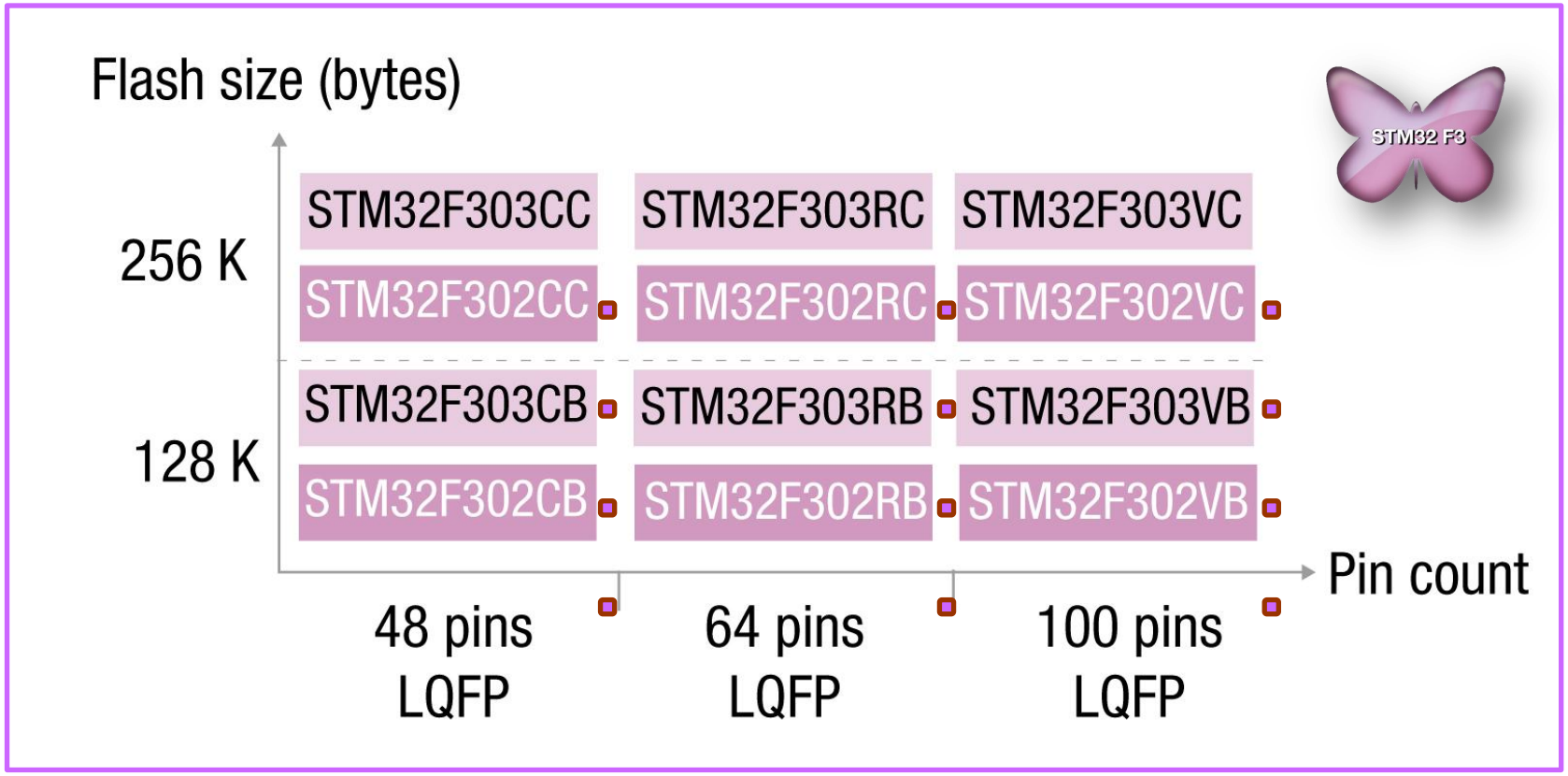
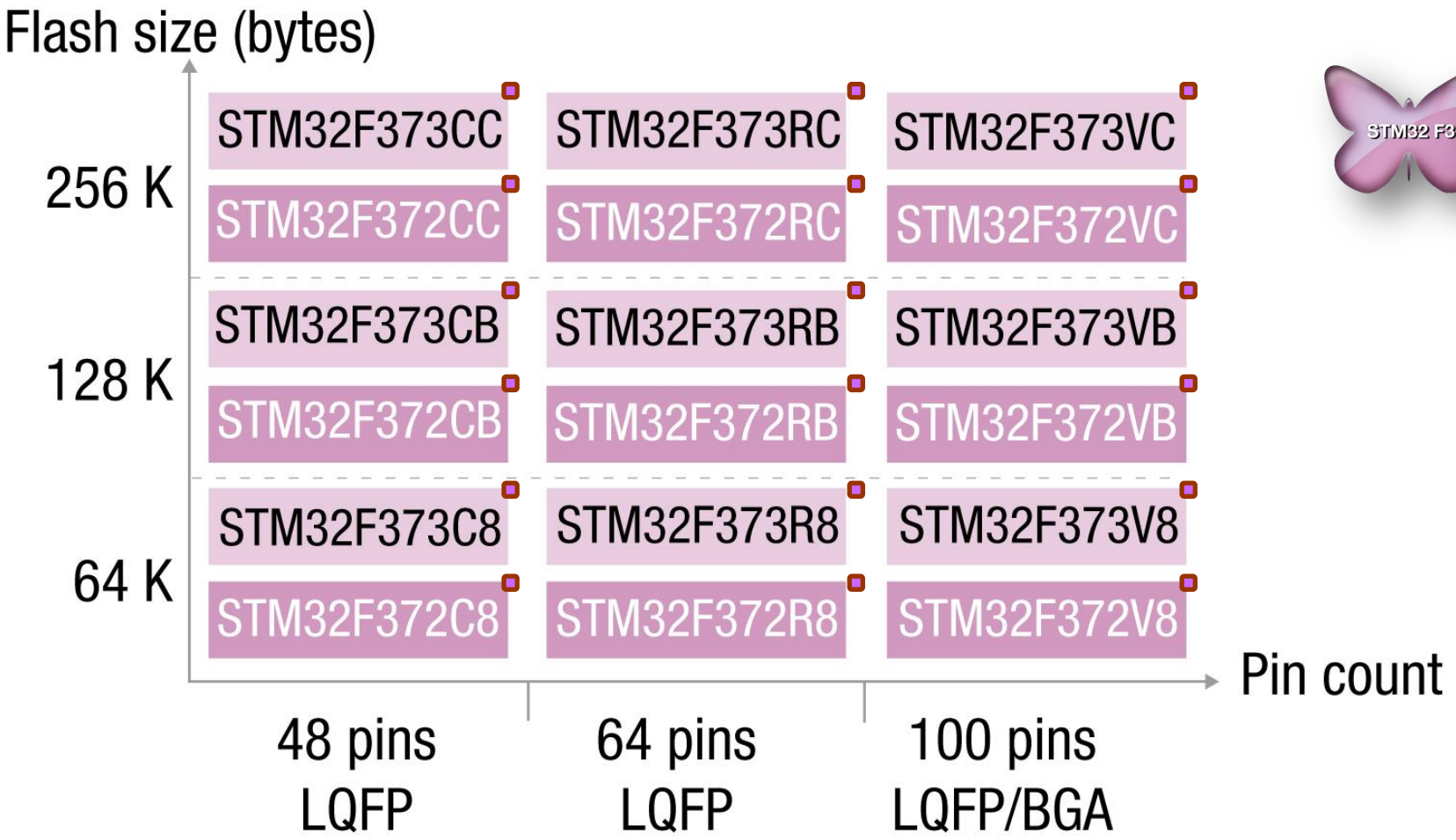
STM32 F3 series – Main differences

Unit parameters	STM32F303	STM32F302	STM32F373	STM32F372
Core	Cortex-M4F + FPU	Cortex-M4F + FPU	Cortex-M4F + FPU	Cortex-M4F + FPU
Freq max	72 MHz	72 MHz	72 MHz	72 MHz
Flash max	256 Kbytes	256 Kbytes	256 Kbytes	256 Kbytes
Ram (up to)	40 Kbytes } 48-Kbyte	32 Kbytes } 40-Kbyte	32 Kbytes	32 Kbytes
CCM (Code-SRAM)	**8 Kbytes** }	**8 Kbytes** }	-	-
ADC SAR	**4x 12-bit 5 Msps**	**2x 12-bit 5 Msps**	1x 12-bit 1 Msps	1x 12-bit 1 Msps
ADC ΣΔ	-	-	**3x 16-bit**	**1x 16-bit**
Other Analog	**7x Comp** **4x PGA** **2x DAC**	**4x Comp** **2x PGA** **1x DAC**	**2x Comp** - **3x DAC**	**1x Comp** - **1x DAC**
MC timer	2x (144 MHz)	1x (144 MHz)	-	-
Other Digital **(except SPI, UASRT, I²C)**	1x USB *FS device* 1x CAN, **CT Touch sense**	1x USB *FS device* 1x CAN, **CT Touch sense**	1x USB *FS device* 1x CAN, **CT Touch sense**	1x USB *FS device* 1x CAN, **CT Touch sense**



STM32 F3

1.8 V power supply option



1.8 V power supply option

Large tools offer STM32F3- series

- **Evaluation board** for full product feature evaluation
  Available Mid October 2012 (For any support before please contact the local ST office)

  Sales types : STM32303C-EVAL
  STM32373C-EVAL

- **STM32F3 discovery kit :** low-cost evaluation kit is the cheapest and quickest way to discover the STM32F3 series
  - For fast evaluation or prototyping at less than $ 13

    Available in October 2012

- Large choice of development IDE solutions

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

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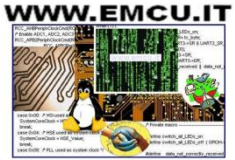

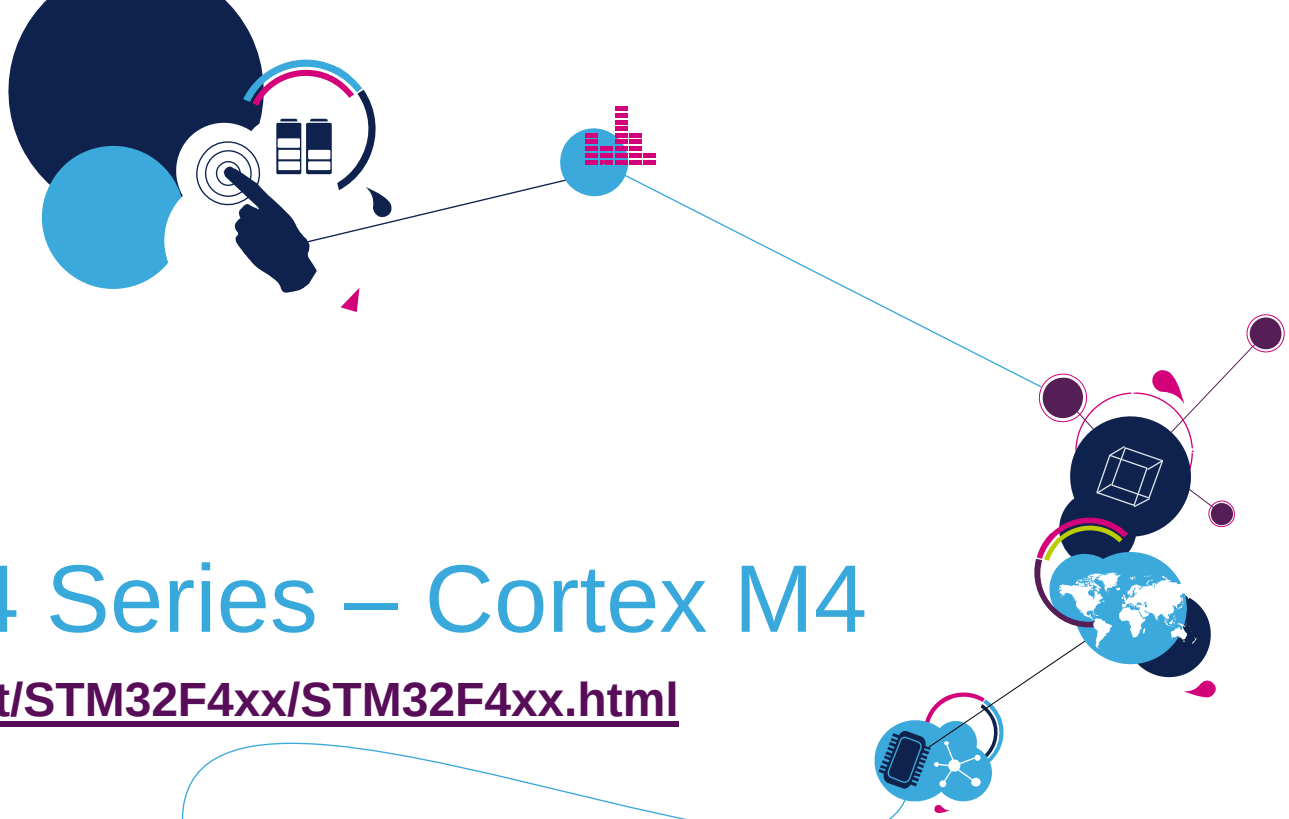

STM32 F4 Series – Cortex M4

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

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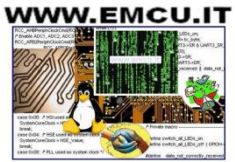

STM32 F4 series

High-performance digital signal controller

168 MHz F_{CPU}/**210** DMIPS - **363** Coremark score

ARM

Cortex
Low-Power Leadership from ARM

FPU

Single precision
Ease of use
Better code efficiency
Faster time to market
Eliminate scaling and saturation
Easier support for meta-language tools (Matlab…)

STM32 F4

MCU

Ease of use of C programming
Interrupt handling
Ultra-low power

DSP

Harvard architecture
Single-cycle MAC
Barrel shifter

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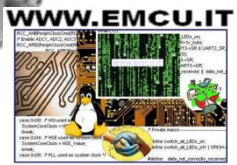

STM32 F4 Series highlights 1/2

Advanced technology and process from ST:

- Memory accelerator: **ART Accelerator**™
- Multi AHB Bus Matrix
- 90nm process

Outstanding results:

- **210**DMIPS at **168**Mhz.
- **Execution from Flash equivalent to 0-wait** state performance up to 168Mhz thanks to ST **ART Accelerator**

STM32 F4 Series highlights 2/3

More Memory

- Up to **1MB Flash**,
- **192kB SRAM**: 128kB on bus matrix + 64kB on data bus dedicated to the CPU usage

Advanced peripherals shared with STM32 F2 Series

- **USB OTG** High speed **480Mbit/s**
- **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.

STM32 F4 Series highlights 3/3

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 **10.5Mbits/s**
- High speed **SPI** up to **37.5Mbits/s**
- **Camera interface up to 54MBytes/s**

*external reset circuitry required to support 1.7V

STM32 F4 series – applications served

- Points of sale/inventory management

- Industrial automation and solar panels

- Transportation

- Medical

- Building

- Security/fire/HVAC

- Test and measurement

- Consumer

- Communication

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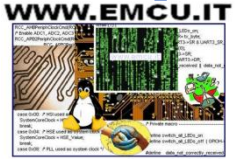
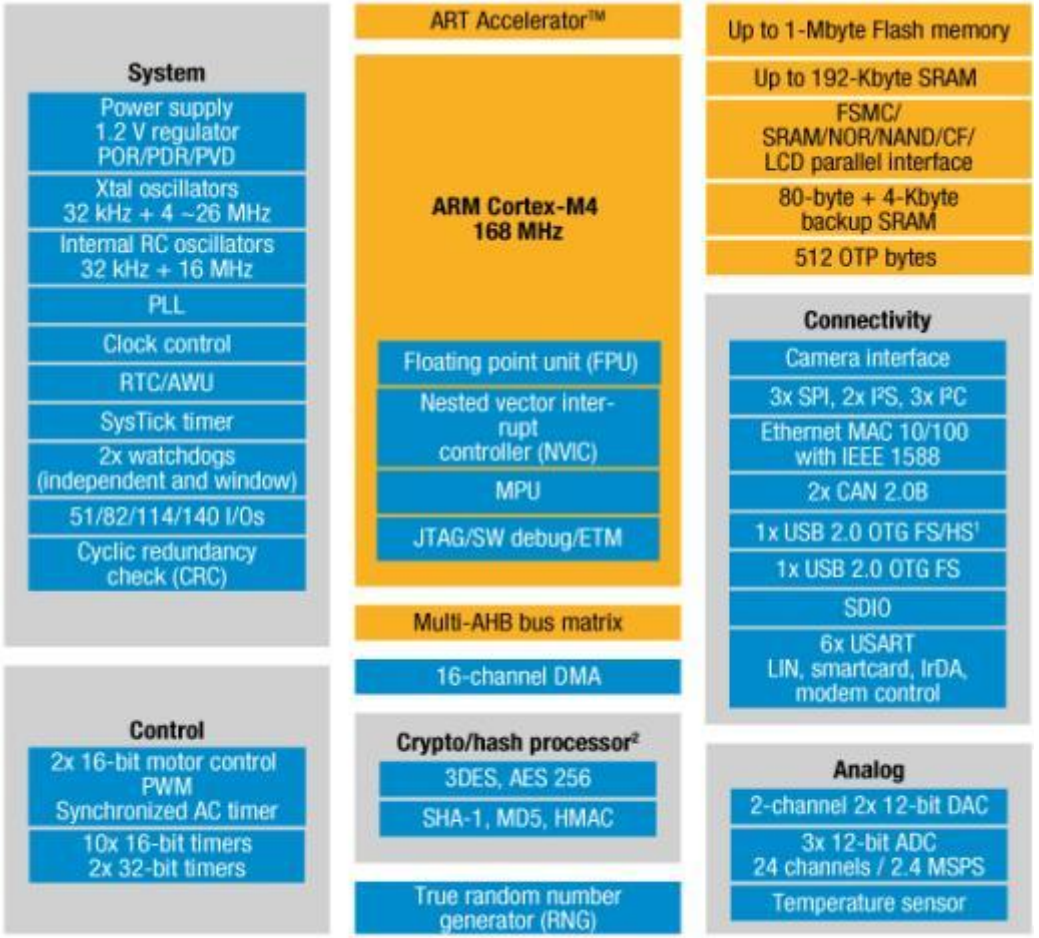


STM32 F4 block diagram

Feature highlight

- 168 MHz Cortex-M4 CPU
  - Floating point unit (FPU)
  - ART Accelerator ™
  - Multi-level AHB bus matrix
- 1-Mbyte Flash, 192-Kbyte SRAM
- 1.7 to 3.6 V supply
- RTC: <1 µA typ, sub second accuracy
- 2x full duplex I²S
- 3x 12-bit ADC 0.41 µs/2.4 MSPS
- 168 MHz timers



Notes:
1. HS requires an external PHY connected to the ULPI interface
2. Crypto/hash processor on STM32F417 and STM32F415

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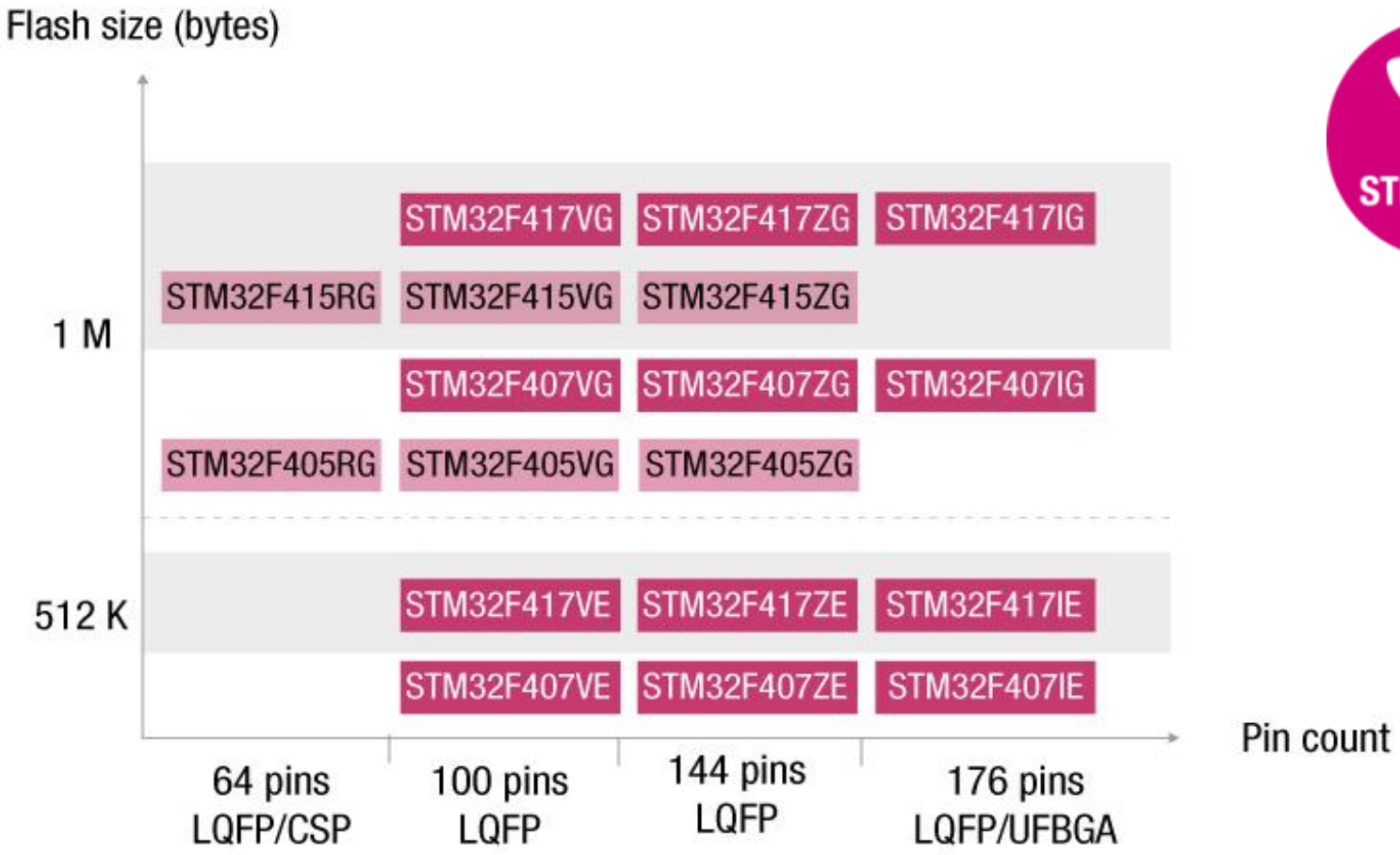
STM32 F4 portfolio



Legend:

Ethernet, 2xUSB OTG, camera IF

1xUSB OTG FS/HS

Encryption

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STM32 L1Series – Cortex M3 Low Power

http://www.emcu.it/STM32/STM32Lxx/STM32Lxx.html

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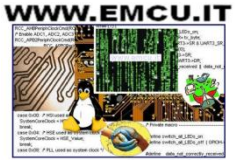

STM32 L1 series

Wide range of application

Consumer

Digital cameras

Bar-code scanners

GPS

Gaming

Industrial

Home automation

Water meters

Electricity meters

Healthcare and fitness

Glucose meters, insulin pumps, ECG, sports watches

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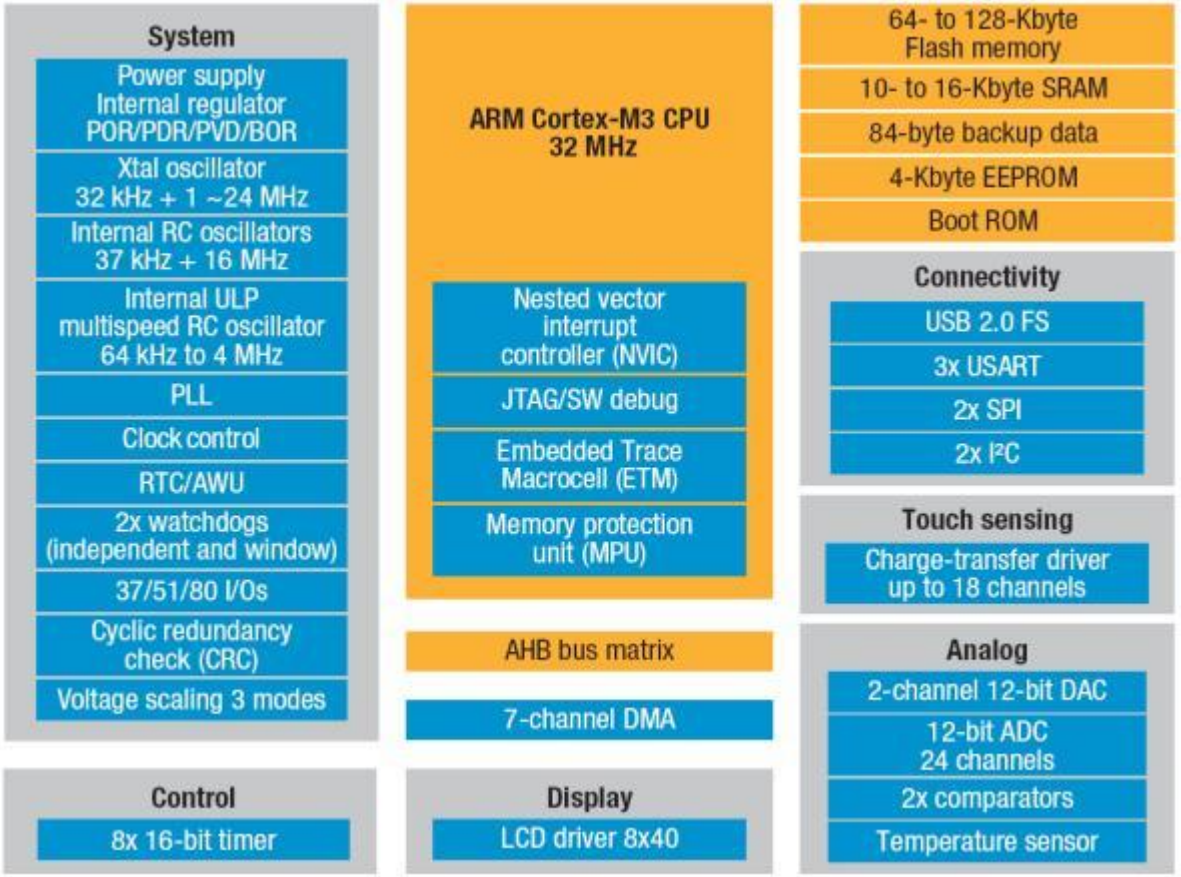
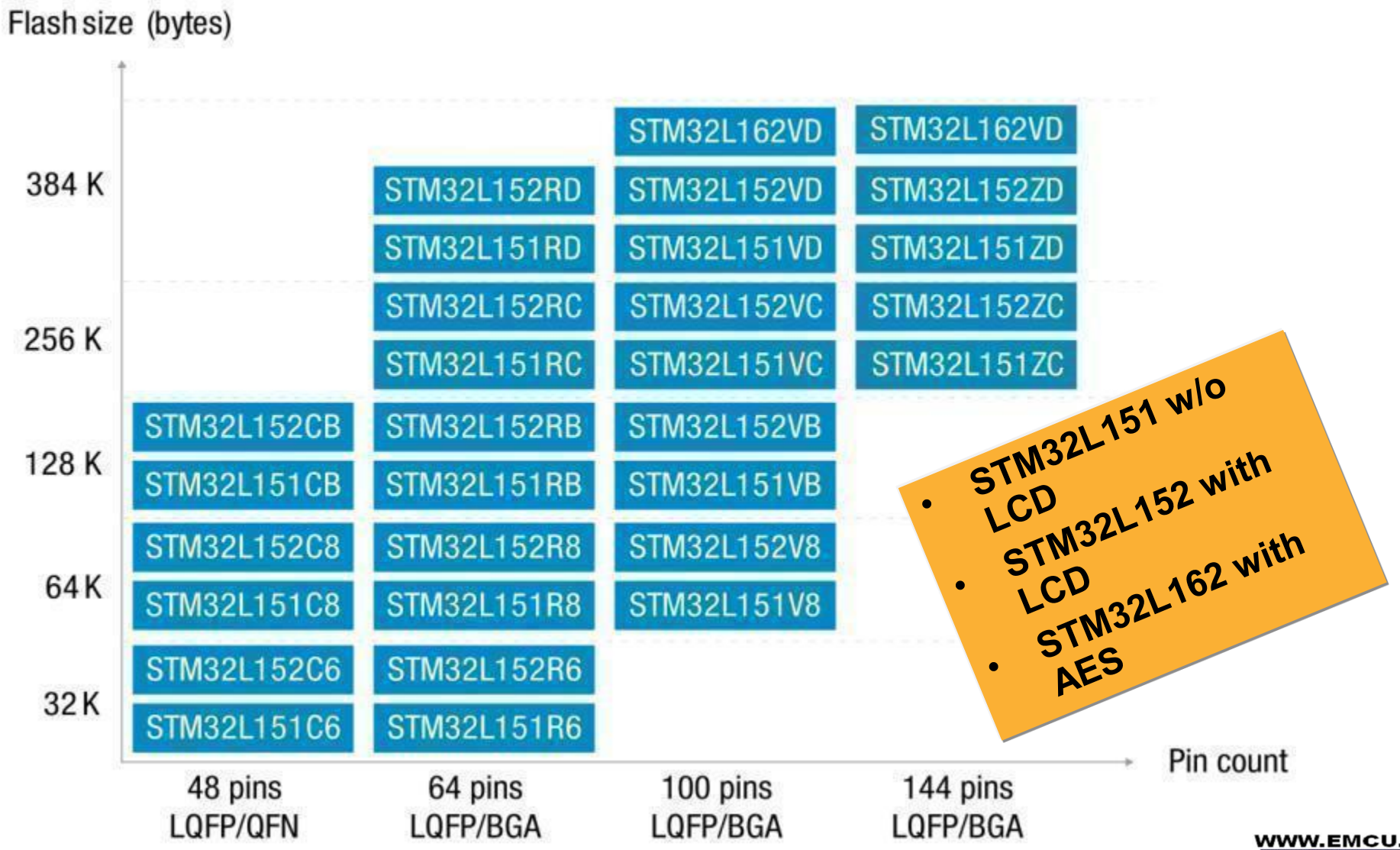
STM32L - block diagram

- Core
  - ARM **Cortex-M3** core @ **32 MHz**
  - 1.65 to 3.6 V w/o BOR
  - 1.8 to 3.6 V with BOR
- Memory
  - 64 to 128-Kbyte Flash
  - 10 to 16-Kbyte SRAM
  - **4-Kbyte data EEPROM**



STM32L portfolio



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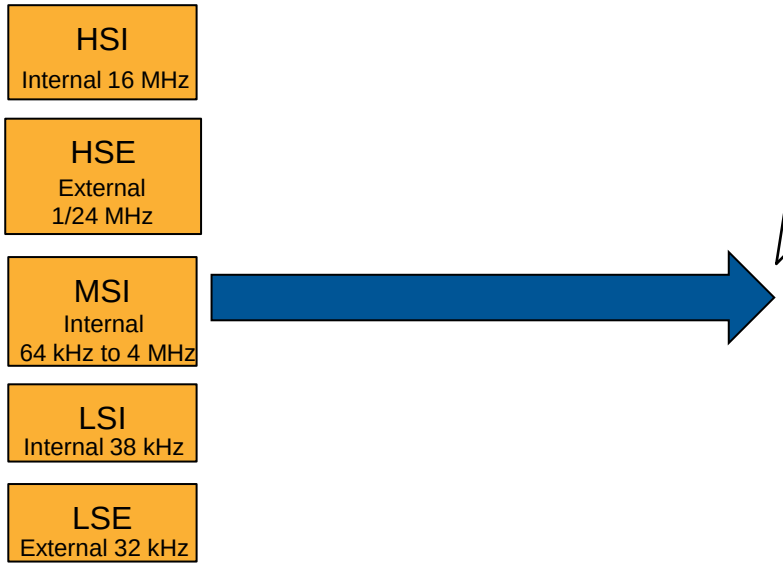
STM32L – flexible and secure

Flexible clock system

Multiple sources



- 0.5 % internal clock accuracy when trimmed by RTC oscillator
- Up to 5 clock sources
- MSI (STM32L only) to achieve very low power consumption at 7 low frequencies
  - 1 µA @ 64 kHz
  - 20 µA @ 4 MHz

Security and safety

- Memory protection unit
- Anti tamper
- Reset circuitry
- Dual watchdog
- CRC 32-bit
- Unique ID
- Back-up clock
- I/O locking
- Back-up register
- Supply monitoring
- Flash protection
- Dual stack pointer
- NV memories with ECC
- JTAG fuse

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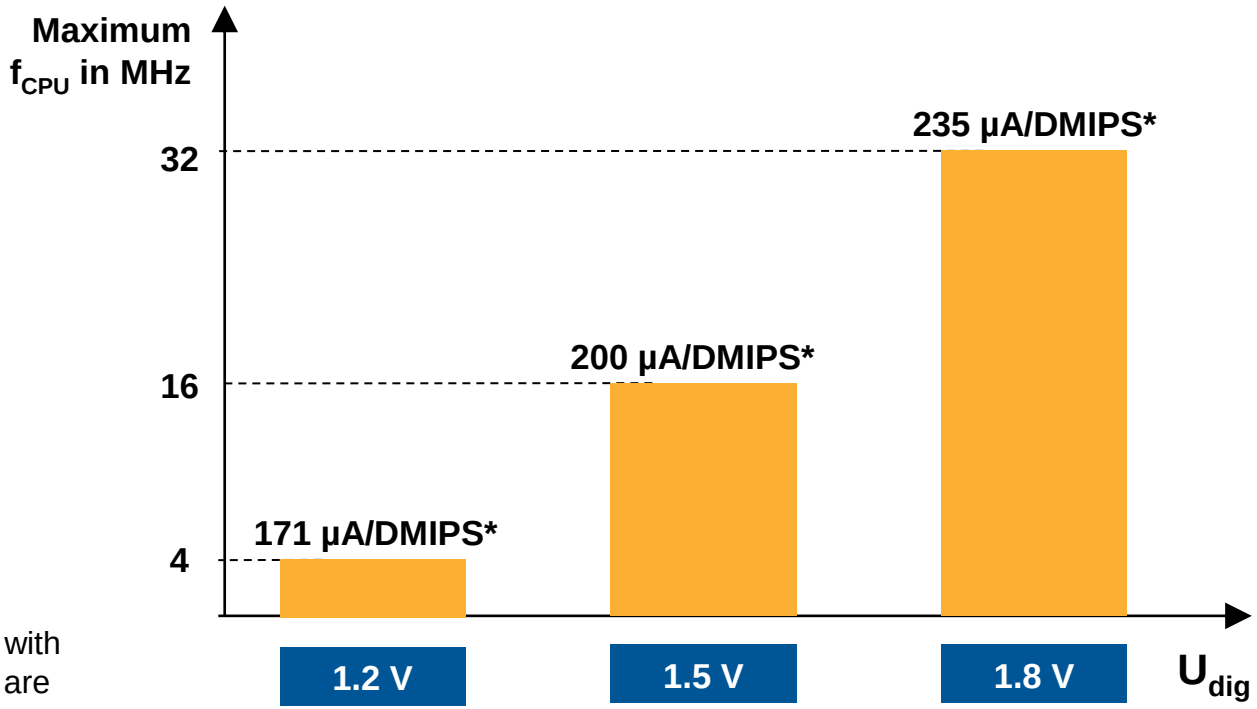
Dynamic voltage scaling in Run mode

- Voltage scaling optimizes the product efficiency (consumption versus performance)
- User selects a mode (voltage scaling) according to:
  - External V_{DD} supply
  - DMIPS performance required
  - Maximum power consumption

***Just-enough* energy concept**



Note:
* Run from Flash with internal oscillator are the minimum values

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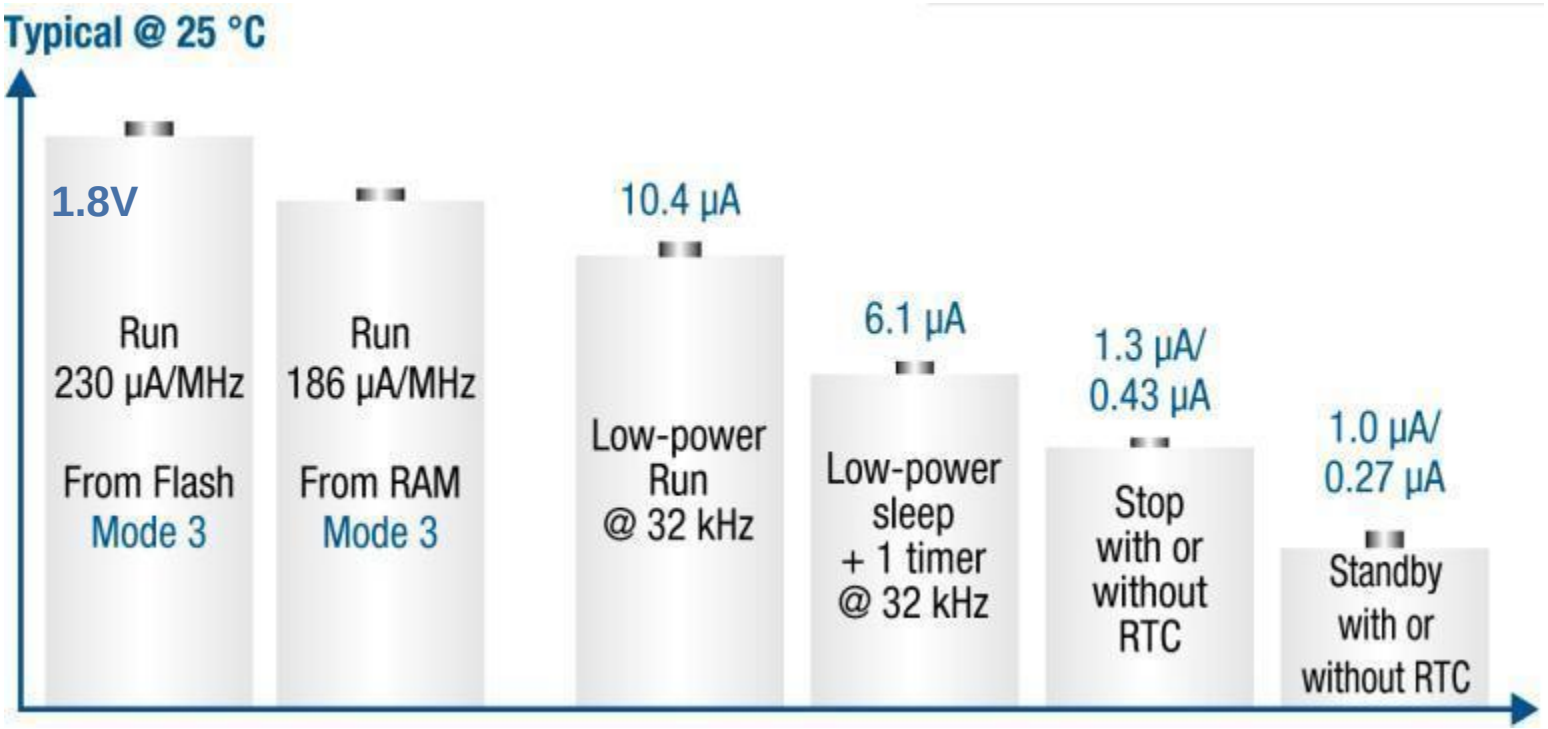
STM32L152 ultra-low-power consumption

CPU ON
Peripherals activated
RAM & context saved
Backup registers saved



Wake up STOP: 8µS
POR/PDR ON

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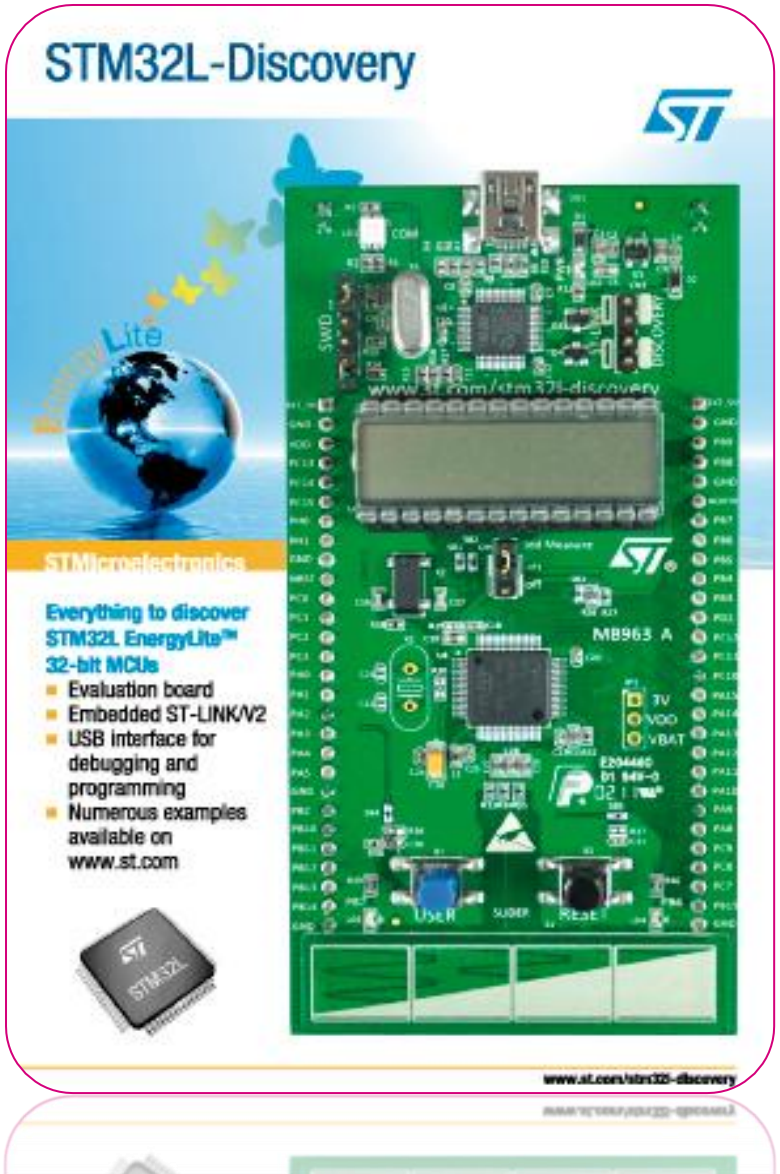
Ultra-low-power Discovery-kit



STM32 Motor control offers

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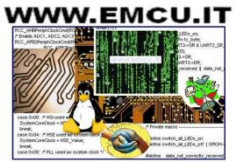
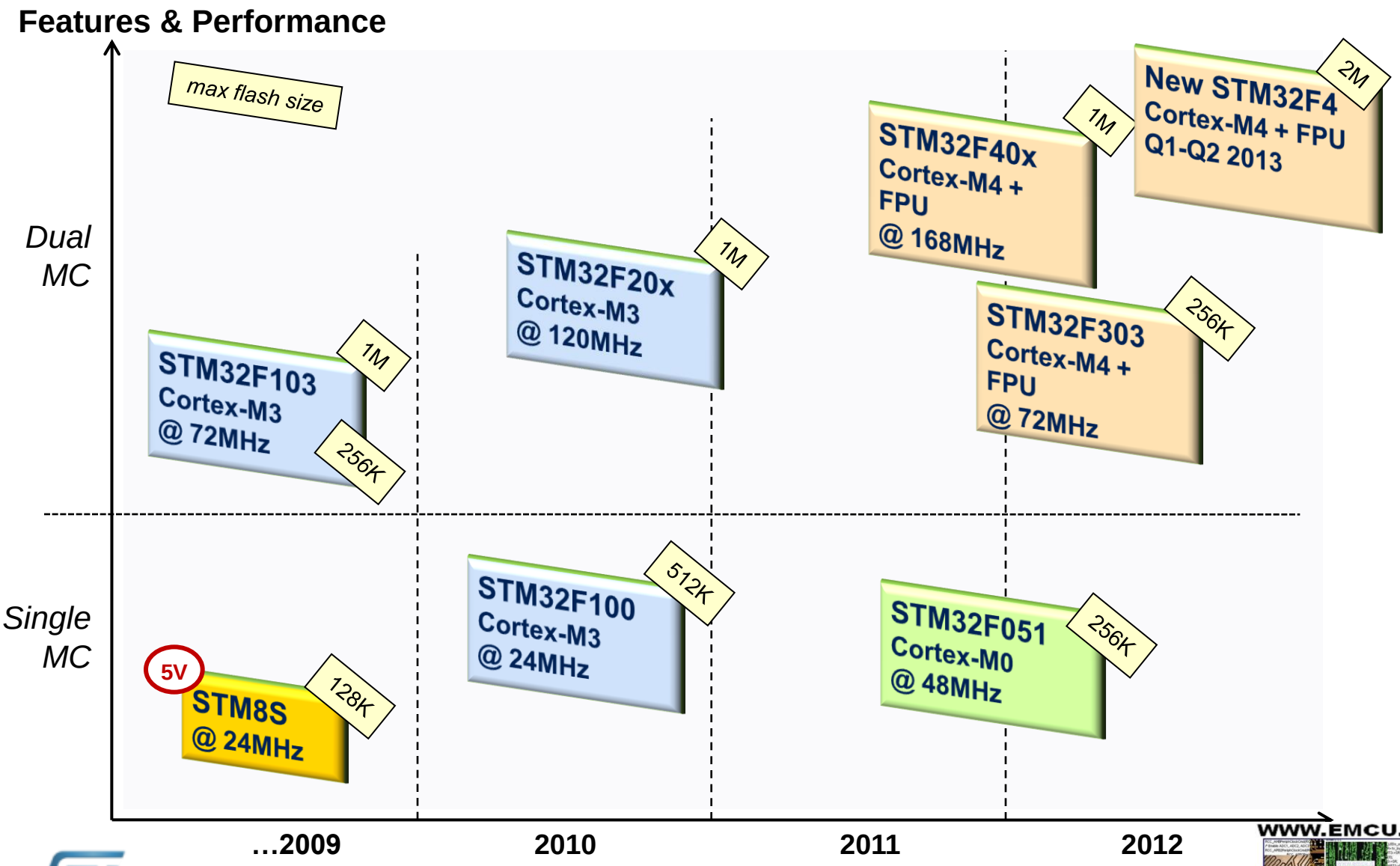


STM32F fitting Motor Control needs



STM32's features for appliances

STM32 features | **Applications**

Products	Cortex Core	Freq. max	DMips	Touch Units (CT)	Timers (all)	Advanced MC Timer	Timer / PWM with OCN & DT	ADC 12-bit	Comparator	DAC 12-bit	PGA	Single MC	4x Induction	Dual MC
STM32F405	C-M4	150	188	0	17	2	2/6	3x 2Msps → 24ch	0	2	0	☑	☒	☑
STM32F205	C-M3	120	150	0	17	2	2/6	3x 2Msps → 24ch	0	2	0	☑	☒	☑
STM32F30x	C-M4	72	90	18	13	2	5/9	4x 5Msps → 39ch	7	2	4	☑	☑	☑
STM32F103	C-M3	72	62	0	11	2	2/6	3x 1Msps → 21ch	0	2	0	☑	☒	☑
STM32F100	C-M3	24	30	0	16	1	4/7	1x 1Msps → 16ch	0	2	0	☑	☑	☒
STM32F051	C-M0	48	36	18	11	1	4/7	1x 1Msps → 16ch	2	1	0	☑	☑	☒

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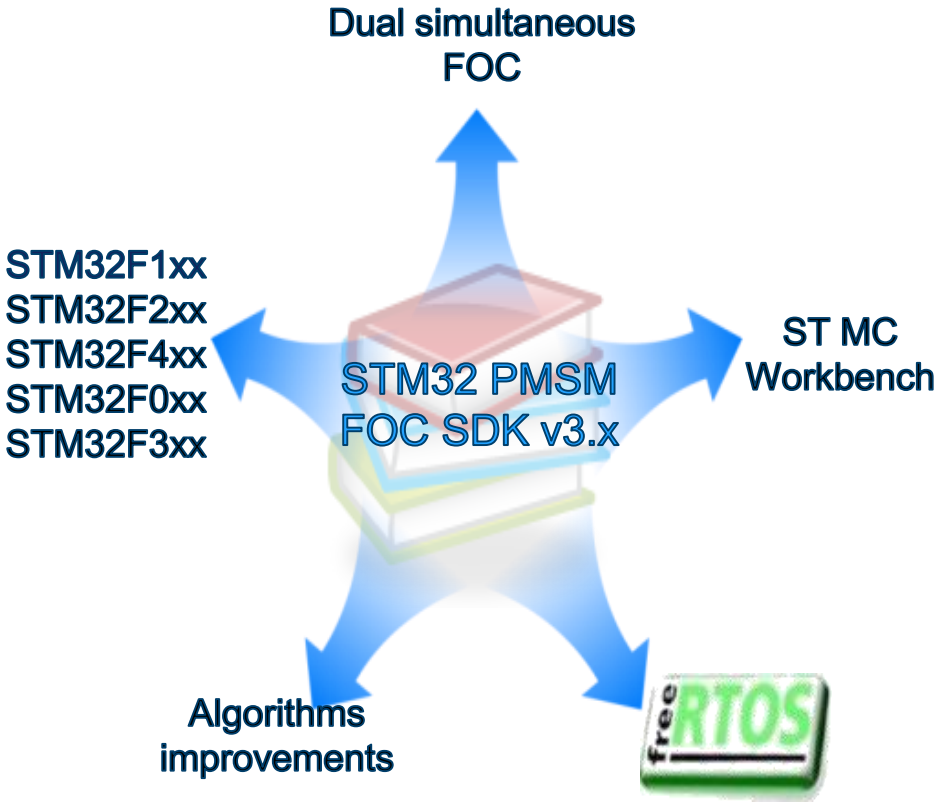
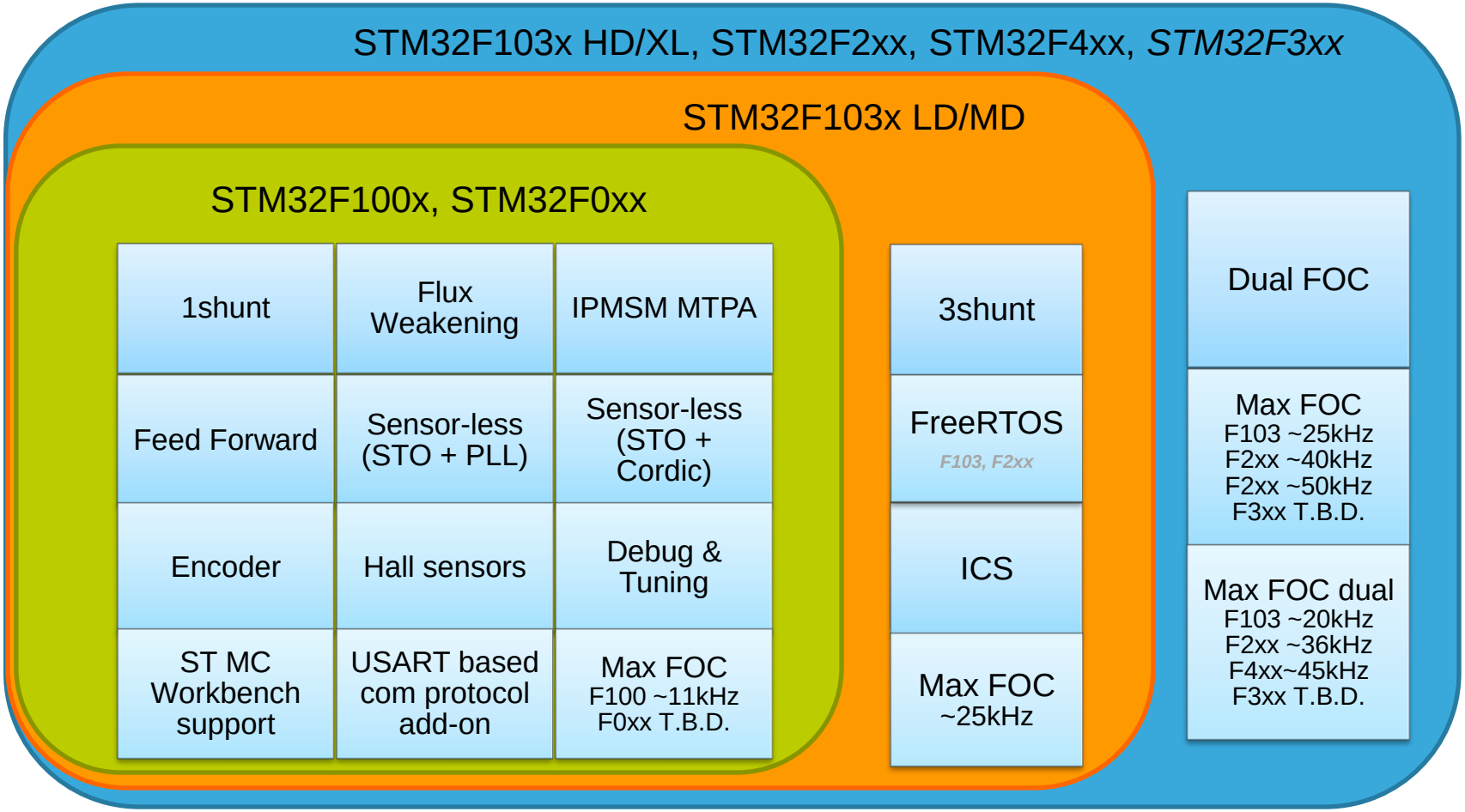
The STM32 FOC PMSM SDK v3.x
- at a glance -

- STM32 PMSM FOC SDK v3.x:
  is a Motor Control Software Development Kit for 3-phase Permanent Magnet Synchronous Motors (PMSM) based on Field Oriented Control (FOC) supporting STM32F103, STM32F100, STM32F2xx, STM32F4xx, STM32F0xx, *STM32F3xx.*

- Key features:
  - Single/Dual simultaneous vector control (FOC)
  - Any combination of current reading topologies and/or speed/position sensors is supported
  - Wide range of STM32 microcontrollers families supported
  - Full customization and real time communication through PC software ST MC Workbench
  - Wide range of motor control algorithms implemented for specific applications
  - Application example based on FreeRTOS
  - Increase code safety through
    - MISRA C rules 2004 compliancy
    - Strict ANSI C compliancy
    - New object oriented FW architecture (better code encapsulation, abstraction and modularity)



Features set, MCU support



STM32® SW & HW tools

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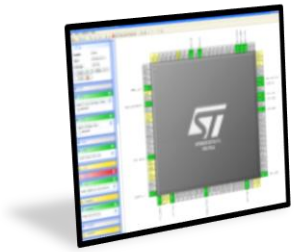
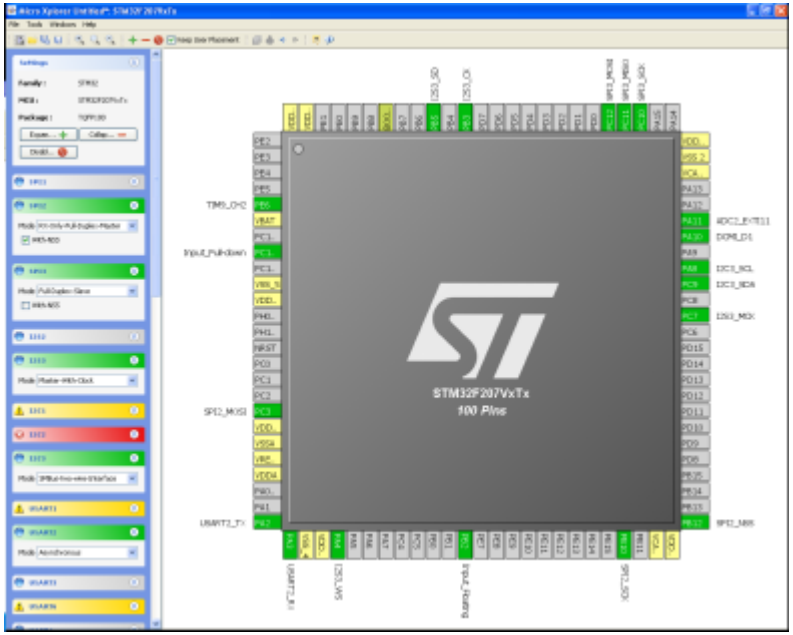


STM's MCU MicroXplorer

- **MCU configuration tool**
  - Peripherals pinout setup wizard
    - Quickly define your pin configuration
    - Efficient constraint solver to match your application request
  - Clock configuration
  - Code generation*



- **MCU product selector**
  - Quickly identify the best fitting MCU for your application
  - STM8/STM32** portfolio

*Under development
**All references not available yet

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

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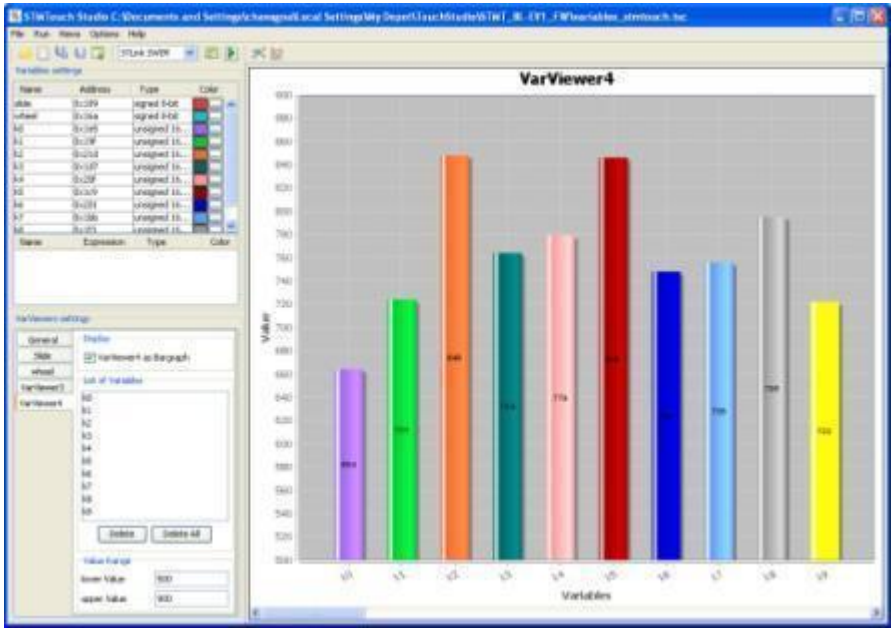
STM STudio

- **V**ariable **M**onitoring **T**ool
- All **STM8/STM32** support
- **Several display modes**
  - *Bar graph, Oscilloscope, View point*
- **Two acquisition modes**
  - *On-the-fly mode*
  - *Snapshot mode* (link library provided)*
- **Log to/Replay** from file feature
- **Read/Write** capability
- Variable import through **ELF** file
- **ST-LINK**/Rlink support



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

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*Under development

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STM32
Embedded software solutions
link

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STM32 C Compiler

Version : 2.0
Latest Update : April 2012

Feature SW Tool	Company	Compiler Linker	IDE	Current version\Date	Available versions	Supported ST-MCUs	ST Probes support	Operating System			Next version	
								Windows	Linux	Mac OS	MCU support	Availability
EWARM	IAR System	Proprietary	Proprietary	V6.30 (Dec-11)	* 30-day evaluation edition * KickStart edition(32Ko Limitation)	STM32F1xx STM32F2xx STM32F4xx STM32Lxxx STM32Wxxx	ST-LINK ST-LINK/V2	XP (SP3) Vista (SP2) 7(32/64)	No	No	STM32F0xx	v6.40 May-12
MDK-ARM	Keil	Proprietary ARMCC v4.1.0.894	Proprietary	V4.50 (Mar-12)	* MDK-Lite (32Ko Code size limitation) * MDK-Basic (256Ko Code size limitation) * MDK-Standard * MDK-Professional	STM32F0xx STM32F1xx STM32F2xx STM32F4xx STM32Lxxx	ST-LINK ST-LINK/V2	XP SP2 Vista 7 (32/64)	No	No	STM32Wxxx	v4.53 May-2012
RIDE7/Rkit ARM	Raisonance	GNU v4.5.2	Proprietary	RIDE7 v7.36 Rkit ARM v1.38	* 7-day entreprise license (with RLink Pro) * Lite license (64Ko size limitation with Rlink Std)	STM32F1xx STM32F2xx STM32F4xx STM32Lxxx MD STM32Wxxx	No	XP SP3 Vista 7 (32/64)	No	No	STM32Lxxx HD STM32F0xx	Rkit v1.40 May-2012
Tasking	Tasking	Proprietary	Eclipse	v4.2r1 (Mar-12)	* Free 15-day evaluation version	STM32F0xx STM32F1xx STM32F2xx STM32F4xx STM32Lxxx STM32Wxxx	ST-LINK ST-LINK/V2	2000 XP Vista 7	Yes	Yes	STM32F3xx	v4.3r1 June-2012
TrueSTUDIO	Atollic	GNU v4.6.2	Eclipse	V3.1.0 (April-12)	* 32Ko Limitation * Professional version * 30 day Professional version (Trial)	STM32F0xx STM32F1xx STM32F2xx STM32F4xx STM32Lxxx STM32Wxxx	ST-LINK ST-LINK/V2	XP Vista (32/64) 7 (32/64)	No	No	STM32F3xx	v3.2.0 August-2012
Red Suite	Code Red Technologies	GNU v4.5.1	Eclipse	Red Suite 4.2 (Feb-2012)	* Red Suite Full License	STM32F1xx STM32F2xx STM32F4xx STM32Lxxx	No	XP Vista (32/64) 7 (32/64)	Yes	Yes	STM32F0xx	Not yet known
CrossWorks for ARM	Rowley Associates	GCC 4.6.2	Eclipse	V2.2.0 (Dec-11)	* Evaluation version (30-day evaluation version) * Commercial License * Educational License * Personal License	STM32F1xx STM32F2xx STM32F4xx STM32Lxxx	No	XP Vista (32/64) 7 (32/64)	Yes	Yes	STM32F0xx Note: The device support database is separate from CrossWorks releases.	v2.2.1 June-2012

STM32® Short term roadmap

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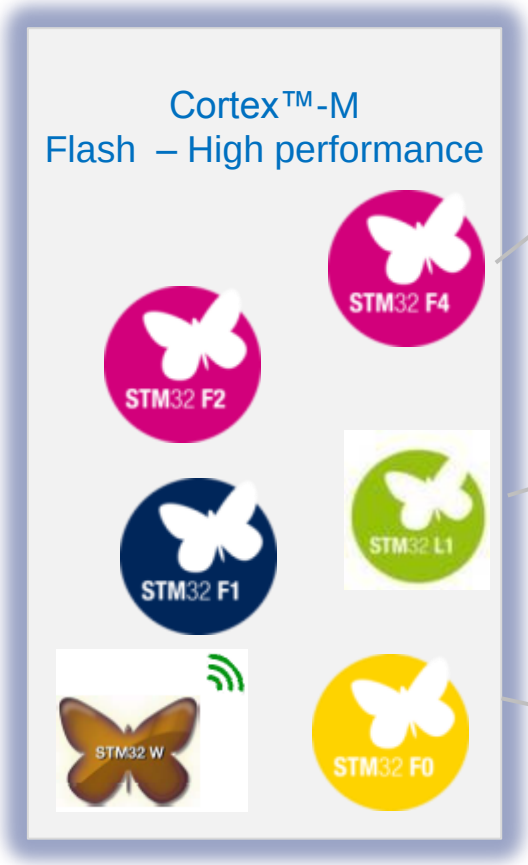
STM32

STM32 next major launch Q4/12 Q1/13

Existing portfolio:
300+ sales types



Leadership
Performance

2nd Family STM32 F4 – Cortex-M4 – ++ MHz

- ARM 32-bit Cortex-M4 core w/FPU
  - Xxx MHz max CPU frequency
  - 2-Mbyte Flash
  - TFT LCD controller
  - SDRAM support
- 1.65 to 3.6V supply
- High performance /fast IP

Sample Q4 2012
Production Q1 2013

STM32LW – Cortex-M3 + 2,4Ghz radio

- ARM 32-bit Cortex-M3 core
  - 32 MHz max CPU frequency
- 1.65 to 3.6 V supply
- New 2,4GHz radio

Samples - Q1/2013
Production eof Q2/2013

STM32 F052 – Cortex-M0 – 48 MHz

- ARM 32-bit Cortex-M0 core
  - 48 MHz max CPU frequency
  - 64-Kbyte to 128-Kbyte flash / up to 12-Kbyte SRAM
  - 20 & 28pin
- USB Full Speed Charging Class
- CAN 2.0 B
- 1.8 to 3.6 V supply
- 250 µA/MHz, new digital Ips, < 5 µA STOP

Q1 2013

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