life.augmented

STM32L4 series

Ultra-low-power MCUs with performance

The STM32 portfolio

Five product categories

- **Wireless MCU** — Short- and long-range connectivity
- **Ultra-low-power MCU**
- **Mainstream MCU**
- **High-performance MCU**

32-bit general-purpose microcontrollers: from 75 to 3,360 CoreMark score

- **Embedded MPU** — 32- and 64-bit microprocessors





Enabling edge AI solutions

Scalable security

life.augmented

MPU portfolio

MCU portfolio

Why choose the STM32L4 series

+ ULP and performance booster

STM32L4 architecture reaches 100 MIPS thanks to an Arm® Cortex®-M4 core with FPU and ST ART Accelerator™ at 80 MHz, while keeping best-in-class, ultra-low-power (ULP) performance

+ Innovation

Innovative peripherals are embedded to optimize the BOM cost.

+ Integration and safety

1 Mbyte of Flash and 320 Kbytes of SRAM with safety and security features, many smart peripherals, advanced and low power analog circuits in packages as small as 2.58 x 3.07 mm.

+ Long term investment

Pin-to-pin compatibility with the STM32L4 and STM32L4+ and integrated in the STM32 ecosystem.

life.augmented

Ultra-low power and flexibility

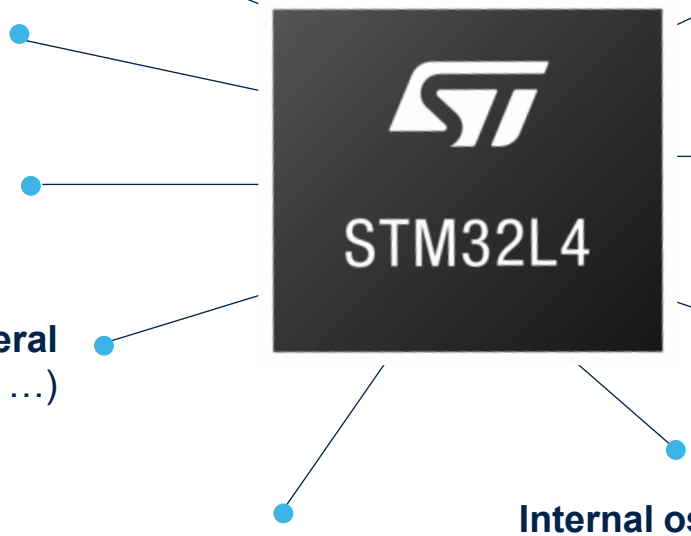
FlexPowerControl: more flexibility when managing power modes and reduced power consumption

External level shifter no longer needed
Separate V_{DD} supplies (down to 1.08 V)

28uA/MHz using external SMPS
Dedicated V_{12} to the core (down to 1.05 V)

Down to 200 nA keeping
16 Kbytes of SRAM active in Standby mode

Wake up MCU with any peripheral
(Communication I/Fs, analog circuits, timers …)



Down to 8 nA for I/O wake-up
with additional Shutdown mode

RTC available for all power modes
(from Active down to V_{BAT})

2 nA V_{BAT} mode with charging capability
Automatic switch to maintain power
for RTC and backup registers

USB crystal-less capable
(Dedicated crystal oscillator is no
longer needed for USB functions)

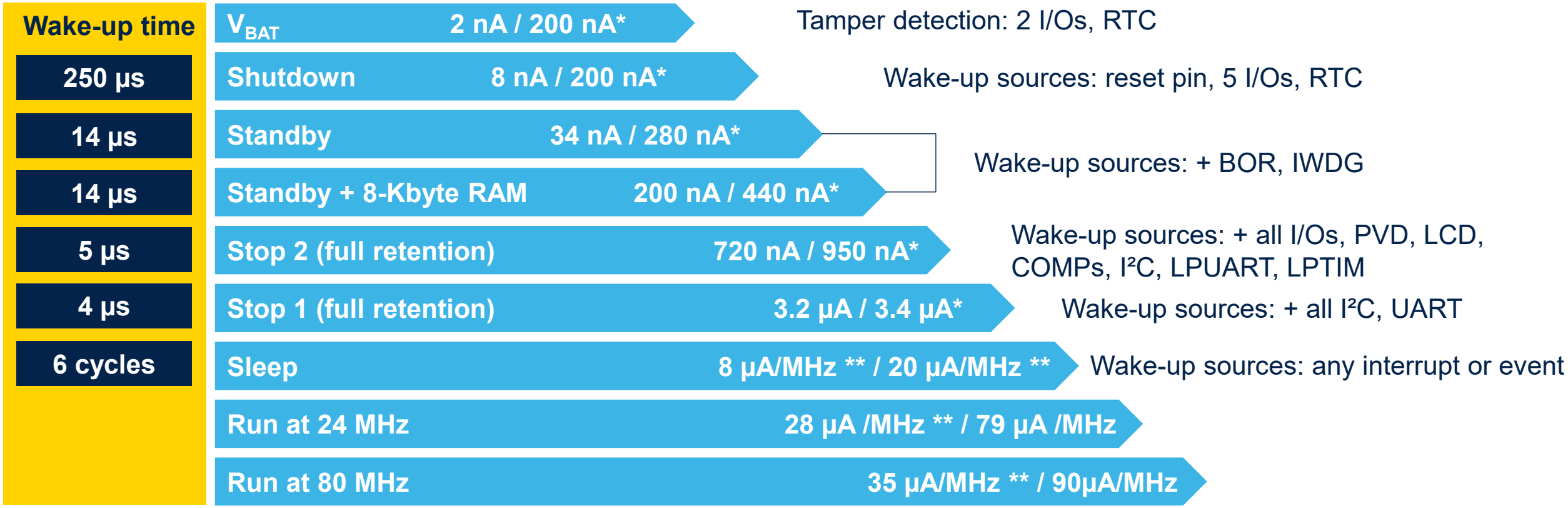
Internal oscillator from 100 kHz to 48 MHz
(±0.25% int. clock accuracy over voltage/temperature with LSE)

I/O level kept in low-power modes
Optimization of system consumption

life.augmented

Ultra-low-power modes

Best power consumption with high flexibility



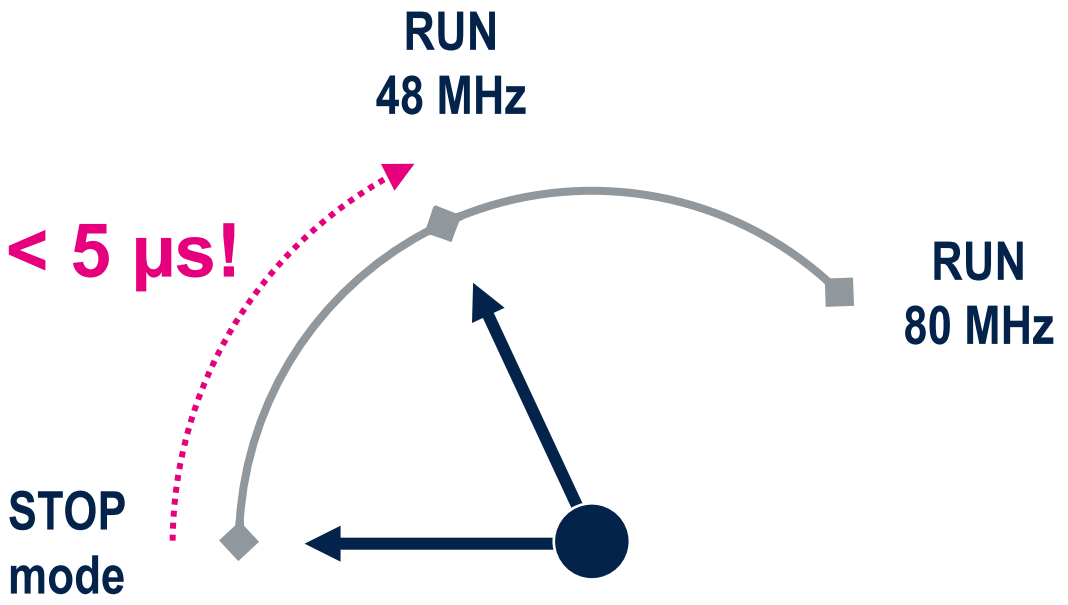
Note : * without RTC / with RTC
** with external SMPS

life.augmented

STM32L4 wake up

STM32L4 takes off like a rocket!

Dhrystone MIPS	100
ULPBENCH™ An EEMBC Benchmark	447 ULPMark-CP™
ULPBENCH™ An EEMBC Benchmark	167 ULPMark-PP™
COREMARK® An EEMBC Benchmark	273



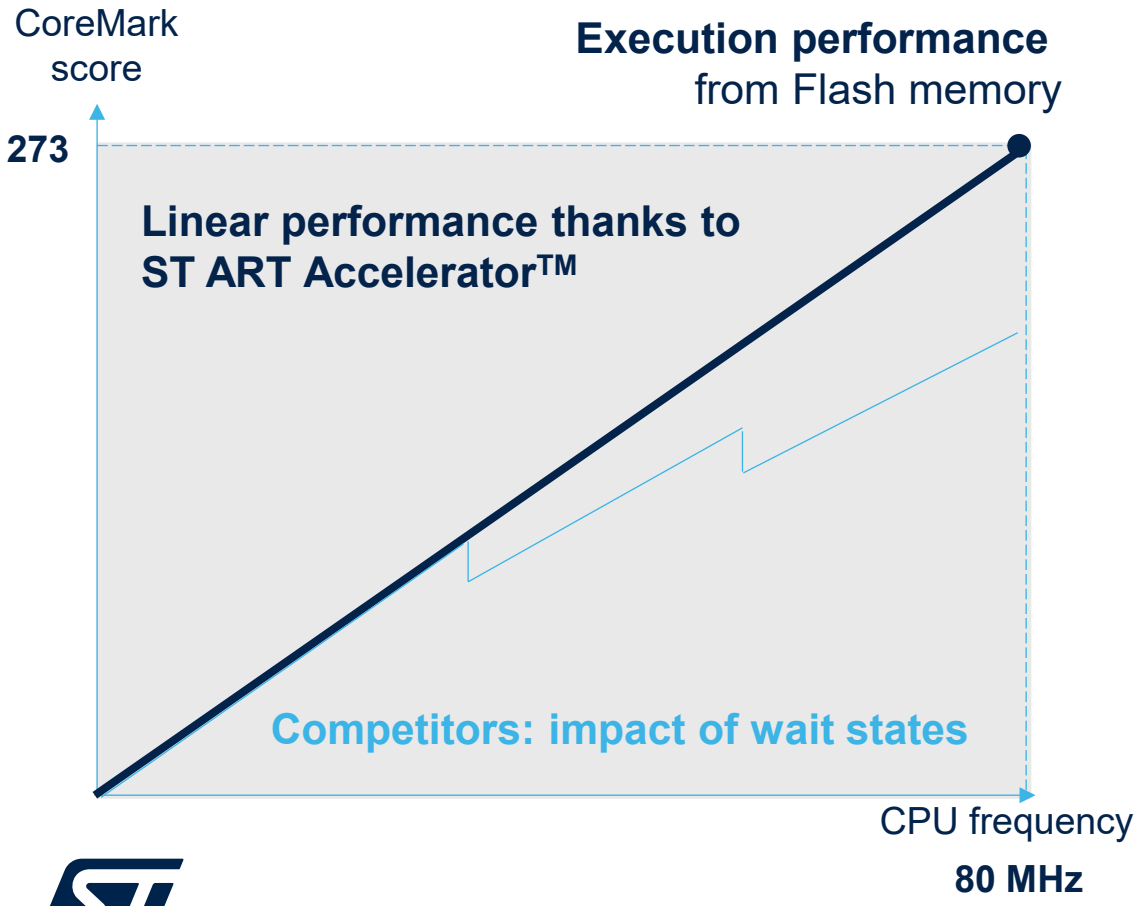
From 0 to 48 MHz in less than 5 µs

From 0 to 80 MHz in less than 20 µs

life.augmented

Providing more performance

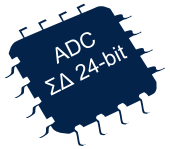
No compromise on performance with STM32L4 MCUs



- **Up to 80** MHz/ **100 DMIPS** with ST ART Accelerator™
- **Up to 273** CoreMark result
- Arm® Cortex®-M4 with FPU and DSP instructions
- 2x DMA (14 channels)
- SPI up to 40 Mbit/s, USART 10 Mbit/s

Smart peripherals metering

Digital Filter for Sigma Delta Modulators
8 x parallel inputs
with up to 24-bit data output resolution

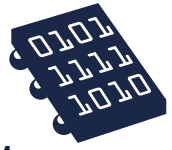


V_{BAT} with RTC
for battery backup
200 nA in V_{BAT} mode
for RTC and
32 x 32-bit backup registers

TRNG & AES
for Security
128-/256-bit AES
key encryption hardware accelerator

STM32L4

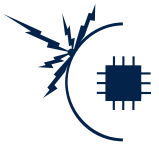
Electricity/Gas / Water Smart Meter



FSMC
External memory interface
for static memories supporting SRAM, PSRAM, NOR and NAND

I/Os
Up to 114 fast I/Os for buttons & relays

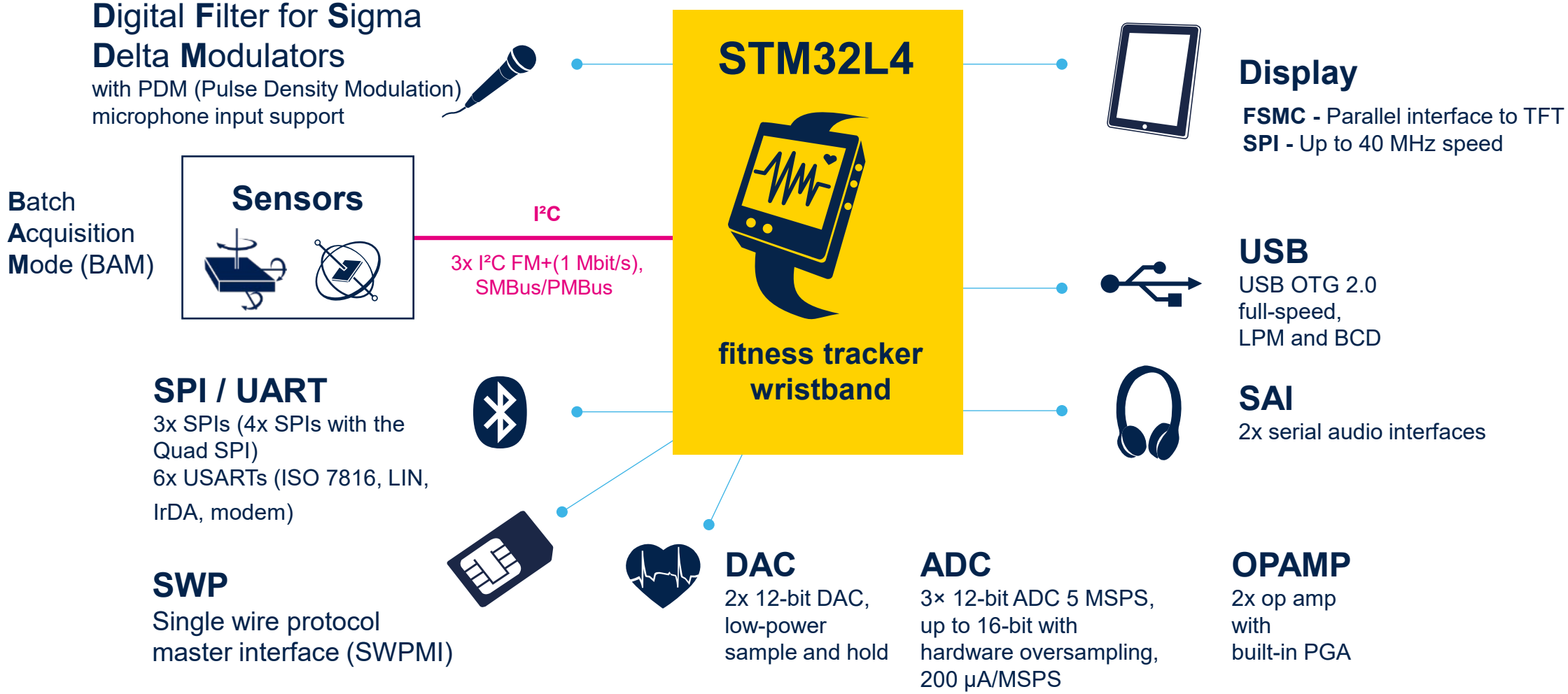
LCD Display
SPI, Parallel or TFT Interface



Anti Tamper pin
3 x tamper pins
for battery domain

SPI / UART/ SDIO
for Wireless
3x SPIs (4x SPIs with the Quad SPI)
6x USARTs (ISO 7816, LIN, IrDA, modem)
1 x SDIO

Smart peripherals fitness tracker - wristband



Smart peripherals industrial sensors

Motor Control:
2x 16-bit advanced
motor-control timers
12-bit ADCs: 5 MSPS,
with up to 16-bit with hardware oversampling,
200 µA/MSPS

CAN Bus
(2.0B Active)

TRNG & AES
for Security
128/256-bit AES
key encryption hardware accelerator

STM32L4

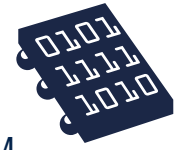
Electricity/Gas /Water Smart Meter

Display
FSMC - Parallel interface to TFT
SPI - Up to 40 MHz speed

High temperature
from -40°C
up to + **125°C**

SPI / UART
3x SPIs (4x SPIs with the Octo SPI)
6x USARTs (ISO 7816, LIN, IrDA, modem)

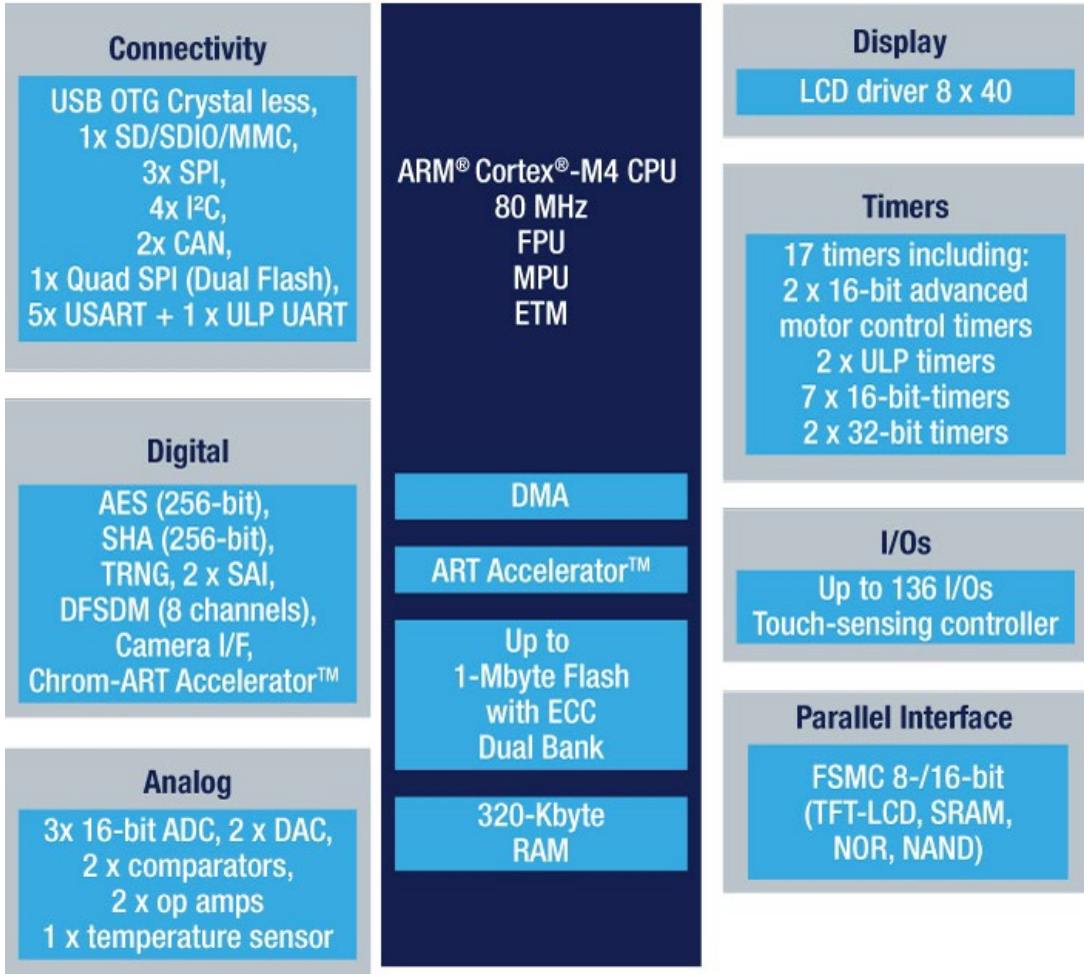
I²C
3x I²C FM+(1 Mbit/s), SMBus/PMBus



FSMC
External memory interface
for static memories supporting SRAM,
PSRAM, NOR and NAND

I/Os
Up to 114 fast I/Os for buttons & relays

High integration with large memory size in small packages



Package size down to 2.58 x 3.07 mm

life.augmented

Safety and security

Integrated safety and security features

SAFETY

- **Brown-out Reset in all modes**
- Clock Security System
- **SRAM parity check**
- Backup byte registers
- Supply monitoring
- **Flash with ECC with status register (address)**
- Dual watchdog

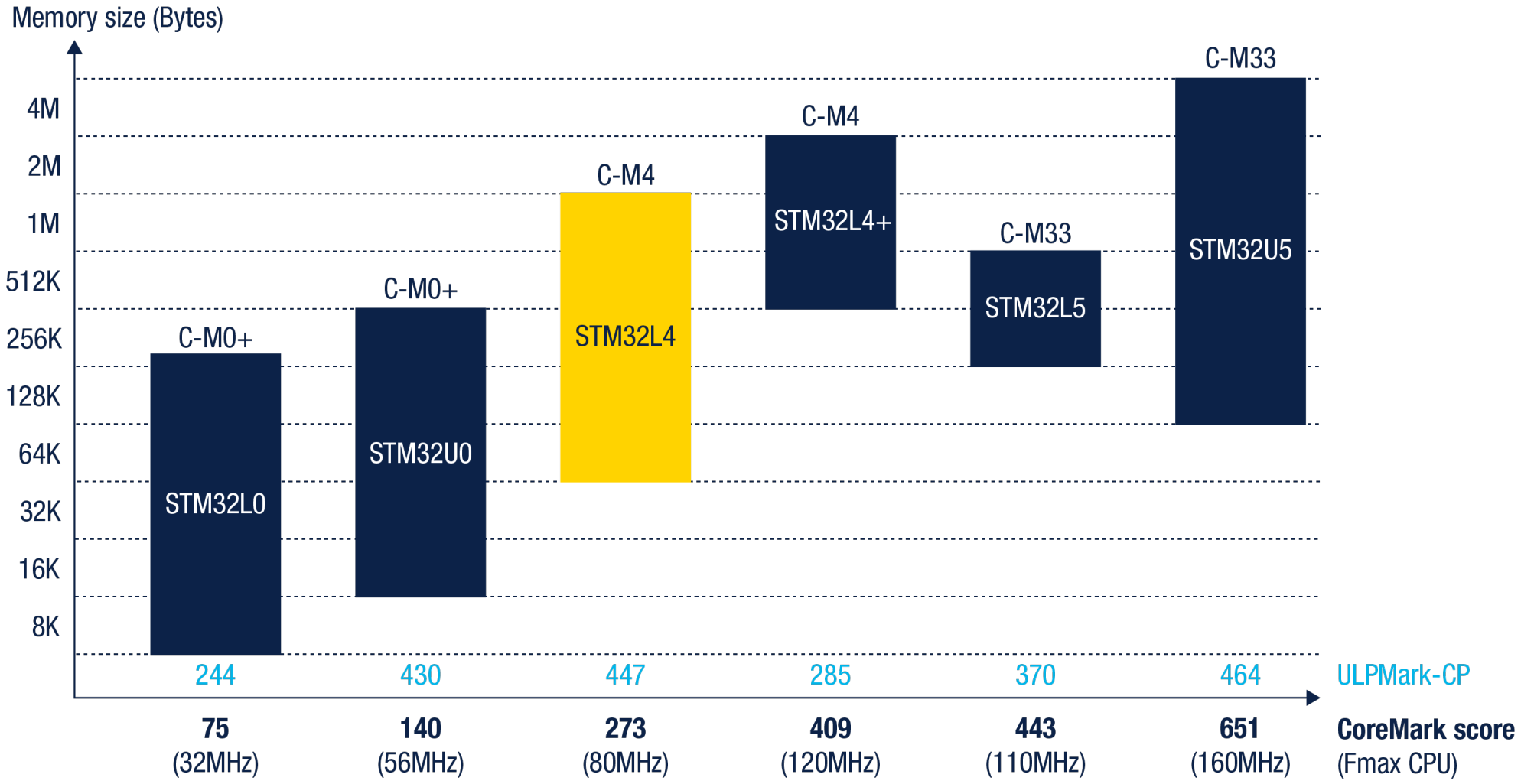
STM32**L4**

SECURITY

- **Anti-tamper detection**
- Memory Protection Unit (MPU)
- Read and Write Protection
- **Unique ID**
- **AES-256 / SHA-256 Encryption**
- JTAG fuse
- True Random Number Generator
- **Software IP Protection**

life.augmented

STM32L4 ultra-low-power benchmark



STM32L4 series
10 Product lines

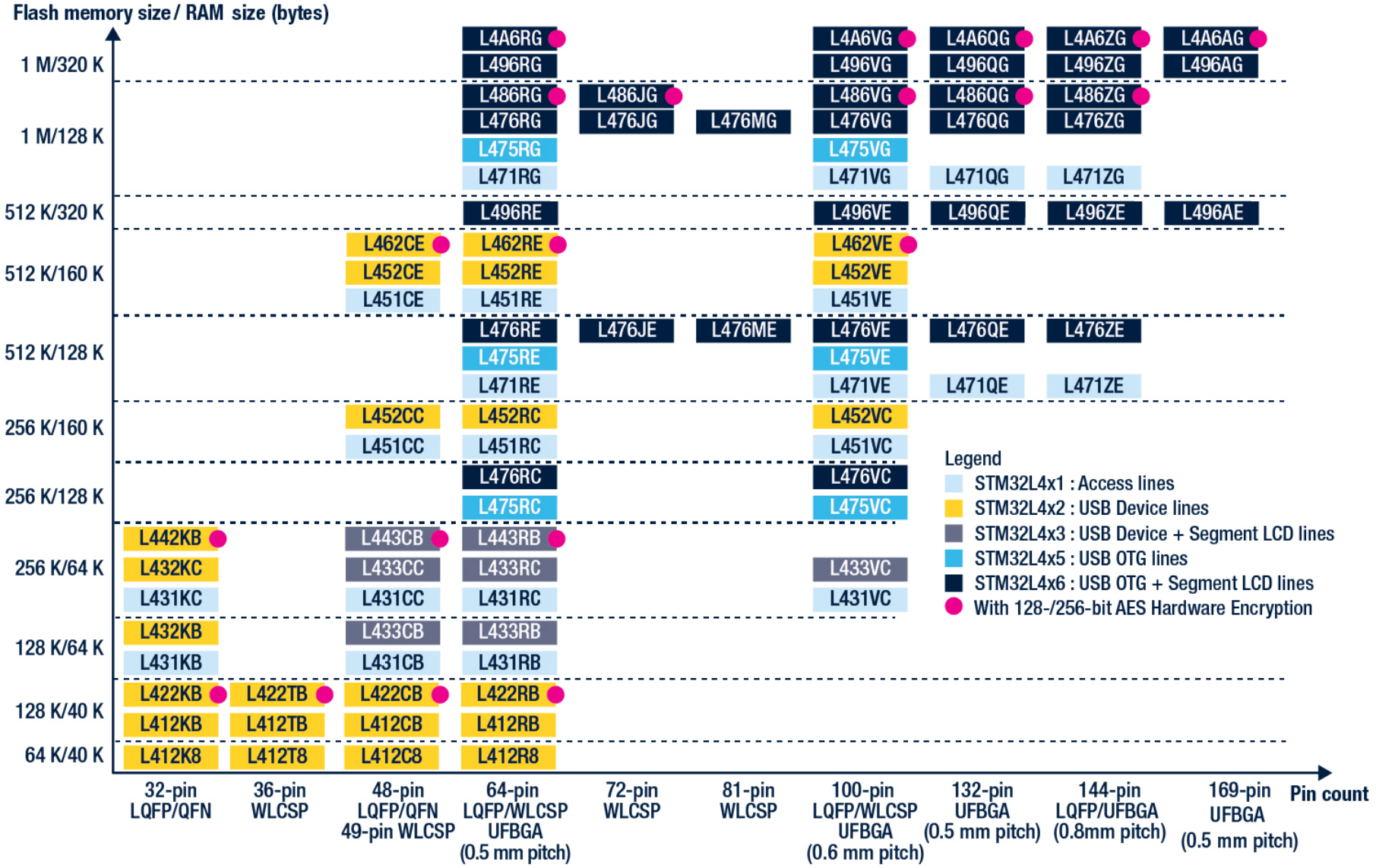
- ART Accelerator™
- USART, SPI, I²C
- Quad-SPI
- 16- and 32-bit timers
- SAI + Audio PLL
- SWP
- 2x CAN
- 2x 12-bit DACs
- Temperature sensor
- Low voltage 1.71 to 3.6V
- V_{BAT} mode
- Unique ID
- Capacitive Touch sensing
- AES-128/256* and SHA-256**

Product line	Flash (KB)	RAM (KB)	Memory I/F FSMC	Op-Amp	CAN	Sigma Delta Interface	12-bit ADC 5 Msps 16-bit HW over-sampling	DAC	SAI	USB 2.0 OTG	USB Device	Segment LCD driver	Chrom-ART Accelerator
STM32L496**	512 to 1024	320	•	2	2	8x ch	3	2	2	•		Up to 8x40	•
STM32L476*	256 to 1024	128	•	2	1	8x ch	3	2	2	•		Up to 8x40	
STM32L475	128 to 1024	128	•	2	1	8x ch	3	2	2	•			
STM32L433	128 to 256	64		1	1		1	2	1		•	Up to 8x40	
STM32L452	256 to 512	160		1	1	4x ch	1	1	1		•		
STM32L432	128 to 256	64		1	1		1	2	1		•		
STM32L412	64 to 128	40		1			2				•		
STM32L471 Access line	512 to 1024	128	•	2	1	8x ch	3	2	2				
STM32L451 Access line	256 to 512	160		1	1	4x ch	1	1	1				
STM32L431 Access line	128 to 256	64		1	1		1	2	1				

Note: *HW crypto/hash functions are available on STM32L486, STM32L443, STM32L462, STM32L442 and STM32L422
** on STM32L4A6

life.augmented

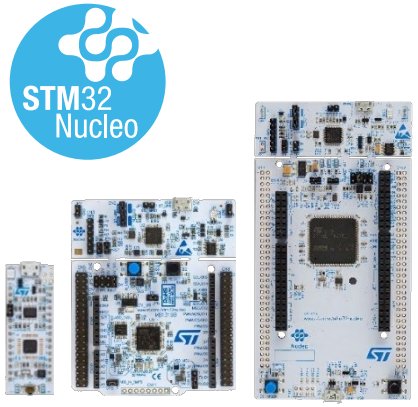
STM32L4 portfolio

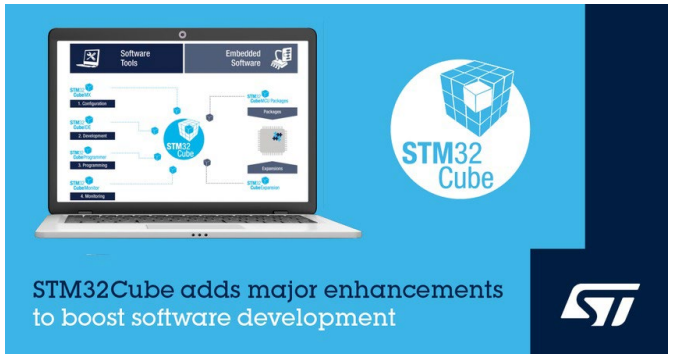


STM32L4 ecosystem

HARDWARE TOOLS

STM32 Programming Tool





STM32 Nucleo boards

Flexible prototyping

Discovery kits

Key feature prototyping

Evaluation board

Full feature evaluation

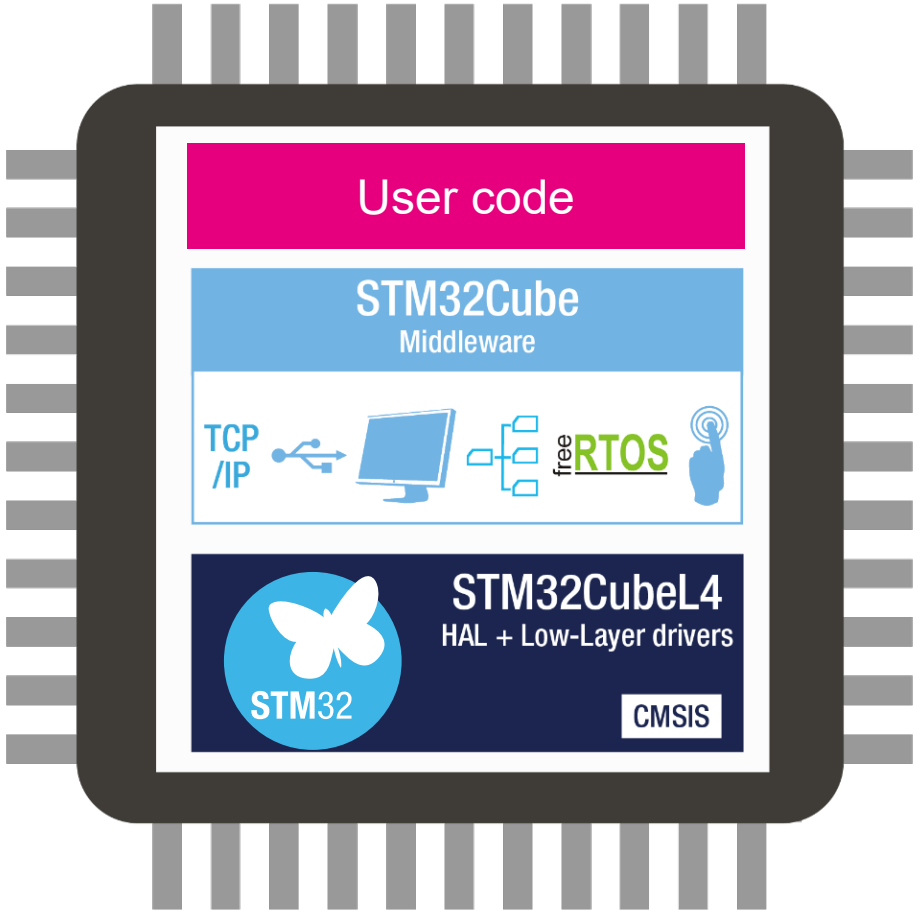
STM32 CubeMX

wiki.st.com/stm32mcu

github.com/STMicroelectronics

life.augmented

STM32L4/L4+ ecosystem



EMBEDDED SOFTWARE

- Open-source TCP/IP stack (lwIP)
- USB Host and Device library from ST **Qualified HAL firmware**
- STemWin graphical stack library from ST and SEGGER
- Open-source FAT file system (FatFs)
- Open-source real-time OS (FreeRTOS)
- Touch-sensing library
- Dozens of examples

- STM32L4 Hardware Abstraction Layer (HAL) portable APIs
- **High-performance, light-weight low-layer (LL) APIs**
- High coverage for most STM32 peripherals
- Production-ready and fully qualified
- Dozens of usage examples
- Open-source BSD license

Releasing your creativity

/STM32

@ST_World

community.st.com

www.st.com/STM32L4

wiki.st.com/stm32mcu

github.com/stm32-hotspot

STM32 MCU Developer Zone

STM32L4 Online Training

STM32L4 MOOC

life.augmented

Our technology starts with You

Find out more at www.st.com/STM32L4

life.augmented