STM32L4 MCU series

Excellence in ultra-low-power with performance

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Key advantages of STM32L4 series

1. **ULP leader and performance booster** ST has built a new architecture to reach best-in-class, ultra-low-power figures thanks to its high flexibility. Moreover, the performance of the STM32L4 series adds a new dimension to the ultra-low-power world. It delivers 100 DMIPS based on its ARM Cortex-M4 core with FPU and ST ART Accelerator™ at 80 MHz.
2. **Innovation** To address a large market range, its architecture implements several innovations and embeds smart peripherals.
3. **Integration and safety** Up to 1 Mbyte of Flash memory and 128 Kbytes of SRAM with safety and security features, smart and numerous peripherals, advanced and low-power analog circuits in packages as small as 3.13 x 3.14 mm.
4. **Great Investment** This new STM32 member benefits from the pin-to-pin compatibility of the STM32 family and the STM32 development ecosystem.

Ultra-low-power and flexibility

FlexPowerControl

STM32L4 is based on a new platform optimized to reduce power consumption and increase flexibility

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

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

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

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

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

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

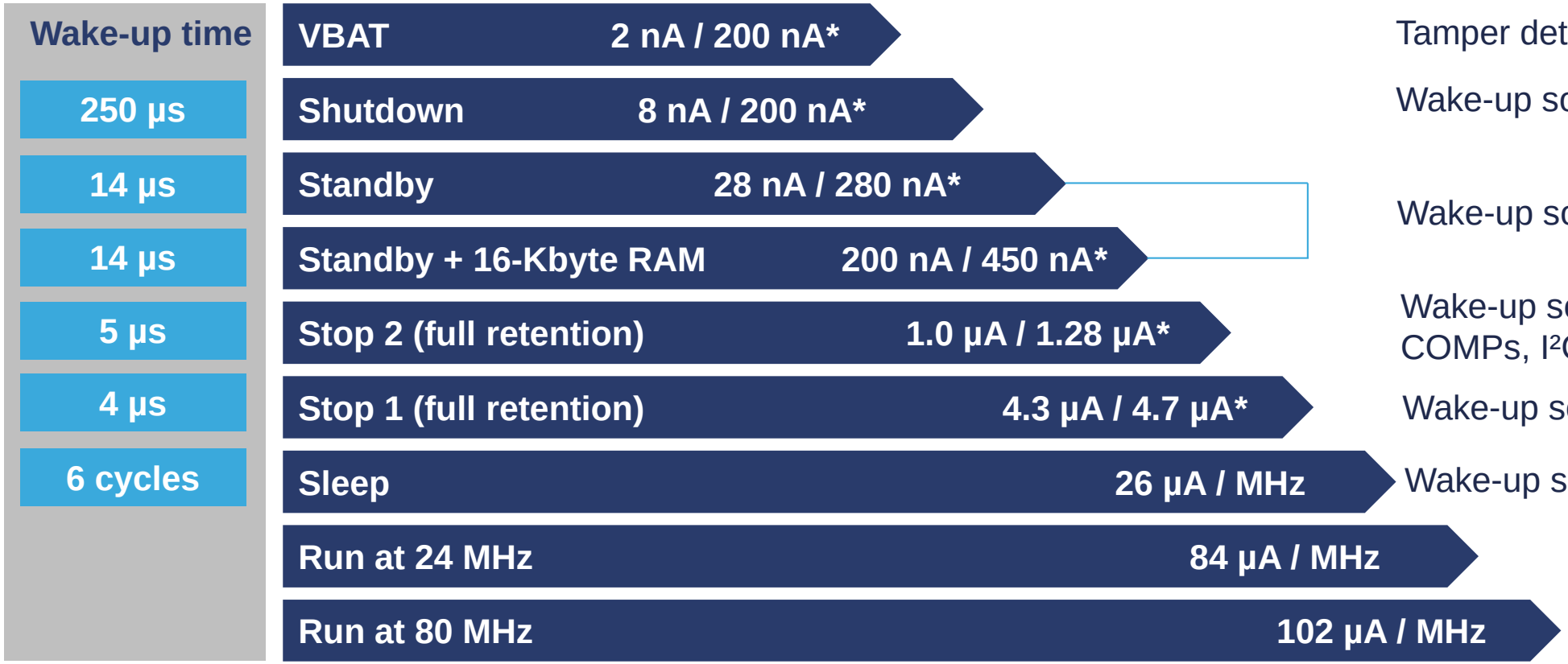
USB crystal-less capable
(Dedicated crystal oscillator is no
longer needed for USB functions)

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

Ultra-low-power modes

Best power consumption numbers with full flexibility



Tamper detection: 3 I/Os, RTC

Wake-up sources: reset pin, 5 I/Os, RTC

Wake-up sources: + BOR, IWDG

Wake-up sources: + all I/Os, PVD, LCD, COMPs, I²C, LPUART, LPTIM

Wake-up sources: + all I²C, UART

Wake-up sources: any interrupt or event

Note : * without RTC / with RTC

This ULPBench® winner takes off like a rocket

STM32 L4

Dhrystone MIPS	100
ULPBENCH™ An EEMBC Benchmark	177
COREMARK® An EEMBC Benchmark	273

www.st.com/stm32l4

From 0 to 48 MHz in less than 5 µs
From 0 to 80 MHz in less than 20 µs

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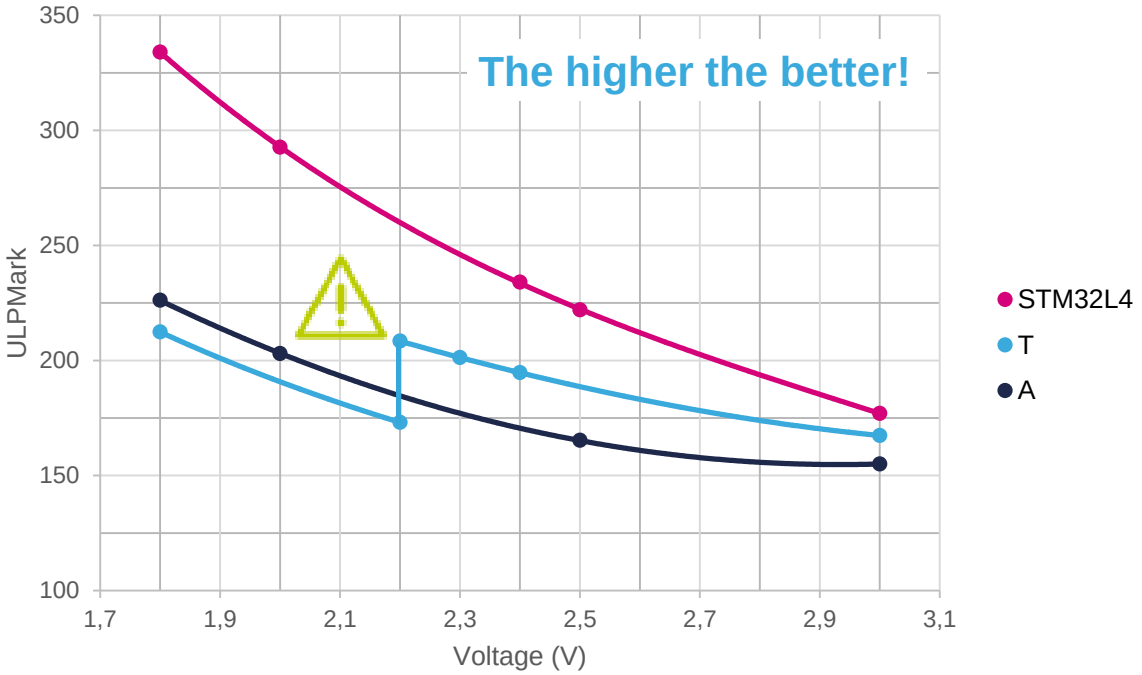
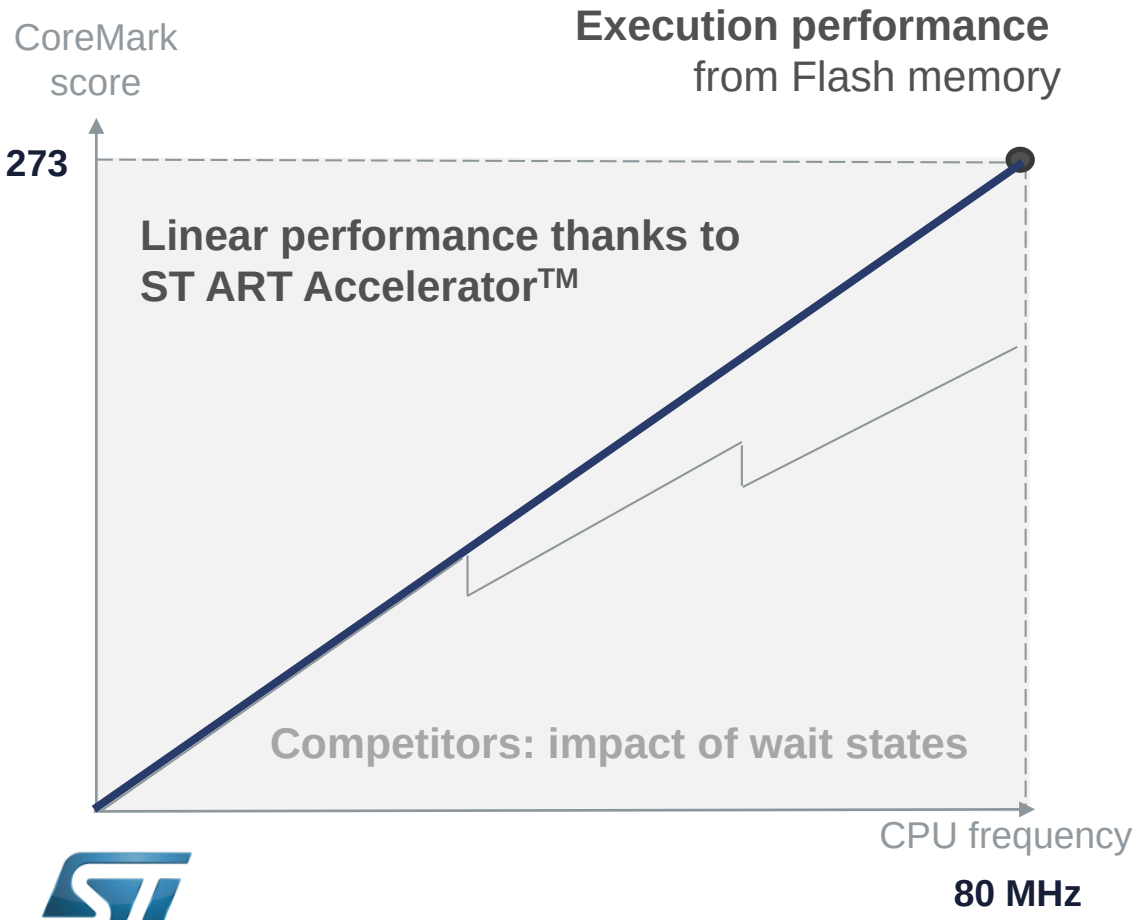
And shatters performance limits in ULP world



On competition devices: discontinuity due to DC/DC no longer functional when voltage decreases

Providing more performance

Do not compromise on performance with STM32L4



- **Up to 80** MHz/ **100 DMIPS** with 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

Δ 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

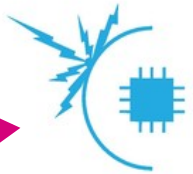
TRNG & AES
for Security
128-/256-bit AES
key encryption hardware
accelerator

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

STM32L4

Electricity/Gas /Water Smart Meter

LCD Display
38×40 or 4×44
with step-up converter



Anti-tamper pin
3 x tamper-detection pins
for battery domain

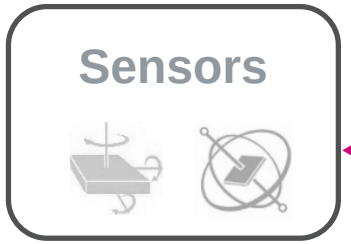
SPI / UART/ SDIO for Wireless
3x SPIs (4x SPIs with the Quad-SPI)
6x USARTs (ISO 7816, LIN, IrDA, modem)
1 x SDIO

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

Smart peripherals

Fitness tracker - Wristband

Digital **F**ilter for **S**igma **D**elta **M**odulators
with PDM (Pulse Density Modulation) microphone input support



I²C
3x I²C FM+(1 Mbit/s), SMBus/PMBus

Batch **A**cquisition **M**ode (BAM)

STM32L

TFT Display

FSMC
Parallel interface to TFT
SPI
Up to 40 MHz speed

USB
USB OTG 2.0 full-speed, LPM and BCD

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

SWP
Single wire protocol master interface (SWPMI)

OPAMP
2x op amp with built-in PGA

DAC
2x 12-bit DAC, low-power sample and hold

ADC
3× 12-bit ADC 5 MSPS, up to 16-bit with hardware oversampling, 200 µA/MSPS

SAI
2x serial audio interfaces

Smart peripherals

Industrial sensors

Motor control :
2x 16-bit advanced motor-control timers
3x 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

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

I/Os
Up to 114 GPIOs

I²C
3x I²C FM+(1 Mbit/s), SMBus/PMBus

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

LCD Display
8×40 or 4×44
with step-up converter

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

STM32L4

High integration

High integration with high memory size in small packages

Parallel Interface
FSMC 8-/16-bit
(TFT-LCD, SRAM, NOR, NAND)

Display
8 x 40 LCD driver

Timers
17 timers including:
2 x 16-bit advanced motor control timers
2 x ULP timers
7 x 16-bit-timers
2 x 32-bit timers

I/Os
Up to 114 I/Os
Touch-sensing controller

ARM® Cortex®-M4
80 MHz
FPU
MPU
ETM

DMA

ART Accelerator™

Up to 1-Mbyte Dual Bank Flash memory with ECC

Up to 128-Kbyte RAM

Connectivity
USB OTG,
1x SD/SDIO/MMC, 3 x SPI,
3 x I²C, 1x CAN, 1 x Quad-SPI,
5 x USART + 1 x ULP UART,
1 x SWP

Digital
AES (256-bit), TRNG, 2 x SAI, DFSDM (8 channels)

Analog
3 x 16-bit ADC, 2 x DAC,
2 x comparators, 2 x op amps
1 x temperature sensor

Package size down to 3.13 x 3.14 mm

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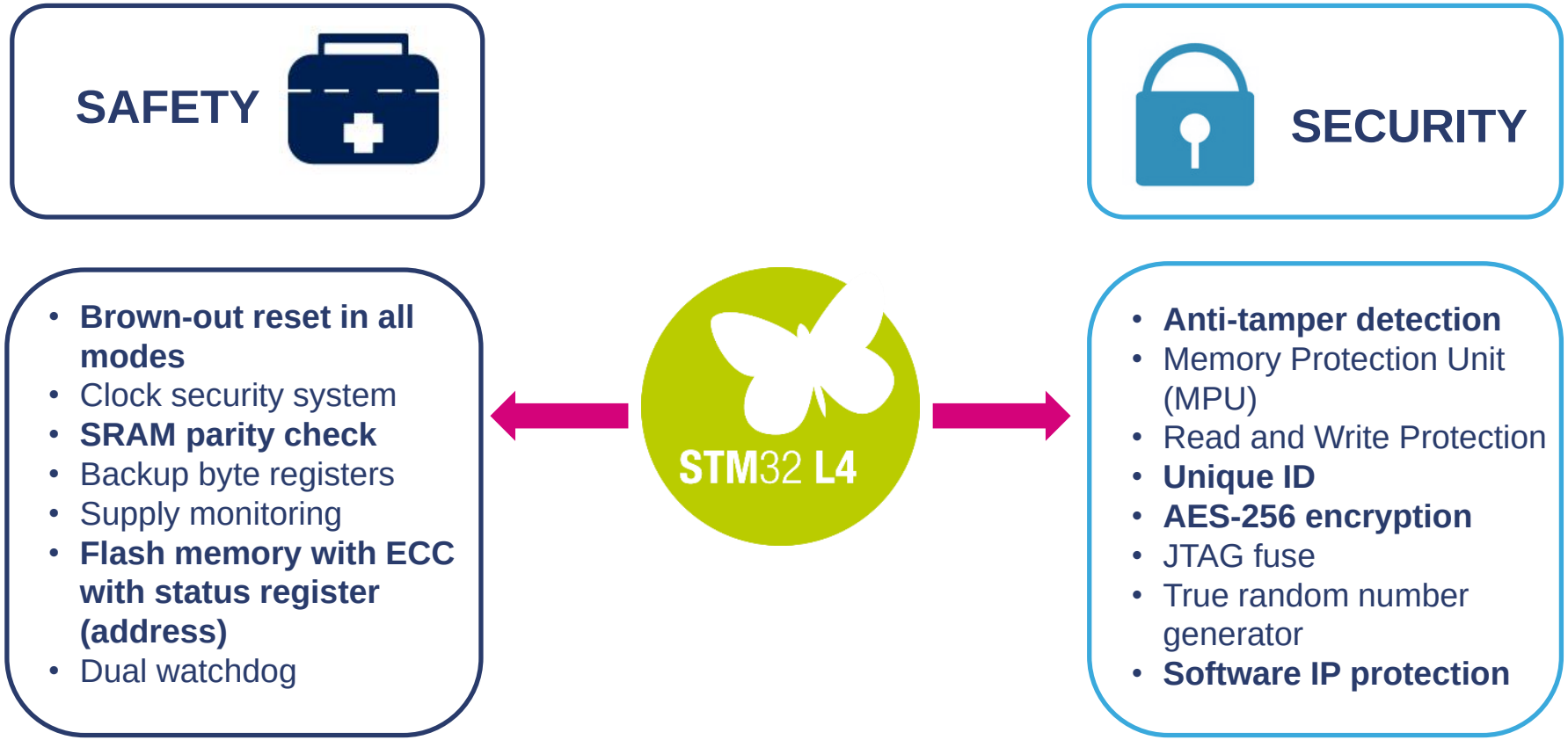
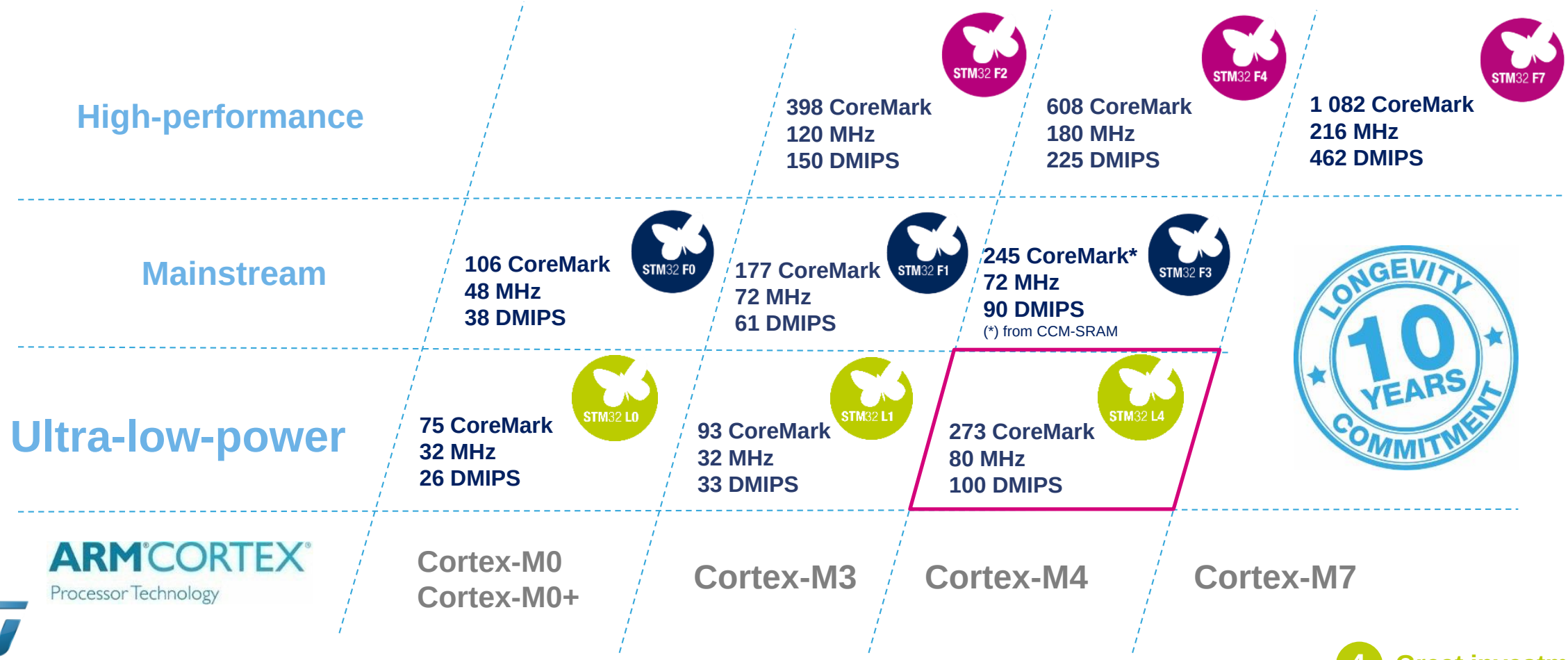
Safety and security

Integrated safety and security features



STM32L4: continuity in STM32 portfolio

9 product series / more than 32 product lines
STM32L4 benefits from pin-to-pin compatibility across the family



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STM32L ULP porfolio

STM32L4 completes the ultra-low-power family

Cost-smart ULP champion

Cortex-M0+ at 32 MHz
1.65 to 3.6V
8-/16-bit applications
Wide range of pin-counts

3 product lines,
Cost-effective,
Smaller packages,
USB, LCD, Analog
16 to 192 Kbytes of Flash,
20 Kbytes of SRAM

Broad-range foundation

Cortex-M3 at 32 MHz
1.65 to 3.6V
Wide choice of memory sizes

3 product lines,
USB, LCD, AES,
Rich Analog
True EEPROM,
Dual-bank Flash memory (RWW),
32 to 512 Kbytes of Flash,
80 Kbytes of SRAM

High-performance Advanced analog

Cortex-M4 w/ FPU at 80 MHz
1.71 to 3.6V
High-performance, advanced analog circuits

3 product lines,
5-MSPS ADC,
PGA, Compar.,
DAC, Op Amp, USB OTG, LCD, AES
128 Kbytes to 1 Mbyte
128 Kbytes of SRAM

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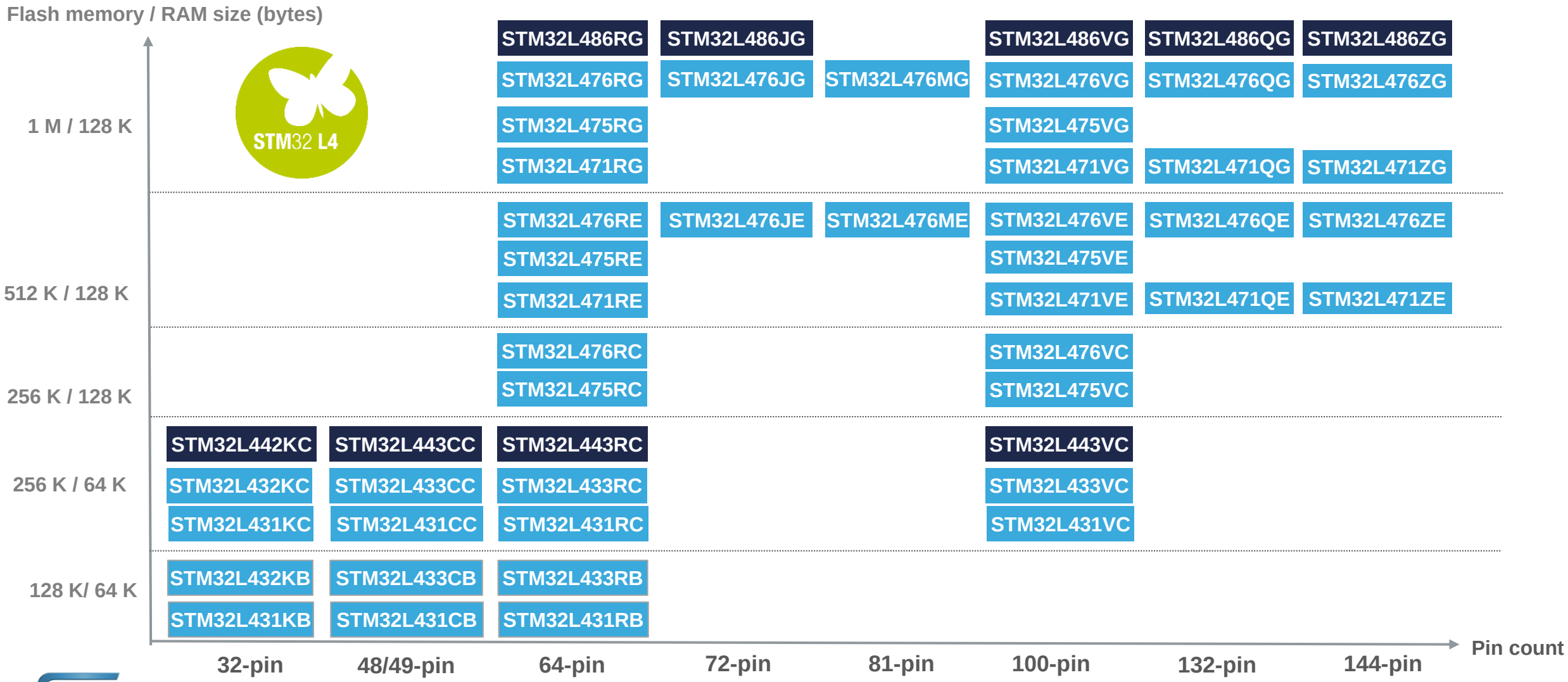
STM32L4 portfolio



Legend:

- With 128/256-bit AES hardware encryption
- Without encryption

4 Great investment

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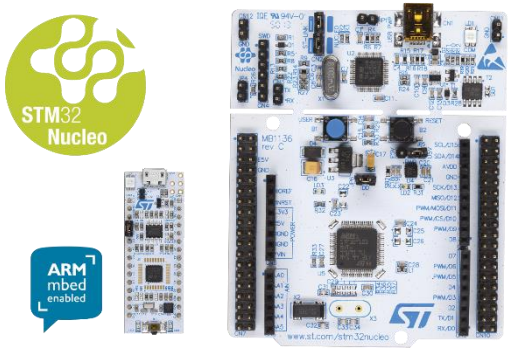
STM32L4 ecosystem

HARDWARE TOOLS

STM32 Nucleo



Flexible prototyping

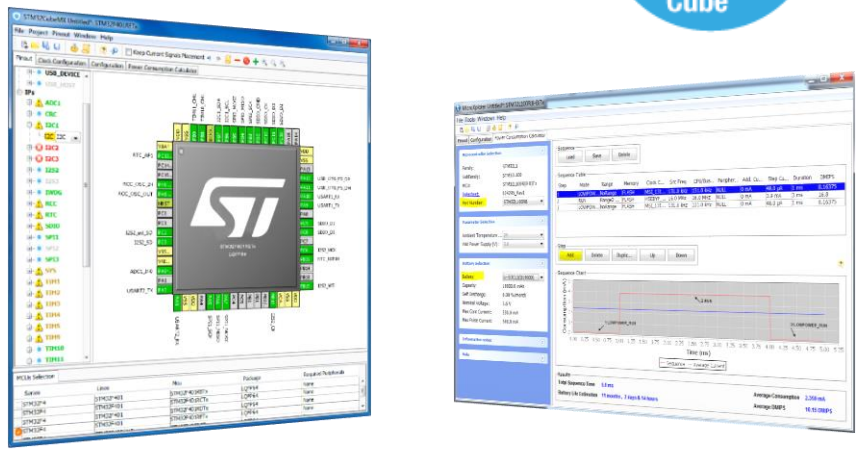
Discovery kit

Key feature prototyping

Evaluation board

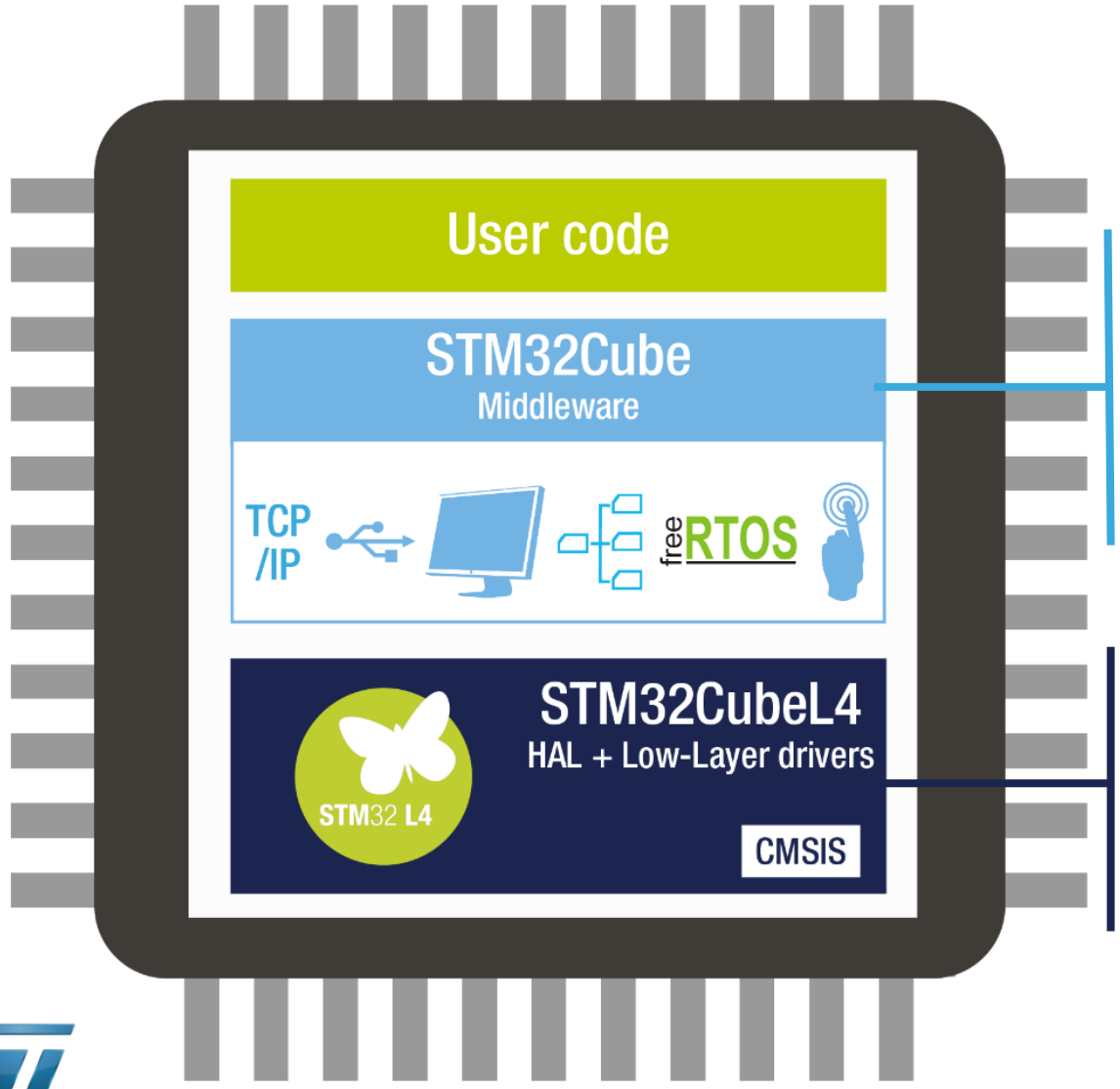
Full feature evaluation

SOFTWARE TOOLS



STM32CubeMX featuring code generation and power consumption calculation

STM32L4 ecosystem



EMBEDDED SOFTWARE

- Open-source TCP/IP stack (lwIP)
- USB Host and Device library from ST
- 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

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- Find more about STM32 products and solutions:

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