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STM32L4+ series

Excellence in ultra-low-power MCUs with more 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 3,224 CoreMark score

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





Enabling edge AI solutions

Scalable security

MPU portfolio

MCU portfolio

Key messages of STM32L4+ series

More performance and still ULP leader

ST has stretched the STM32L4 architecture to reach 150 MIPS based on its Arm® Cortex®-M4 core with FPU and ST ART Accelerator™ at 120 MHz while keeping best-in-class, ultra-low-power (ULP) figures.

More Graphics and Innovation

Enhanced graphics acceleration and innovative peripherals are embedded to optimize the BOM cost.

More Integration

2 MB of Flash and 640 KB of SRAM with safety and security features, smart and numerous peripherals, advanced and low power analog circuits in packages as small as 4.62 x 4.14 mm.

Great Investment

Great Investment This new STM32 member benefits from the pin-to-pin compatibility of the STM32 family and the STM32 Ecosystem.

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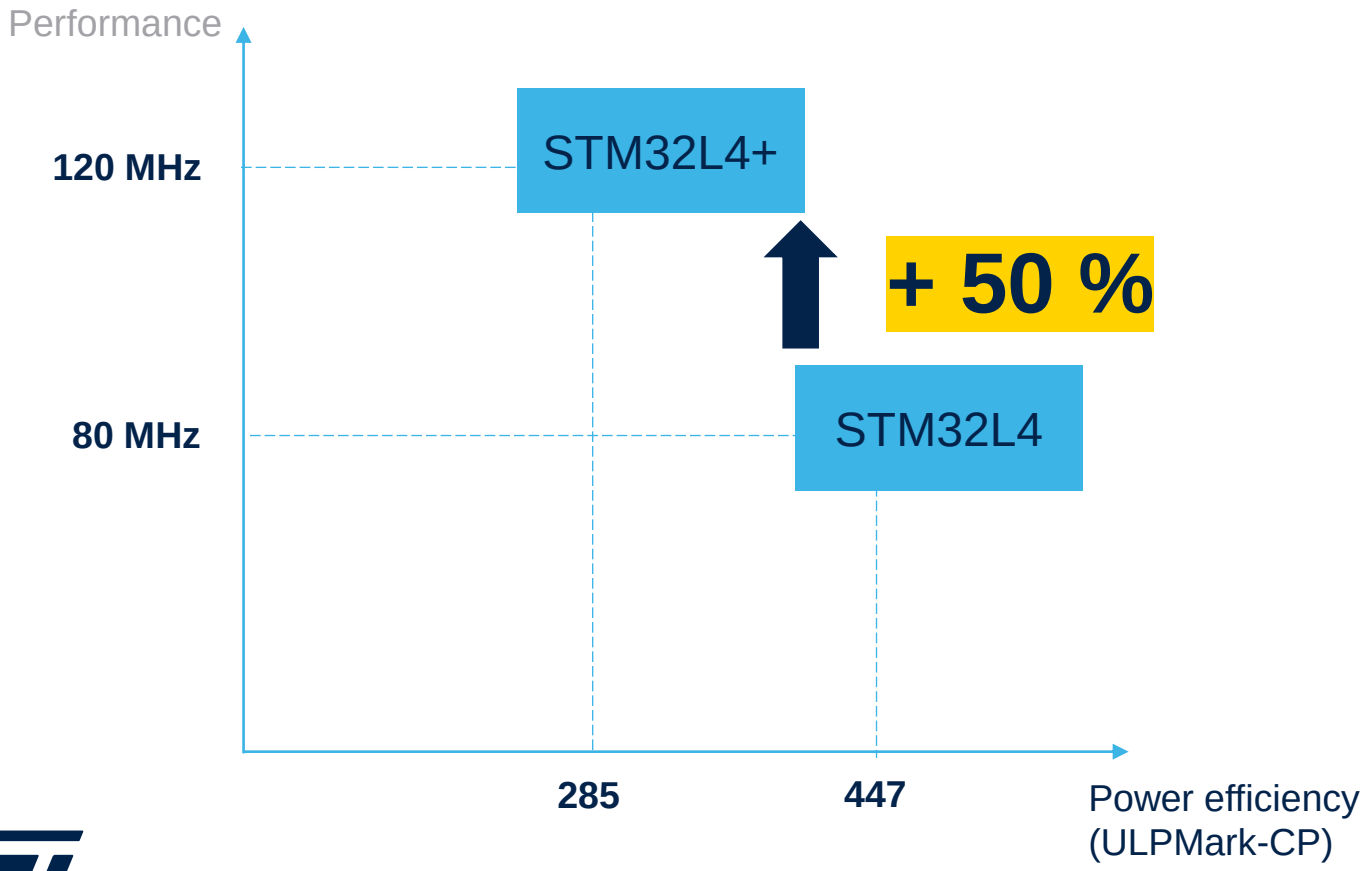
Providing more performance

Stretching the performance and still excellent in Power consumption



- **Up to 120** MHz/ **150 DMIPS** with ART Accelerator™
- **Up to 409** CoreMark Result
- Arm® Cortex® -M4 with DSP instructions and floating-point unit (FPU)
- 2 x DMA (14 channels)
- SPI up to 60 Mbit/s, Octo-SPI up to 86 MHz
  USART up to 10 Mbit/s

ULPBENCH™ An EEMBC Benchmark **285 ULPMark-CP™**

ULPBENCH™ An EEMBC Benchmark **56.5 ULPMark-PP™**

COREMARK® An EEMBC Benchmark **409**

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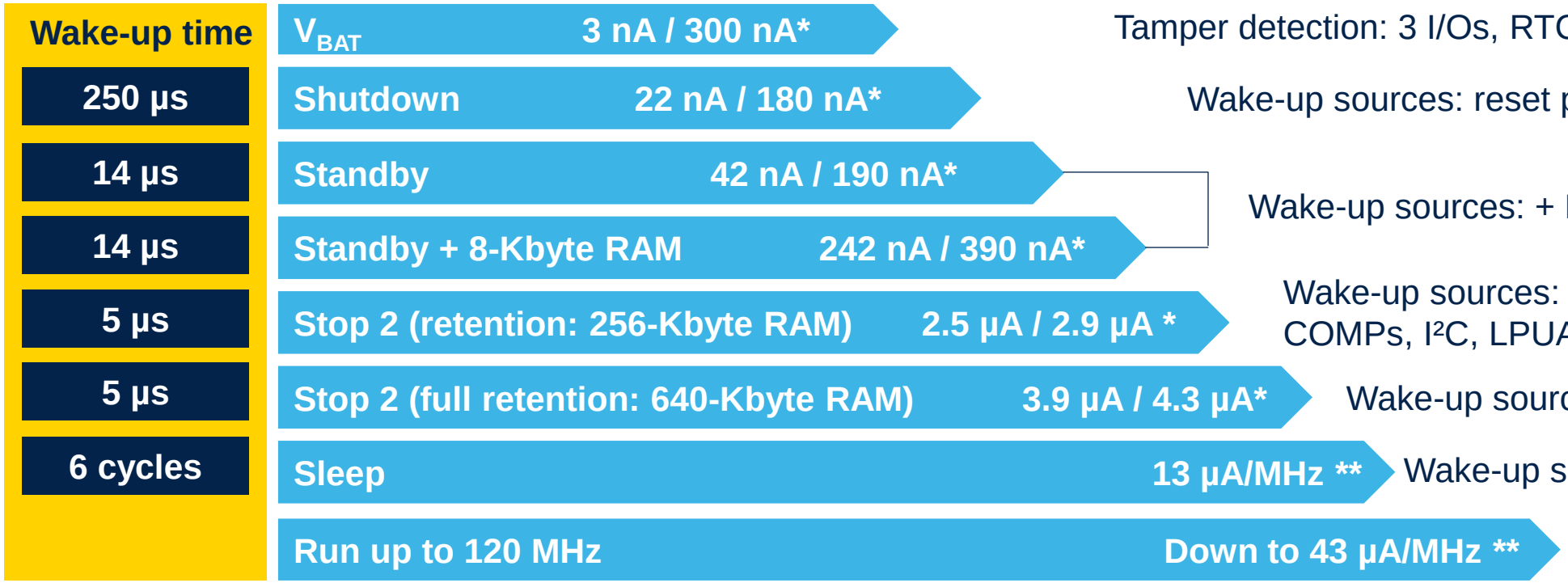
Ultra-low-power modes

Best power consumption numbers with full flexibility



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

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Enhanced graphics capabilities

Chrom-ART Accelerator™

- 2D Graphic acceleration
- Allowing **enhanced** graphic while releasing the core capabilities for real time processing

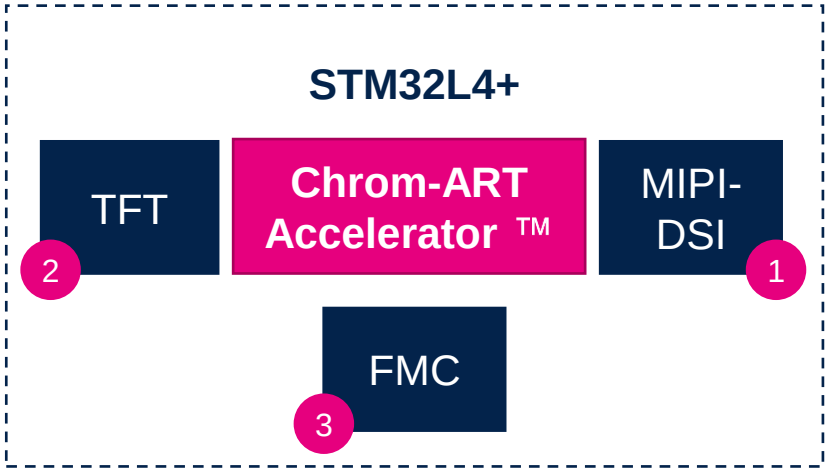
11% CPU Load
With Chrom-ART Accelerator™
and 84% CPU load without it

Enhanced graphics capabilities

Chrom-ART Accelerator™

Large choice of display interfaces

1. MIPI-DSI Controller for high pixel density, low pin count and low EMI displays
2. LCD-TFT Controller for mid resolution displays
3. Parallel display interface for low resolution displays

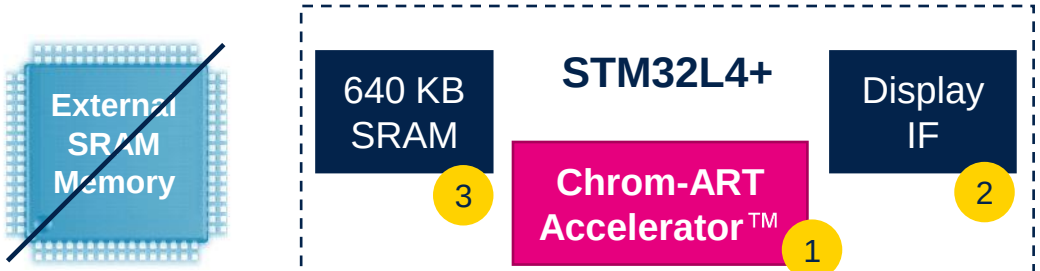


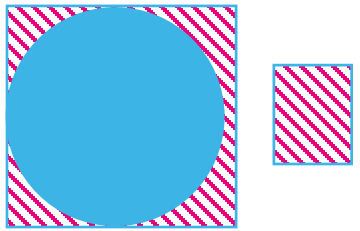
Enhanced graphics capabilities

1. Chrom-ART Accelerator™
2. Large choice of display interfaces

Integration and resource optimization

- Chrom-GRC™ memory optimization for round displays
3. Large internal SRAM allowing
   - BOM cost and power consumption optimization
   - Support of up to 400x400 24 bpp MIPI-DSI round displays
   - Support of up to 4’, WQVGA 16 bpp TFT displays with no external memory

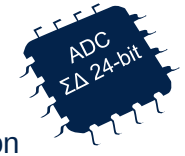




20% Memory saving

Smart peripherals metering

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



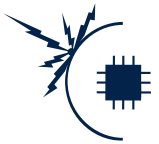
V_{BAT} with RTC
for battery backup
300 nA in V_{BAT} mode for RTC and
32x 32-bit backup registers

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

STM32L4+

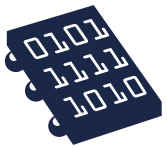
Electricity/Gas / Water Smart Meter

LCD Display
SPI, Parallel or TFT Interface



Anti Tamper pin
3 x tamper pins
for battery domain

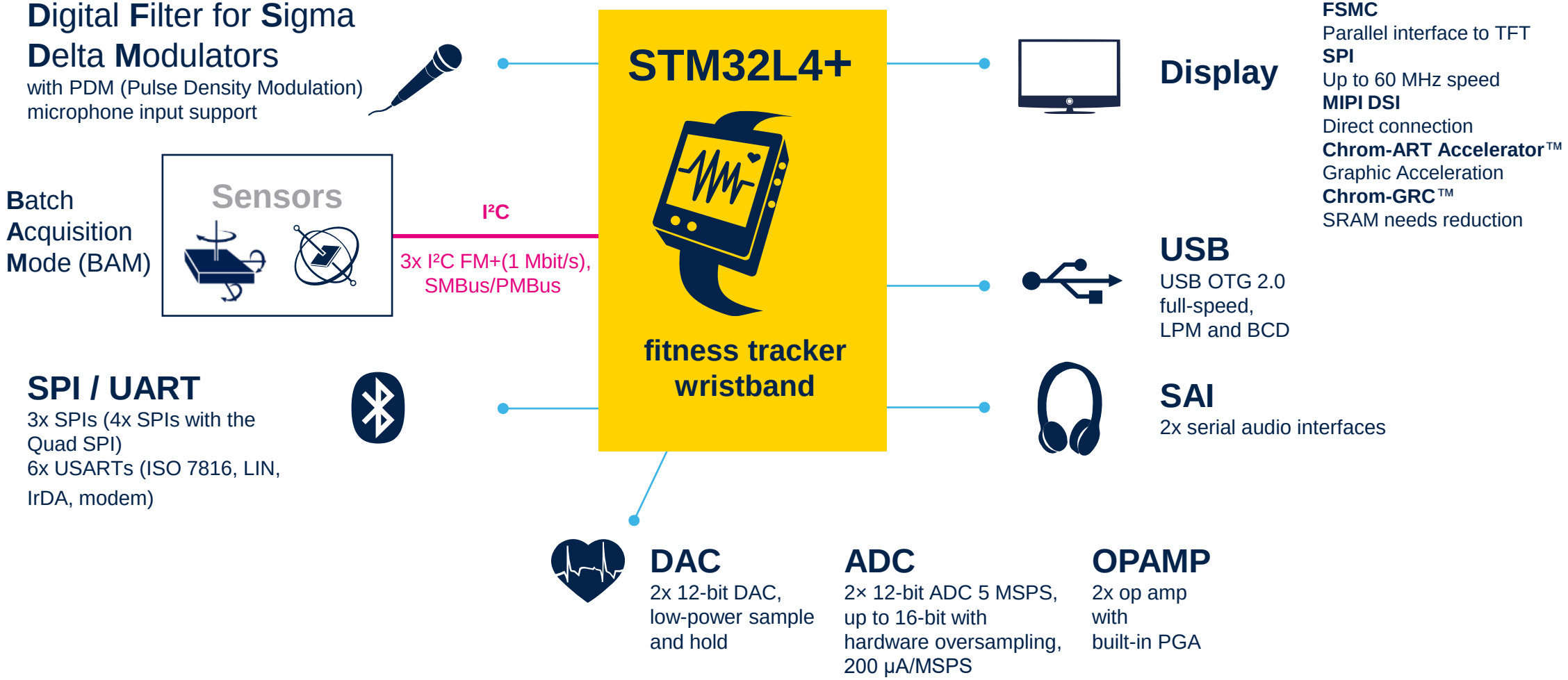
SPI / UART/ SDIO
for Wireless
3x SPIs (4x SPIs with the Quad SPI)
6x USARTs (ISO 7816, LIN, IrDA, modem)
1 x SDIO



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

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

Smart peripherals fitness tracker - wristband



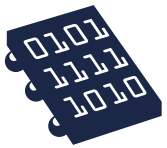
Smart peripherals industrial sensors

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

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



STM32L4+

Electricity/Gas
/Water
Smart Meter

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

Display
TFT controller, or SPI or FSMC

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

High integration level with high memory size in small packages

Connectivity
USB OTG
1 x SD/SDIO/MMC
3 x SPI
4 x I²C
1 x CAN
2 x Octo SPI
5 x USART
1 x ULP UART

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

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

ARM® Cortex®-M4 CPU
120 MHz
FPU
MPU
ETM

DMA

ART Accelerator™

Up to 2-Mbyte Flash with ECC Dual Bank

Chrom-ART Accelerator™
Chrom-GRC™

640-Kbyte RAM

Display
MIPI-DSI 2-lane TFT-LCD Controller

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

Analog
1 x 12-bit ADC, 2 x DAC
2 x Comparators
2 x Op amps
1 x Temperature sensor

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

Package size down to 4.62 x 4.14 mm

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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

STM32L4+

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**
- **OTP Zone**

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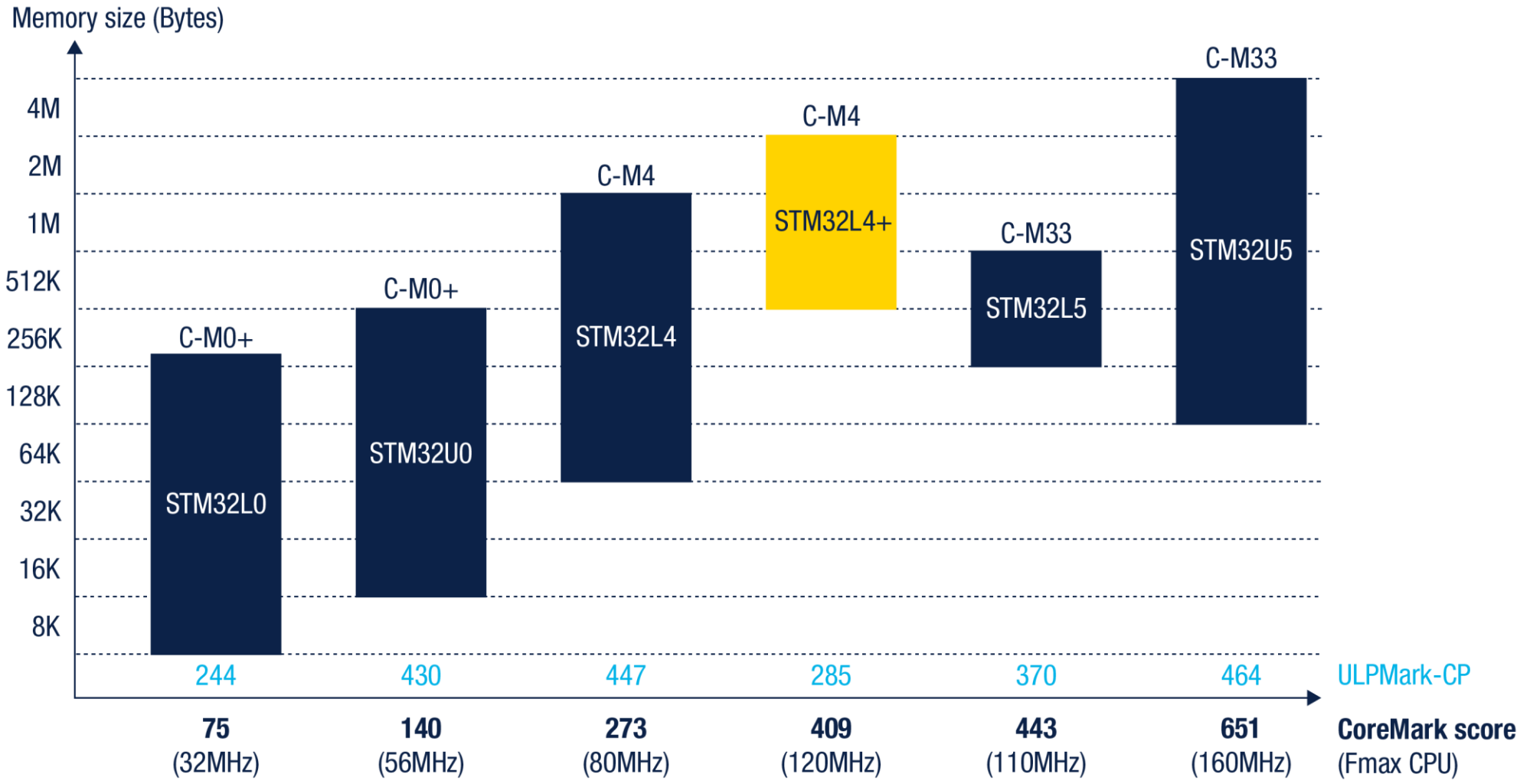
STM32L4+ ultra-low-power benchmark



STM32L4+ MCU series
32-bit Arm® Cortex®-M4 (DSP + FPU) – 120 MHz

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

Product line	Flash (KB)	RAM (KB)	Memory I/F	Op-Amp	Comparators	Sigma Delta Interface	12-bit ADC 5 Msps 16-bit HW oversampling	USB2.0 OTG	TFT Display Interface	Chrom-GRO™	MIPI-DSI	AES 128-/256-bit
STM32L4P5 USB OTG	512 to 1024	320	SDIO FSMC	2	2	4 ch	3	•	•			
STM32L4Q5 USB OTG & AES	1024	320	SDIO FSMC	2	2	4 ch	3	•	•			•
STM32L4R5 USB OTG	1024 to 2048	640	SDIO FSMC	2	2	8x ch	1	•				
STM32L4S5 USB OTG & AES	2048	640	SDIO FSMC	2	2	8x ch	1	•				•
STM32L4R7 USB OTG & TFT Interface	1024 to 2048	640	SDIO FSMC	2	2	8x ch	1	•	•	•		
STM32L4S7 USB OTG & TFT Interface & AES	2048	640	SDIO FSMC	2	2	8x ch	1	•	•	•		•
STM32L4R9 USB OTG & MIPI-DSI	1024 to 2048	640	SDIO FSMC	2	2	8x ch	1	•	•	•	•	
STM32L4S9 USB OTG & MIPI-DSI & AES	1024 to 2048	640	SDIO FSMC	2	2	8x ch	1	•	•	•	•	•

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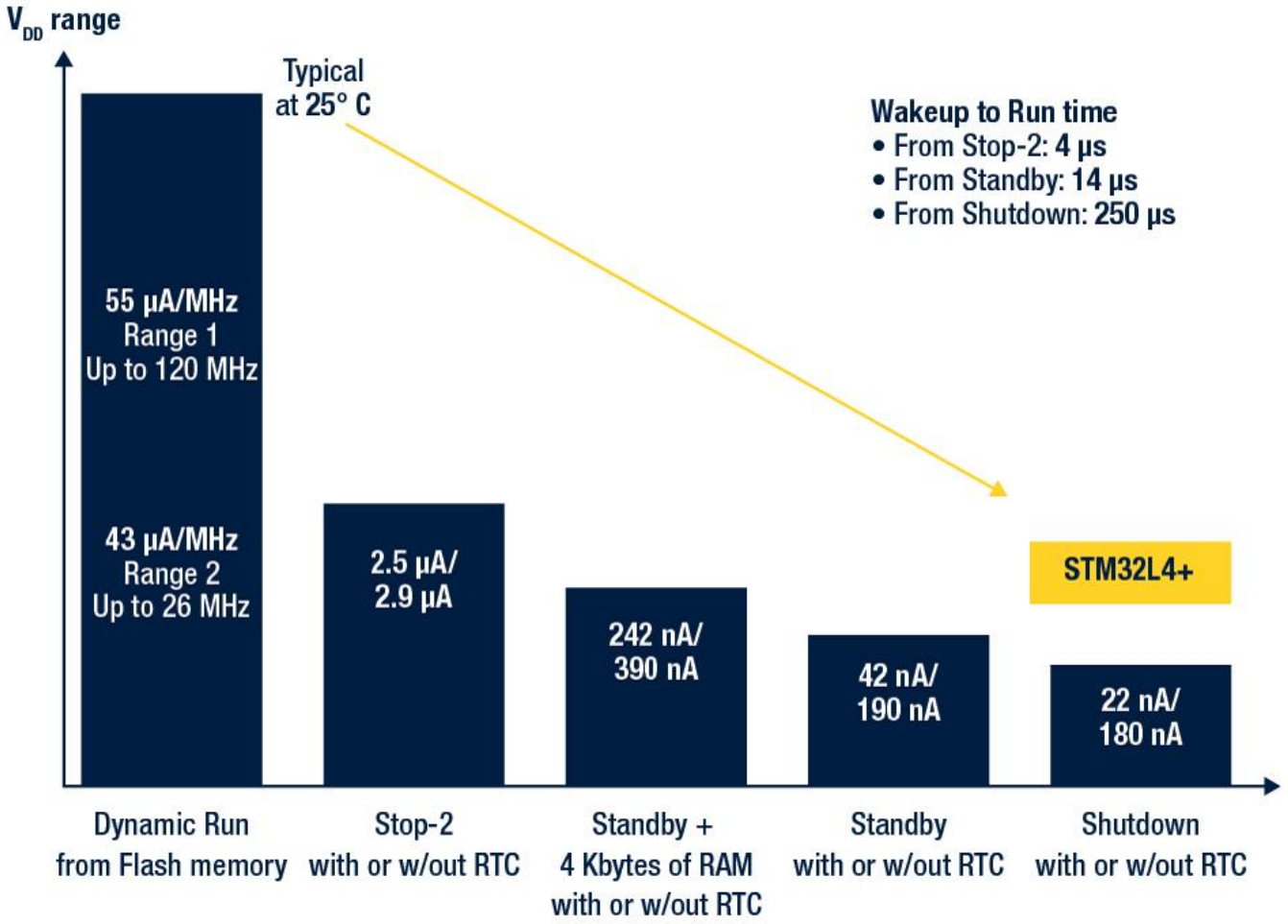
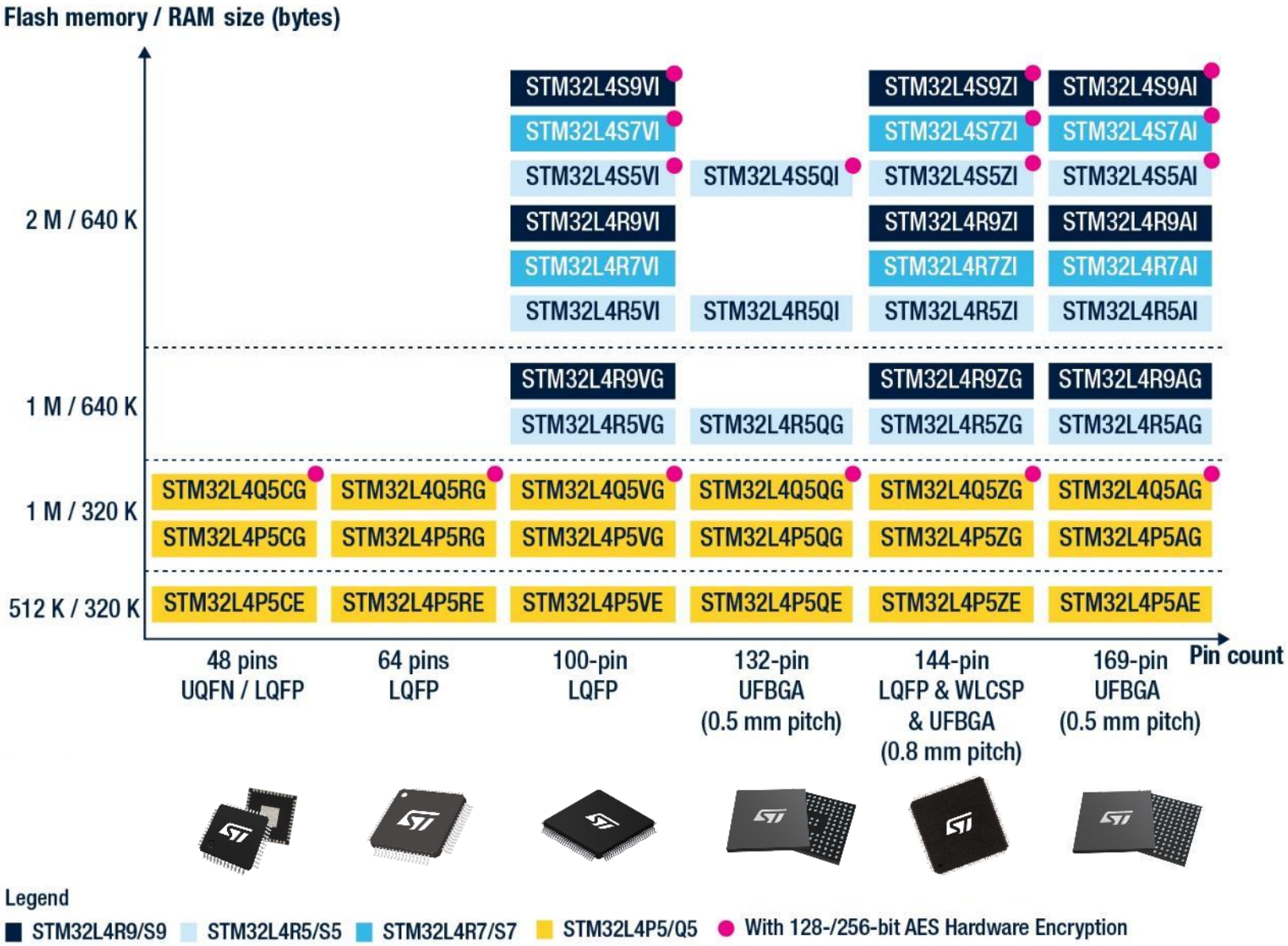
STM32L4+ ULTRA-LOW-POWER



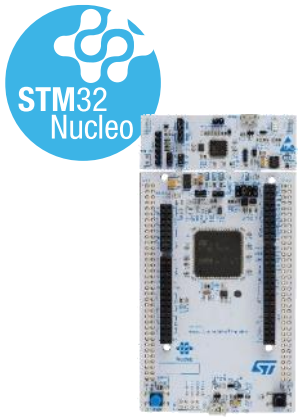
STM32L4+ portfolio



STM32L4+ ecosystem

HARDWARE TOOLS

STM32 Programming Tool



STM32 Nucleo boards	Discovery kits	Evaluation board	STM32 CubeMX
Flexible prototyping	Key feature prototyping	Full feature evaluation	

wiki.st.com/stm32mcu

github.com/STMicroelectronics

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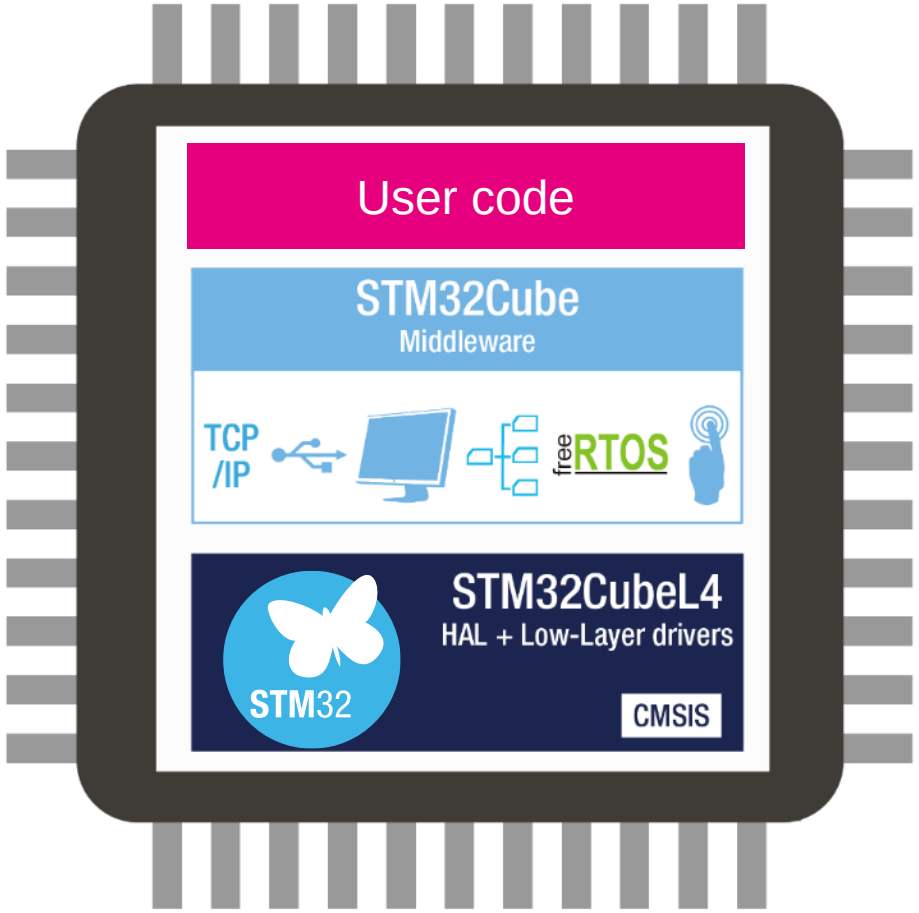
STM32L4/L4+ ecosystem



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

STM32 graphic ecosystem

3 Recommended Software Solutions

STemWin

FREE

Entry Solution

TouchGFX

FREE

Embedded Wizard

Advanced Solutions

Releasing your creativity

@STM32

@ST_World

community.st.com

www.st.com/stm32l4+

STM32L4+ Online Training

github.com/stm32-hotspot

www.st.com/mcu-developer-zone

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Our technology starts with You

Find out more at www.st.com/STM32L4+

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