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# STM32U3 ultra-low-power MCUs

**Extending battery life and protecting data in  
cost-sensitive industrial, medical, and consumer devices.**



# The STM32 portfolio

## Five product categories



Wireless  
MCU

Short- and long-range connectivity



Ultra-low-power  
MCU

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



Mainstream  
MCU



High-performance  
MCU



Embedded  
MPU

32- and 64-bit microprocessors



Enabling edge AI solutions



Scalable security



[MPU portfolio](#)  
[MCU portfolio](#)



# STM32U3 microcontroller series



**Industry-leading energy  
efficiency**



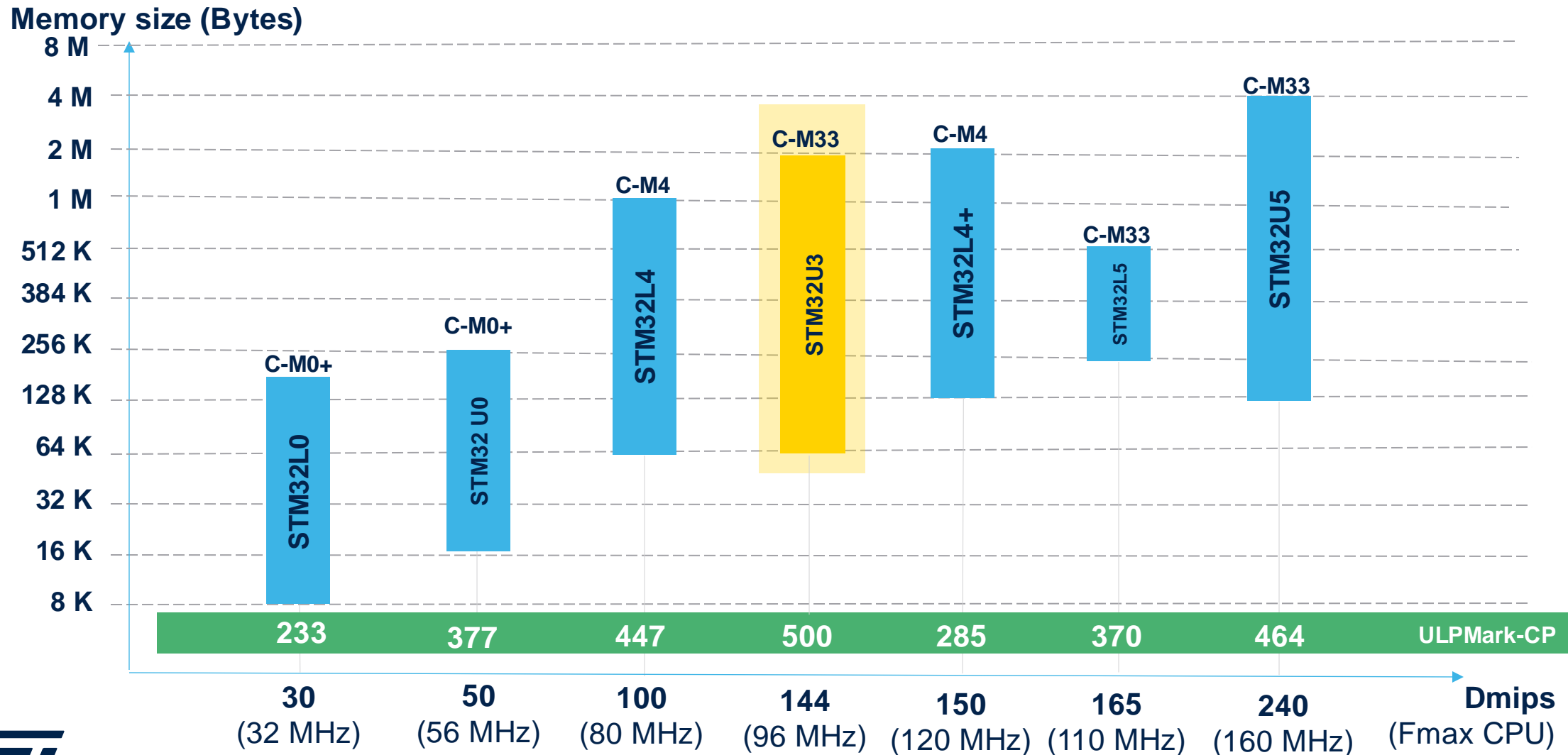
**Robust security to  
safeguard  
sensitive applications**



**Versatile peripheral offering  
without compromising cost  
efficiency**



# Expanding the STM32 ultra-low-power family



# Enabling more efficient battery-powered devices

**Greater power efficiency  
in run mode compared to  
previous product  
generations**



## **First STM32 with near-threshold design**

- Significantly reduces dynamic consumption

## **Market-leading efficiency with 117 CoreMark/mW**

- Five times more efficient vs previous product generation

## **Standard & extended industrial temperature support**

- -40 up to +85°C and +105°C



# Smaller, more energy efficient devices



A sustainable technology product expanding device battery lifetime.

## Activity tracking devices

**7x longer**

**battery lifetime**



## Gas and water metering devices

**4x smaller**

**device size**



## Industrial GPS tracking devices

**2x more**

**power efficient**



*Versus STM32L4 MCU*

# Enhancing device longevity and making products more sustainable



## Industrial & smart home

Thermostats, smoke detectors, heat cost allocators, door locks, asset trackers, sensors

## Medical

Insulin pumps, glucose meters



## Smart metering

Water, gas, electricity meters, smart home gateways

## Consumer

Activity trackers, GPS, e-cigarettes, headphones, PC accessories



# Leveraging near-threshold technology to boost power efficiency

A key enabler to significantly reduce dynamic consumption

## What is near-threshold technology?

- Operates transistors within an MCU below their traditional power supply voltage level (1.20 to 0.9 V)
- STM32U3 core logic can operate at a **minimum voltage of 0.65 V**

## How this technology makes a difference

Reduces dynamic consumption (when the MCU is in run mode).

Dynamic consumption is a major part of the application energy usage.



80% energy consumed in run mode



99% energy consumed in run mode

Reducing dynamic consumption impacts overall energy efficiency.



# Optimizing power consumption with adaptive voltage scaling (AVS)

**The adaptive voltage scaling (AVS) technique adjusts the supply voltage to the minimum in test production**

## **Dynamic voltage adjustment for optimal performance**

AVS minimizes the core voltage, enabling significant power savings.

## **A patented technique utilized during the production phase to precisely define AVS thresholds**

## **API-free implementation of the AVS technique**

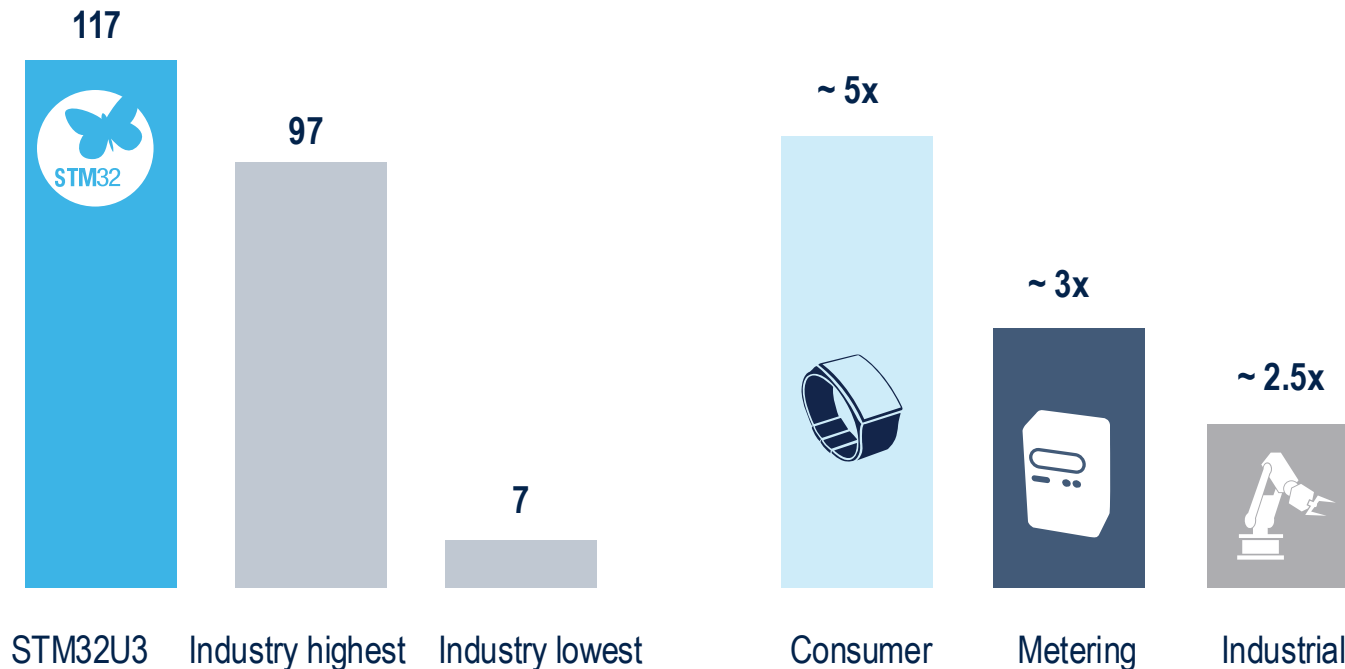
Preprogramming the optimal voltage value during in-house test production eliminates the need for an API during product configuration, saving time and costs.

# Superior efficiency against industry references

**CoreMark/mW\***  
(the higher the better)

**STM32U3 benchmark per application area**  
(average ratio to STM32U3, the lower the better).

Above 1 means higher consumption than STM32U3



**Outperforms best-in-class industry products**

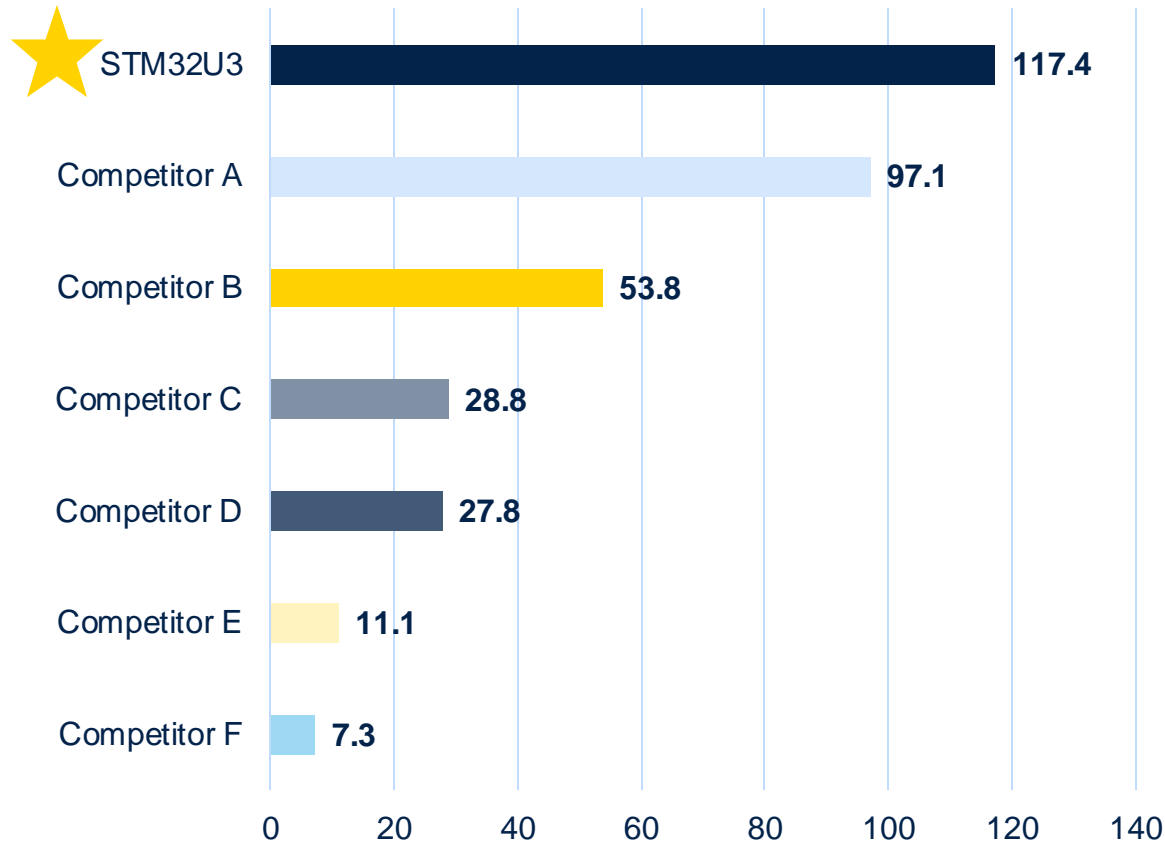
**The most power efficient product in all application areas**

Competition values are expressed with their best-in-class products

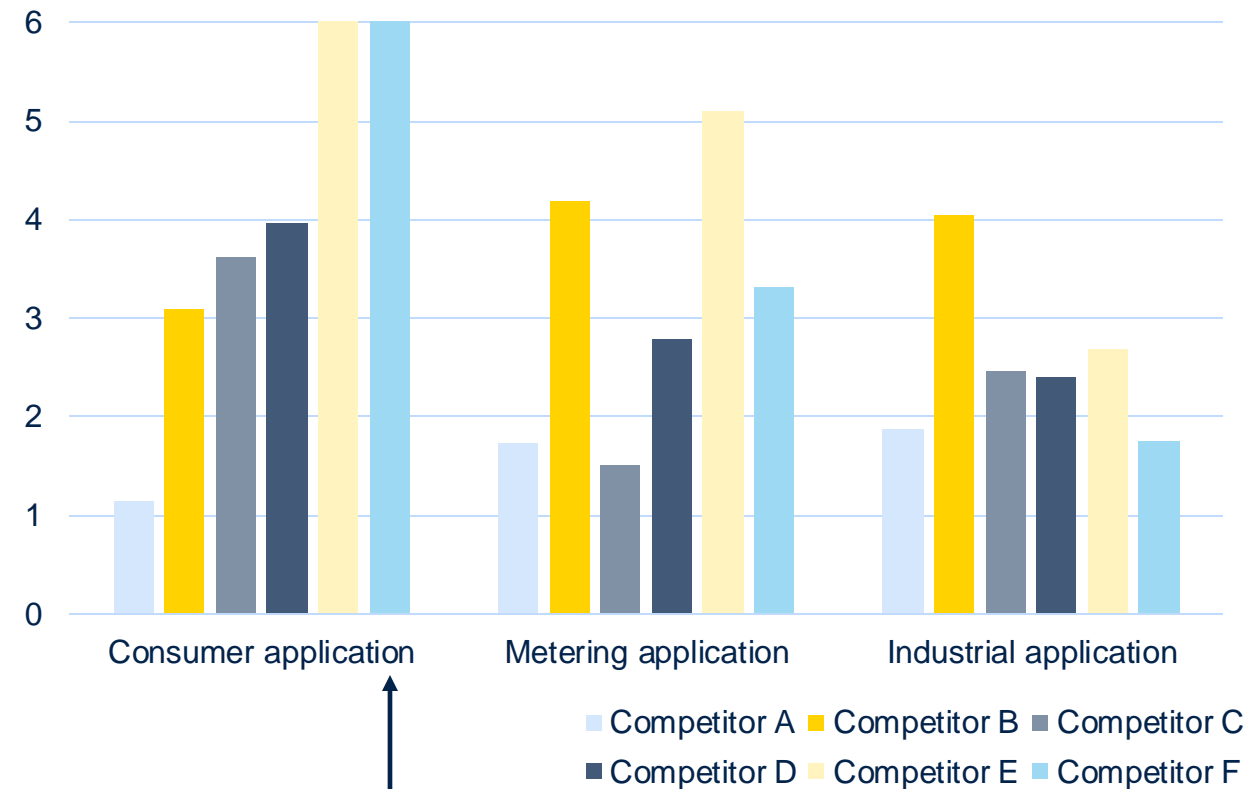
\*CoreMark/mW is a relevant metric to compare different cores and different voltage ranges

# Benchmarking superior energy efficiency against competition

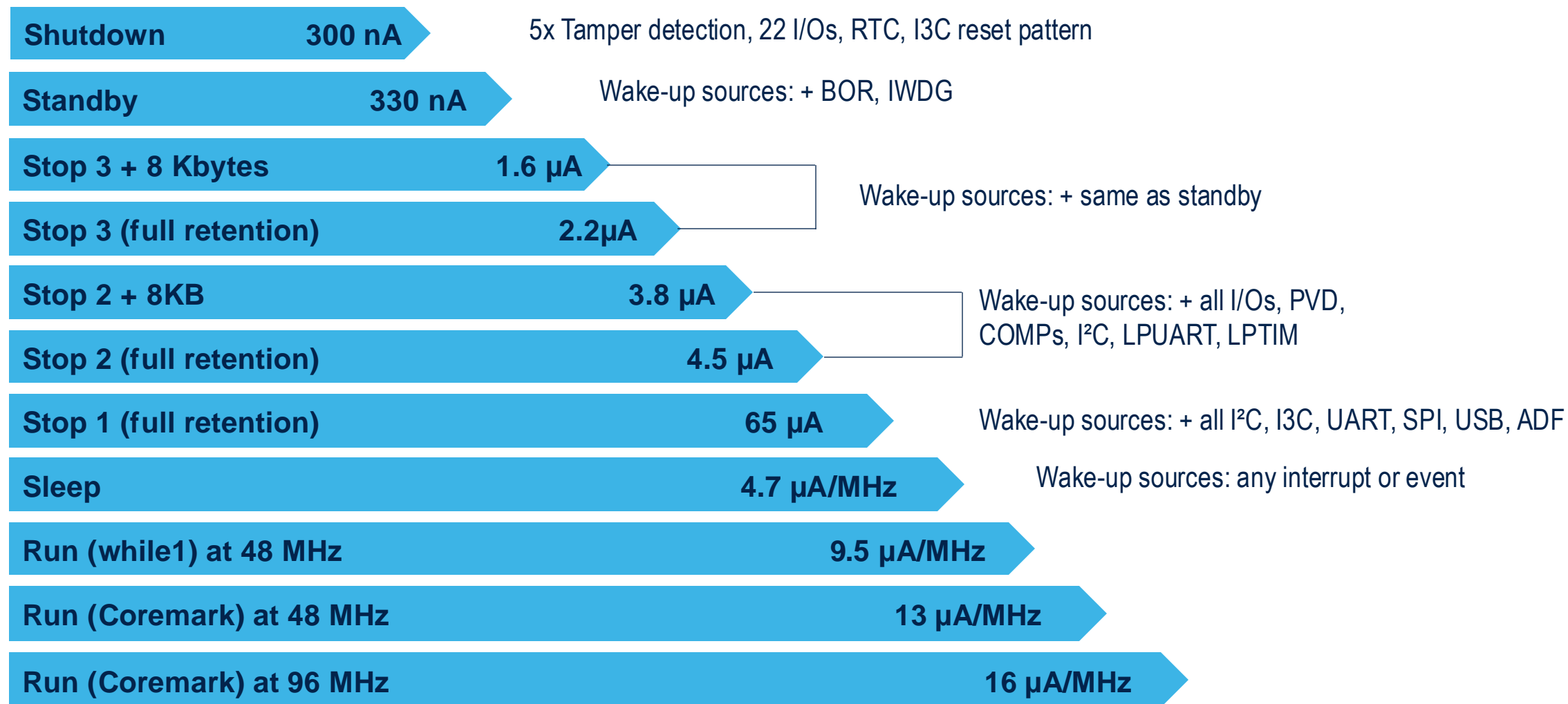
**CoreMark/mW\* (the higher the better)**



**STM32U3 benchmark  
(ratio to STM32U3, the lower the better)**  
Above 1 means higher consumption than STM32U3



# STM32U3 ultra-low-power modes at 3.3 V





# Robust security to safeguard sensitive and mission-critical applications

## More locked doors to ensure device security

### Enhanced device authentication and anticloning capabilities at a reduced cost

#1

#### The coupling and chaining bridge (CCB) HAL

- Key hardware protection by securely wrapping provisioning keys with an encryption algorithm.
- Keeping keys hidden even from the CPU and securely stored.

#2

#### In-factory provisioned attestation

Assigning a unique, secure identity to each device during manufacturing.



Side-channel resistant hardware protection

Ready for the cyber resilience act (CRA)

PSA Certified L3 & SESIP3 targets

Two new mechanisms on STM32U3 in standalone



## Increasing security with digital identities

<b>Memory protections</b> against illegal access control	<b>Cryptography</b> for hardware robustness	<b>Security services</b>
OTP, HDP, WRP, RDP, MPU Secure Debug 5x Tamper pins, & V/T	<b>Side channel AES, PKA</b> Additional AES, SHA, TRNG, <b>HUK</b> (Hardware unique key) <b>Attestation keys</b>	STM32Trust TEE <b>TF-M</b>
<b>Platform protection</b> during product lifecycle	<b>Code isolation</b> for runtime protection	Secure boot & secure updates
RDP: 4 protection level states Password based regression	<b>4 isolation stages</b> <b>Arm® TrustZone® technology</b>	Secure firmware install
		<b>NIST - CAVP certified CryptoLib</b>

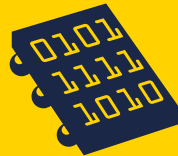
**State-of-the-art security assurance level**



# Versatile peripheral offering without compromising cost efficiency

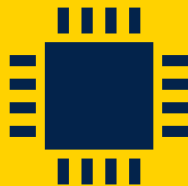


**Built on 40 nm platform for enhanced performance**



**Offering essential peripherals and memory capacity**

- I3C & FDCAN IP for fast connectivity
- 256 Kbytes of RAM & 1 Mbyte of flash dual bank for flexible memory operations

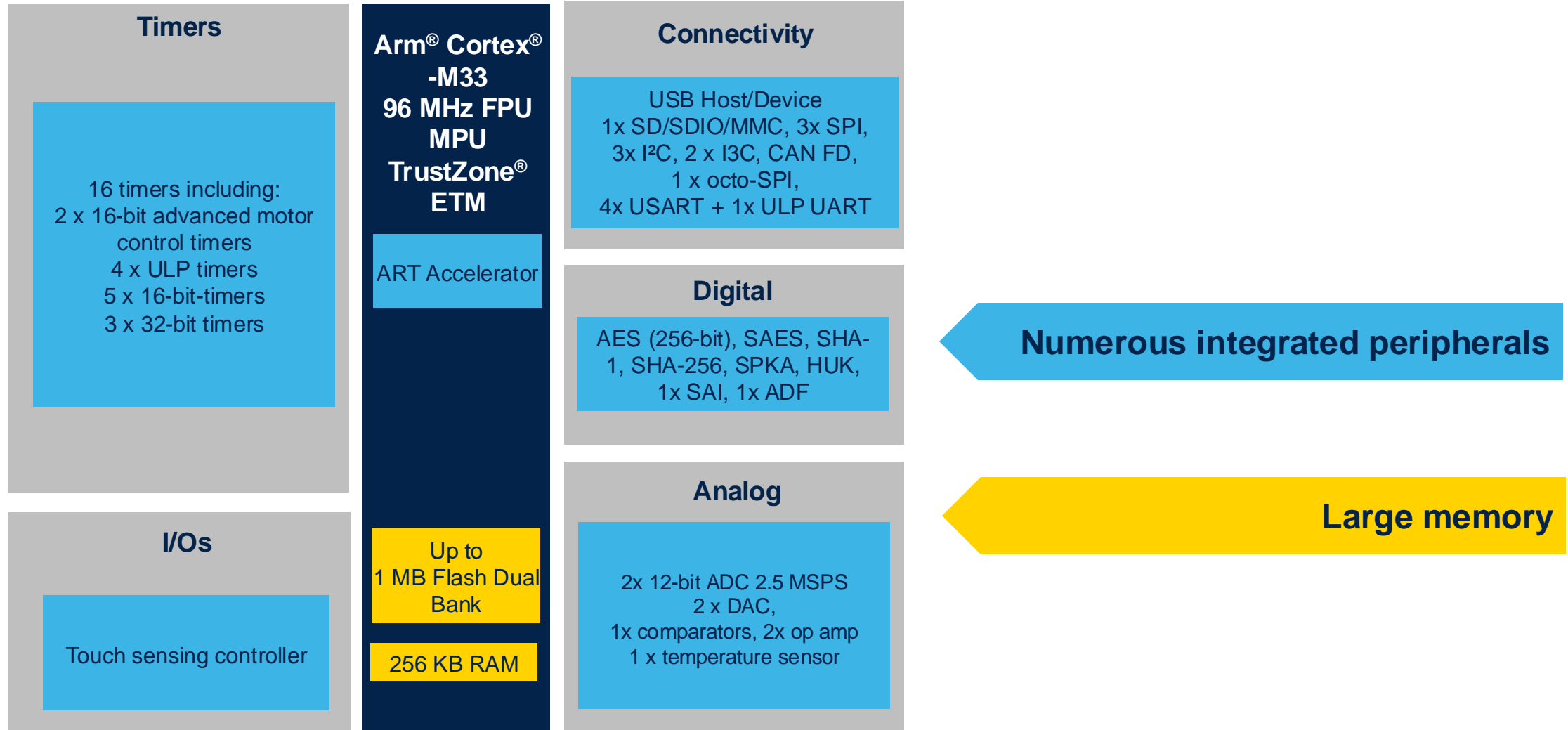


**Enabling a simple PCB design**

Wide offer of packages (including LQFP and QFN)



# STM32U375/385 block diagram





# Many options available to streamline costs

**100% pin to pin  
compatible with  
STM32U5**  
(Except WLCSP)



**9 different packages  
per line**

LQFP48 (7 × 7 mm)  
LQFP64 (10 × 10 mm)  
LQFP100 (14 × 14 mm)  
UFBGA64 (5 × 5 mm)  
UFBGA100 (7 × 7 mm)

UFQFPN32 (5 × 5 mm)  
UFQFPN48 (7 × 7 mm)  
WLCSP52 (3.17 × 3.11 mm)  
WLCSP68 (3.11 × 3.17 mm)

Product types	Flash memory (Kbytes)	RAM (Kbytes)	ULP comparators	ULP timers	I3C	Coupling and chaining bridge (CCB)	Secure data storage with hardware unique key (HUK)	Public key accelerator (PKA)	AES 128/256 + S-AES
STM32U375	512 to 1024	256	2	4	2				
STM32U385	1024	256	2	4	2	•	•	•	•



# STM32Cube framework

## Tools and software supporting you during all your design steps

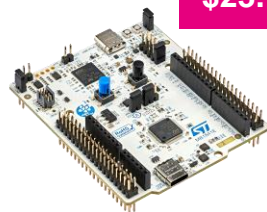
Evaluation,  
prototyping,  
and selection

Hardware and  
software  
configuration

Application development and debug

Code and hardware  
options  
programming

Run-time  
application  
monitoring



\*\$23.10

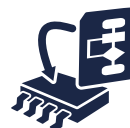
NUCLEO-U385RG-Q



STM32  
CubeMX



STM32  
CubeU3



STM32  
CubeExpansion  
&  
Verticals and  
partner solutions



STM32  
CubeIDE  
&  
Partner IDEs



STM32  
CubeProgrammer  
&  
Programmers from partners



STM32  
CubeMonitor

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# Our technology starts with You



Find out more at [www.st.com/STM32U3](http://www.st.com/STM32U3)

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