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# Introducing STM32U5, the flagship of ultra-low-power MCUs

STM32

# STM32 portfolio

| | | | | | | |
|---|---|---|---|---|---|---|
| MPU | | | | | | STM32**MP1**<br>4158 CoreMark<br>650 MHz Cortex –A7<br>209 MHz Cortex –M4 |
| High Perf MCUs | | | STM32**F2**<br>Up to 398 CoreMark<br>120 MHz Cortex-M3 | STM32**F4**<br>Up to 608 CoreMark<br>180 MHz Cortex-M4 | STM32**F7**<br>1082 CoreMark<br>216 MHz Cortex-M7 | STM32**H7**<br>Up to 3224 CoreMark<br>Up to 550 MHz Cortex -M7<br>240 MHz Cortex -M4 |
| Mainstream MCUs | STM32**F0**<br>106 CoreMark<br>48 MHz Cortex-M0 | STM32**G0**<br>142 CoreMark<br>64 MHz Cortex-M0+ | STM32**F1**<br>177 CoreMark<br>72 MHz Cortex-M3 | STM32**F3** ●<br>245 CoreMark<br>72 MHz Cortex-M4 | STM32**G4** ●<br>**550 CoreMark**<br>**170 MHz Cortex-M4** | |
| | | | | Optimized for mixed-signal Applications | | |
| Ultra-low-power MCUs | STM32**L0**<br>75 CoreMark<br>32 MHz Cortex-M0+ | STM32**L1**<br>93 CoreMark<br>32 MHz Cortex-M3 | STM32**L4**<br>273 CoreMark<br>80 MHz Cortex-M4 | STM32**L4+**<br>409 CoreMark<br>120 MHz Cortex-M4 | STM32**L5**<br>443 CoreMark<br>110 MHz Cortex-M33 | STM32**U5**<br>651 CoreMark<br>160 MHz Cortex-M33 |
| Wireless MCUs | | | STM32**WL**<br>162 CoreMark<br>48 MHz Cortex-M4<br>48 MHz Cortex-M0+ | STM32**WB** ●<br>216 CoreMark<br>64 MHz Cortex-M4<br>32 MHz Cortex-M0+ | | |

LONGEVITY 10 YEARS COMMITMENT

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● Optimized for mixed-signal applications

● Cortex-M0+ Radio co-processor

# Applications are more and more demanding!


**more autonomy**

**more integration**

**more security**

Application examples:

- Gas and water meter
- Fitness band
- Medical monitoring devices
- POS

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# Continuing our leadership in ultra-low-power MCUs

**2021**

## STM32**U5**

First ultra-low-power STM32
with **40 nm technology**

| | | |
|---|---|---|
| **2020** | **2 billion ultra-low-power STM32s shipped** | |
| **2019** | STM32**L5** | **Introduction of M33**, excellence in ultra-low-power **with certified security** |
| **2017** | STM32**L4+** | Ultra-low-power excellence with **more performance** |
| **2015** | STM32**L4** | **Leadership** ultra-low-power Cortex-M4 **(#1 ULP 447 ULPBench™)** MCUs |
| **2014** | STM32**L0** | **Entry cost** ultra-low-power MCU |
| **2009** | STM32**L1** | **World 1st Cortex-M** ultra-low-power MCU |

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# Enabling key new features for embedded developers


**Lower power consumption**
New power management
LPBAM*, DMA and IP autonomous in LP mode

**Higher security**
AES and PKA, side attack resistant

**Higher level of safety**
ECC on Flash and SRAM

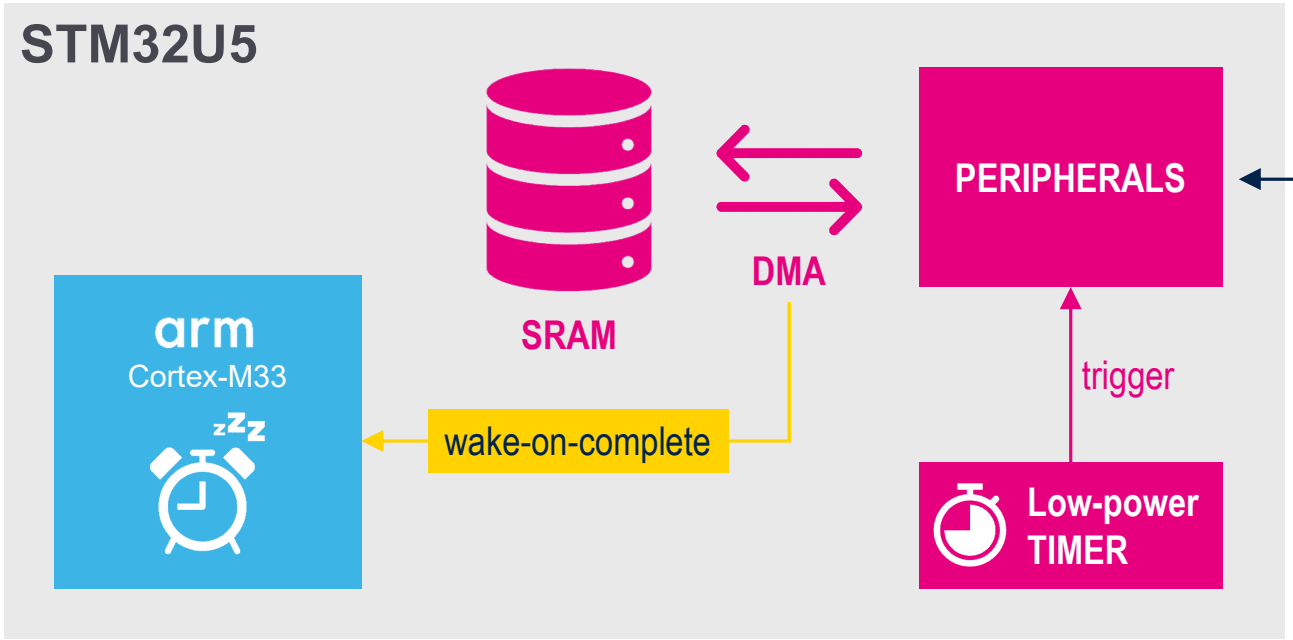
**Improved data storage**
100 kcycles for 512 kB of Flash

**Better accuracy**
ADC 14-bit

* Low Power Background Autonomous Mode

# Cut MCU power consumption by 90%*

## Low Power Background Autonomous Mode (LPBAM)




**Peripherals:**

- I2C master or slave
- SPI / UART reception or transmission
- ADC / DAC
- Voice Activity Detection
- LPTIM
- I/O

** Typical application where peripherals need to acquire data regularly*

# Extends battery life

## Improved flexibility versus existing STM32L series

- The STM32U5 provides a **large choice of low power modes** with fast wake-up times

See below some examples to illustrate the best-in class power consumption:

**300 nA** Standby

**1.7 µA** Stop3 (with 16kB SRAM)

**6.6 µA** Stop 2 (full retention: 786-Kbyte RAM)

**Down to 19 µA / MHz** (Run up to 160 MHz)

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# STM32U5 efficiency proven by benchmarks

**Best performances among 32-bit MCUs available on the market**

| | |
|---|---|
| ULPBENCH™ An EEMBC Benchmark **535 ULPMark-CP** | True energy cost of deep-sleep modes |
| ULPBENCH™ An EEMBC Benchmark **149 ULPMark-PP** | Common peripherals' energy impact on deep-sleep |
| ULPBENCH™ An EEMBC Benchmark **58 ULPMark-CM** | Active power, using CoreMark as the workload |
| ULPBENCH™ An EEMBC Benchmark **133000 SecureMark-TLS** | Efficiency of cryptographic processing solutions |

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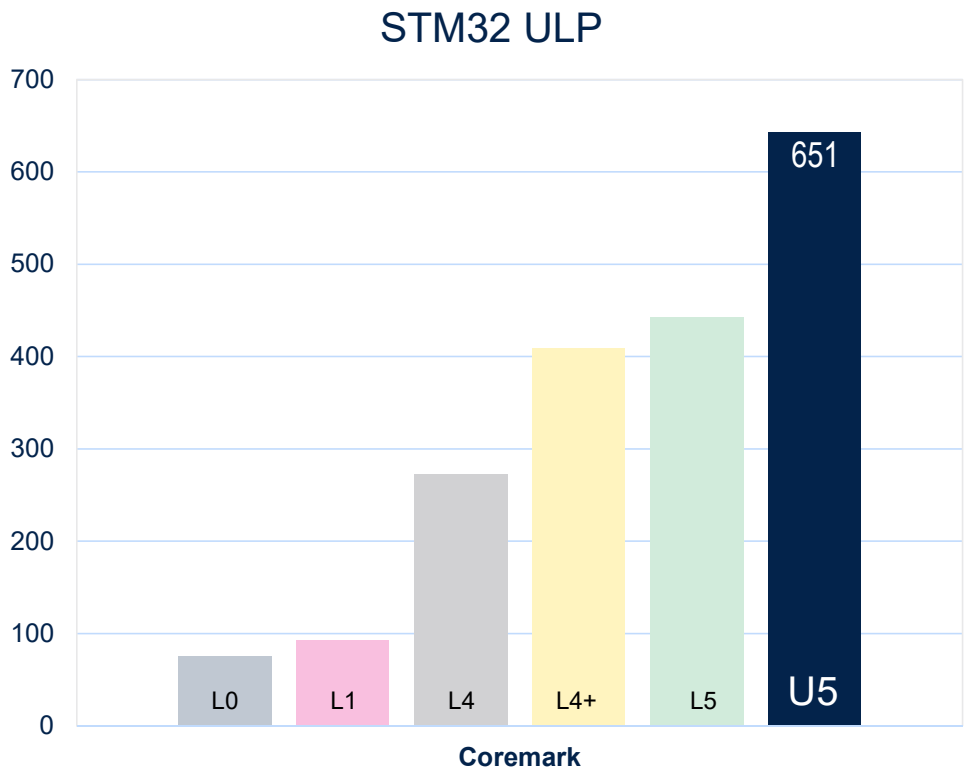
# Unparalleled performance for an ULP MCU

## STM32**U5**

- Arm® Cortex®-M33 at **160 MHz**
  **240 DMIPS** or **651 Coremark**
- Mathematics accelerators:
  **FMAC** and **Cordic**
- Cache for execution and **data** for internal and external memory (ART Accelerator)

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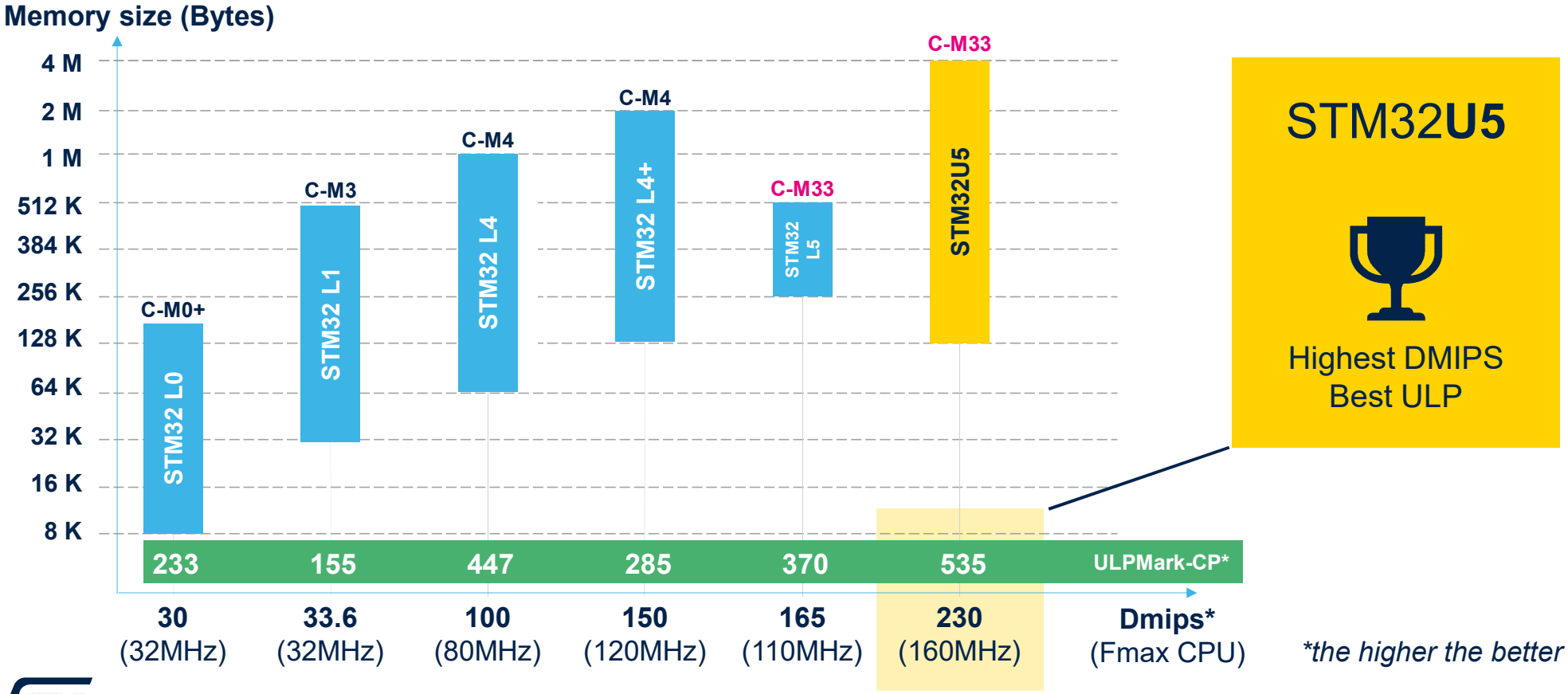
# STM32U5, the new flagship of STM32 ULP series

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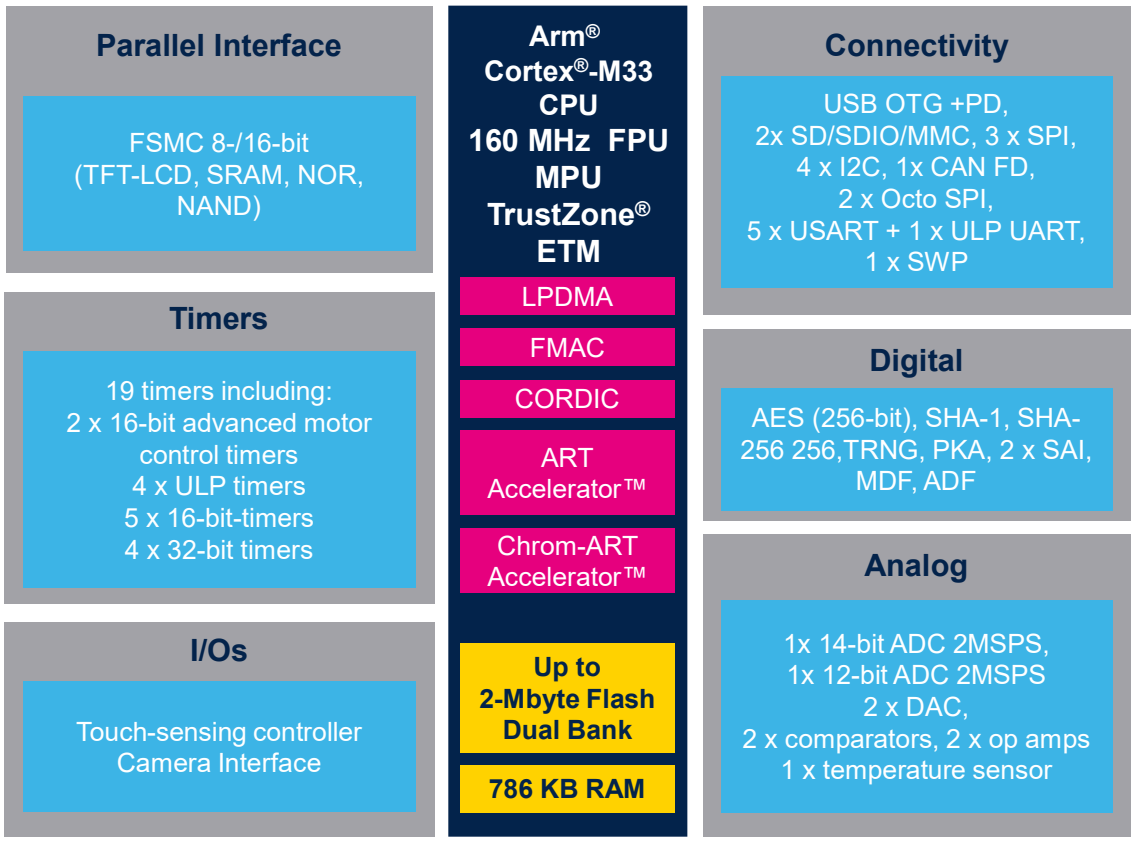
# High level of integration




**Numerous integrated peripherals**

**Advanced accelerators**

**Large embedded memory**

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# Enhanced security

## Extensive functionality to protect your assets

| Isolation | Cryptography | Security assurance level |
|---|---|---|
| TrustZone®<br>Secure Peripherals<br>Secure DMA | **Side channel AES, PKA**<br>Additional AES, PKA, SHA, TRNG<br>CAVP certified CryptoLib | psacertified™ L3<br>SESIP L3 |

1st MCU to reach Level 3

| Lifecycle | Memory protections | Active tamper | Trust anchor |
|---|---|---|---|
| RDP: **4 protection level states**<br>**Password based regression** | OTP, HDP, WRP, RDP, MPU<br>Ext. Flash encryption OTFDec<br>**Secure Debug** | **4x active pair** of tamper pins.<br>Volt. &Temp. monitoring (**Vbat**)<br>Total tamper I/Os: **8** | TF-M, Secure Boot,<br>Secure Firmware Install<br>**Hardware Unique Keys** |

**New features for STM32 in bold**

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# Multiple options to meet the needs of developers

**8 different packages**

48-pin QFN
90-pin WLCSP
48/64/100/144-pin LQFP
132/169-pin UFBGA

**2 memory size configurations**

1 M Flash / 786 K RAM
2 M Flash / 786 K RAM

**Optional security**

without HW crypto
with HW crypto

**24 variants**

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# STM32Cube Software Suite

**Microsoft Azure RTOS bringing additional Key benefits to well-know STM32Cube software Suite**


Microsoft Azure

+ Azure RTOS

- Faster & Easier Development
- Business-friendly terms
- Better Quality

+

- Fast performance
- Complete consistent solution
- Industry certifications

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# Early adoption by partners

**STM32U5 selected for IoT and cloud connection solutions**

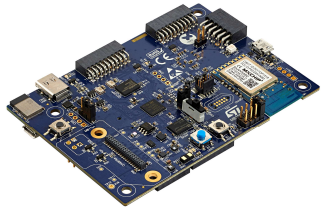
twilio

Microvisor

IoT Device Builder Platform

Microvisor simplifies the transition to connected products for embedded engineers, with support for secure boot, over-the-air firmware upgrades, and remote debugging

Microsoft Azure



B-U585I-IOT02A discovery kit selected as reference board for Microsoft Azure Certified Device program

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# Start your project based on the STM32U5 now!

**STM32U5**

**Ultra-low-power**
**Performance**
**Security**

**Sampling now**

**Mass market in Sept -21**

# Releasing your creativity

/STM32

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community.st.com

www.st.com/STM32U5

wiki.st.com/stm32mcu

github.com/STMicroelectronics

STM32U5 blog articles

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# Thank you



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