Introducing STM32U5, the flagship for ultra-low-power MCUs

Rev 1.0

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The STM32U5 series offers advanced power-saving microcontrollers, based on Arm® Cortex®-M33 to meet the most demanding power/performance requirements for smart applications, including wearables, personal medical devices, home automation, and industrial sensors.

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

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The STM32U5 brings innovations with added value for your application.
Most of the innovations are linked to increase the battery life time and decrease the power consumption. The LPBAM which stands for Low Power Background Autonomous Mode, is an innovative autonomous power mode and saves power by enabling direct memory access (DMA) and ensuring the peripherals keep working, while most of the device is in stop mode.

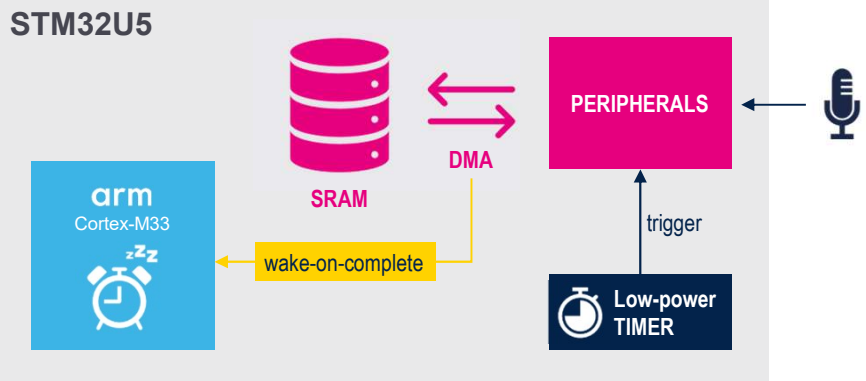
The STM32U5 brings a higher security with AES encryption and Public Key Accelerator (PKA) which are now side-channel hardware-resistant.
The ECC available on all the Flash and a part of SRAM increases the level of safety.

The Flash size is up to 4 Mega-Bytes and 512Kilo-bytes can be erased and programmed up to one hundred thousand times. This is a very interesting feature for storing data.

The STM32U5 also embeds also a new 14 bit ADC providing a better accuracy.

Cut MCU power consumption by 10

Low Power Background Autonomous Mode (LPBAM)



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

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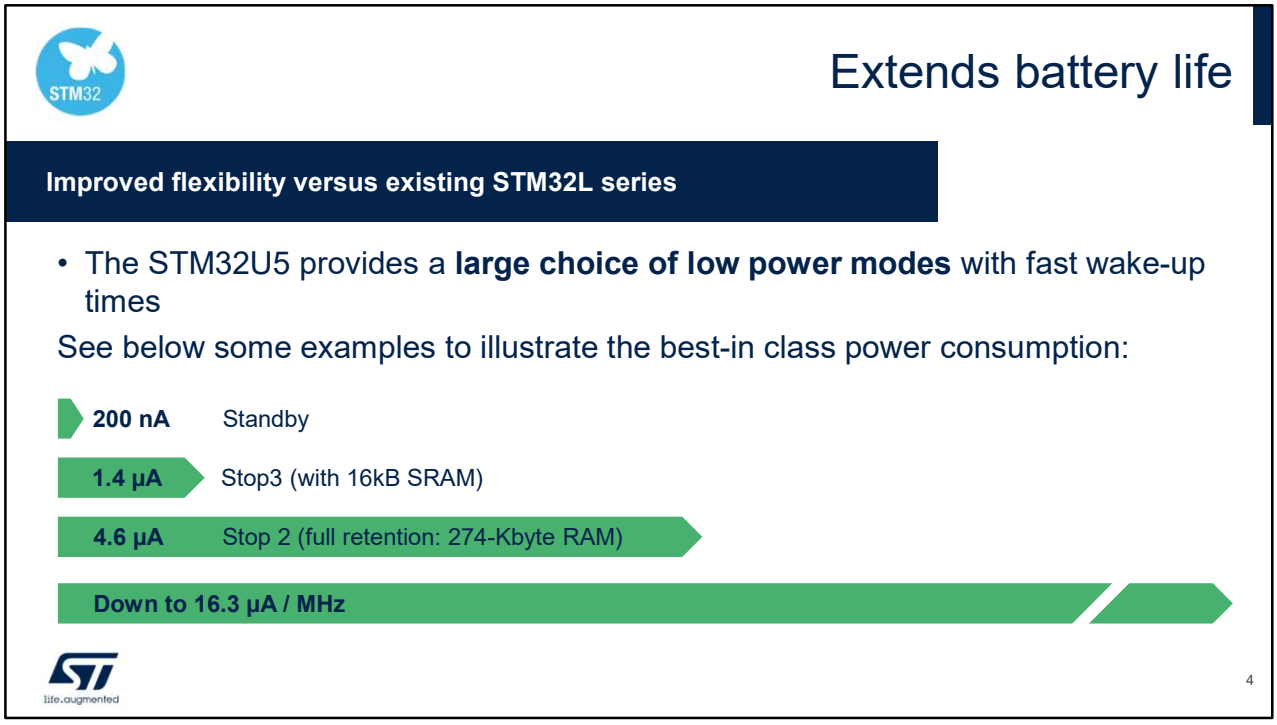
The STM32U5's disruptive innovation which will be key to cutting the power consumption in your products.

The main innovation is called the Low-Power Background Autonomous Mode. This LPBAM is a brand-new way to program your system and architecture your firmware.

Today, to obtain the best consumption, you switch between the different low power and active modes to achieve your function.
With LBPBAM, the STM32U5 peripherals can be functional and autonomous in Stop mode, without any software running.
This can reduce the power consumption of some functions by a factor of 10.



This slide shows some example figures of power consumption but the STM32U5 features a very wide choice of low power modes.
In addition to shutdown or standby, it introduces a new mode called stop 3 providing a lower power consumption keeping all the peripheral states but with less wake-up inputs. The STM32U5 brings more flexibility : you can now program with more granularity how the SRAM kept in low power mode.
Key performance indicators include:

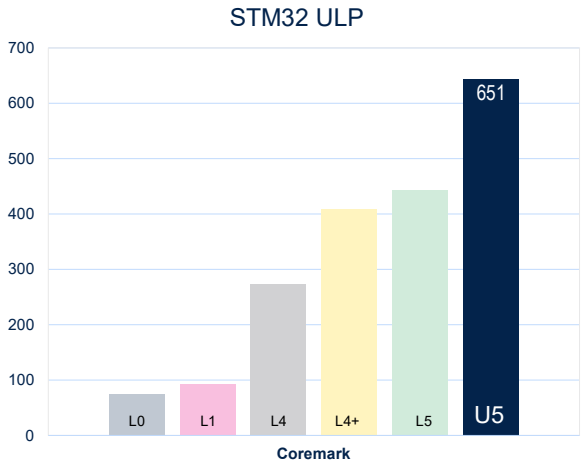
- 200 nA in standby mode
- 1.4 µA in stop mode 3 with 16 Kbytes of SRAM
- 4.6 µA in stop mode 2 with 274 Kbytes of SRAM
- Down to 16.3 µA/MHz in active mode

The power efficiency is proven by the different scores obtained at EEMBC ULPBench in all known benchmarks. The STM32U5 provides the best-in class power consumption.

Unparalleled performance for an ULP MCU

STM32**U5**

- 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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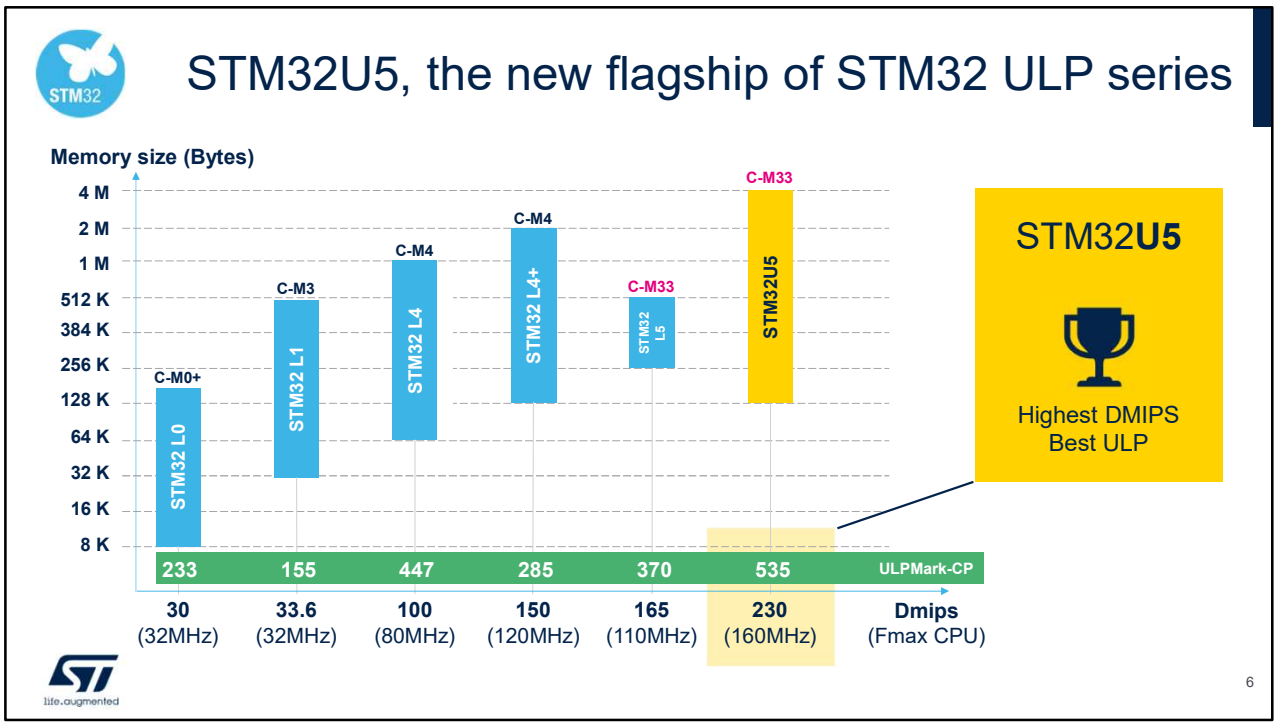
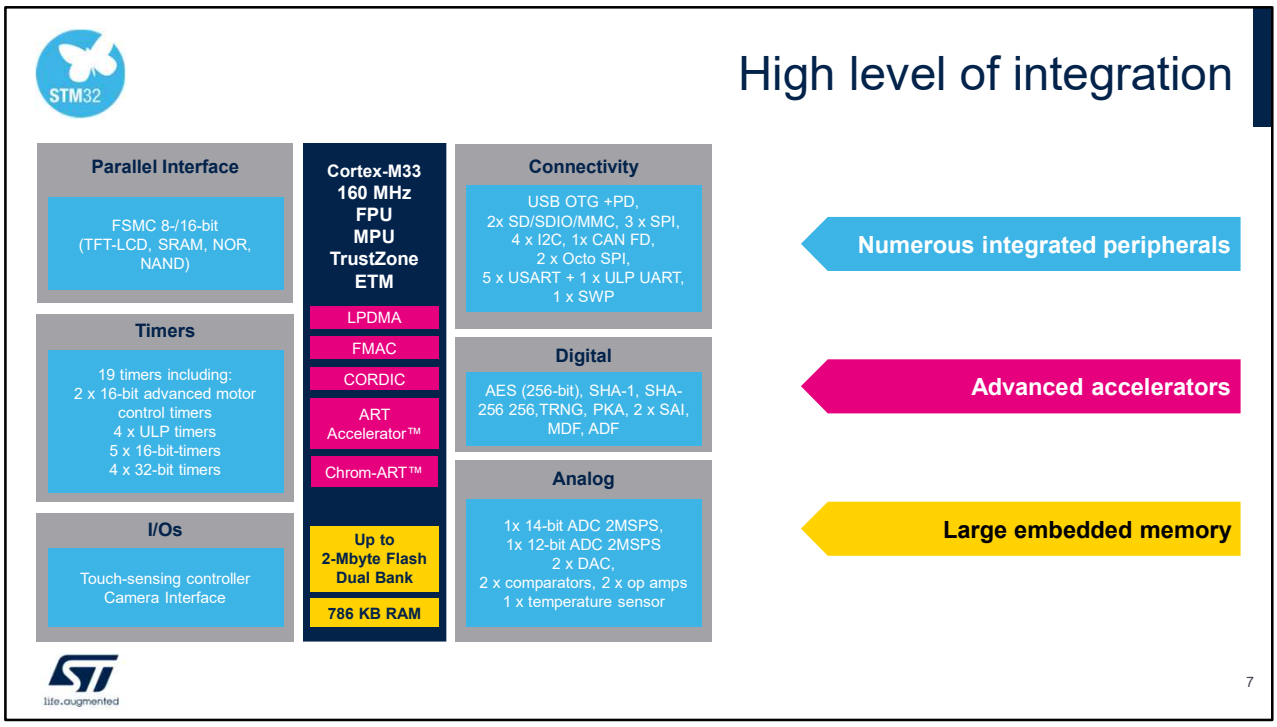
You don’t have to choose between power consumption and performance with the STM32U5. Thanks to the 40nm technology, you can reach 160 MHz with a cortex-M33 so 240 DMIPS or 651 coremark.
If you need more, you can use mathematics accelerator IP such as FMAC or Cordic. And the new ART accelerator now accelerates both the execution and data accesses from external memories, in addition to the internal memories of course.



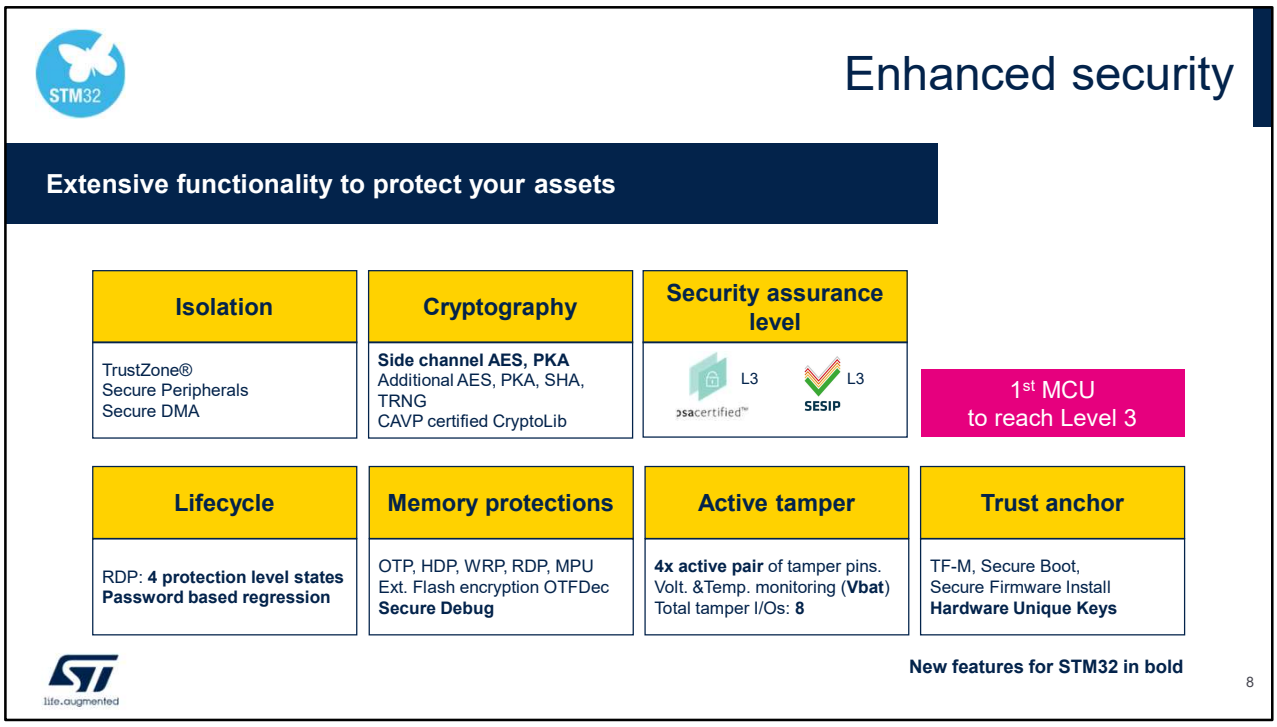
The STM32U5 is the new flagship of the STM32 ultra low power series. In addition to providing the best-in class power consumption and higher performance our intention is to quickly offer a wide range of memory.

With the STM32U5, the ultra low power STM32 family covers a very wide range of packages, memory sizes and performance.



Here is the block diagram of STM32U5.
It embeds many digital and analog peripherals as well as advanced accelerators. In addition to the DMA, FMAC, Cordic and ART accelerator the Chrom-ART can be useful for accelerating graphic animation.

Furthermore, it features a high integrated memory: up to 2MB of Flash and 786 kB of SRAM.



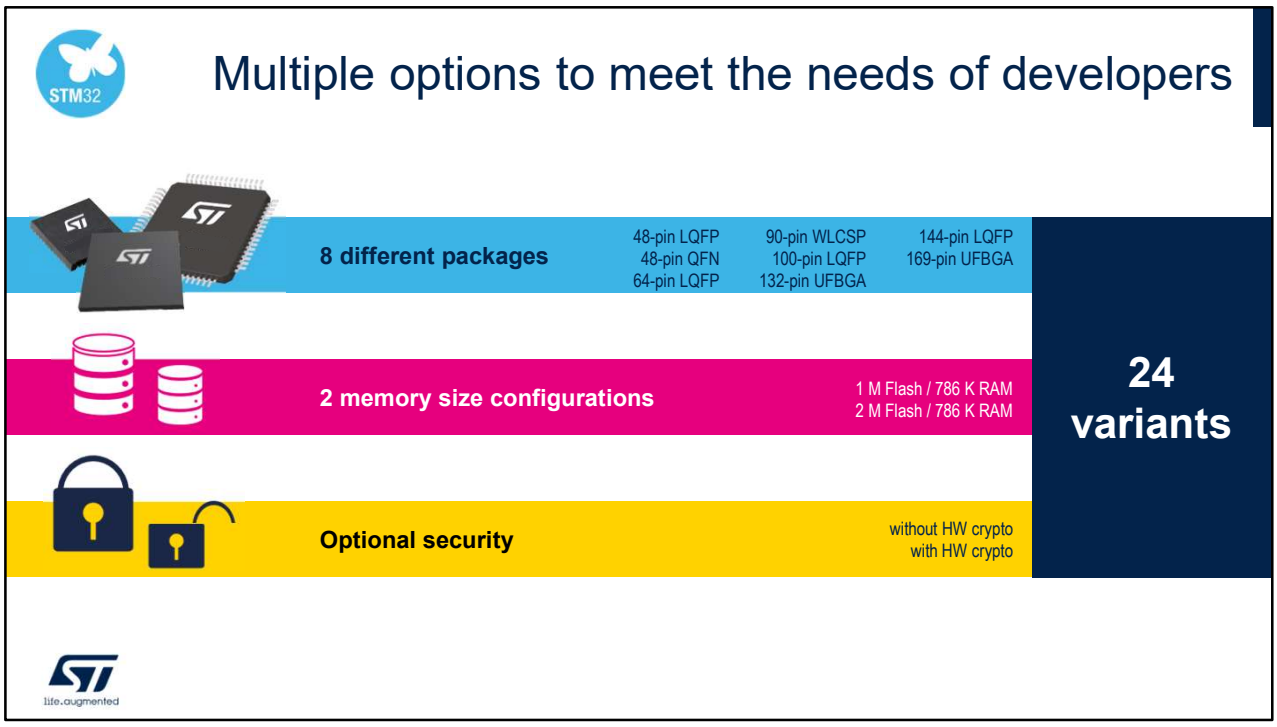
The STM32U5 increases the level of security. It is the first microcontroller certified PSA level 3 and SESIP assurance level 3.

Building on the cyber security features of the STM32L5 MCU, with its Arm Cortex-M33 core that incorporates Arm's TrustZone® technology and an ST-specific security feature set, the STM32U5 series introduces state-of-the-art innovations:

•AES encryption and Public Key Accelerator (PKA) are now side-channel hardware- resistant

•Secure data storage with a Hardware Unique Key (HUK)

•Active tamper detection. Internal monitoring, that can erase secret data in the event of perturbation attacks, helps meet the PCI Security Standards Council (PCI SSC) requirements for Point Of Sales (POS) applications.



The STM32U5 series offers a large portfolio : 8 different packages from 48 to 169 pins, 2 Flash memory options 1MB or 2MB and optional hardware crypto acceleration.
You have the choice to select the best configuration for your application !