



Hello, and welcome to this introduction to the STM32C0 microcontroller series.

This short presentation describes the various lines available in the new STM32C0 series of entry-level microcontrollers for cost-sensitive applications.



# Introducing the STM32C0 ST's most affordable 32-bit MCU

Streamline costs without compromising performance



## Affordability

Helps you reduce costs thanks to an attractive price point and an optimized BOM



## Reliability

Benefits from proven STM32 quality & reliability



## Continuity

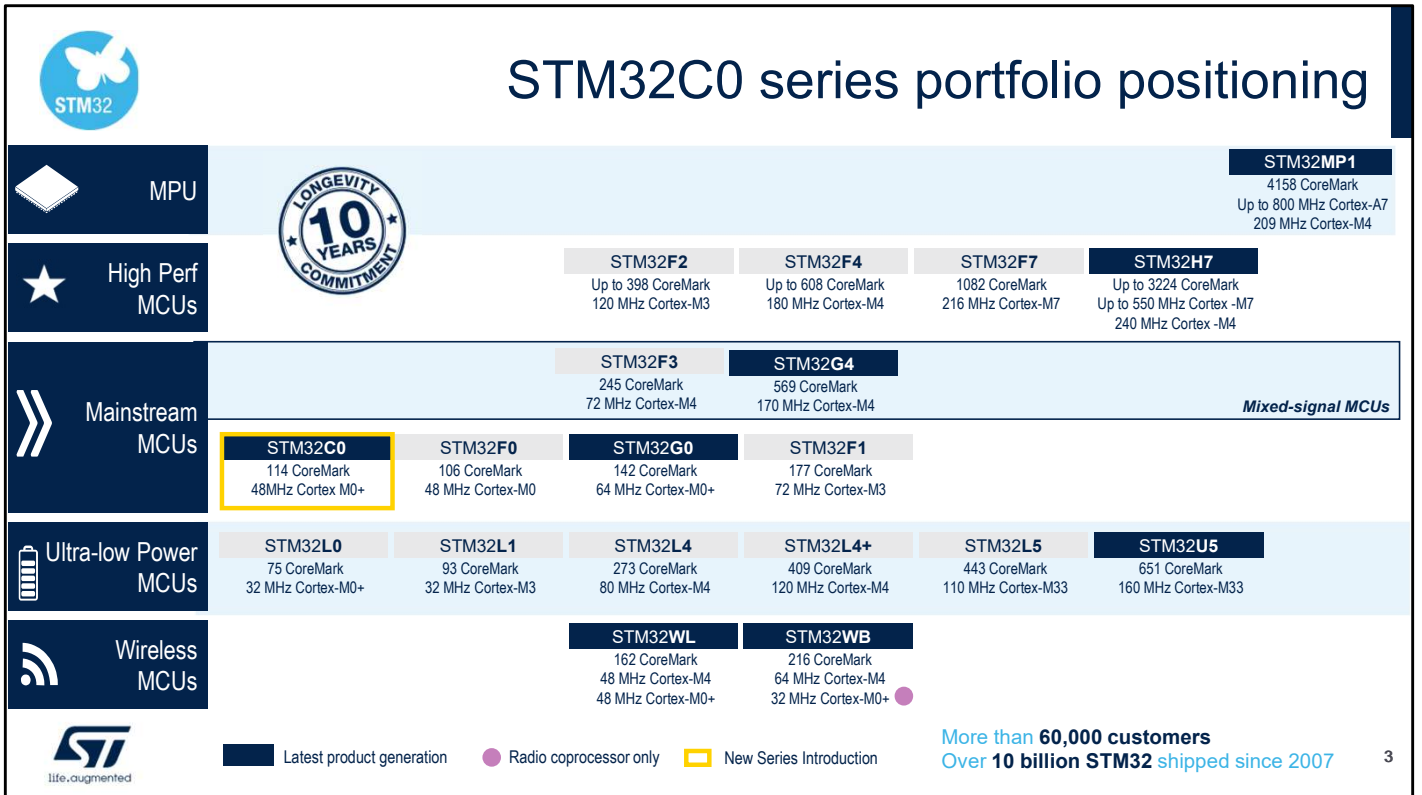
Consistent pinout with STM32G0  
Shares same technological platform



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The STM32C0 microcontrollers have been designed with the following objectives:

- Affordability: very low cost
- Reliability: Benefits from proven STM32 quality & reliability
- Continuity: consistent pinout with STM32G0, that simplifies the design of board and software targeting the two MCU families.



This slide summarizes the port-folio of MCUs and MPUs designed by ST Microelectronics. It is divided into 5 categories: MPU, high performance MCUs, mainstream MCUs, ultra low-power MCUs and wireless MCUs. The STM32C0 belongs to the mainstream MCU product line. This is an entry-level microcontroller that can run up to 48 MHz. Performance expressed in CoreMark is 114, which is slightly above the one of the STM32F0 Series.

## Perfect fit for applications typically served by 8-bit/16-bit MCUs

Smart home	Industrial devices	Consumer devices	
			
Fridges Ovens Coffee machines	Industrial pumps Fan control Circuit breakers	Smoke detectors Fire detectors Alarms	PC peripherals E-cigarettes Accessories



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The STM32C0 is based on an Arm Cortex-M0+ core, which is a 32-bit processor supporting a 4 GB flat address space. In terms of software design, this is much easier to manage than paging required by 8-bit and 16-bit processors. Thus, the STM32C0, due to its performance and low consumption, can efficiently replace 8-bit and 16-bit MCUs. Here is the list of typical applications, for which the STM32C0 can be appropriate:

- Smart Home, appliances such as fridges, ovens, coffee machines
- Industrial: alarm detectors, pumps, circuit breakers
- Consumer devices: PC peripherals and accessories, e-cigarettes

## Affordability



**Attractive price point**

- Most cost-effective STM32 MCU

**Compact**  
9 tiny packages down to:

- 3 x 3 mm 20-pin QFN
- WLCSP12
- 8-pin SO8N

**Reduced BOM costs**

- Smallest package: max I/O count
- Fewer surrounding components:
  - Accurate internal high-speed clock 1% RC
  - Only one power supply pair

ST logo: life.augmented

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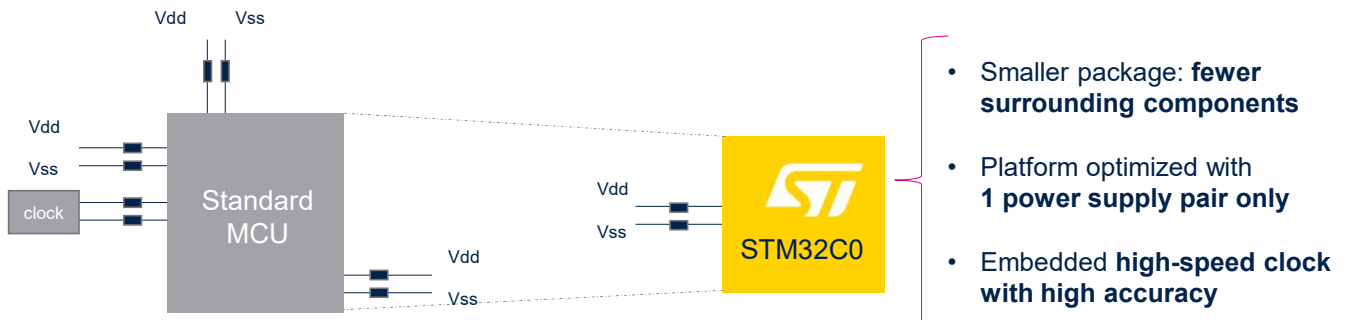
The STM32C0 is the most cost-effective STM32 MCU. It also contributes to reduce the BOM cost, because it requires fewer surrounding components: only one external power supply is necessary.

Clocks can be synthesized from an internal oscillator, which is 1% accurate and very stable over temperature. If a more accurate clock is needed, an external crystal can be used as well.

ST offers these devices in nine packages, starting with 8-pin SO8N.

## Optimized BOM cost

The STM32C0 series lets designers do more with less



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Several innovations are coming with the STM32C0 Series to allow customer select the most compact microcontroller package with a minimum set of external components, thus reducing significantly the BOM cost:

- Only 1 power supply pair provide more IOs
- The embedded 1% accurate clock across a wide temperature range from 0°C to 90°C allows to remove external components
- 32 or 16- kilobyte flash and 12- or 6- kilobyte RAM fit into packages from 8-pin up to 48-pin.

# Compact Multiple packages



Low thickness and tiny

20-pin UFQFPN 3 x 3 mm

28/32/48-pin UFQFPN



Easy handling

SO8N  
TSSOP20  
LQFP32/ 48



Lowest thickness, tiniest form factor

WLCSP12  
1,42 x 2,08 mm

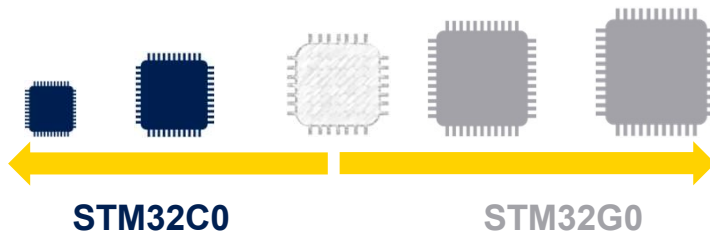
9  
packages



The STM32C0 supports a wide set of package types fitting different size and width requirements, such as WLCSP, TSSOP, SON, LQFP and UFQFPN packages.

# The STM32 Continuum

The STM32C0 series uses the same 90nm technology as STM32G0, ensuring high quality standards



- Arm® Cortex®-M0+ running at 48MHz
- Delivers 44 DMIPS instruction throughput with 114 CoreMark performance
- Continuum with STM32G0 series
  - Consistent pinout
  - Same IP platform
  - Same technology platform



**Safe in deliveries:** 10-year longevity program  
Renewed commitment every year

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The STM32C0 shares the same technological platform as the STM32G0.

Both are based on Arm Cortex-M0+ core, running up to 48 MHz.

They deliver 44 DMIPS instruction throughput with 114 CoreMark performance.

Continuity with STM32G0 family includes:

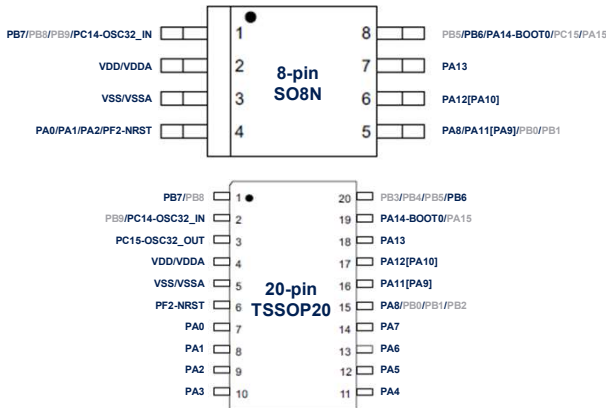
- Consistent pinout
- Same IP platform, enabling software reuse.
- Same 90 nanometer technology platform.

10-year longevity commitment program ensures continuous supply for 10 years.



# Easy porting with STM32G0

Consistent pinout with STM32G0 leaves room for future product upgrades



Consistent I/O footprint

Common pin location for alternate functions & system

Maximum I/O ratio vs pin count

## Common signals on STM32C011 and STM32G031

Legend: Common signals - STM32G031 only - STM32C011 only

The pinout of STM32C011 is consistent with STM32G031, as shown in the two figures, describing the 8-pin SO8N and 20-pin TSSOP packages.

Due to the unique VDD/VSS pair, these microcontrollers offer the maximum I/O ratio versus pin count.

Project migration between the two microcontroller families is facilitated, in terms of hardware and software design.

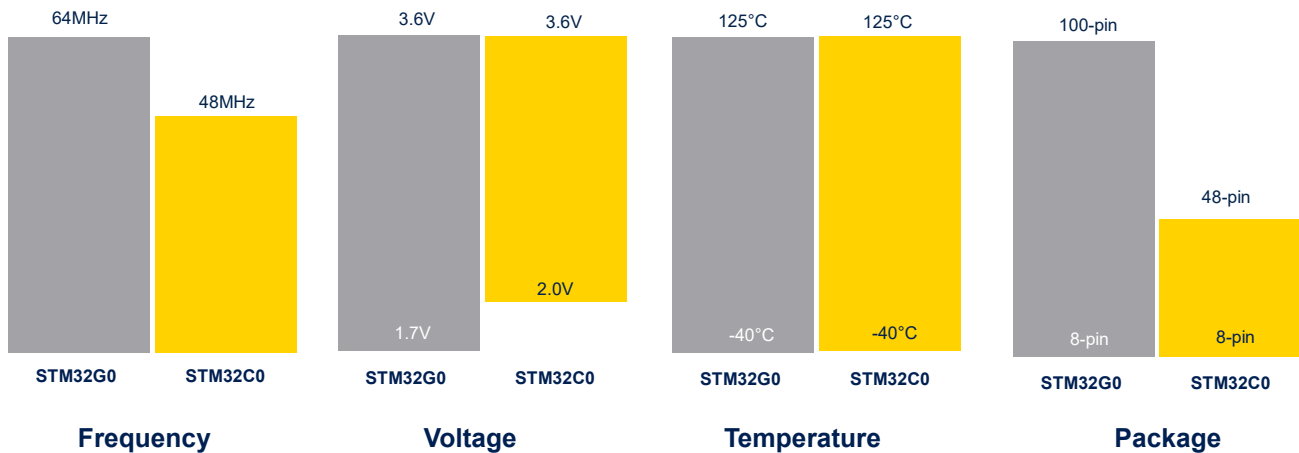
# Low-power modes for better efficiency

## Excellent dynamic consumption



Conditions: 25°C, V<sub>DD</sub> = 3V

## Performance benchmark STM32C0 & STM32G0

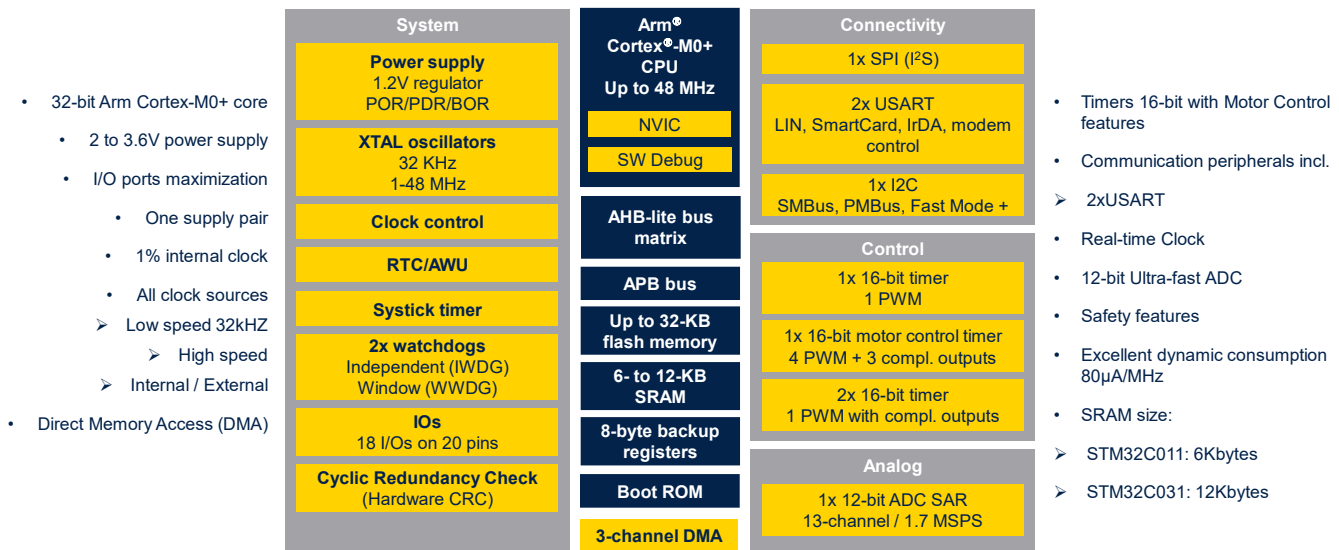


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This slide compares the STM32C0 and the STM32G0 according to 4 criteria:

- Maximum frequency
- Voltage range
- Temperature range
- Smallest and largest package.

# STM32C011 / C031 Block Diagram



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The STM32C0 integrates the following subsystems:

- System modules: PWR, RCC, RTC, Systick, GPIO, CRC and SYSCFG
- Processor modules: Cortex-M0+ core, MPU, NVIC, and Serial Wire debug
- DMA controller, supporting 3 channels
- Interconnect, based on an AHB-Lite matrix and an AHB-to-APB bridge
- Embedded memories: 16-or 32-Kbyte Flash memory + 12-or 6- Kbyte SRAM
- Control modules: one 16-bit timer that can be used to control a motor, two 16-bit timers with PWM capability and complementary outputs, one 16-bit timer with PWM
- Analog modules: temperature sensor, 12-bit ADC
- Connectivity modules: one SPI module also supporting I2S, two USARTs, one I2C controllers.

Most peripherals can request a DMA transfer to the DMAMUX

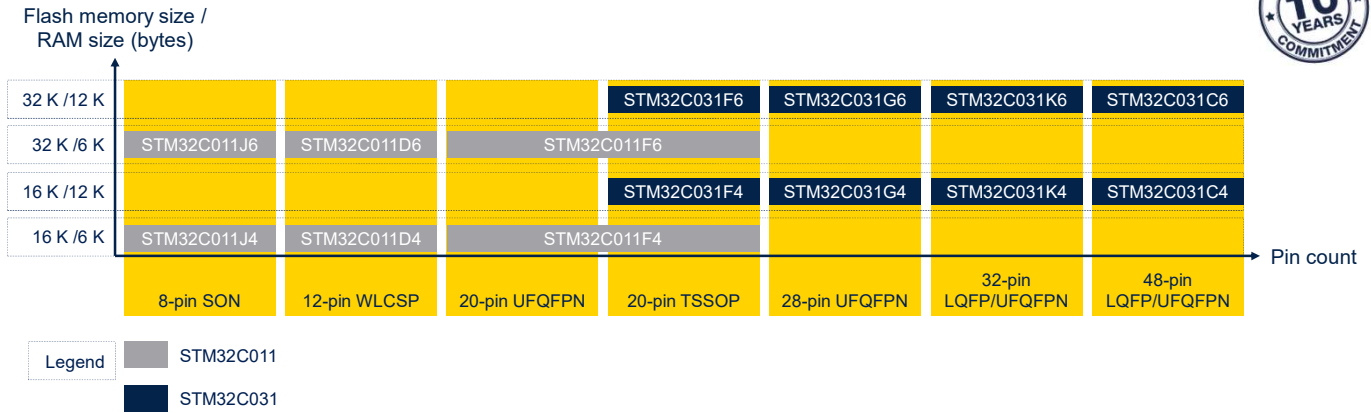
and then the DMA Controller in order to transfer data to/from SRAM or Flash memory.

For instance, characters received by USART1 can be transferred to a buffer in SRAM without software intervention, by relying on a DMA channel.



# STM32C0 portfolio

## Same feature-set, different RAM size and packages



This figure indicates for each STM32C0 particular reference:

- The size of integrated memories: flash and RAM
- The package.

# Thank you

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Thank you for attending this presentation!