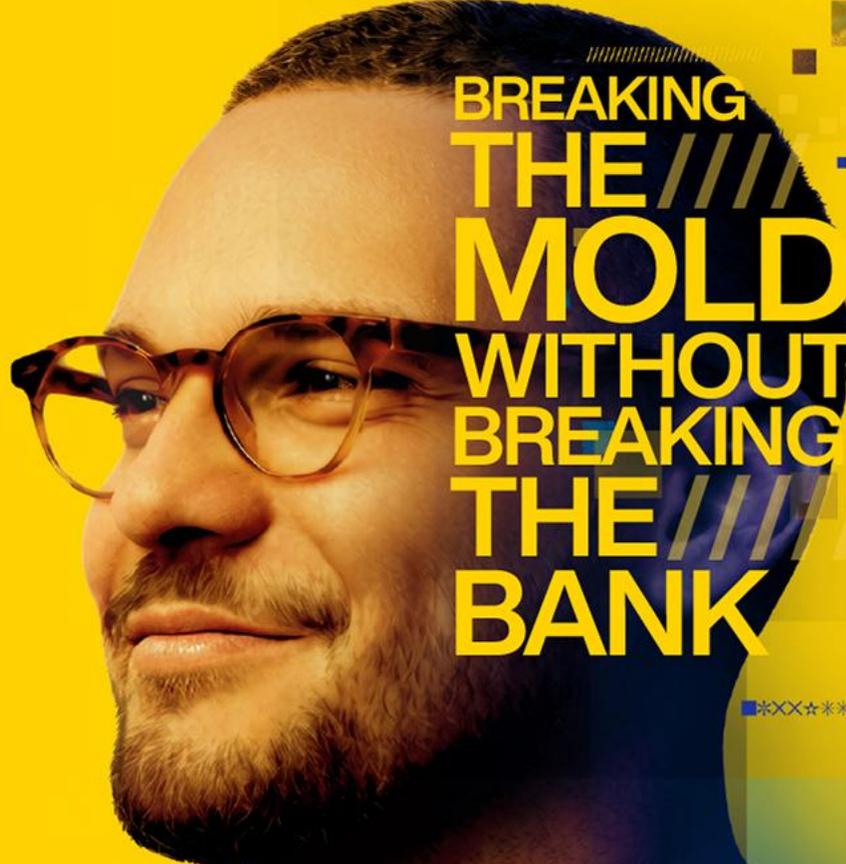




# STM32C5 microcontroller series

Upgrade your entry-level design  
without raising your budget





BREAKING  
THE  
MOLD  
WITHOUT  
BREAKING  
THE  
BANK

\*\*\*X\*~\*\*\*->>>>>

\*\*\*X\*~\*\*\*->>>>>

0101010101010



STM32C5 



# What the STM32C5 series offers



**Enhanced performance for  
developers and end device  
users**



**Without impacting  
end-product cost**



**Building on the foundation  
of the STM32 offering**



# 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 5,072 CoreMark score



Mainstream  
MCU



High-performance  
MCU



Embedded  
MPU

32- and 64-bit microprocessors



Enabling edge AI solutions



Scalable security

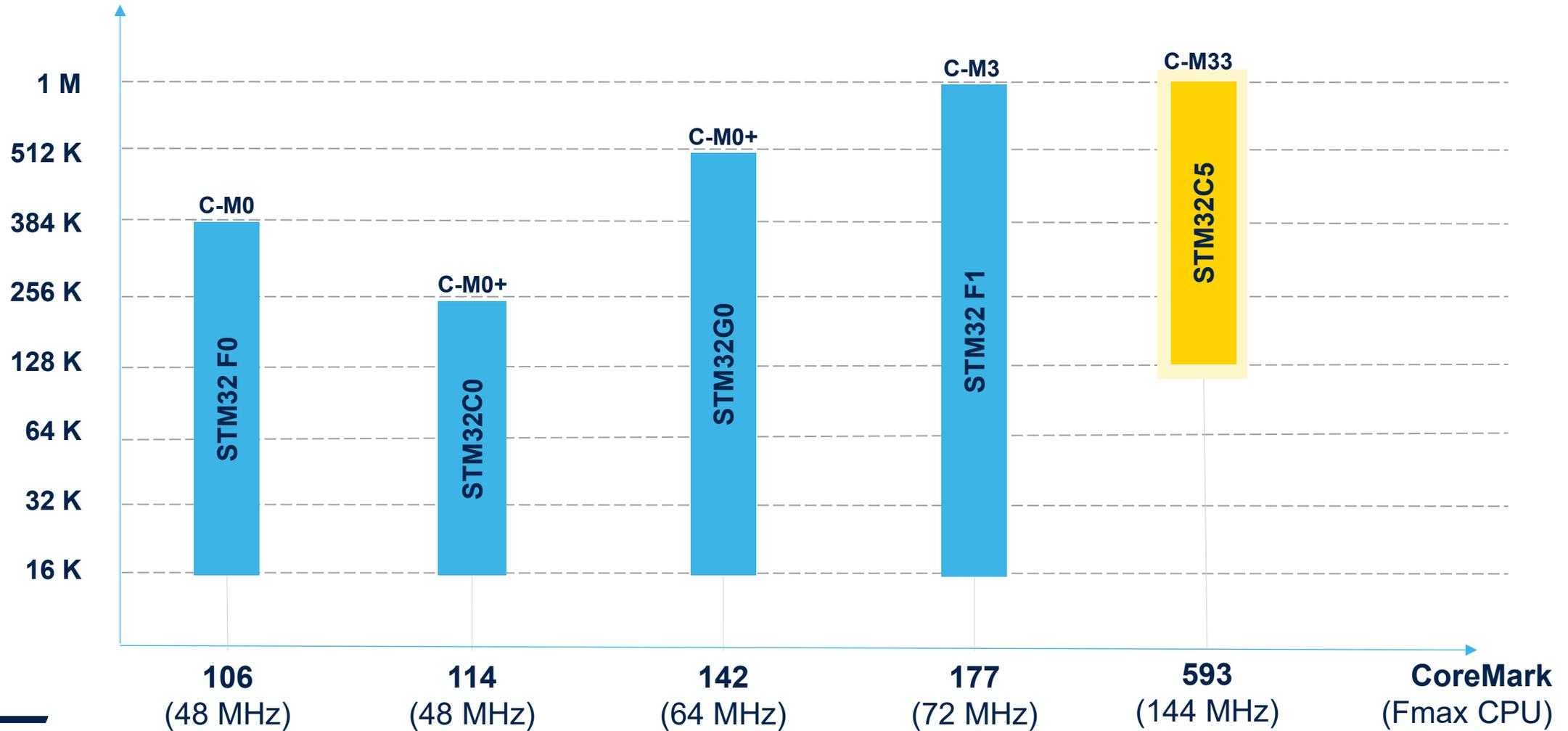


[MPU portfolio](#)  
[MCU portfolio](#)



# New STM32C5 series

Flash memory size (bytes)



# Expanding the potential of entry-level applications



## Smart homes & appliances

Home appliances, thermostats, smoke detectors, door locks, sensors



## Factory automation

Sensors, controllers, robotics, PLCs



## Entertainment

Gaming accessories, keyboards

# A modern platform

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Built on Arm® Cortex® -M33 core

Powered by ST's 40nm process

# Enabling a smooth design journey

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- **No external accelerators required**
  - Integrated floating-point unit simplifies software development & hardware division
  - Enhanced native DSP and math instructions
- Easier peripheral separation and software management thanks to **more flexible** interrupt vectors
- **Easier debugging** with improved trace features
- Boosted edge AI algorithms
- Cortex® -M33 is **supported by all major compilers**



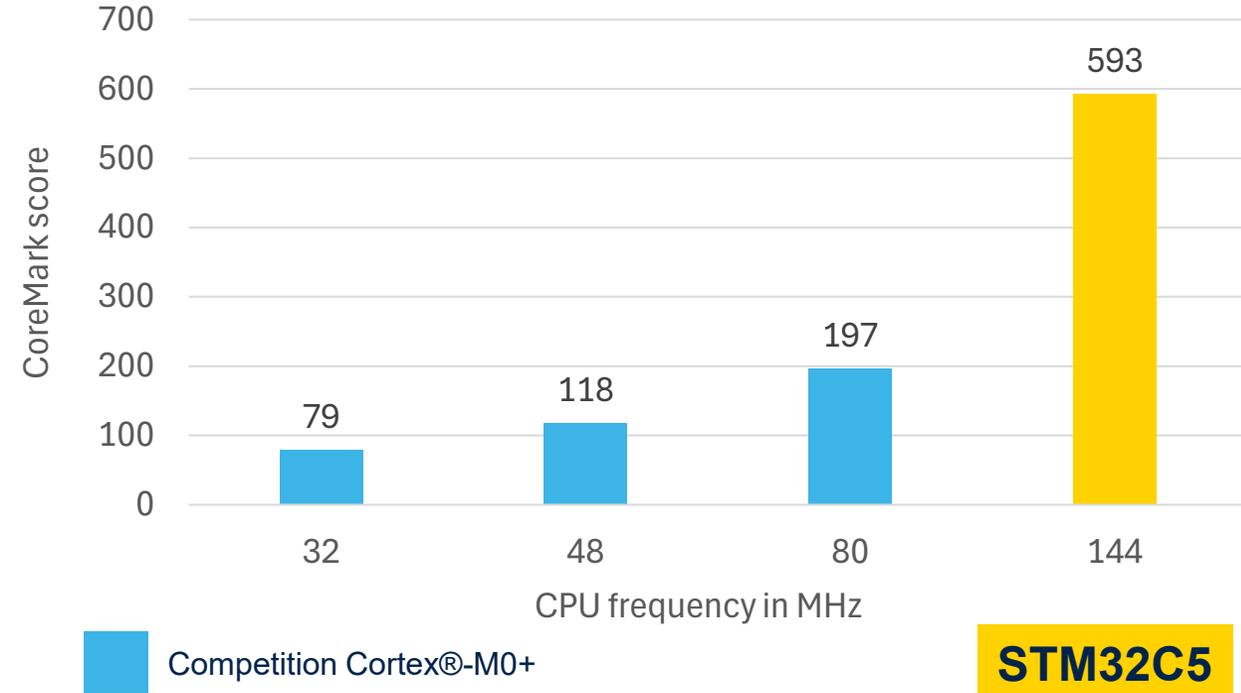
**512 Kbytes** of flash, **128 Kbytes** of SRAM,  
**64 pins**, starts at **\$0.87** for 10k units



# A modern core providing a performance leap for the entry range

	Cortex®-M0+	Cortex®-M33
Instruction set	Arm V6	Arm V8
FPU	-	Yes
Hardware divide	-	Yes
CoreMark/MHz	2.46	4.12
FIR filter (float32) perf	Reference	40x more performance
FIR filter (int32) perf	Reference	20x more performance
Flexible interrupt vectors	Up to 32 inputs	Up to 480 inputs

STM32C5 provides **three times more performance** than the competition Cortex®-M0+ in the market



# Reliable performance in industrial environments



## A robust platform and precise clock system

- Arm Cortex®-M33 core up to **144 MHz** with FPU, MPU, and flexible NVIC
- Up to **125°C** ambient temperature without performance penalty
- **1%** factory-calibrated internal oscillator between wide ambient temperature range from **-20 to 105°C**
- Multiple external clock sources including high-speed (HSE), low-speed (LSE), and internal oscillators for flexibility and redundancy
- Versatile analog features available (op amp, DAC, 12-bit ADC, comparator)

## Industrial interfaces and flexible memory

- More RAM available compared to typical Cortex-M0 +-based applications
- **OctoSPI** for external memory expansion
- Industrial-grade communication interfaces: **Ethernet, FDCAN, I3C**

## Security & safety

- Hardware security with side channel attack resistant crypto
- PSA Certified Level 3 & SESIP3 target certifications
- Ready for functional safety requirements



# Certified functional safety packages for STM32C5



[www.st.com/x-cube-stl](http://www.st.com/x-cube-stl)

## Robust performance and reliability in harsh conditions

- ECC on RAM and flash
- Brown-Out Reset
- Dual Watchdog

## SIL functional safety

- Ready for IEC 61508 systems up to SIL3
- FMEDA & FMEA, safety manual
- Certified STM32 Self-Test library

## Class B functional safety

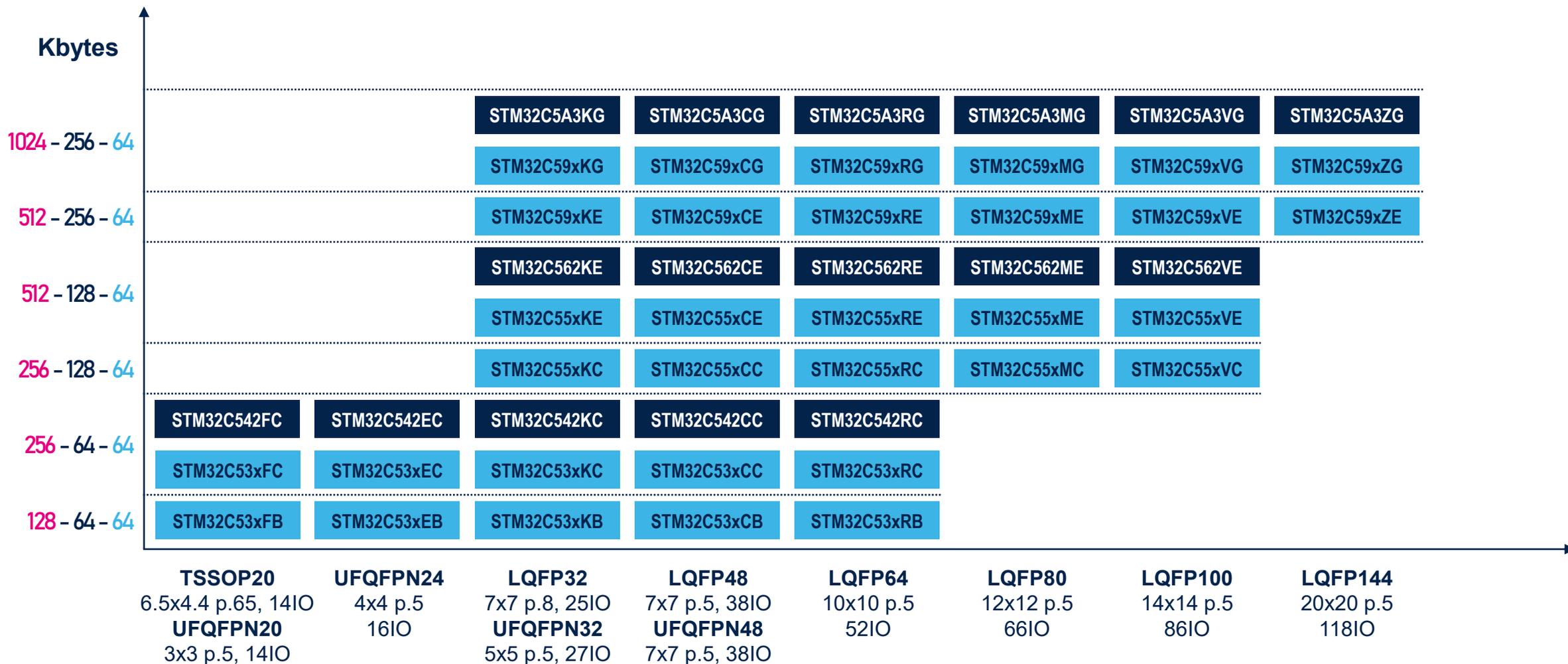
- IEC 60335-1/60730-1 Class-B
- Household electrical appliances
- Certified STM32 Self-Test library

# Find the right fit for your design thanks to a scalable portfolio

	STM32C531	STM32C532	STM32C542	STM32C551	STM32C552	STM32C562	STM32C591	STM32C593	STM32C5A3
<b>Flash size with ECC</b>	128 to 256 KB	128 to 256 KB	256 KB	256 to 512 KB	256 to 512 KB	512 KB	512 KB to 1 MB	512 KB to 1 MB	1 MB
<b>RAM size with ECC</b>	64 KB	64 KB	64 KB	128 KB	128 KB	128 KB	256 KB	256 KB	256 KB
<b>12-bit ADC</b>	1	1	1	2	2	2	3	3	3
<b>DAC/COMP</b>	2/2	2/2	2/2	1/1	1/1	1/1	1/1	1/1	1/1
<b>OPAMP</b>	1	1	1						
<b>Memory IF</b>							1x OctoSPI	1x OctoSPI	1x OctoSPI
<b>FDCAN</b>		2	2		1	1		2	2
<b>Ethernet 10/100Mbit</b>								Yes	Yes
<b>AES</b>			Yes			Yes			Yes
<b>HASH</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>SAES/SPKA, HUK, SCA, CCB</b>							SPKA verify	SPKA verify	Full config

# One new STM32 series. Multiple lines.

Flash - RAM - Flash area for software EEPROM emulation



Commercial part number availability in  $T_{ambient} = -40$  to  $85/125^{\circ}C$

Crypto line

Non-crypto

# STM32C53x/42 block diagram

**Arm® Cortex®-M33**  
**144 MHz**  
**593 CoreMark**

FPU, MPU, ETM  
 SW debug

8 KB - ICACHE

## Memory

256 KB flash  
 Dual Bank w/ ECC

64 KB SRAM w/ ECC

64 KB flash area for  
 software emulated  
 EEPROM

4.5 KB  
 OTP

128B bkp  
 RAM

## System

VDD 2.7-3.6V

32kHz LSE, LSI, HSE  
 144MHz HSI with internal  
 1% accuracy Ta=-20-105°C

RTC

## Connectivity

2x USART, 2x UART  
 1x LPUART

2x SPI

2x I2C, 1x I3C

1x USB FS

2x FDCAN <sup>(2)</sup>

## Security

AES 128/256 <sup>(1)</sup>

TRNG

HASH, OTP

96-bits unique ID

## Accelerators

DMA (4+4)

CORDIC, CRC

## Analog

1x 12-bit ADC  
 2.25MSPS

2x DAC12  
 w/ Buffer

2x COMP

1x OPAMP

## Timers

1x 32-bit GPTIM

2x 16-bit 7ch MCTIM

2x 16-bit GPTIM

2x 16-bit basic TIM

1x 16-bit LPTIM

IWDG, WWDG  
 SysTick

## Operation modes

Run, Sleep, STOP,  
 Standby

## Bootloader

UART, SPI, FDCAN, USB

## Operating temperature

T<sub>ambient</sub> -40 to 125°C

T<sub>junction</sub> 140°C

## Packages

QFP (0.5p) 32, 48, 64  
 QFN (0.5p) 20, 24, 32, 48  
 TSSOP20

Cortex-M33 for all entry products

Extensive memory

(1) Available on STM32C542 lines

(2) Available on STM32C532 and STM32C542 lines

# STM32C55x/62 block diagram

**Arm® Cortex®-M33**  
**144 MHz**  
**593 CoreMark**

FPU, MPU, ETM  
 SW debug

**8KB - ICACHE**

## Memory

512 KB flash  
 Dual Bank w/ ECC

128 KB SRAM w/ ECC

64 KB flash area for  
 software emulated  
 EEPROM

4.5 KB  
 OTP

128B bkp  
 RAM

## System

VDD 2.7-3.6V

32kHz LSE, LSI, HSE  
 144MHz HSI with internal  
 1% accuracy Ta=-20-105°C

RTC

## Connectivity

3x USART, 2x UART  
 1x LPUART

3x SPI

2x I2C, 1x I3C

1x USB FS

1x FDCAN (2)

## Security

AES 128/256 (1)

TRNG

HASH, OTP

96-bits unique ID

## Accelerators

2x DMA (8+4)

CORDIC, CRC

## Analog

2x 12-bit ADC  
 2.25MSPS

1x DAC12  
 w/ Buffer

1x COMP

## Timers

2x 32-bit GPTIM

2x 16-bit 7ch MCTIM

4x 16-bit GPTIM

2x 16-bit basic TIM

1x 16-bit LPTIM

IWDG, WWDG  
 SysTick

## Operation modes

Run, Sleep, STOP,  
 Standby

## Bootloader

UART, SPI, FDCAN, USB

## Operating temperature

T<sub>ambient</sub> -40 to 125°C

T<sub>junction</sub> 140°C

## Packages

QFP (0.5p) 32, 48, 64, 80,  
 100  
 QFN (0.5p) 32, 48

Cortex-M33 for all entry products

Extensive memory

(1) Available on STM32C562 lines

(2) Available on STM32C552 and STM32C562 lines

# STM32C59x/A3 block diagram

**Arm® Cortex®-M33**  
**144 MHz**  
**593 CoreMark**

FPU, MPU, ETM  
 SW debug

**8KB - ICACHE**

## Memory

1 MB flash  
 Dual Bank w/ ECC

256 KB SRAM w/ ECC

64 KB flash area for  
 software emulated  
 EEPROM

4.5 KB  
 OTP

128B bkp  
 RAM

## System

VDD 2.7-3.6V

32kHz LSE, LSI, HSE  
 144MHz HSI with internal  
 1% accuracy Ta=-20-105°C

RTC

## Connectivity

4x USART, 3x UART  
 1x LPUART

3x SPI

2x I2C, 1x I3C

1x USB FS

2x FDCAN (2)

1x OCTOSPI

ETH 10-100Mb (2)

## Security

SAES, AES 128/256 (1)

TRNG

HASH, OTP, HUK  
 SPKA, CCB

96-bits unique ID

## Accelerators

2x DMA (8+8)

CORDIC, CRC

## Analog

3x 12-bit ADC  
 2.25MSPS

1x DAC12  
 w/ Buffer

1x COMP

## Timers

4x 32-bit GPTIM

2x 16-bit 7ch MCTIM

4x 16-bit GPTIM

2x 16-bit basic TIM

1x 16-bit LPTIM

IWDG, WWDG  
 Systick

## Operation modes

Run, Sleep, STOP,  
 Standby

## Bootloader

UART, SPI, FDCAN, USB

## Operating temperature

T<sub>ambient</sub> -40 to 125°C

T<sub>junction</sub> 140°C

## Packages

QFP (0.5p) 48, 64, 80, 100,  
 144

QFN (0.5p) 32, 48

Cortex-M33 for all entry products

Extensive memory

More connectivity

(1) Available on STM32C5A3 lines

(2) Available on STM32C593 and STM32C5A3 lines

# Security on STM32C5



# Choose your STM32C5 based on your security strategy



## Advanced

Aim for a higher security level with side channel attack resistant crypto

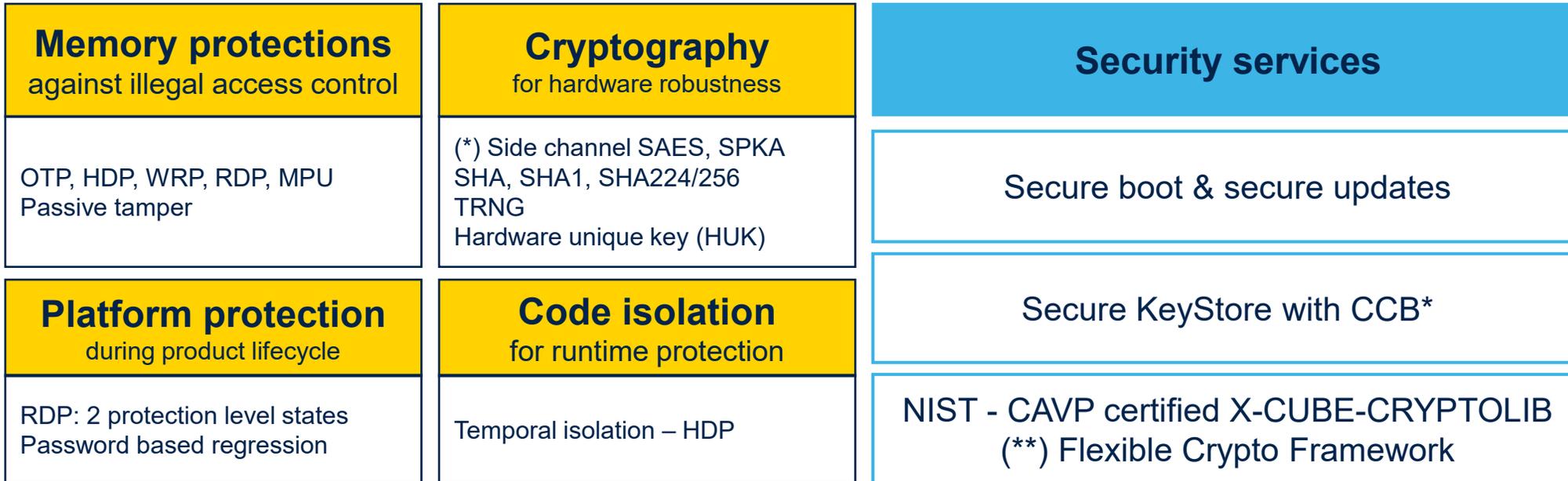
**STM32C59x/5A3**

## Focus on the essentials

Enable custom software security by using hardware features

**STM32C55x/562**  
**STM32C53x/542**

## Increasing security with digital identities



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

# Robust security to safeguard sensitive and mission-critical applications

More locked doors to ensure device security on STM32C59x/5A3

Enhanced device authentication and anticloning capabilities at a reduced cost

#1

## The coupling and chaining bridge (CCB) HAL

- Isolated Secure crypto engines with private key bus to chain crypto operations without involving CPU.
- Keeps keys hidden even from the CPU and securely stored.

#2

## Secure key storage

- Key wrapping with hardware unique key and CCB.
- Key isolation during life cycle with HiDeProtect.

Side-channel resistant hardware protection



Strong security for regulatory compliance, including CRA

SESIP3 and PSA Certified Level 3 Certification targets



**Tailored for entry-level graphics**



# STM32 hardware for entry-level graphics

Graphic performance	ENTRY LEVEL							
Display	SPI/Quad/OctoSPI and parallel display IF, G-RAM, touch, and no-touch							
STM32 MCU	STM32U0	STM32U3	STM32C0	STM32G0	STM32H503	STM32C5	STM32WBA	STM32WB
Development kits- TouchGFX supported	Nucleo-U083RC + X-NUCLEO-GFX01M2	Nucleo-U385RG-Q + RVA15MD*	Nucleo-C092RC + RVA15MD*/ X-NUCLEO-GFX01M2	Nucleo-G071RB + X-NUCLEO-GFX01M2	Nucleo-H503RB + X-NUCLEO-GFX01M2	NUCLEO-C5A3ZG + RVA15MD	Nucleo-WBA65RI + RVA15MD*	Nucleo-WB55RG + X-NUCLEO-GFX01M2
Main features <i>Max memory listed</i>	CM0+, 56 MHz 40 KB RAM 256 KB flash	CM33, 96 MHz 256 KB RAM 1000 KB flash	CM0+, 48 MHz 36 KB RAM 256 KB flash	CM0+, 64 MHz 144 KB RAM 512 KB flash	CM33, 250 MHz 32 KB RAM 128 KB flash	CM33, 144 MHz 64-256 KB RAM 128-1024 KB flash	CM33, 100 MHz 512 KB RAM 1000 KB flash	CM4, 64 MHz 256 KB RAM 1000 KB flash
Framebuffer details	Partial in internal RAM, starting from 6 KB					Full or partial in internal RAM		
Asset storage (flash memory)	Internal or External SPI	Internal or External(Q)SPI	Internal or External SPI	Internal or External SPI	Internal or External(Q)SPI	Internal or External (O)SPI	Internal or External SPI	Internal or External(Q)SPI

\*Riverdi add-on kit: RVA15MD, order from Riverdi sales channels: [1.54" STM32 Nucleo-64 display kit - Riverdi](#)



# STM32C5 tailored for entry-level GUIs

STM32 hardware

STM32 software



All STM32C5 Nucleo kits



Extension display from Riverdi



One-chip module from TSD

TouchGFX +



A complete STM32 software offer,  
free of charge

**Achieve STM32C5 design success with  
STM32Cube ecosystem**



# Helping developers release their creativity

## Develop faster

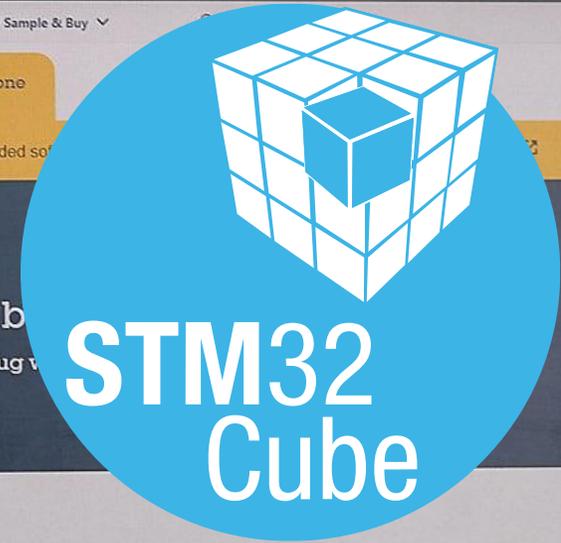
With STM32 code generation tools, IDE, and production-ready examples

## Stand out more

With optimized drivers leveraging all STM32 smart features

## Save costs

With free and permissive production licenses



# STM32Cube ecosystem

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

Evaluation		Large and affordable selection of evaluation kits
Getting Started		Efficient and intuitive MCU configuration with automatic code generation
Development and debug		Optimized drivers and ported middleware, full access to hardware features
		Extended selection of optimized middleware and part drivers
		Eclipse & VS Code options , C/C++ code editing, GCC & LLVM build, advanced debugging features, integrated code programming
Programming		Efficient and secure code and hardware option bytes programming
Monitoring		Graphical and non-intrusive code monitoring





# Achieve STM32C5 design success with the STM32Cube ecosystem

STM32CubeMX2 configuration tool,  
Optimized HAL2 and LL drivers, production-ready examples  
STM32CubeIDE and STM32CubeIDE for Visual Studio Code  
STM32CubeProgrammer and STM32CubeMonitor tools

**Available mid-March**



# Our technology starts with You



Find out more at [www.st.com/stm32c5](http://www.st.com/stm32c5)

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