STM32C0 series

Entry-level 32-bit MCU
for cost-sensitive applications

STM32

STM32

Five product categories

Wireless MCU	Ultra-low-power MCU	Mainstream MCU	High-performance MCU	Embedded MPU

Short- and long-range connectivity

32-bit general-purpose microcontrollers: from 75 to 3,224 CoreMark score

32- and 64-bit microprocessors

Enabling edge AI solutions

Scalable security

life.augmented

ST's most compact and affordable 32-bit MCU
Now supports USB and FDCAN

STM32**C0**

$ Affordable
Reduce costs thanks to an attractive price point and an optimized BOM. Starting at $0.21

Reliable
- Monitoring and diagnostic features for safe behavior
- High accuracy internal high-speed clock

Flexible
- Flexible function mapping for optimized layout
- Common platform & consistent pinout with STM32G0 for seamless migrations
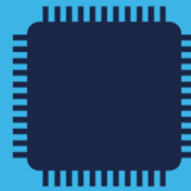
Perfect for applications typically served by 8-bit / 16-bit MCUs
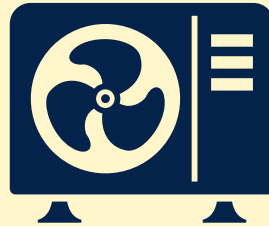
Smart homes	Industrial devices		Consumer devices
Fridges	Industrial pumps	Smoke detectors	PC peripherals
Ovens	Fan control	Fire detectors	Printers
Coffee machines	Circuit breakers	Alarms	& accessories

Built on the same 90 nm as STM32G0 for high quality

STM32C0

- Arm® Cortex®-M0+ running at 48 MHz

- Delivers 44 DMIPS instruction throughput with 114 CoreMark performance

- Continuum with STM32G0 series
  - Consistent pinout
  - Same IP platform
  - Same technology platform

Lower costs   **More performance**

Same platform
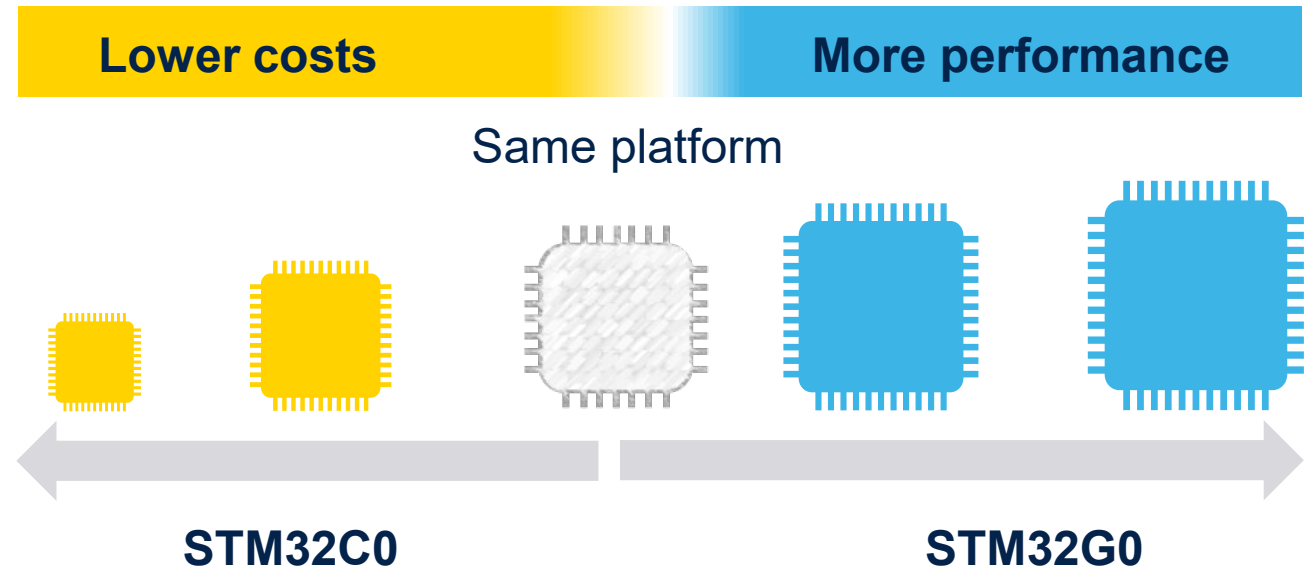
STM32C0   **STM32G0**

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

The STM32C0 series lets designers do more with less
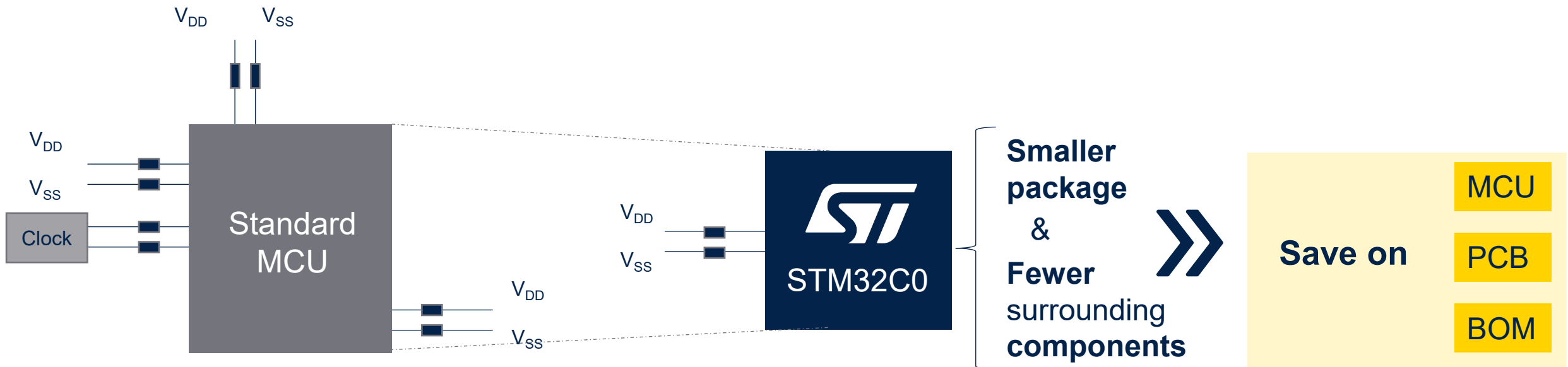
INSIDE
- High-speed **clock with high accuracy**
- **1 power supply pair only**

Easy porting with STM32G0

Consistent pinout with STM32G0 leaves room for future product upgrades

8 pins   64 pins   80 & 100 pins
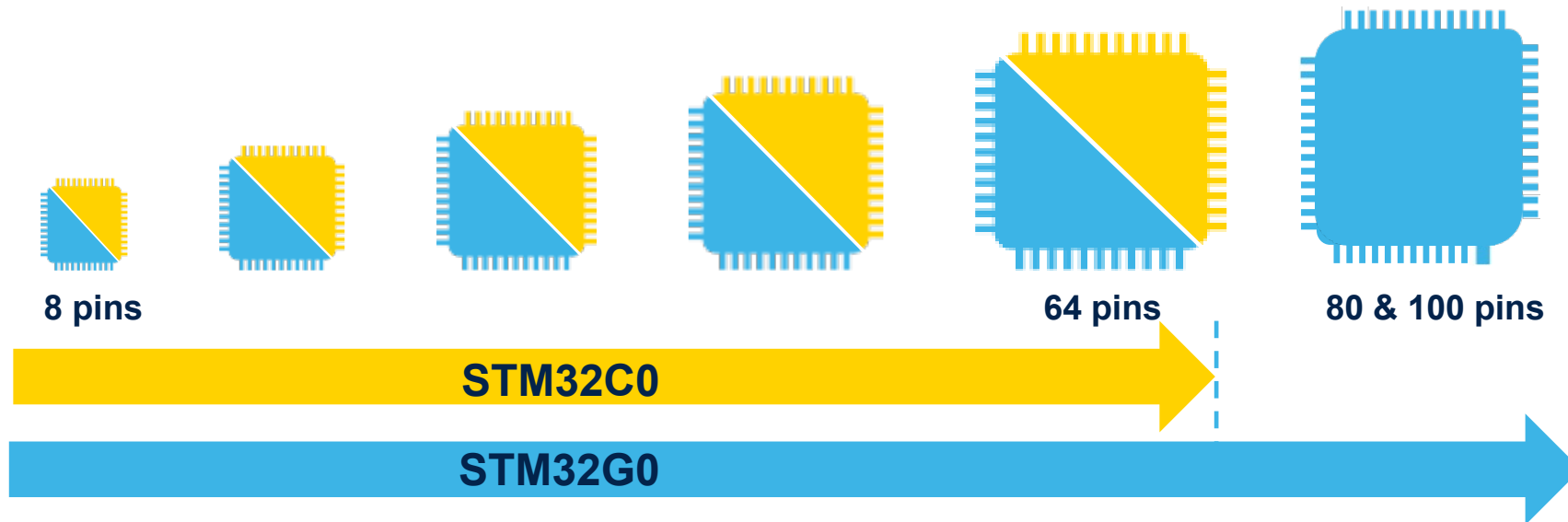
STM32C0

STM32G0

Consistent I/O footprint

Common pin location
to alternate functions & system

Maximum I/O ratio vs pin count

STM32C0 & STM32G0 feature comparison

	STM32G0	STM32C0
	90 nm platform	
	Clock +/- 1%	
	- 40 to 125 °C junction temperature	

SYSTEM		STM32G0	STM32C0
	Core frequency	64 MHz	48 MHz
	Flash memory	Up to 512 Kbytes	Up to 256 Kbytes
	RAM	Up to 144 Kbytes	Up to 36 Kbytes

POWER		STM32G0		STM32C0	
	Power supply	Down to 1.7 V		Down to 2.0 V	
	Power consumption	<5 µA stop	<1 µA standby	80 µA stop	8 µA standby

PACKAGES	STM32G0	STM32C0
	Pinout compatibility	
	8 to 100 pins	8 to 64 pins

TIMERS	STM32G0	STM32C0
	Advanced timer (MC) + timers 16-/32-bit	
	Low-power timer	N/A

CONNECTIVITY	STM32G0	STM32C0
	USART, FDCAN, USB, I²C, SPI	
	USB-C® Power Delivery, LPUART	-

ANALOG	STM32G0	STM32C0
	12-bit ADC	
	12-bit DAC comparators	-

STM32C0 low-power modes for better efficiency

Excellent dynamic consumption

Wake-up time	Mode	Consumption	Wake-up sources
385 µs	Shutdown	20 nA	Wake-up sources: reset pin, few I/Os
23 µs	Standby	8 µA	Wake-up sources: + BOR, IWDG
2.7 µs	Stop	80 µA	Wake-up sources: + RTC, all I/Os, I²C, UART
	Run at 48 MHz	80 µA / MHz	Wake-up sources: any interrupt or event

Conditions: 25°C, V_{DD} = 3 V

The latest additions to the STM32C0 series portfolio

The most compact STM32 MCU now offers more design options

Larger memory	More connectivity options	A wider selection of packages

128- and 256-Kbyte options

USB

FDCAN

More 64-pin packages

A growing portfolio

Flash memory size / RAM size (bytes)

	8-pin SON	12[1]/15[2]/19[3]-pin WLCSP	20-pin TSSOP	20-pin UFQFPN 24[4]-pin WLCSP	28-pin UFQFPN	32-pin LQFP/UFQFPN	48-pin LQFP/UFQFPN	64-pin LQFP/UFBGA
256 K / 30 K			STM32C092FC	STM32C092EC[4]	STM32C092GC	STM32C092KC	STM32C092CC	STM32C092RC
256 K / 36 K			STM32C091FC		STM32C091GC	STM32C091KC	STM32C091CC	STM32C091RC
128 K / 30 K			STM32C092FB		STM32C092GB	STM32C092KB	STM32C092CB	STM32C092RB
128 K / 36 K			STM32C091FB		STM32C091GB	STM32C091KB	STM32C091CB	STM32C091RB
128 K / 24 K		STM32C071FB[3]			STM32C071GB	STM32C071KB	STM32C071CB	STM32C071RB
64 K / 24 K			STM32C071F8		STM32C071G8	STM32C071K8	STM32C071C8	STM32C071R8
64 K / 12 K		STM32C051D8[2]	STM32C051F8		STM32C051G8	STM32C051K8	STM32C051C8	
			STM32C051F6		STM32C051G6	STM32C051K6	STM32C051C6	
32 K / 12 K			STM32C031F6		STM32C031G6	STM32C031K6	STM32C031C6	
32 K / 6 K	STM32C011J6	STM32C011D6[1]	STM32C011F6					
16 K / 12 K			STM32C031F4		STM32C031G4	STM32C031K4	STM32C031C4	
16 K / 6 K	STM32C011J4		STM32C011F4					

Pin count

Legend: ⬛ Standard interfaces (light blue) ⬛ USB (dark navy) ⬛ FDCAN (yellow) ▭ New product introduction (pink outline)

STM32

LONGEVITY 10 YEARS COMMITMENT

13

Compact packages down to 1.70 x 1.42 mm

Easy handling

SO8N
TSSOP-20
LQFP32/ 48 / 64

Tiny format and low thickness

20-pin UFQFPN 3 x 3 mm
28/32/48-pin UFQFPN 4x4 to 7x7 mm
64-pin UFBGA 5 x 5 mm

Lowest thickness, tiniest form factor

WLCSP24, 19, 15, 12
Down to 1.70 x 1.42 mm

14 packages

STM32C011 / C031 block diagram

- 32-bit Arm® Cortex® -M0+ core
- 2 to 3.6 V power supply
- I/O ports maximization
- One supply pair
- 1% internal clock
- All clock sources
  - Low speed 32 kHz
  - High speed
  - Internal / external
- Direct memory access (DMA)

System

- Power supply
  1.2V regulator
  POR/PDR/BOR
- Xtal oscillator
  32 kHz + 1 ~ 48 MHz
- Internal RC oscillators
  32 kHz (±5%)
  + 48 MHz (1%)
- Clock control
- RTC
- Systick timer
- 2x watchdogs
  (independent and system)
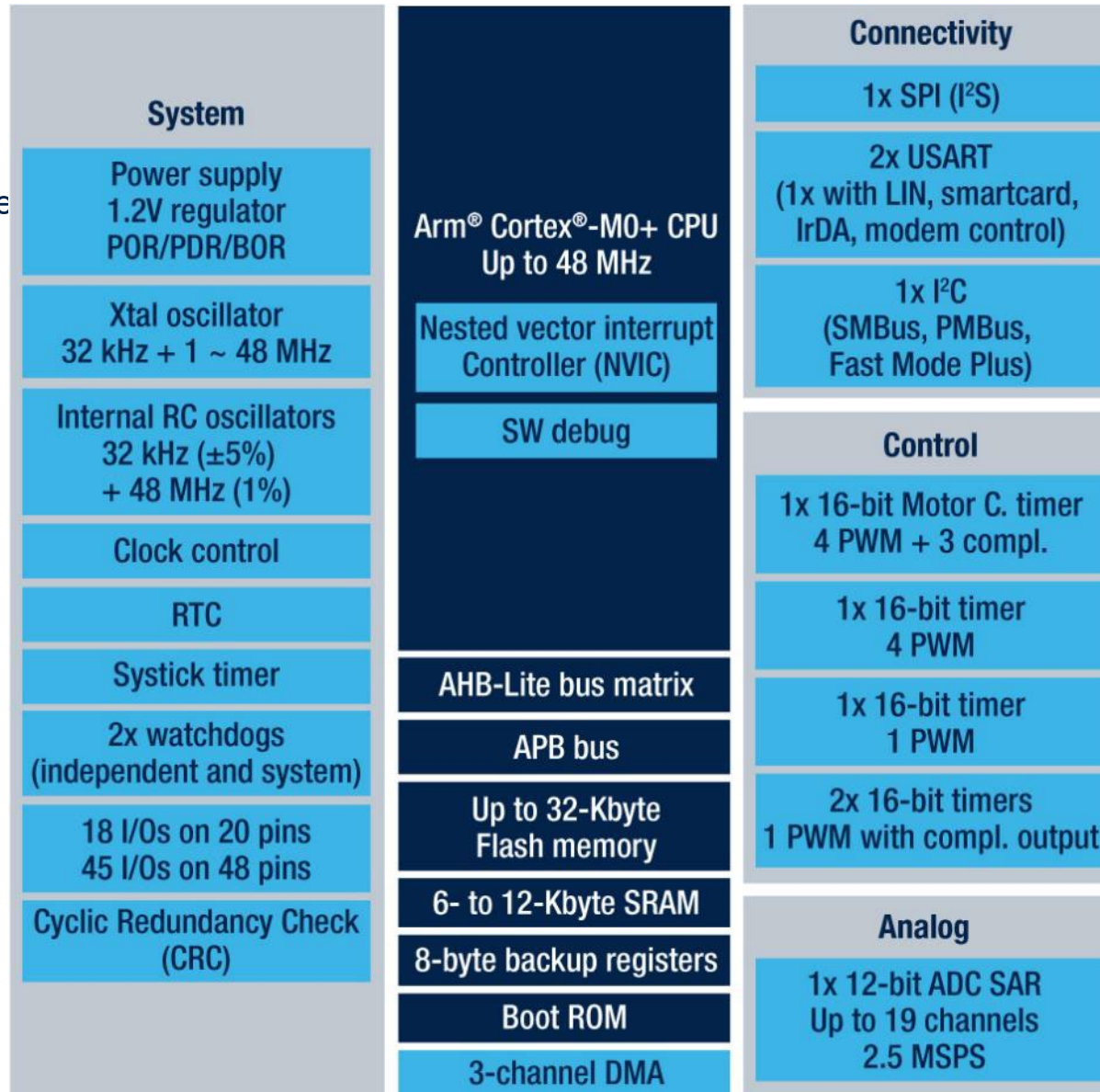- 18 I/Os on 20 pins
  45 I/Os on 48 pins
- Cyclic Redundancy Check
  (CRC)

Arm® Cortex®-M0+ CPU
Up to 48 MHz

Nested vector interrupt
Controller (NVIC)

SW debug

AHB-Lite bus matrix

APB bus

Up to 32-Kbyte
Flash memory

6- to 12-Kbyte SRAM

8-byte backup registers

Boot ROM

3-channel DMA

Connectivity

- 1x SPI (I²S)
- 2x USART
  (1x with LIN, smartcard,
  IrDA, modem control)
- 1x I²C
  (SMBus, PMBus,
  Fast Mode Plus)

Control

- 1x 16-bit Motor C. timer
  4 PWM + 3 compl.
- 1x 16-bit timer
  4 PWM
- 1x 16-bit timer
  1 PWM
- 2x 16-bit timers
  1 PWM with compl. output

Analog
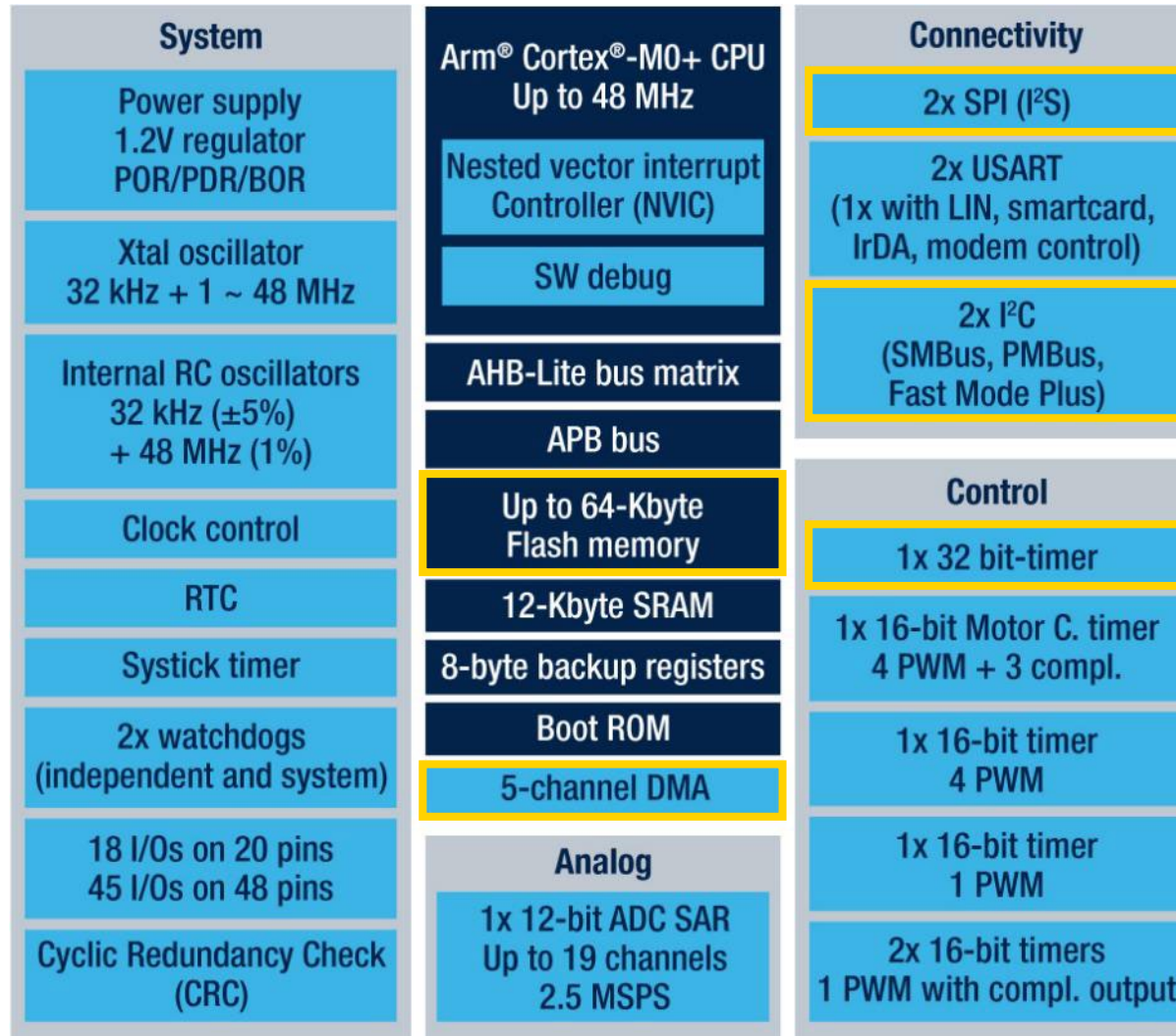
- 1x 12-bit ADC SAR
  Up to 19 channels
  2.5 MSPS

- Timers 16-bit with motor control feature
- Communication peripherals incl.
  - 2 x USART
- Real-time clock
- 12-bit ultrafast ADC
- Safety features
- Excellent dynamic consumption 80µA/MHz
- SRAM size:
  - STM32C011: 6 Kbytes
  - STM32C031: 12 Kbytes

STM32C051 block diagram

- 32-bit Arm Cortex®-M0+ core
- 2 to 3.6 V power supply
- I/O ports maximization
- One supply pair
- 1% internal clock
- All clock sources
  - Low speed 32kHZ
  - High speed
  - Internal / External
- Direct memory access (DMA)
- 20- to 48-pin packages

System
- Power supply 1.2V regulator POR/PDR/BOR
- Xtal oscillator 32 kHz + 1 ~ 48 MHz
- Internal RC oscillators 32 kHz (±5%) + 48 MHz (1%)
- Clock control
- RTC
- Systick timer
- 2x watchdogs (independent and system)
- 18 I/Os on 20 pins 45 I/Os on 48 pins
- Cyclic Redundancy Check (CRC)

Arm® Cortex®-M0+ CPU Up to 48 MHz
- Nested vector interrupt Controller (NVIC)
- SW debug
- AHB-Lite bus matrix
- APB bus
- Up to 64-Kbyte Flash memory
- 12-Kbyte SRAM
- 8-byte backup registers
- Boot ROM
- 5-channel DMA

Analog
- 1x 12-bit ADC SAR Up to 19 channels 2.5 MSPS

Connectivity
- 2x SPI (I²S)
- 2x USART (1x with LIN, smartcard, IrDA, modem control)
- 2x I²C (SMBus, PMBus, Fast Mode Plus)

Control
- 1x 32 bit-timer
- 1x 16-bit Motor C. timer 4 PWM + 3 compl.
- 1x 16-bit timer 4 PWM
- 1x 16-bit timer 1 PWM
- 2x 16-bit timers 1 PWM with compl. output

- Timers 16-bit with motor control feature
  - Additional 32-bit timer
- Communication peripherals incl.
  - 2 x USART
  - 2 x SPI
  - 2 x I²C
- Real-time clock
- 12-bit Ultrafast ADC
- Safety features
- Excellent dynamic consumption 80µA/MHz
- SRAM size:
  - STM32C051: 12 Kbytes

Yellow: upgrades vs STM32C031

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STM32C071 block diagram

System
- Power supply 1.2V regulator POR/PDR/BOR
- Xtal oscillator 32 kHz + 1 ~ 48 MHz
- Internal RC oscillators 32 kHz (±5%) + 48 MHz (1%)
- Internal RC oscillators 48 kHz (auto trimming on ext. synchro)
- Clock control
- RTC
- Systick timer
- 2x watchdogs (independent and system)
- 18 I/Os on 20 pins 45 I/Os on 48 pins
- Cyclic Redundancy Check (CRC)

Arm® Cortex®-M0+ CPU Up to 48 MHz
- Nested vector interrupt Controller (NVIC)
- SW debug
- AHB-Lite bus matrix
- APB bus
- Up to 128-Kbyte Flash memory
- 24-Kbyte SRAM
- 8-byte backup registers
- Boot ROM
- 5-channel DMA

Connectivity
- 1x USB FS Device X-less
- 2x SPI (I²S)
- 2x USART (1x with LIN, smartcard, IrDA, modem control)
- 2x I²C (SMBus, PMBus, Fast Mode Plus)

Control
- 1x 32 bit-timer
- 1x 16-bit Motor C. timer 4 PWM + 3 compl.
- 1x 16-bit timer 4 PWM
- 1x 16-bit timer 1 PWM
- 2x 16-bit timers 1 PWM with compl. output

Analog
- 1x 12-bit ADC SAR Up to 19 channels 2.5 MSPS

- 32-bit Arm Cortex®-M0+ core
- 2 to 3.6 V power supply
- I/O ports maximization
  - Secondary voltage domain as option
- One supply pair
- 1% internal clock
- All clock sources
  - Low speed 32kHZ
  - High speed
  - Internal / external
- Direct memory access (DMA)
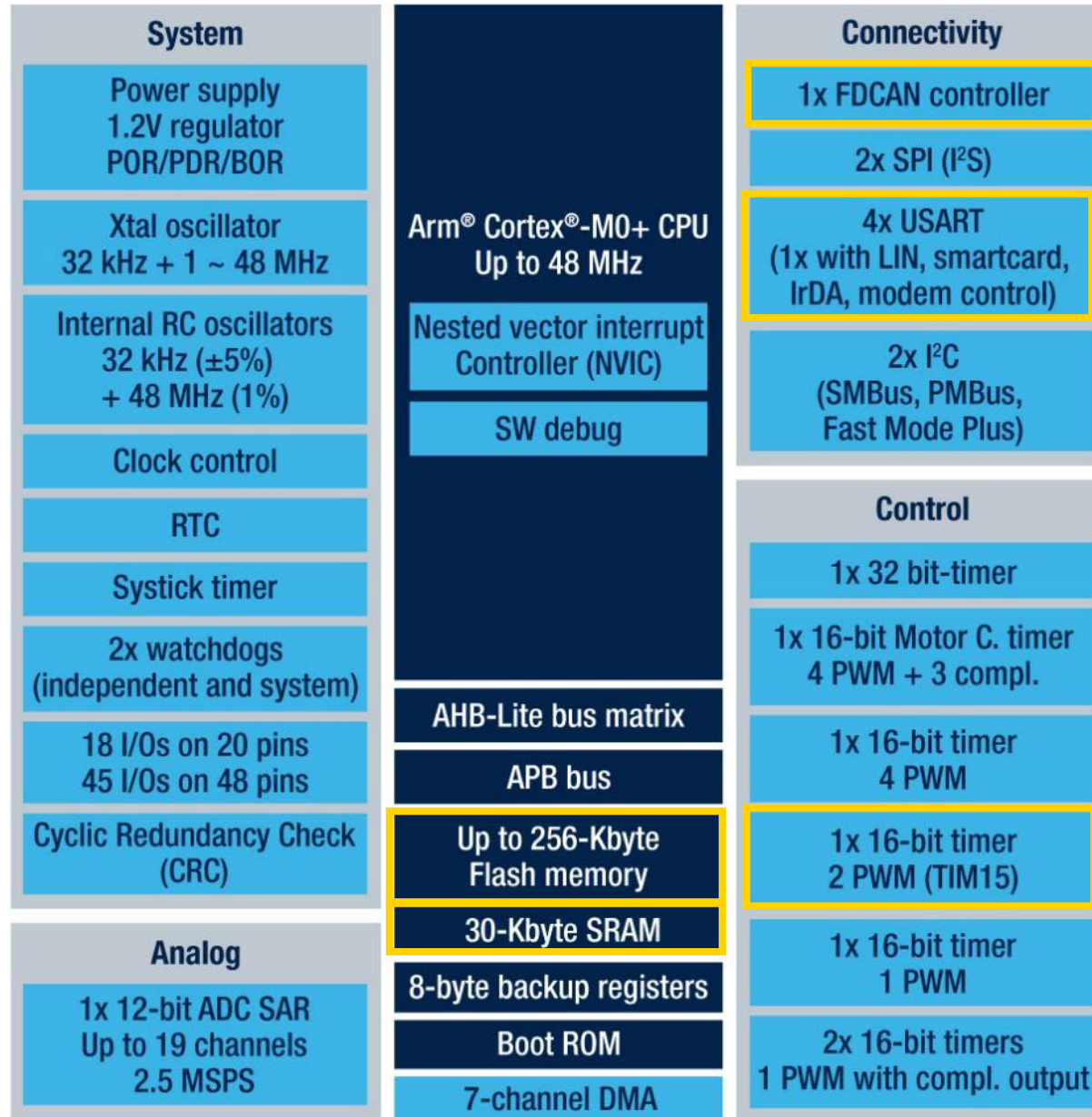- 20 to 64-pin packages
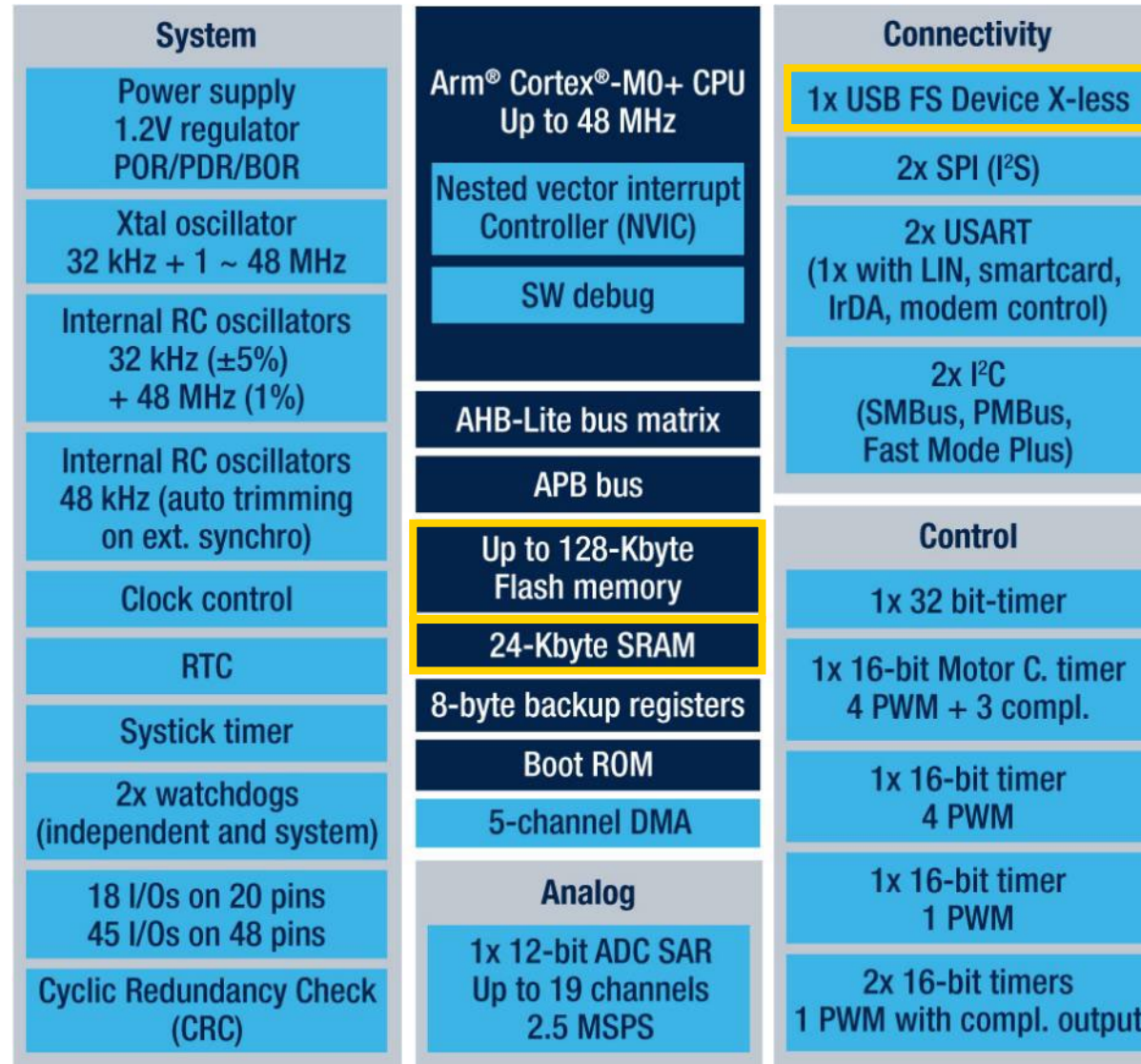
- Timers 16-bit with motor control features
  - Additional 32-bit timer
- Communication peripherals incl.
  - 2 x USART
  - 2 x SPI
  - 2 x I²C
  - USB FS device crystal-less
- Real-time clock
- 12-bit ultrafast ADC
- Safety features
- Excellent dynamic consumption 80µA/MHz
- SRAM size:
  - STM32C071: 24 Kbytes

Yellow: upgrades vs STM32C051

STM32C091 block diagram

- 32-bit Arm Cortex®-M0+ core
- 2 to 3.6 V power supply
- I/O ports maximization
- One supply pair
- 1% internal clock
- All clock sources
  - Low speed 32kHZ
  - High speed
  - Internal / external
- Direct memory access (DMA)
- 20 to 64-pin packages

System
- Power supply 1.2V regulator POR/PDR/BOR
- Xtal oscillator 32 kHz + 1 ~ 48 MHz
- Internal RC oscillators 32 kHz (±5%) + 48 MHz (1%)
- Clock control
- RTC
- Systick timer
- 2x watchdogs (independent and system)
- 18 I/Os on 20 pins 45 I/Os on 48 pins
- Cyclic Redundancy Check (CRC)

Analog
- 1x 12-bit ADC SAR Up to 19 channels 2.5 MSPS

Arm® Cortex®-M0+ CPU Up to 48 MHz
- Nested vector interrupt Controller (NVIC)
- SW debug
- AHB-Lite bus matrix
- APB bus
- Up to 256-Kbyte Flash memory
- 36-Kbyte SRAM
- 8-byte backup registers
- Boot ROM
- 7-channel DMA

Connectivity
- 2x SPI (I²S)
- 4x USART (1x with LIN, smartcard, IrDA, modem control)
- 2x I²C (SMBus, PMBus, Fast Mode Plus)

Control
- 1x 32 bit-timer
- 1x 16-bit Motor C. timer 4 PWM + 3 compl.
- 1x 16-bit timer 4 PWM
- 1x 16-bit timer 2 PWM (TIM15)
- 1x 16-bit timer 1 PWM
- 2x 16-bit timers 1 PWM with compl. output

- Timers 16-bit with motor control features (+ 1 timer vs STM32C071)
- Communication peripherals incl.
  - 4 x USART
  - 2 x SPI
  - 2 x I²C
- Real-time clock
- 12-bit ultrafast ADC
- Safety features
- Excellent dynamic consumption 80µA/MHz
- SRAM size:
  - STM32C091: 36 Kbytes

Yellow: upgrades vs STM32C071

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STM32C092 block diagram

- 32-bit Arm Cortex®-M0+ core
- 2 to 3.6 V power supply
- I/O ports maximization
- One supply pair
- 1% internal clock
- All clock sources
  - Low speed 32kHZ
  - High speed
  - Internal / external
- Direct memory access (DMA)
- 20 to 64-pin packages

System

- Power supply 1.2V regulator POR/PDR/BOR
- Xtal oscillator 32 kHz + 1 ~ 48 MHz
- Internal RC oscillators 32 kHz (±5%) + 48 MHz (1%)
- Clock control
- RTC
- Systick timer
- 2x watchdogs (independent and system)
- 18 I/Os on 20 pins 45 I/Os on 48 pins
- Cyclic Redundancy Check (CRC)

Analog

- 1x 12-bit ADC SAR Up to 19 channels 2.5 MSPS

Arm® Cortex®-M0+ CPU Up to 48 MHz

Nested vector interrupt Controller (NVIC)

SW debug

AHB-Lite bus matrix

APB bus

Up to 256-Kbyte Flash memory

30-Kbyte SRAM

8-byte backup registers

Boot ROM

7-channel DMA

Connectivity

- 1x FDCAN controller
- 2x SPI (I²S)
- 4x USART (1x with LIN, smartcard, IrDA, modem control)
- 2x I²C (SMBus, PMBus, Fast Mode Plus)

Control

- 1x 32 bit-timer
- 1x 16-bit Motor C. timer 4 PWM + 3 compl.
- 1x 16-bit timer 4 PWM
- 1x 16-bit timer 2 PWM (TIM15)
- 1x 16-bit timer 1 PWM
- 2x 16-bit timers 1 PWM with compl. output

- Timers 16-bit with motor control features (+ 1 timer vs STM32C071)
- Communication peripherals incl.
  - 4 x USART
  - 2 x SPI
  - 2 x I²C
  - FDCAN controller
- Real-time clock
- 12-bit ultrafast ADC
- Safety features
- Excellent dynamic consumption 80µA/MHz
- SRAM size:
  - STM32C092 (FDCAN): 30 Kbytes

Yellow: upgrades vs STM32C071

STM32C0 development ecosystem

STM32Cube framework

Take the full benefits of STM32C0 MCUs thanks to our tools and embedded software

Evaluation, prototyping, and selection	Hardware and software configuration	Application development and debug	Code and hardware options programming	Runtime application monitoring

STM32 Finder   **STM32 evaluation tools**   **STM32 Nucleo**

STM32 CubeMX

STM32 CubeMCU Packages   **STM32 CubeExpansion**   **STM32 CubeIDE**

&
Verticals and partner solutions

&
Partner IDEs

STM32 CubeProgrammer

&
Programmers from partners

STM32 CubeMonitor

Worldwide support channels

life.augmented

Supporting hardware boards: NUCLEO-C0xxx

Three new boards *$10.32

NUCLEO-C092RC
- 256 Kbytes of flash memory
- FDCAN function
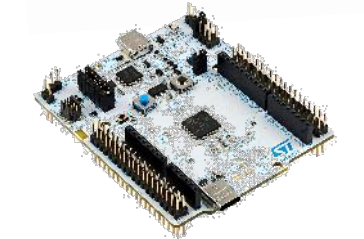
NUCLEO-C071RB
- 128 Kbytes of flash memory
- USB function
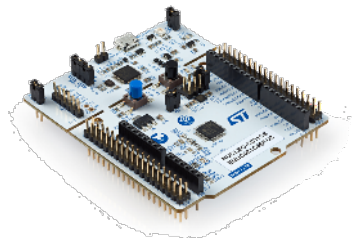
NUCLEO-C051C8
- 64 Kbytes of flash memory
- 48-pin package

+

Current boards

| $10.32 | $17 | $11 |

STM32 Nucleo with C031	Discovery kit for C031	Discovery kit for C011
Prototyping QFP48 NUCLEO-C031C6	**Mini evaluation board** Full voltage range 2.0 ~ 3.6 V Standalone fast STLinkV3-Minie STM32C0316-DK	**Ready to use wired sample** Daughter board QFN20/DIP20 STM32C0116-DK

*Recommended Resale Price (RRP)

STM32CubeC0 package - Drivers

Efficient and flexible access to the STM32 MCU features

LL drivers	HAL drivers
Lower abstraction level Higher optimization Direct peripheral hardware control Lower current consumption Lower code size	Higher abstraction level Higher portability and reuse Faster time to design Easier maintenance Relatively bigger code size

Full and optimized access to all STM32C0 peripherals and features

MISRA C compliant, statically analyzed, rigorously tested

Large number of production-ready reference examples projects

Available from st.com, GitHub, or STM32Cube tools

Download STM32CubeC0

STM32CubeC0 Package - Middleware

Faster development with ported selection of market reference middleware

Native middleware

AzureRTOS ThreadX
ThreadX CMSIS-OS wrapper
AzureRTOS USBX (Host and device)
Azure RTOS FileX and LevelX
Open bootloader
MCUBoot
Mbed-Crypto

Expansions packages

FreeRTOS™
ST USB (Host and device)
TouchGFX graphics solution
Mems and sensors
Functional safety self-test library

Porting leveraging STM32C0 MCUs features and architectures

A large set of applicative examples

Available from st.com, GitHub, or STM32Cube tools

Download
STM32CubeC0

Get STM32Cube
expansion packages

STM32C0 for entry-level graphics

Achieve modern displays with STM32C071

Replace traditional segment displays with modern graphical display solutions

- Smartphone-inspired user experience
- Low cost / BOM cost minimal increase
- Easy development with TouchGFX

STM32 Nucleo

NUCLEO-C071RB

Riverdi

TSD

X-NUCLEO-GFX01M2

Prototype with a full ST solution
2.2" SPI QVGA 320x240 display

Authorized Partner

Partner solutions

Extension display from Riverdi
RVA15AD-NUCLEO64A
1.54" SPI IPS 240 x 240 display
NUCLEO-64 board compatible

Knob display from TSD
1.3" round Knob 240 x 240 IPS display
"Turn and push" (no touch)
MCU: STM32G070

Fully supported in TouchGFX

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25

STM32CubeMX

Fast and easy project creation and initialization

STM32 CubeMX
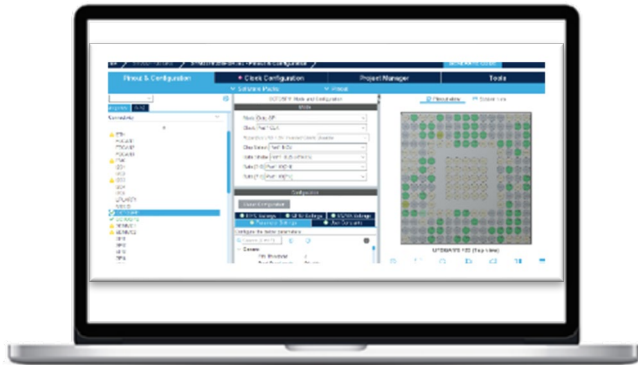
Pinout configuration and easy alternate functions setting

Clock tree initialization with automatic settings solver

Peripherals enablement and full features configuration

Middleware additions and configuration

Project generation for CubeIDE, Keil®, IAR, and CMake

Power consumption calculator

Download STM32CubeMX

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STM32CubeIDE

A free and user-friendly IDE to accelerate your development

STM32 CubeIDE **FREE**
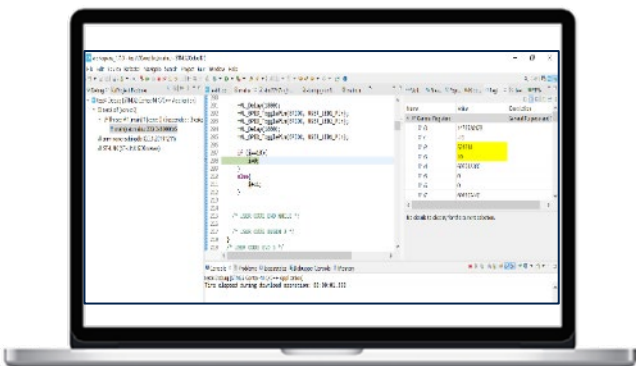
- C and C++ code edits
- CMake support
- GNU GCC-based compile and build
- Programming and debug though STLINK and J-link support
- Cortex®-M Core and peripheral register, memories, and variables view
- CPU fault analysis and SWV based system analysis and real-time tracing

Also supporting STM32C0 products

iar

Free

arm KEIL

Free

Visual Studio Code

Download STM32CubeIDE

Install the STM32 VS Code extension

Get free Arm® Keil® for STM32C0

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User-friendly hardware and software tools to simplify application development

STLINK portfolio

Debugging & programming

STLINK-V3MINIE

STLINK-V3PWR

ST-LINK/V2

STLINK-V3SET

STLINK-V3MODS

and expansion boards

STM32CubeProgrammer software tool

Code & hardware programming

STM32CubeProg

STM32 CubeProgrammer
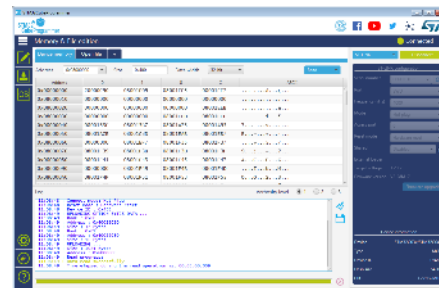
STM32HSM Hardware security module

Authentication & license generation

STM32HSM-V2

STM32HSM-V2
Secure programming for STM32

Third-party programming systems

From prototyping to mass production

ACROVIEW

DediProg

Data IO

Algocraft

BPM

eps

DATAMAN

HI-LO SYSTEMS

PE micro

RK-SYSTEM

Phyton

SECURE THINGZ

SEGGER
It simply works!

SMH Technologies

XELTEK

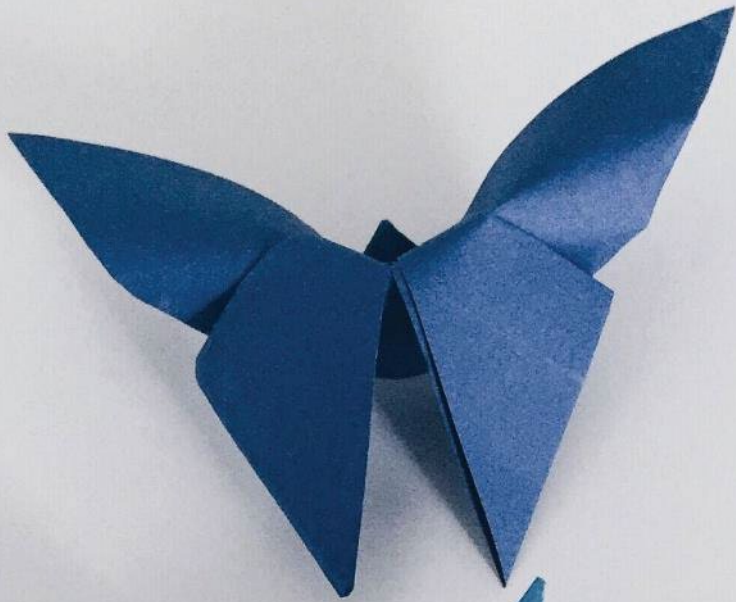# STM32CubeMonitor

Software tools to finetune application behavior at runtime and perform specialized code optimization

STM32CubeMonitor	STM32CubeMonitor-Power	STM32CubeMonitor-UCPD
Non-intrusive monitoring at runtime	Visualize dynamic energy consumption	Monitor USB Type-C® and power delivery apps

STM32 CubeMonitor

Third-party tracing / monitoring systems

From application diagnosis to code profiling

ARM KEIL Microcontroller Tools

iar

LAUTERBACH DEVELOPMENT TOOLS

percepio SENSING SOFTWARE

SEGGER It simply works!

Releasing your creativity

@STM32

@ST_World

community.st.com

www.st.com/stm32c0

wiki.st.com/stm32mcu

github.com/stm32-hotspot

www.st.com/mcu-developer-zone

STM32

Our technology starts with You

Find out more at www.st.com/STM32C0

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