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Optimization at its best with the STM32G0 entry-level Arm® Cortex®-M0+

STM32

Agenda

1. STM32G0 Overview – 25 mins
2. STM32CubeMx Overview & Library– 15 mins
3. STM32G0 Positioning – 10 mins
4. Q&A – 15 mins

STM32G0 Overview
Efficiency at its best

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STM32 Scalable Portfolio
STM32G0: Great **Investment**

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

LONGEVITY 10 YEARS COMMITMENT

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● Optimized for mixed-signal applications

● Cortex-M0+ Radio co-processor

Highlights of STM32G0 series

1

Efficient

- ARM Cortex M0+ at 64MHz
- Compact cost: maximum I/O count
- Best RAM/Flash Ratio
- Smallest possible package down to 8-pin

- Very low power consumption (3µA in stop, <100µA/MHZ in Run)
- Accurate internal high-speed clock 1% RC
- Best optimization, down to each and every detail
- Offers the best value for money

2

Robust

- Low electromagnetic susceptibility, EMC
- Clock Monitoring and 2 Watchdogs
- Error correction on Flash

- IoT ready with embedded security
- Hardware AES-256 encryption
- New Securable Memory Area
- Safe Firmware upgrade / Install

3

Simple

- Easy to configure thanks to the intuitive and graphical STM32CubeMX configuration tool

- Easy to develop based on the Hardware Abstraction Layer library (HAL) or the low-layer library (LL) allowing maximum re-use and faster time-to-market

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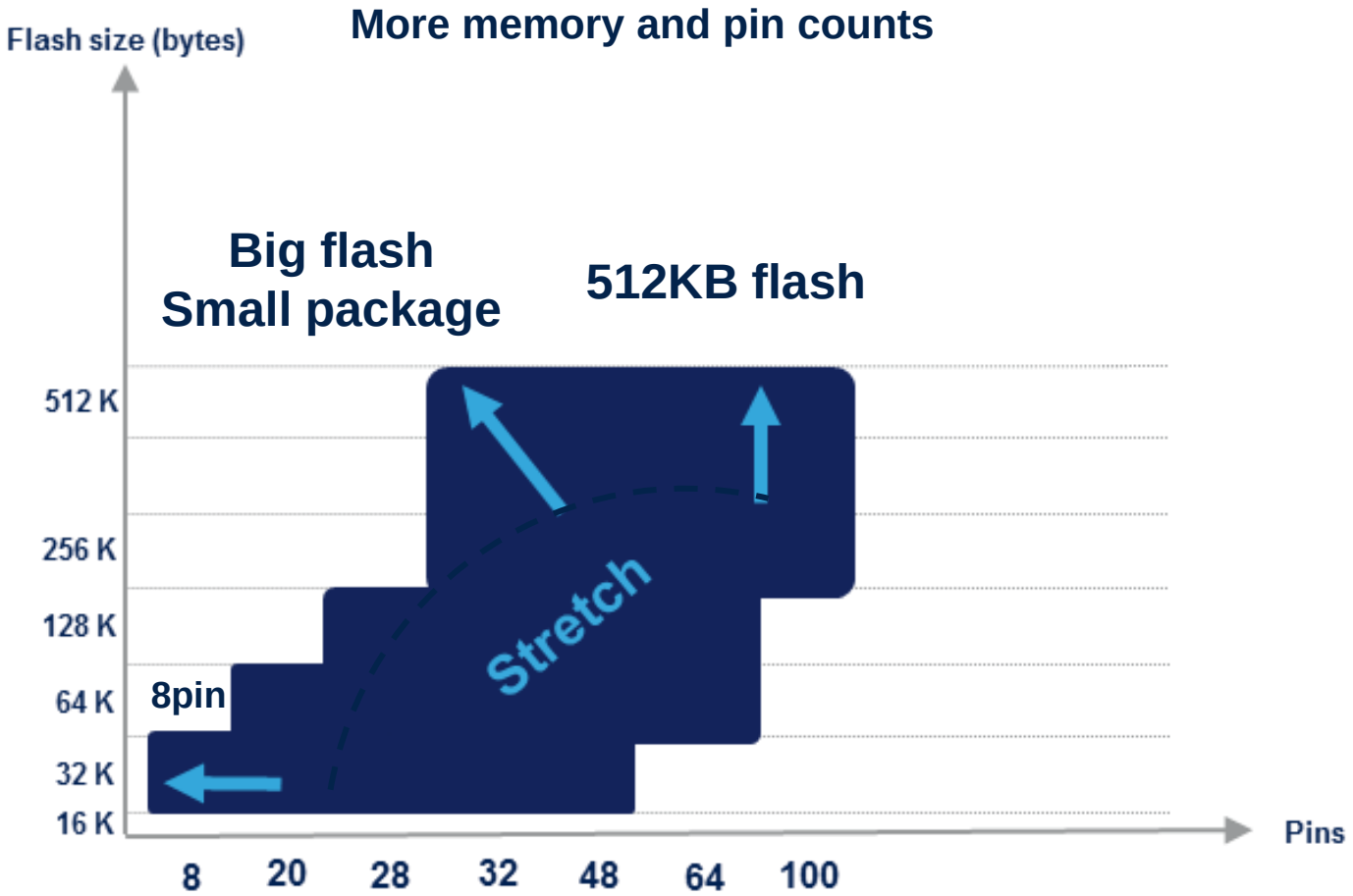
A scalable platform

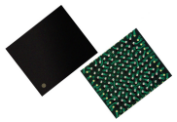
Portfolio stretched for cost-efficient applications



More packages


SO / TSSOP


WLCSP

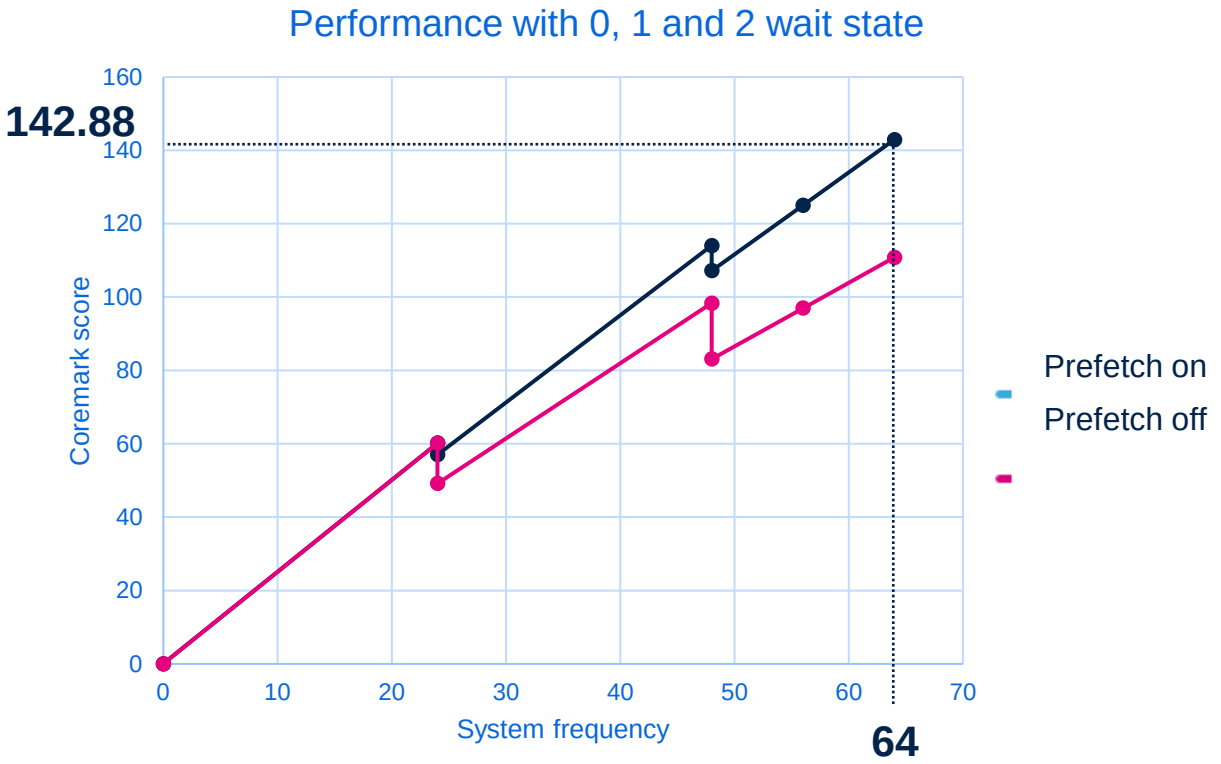

BGA


QFN


LQFP

Providing more performance

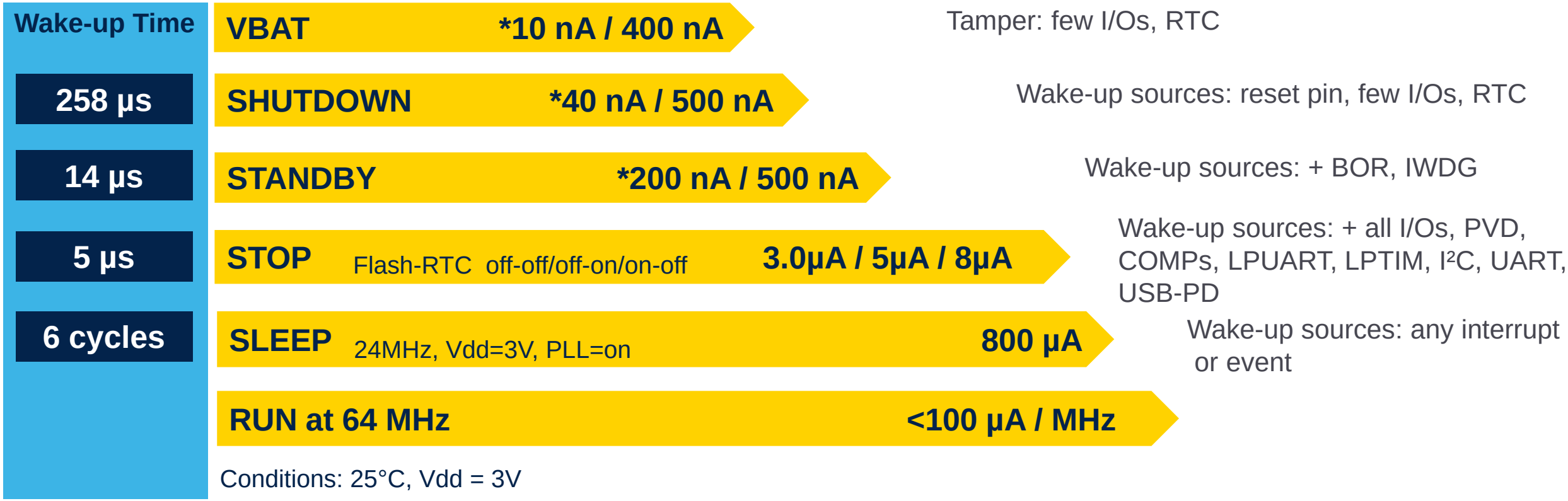
No compromise on performance with STM32G0



- **Up to 64** MHz/ **59 DMIPS**
- **Up to >142** CoreMark Result
- ARM Cortex-M0+ with Memory Protection Unit (MPU)
- Flexible **DMA** up to 7 channels

Low power modes efficiency

When Mainstream MCU Series meets low power requirements



Conditions: 25°C, Vdd = 3V

Note : * without RTC / with RTC

Use cases: Smart applications

Lighting

- High temperature 125°C
- Fast CPU 64MHz
- Advanced timers with high-resolution 7.8ns
- Fast comparators
- ADC-12bit, DAC-12bit
- Low-thickness packages
- AES & security for secure upgrades

Industrial devices
Motor control
Advanced control

Air conditioning, e-bikes, industrial equipments

- High temperature 125°C
- CANFD support
- SPI, USART, I²C
- Advanced timers with high-resolution 7.8ns
- Real Time Clock with backup registers
- AES & security for secure upgrades

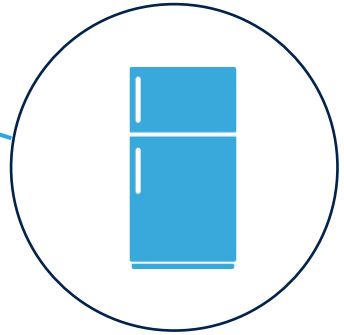
STM32G0

Consumer objects

Smartphones, IoT devices, rechargeable connected devices, drones, toys

- Low-thickness, small form-factor
- 64MHz CPU with DMA
- Low consumption in run and low-power, fast wake-up
- USB type-C Power Delivery 3.0
- USB FS 2.0 dev/host crystal-less

Smart Home



Home appliances, alarms and safety, advanced user interfaces

- High temperature 125°C
- Safety monitoring features
- More RAM for flash
- Low consumption <100µA/MHz in run

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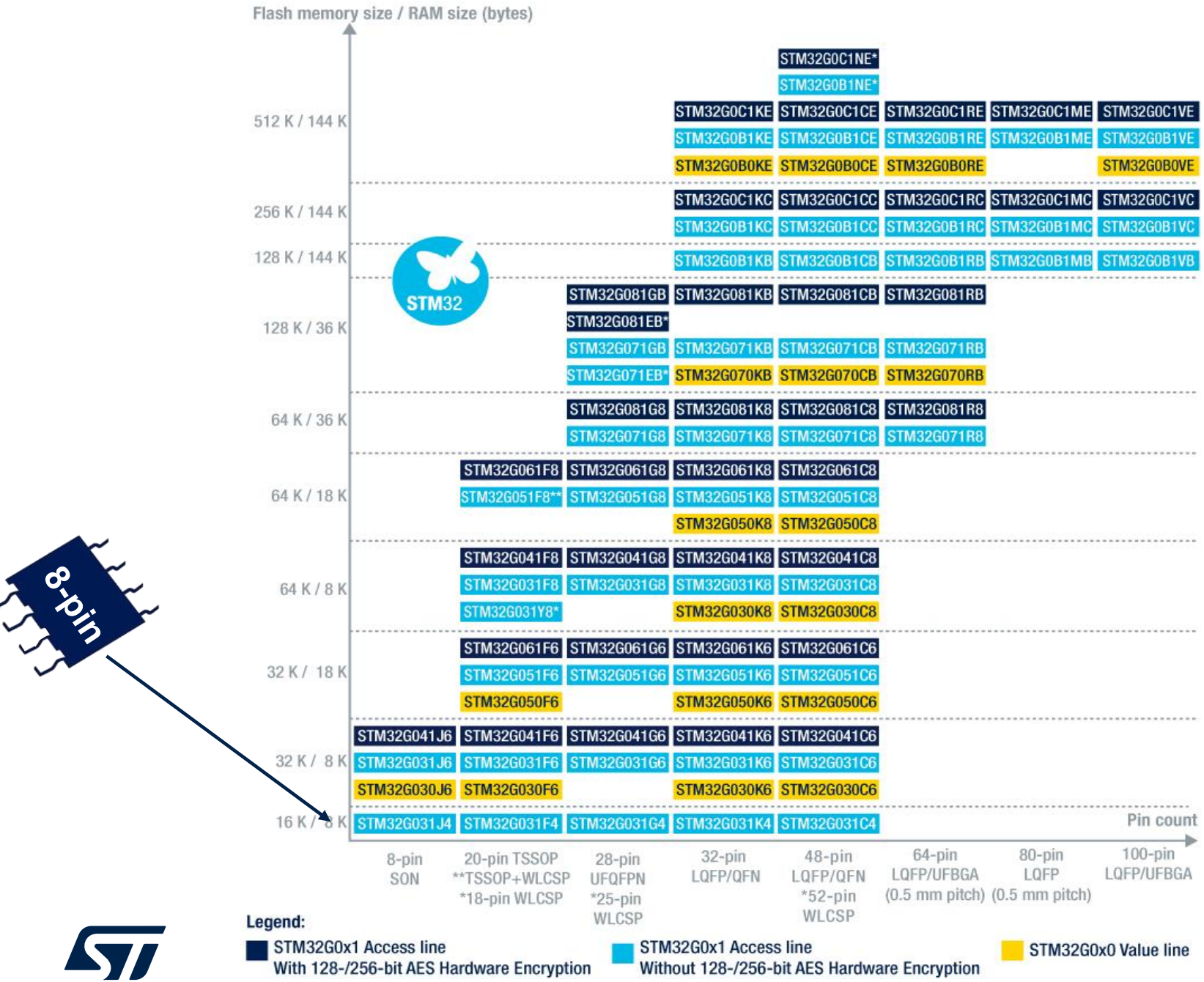
STM32G0 portfolio



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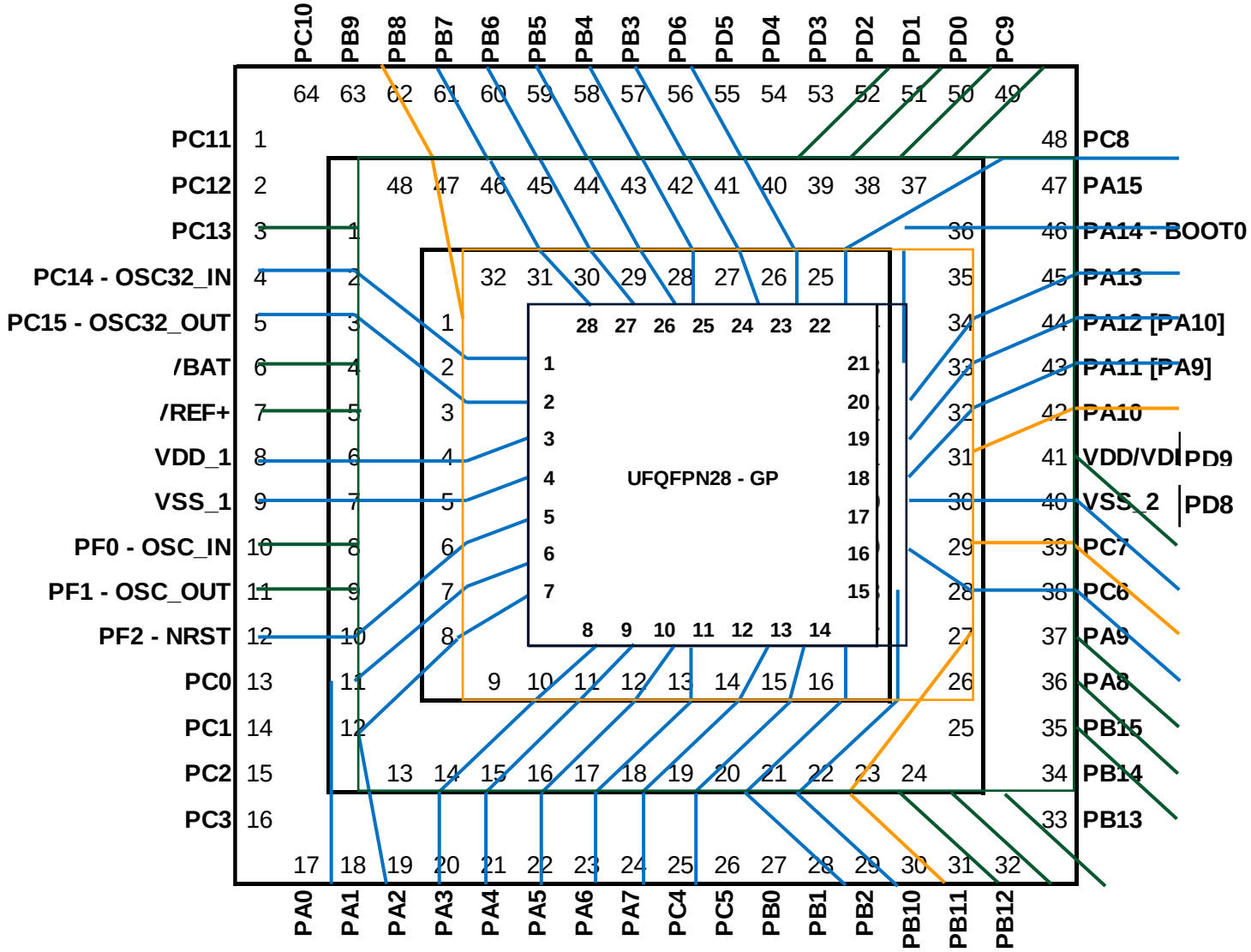
Consistent and optimized pinout

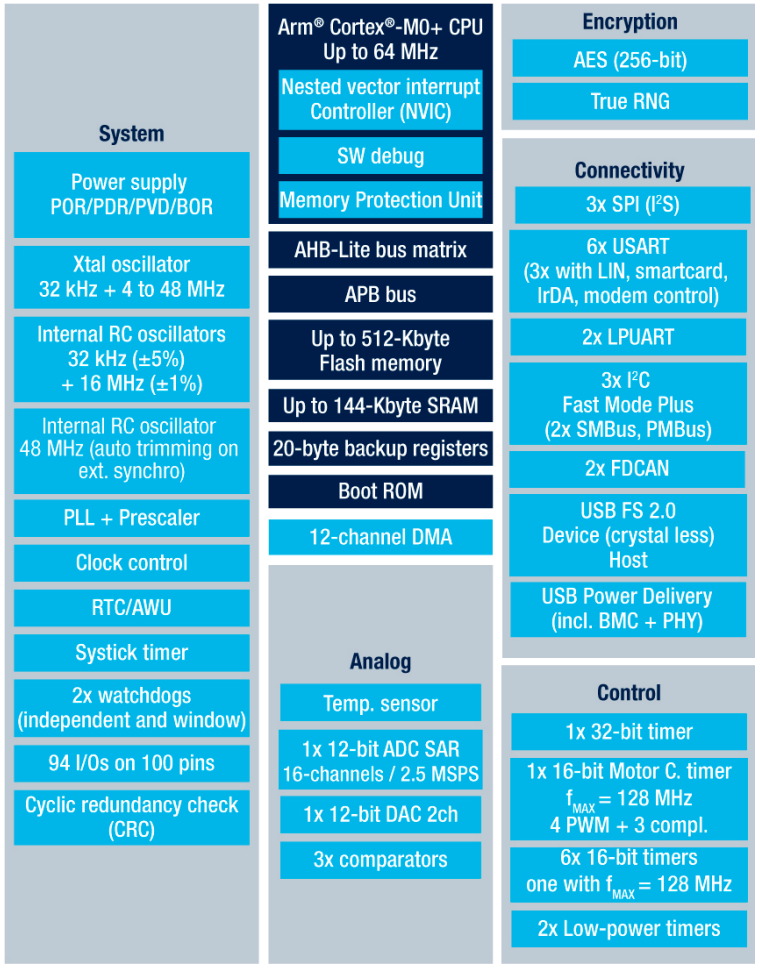


QFP64
QFP/QFN48
QFP/QFN32
QFN28

Access line

Advanced features and solutions

- 32-bit Arm Cortex-M0+ core
- 1.7 to 3.6V power supply
- RAM maximization
- 1% internal clock
- Direct Memory Access (DMA)
- Communication peripherals
- FDCAN peripherals
- USB-C Power Delivery
- USB FS 2.0 Device (crystal-less) and Host



- Timers up to 2xfcpu resolution
- Real-time Clock
- I/O ports maximization
- 12-bit Ultra-fast ADC
- 12-bit DAC
- Comparators
- Safety features
- Advanced Security features

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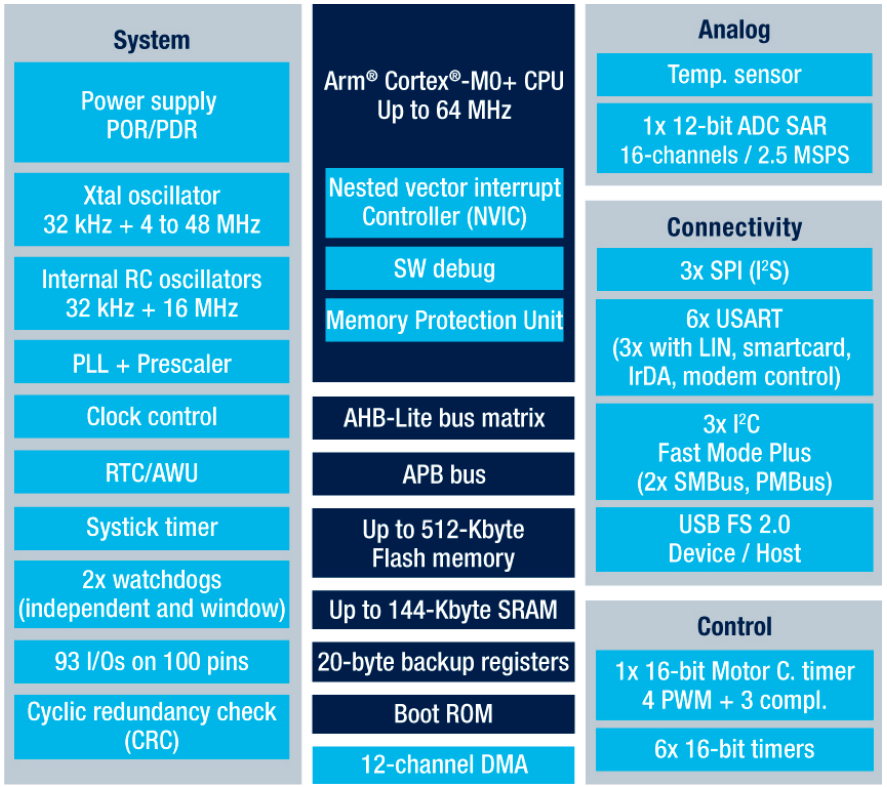
Value line

No compromise on what matters

- 32-bit Arm Cortex-M0+ core
- 2.0 to 3.6V power supply
- RAM maximization
- 1% internal clock
- Direct Memory Access (DMA)
- Communication peripherals
- USB FS 2.0 Device and Host



- Timers
- Real-time Clock
- I/O ports maximization
- 12-bit Ultra-fast ADC
- Safety features

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More security

Integrated security features, ready for tomorrow’s needs

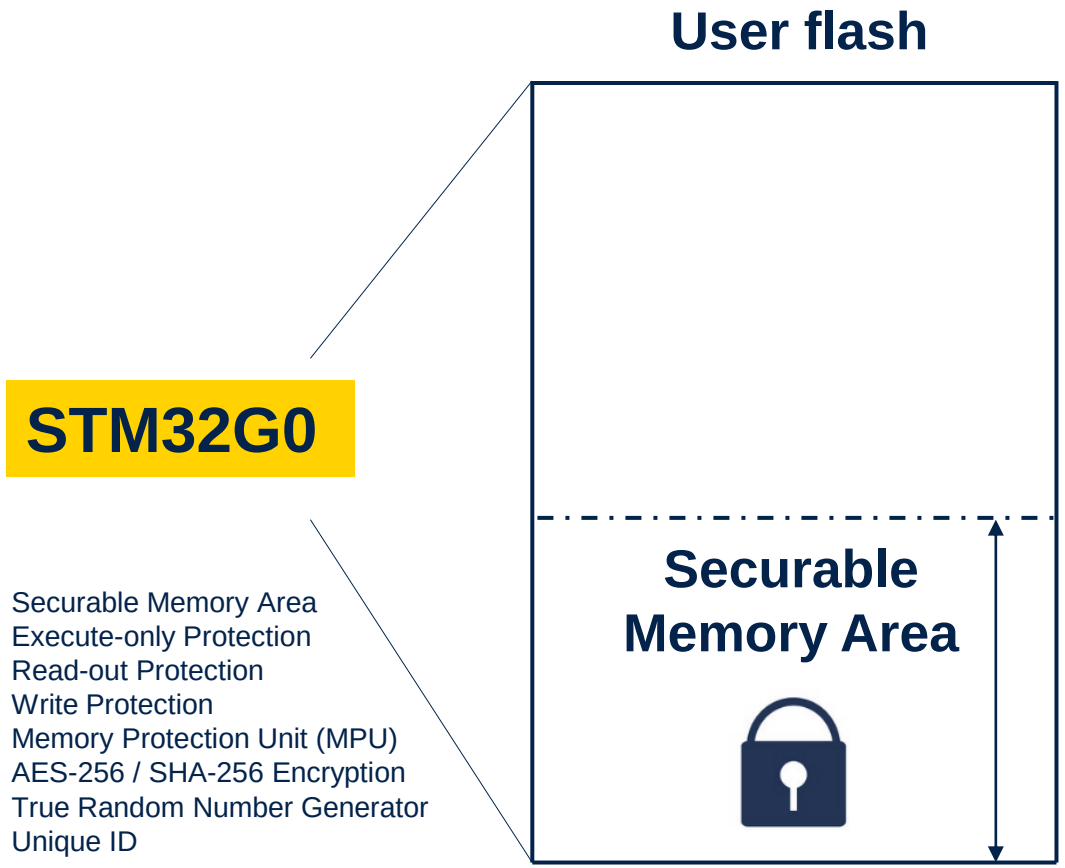
Firmware IP protection

Mutual distrustful

Secret key storage

Authentication

Secure firmware upgrade



Standard user flash by default

Can be secured once exiting
No more Access and Debugging

Configurable size

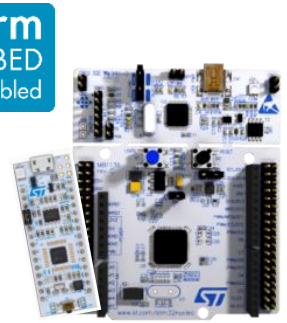
Good fit to store critical data
- **Critical routines**
- **Keys**

STM32G0 Ecosystem

Go fast, be the first

HARDWARE TOOLS

STM32 Nucleo



Flexible prototyping

Discovery kit

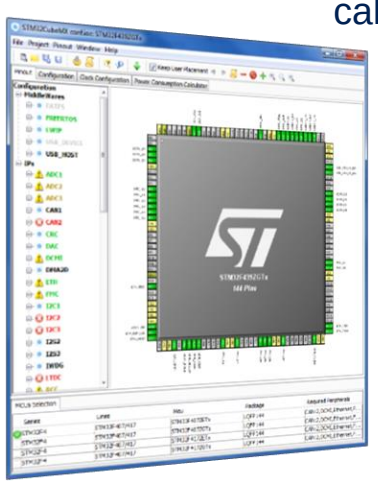
Key feature prototyping

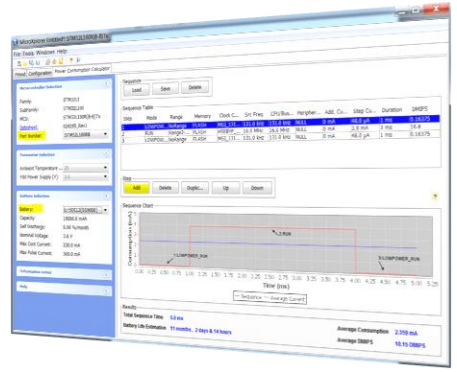
Evaluation board

Full feature evaluation

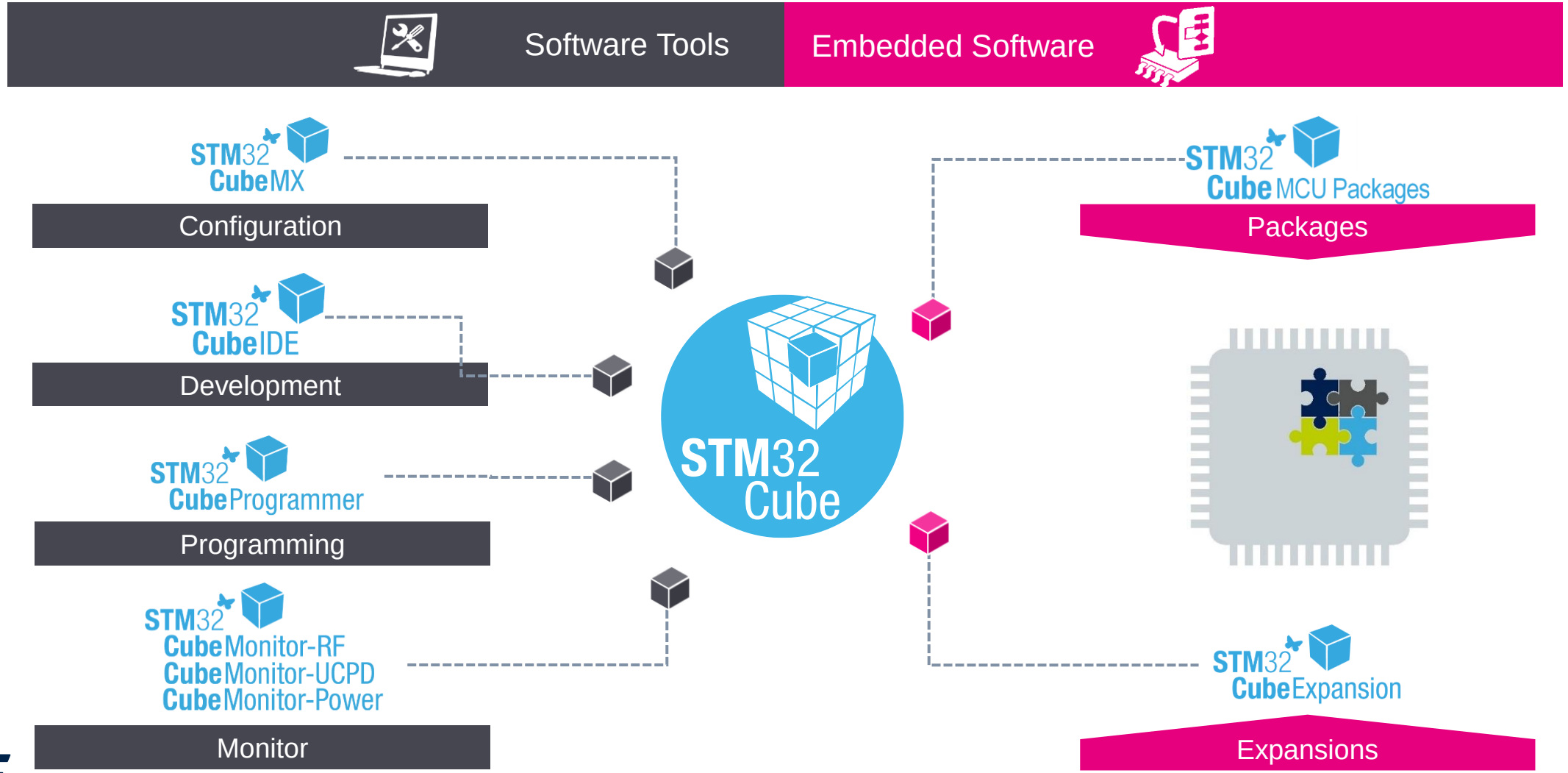
SOFTWARE TOOLS

STM32CubeMX featuring intuitive pin selection, clock tree configuration, code generation and power consumption calculation



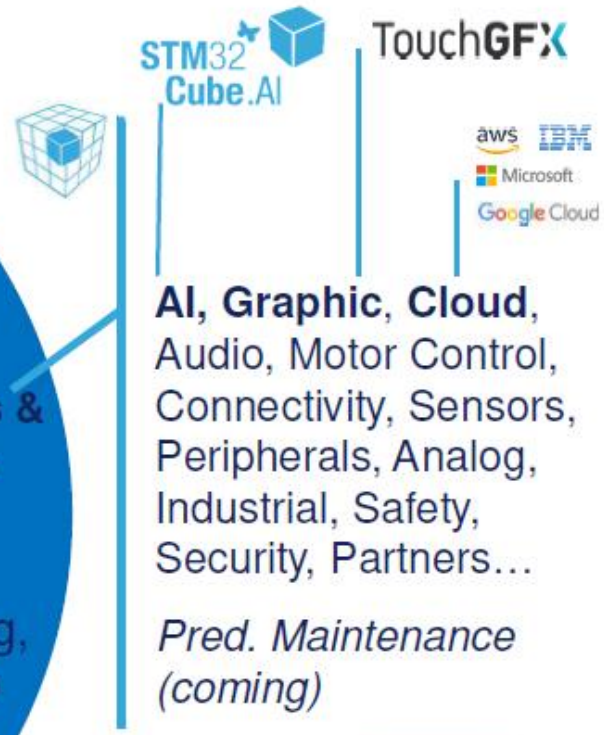


STM32Cube Ecosystem



STM32Cube Ecosystem is a key differentiator

STM32 ecosystem is leading the Market



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+ life.augmented Partner Program

+ MOOC

3 major takeaways STM32G0 series

1. **Efficient**
2. **Robust**
3. **Simple**

STM32G0

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STM32CubeMX Overview & Library
Graphical software configuration tool

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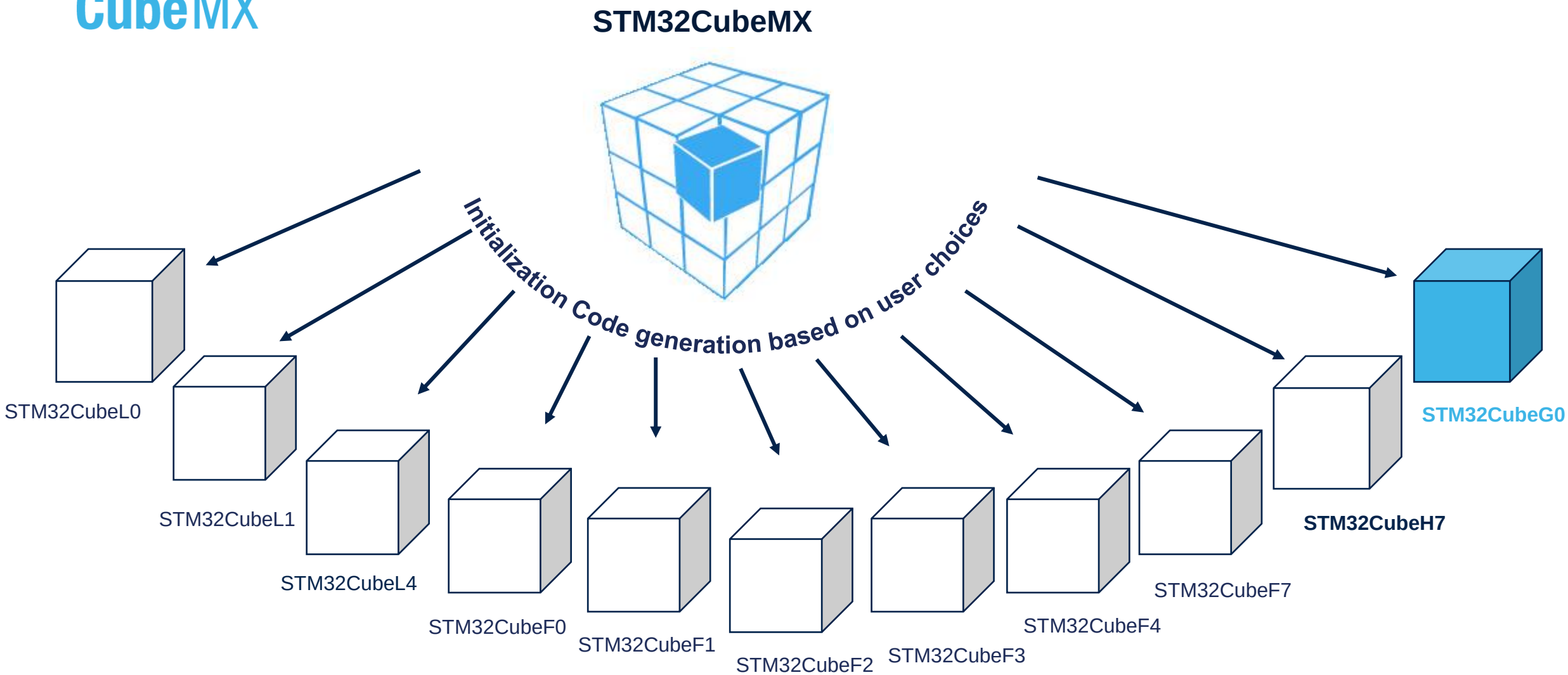
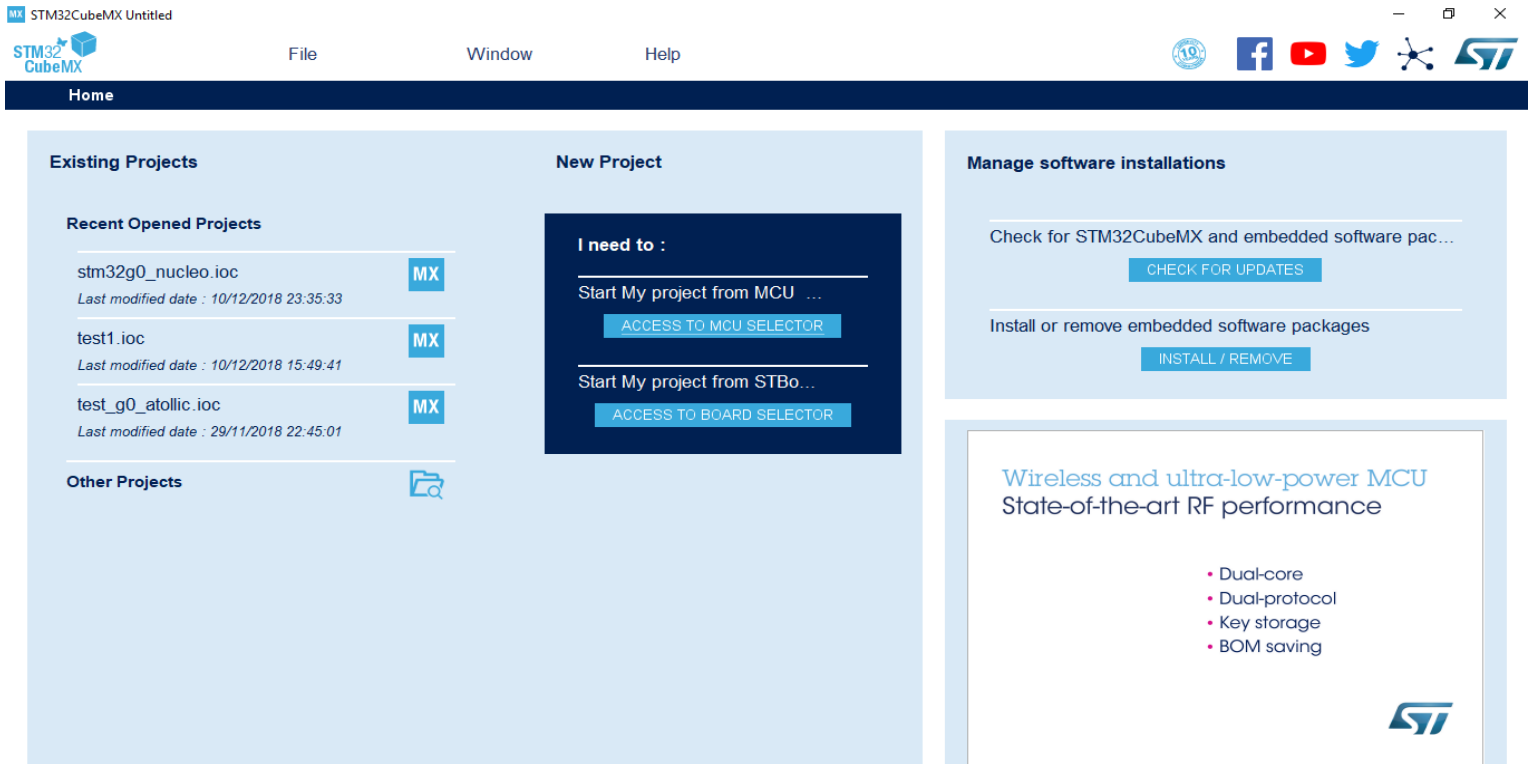
Introduction



Overview

- Choose ideal MCU and simply configure
  - Pinouts
  - Clocks and oscillators
  - Peripherals
  - Low-power modes
  - Middleware

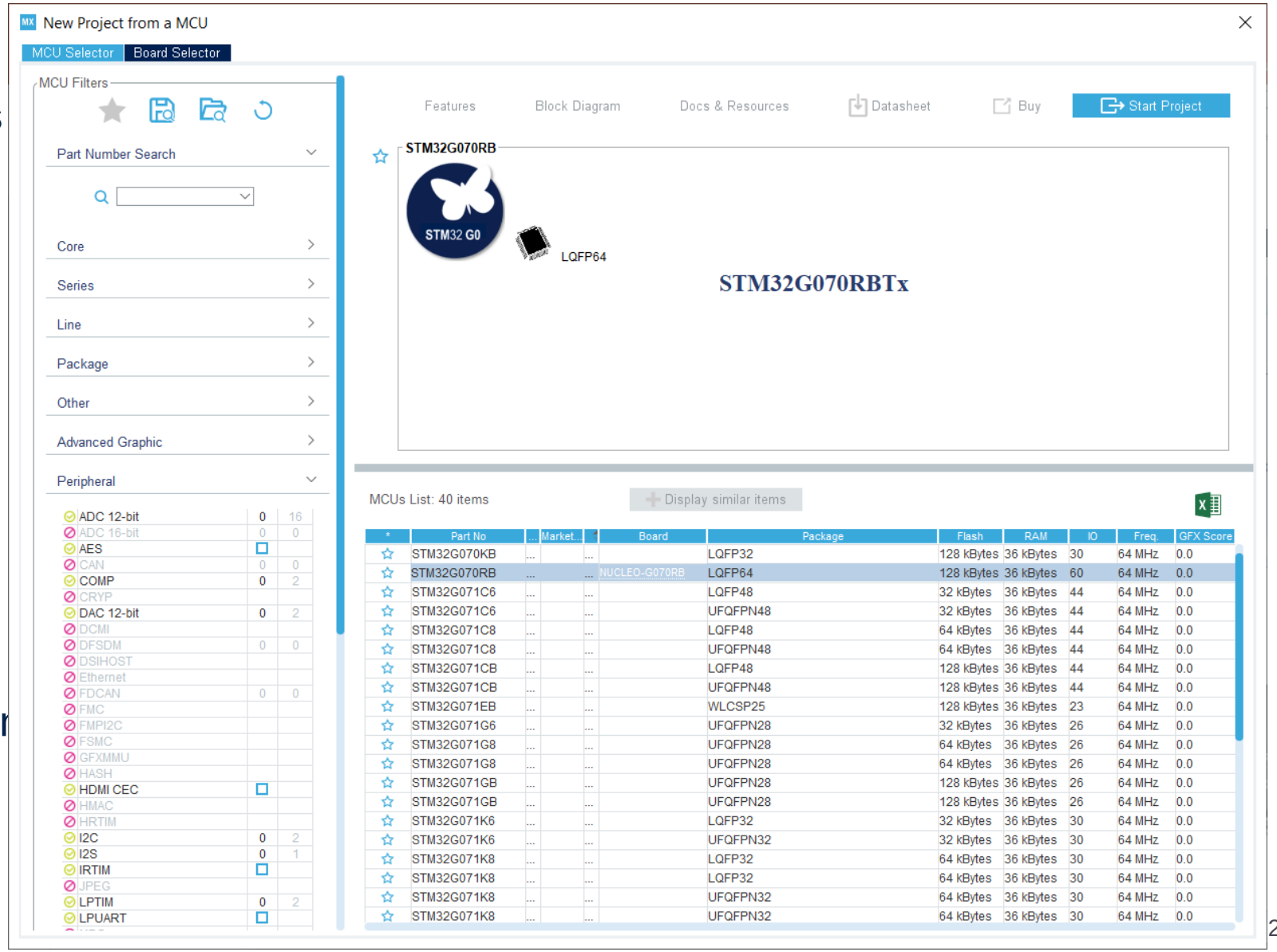


Application benefits

- Helps choose the correct MCU for a given purpose
- Simulation provides an advantage in design phase
- Boosts development speed with a head start

MCU selector

- Find MCU by name …
  - Quickly locate by Series and Lines
- … or application needs
  - Package (pin count)
  - RAM size
  - NV memory requirements
  - Embedded peripherals
  - Number and type of interfaces
  - Core and frequency
  - Price
- Convenient links to documentation
- Export table to Excel file



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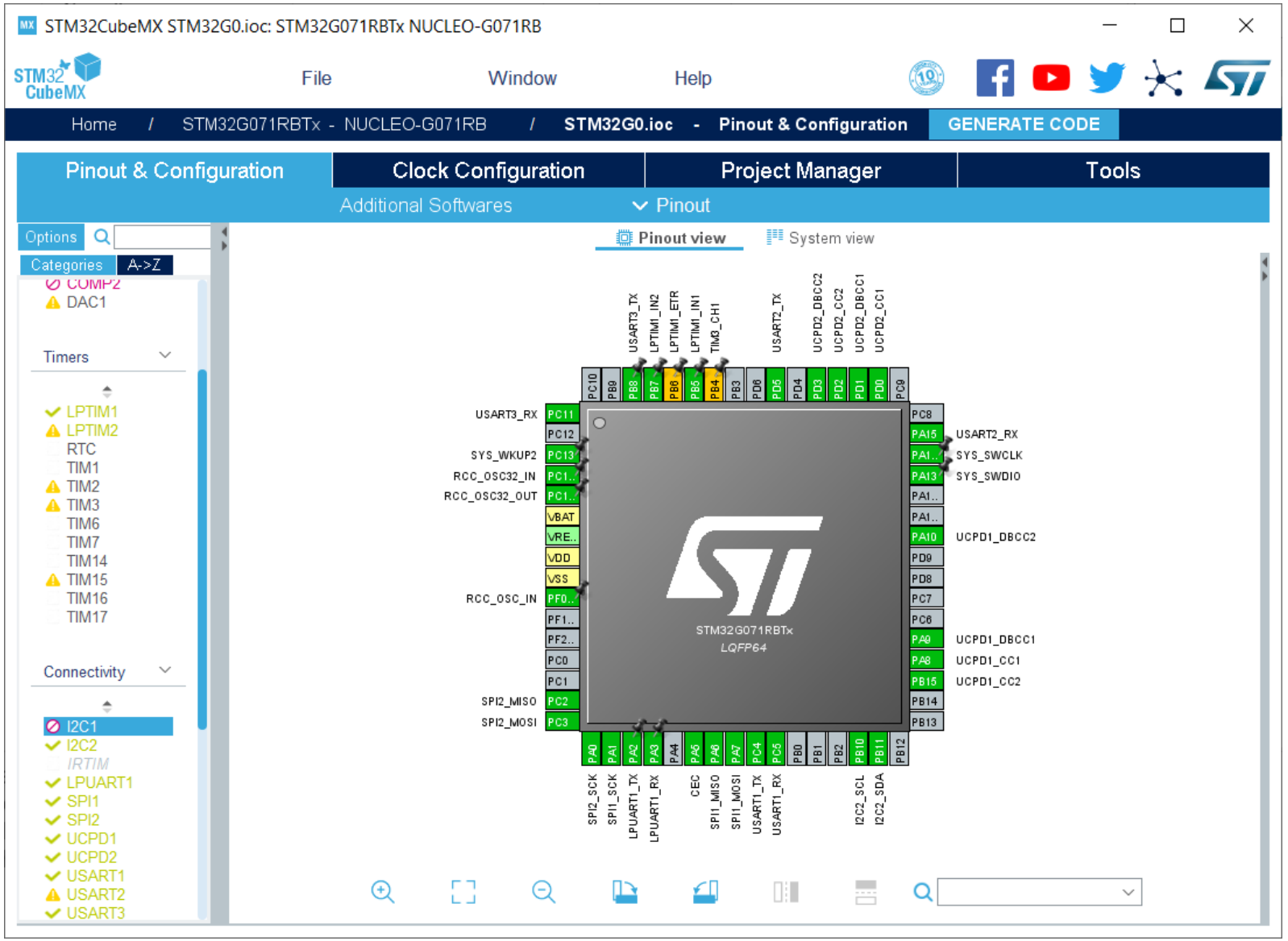
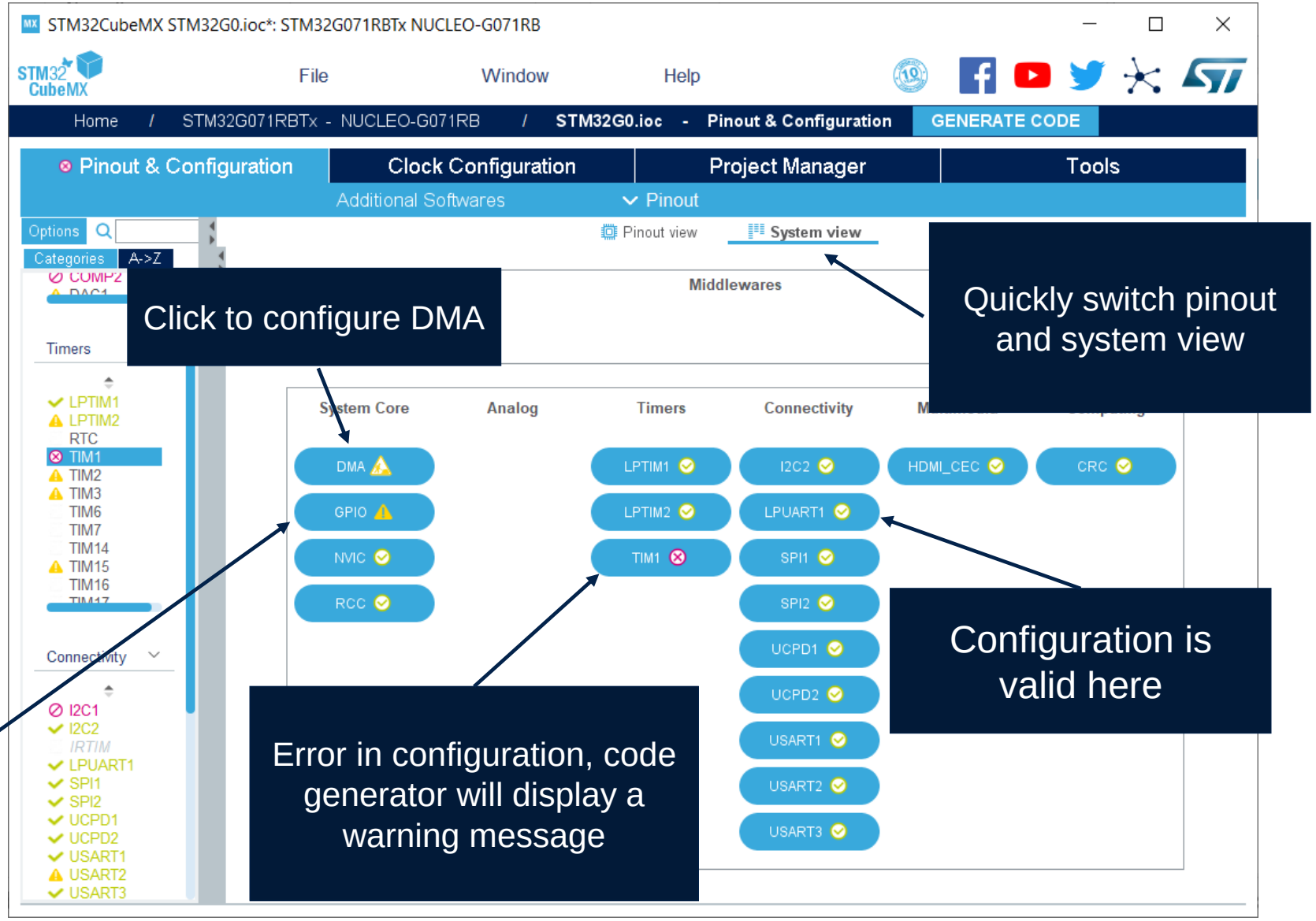
Pin assignment

- Pinout from:
  - Peripheral tree
  - Manually
- Automatic signal remapping
- Management of dependencies between peripherals and/or middleware (FatFS, USB …)



Peripheral and Middleware configuration

- Global view of used peripherals and middleware
- Highlight of configuration errors
  - + Not configured
  - v OK
  - ⚠ Non-blocking problem
  - x Error



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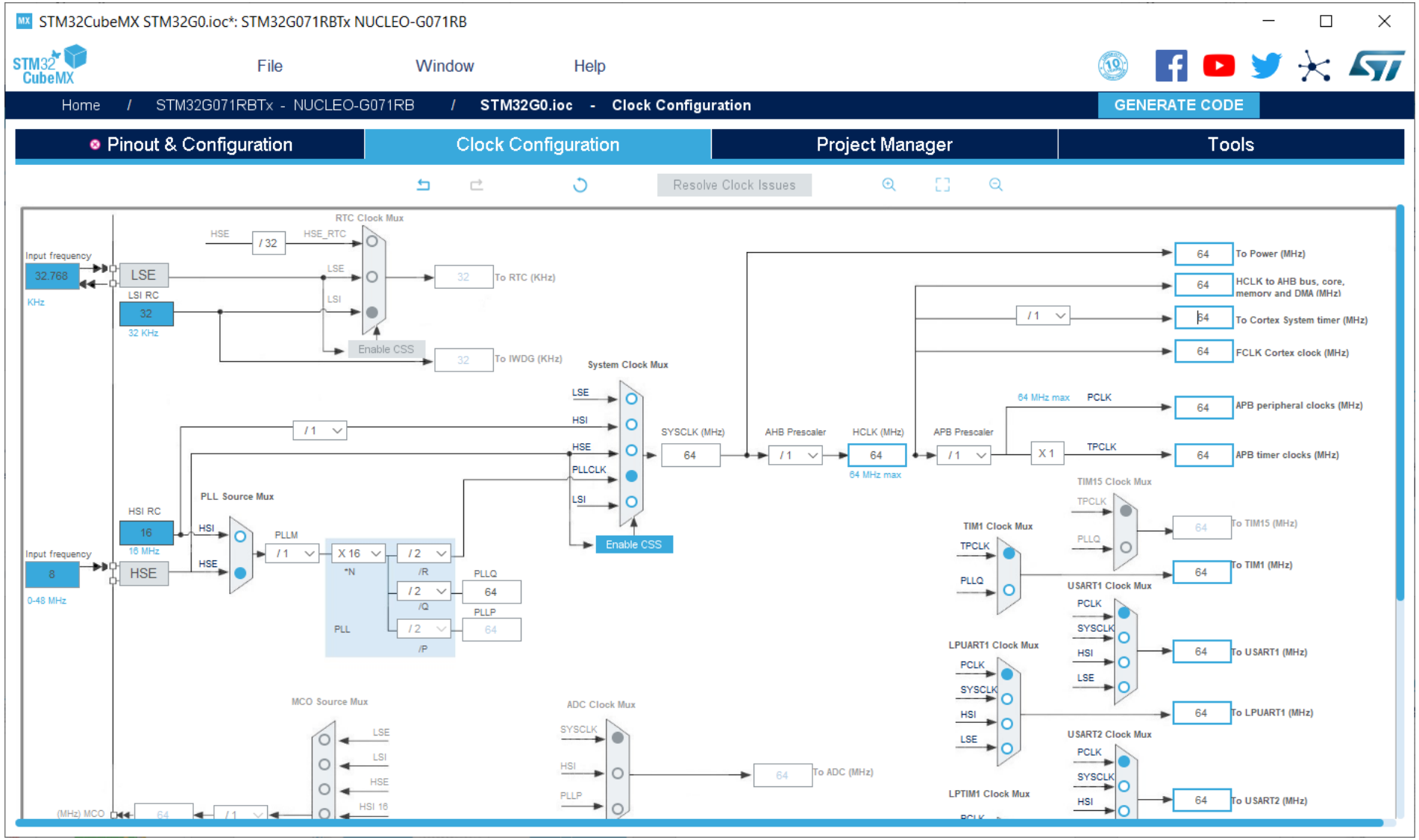
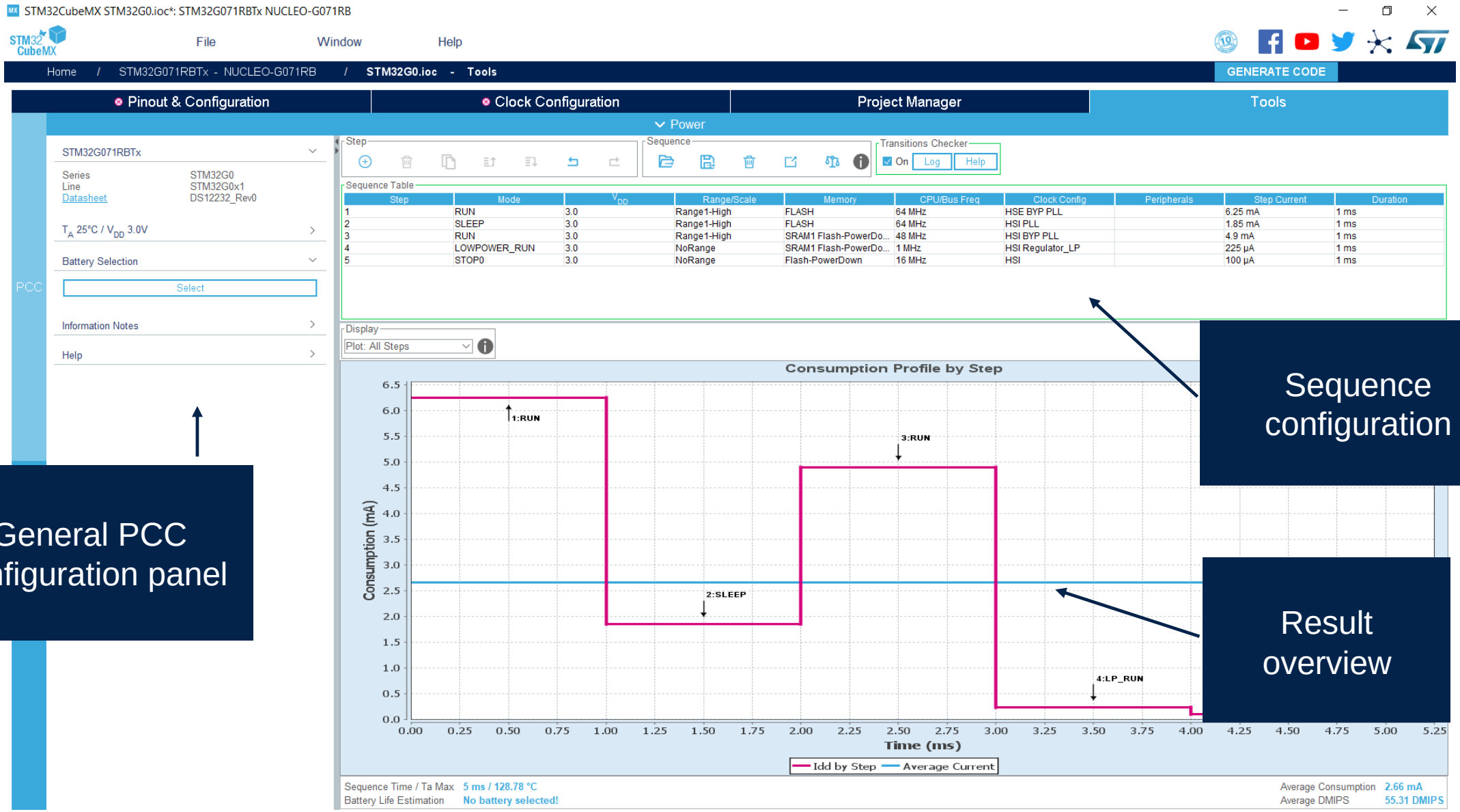
Clock configuration

- Immediate display of all clock values
- Active and inactive clock paths are differentiated
- Management of clock constraints and features



PCC (Power Consumption Calculator)



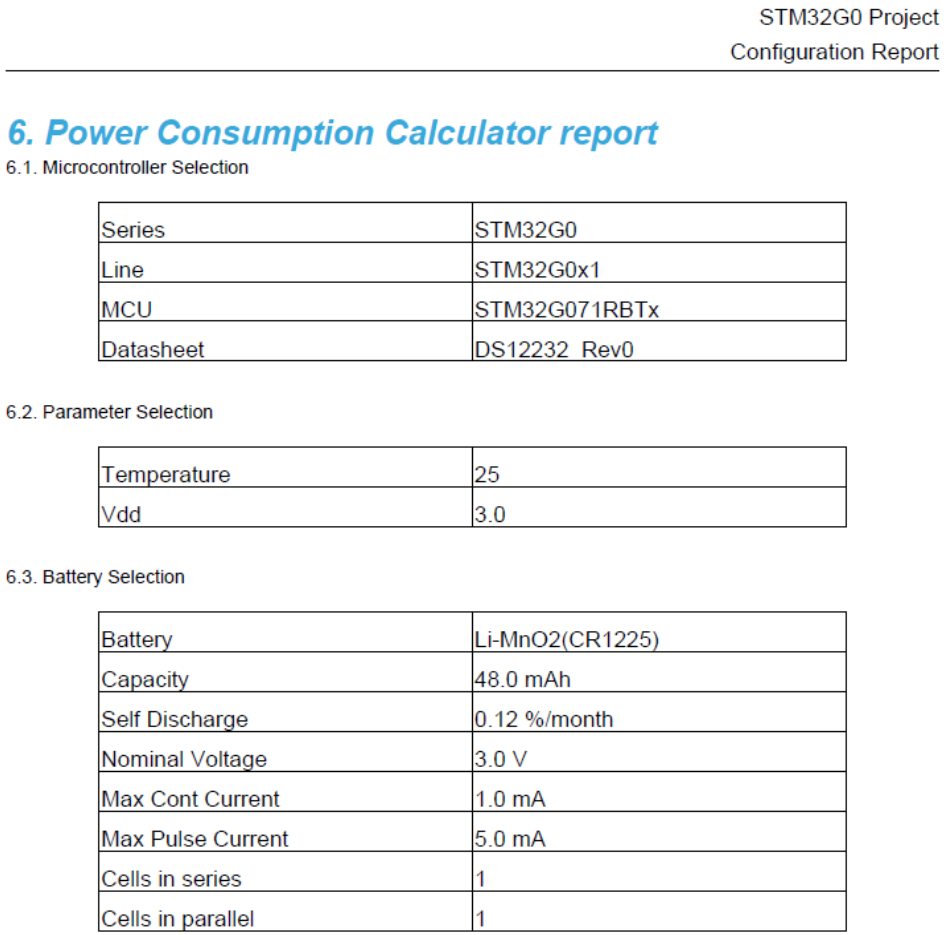
General PCC configuration panel

Sequence configuration

Result overview

Generating Project Report Files

- An optional step is to generate a PDF report
- The PDF report is also available without PCC
- Complete saved project work includes:
  - Project.ioc
  - Project.pcs
  - Project.pdf
  - Project.txt
  - Project.jpg
  - … and the generated project for a supported development environment



STM32G0 Project
Configuration Report

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32G0
Line	STM32G0x1
MCU	STM32G071RBTx
Datasheet	DS12232_Rev0

6.2. Parameter Selection

Temperature	25
Vdd	3.0

6.3. Battery Selection

Battery	Li-MnO2(CR1225)
Capacity	48.0 mAh
Self Discharge	0.12 %/month
Nominal Voltage	3.0 V
Max Cont Current	1.0 mA
Max Pulse Current	5.0 mA
Cells in series	1
Cells in parallel	1

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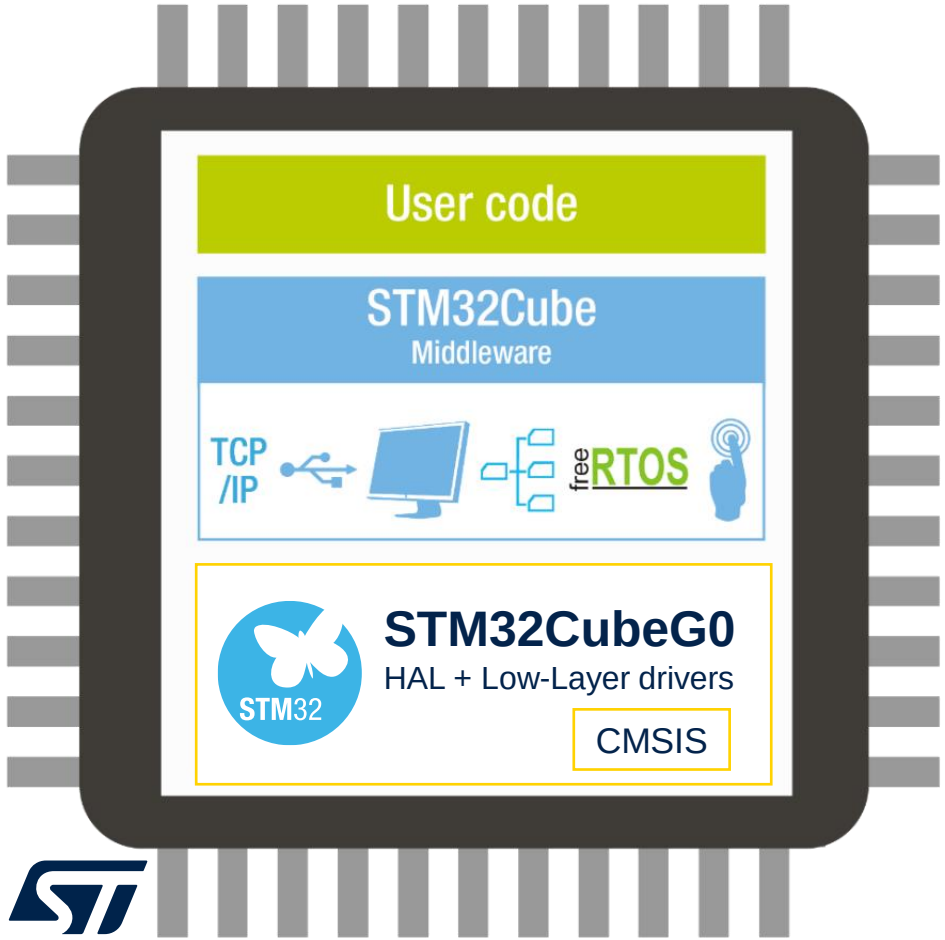
STM32G0 Ecosystem

Platform approach or custom code: you choose



- Open-source FAT file system (FatFs)
- Open-source real-time OS (FreeRTOS)
- 66 + Example applications

- STM32G0 Hardware Abstraction Layer (HAL) portable APIs
- High-performance, light-weight low-layer (LL) APIs
- High coverage for most STM32 peripherals
- Production-ready and fully qualified
- Dozens of usage examples
- Open-source BSD license

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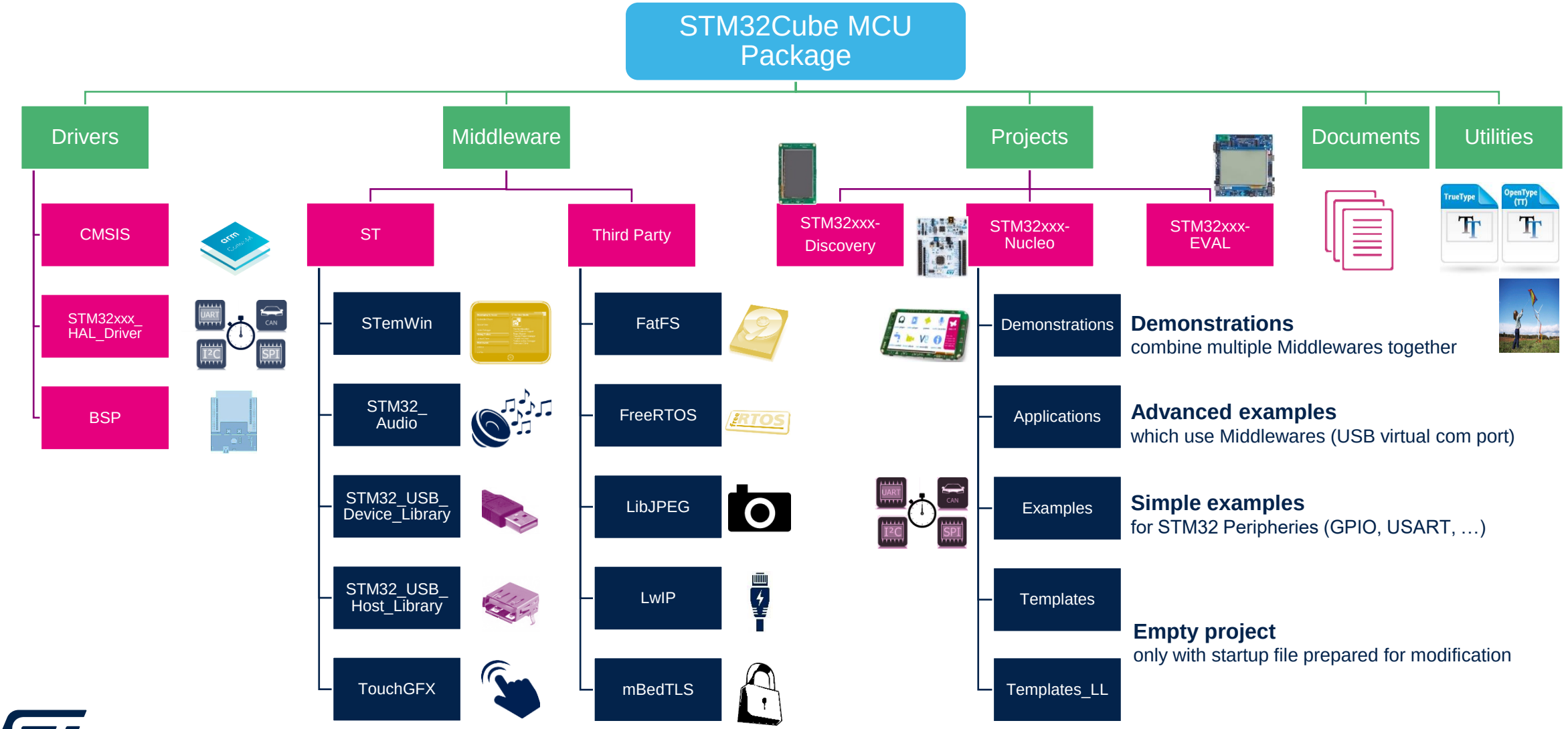
STM32Cube MCU Package Organization



STM32G0 Positioning

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STM32G0 Product Highlights

- STM32G0 DNA:
  - Scalable Portfolio
  - Extensive Ecosystem
  - Leading edge Process technology
  - Advanced IPs
- Services
  - ST Direct
  - Fast ROM – Factory Programming Services
  - Support – OLS, Direct Regional Tech. Team engagement
  - Trainings
    - Regular Regional Seminars & Workshops and Customer focused Trainings
    - eLearning : MOOC & Online Training
  - Supply Chain, etc.

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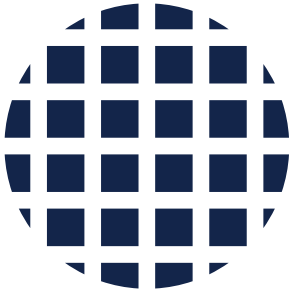
STM32G0 Technology

Process Technology:

- STM32G0 is a 90 nm product diffused in 12 inches.
- Excellent tuning of the process for either low power consumption and/or higher performance:
  - Run Faster => More MHz
  - Embed more resources FLASH/RAM (smaller memory point)
  - Embed a lot of digital IP (higher gate density)
  - Consume less in dynamic mode



Save on Battery Life:

- Low power consumption: process and design
- Low-Power UART: wake-up on frame
- Low-Power Timer: counts and generate signals

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STM32G0 Technology

Save on BOM cost:

+/-1% high speed clock internal from 0 to 90°C
+/-2% high speed clock internal from -40 to 125°C
USB:
- USB-PD
- Crystal less USB FS 2.0
- Up to 2 built-in UCPD

IO maximization: smaller package footprint

High Temperature operation: from -40 up to + 125°C

Enhanced Safety and Security Blocks:

- Main Clock monitoring
- Backup clock and interrupts
- Voltage monitoring: programmable interrupts and reset
- Window watchdog on CPU clock
- Independent watchdog on independent clock
- Checksum by hardware
- ECC on Flash, Parity on RAM

STM32G0 Communication and training

- Regular communication from top managers
- Global Positioning in Social Media
  - YouTube videos
    - Huge increase in subscribers recorded everyday
  - Facebook posts
    - With Differentiating factors
- Webinars
  - Online Webinars building strong expertise
- Online Trainings
  - MOOC
  - Video Tutorials
  - Partner Training Courses
  - Community
- University Programs
  - Dedicated team for supporting and building ST MCU programs and curriculums

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Releasing your creativity

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community.st.com

http://www.st.com/STM32G0

wiki.st.com/stm32mcu

github.com/STMicroelectronics

STM32G0 online training

STM32G0 blog article

MOOC – STM32G0 workshop

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Thank you

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