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



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





STM32 Scalable Portfolio

STM32G0: Great Investment



MPU

STM32MP1

4158 CoreMark
650 MHz Cortex –A7
209 MHz Cortex –M4



High Perf
MCUs

STM32F2

Up to 398 CoreMark
120 MHz Cortex-M3

STM32F4

Up to 608 CoreMark
180 MHz Cortex-M4

STM32F7

1082 CoreMark
216 MHz Cortex-M7

STM32H7

Up to 3224 CoreMark
Up to 550 MHz Cortex -M7
240 MHz Cortex -M4



Mainstream
MCUs

STM32F0

106 CoreMark
48 MHz Cortex-M0

STM32G0

142 CoreMark
64 MHz Cortex-M0+

STM32F1

177 CoreMark
72 MHz Cortex-M3

STM32F3

245 CoreMark
72 MHz Cortex-M4

STM32G4

550 CoreMark
170 MHz Cortex-M4

Optimized for mixed-signal Applications



Ultra-low Power
MCUs

STM32L0

75 CoreMark
32 MHz Cortex-M0+

STM32L1

93 CoreMark
32 MHz Cortex-M3

STM32L4

273 CoreMark
80 MHz Cortex-M4

STM32L4+

409 CoreMark
120 MHz Cortex-M4

STM32L5

443 CoreMark
110 MHz Cortex-M33

STM32U5

651 CoreMark
160 MHz Cortex-M33



Wireless
MCUs

STM32WL

162 CoreMark
48 MHz Cortex-M4
48 MHz Cortex-M0+

STM32WB

216 CoreMark
64 MHz Cortex-M4
32 MHz Cortex-M0+



● 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

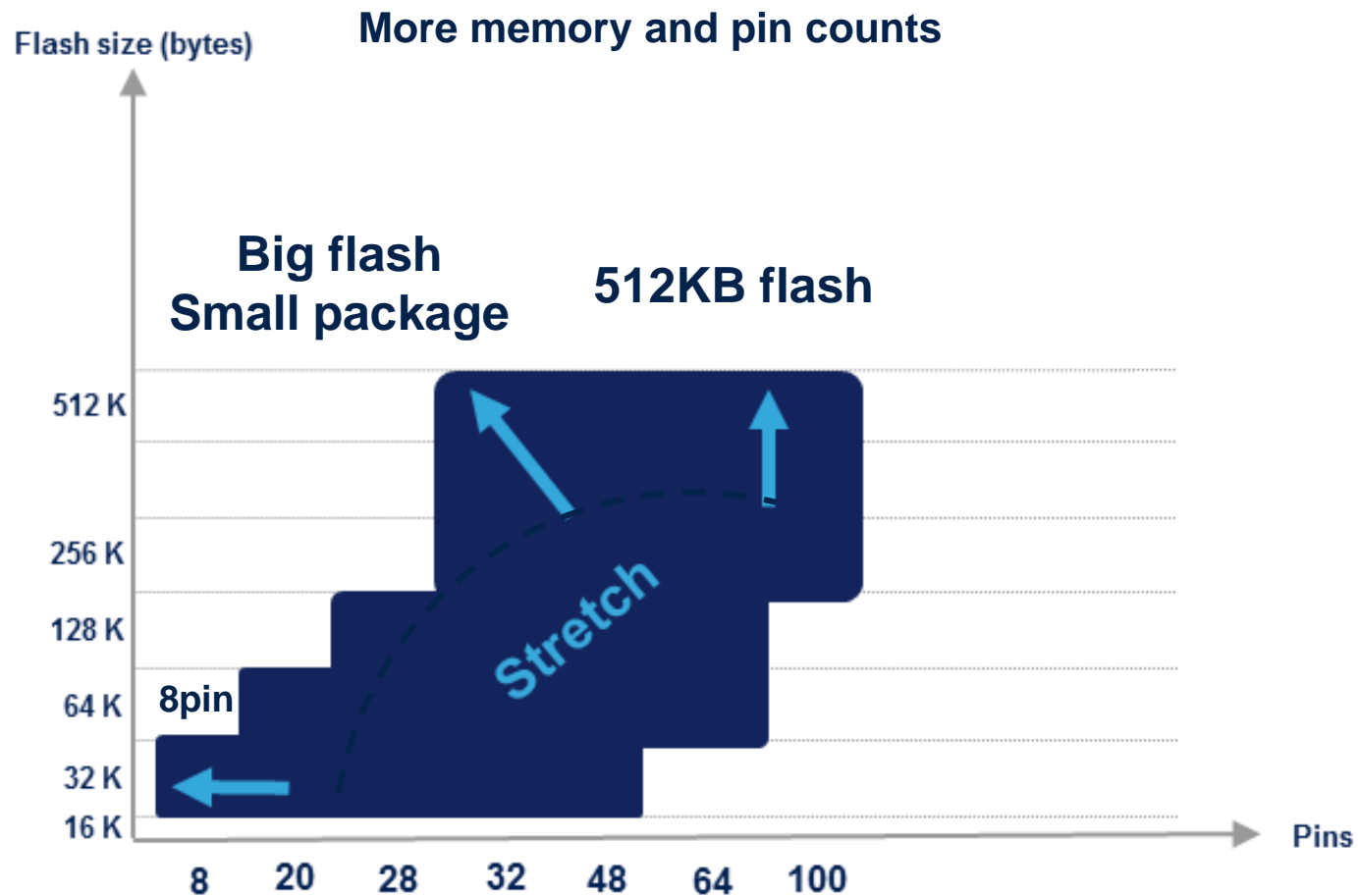
Simple

- 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



A scalable platform

Portfolio stretched for cost-efficient applications



More packages

SO / TSSOP

WLCSP

BGA

QFN

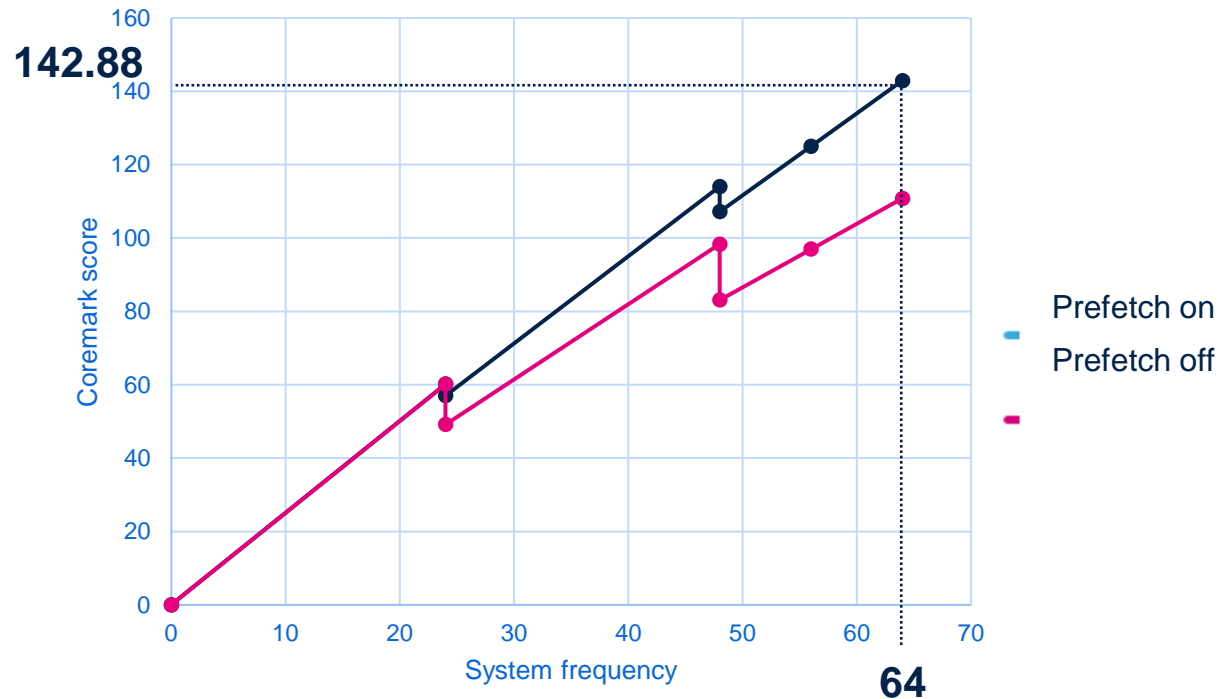
LQFP



Providing more performance

No compromise on performance with STM32G0

Performance with 0, 1 and 2 wait state



- 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

Wake-up Time	VBAT	*10 nA / 400 nA	Tamper: few I/Os, RTC
258 μs	SHUTDOWN	*40 nA / 500 nA	Wake-up sources: reset pin, few I/Os, RTC
14 μs	STANDBY	*200 nA / 500 nA	Wake-up sources: + BOR, IWDG
5 μs	STOP	Flash-RTC off-off/off-on/on-off 3.0μA / 5μA / 8μA	Wake-up sources: + all I/Os, PVD, COMPs, LPUART, LPTIM, I ² C, UART, USB-PD
6 cycles	SLEEP	24MHz, Vdd=3V, PLL=on 800 μA	Wake-up sources: any interrupt or event
	RUN at 64 MHz	<100 μA / MHz	

Conditions: 25°C, Vdd = 3V

Note : * without RTC / with RTC



Use cases: Smart applications

- 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

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

Lighting



Industrial devices Motor control Advanced control



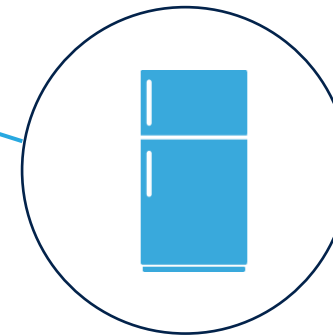
Consumer objects



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

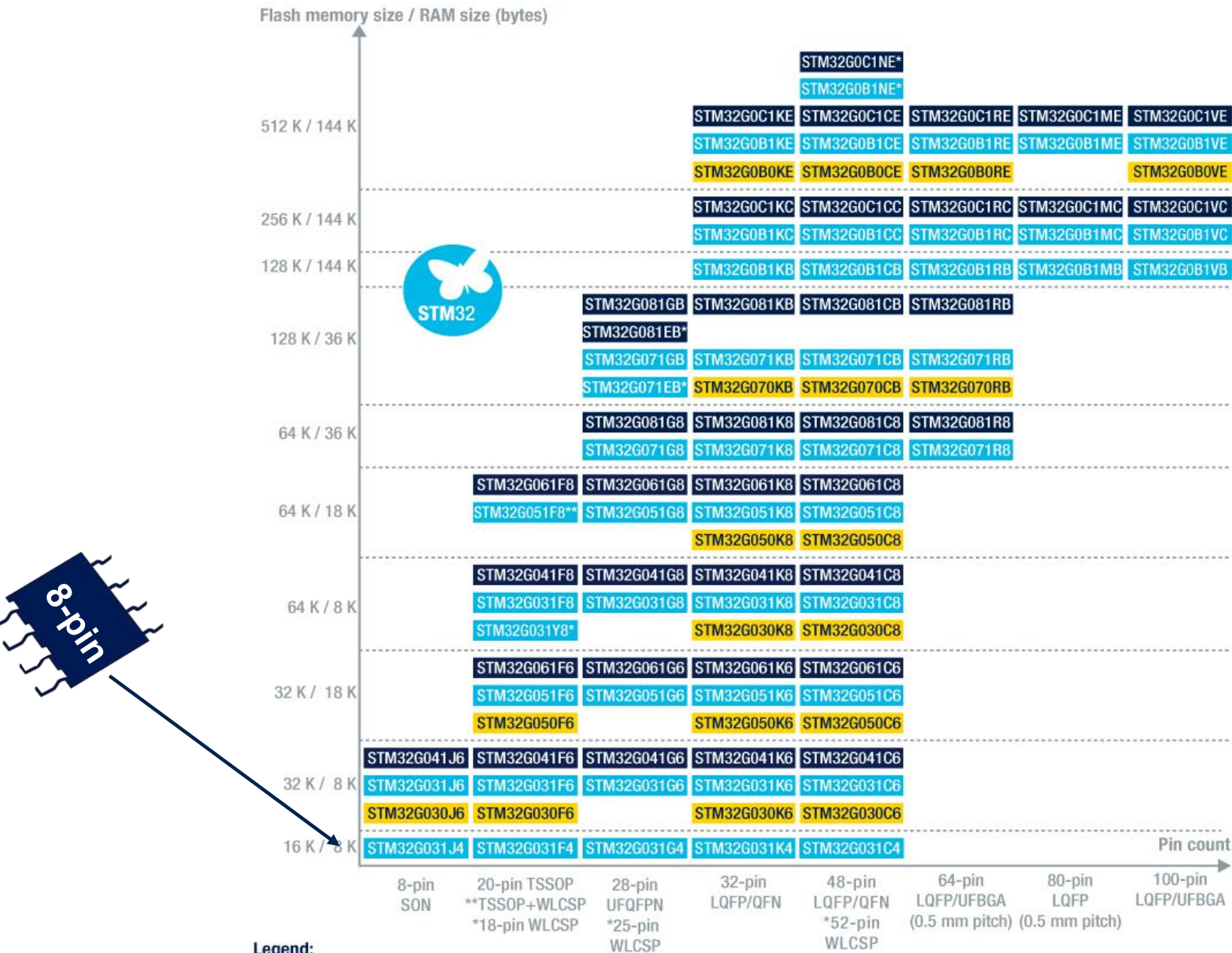


Home appliances, alarms and safety, advanced user interfaces

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

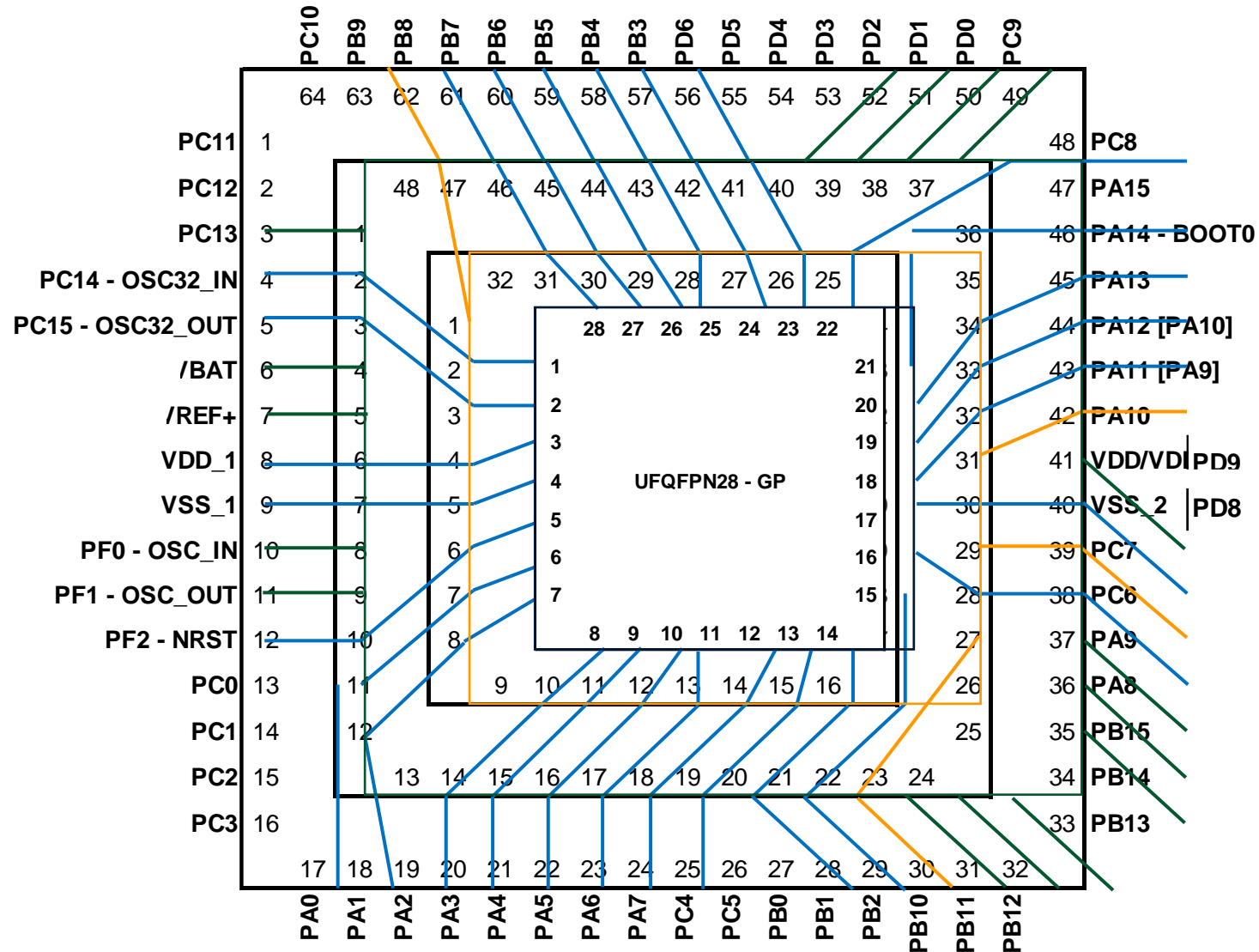
STM32G0

STM32G0 portfolio





Consistent and optimized pinout



QFP64
QFP/QFN48
QFP/QFN32
QFN28

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

System		
Power supply POR/PDR/PVD/BOR	Arm® Cortex®-M0+ CPU Up to 64 MHz	Encryption
Xtal oscillator 32 kHz + 4 to 48 MHz	Nested vector interrupt Controller (NVIC)	AES (256-bit)
Internal RC oscillators 32 kHz (±5%) + 16 MHz (±1%)	SW debug	True RNG
Internal RC oscillator 48 MHz (auto trimming on ext. synchro)	Memory Protection Unit	
PLL + Prescaler	AHB-Lite bus matrix	Connectivity
Clock control	APB bus	3x SPI (I²S)
RTC/AWU	Up to 512-Kbyte Flash memory	6x USART (3x with LIN, smartcard, IrDA, modem control)
Systick timer	Up to 144-Kbyte SRAM	2x LPUART
2x watchdogs (independent and window)	20-byte backup registers	3x I²C Fast Mode Plus (2x SMBus, PMBus)
94 I/Os on 100 pins	Boot ROM	2x FDCAN
Cyclic redundancy check (CRC)	12-channel DMA	USB FS 2.0 Device (crystal less) Host
	Analog	USB Power Delivery (incl. BMC + PHY)
	Temp. sensor	
	1x 12-bit ADC SAR 16-channels / 2.5 MSPS	Control
	1x 12-bit DAC 2ch	1x 32-bit timer
	3x comparators	1x 16-bit Motor C. timer $f_{\text{MAX}} = 128 \text{ MHz}$ 4 PWM + 3 compl.
		6x 16-bit timers one with $f_{\text{MAX}} = 128 \text{ MHz}$
		2x Low-power timers

- 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

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

System		Analog
Power supply POR/PDR	Arm® Cortex®-M0+ CPU Up to 64 MHz	Temp. sensor
Xtal oscillator 32 kHz + 4 to 48 MHz	Nested vector interrupt Controller (NVIC)	1x 12-bit ADC SAR 16-channels / 2.5 MSPS
Internal RC oscillators 32 kHz + 16 MHz	SW debug	
PLL + Prescaler	Memory Protection Unit	Connectivity
Clock control	AHB-Lite bus matrix	3x SPI (I ² S)
RTC/AWU	APB bus	6x USART (3x with LIN, smartcard, IrDA, modem control)
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93 I/Os on 100 pins	20-byte backup registers	
Cyclic redundancy check (CRC)	Boot ROM	Control
	12-channel DMA	1x 16-bit Motor C. timer 4 PWM + 3 compl.
		6x 16-bit timers

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



More security

Integrated security features, ready for tomorrow's needs

Firmware IP protection

Mutual distrustful

Secret key storage

Authentication

Secure firmware upgrade

STM32G0

Securable Memory Area
Execute-only Protection
Read-out Protection
Write Protection
Memory Protection Unit (MPU)
AES-256 / SHA-256 Encryption
True Random Number Generator
Unique ID

User flash

**Securable
Memory Area**



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**

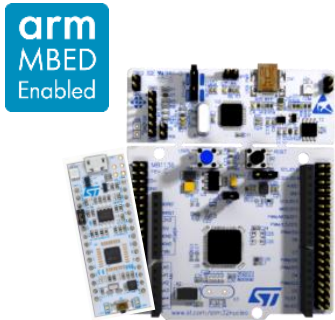


STM32G0 Ecosystem

Go fast, be the first

HARDWARE TOOLS

STM32 Nucleo



Flexible
prototyping

Discovery kit



Key feature
prototyping

Evaluation board

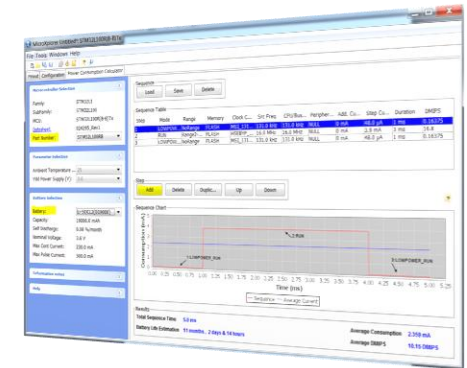
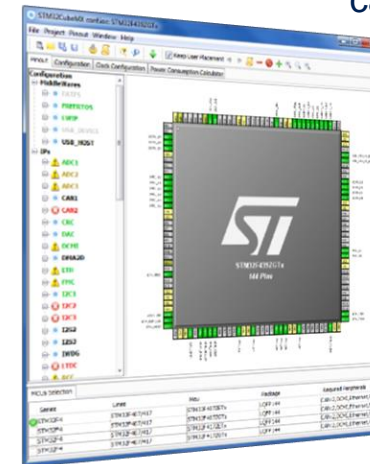


Full feature
evaluation

SOFTWARE TOOLS

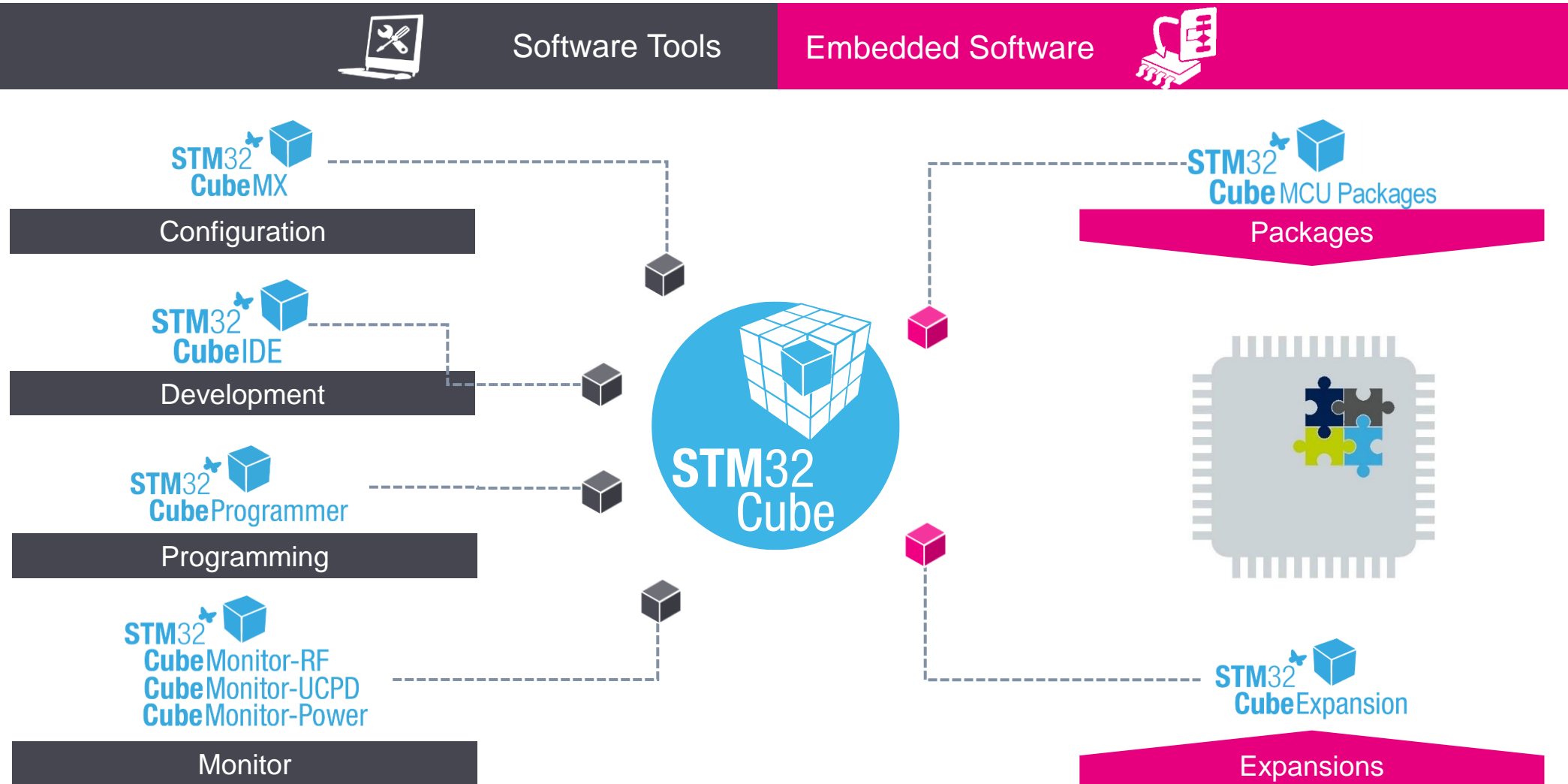


STM32CubeMX featuring intuitive pin selection, clock tree configuration, code generation and power consumption calculation





STM32Cube Ecosystem



STM32Cube Ecosystem is a key differentiator

STM32 ecosystem is leading the Market



STM32Cube.AI TouchGFX

aws IBM
Microsoft
Google Cloud

AI, Graphic, Cloud, Audio, Motor Control, Connectivity, Sensors, Peripherals, Analog, Industrial, Safety, Security, Partners...

Pred. Maintenance (coming)

ST
life.augmented

+ ST life.augmented
Partner Program

+ MCOOC

3 major takeaways STM32G0 series

1 Efficient

2 Robust

3 Simple

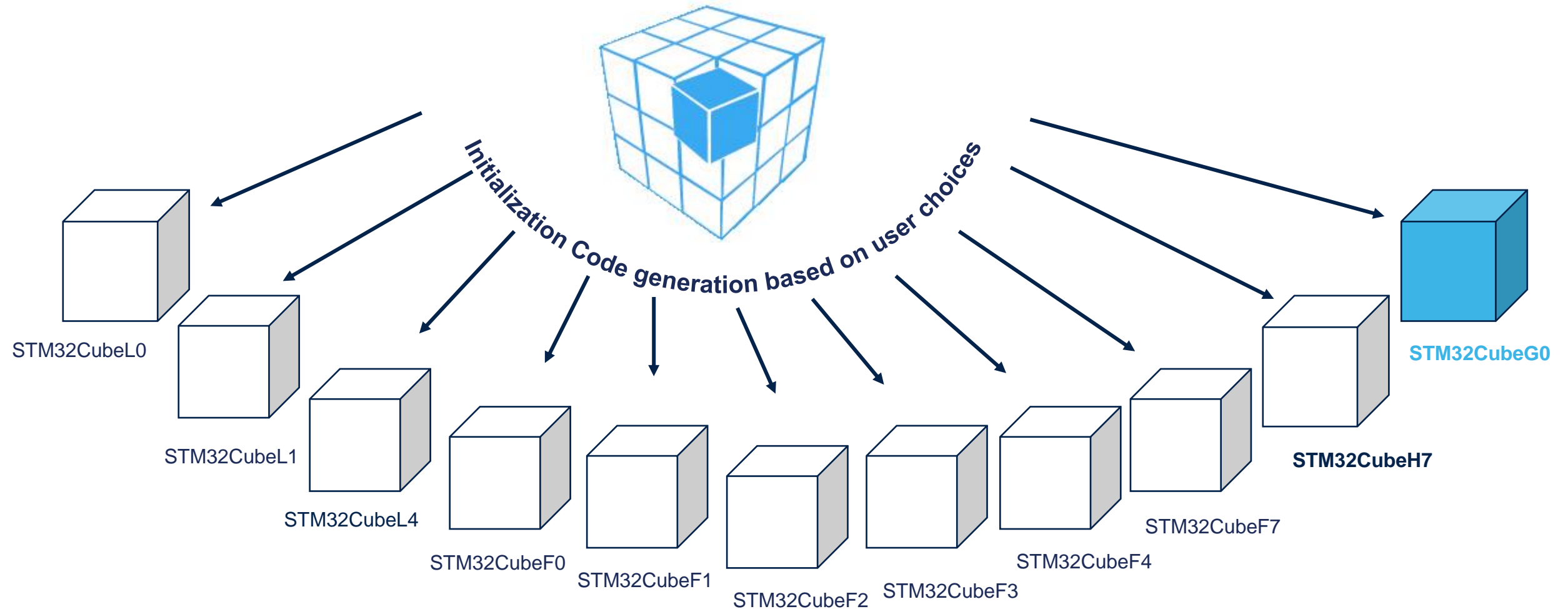


STM32G0

STM32CubeMX Overview & Library

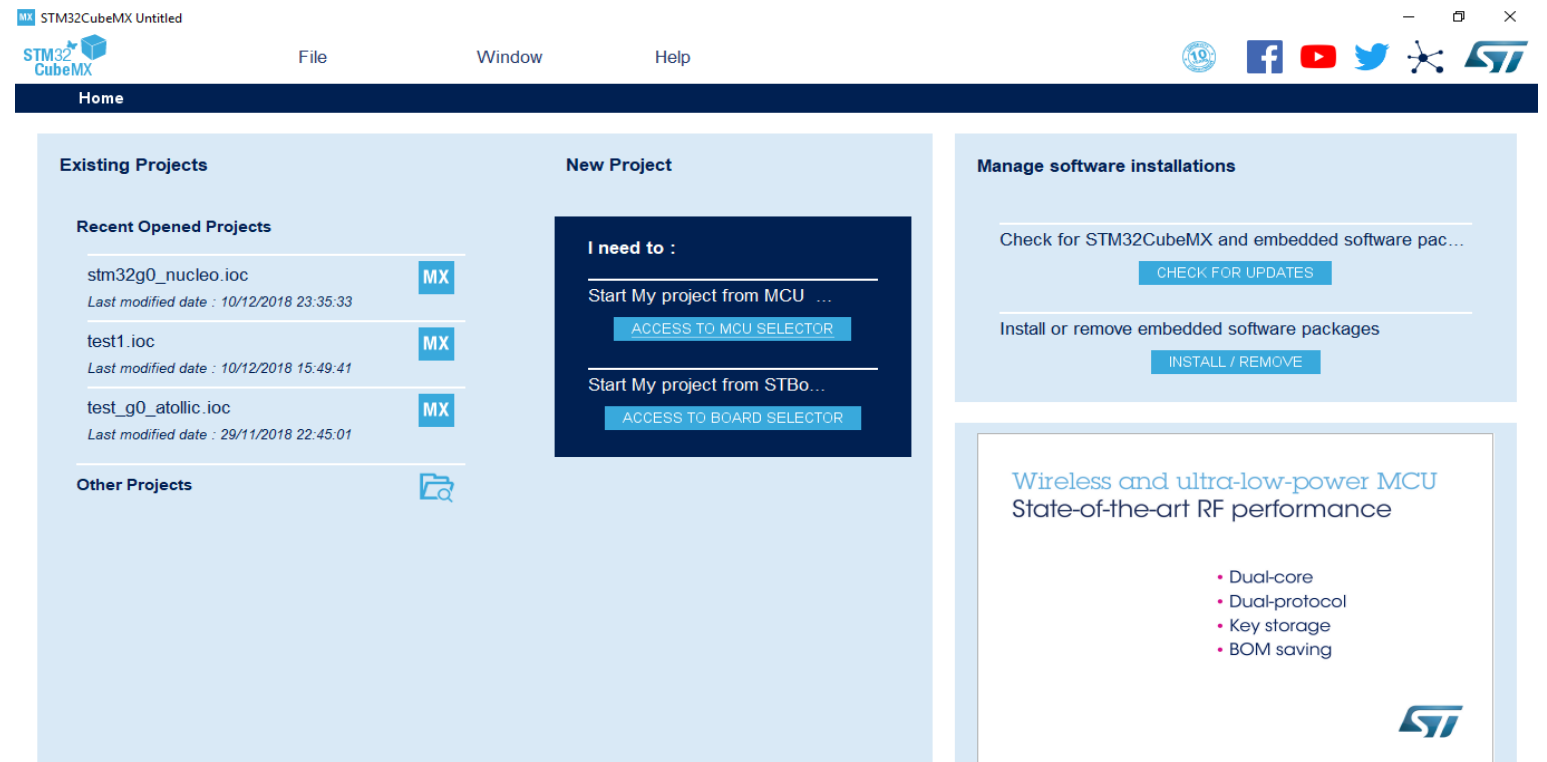
Graphical software configuration tool

STM32CubeMX



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

MX New Project from a MCU

MCU Selector Board Selector

MCU Filters

Part Number Search

Core

Series

Line

Package

Other

Advanced Graphic

Peripheral

ADC 12-bit 0 16

ADC 16-bit 0 0

AES

CAN 0 0

COMP 0 2

CRYP

DAC 12-bit 0 2

DCMI

DFSDM 0 0

DSIHOST

Ethernet

FDCAN 0 0

FMC

FMPI2C

FSMC

GPIO

HASH

HDMI CEC

HMAT

HRTIM

I2C 0 2

I2S 0 1

IRTIM

JPEG

LPTIM 0 2

LPUART

STM32G0

LQFP64

STM32G070RBTx

Features Block Diagram Docs & Resources Datasheet Buy Start Project

MCUs List: 40 items

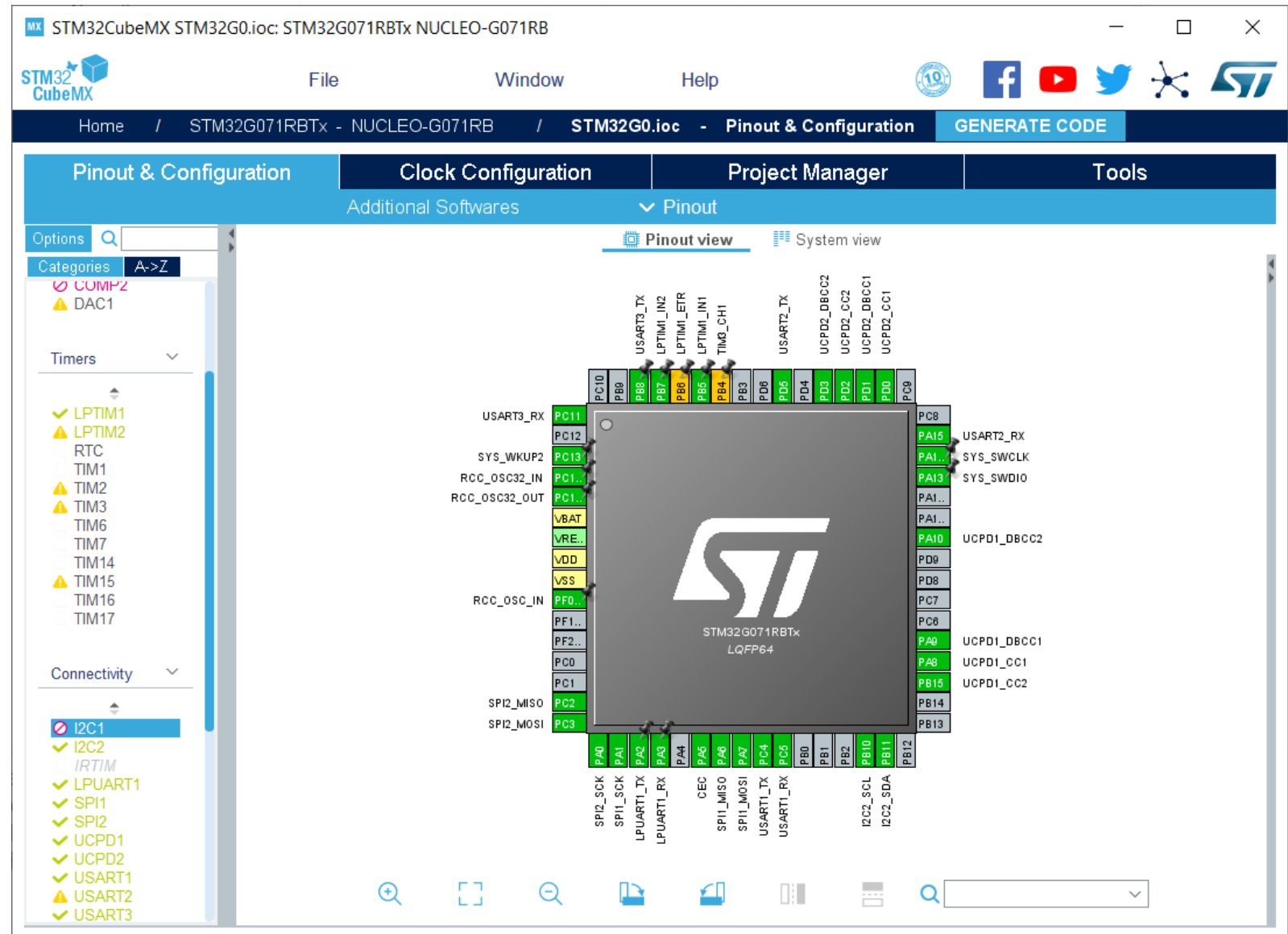
Display similar items

*	Part No	Market	Board	Package	Flash	RAM	IO	Freq	GFX Score
☆	STM32G070KB	...	...	LQFP32	128 kBytes	36 kBytes	30	64 MHz	0.0
☆	STM32G070RB	...	NUCLEO-G070RB	LQFP64	128 kBytes	36 kBytes	60	64 MHz	0.0
☆	STM32G071C6	...	...	LQFP48	32 kBytes	36 kBytes	44	64 MHz	0.0
☆	STM32G071C6	...	...	UFQFPN48	32 kBytes	36 kBytes	44	64 MHz	0.0
☆	STM32G071C8	...	...	LQFP48	64 kBytes	36 kBytes	44	64 MHz	0.0
☆	STM32G071C8	...	...	UFQFPN48	64 kBytes	36 kBytes	44	64 MHz	0.0
☆	STM32G071CB	...	...	LQFP48	128 kBytes	36 kBytes	44	64 MHz	0.0
☆	STM32G071CB	...	...	UFQFPN48	128 kBytes	36 kBytes	44	64 MHz	0.0
☆	STM32G071EB	...	...	WLCSP25	128 kBytes	36 kBytes	23	64 MHz	0.0
☆	STM32G071G6	...	...	UFQFPN28	32 kBytes	36 kBytes	26	64 MHz	0.0
☆	STM32G071G8	...	...	UFQFPN28	64 kBytes	36 kBytes	26	64 MHz	0.0
☆	STM32G071G8	...	...	UFQFPN28	64 kBytes	36 kBytes	26	64 MHz	0.0
☆	STM32G071GB	...	...	UFQFPN28	128 kBytes	36 kBytes	26	64 MHz	0.0
☆	STM32G071GB	...	...	UFQFPN28	128 kBytes	36 kBytes	26	64 MHz	0.0
☆	STM32G071K6	...	...	LQFP32	32 kBytes	36 kBytes	30	64 MHz	0.0
☆	STM32G071K6	...	...	UFQFPN32	32 kBytes	36 kBytes	30	64 MHz	0.0
☆	STM32G071K8	...	...	LQFP32	64 kBytes	36 kBytes	30	64 MHz	0.0
☆	STM32G071K8	...	...	LQFP32	64 kBytes	36 kBytes	30	64 MHz	0.0
☆	STM32G071K8	...	...	UFQFPN32	64 kBytes	36 kBytes	30	64 MHz	0.0
☆	STM32G071K8	...	...	UFQFPN32	64 kBytes	36 kBytes	30	64 MHz	0.0



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
- ✓ OK
- ⚠ Non-blocking problem
- ✗ Error

The screenshot shows the STM32CubeMX Pinout & Configuration window for the STM32G071RBx NUCLEO-G071RB. The window is divided into several sections: a left sidebar with a tree view of peripherals, a main area with tabs for System Core, Analog, Timers, and Connectivity, and a right sidebar with a list of peripherals. The System Core tab is selected, showing components like DMA, GPIO, NVIC, and RCC. The Timers tab shows LPTIM1, LPTIM2, and TIM1. The Connectivity tab shows I2C2, LPUART1, SPI1, SPI2, UCPD1, UCPD2, USART1, USART2, and USART3. The status of each component is indicated by a checkmark (OK), a warning triangle (Non-blocking problem), or a red X (Error). Annotations highlight specific features: 'Click to configure DMA' points to the DMA button; 'Quickly switch pinout and system view' points to the 'System view' tab; 'GPIO configuration is considered incorrect, but code may be generated' points to the GPIO button; 'Error in configuration, code generator will display a warning message' points to the TIM1 button; and 'Configuration is valid here' points to the USART3 button.

STM32CubeMX STM32G0.ioc*: STM32G071RBx NUCLEO-G071RB

File Window Help

Home / STM32G071RBx - NUCLEO-G071RB / STM32G0.ioc - Pinout & Configuration GENERATE CODE

Pinout & Configuration Clock Configuration Project Manager Tools

Additional Softwares Pinout System view

Options A-Z

Categories

Timers

System Core Analog Timers Connectivity

DMA ⚠ GPIO ⚠ NVIC ✓ RCC ✓

LPTIM1 ✓ LPTIM2 ✓ TIM1 ✗

I2C2 ✓ LPUART1 ✓ SPI1 ✓ SPI2 ✓ UCPD1 ✓ UCPD2 ✓ USART1 ✓ USART2 ✓ USART3 ✓

HDMI_CEC ✓ CRC ✓

Click to configure DMA

Quickly switch pinout and system view

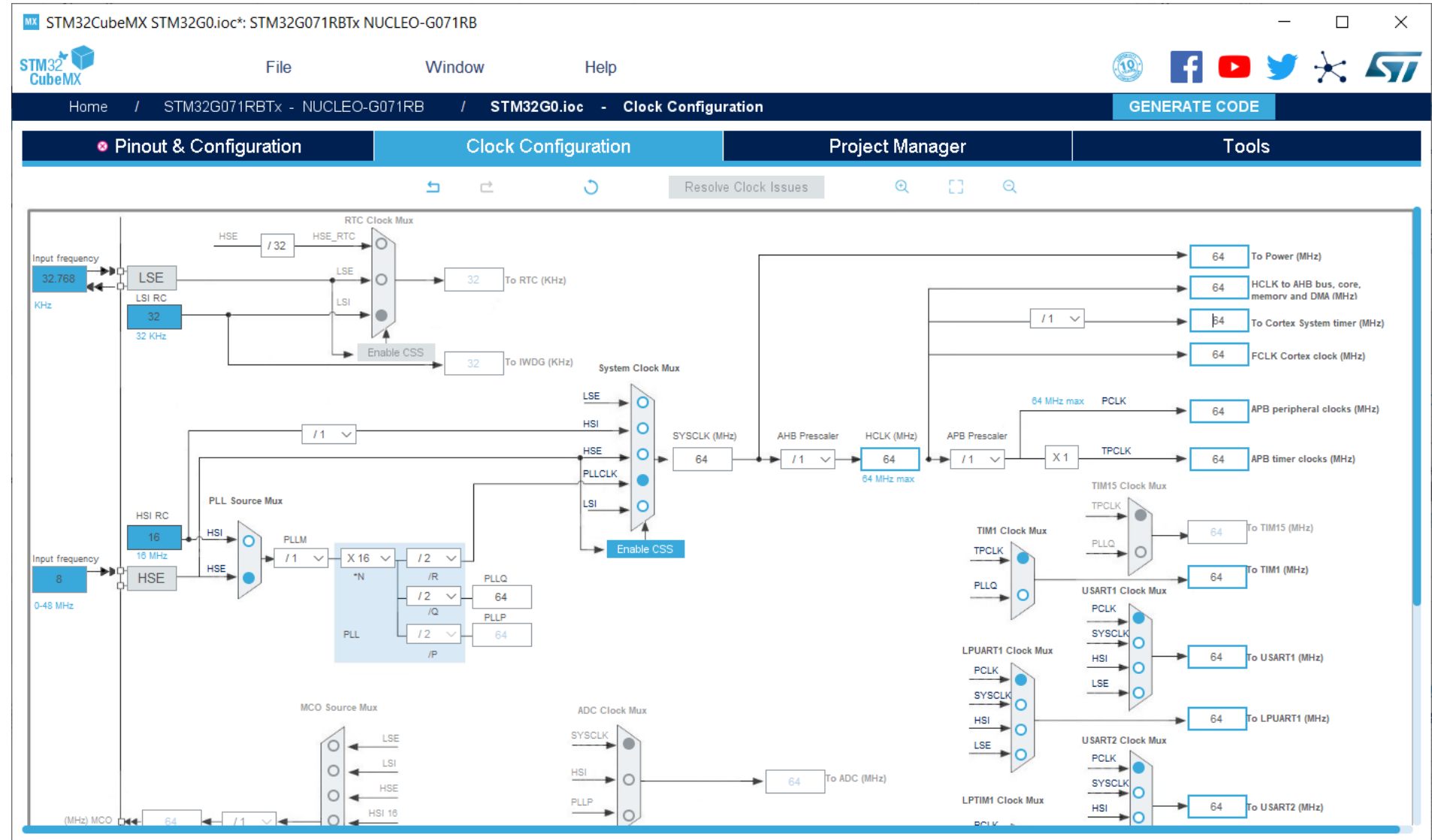
GPIO configuration is considered incorrect, but code may be generated

Error in configuration, code generator will display a warning message

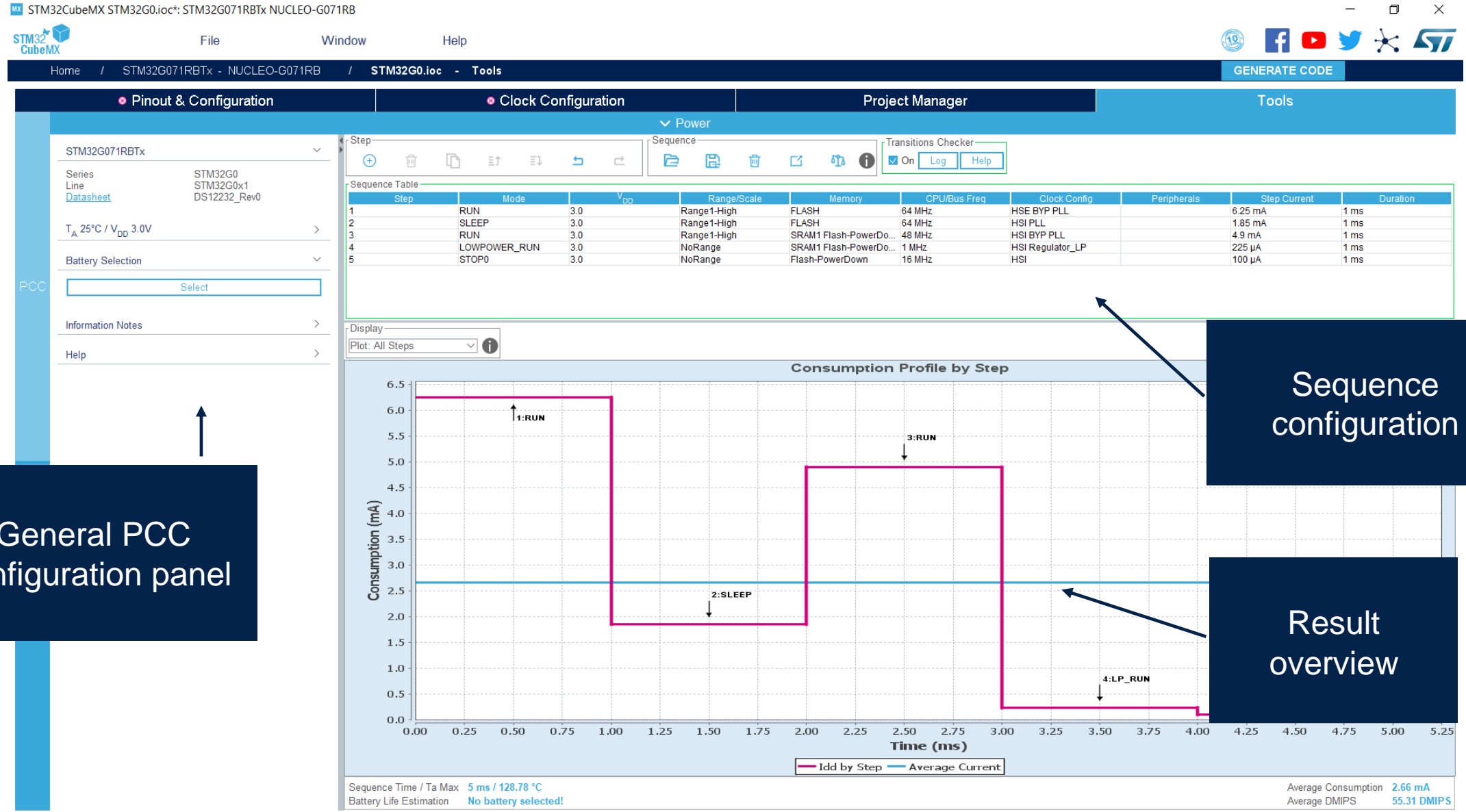
Configuration is valid here

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)



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

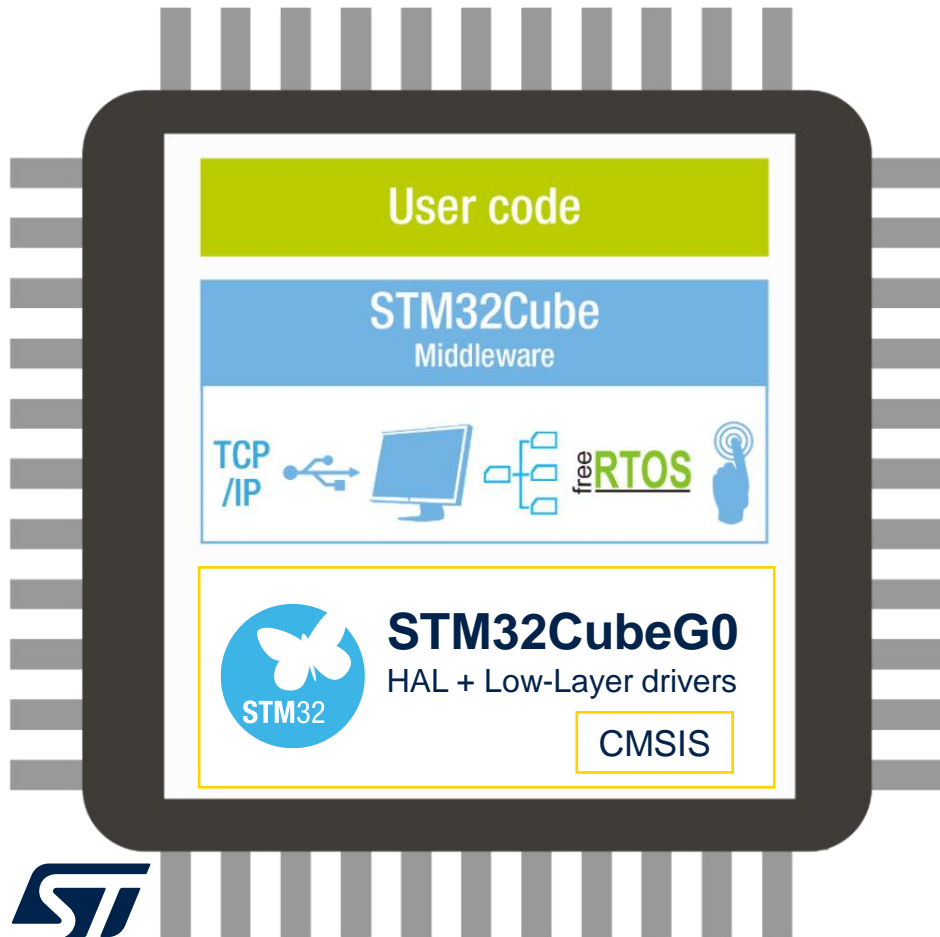
STM32G0 Ecosystem

Platform approach or custom code: you choose

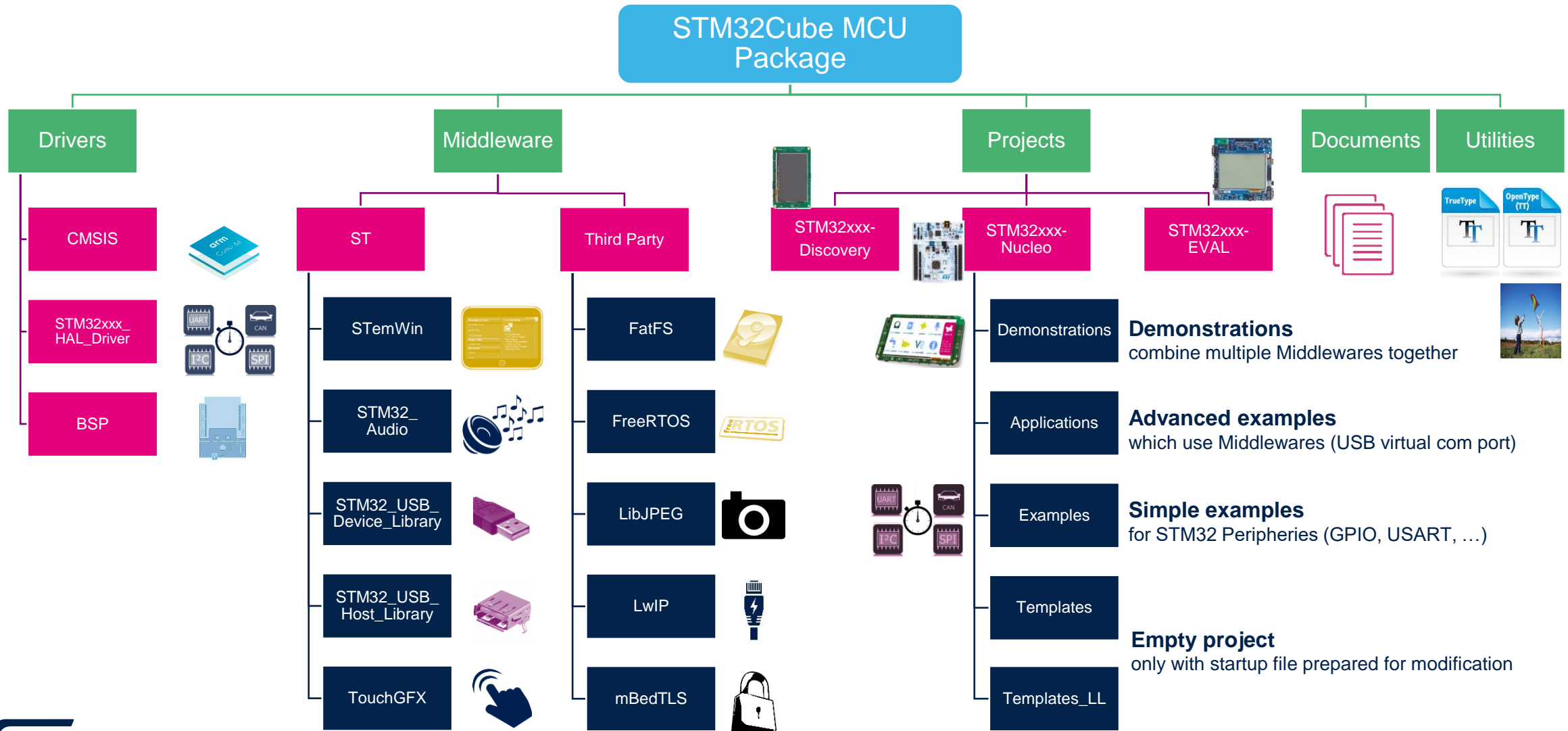


- Open-source FAT file system (FatFs)
- Open-source real-time OS (FreeRTOS)
- 66 + Example applications

- 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



STM32Cube MCU Package Organization



STM32G0 Positioning

STM32G0 Product Highlights

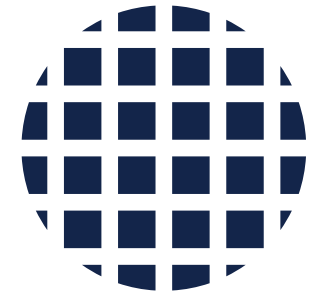
- STM32G0 DNA:
 - Scalable Portfolio
 - Extensive Ecosystem
 - Leading edge Process technology
 - Advanced IPs
- Services
 - ST Direct
 - Fast ROM – Factory Programming Services
 - Support – OLS, Direct Regional Tech. Team engagement
 - Trainings
 - Regular Regional Seminars & Workshops and Customer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



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

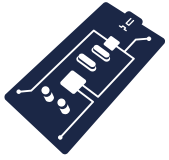


Save on Battery Life:

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



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





Releasing your creativity



[/STM32](#)



[@ST_World](#)



[community.st.com](#)



[http://www.st.com/STM32G0](#)



[wiki.st.com/stm32mcu](#)



[github.com/STMicroelectronics](#)



[STM32G0 online training](#)



[STM32G0 blog article](#)



[MOOC – STM32G0 workshop](#)

Thank you

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