

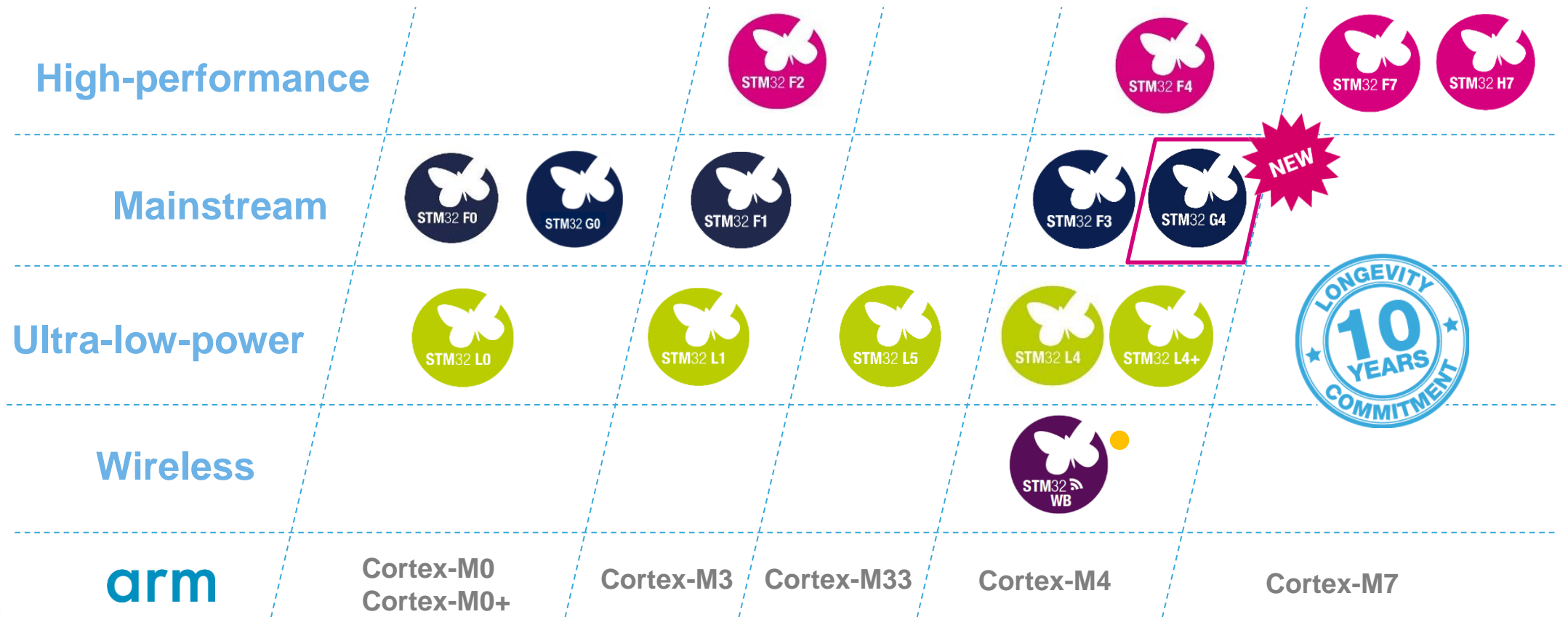
STM32G4 Mainstream Series Mixed Signals MCU



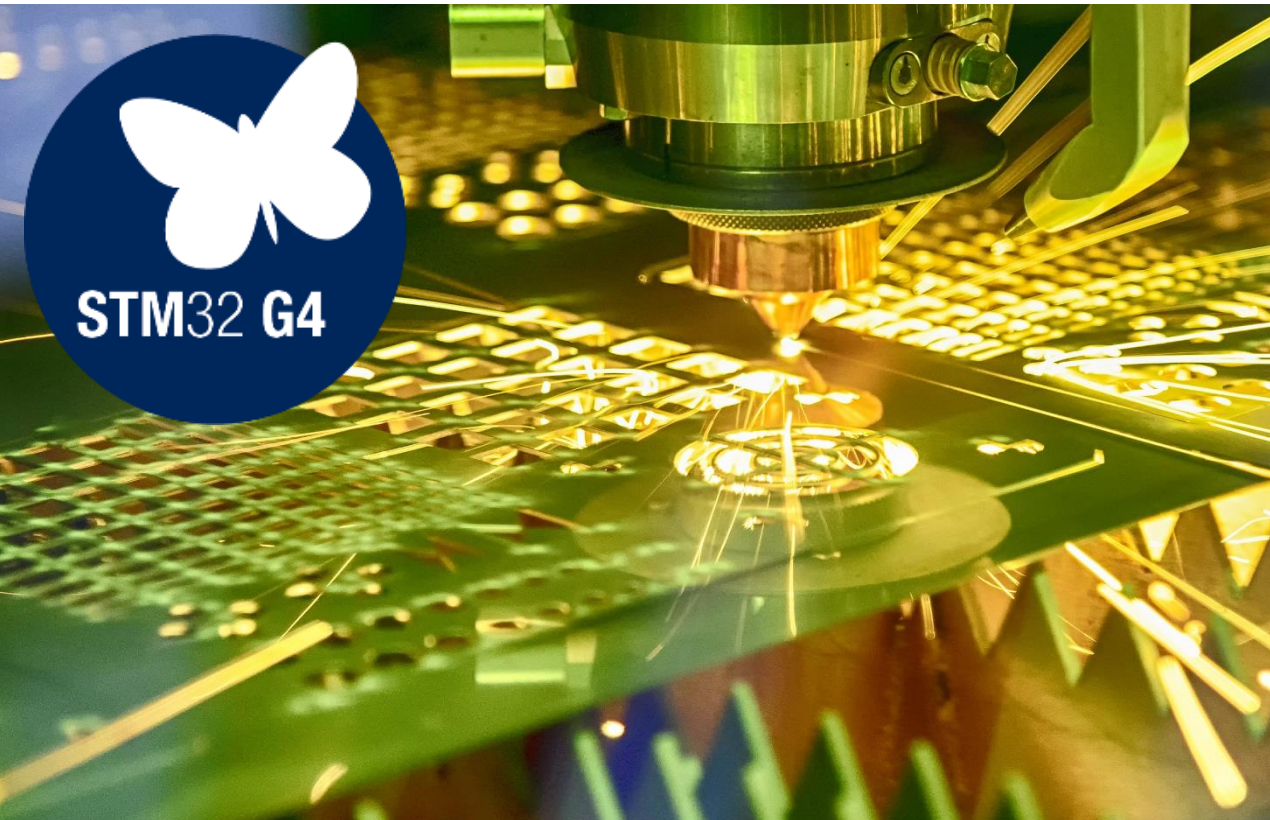


STM32G4: Continuity in STM32 MCUs

Keep releasing your growing creativity



Ideal for applications requiring MCU with advanced and rich analog peripherals

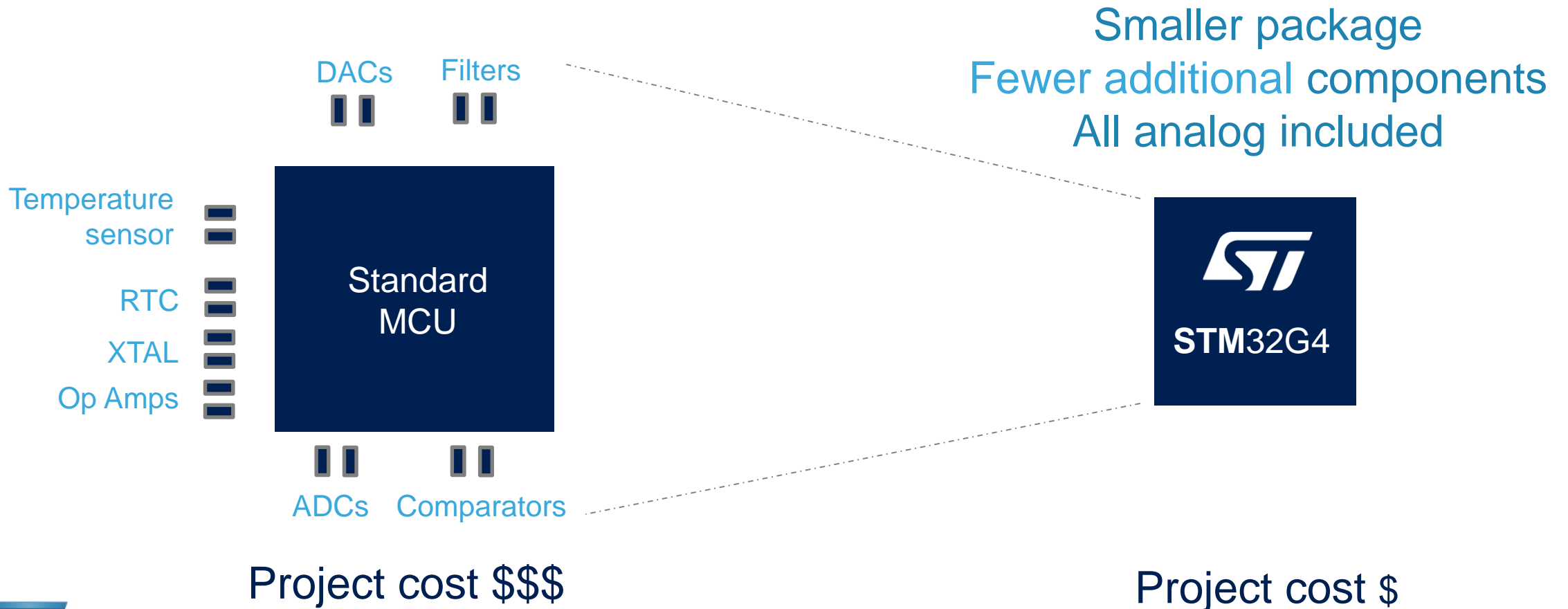


- Control applications (Motor Control...)
- Industrial equipment
- Instrumentation and Measurement
- Digital Power
 - Digital SMPS (switch mode power supply)
 - PFC (power factor correction)



Reducing PCB Size and BOM Cost

System-on-Chip – All-in-one solution



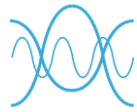


STM32G4 Series – Key Messages



Performance

- Arm® Cortex®-M4 at 170 MHz
- 213 DMIPS and 550 CoreMark® results
- Better dynamic power consumption (163µA/MHz)
- ART Accelerator™ (dynamic cache)
- Mathematical accelerators
- CCM-SRAM Routine Booster (static cache)



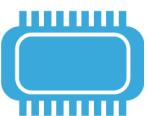
Rich Integrated Analog and Digital

- Op-Amps (Built-in gain), DACs, Comparators
- 12-bit ADCs 4Msps with hardware oversampling
- CAN-FD (flexible data rate – 8Msps bit rate)
- High resolution timer (184 ps)
- USB type-C Power Delivery3.0
- 1% RC accuracy [-5°..90°C], 2% full T° range



Safety and security focus

- Dual Bank Flash with ECC (error code correction)
 - Securable Memory Area
 - Hardware encryption AES-256
 - SIL, Class-B
 - SRAM with Parity bit
- } Secure Live Upgrade
- } Functional safety design packages



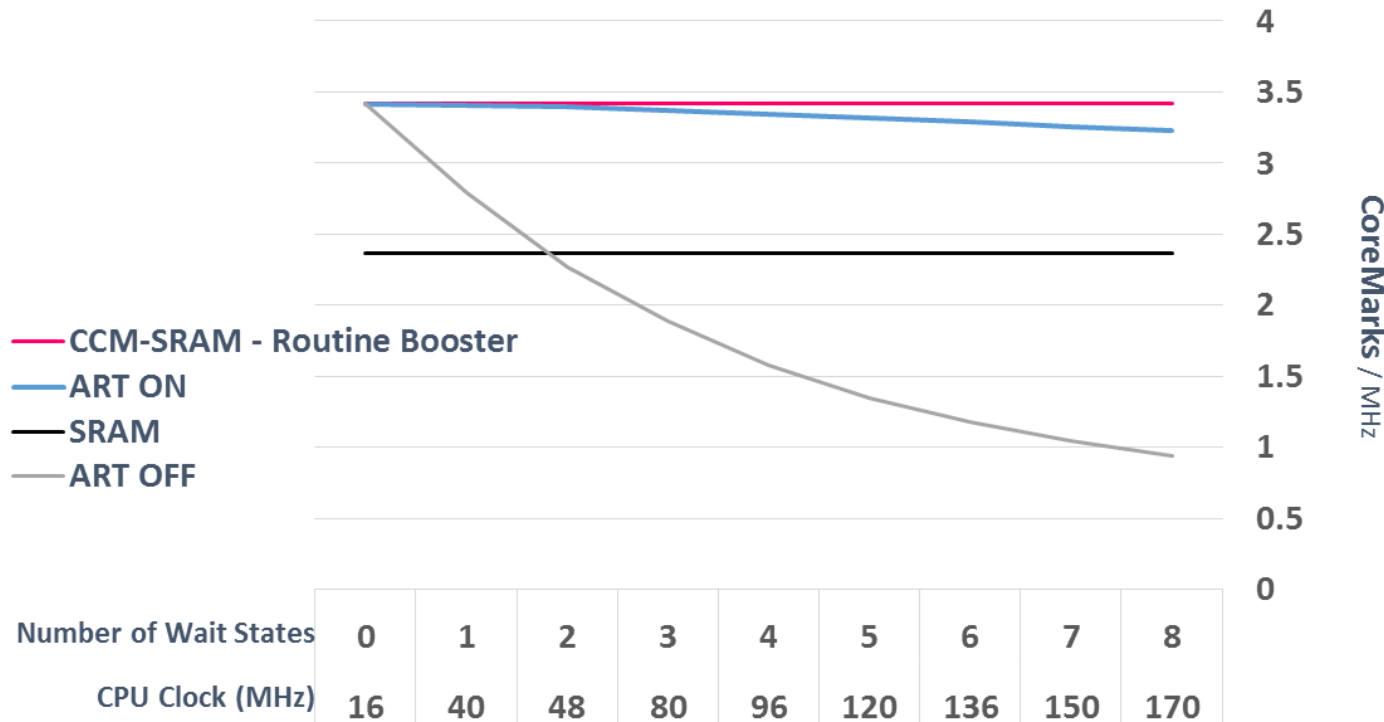
Complete portfolio

- Complements existing STM32F3 Series portfolio
- From -40°C up to 85 or 125°C devices
- From 32- up to 128-pin
- From 32KB to 512KB Flash



Pure 170 MHz CPU performance (Arm® Cortex®-M4) with 3 accelerators

Code execution performance



Arm Cortex-M4 with **FPU**

Up to 170 MHz CPU frequency

Up to 213 DMIPS and 550 CoreMark® results

3 different HW accelerators:

- **ART accelerator** (~dynamic cache) → Full code acceleration (average)
- **Routine Booster CCM-SRAM** (~static cache) → determinism preserved
- **Mathematical** (Cordic + FMAC)



Function acceleration and CPU offload

1. Cordic (Trigo)

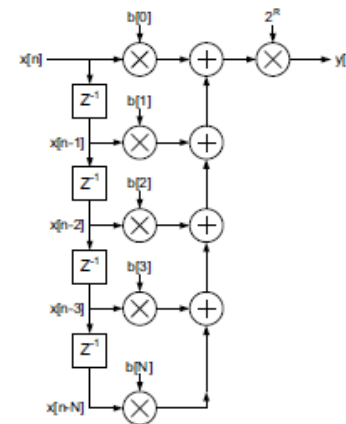
- Very helpful for Field Oriented Motor Control method (FOC)

- Vector rotation (polar to rectangular): Sin, Cos
- Vector translation (rectangular to polar): Atan2, Modulus
- Sinh, Cosh, Exp
- Atan, Atanh
- Square root
- Ln

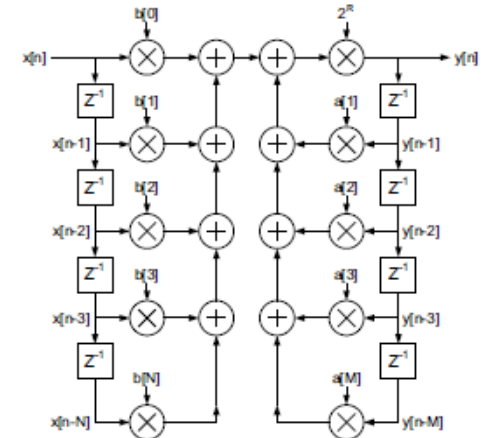
2. Filter Math ACcelerator (FMAC)

- Can be used to create
 - 3p3z Compensator (→ Digital power)
 - Sigma Delta modulator
 - Noise Shaper

FIR filter



IIR filter





Rich, Advanced Analog

Mixed-signal SoC for wide variety of applications

ADC (up to 5)	Values
Topology	SAR 12-bit + HW oversampling → 16-bit
Sampling rate	Up to 4 Msps
Input	Single-ended and differential
Offset and Gain compensation	Auto calibration to reduce gain and offset

Op-Amp (up to 6)	Values
GBW	13 MHz
Slew rate	45 V/μs
Offset	3mV over full T° range 1.5mV @ 25°C
PGA Gain (accuracy)	2, 4, 8, 16, -1,-3,-7,-15 (1%) 32, 64, -31,-63 (2%)

DAC (up to 7)	Values
Sampling rate	15 Msps (internal) 1Msps (from buffered output)
Settling time	16ns

Comparator (up to 7)	Values
Power supply	1.62 .. 3.6V
Propagation delay	16.7ns
Offset	-6 .. +2 mV
Hysteresis	8 steps: 0, 9, 18, 27, 36, 45, 54, 63 mV



Key Features for Targeted Applications

Motor Control

Home appliances, E-bikes, Air Conditioning

- Fast CPU 170MHz
- Mathematical accelerator (Cordic)
- Advanced Motor Control timers
- Fast comparators
- 4Msps ADC-12bit + HW oversampling
- Op-Amp with built-in gain (PGA)
- DAC-12bit
- 1% RC accuracy (UART communication w/o external Xtal)



High-End Consumer

Rechargeable devices, drones, toys

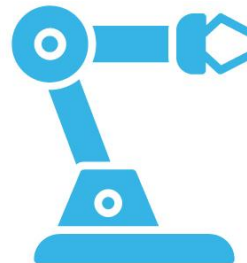
- Low-thickness, small form-factor
- Low consumption in run mode ~ 160µA/MHz
- Embedded analog
- SAI (Sound Audio Interface)
- USB type-C Power Delivery 3.0



Industrial devices Measurements

Industrial equipment

- Fast CPU 170MHz
- Mathematical accelerator (Cordic)
- High temperature 125°C
- CAN FD support
- SPI, USART, I²C
- Advanced timers
- Real Time Clock with backup registers
- Dual bank flash for **live** upgrade
- AES & security



Digital Power

Servers, Telecom, EV Charging station

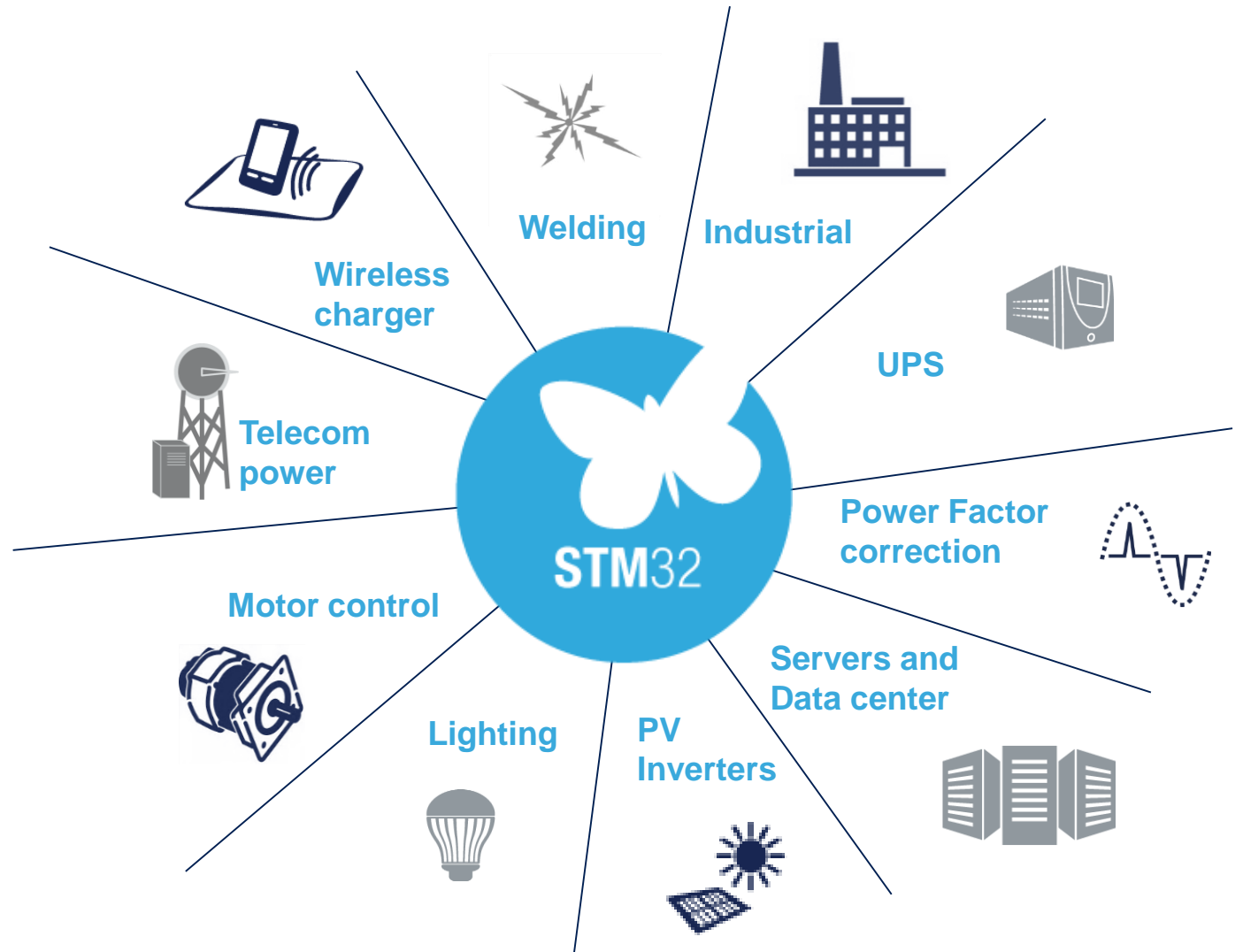
- Fast CPU 170 MHz
- Mathematical accelerator (Filtering)
- 12ch High Resolution timer (184ps)
- 4Msps ADC-12bit + HW oversampling
- Fast comparators (17ns)
- Embedded analog
- Dual bank flash for **live** upgrade
- AES & security
- FMAC for 3p3z compensation





Ease Digital Power Conversion

Enhance your digital power solutions using the STM32G4's full features High Resolution Timer (HRTIM)



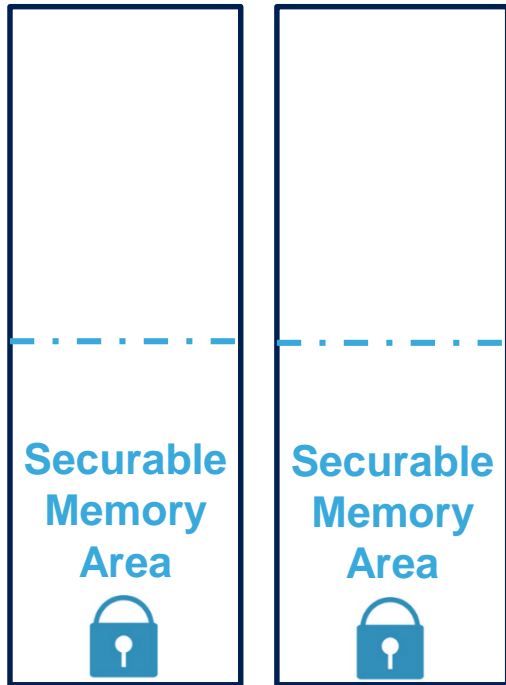


Integrated security features, ready for tomorrow's needs

User Flash

Bank1

Bank2



Securable Memory Area:

- Configurable size
- Can be secured once exiting
- No more access nor debug possible
- Good fit to store critical data
- Critical routines
- Keys

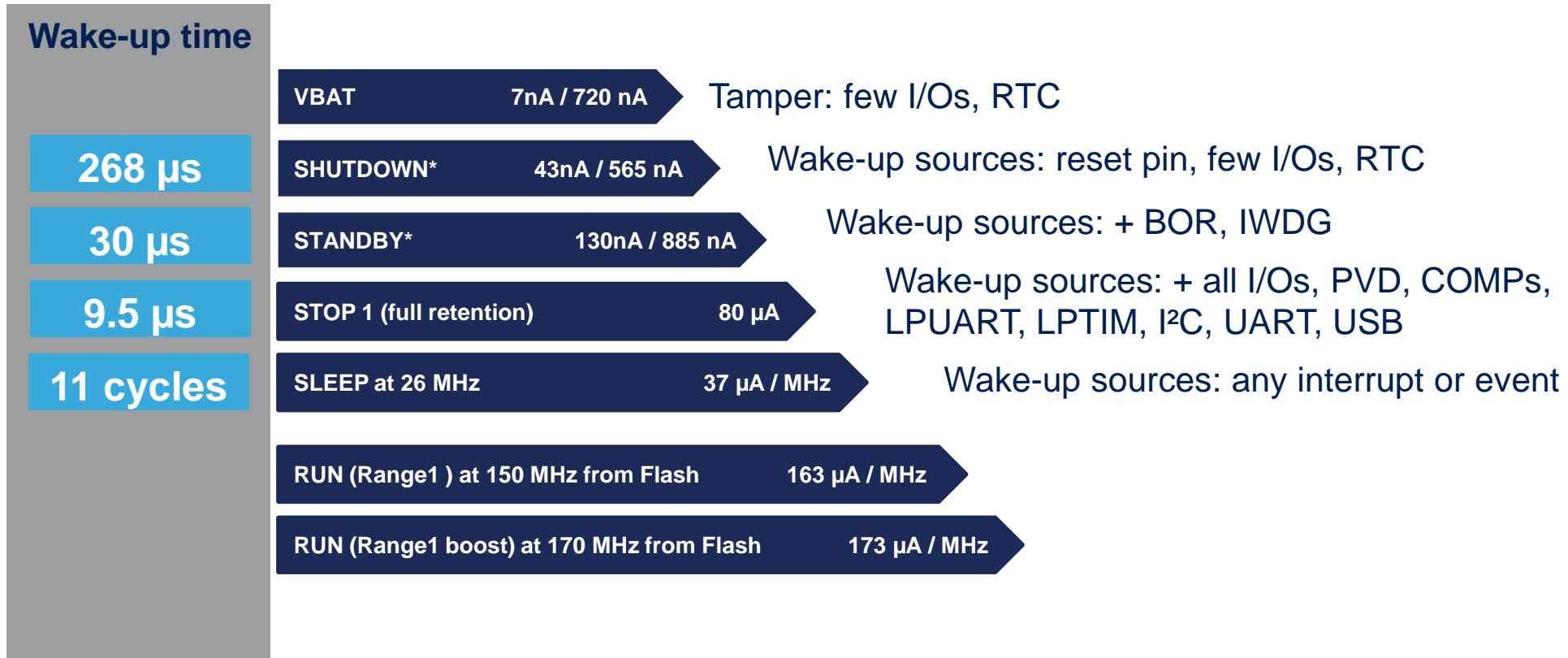


	Securable user memory	AES TRNG	PCROP	MPU	Readout protection	CRC	Write Protection
Secure firmware install (SFI)	●	●			●		
Secure Firmware upgrade (SFU)	●	●			●		●
Mutual Distrustful			●				
Firmware IP protection			●				
Secret key storage	●				●		
Secured communication		●				●	
Authentication	●	●			●		
Task cloisoning				●			



Dynamic Efficiency Modes

When Mainstream MCU Series meets low-power requirements



Conditions: 25°C, V_{DD} = 3V

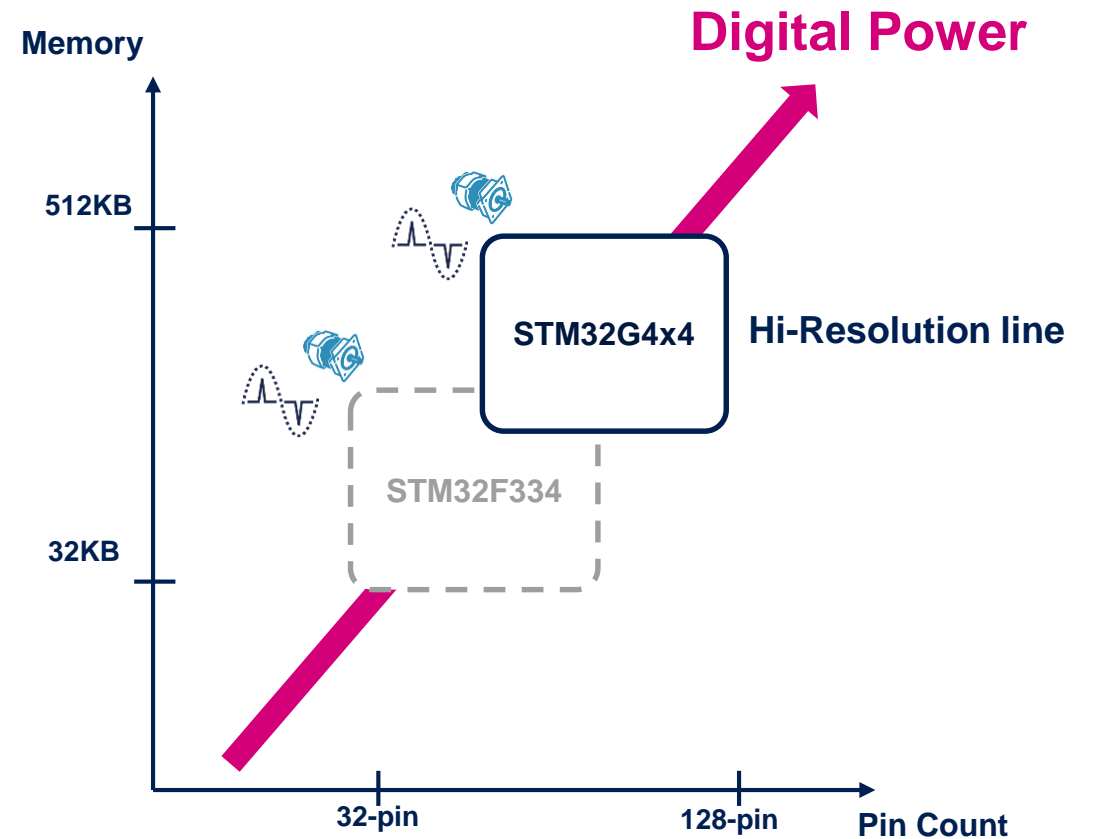
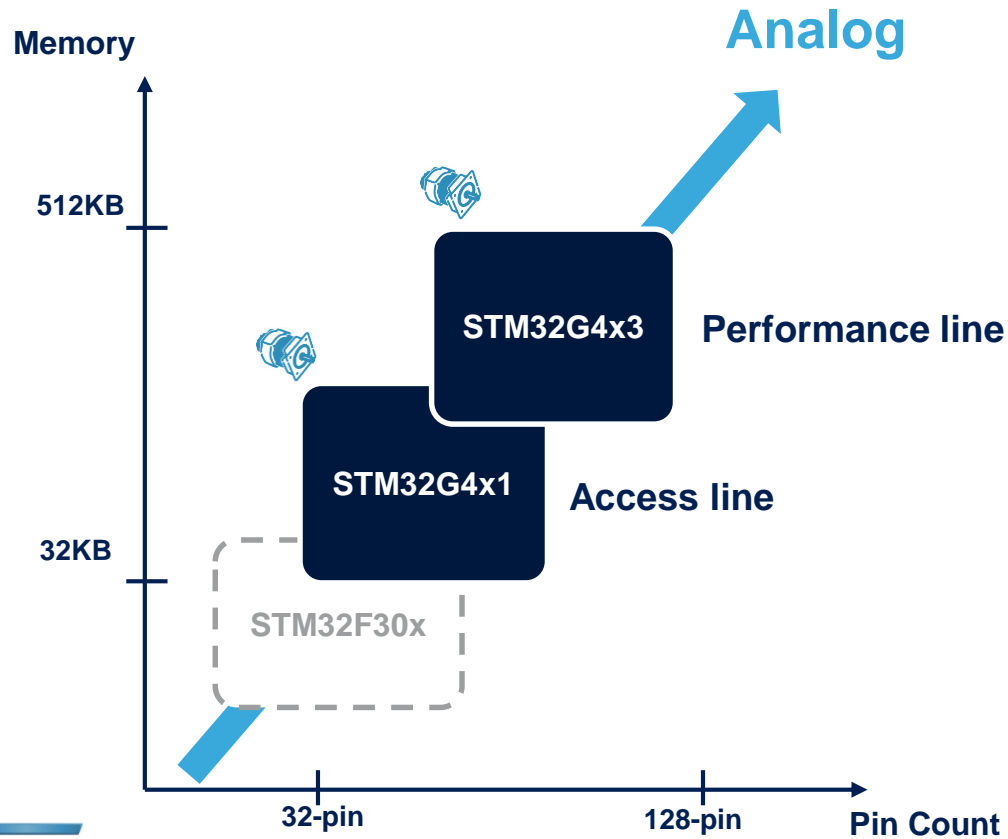
Note : * without RTC / with RTC



STM32G4 Products Lines

General Purpose

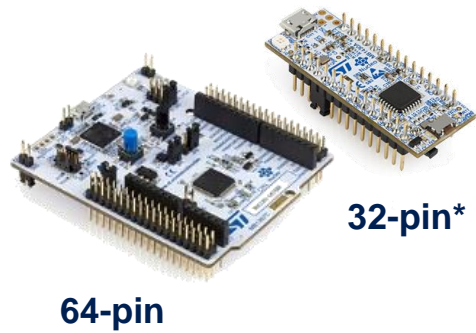
Applications Specific





STM32G4 Hardware Solutions

Accelerate evaluation, prototyping and design



32-pin*

64-pin



STM32 Nucleo

Flexible prototyping

- NUCLEO-G431RB
- NUCLEO-G474RE
- NUCLEO-G431KB*

Evaluation boards

Full feature STM32G4 evaluation

- STM32G484E-EVAL
- STM32G474E-EVAL
- STM32G474E-EVAL1

Motor Control Pack

Full feature for Motor Control and Analog

- P-NUCLEO-IHM03

Discovery kits

Key feature prototyping

- B-G474E-DPOW1*
- B-G431B-ESC1*



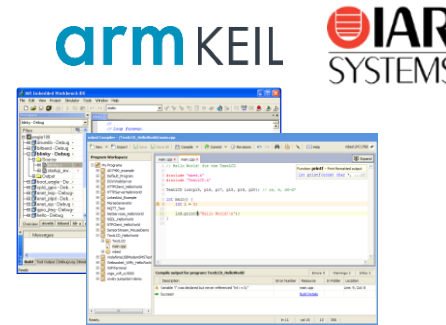
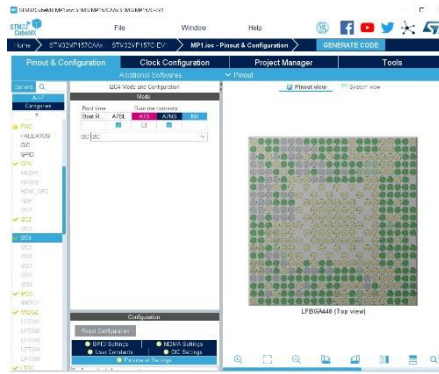
Available now from distributor stocks

* Available in distributor stocks from Q3-2019



STM32G4 Software Tools

Complete support of Arm Cortex-M ecosystem



All-in-one STM32 programming tool
Multi-mode, user-friendly



STM32CubeMX

STM32CubeMX

- Configure and generate Code
- Conflicts solver

IDEs Compile and Debug

Flexible Solutions

- Partners IDE, like IAR and Keil
- Free IDE based on Eclipse like STM32CubeIDE*

STM32 Programming Tool

STM32CubeProgrammer

- Flash and/or system memory
- GUI or command line interface

* SW examples will be available in Q4 19



STM32G4 Series – Take Away

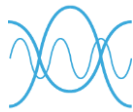
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Analog-rich MCUs for mixed-signal applications



Performance

170MHz Cortex-M4 coupled with 3x accelerators

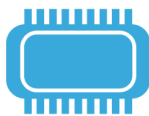


Rich and Advanced Integrated Analog

ADC, DAC, Op-Amp, Comp.



Safety and security focus



Large portfolio available from NOW!

32..512KB Flash memory

32..128-pin packages

Releasing Your Creativity

