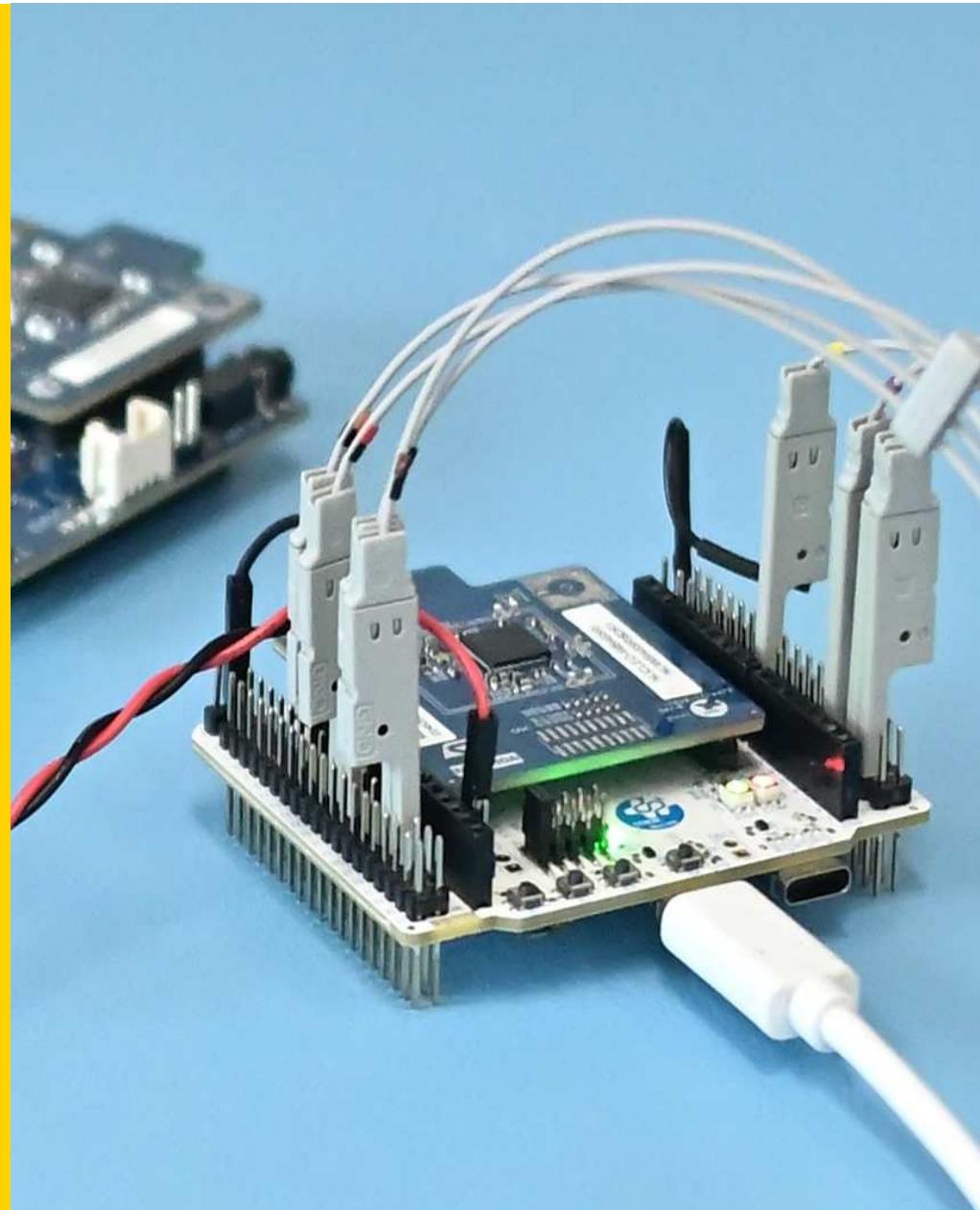




Welcome to
**STM32WBA6 series
workshop**

Enhance your wireless
applications with the new
STM32WBA6

Workshop team





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 3,360 CoreMark score



Mainstream
MCU



High-performance
MCU



Embedded
MPU

32- and 64-bit microprocessors



Enabling edge AI solutions

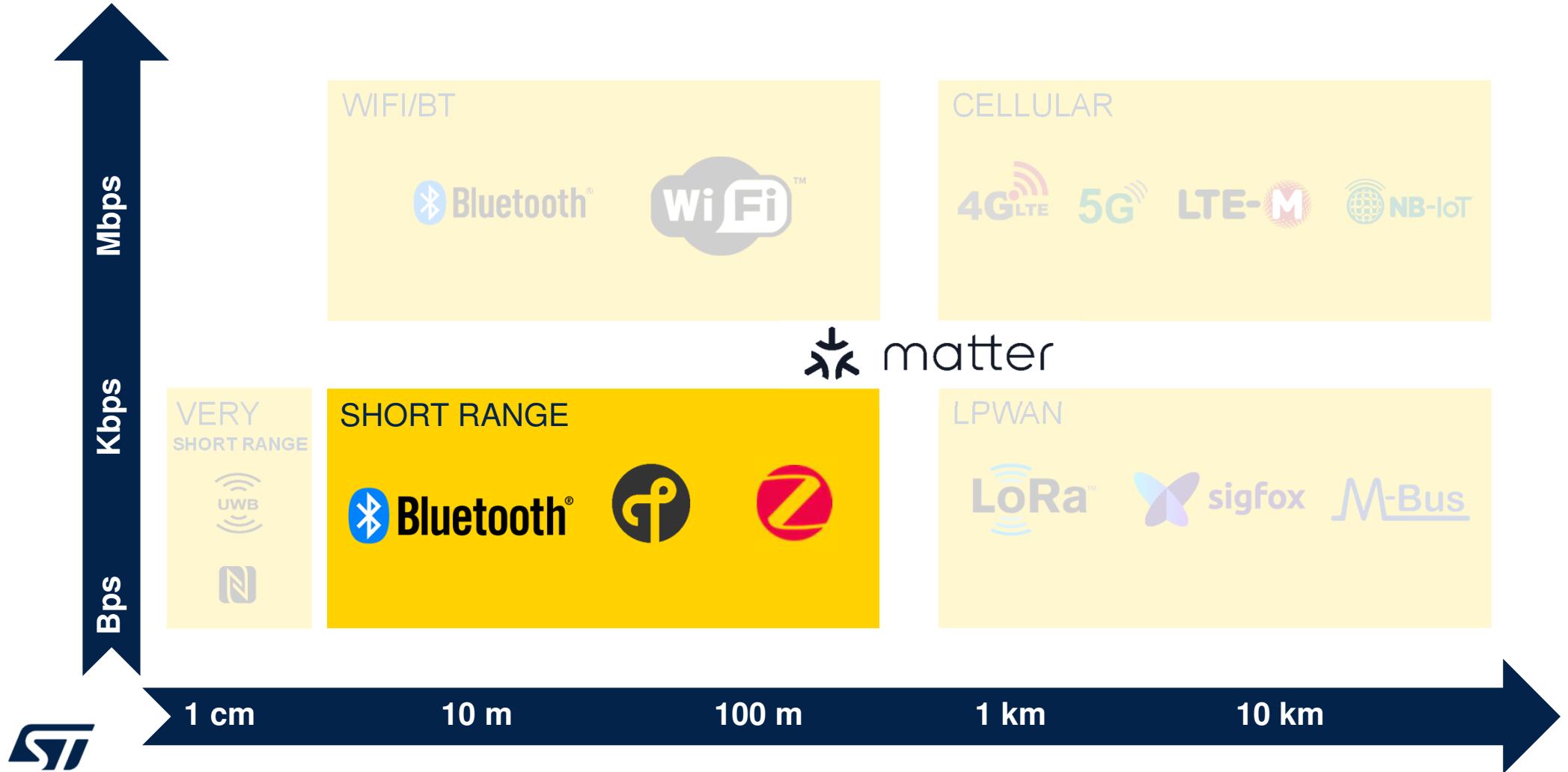


Scalable security



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

Communication technologies



Fully embrace 2.4 GHz technologies



Wearable, healthcare,
smart appliances

- Security
- Interoperability
- BT SIG Standard



Sensor networks, home
appliances, industrial

- Mesh topology
- Large scale
- Open Standard



Sensor networks,
industrial & home
automation

- Mesh topology
- Large scale
- Zigbee compliant

Product portfolio

Performance



STM32WB05xN
Network co-processor



STM32WB0x
CM0+ 64 MHz
Flash up to 512 KB



STM32WB15
CM4 64 MHz & CM0+ 32 MHz
Flash up to 320 KB



STM32WB55/35
CM4 64 MHz & CM0+ 32 MHz
Flash up to 1 MB



STM32WBA5
CM33 100 MHz
Flash up to 1 MB



STM32WBA6
CM33 100 MHz
Flash up to 2 MB

Advanced solution

Network processor
Bluetooth® LE
add-on

Space-constrained
applications

Dual core
Simpler applications

Multiprotocol
Dual core
Rich feature set

High processing
Enhanced security
High RF power output



What the STM32WBA series offers

Enhanced wireless performance for a greater user experience

- Arm® Cortex®-M33 at 100 MHz. CoreMark score at 407.
- Multiprotocol support: Bluetooth® Low Energy, Zigbee, OpenThread, Matter
- +10 dBm output power with low power consumption

Secure: reliable and compliant with the latest regulations

- SESIP Level 3: compliance with the US Cyber Trust Mark and EU Radio Equipment Directive (RED) regulations
- PSA Certified Level 3
- 10-year rolling longevity commitment for continuous supply

Simpler and faster development thanks to proven STM32 ecosystem

- Rich ecosystem offering hardware, embedded software & tools, documentation
- Design flexibility with a wide range of package options



STM32WBA increases security

Extensive functionalities to protect your assets

Memory protections against illegal access control

OTP, **HDP**, WRP, MPU
Secure Debug
Active Tamper, 4 pairs

Cryptography for hardware robustness

Side channel AES, PKA
Additional AES, SHA, TRNG,
HUK (Hardware Unique key)

Platform protection during product lifecycle

RDP: 4 protection level states
Password based regression

Code isolation for runtime protection

4 isolation stages
Arm® TrustZone® technology

Security services

STM32Trust TEE TF-M

Secure boot & secure updates

Secure firmware install

NIST - CAVP certified CryptoLib



psacertified™
Level three

target certifications

State-of-the-art security assurance level*



*Ready to address the US Cyber Trust Mark and EU Radio Equipment Directive (RED) regulations due to become mandatory in H2'2025.

STM32WBA5 DNA within portfolio

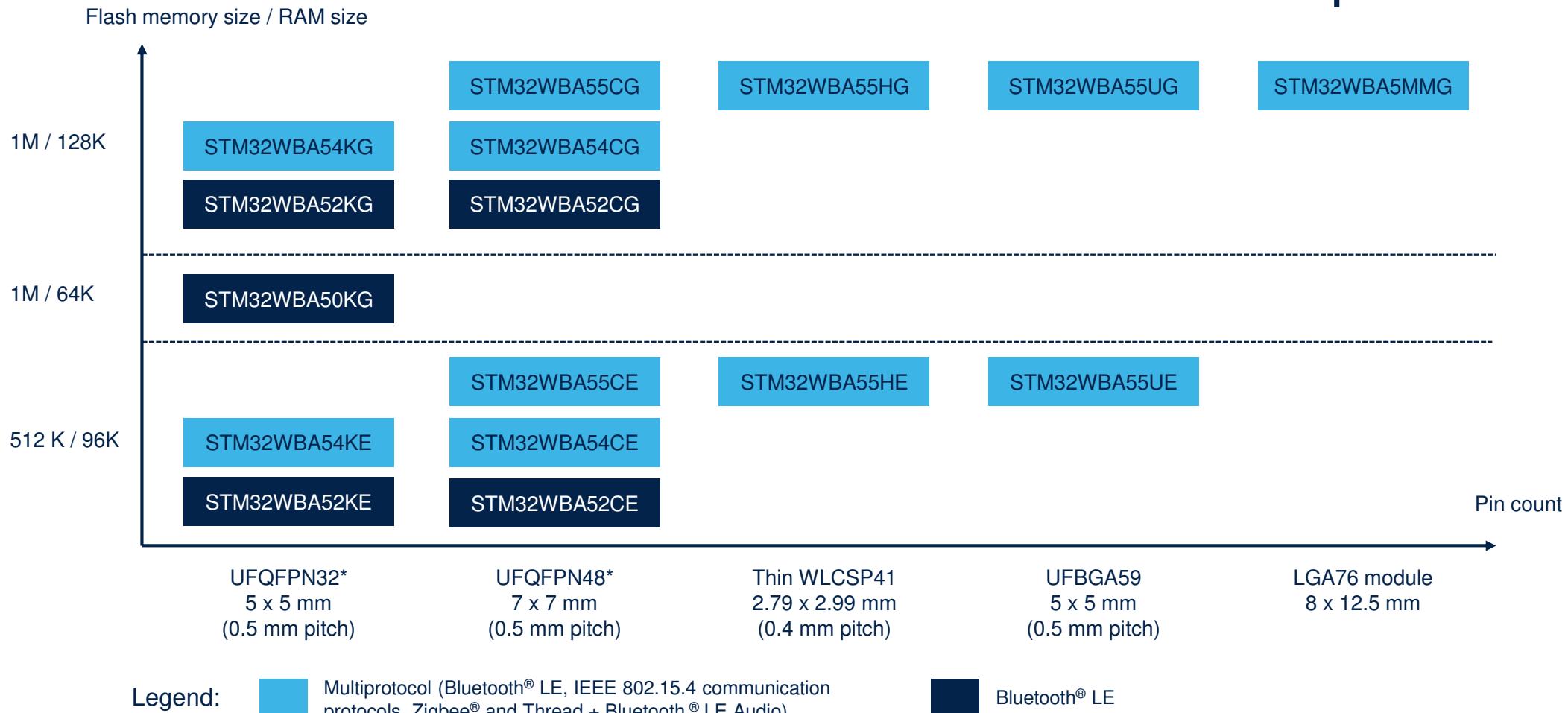


Ideal combination of performance, peripherals, and cost efficiency for fast and simplified development.

- Flash memory up to 1 Mbytes and 128 Kbytes of SRAM
- Large choice of packages
- Concurrent communication via Bluetooth® LE (qualified against Bluetooth Core 5.4), Zigbee and Thread.

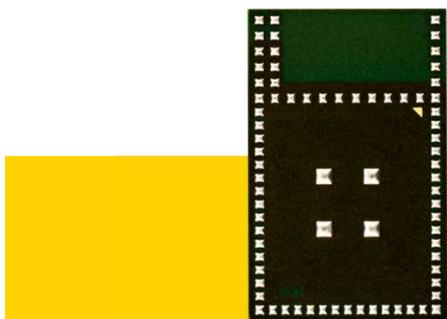


STM32WBA5x portfolio

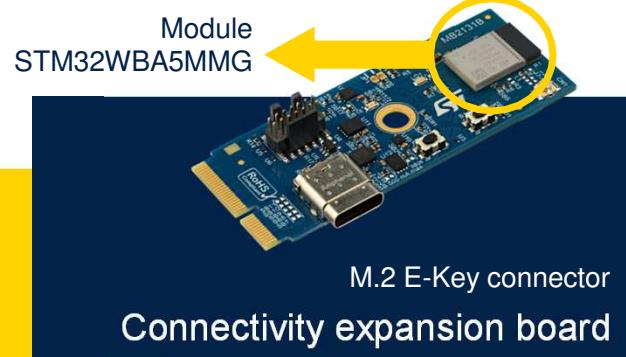


* MLPF-WB-04D3: integrated matching RF components tailored for STM32WBA54/55 UFQFPN32 and UFQFPN48 packages.

STM32WBA5M: efficient and versatile module



STM32WBA5MMG



B-WBA5M-WPAN

Small form factor	Reduce costs	Strong features set	Ecosystem
<ul style="list-style-type: none">SiP LGA76: 8 x 12.5 mmFully integrated BOM including 32 MHz and 32 kHz crystals. Only one external capacitor needed.Integrated antenna with IPD provides best-in-class and reliable matching, with an external antenna option.	<ul style="list-style-type: none">Fast time to marketFully certified CE, FCC, ISED, MIC, RoHS, REACHFree of charge radio stacksSimplified design: down to 2 PCB layers	<ul style="list-style-type: none">Cortex®-M33 @ 100MHz1MB Flash / 128kB RAM33 GPIOs, ADC, Comp, TSCSecurity and Cryptography	<p>STM32 CubeMX STM32 CubeIDE STM32 CubeWB STM32 CubeMonitor STM32 CubeProgrammer</p>
Extended battery life		Multiprotocol	
<ul style="list-style-type: none">1.71 to 3.6 V power supplySMPS and ultra-low-power modes during radio activities			



STM32WBA6



STM32WBA6 DNA within portfolio



High-end MCU offering the most advanced features in the series, such as:

- Up to 2 Mbytes of flash memory and 512 Kbytes of RAM
- Up to 86 GPIOs and USB high-speed support for advanced connectivity
- Design flexibility with a wide range of package options
- QFN48 pin-to-pin compatibility for upgrades from STM32WBA55



What makes STM32WBA6 ideal for smart wireless devices

Smart lock



Smart home – Matter Thread end devices



High performance

- Reliable data transmission with +10 dBm output power
- X-CUBE-MATTER package certifications
- Extensive 2 Mbytes of flash memory and 512 Kbytes of RAM, sufficient for OTA updates

Enhanced user experience

- Easily store keys & data with 2 Mbytes flash for flexible use
- Seamless firmware updates with dual banking

Cost-efficiency: simplification of design thanks to MCU with integrated radio

Medical – continuous glucose monitoring devices (CGM)



Better design efficiency

- Tiny packages for flexible integration
- 2 Mbytes flash for data logging
- Lower device cost

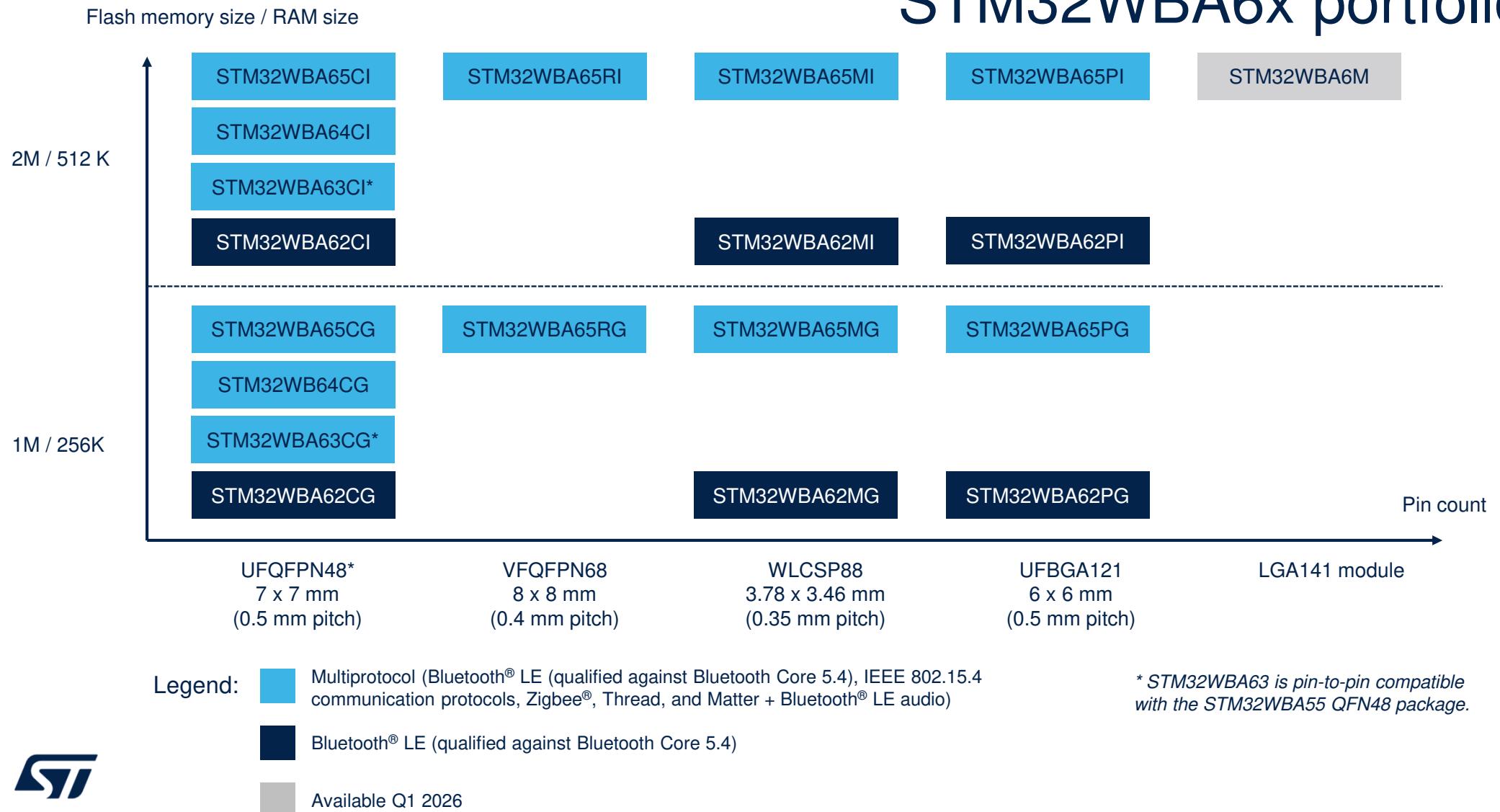
Robust connectivity: reliable data transmission with +10 dBm output power

Ultra-low-power for battery-based devices

Robust security (SESIP L3, RED compliance)

Multiprotocol support (Bluetooth® LE, Thread, Matter) & flexible packages

STM32WBA6x portfolio



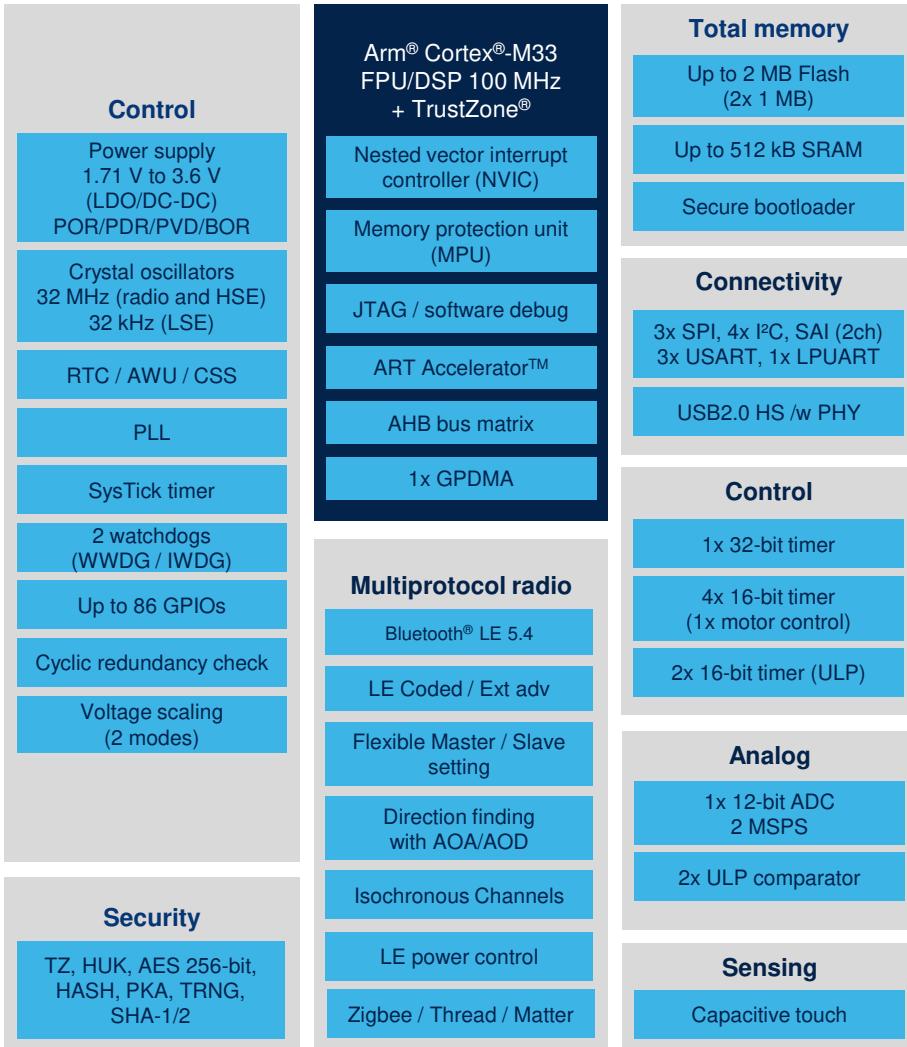
STM32WBA6 product lines

<ul style="list-style-type: none"> • Arm® Cortex®-M33 (DSP + MPU + TZ) at 100 MHz • ART Accelerator • Integrated balun + antenna matching • Max output power: +10 dBm • 16-bit motor control timer • 32- bit timer • 1x ADC 12-bit • 2x comparators • Temperature sensor • Low voltage 1.7 to 3.6V • Temperature range -40° to 105°C 	Product line	Flash (MB)	RAM (KB)	Multi protocols	Other	USB	LDO/SMPS
	STM32WBA6						
	STM32WBA65	Up to 2 MB	Up to 512 KB	Yes	3x USART 3x SPI 4x I2C	USB HS	SMPS + LDO
	STM32WBA64			Yes	3x USART 3x SPI 4x I2C	USB HS	LDO
	STM32WBA63			Yes	2x USART 2x SPI 2x I2C	-	SMPS + LDO
	STM32WBA62			-	3x USART 3x SPI 4x I2C	USB HS	LDO





STM32WBA6x block diagram

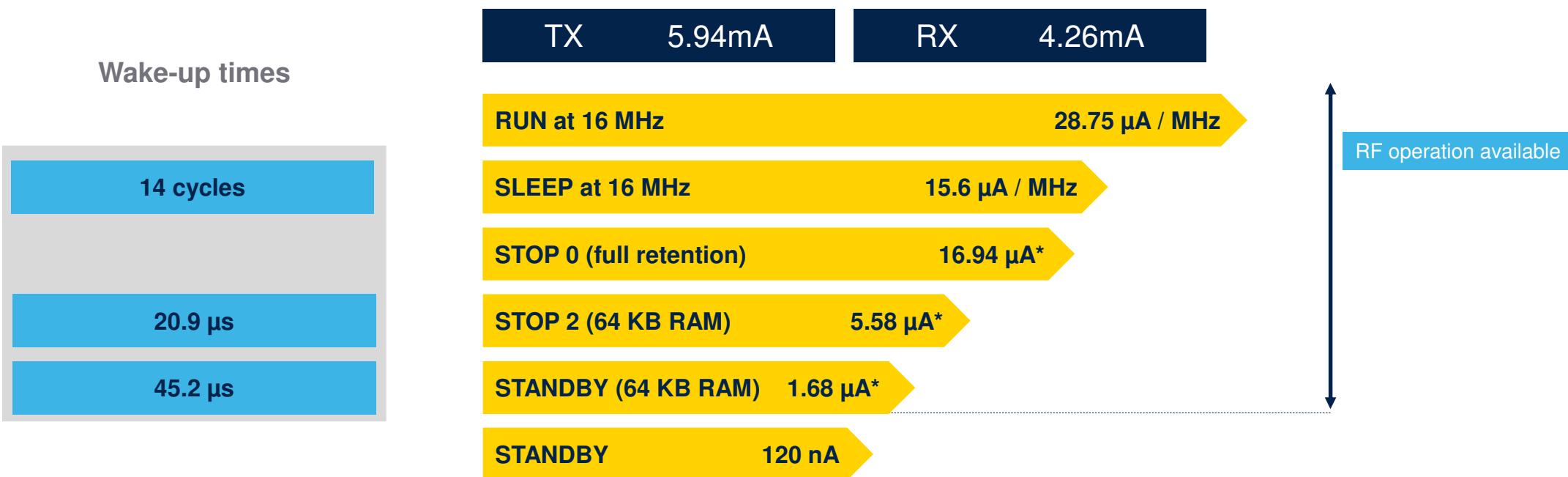


Strong radio performance

- Multiprotocol: BLE 5.4, Zigbee R22/23, OpenThread 1.4, Matter 1.4
- +10 dBm max output power + external PA support
- Tx = 5.94 mA (0 dBm) / Rx = 4.3 mA (3.3 V SMPS)
- Rx sensitivity:
 - -96 dBm Bluetooth® LE @ 1 Mbps
 - -100 dBm 802.15.4 @ 250 kbps
- Packet Traffic Arbitration



STM32WBA65 power consumption



Typ @ SMPS ON 3.3 V @ 25°C

* with RTC

STM32WBA ecosystem



STM32WBA6 Wireless Ecosystem



Bluetooth® LE 5.4
Fully certified
BLE Audio / Auracast
Long Range
Extended Advertising
AoA/AoD
LE power control
Full set of examples



Zigbee 3.0
Fully certified (Q3'25)
R23 FFD/RFD
R22 FFD/RFD
R22-SE FFD/RFD
Zigbee Direct
Full set of examples

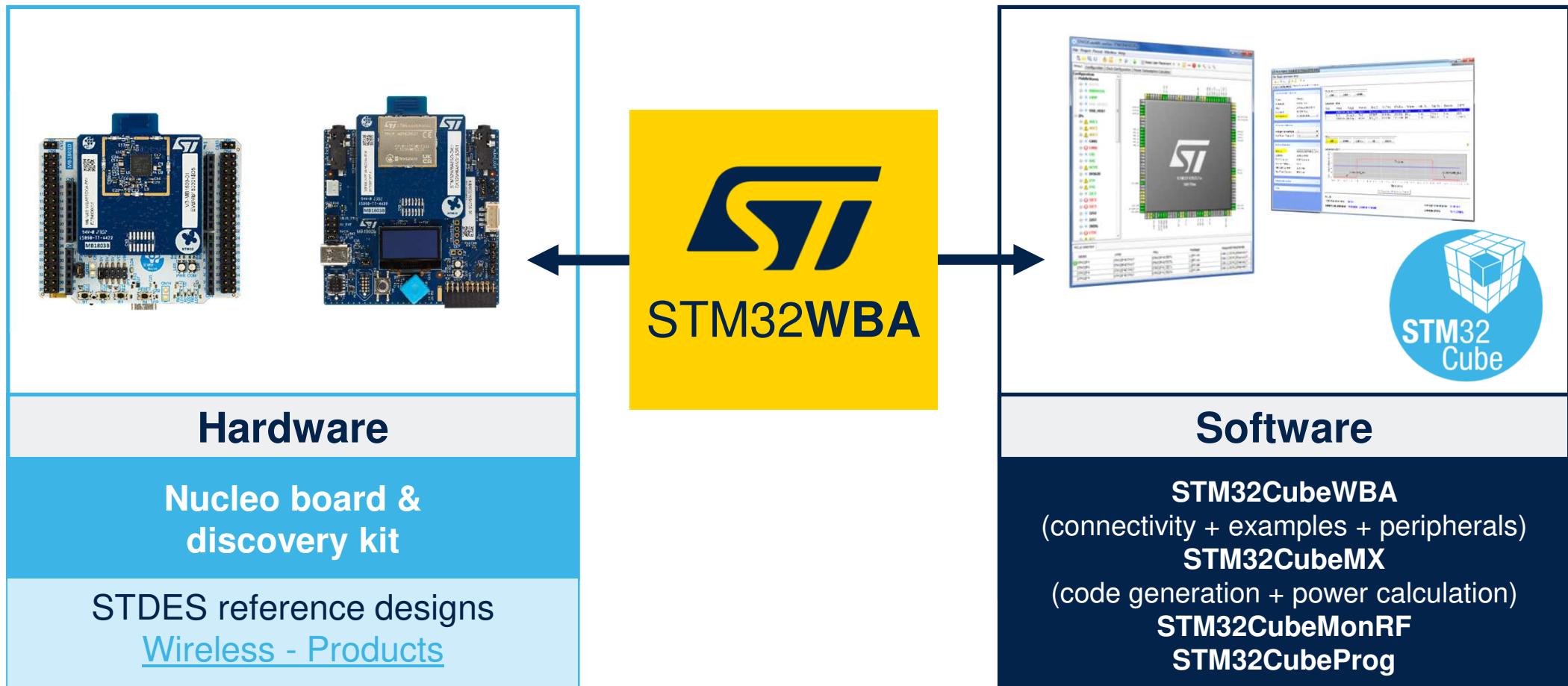


OpenThread 1.4
Thread 1.4 FTD/MTD
Certification
Examples
applications



Matter 1.4
Pre-certification done
Matter Provisioning
Secure OTA with
OEMiRoT
Support of internal &
external Flash
Examples
applications

STM32WBA ecosystem simplifies your design journey



STM32WBAX development boards

Discover many use cases with the STM32WBA using Arduino® connectivity USB HS, and I/Os

STM32WBA55G-DK1
Discovery kit



NUCLEO-WBA55CG
Nucleo-64 board



STM32WBA65I-DK1
Discovery kit



NUCLEO-WBA65RI
Nucleo-64 board



- UFQFPN48 package
7 x 7 mm 0.5 mm pitch
- Small serial LCD for simple GUI use cases
- Arduino® and STMod+ connectors
- RF certified for protocols & regulations

- UFQFPN48 package
7 x 7 mm 0.5 mm pitch
- 35 GPIOs
- Arduino® and Morpho connectors
- RF certified for protocols & regulations

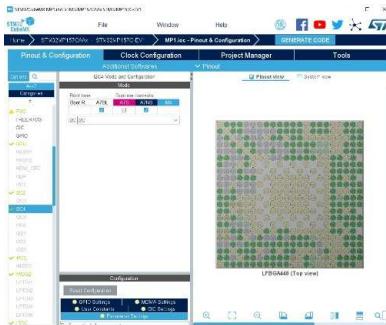
- VFQFPN68 package
8 x 8 mm 0.4 mm pitch
- USB HS, Small serial LCD for simple GUI use cases, High performance Serial EEPROM
- Arduino®; STMod+ connectors
- RF certified for protocols & regulations

- VFQFPN68 package
8 x 8 mm 0.4 mm pitch
- 46 GPIOs, USB HS
- Arduino® and Morpho connectors
- RF certified for protocols & regulations



Software tools for STM32WBA

Complete support of Arm® Cortex®-M33 architecture



STM32CubeMX

Graphical tool
for easy configuration

- Configure and generate code
- Peripherals and middleware configuration



IDEs Compile and debug

Simple,
powerful solutions

- Partners IDE (Arm® Keil®) **FREE**
- STM32 VS Code extension **FREE**
- IDE based on Eclipse **FREE**
- RTOS aware debug

STM32 programming & monitoring tools

STM32CubeProg
STM32CubeMonitor

- Device and memory configuration
- Program the application
- Monitor variables at runtime



RF IPD companion chip to STM32WBA series

Designed to ensure harmonics filtering, impedance matching and ESD protection in one die

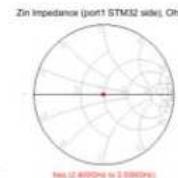
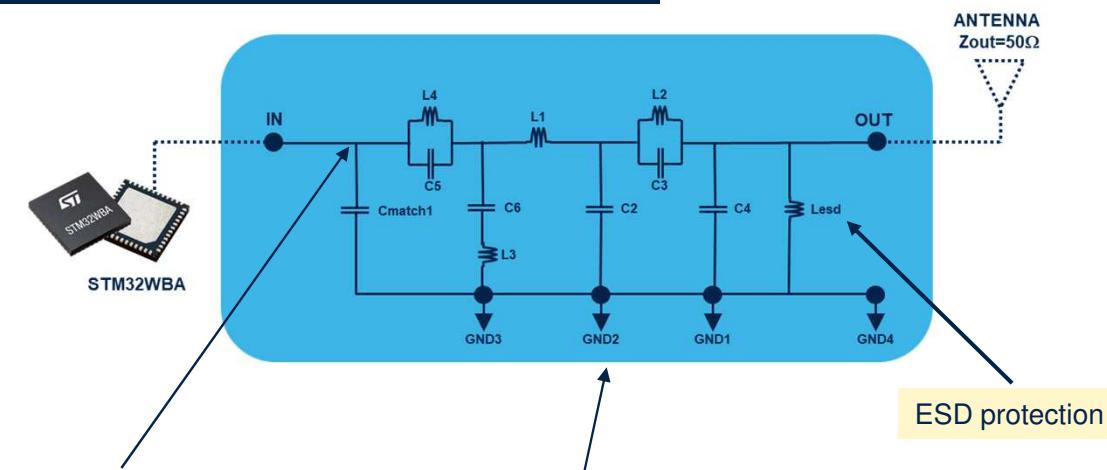
- All-in-one: matching, filtering and antenna protection in one die
- Designed to simplify the RF path between STM32WBA and antenna
- Optimized to answer optimized performances
- BOM reduction, reliability improvement
- System integration: small die size 1.6 x 1 mm²



Chip scale package on glass 6 bumps

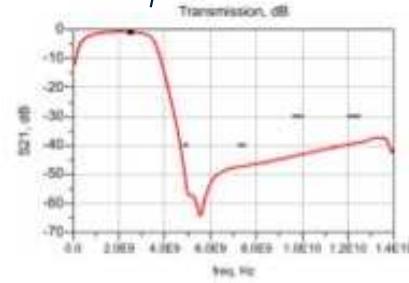
MLPF-WB-04D3

1.6 x 1 mm²



freq=2440000000.0Hz
impedance = 49.3 - j0.9

Direct match of STM32WBA impedance



Deep attenuation to answer system requirements

How ST could help in your wireless journey ?

**ST RF
Support**

Senior expertise in wireless communication

Knowledge on your application

Pre-certification capabilities with dedicated application labs

**ST support you
to make the right choice**

**ST Product
Selection**

- Training
- Benchmark
- Datasheet review

**ST Product
Evaluation**

- Eval kit bring-up
- Performance review

**SW and HW
Development**

- **Schematic review**
- **Layout review**
- Software porting
- **1st PCB bring-up**
- **1st RF test report**
- Debugging

**Testing and
certification**

- **Regional RF test report**
- Protocol RF tests
- Corner case debugging
- **Certification process guidance**

Industrialization

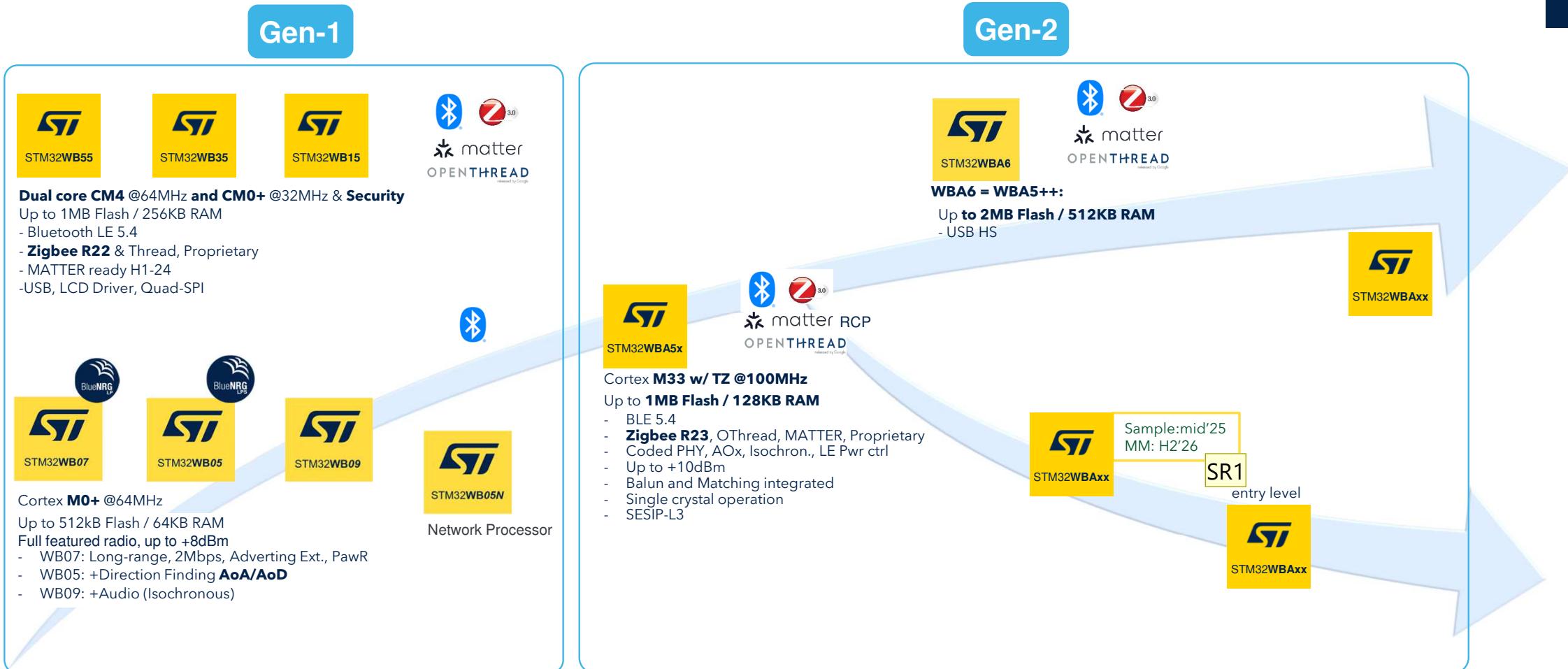
- RF Production tooling
- Ramp-up support

**ST technical support
for wireless connectivity project**



STM32 MCU

STM32 wireless 2.4GHz Roadmap



Slide 25

SR0 No matter on WBA2. to be removed
Sylvain RAYNAUD; 2025-05-15T09:39:20.343

SR1 MML on cut 2.0 => Q4'26
Sylvain RAYNAUD; 2025-05-15T09:42:38.803

SR2 Bluetooth "5" to be removed ?
Sylvain RAYNAUD; 2025-05-15T09:49:32.300

STM32WBA takeaways



Wireless

Multiple protocols supported
+10 dBm output power

Performance

Arm® Cortex®-M33 at 100 MHz
Efficiency

Power efficiency

Extended battery lifetime
Autonomous low-power mode

Security

TrustZone® DPA resistant
Target SESIP Level 3

Integration

Up to 2 Mbytes of flash memory, up to 512 Kbytes RAM. Reduced BOM

Free ecosystem

Faster time to market
Enhanced design journey



Our technology starts with You



Find out more at www.st.com

© STMicroelectronics - All rights reserved.

ST logo is a trademark or a registered trademark of STMicroelectronics International NV or its affiliates in the EU and/or other countries.

For additional information about ST trademarks, please refer to www.st.com/trademarks.

All other product or service names are the property of their respective owners.

