



STM32WBA wireless MCU series

**Faster time-to-market and higher performance
for wireless short-range devices**





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

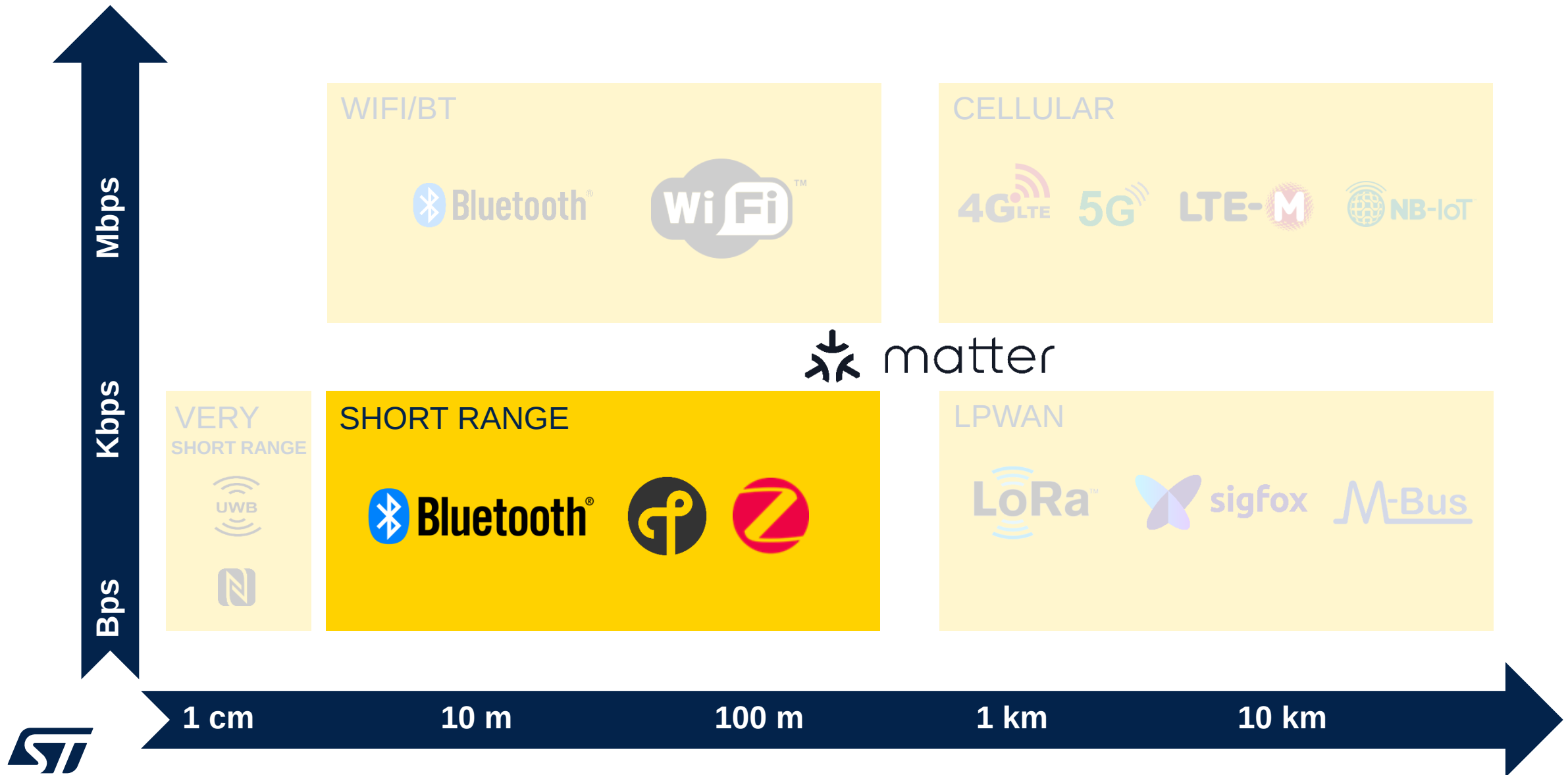


Scalable security



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

Communication technologies



Fully embrace 2.4 GHz technologies



Wearable, healthcare,
smart appliances

- Security
- Interoperability
- Bluetooth® SIG Standard



Sensor networks, home
appliances, industrial

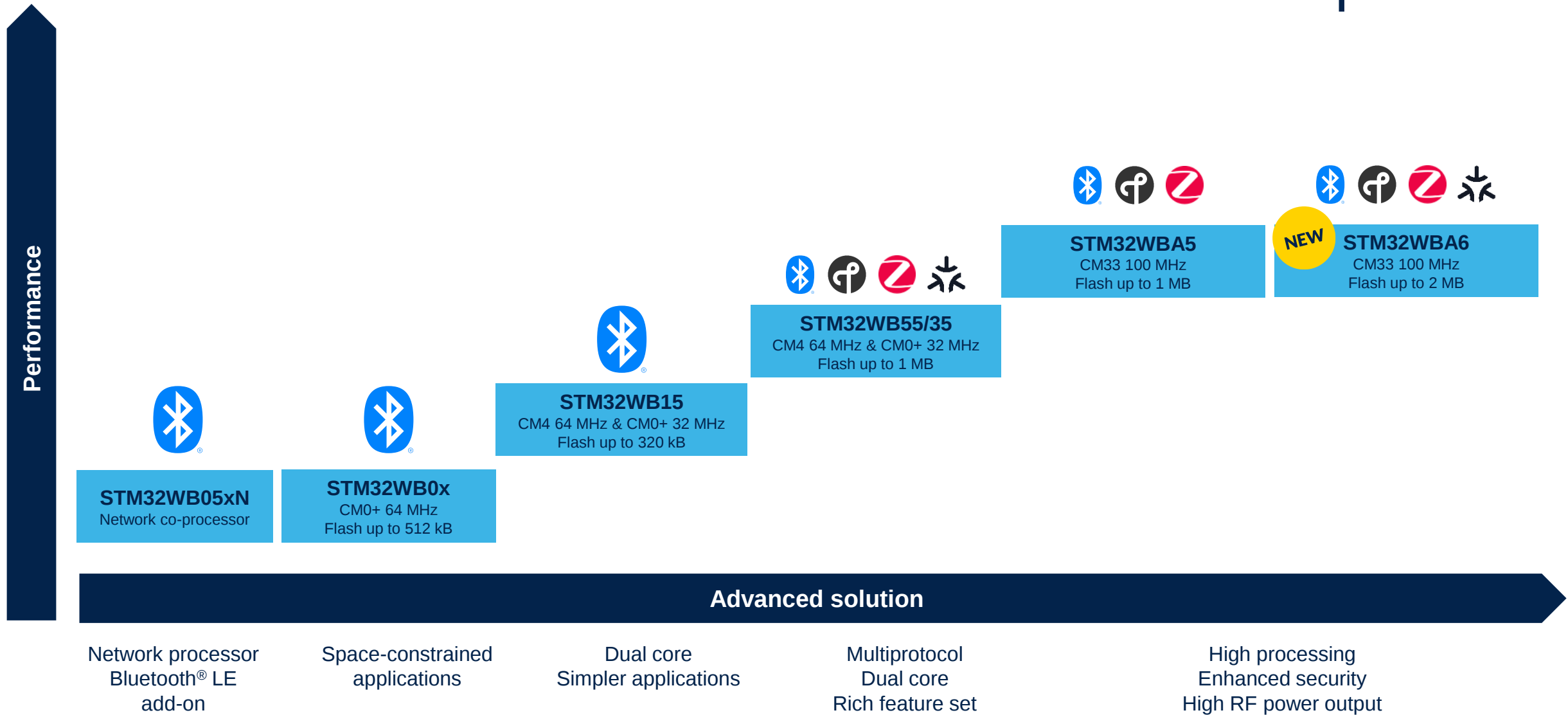
- Mesh topology
- Large scale
- Open Standard



Sensor networks, industrial
& home automation

- Mesh topology
- Large scale
- Zigbee compliant

Product portfolio





What the STM32WBA series offers



Enhanced wireless performance for a greater user experience



Secure: reliable and compliant with the latest regulations



Simpler and faster development thanks to proven STM32 ecosystem



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® LE, 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



High performance and scalable integration

Industrial



- Extended range capability
- Data privacy
- Cost optimized

Consumer



- Anticlone
- Brand protection
- High interoperability

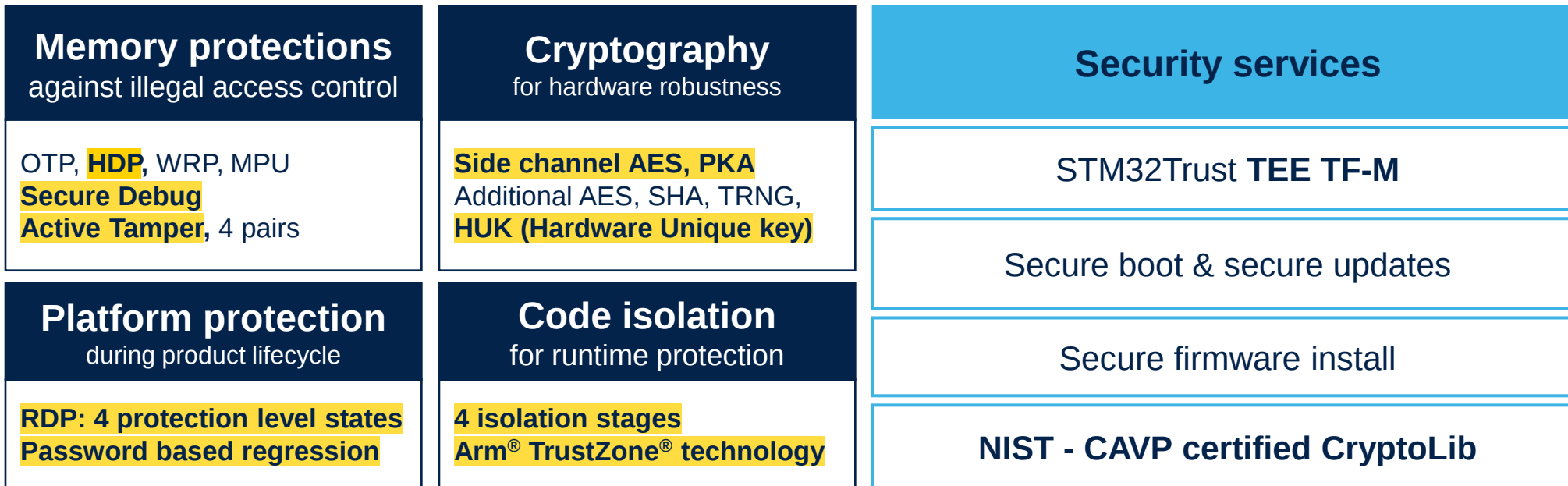
Smart home control



- Fingerprint accessible with high processing capability
- Market-proven security grade

STM32WBA increases security

Extensive functionalities to protect your assets



State-of-the-art security assurance level*



What security certifications mean

STM32WBA MCU series targets PSA Certified L3 & SESIP3 certifications, which are high-end security standards for IoT robustness.



Scope

Evaluating and certifying the security of individual components.
A comprehensive and rigorous evaluation process, including both design and implementation aspects.

Providing robust protection against advanced threats and rigorous validation of security properties.



[Click here to know more](#)



Scope

Developed by Arm, focusing on the hardware, the software, and firmware.

PSA Certified L3 follows a clear methodology and includes comprehensive testing, including robustness to physical attacks.

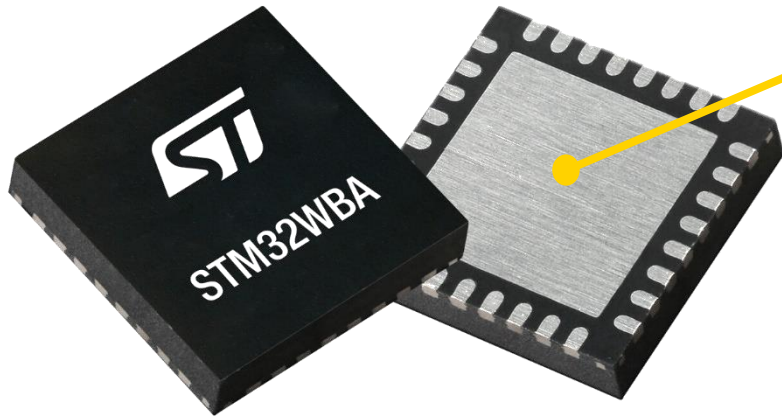
“Increased robustness for OEMs building applications with high-value assets.”



[Click here to know more](#)

STM32WBA5

STM32WBA5 DNA within portfolio

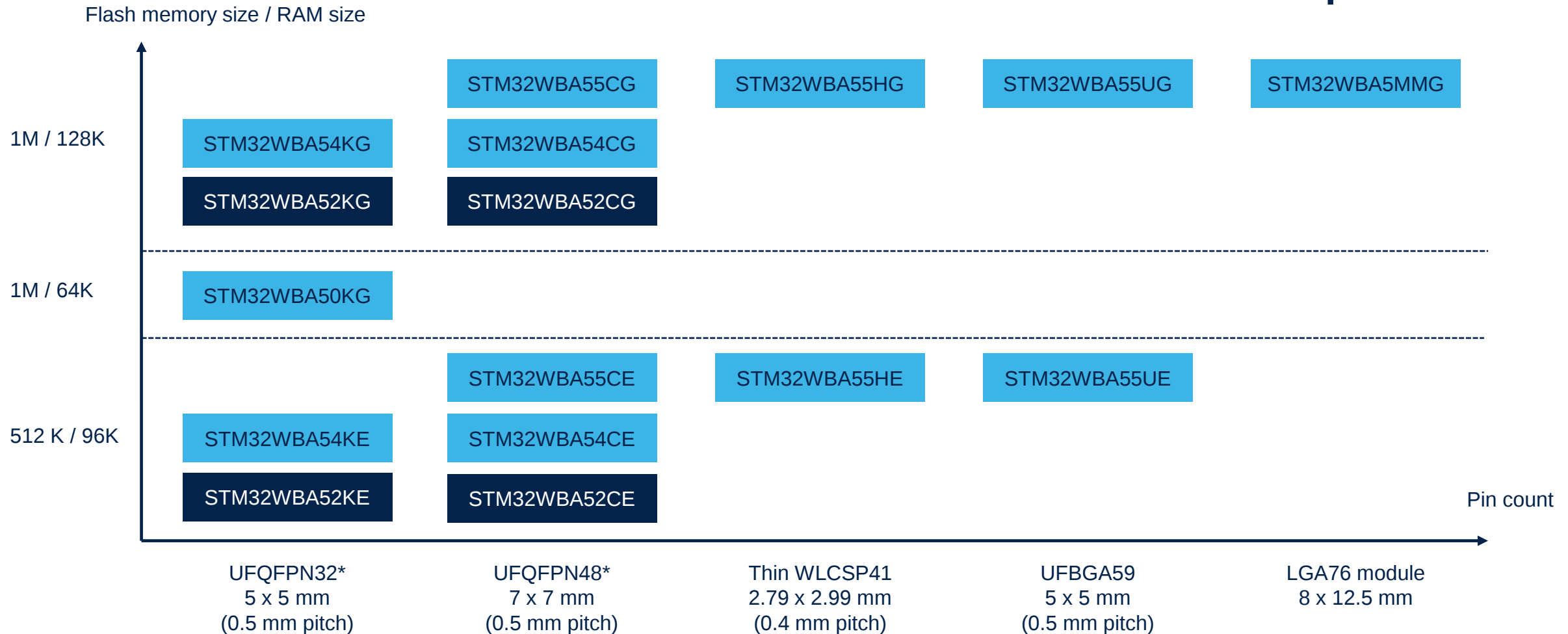


Ideal combination of performance, peripherals, and cost efficiency for fast and simplified development.

- Flash memory up to 1 Mbyte 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



Legend:



Multiprotocol (Bluetooth® LE, IEEE 802.15.4 communication protocols, Zigbee® and Thread + Bluetooth® LE Audio)



Bluetooth® LE



STM32WBA5 product lines

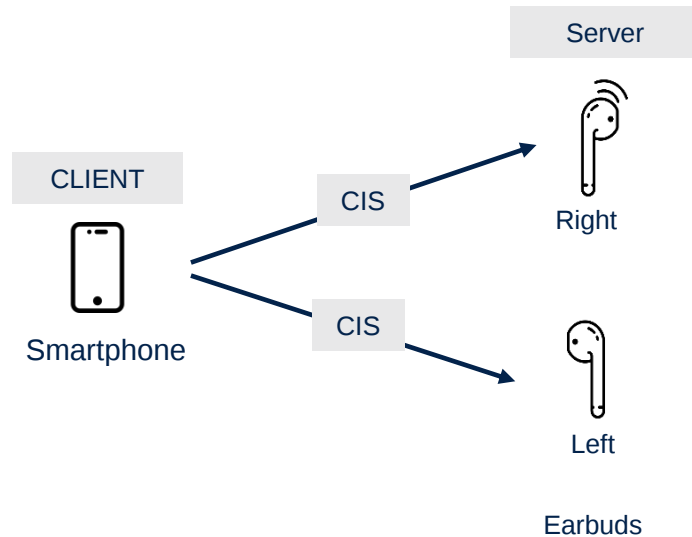
• Arm® Cortex®-M33 (DSP + MPU) • CPU max 100 MHz • ART Accelerator • Integrated balun + antenna matching • 16-bit motor control timer • 32-bit timer • 1x ADC 12-bit, oversampling 16b • Capacitive touch • Temperature sensor • Low voltage 1.7 to 3.6 V • Internal RC +/- 1%	Product line	Flash (MB)	RAM (KB)	TrustZone /HUK	Connectivity			LDO/SMPS
					Bluetooth® LE	Zigbee, Thread	Other	
	STM32WBA55	Up to 1 MB	Up to 128 KB	■	Bluetooth® LE 5.4	■	SAI 2x SPI, 2x I2C 2x USART, 1x LPUART	SMPS + LDO
	STM32WBA54		Up to 128 KB	■		■	SAI 2x SPI, 2x I2C 2x USART, 1x LPUART	LDO
	STM32WBA50		Up to 64 KB				1x SPI, 1x I2C 1x USART, 1x LPUART	LDO
	STM32WBA52		Up to 128 KB	■			2x SPI, 2x I2C 2x USART, 1x LPUART	LDO

Bluetooth® LE for audio devices

Enabling new applications for richer listening and hearing experiences

Unicast

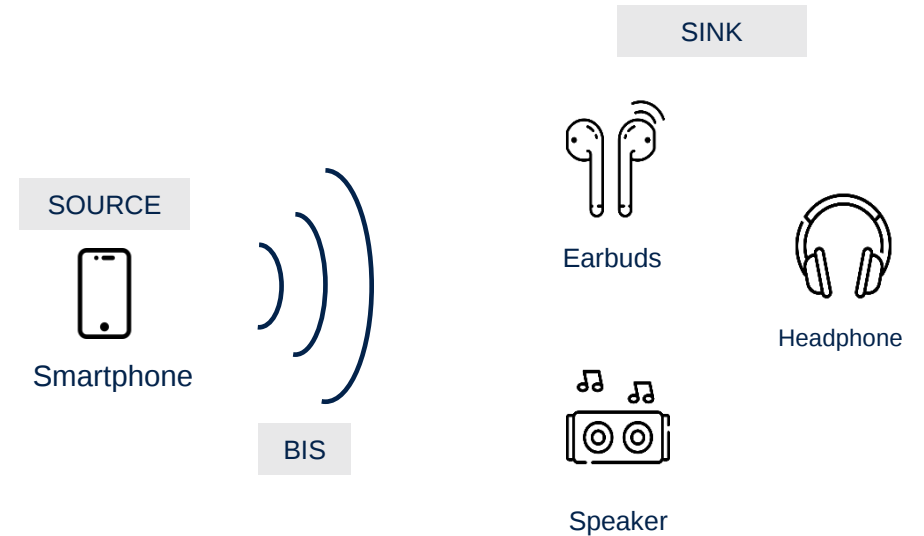
CIG



CIG: connected isochronous stream

Auracast™ broadcast audio

BIG

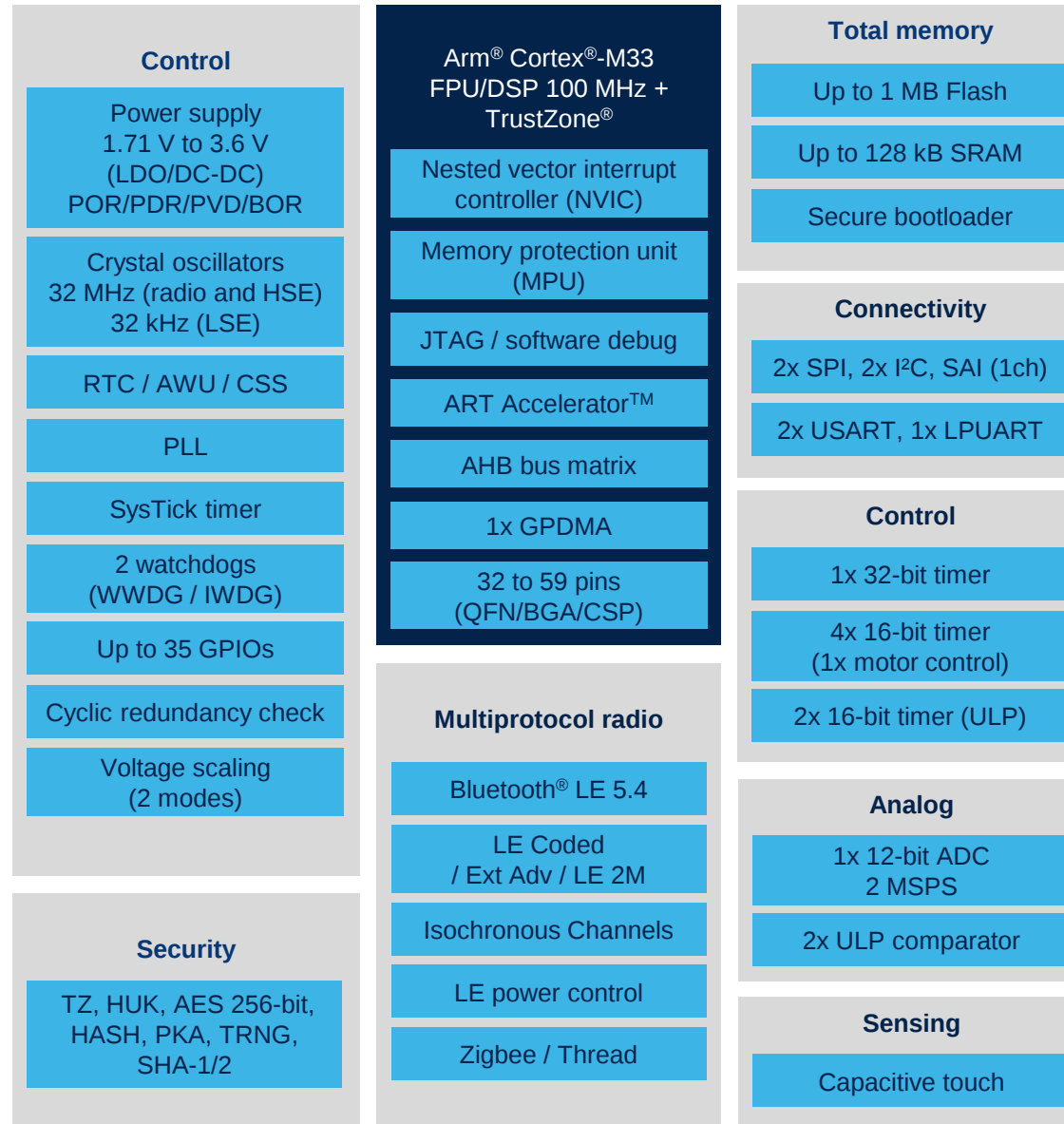


BIG: broadcasted isochronous stream





STM32WBA54x/55x block diagram



Temperature: $-40^{\circ}\text{C} < T_a < 105^{\circ}\text{C}$

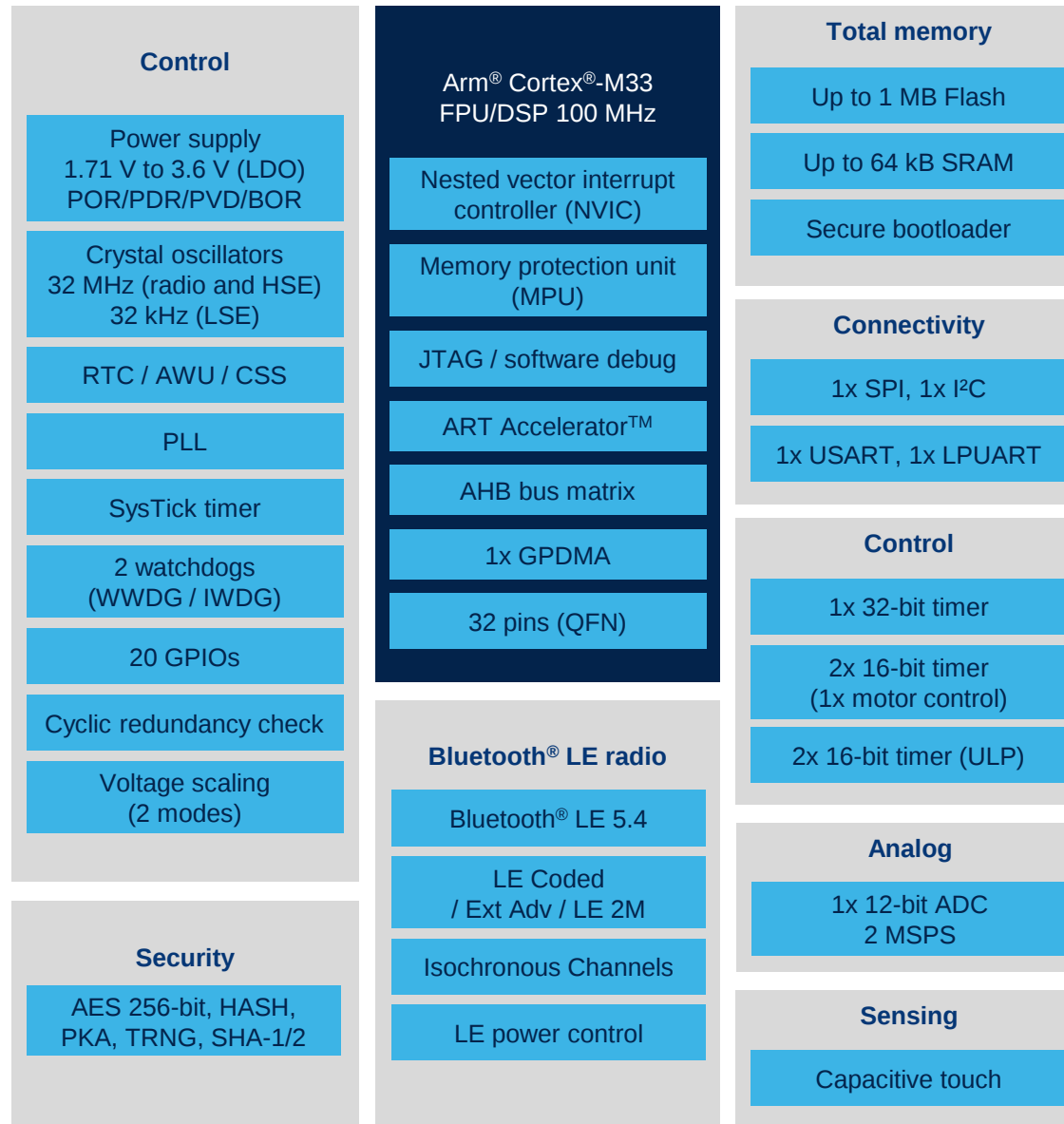
Rx sensitivity:

- -96 dBm (BLE at 1 Mbps)
- -97.5 dBm (802.15.4 at 250 kbps)

Programmable output power: +10 dBm with 1 dB steps



STM32WBA50x block diagram



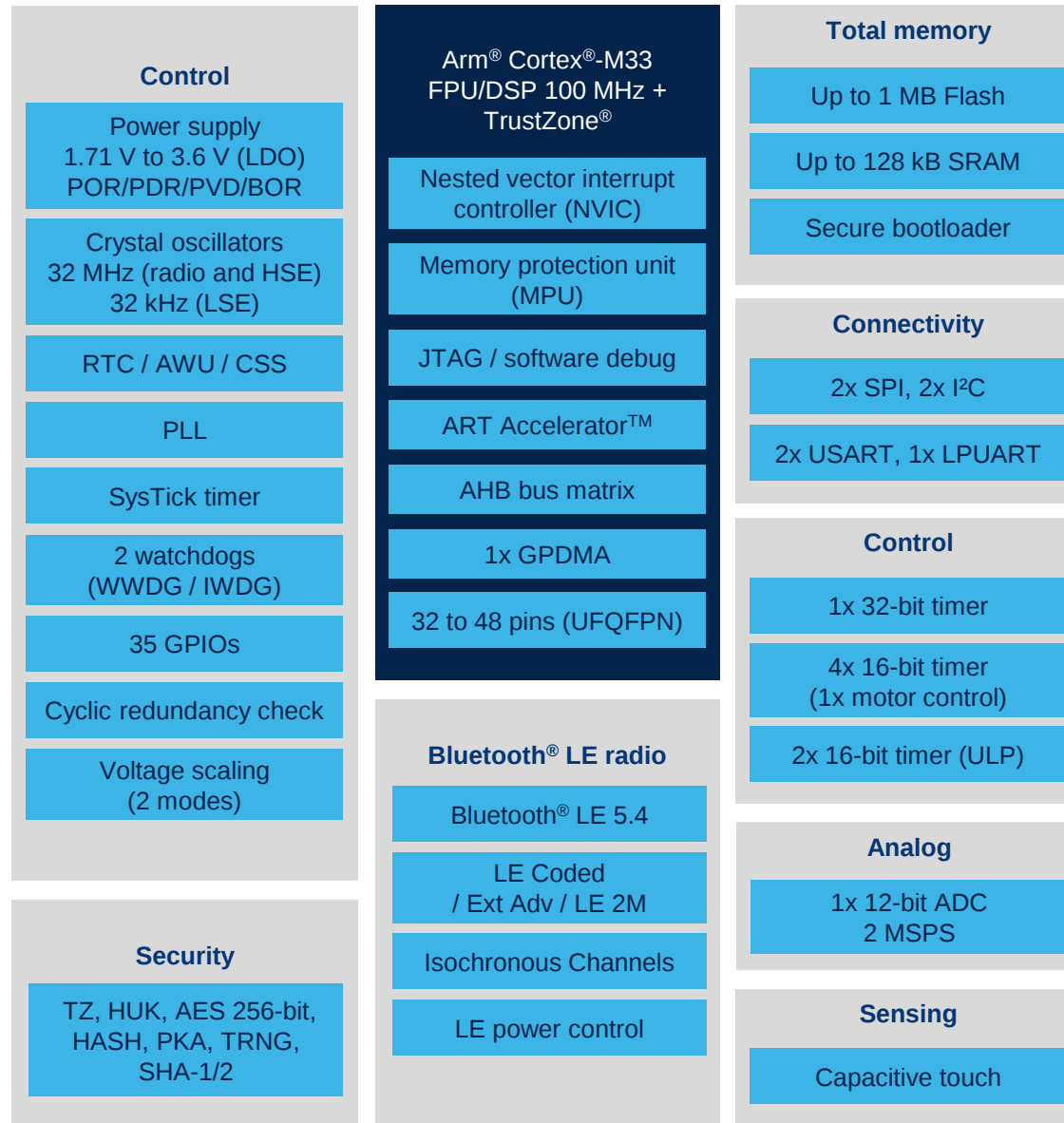
Temperature: $-40^{\circ}\text{C} < T_a < 85^{\circ}\text{C}$

Rx sensitivity: -96 dBm (BLE at 1 Mbps)

Programmable output power: +4 dBm with 1 dB steps



STM32WBA52x block diagram



Temperature: $-40^{\circ}\text{C} < T_a < 105^{\circ}\text{C}$

Rx sensitivity: -96 dBm (BLE at 1 Mbps)

Programmable output power: +10 dBm with 1 dB steps

STM32WBA55 power consumption

Wake-up times

14 cycles
STM32WBA55: 13.5 μ s
19.1 μ s
45.5 μ s

RUN at 100 MHz	30 μ A / MHz
RUN at 16 MHz	22 μ A / MHz
SLEEP at 100 MHz	15 μ A / MHz
SLEEP at 32 MHz	26 μ A / MHz
SLEEP at 16 MHz	16 μ A / MHz
STOP 0 (full retention)	49 μ A
STOP 1 (full retention)	7.2 μ A*
STOP1 (64 KB RAM)	6.9 μ A*
STANDBY (64 KB RAM)	1.25 μ A*
STANDBY	140 nA

RF operation available

Typ @ SMPS ON 3 V @ 25°C

* with RTC

A versatile product

- Robust RF link **106 dBm** with **IEEE 802.15.4**
- **+10 dBm** output power with 1dB steps
- **Secure** radio update and stack firmware with SBSFU/SFI
- Bluetooth® Core 5.4 / 802.15.4 multiprotocol **capable**
- **Concurrent mode**



Lighting



Fleet maintenance

- Retrofit legacy product to **Bluetooth® Core 5.4** and concurrency mode
- Remotely upgrade device with **OTA capability**
- **Brand protection** with authenticated **firmware upgrade** system
- **IoT protection ready**

- **Up to 105°C** radio capable
- **Capacitive Touch**
- **External PA** support to get ultra wide communication distance
- Down to **1.35µA mode with RTC** and 64 KB of RAM
- **Security:** AES, PKA side attack resistant
- **Security:** RTC active tamper enabled
- **Robustness:** 100KB cycle flash cycle capable



Industrial devices



Fitness/ healthcare

- **Multipoint** Bluetooth® Core 5.4 connections, up to 20 links
- Battery lifetime care with **< 140 nA** standby mode
- Dynamic efficient **23µA/MHz**
- Battery care thanks top **LPBAM acquisition** mode
- **Single crystal** operation capable
- Handle an advanced algorithm with **1 Mbyte** of flash memory

- **Beacon** profile available among a huge list
- **Bluetooth® LE, long-range** capable
- **Embedded balun + matching** to minimize design cost
- Only **5.2 mA Radio Tx** current to extend beacon lifetime
- **Up to +10 dBm** output power to get best beacon range
- 0.9 µA ULP-mode with full RAM for
- **battery life** optimization
- Down to 1.71 V power supply full feature capabl



Beaconing and sensors



Home automation & Audio

- Built-in **Bluetooth® LE audio broadcast / unicast** enabled
- **-96 dBm** sensitivity to increase area coverage
- Embedded SAI 2ch
- **Best-in-class security:** SESIP L3 certification target

STM32WBA5M: efficient and versatile module



Small form factor

- SiP LGA76: 8 x 12.5 mm
- Fully 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.

Reduce costs

- Fast time to market
- Fully certified CE, FCC, ISED, MIC, RoHS, REACH
- Free of charge radio stacks
- Simplified design: down to 2 PCB layers

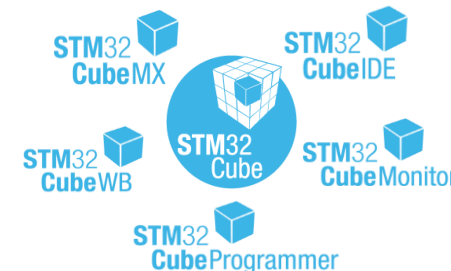
Strong features set

- Cortex®-M33 @ 100MHz
- 1MB Flash / 128kB RAM
- 33 GPIOs, ADC, Comp, TSC
- Security and Cryptography

Extended battery life

- 1.71 to 3.6 V power supply
- SMPS and ultra-low-power modes during radio activities

Ecosystem

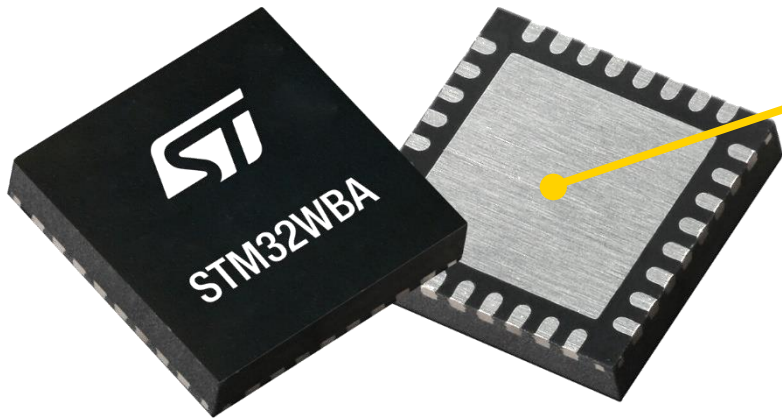


Multiprotocol



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



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

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

Medical – continuous glucose monitoring devices (CGM)



Better design efficiency

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

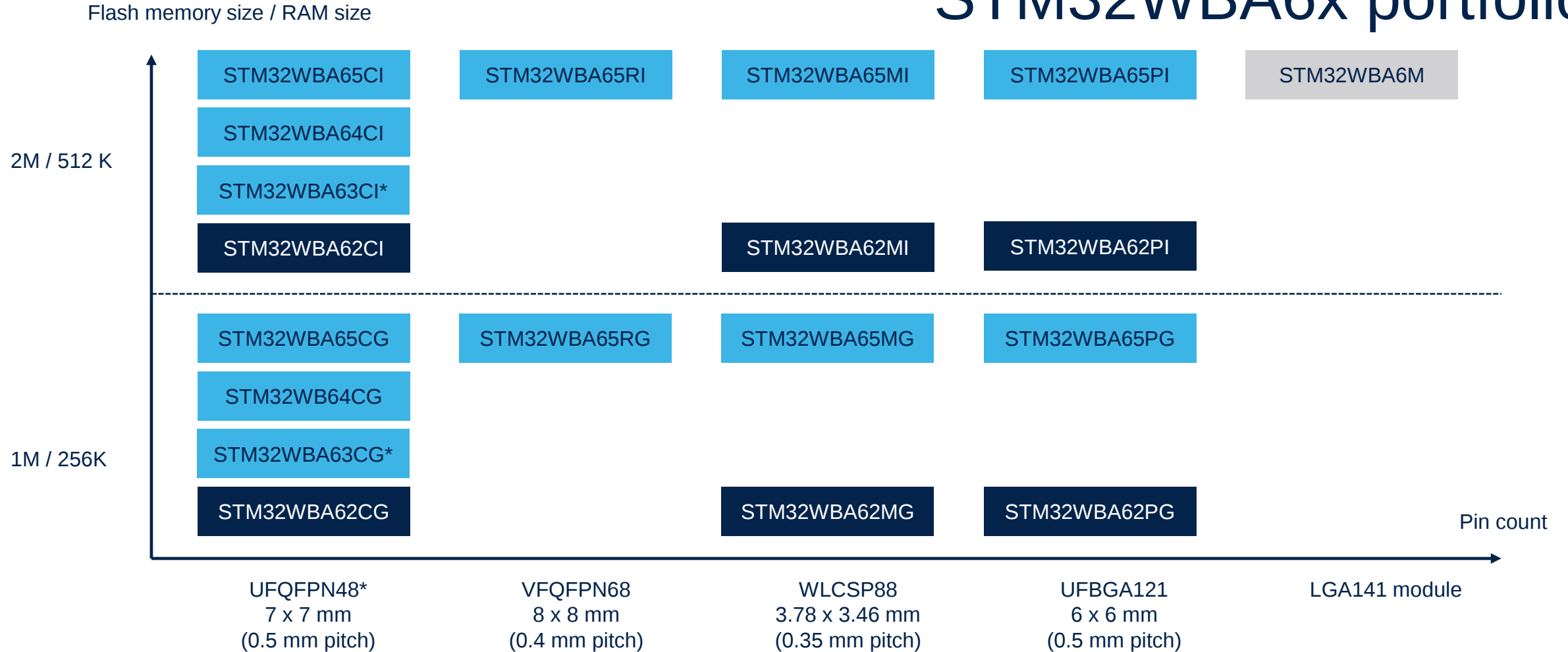
Robust connectivity: reliable data transmission with +10 dBm output power

Ultra-low-power for battery-based devices

Robust security (SESIP L3, RED compliance)

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

STM32WBA6x portfolio



Legend: ■ Multiprotocol (Bluetooth® LE (qualified against Bluetooth Core 5.4), IEEE 802.15.4 communication protocols, Zigbee®, Thread, and Matter + Bluetooth® LE audio)

■ Bluetooth® LE (qualified against Bluetooth Core 5.4)

■ Available Q1 2026

* STM32WBA63 is pin-to-pin compatible with the STM32WBA55 QFN48 package.

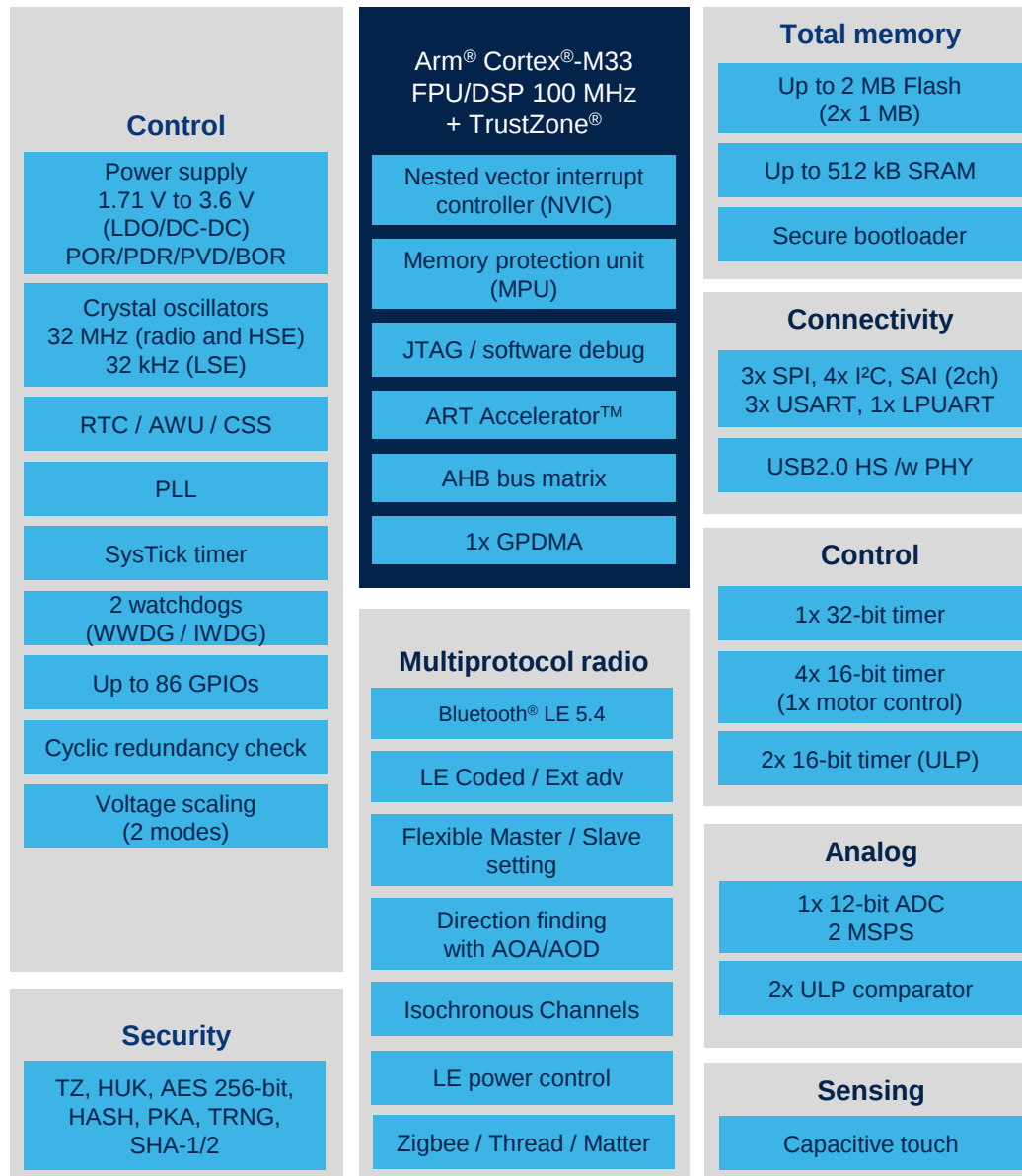


STM32WBA6 product lines

• 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



Maximize integration efficiency

USB high speed
(480 Mbps)



WLCSP88

Size: 3.78 x 3.46 mm p0.35 mm - 54 GPIOs

QFN48

Size: 7 x 7 mm p0.5 mm - 34 GPIOs

QFN68

Size: 8 x 8 mm p0.4 mm - 46 GPIOs

BGA121

Size: 6 x 6 mm p0.5 mm - 86 GPIOs

QFN48 no
USB

Size: 7 x 7 mm p0.5 mm - 31 GPIOs, pin-to-pin compatible with STM32WBA5x, no USB high speed

STM32WBA65 power consumption

Wake-up times

14 cycles
20.9 μ s
45.2 μ s

TX	5.94mA	RX	4.26mA
RUN at 16 MHz	28.75 μ A / MHz		
SLEEP at 16 MHz	15.6 μ A / MHz		
STOP 0 (full retention)	16.94 μ A*		
STOP 2 (64 KB RAM)	5.58 μ A*		
STANDBY (64 KB RAM)	1.68 μ A*		
STANDBY	120 nA		

RF operation available

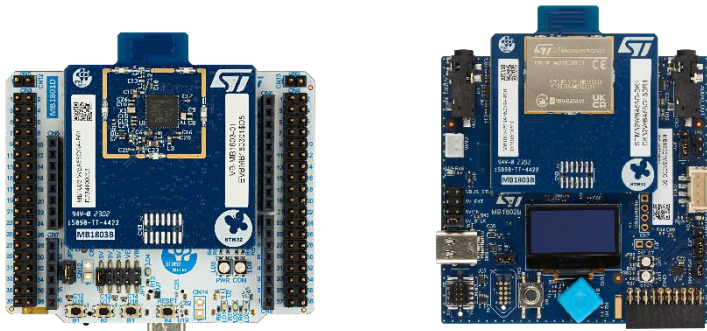
Typ @ SMPS ON 3.3 V @ 25°C

* with RTC

STM32WBA ecosystem

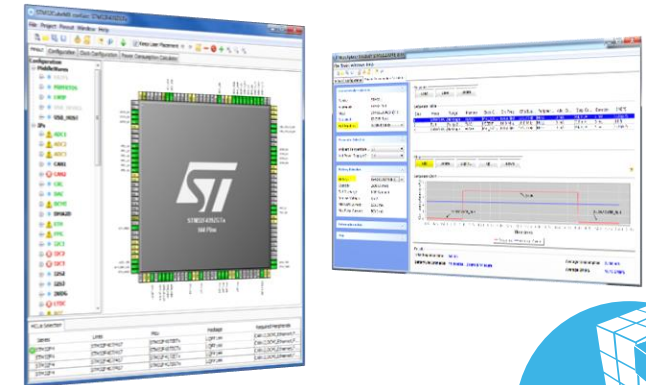


STM32WBA ecosystem simplifies your design journey



Hardware

**Nucleo board &
discovery kit**



Software

STM32CubeWBA
(connectivity + examples + peripherals)
STM32CubeMX
(code generation + power calculation)
STM32CubeMonRF
STM32CubeProg

STM32WBA5 and STM32WBA6 development boards

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

STM32WBA55G-DK1
Discovery kit



- 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

NUCLEO-WBA55CG
Nucleo-64 board



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

STM32WBA65I-DK1
Discovery kit



- 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® and STMod+ connectors
- RF certified for protocols / regulations

NUCLEO-WBA65RI
Nucleo-64 board



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

RF IPD companion chip to STM32WBA series

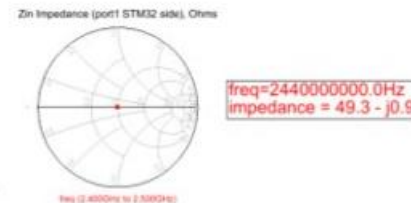
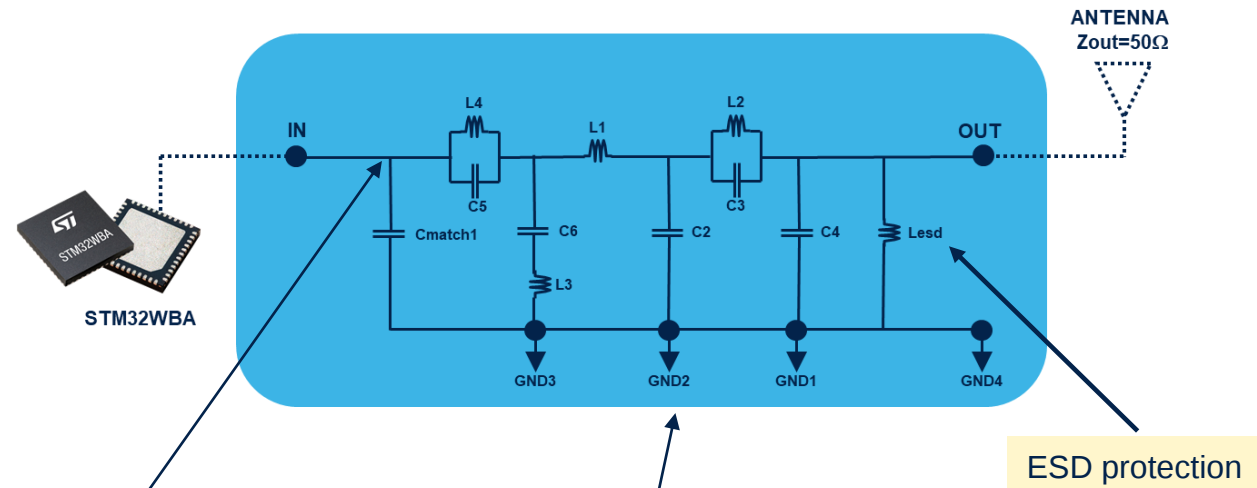
Designed to ensure harmonics filtering, impedance matching and ESD protection in one die

- 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

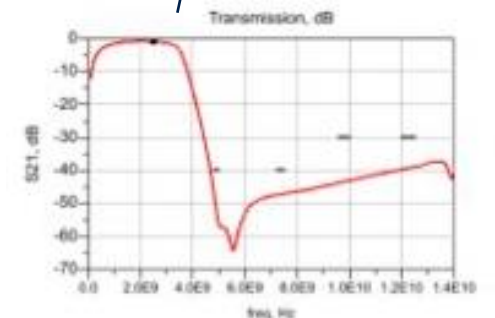


Chip scale package on glass 8 bumps

[MLPF-WB-04D3](#)
1.6 x 1 mm²



Direct match of STM32WBA impedance

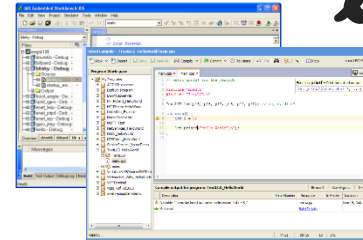
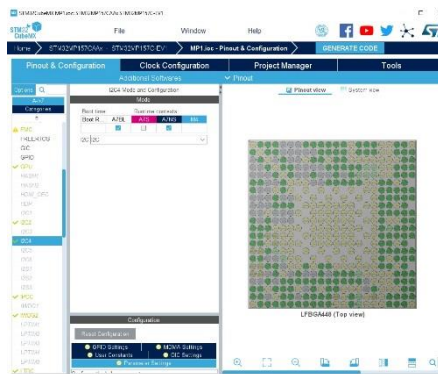


Deep attenuation to answer system requirements



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**

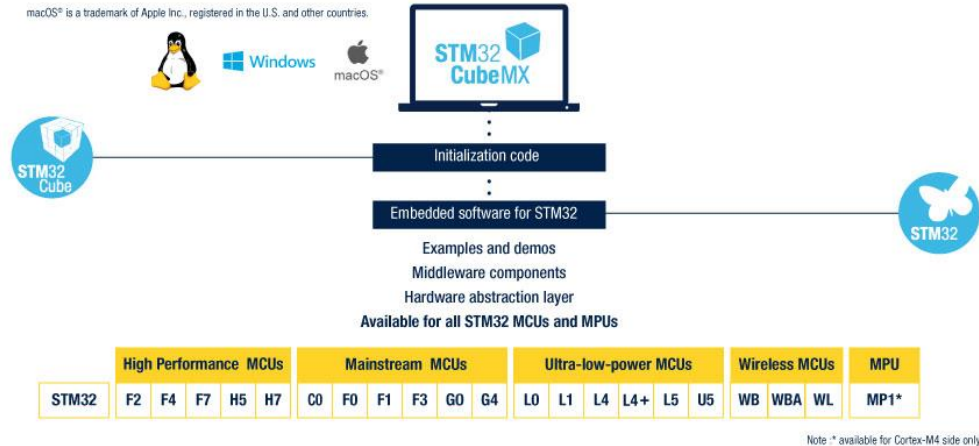
- Partners IDE (Arm® Keil®) **FREE**
- IDE based on Eclipse **FREE**
- RTOS aware debug

STM32 programming & monitoring tools

**STM32CubeProg
STM32CubeMonitor**

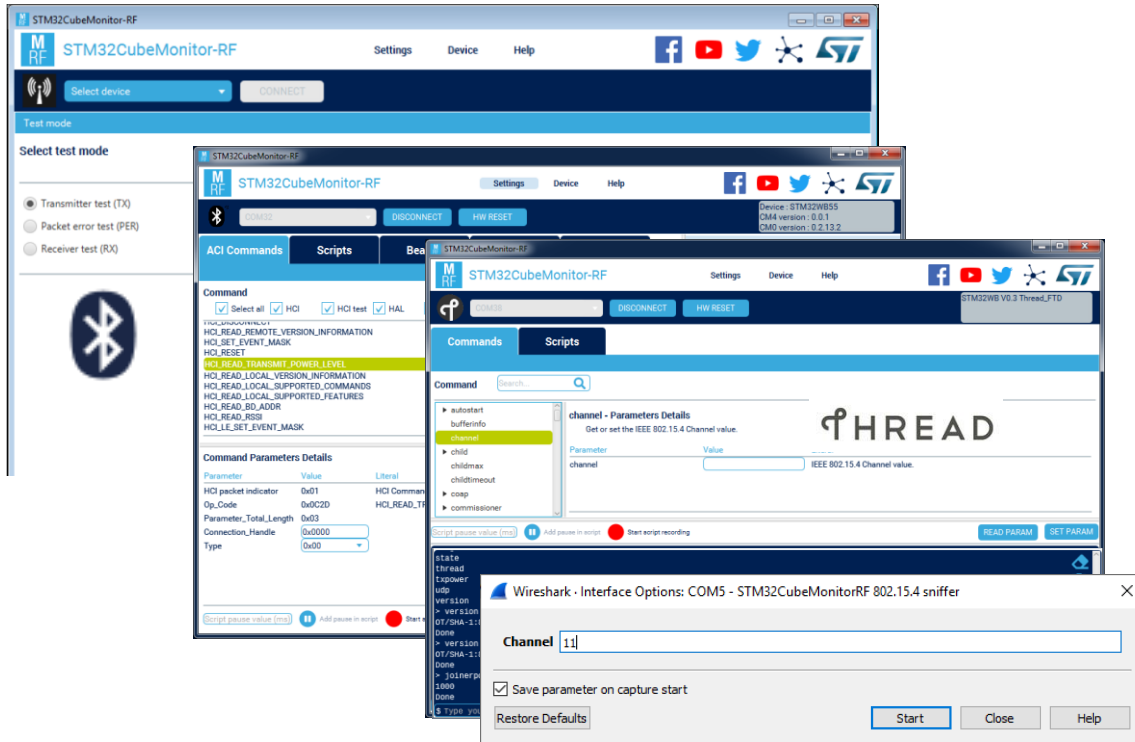
- Device and memory configuration
- Program the application
- Monitor variables at runtime

Extensive radio stack support



- Enabling the STM32_WPAN
- Integration of RTOS and radio use cases
- Configuration GUI for Bluetooth® LE, Zigbee, Thread
- Examples generated with STM32CubeMX
- Bluetooth® LE, Zigbee, and Thread standardized and custom profiles

STM32 CubeMonitor-RF



- Performance monitoring
- Radio testing
- Advanced scripting capabilities
- Data logging and report generation

ST Bluetooth® LE smartphone apps



ST Bluetooth® LE Sensor



ST Bluetooth® LE StarNet

ST BLE Sensor – Used with our OOB demo

Read the data exported by a Bluetooth® LE device using the BlueST protocol.

ST BLE StarNet (Star topology)

View the data exported by a Bluetooth® LE gateway connected to a network of devices.

ST BLE ToolBox

Discover peripherals, services, and characteristics, and perform R&W. Users can collect cloud-based analytics on the Azure App Center, bond devices, test throughput, log messages.

new



ST BLE Toolbox

STM32WBA ecosystem takeaways



- Dedicated Nucleo boards and discovery kit for prototyping
- Full support & integration of Bluetooth® Low Energy, Zigbee, Thread stacks & Matter
- Advanced RF stacks integration with STM32CubeMX
- Advanced QoL features for STM32CubeMonRF
- Mobile applications to address applicative use cases
- Resources on GitHub, including STM32 hotspot

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



Releasing your creativity



[@STM32](#)



[@ST_World](#)



[community.st.com](#)



[www.st.com/stm32wba](#)



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



[github.com/stm32-hotspot](#)



[STM32 MCU Developer Zone](#)



Our technology starts with You



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