STM32WL marketing presentation

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Continuing the STM32 Success Story

Leader in ARM Cortex-M 32-bit MCUs / SoCs

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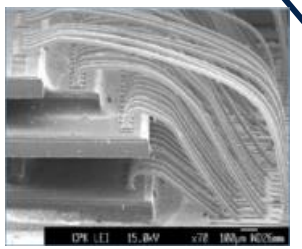
STM32WL: first LoRa-enabled SoC in the world

The integration pyramid

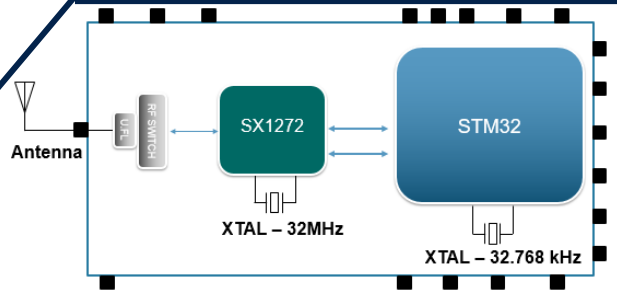
System-on-Chip (SoC)

One Silicon die in one package

Different silicon dice inside the same package



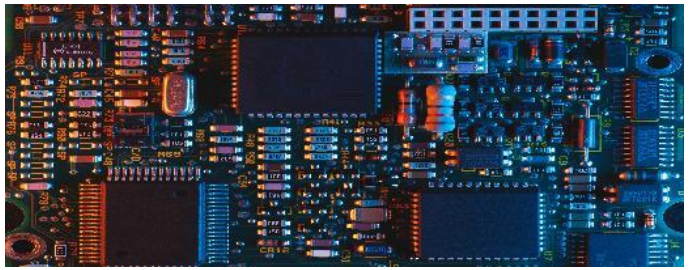
System-in-Package



Different packages on a very tiny piece of re-packaged PCB

Module

Different discrete packages on a big PCB



PCB

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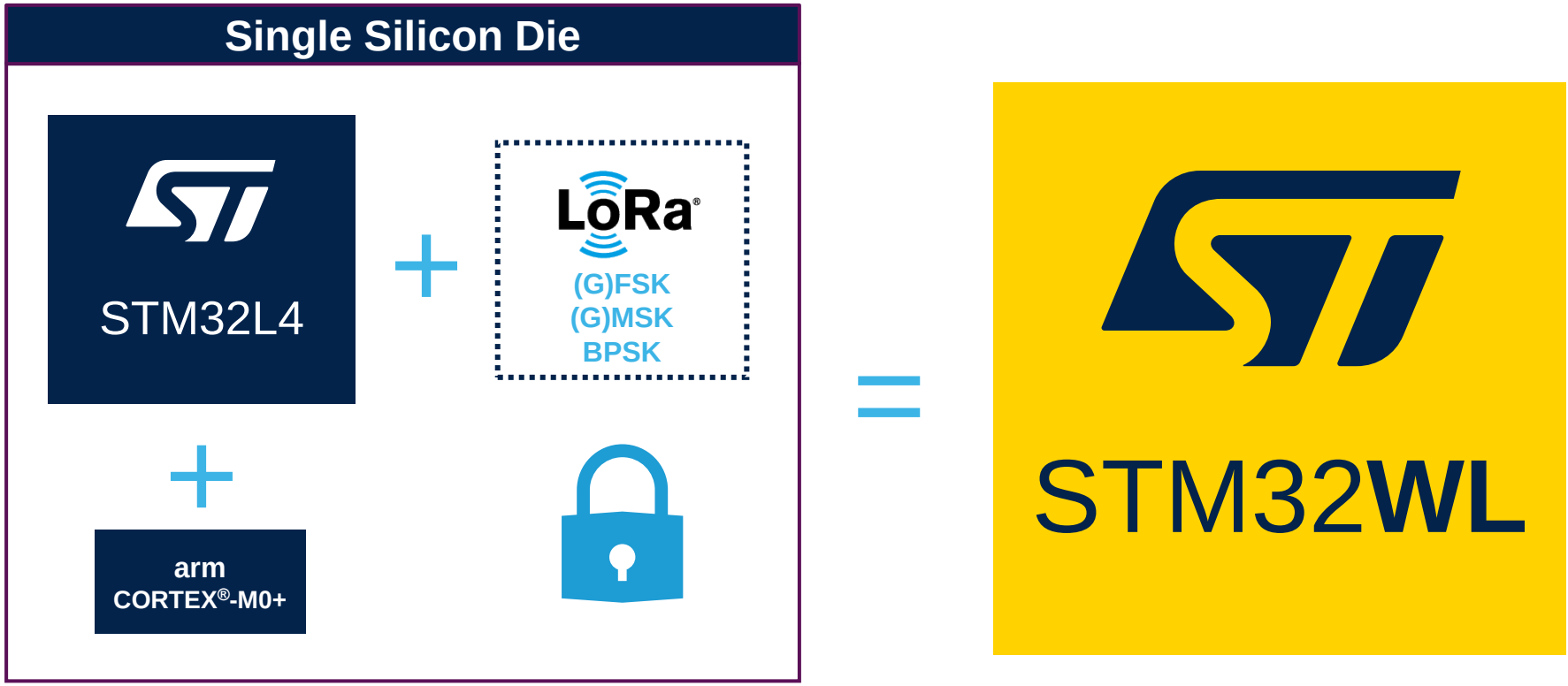
System-on-chip made for versatility

A Long-Range Wireless Microcontroller: one die, many IoT possibilities

World First!



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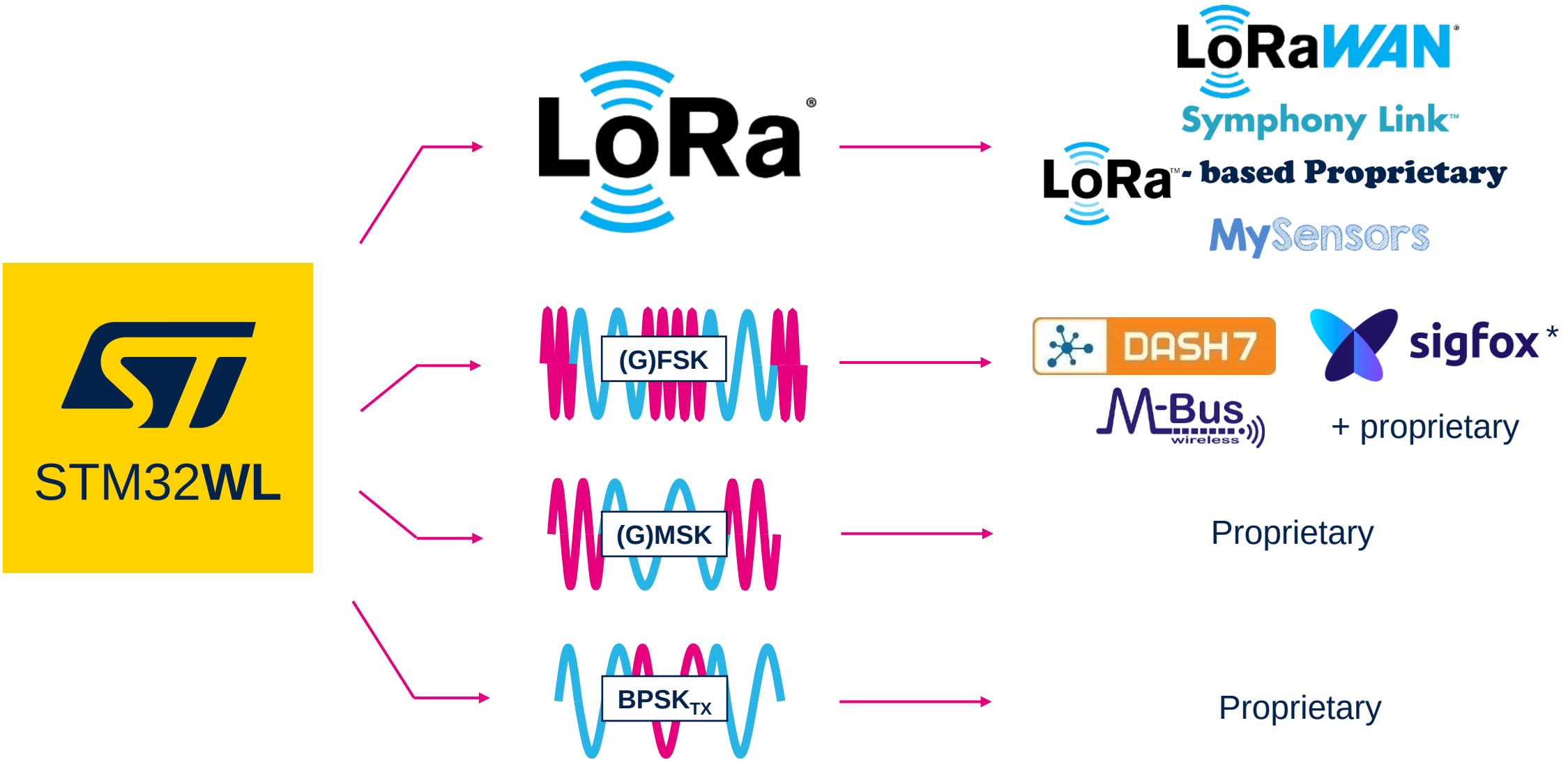
4 modulations - many protocols



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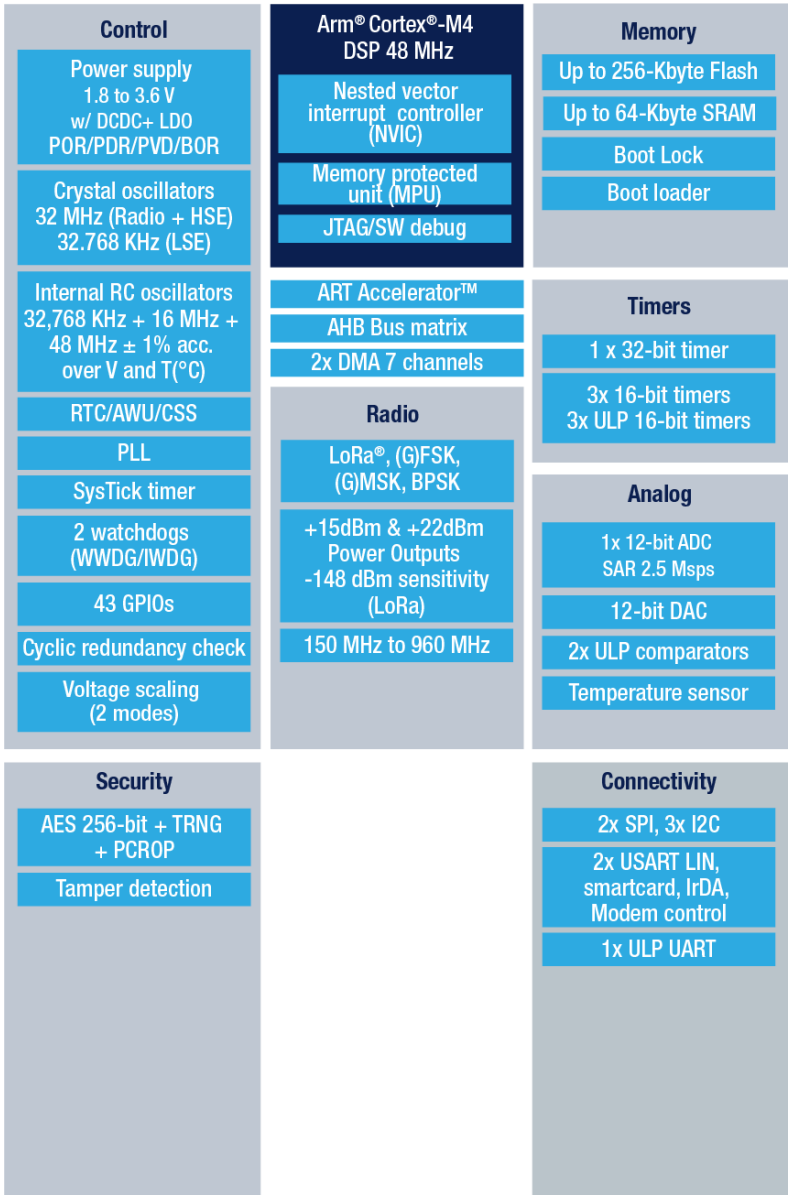
STM32WLEx Line - a rich feature set



KEY FEATURES

- Arm® Cortex®-M4 & DSP up to 48 MHz
- Up to 256 KB Flash and 64 KB SRAM

- **Sub-GHz Radio**
  - Multi-modulation: LoRa, (G)FSK, (G)MSK, BPSK
  - 2 embedded power amplifiers:
    - 1 output up to +15 dBm
    - 1 output up to +22 dBm
  - LoRa RX sensitivity: -148 dBm (SF12, BW=10.4kHz)
  - RX: 4.82mA and TX: 15mA (at 10dBm) / 87mA (at 20dBm) [3.3V]

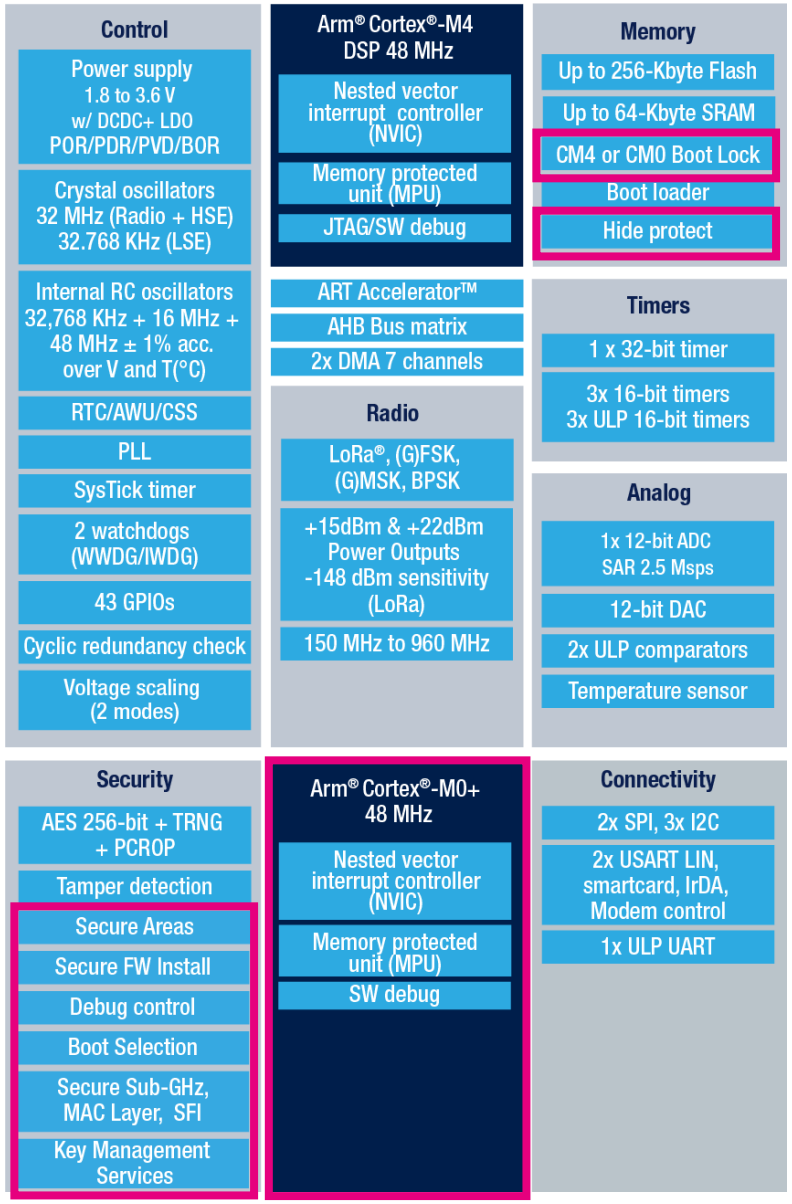
- **Ultra-Low Power consumption**
  - < 71µA/MHz Active mode (3V - RF OFF)
  - 1 µA Stop2 mode with RAM retention
  - 390 nA Standby mode with RTC
  - 31 nA Shutdown mode

- **Peripherals**
  - 3xI²C, 2xUSART, 1xLP-UART, 2xSPI
  - 7x timers + 2x ULP Comparators

- 1.8 to 3.6V voltage range (DC/DC, LDO)
- -40 to up to +105°C temperature range

STM32WL5x Line - a rich feature set

Dual-core and enhanced security



KEY FEATURES

- Arm® Cortex®-M4 & DSP up to 48 MHz
- Up to 256 KB Flash and 64 KB SRAM
- Arm® Cortex®-M0+ up to 48 MHz

- **Sub-GHz Radio**
  - Multi-modulation: LoRa, (G)FSK, (G)MSK, BPSK
  - 2 embedded power amplifiers:
    - 1 output up to +15 dBm
    - 1 output up to +22 dBm
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  - 31 nA Shutdown mode

- **Peripherals**
  - 3xI²C, 2xUSART, 1xLP-UART, 2xSPI
  - 7x timers + 2x ULP Comparators

- **Advanced security features**

- 1.8 to 3.6V voltage range (DC/DC, LDO)
- -40 to up to +105°C temperature range

STM32WL product lines

ARM Cortex-M4 (DSP+ MPU) + M0+ (DSP+MPU) - 48 MHz

- **Freq. : 150 to 960MHz**
- Sensitivity: -148 dBm
- ARM Cortex M4 &
- CPU max 48MHz
- ART Accelarator
- USART, SPI, I2C
- 16- and 32- bit timer
- 1x ADC 12-bit
- 1x DAC 12-bit
- Temperature sensor
- Low voltage 1.8 to 3.6V
- LDO or DC/DC
- Internal RC +/- 1% [-20° to 85°C]
- Vbat mode
- Unique ID
- AES 128/256- bit
- Temperature range -40° to 105°C

Product line	Flash (KB)	RAM (KB)	Output power (dual output)	Modulation				CPUs	Security
				LoRa	(G)FSK	(G)MSK	BPSK		
STM32WL5x – Dual Core lines									
STM32WL55	256	64	Up to 15 and 22dBm	■	■	■	■	CM0+: Radio CM4: User app	Secure Key Storage Secure Sub-GHz Mac Layer SFI, SFU
STM32WL54	256	64	Up to 15 and 22dBm		■	■	■	CM0+: Radio CM4: User app	Secure Key Storage Secure Sub-GHz Mac Layer SFI, SFU
STM32WLEx – Single Core lines									
STM32WLE5	Up to 256	Up to 64	Up to 15 and 22dBm	■	■	■	■	CM4: Radio + user App	AES, TRNG, PCROP
STM32WLE4	64	20	Up to 15 and 22dBm		■	■	■	CM4: Radio + user App	AES, TRNG, PCROP

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STM32WL Sub-GHz - portfolio

Flash / RAM Size (bytes)

256K / 64K

256K / 64K

128K / 48K

64K / 20K

Up to 29 GPIOs + Optimized BOM cost + 2-Layer PCB enablement

48 pins 7x7mm UQFN (p=0.5)	73 pins 5x5 mm BGA (p=0.5)
STM32WL5xCC	STM32WL5xJC
STM32WLExCC	STM32WLExJC
STM32WLExCB	STM32WLExJB
STM32WLExC8	STM32WLExJ8

Up to 43 GPIOs for full flexibility + Tiny package footprint

Pin count

Dual core

Single core

Note:
x = 5 all modulations available
x = 4 all modulations available except LoRa

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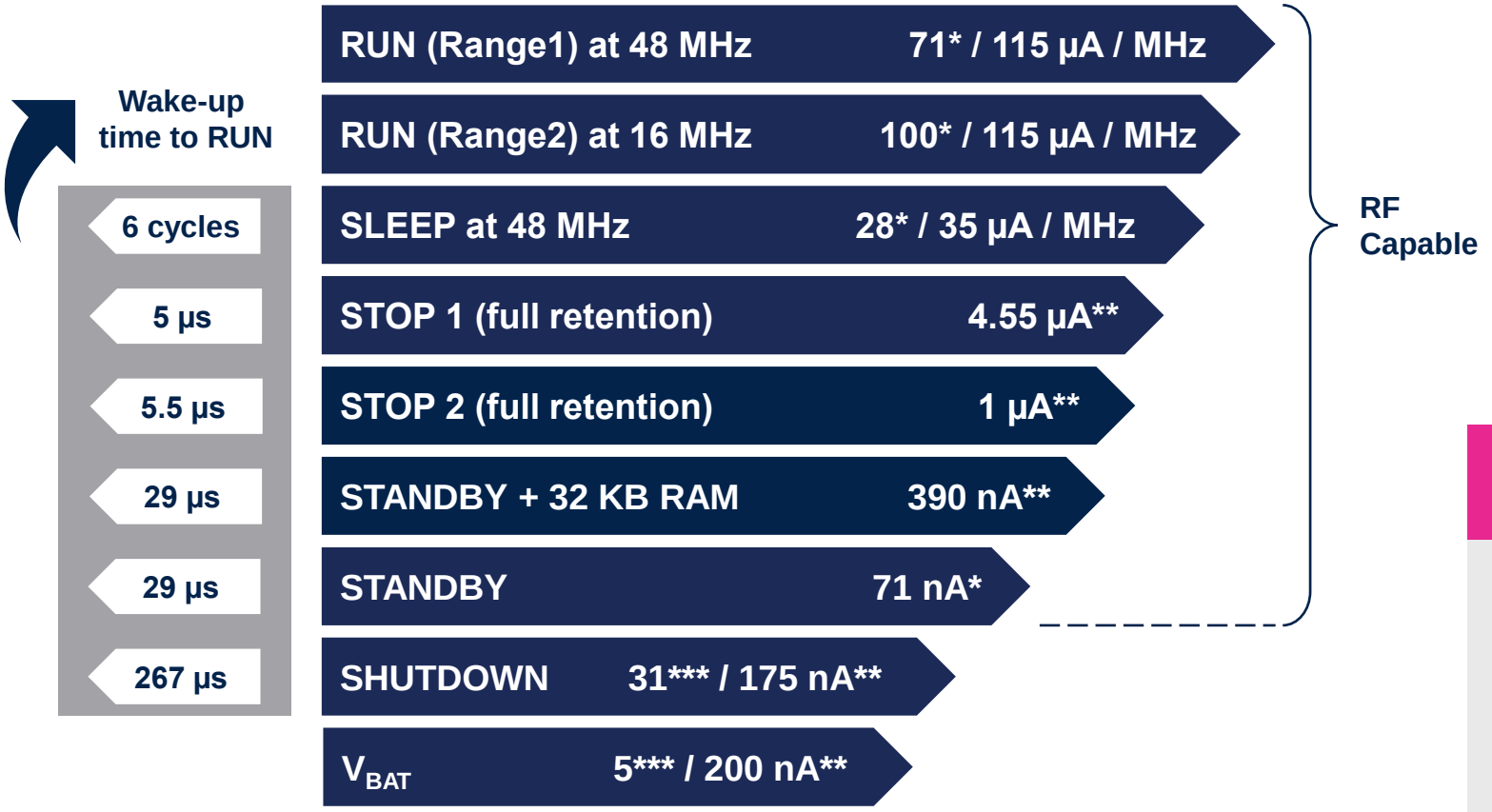
Flexible power scheme FlexPowerControl

Typ with LDO @ V_{DD} = 3 V @ 25 °C



* Typical values with SMPS, **RF OFF**
** with RTC on LSE Bypass
*** All OFF

Benchmark scores

- High Efficiency
  - ➔ CoreMark score = 162
- Ultra Low-Power Platform
  - ➔ ULPBbench score ≈ 204

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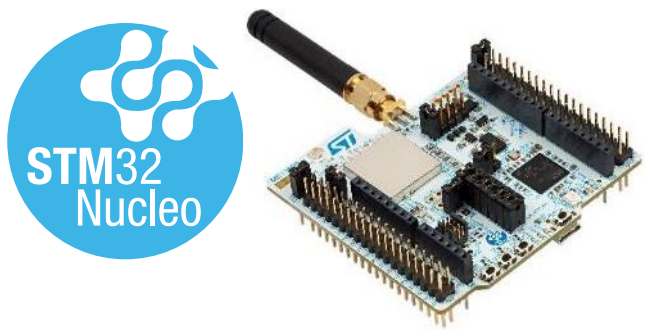
STM32WL – ecosystem overview

Fully integrated into the rich and market-proven STM32 ecosystem



STM32 CubeMX
STM32 CubeIDE
STM32 Cube
STM32 CubeProgrammer
STM32 CubeMonitor
IAR SYSTEMS
arm KEIL

LoRaWAN
sigfox
M-Bus wireless

STM32 Nucleo-64	Dev tools	Stacks
Flexible prototyping	STM32CubeMX STM32CubeWL STM32CubeMonitor STM32CubeProg STM32CubeIDE + Partners IDEs	LoRaWAN (ST) Sigfox (ST) Wireless-MBUS (Stackforce)

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Make the choice of the STM32WL series

The 8 key points that make the difference

(G)FSK
(G)MSK
BPSK

Multi-modulation

Massive integration
Cost saving

Open dual-core platform

Ultra-low-power

STM32 Security

256KB
3.6 V
73-pin
1.8 V
48-pin
64KB Flash

A large offer

STM32 Cube

End-to-end ecosystem

LONGEVITY 10 YEARS COMMITMENT

No matter what!

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