STM32WL3x LINES

Wireless MCUs for efficient long-range communications

Low-power sub-GHz wireless MCU for long-range IoT connectivity

Based on the Arm® Cortex®-M0+ core, up to 64 MHz, the STM32WL3x lines integrate a sub-GHz dual radio for high flexibility and reduced BoM costs.

Offering up to 256 Kbytes of flash memory, the STM32WL3x lines come in compact packages down to 5 x 5 mm. It includes two radios, analog sensing peripherals, and an LCD driver.

With low-power consumption and a dedicated wake-up radio, the STM32WL3x lines ensure extended battery life for IoT devices.

STM32WL3x enabling features

Enables longer battery lifetime
- Main radio down to 5.6 mA (RX) and 8 mA (TX @ 10 dbm)
- Additional wake up receiver down to 4 µA in always on mode
- MCU low-power mode down to 910 nA with RAM retention

Offers flexible & multi-modulation support
- Multiple modulation, IQ interface and H/W packet handler
- Worldwide deployments: 413-479 MHz, 826-958 MHz
- 169 MHz band support: 159-185 MHz (on STMWL3xxxxxA P/N)

Reduces design complexity
- Lower BOM costs thanks to high integration
- SoC integrating MCU + dual radio + LCD and LCSC (fluid flow sensing controller)
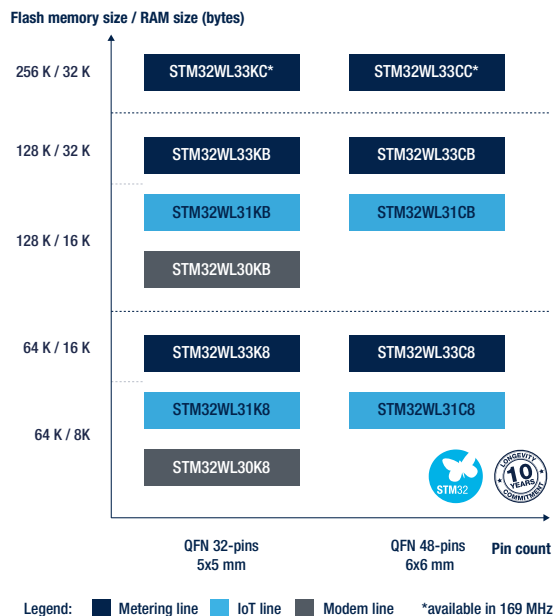- Internal balun: single-ended Radio

Standard protocols

M-Bus wireless   6LoWPAN   sigfox 0G Technology   mioty   Wi-SUN
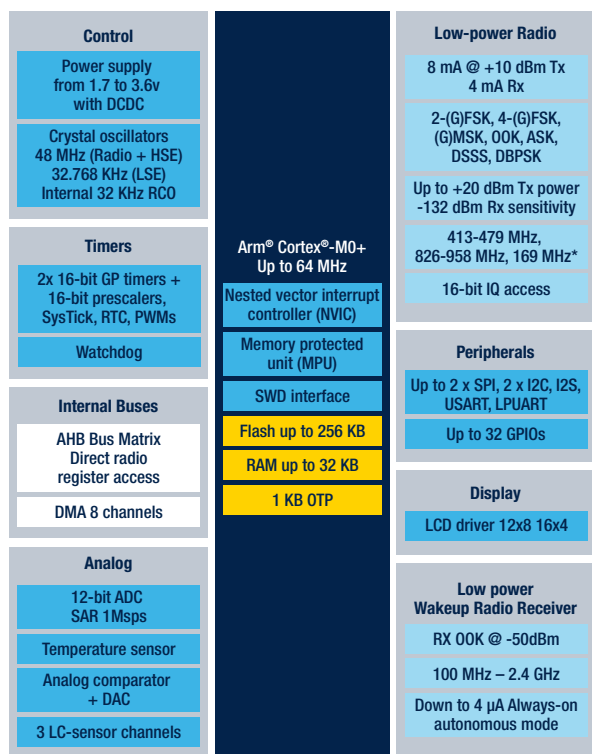
www.st.com/stm32wl3x

STM32WL3x portfolio, now supporting multiple markets

Discover our extended portfolio of STM32WL3x microcontrollers, offering designers flexibility with various memory sizes and pin counts. These microcontrollers are available in two ECOPACK2® compliant packages and are tailored to three key markets: metering, IoT, and modem applications.

	Market	Flash	Package	Radio	SERIAL/ RX+TX	SPI/ UART	I2C/ ADC	LCD/ LCSC/ COMP/ DAC
STM32WL33x Metering line	Water/ Gas Heat cost	Up to 256 KB	QFN32 and QFN48	Main Radio + WKUP Radio	Yes	Yes	Yes	Yes
STM32WL31x IoT line	IoT sensors IoT asset tracking	Up to 128 KB	QFN32 and QFN48	Main Radio	Yes	Yes	Yes	-
STM32WL30x Modem line	Open Co-processor	Up to 128 KB	QFN32	Main Radio	Yes	Yes	-	-

Flash memory size / RAM size (bytes)

256 K / 32 K	STM32WL33KC*	STM32WL33CC*
128 K / 32 K	STM32WL33KB	STM32WL33CB
128 K / 16 K	STM32WL31KB	STM32WL31CB
	STM32WL30KB	
64 K / 16 K	STM32WL33K8	STM32WL33C8
	STM32WL31K8	STM32WL31C8
64 K / 8K	STM32WL30K8	

QFN 32-pins 5x5 mm   QFN 48-pins 6x6 mm   **Pin count**

Legend: ■ Metering line   ■ IoT line   ■ Modem line   *available in 169 MHz

STM32WL3x block diagram

Control
- Power supply from 1.7 to 3.6v with DCDC
- Crystal oscillators 48 MHz (Radio + HSE) 32.768 KHz (LSE) Internal 32 KHz RCO

Timers
- 2x 16-bit GP timers + 16-bit prescalers, SysTick, RTC, PWMs
- Watchdog

Internal Buses
- AHB Bus Matrix Direct radio register access
- DMA 8 channels

Analog
- 12-bit ADC SAR 1Msps
- Temperature sensor
- Analog comparator + DAC
- 3 LC-sensor channels

Arm® Cortex®-M0+ Up to 64 MHz
- Nested vector interrupt controller (NVIC)
- Memory protected unit (MPU)
- SWD interface
- Flash up to 256 KB
- RAM up to 32 KB
- 1 KB OTP

Low-power Radio
- 8 mA @ +10 dBm Tx 4 mA Rx
- 2-(G)FSK, 4-(G)FSK, (G)MSK, OOK, ASK, DSSS, DBPSK
- Up to +20 dBm Tx power -132 dBm Rx sensitivity
- 413-479 MHz, 826-958 MHz, 169 MHz*
- 16-bit IQ access

Peripherals
- Up to 2 x SPI, 2 x I2C, I2S, USART, LPUART
- Up to 32 GPIOs

Display
- LCD driver 12x8 16x4

Low power Wakeup Radio Receiver
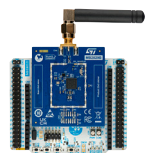- RX OOK @ -50dBm
- 100 MHz – 2.4 GHz
- Down to 4 μA Always-on autonomous mode

Legend: ■ Low-power radio   ■ Memory   □ Internal buses   * Available on dedicated P/N (STM32WL3xxxxxA)

STM32WL3x comprehensive ecosystem

Nucleo boards

NUCLEO-WL33CC1
High band: 826-958 MHz

& NUCLEO-WL33CC2
Low band: 413-479 MHz

Reference designs

STDES-WL3xxxxx
Resources as: schematics, layout, BoM and firmware examples to get you started

Start developing now!

STM32 CubeWL3

More than 1 million developers have chosen **STM32Cube**, making it the reference in the industry.

WiSE Studio

Radio development tools: WISE Studio
The **STM32CubeWISEre** is a graphical user interface to interact with the STM32WL3x and evaluate their radio capabilities.
The **STM32CubeWISEcg** is a PC application to build flowgraph to define radio actions using the sequencer driver.

RF IPD

MLPF-WL-0xD3 RF IPDs
The STM32WL3's IPD portfolio, helps in reducing PCB footprint and achieving optimal RF performance by integrating the RF BoM of harmonic filters and impedance matching into a tiny footprint.