



STM32WL5M module line

A tiny, certified LoRaWAN® device for simplified integration and faster time-to-market



The STM32 portfolio

Five product categories



Short- and long-range connectivity









32- and 64-bit microprocessors













Enabling edge Al solutions

32-bit general-purpose microcontrollers: from 75 to 3,224 CoreMark score



Scalable security







sub-GHz connectivity is everywhere

Smart industries



Smart cities



Smart agriculture



Smart homes



Asset tracking



Metering



Alarm systems



Heat cost allocators

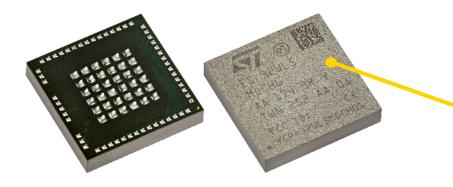






What the STM32WL5M module line offers

Faster development for power-efficient, long-range wireless devices



Dual-core Arm® Cortex®-M0 and Arm® Cortex®-M4 up to 48 MHz + sub-GHz radio transceiver







High integration, small footprint

- Embedded dual-core STM32WL55JC MCU
- 256 Kbytes of flash memory, 64 Kbytes of SRAM with sub-GHz radio transceiver
- Integrated 32 MHz radio TCXO and 32 kHz RTC crystals
- All RF components for transmission and reception matching network, incl. default antenna filter
- STSAFE-A110 secure element (optional)

Flexible wireless radio

- Certified for LoRaWAN® and Sigfox protocols
- Simple and ultra flexible platform with multiple modulation support: LoRa®, (G)FSK, (G)MSK and BPSK

Expanding battery life for IoT devices

Low power consumption radio down to 4.82 mA (Rx) and 15 mA (Tx at 10 dBm) (radio only)



STM32WL5M: one step further in integration

All-in-one sub-Ghz SoC



256KB FLASH 37 GPIOs Integrated Crystals



32Khz XO

Integrated Passive device



Integrated RF Switch



RX/TX Switch

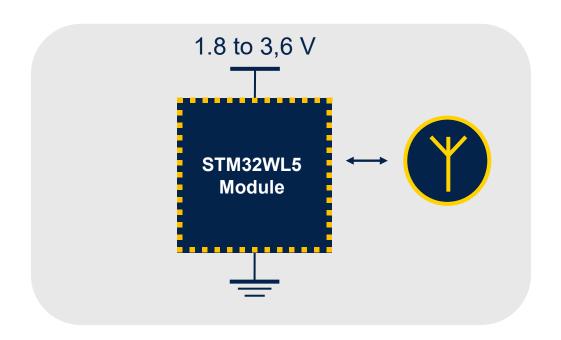
+ Optional STSAFE



Packed in a tiny 10 x 10 mm module



STM32WL5M: a simplified approach to lower BOM costs



Simple PCB: no external components required

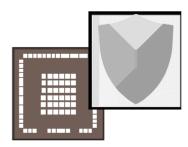
Easy to layout: enabling 2-layer PCBs

Internal antenna matching

Direct connection to VDD: internal SMPS components



STM32WL5M more robustness



EMC protected: molded module

Stable power supply: embedded power-supply filters

Robust RF Link: embedded default antenna filters

-40 to 85 °C temperature range



STM32WL5M offers a flexible radio configuration

High band frequency

From 868 to 928 MHz

Multimodulation

LoRa®, (G)FSK, (G)MSK, and BPSK.

Adjustable output power

Up to 22 dBm

Low power output (up to 15 dBm) Current consumption optimized

Dual output power

Selectable externally by solder bridge or switch

High power output (up to 22 dBm) long range optimized





Control

Power supply 1.8 to 3.6 V w/ DCDC+ LDO POR/PDR/PVD/BOR

Crystal oscillators 32 MHz (Radio + HSE) 32.768 KHz (LSE)

Internal RC oscillators 32,768 KHz + 16 MHz -48 MHz ± 1% acc. over V and T(°C)

SysTick timer

2 watchdogs (WWDG/IWDG)

37 GPIOs

Cyclic redundancy check

Voltage scaling (2 modes)

Security

AES 256-bit + TRNG + PCROP

Tamper Detection

Secure Areas

Secure FW Install

Debug control **Boot Selection**

Secure Sub-GHz. MAC Layer, SFI

Key Management services

*Only for STM32WL5M0CH6S

Arm® Cortex®-M4 DSP 48 MHz

Nested vector nterrupt controller

Memory protected unit (MPU) JTAG/SW debug

ART Accelerator™

AHB Bus matrix

2x DMA 7 channels

Arm® Cortex®-M0+

48 MHz

Nested vector

interrupt controller (NVIC)

Memory protected

unit (MPU)

SW debug

SMPS Passive components

Decoupling Capacitor

STSAFE-A110 (optional)*

Matching Networks

+ RX/TX Switch

Default Antenna Filter

Timers

1x 32-bit timer

3x 16-bit timers

3x ULP 16-bit timers

Memory

Up to 256-Kbyte Flash Up to 64-Kbyte SRAM

CM4 or CM0 Boot Lock **Boot loader** Hide protect

1x 12-bit ADC SAR 2.5 Msps

12-bit DAC

Analog

2x ULP comparators Temperature sensor

Connectivity

2x SPI, 3x I2C

2x USART LIN. smartcard, IrDA Modem control 1x ULP UART

+14dBm & +21dBm Power Outputs (LoRa)

868 MHz to 928 MHz

Radio

LoRa®, (G)FSK, (G)MSK, BPSK

-148 dBm sensitivity

STM32WL5MOC block diagram

Dual cores: Arm® Cortex®-M0 and Arm® Cortex®-M4

- **Open module** (AT commands firmware available)
- **HF bands:** 864 to 928 MHz
- **Selectable PA**: low power (up 15 dBm) / high power (up 22 dBm)
- **External Antenna**
- **Full BOM integrated**: crystals, decoupling, matching, filters
- Allows 2-layer PCB
- **Tiny form factor: 10 x 10 mm** with 0.5 mm pitch
- Operating range: -40 to -85°C / 1.8 to 3.6V
- STSAFE secure element (unmounted component)



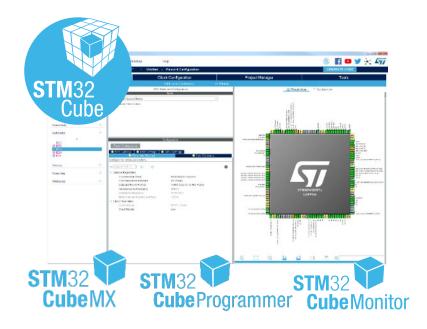
Accelerate your design journey using the STM32WL5M development ecosystem

sigfox

verified

+ Monarch

Development



Available in STM32CubeMX
Straightforward firmware migration

Certification

Open stack and available from st.com/STM32CubeWL



+ Stack available from partners





Open and certified module Certification by similarity

Prototyping



Evaluation board with sensors & connectors





Releasing your creativity



@STM32



@ST_World





community.st.com



www.st.com/stm32wlxm



wiki.st.com/stm32mcu



github.com/stm32-hotspot



STM32 MCU Developer Zone



STM32WL blog articles

Our technology starts with You



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