

STM32L5 – Series Presentation

Series Presentation

Revision 1.0



Hello, and welcome to this introduction to the STM32L5 Series training session.

It describes the feature sets available in the STM32L5 microcontroller series.

Main Concerns for Embedded Design

2



- **Security**

- Protection from hackers



- **Low power consumption**

- Long life time, small battery size



- **Integration, size, performance**

- Best fit versus the application requirements



The main challenges faced by our customers is to protect from Hackers at logical and board level attack and to add more security.

The second concern is related to the low power consumption in order to reduce the battery size and increase the life time. In the end the target is to define the right microcontroller which fits the application requirements the best in terms of integration, size and performance.



First STM32 Based on Cortex-M33

3

STM32L5 is the answer

- More security with TrustZone and ST security implementation
 - HW to resist to Logical and board level attack
- Lower Power consumption
 - STM32 ultra-low-power technology
- Integration, Size, performance
 - More performance, high memory size and wide portfolio



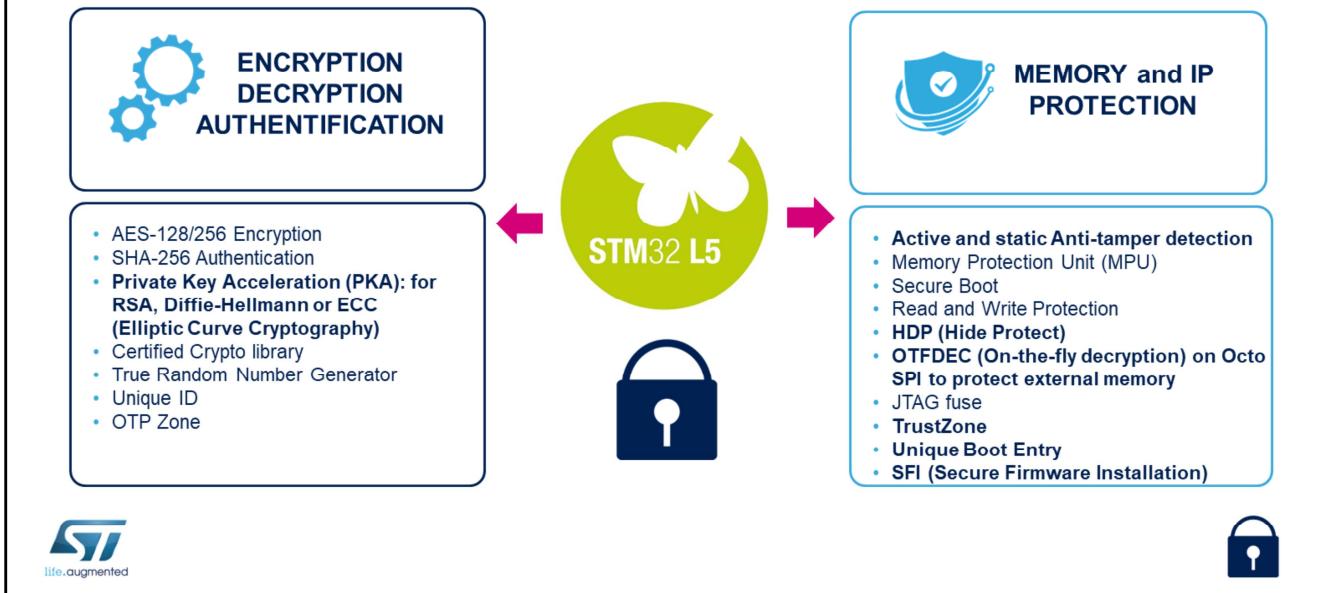
The STM32L5 microcontroller is the first STM32 MCU based on the Cortex-M33 core. It provides more security with TrustZone and ST security implementation.

It provides offers the lower power consumption, reusing the STM32 best-in class ultra low power technology and adds innovation.

Thanks to a large portfolio, high memory size and better performance, it can fit into a large type of applications.

A Full Set of Security

4



In addition to TrustZone, it shows a full set of security. Besides a Symmetric keys accelerator, a true number generator and a certified crypto library, it provides a private key accelerator (PKA) for asymmetric cryptography.

In terms of memory and IP protection, it offers an active temperature and voltage tampering.

Two new features are also reinforcing the security level and help the design of a root of trust: HDP (Hide Protect) which provides higher protection by a hardware secure boot with secure keys, and a unique boot entry which defines the address to boot.



Extend the Battery Life Time

5

- STM32L5 series reuses the STM32L4/L4+ technology achieving **best-in-class** power consumption
- STM32L5 integrates an optional **SMPS** (DC/DC buck voltage regulator) which can be enabled/disabled on the fly to avoid external noise for external RF or data acquisition.
- Proven by EEMBC test results:

ULPBENCH™ 370 ULPMark-CP
An EEMBC Benchmark

ULPBENCH™ 54 ULPMark-PP
An EEMBC Benchmark



The second main message is about power consumption. The STM32L5 series reuses the STM32L4/L4+ technology achieving best-in-class power consumption. It integrates an optional SMPS (DC/DC buck voltage regulator) which can be enabled/disabled on the fly to avoid external noise for external RF or data acquisition. This excellence in power consumption is proven by the EEMBC benchmark scores: 370 ULPMarks with the core profile benchmark and 54 ULPMarks with the peripheral profile benchmark.



Ultra-low-power Modes

6

Best power consumption numbers with full flexibility

Wake-up time	V _{BAT}	3 nA / 187 nA*	Tamper detection: 3 I/Os, RTC
250 µs	Shutdown	17 nA / 122 nA*	Wake-up sources: reset pin, 5 I/Os, RTC
14 µs	Standby	108 nA / 222 nA*	Wake-up sources: + BOR, IWDG
14 µs	Standby + 4-Kbyte RAM	272 nA / 386 nA*	Wake-up sources: + all I/Os, PVD, COMPs, I ² C, LPUART, LPTIM
5 µs	Stop 2 (full retention: 256-Kbyte RAM)	3.0 µA / 3.1 µA*	Wake-up sources: any interrupt or event
6 cycles	Sleep	26 µA / MHz	
	Run up to 110 MHz	Down to 62 µA / MHz	

Note : * without RTC / with RTC



The STM32L5 series offers best-in class power consumption figures with a full flexibility. The user can select the mode depending on the wake-up time, the state of retention and the number of sources required.

More Performance

7

Better responsiveness of the application

- New Arm® Cortex®-M33 performance: **+20%** versus Cortex-M4

1.5 DMIPS/MHz
4.02 CoreMark/MHz



165 DMIPS
442 CoreMark



- New ST ART Accelerator™: working both on internal and external Flash
 - 8 Kbytes of instruction cache



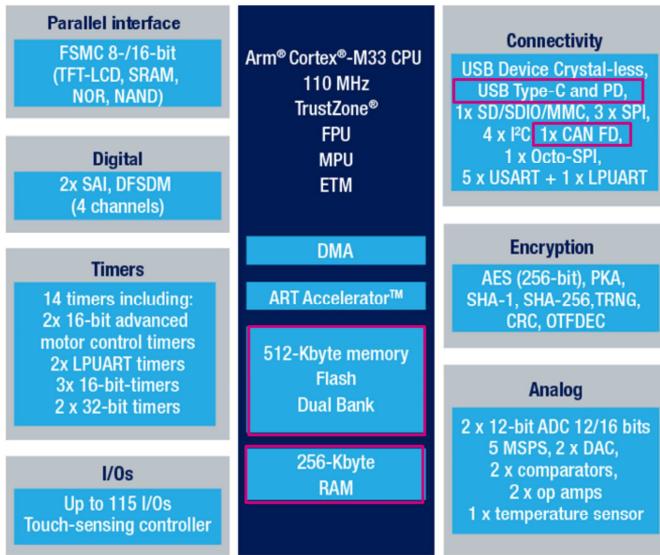
The STM32L5 series provides more performance thanks to its new core. The Cortex-M33 core gives 20% more performance running at the same frequency and so achieving 1.5 DMIPS/MHz leading to 165 DMIPS or 442 Coremark.

Furthermore it supports a new version of the ST ART Accelerator. In addition to the internal flash memory, this version also supports external memory thanks to its 8-kbytes instruction cache, which enables a higher performance as well as a better power efficiency.

High Integration and Innovation

8

Large memory, USB Type-C™ w/ power delivery controller, CAN FD



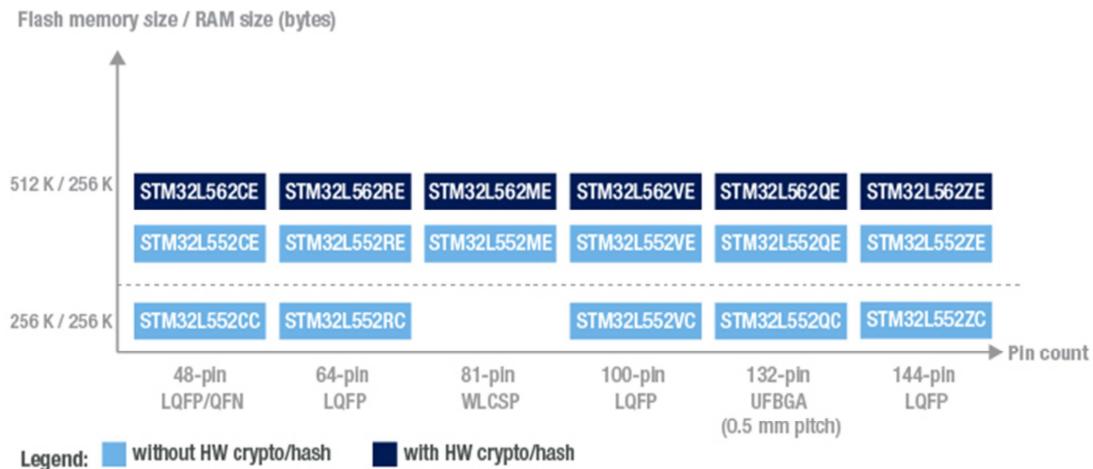
Here is the block diagram of a STM32L5 microcontroller. This product embeds a long list of digital and analog peripherals as well as a large memory size (up to 512 kBytes of Flash dual bank and 256 kBytes of SRAM). In addition to a USB crystal less port, it provides an extended connectivity with a USB type C port with power delivery support and CAN FD.



Large Portfolio

9

7 packages, several options



The STM32L5 series is available in 7 packages with several options (with or without the crypto accelerator), 512 or 256 kBytes of Flash memory and with or without the SMPS buck converter.

So a large portfolio.