

# STM32L5

E.Marinoni – v 1.0 October 2018



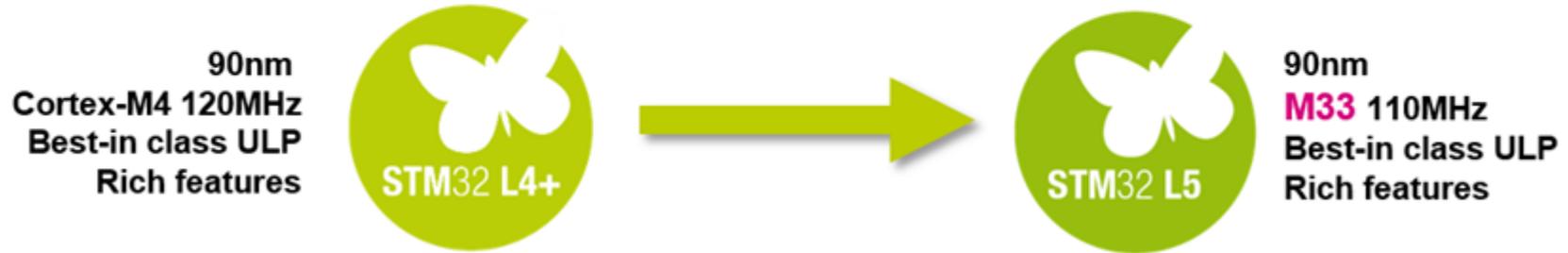
AVNET<sup>®</sup> SILICA





## STM32L5 series of Ultra-low-power MCUs

STM32L4+ will be expanded to create the **STM32L5x Series**



Excellence in **ultra-low-power** with **more performance**

**90** nm technology

Cortex-**M33**: the future of Cortex-M4

More performance: **+18 %** in *DMIPS/MHz* (**1.5 DMIPS/MHz**)

More features: security (**Trust Zone**)

Up to **125°C**

Embedded **Secure Firmware Install loader**

1. Strong focus on Security:
  - **Trust Zone**
  - **Active tampering**
  - **Temperature/Voltage/frequency protection** (PCI for Mobile POS)
  - **Elliptic curve acceleration (PKA)**
  - **Crypted Octo SPI**
  - **Secured Bootloader**
2. Power consumption:
  - **Optimized DC/DC + LDO with switching on the fly**
  - **Optimized RTC consumption (100 nA including Crystal)**
3. Performance:
  - **Cache for external memory**
4. New IP:
  - **FD-CAN**
  - **USB type C connector**

# STM32L5

- **A full set of security**

Flexible hardware and software secure isolations with [TrustZone](#)

Enhanced security services: dedicated **secure user memory space** for **Secure Boot**, **symmetric** and **asymmetric crypto accelerations**, **memory** and **IP protection**, **independent Read out protection between secure / non secure domains**, **active IO tamper detection**, certified **cryptolib**, **embedded Secure Firmware Install loader** and ecosystem.

- **Best power consumption**

EEMBC ULPBench®: **402** ULPMark-CP score

Embedded **SMPS** step down converter (optional)

Best power consumption numbers with full flexibility:

**33 nA** in **shutdown mode**

**3.6  $\mu$ A** in **stop mode** with **full SRAM** and **peripheral states retention** with **5 $\mu$ s** wake-up time

Down to **60  $\mu$ A/MHz** in active mode

- **Integration, size and performance**

Better responsiveness of the application:

New Arm **Cortex-M33** at **110 MHz performance: +18%** versus **Cortex-M4**

New ST **ART Accelerator**: working both on **internal** and **external Flash** (8 Kbytes of instruction cache)

Achieving **165 DMIPS** and **427 CoreMark** scores

High integration and innovation: large memory, **USB Type-C** w/power delivery controller, **CAN FD**

Large portfolio: 7 packages type (LQFP48, QFN48, LQFP64, WLCSP81, LQFP100, UFBGA132 and LQFP144) for several options

# STM32L5

| Arm® Cortex®-M33 (TrustZone® + DSP + FPU) – 110 MHz | <br>Product   | FLASH (KB)  | RAM (KB)   | Memory I/F | 2 x Op-Amp               | 2 x Comp | 4ch / 2x Sigma Delta Interface | 12- bit ADC<br>5 Msps<br>16 bit HW oversampling | USB2.0 Device<br>XTAL-less<br>USB Type-C and Power Delivery | CAN-FD | AES 128/256-bit,<br>PKA, OTFDEC |   |
|---|--|---|------------|------------|--------------------------|----------|--------------------------------|---|---|--------|---------------------------------|---|
|   | <ul style="list-style-type: none"> <li>• ART Accelerator™</li> <li>• USART, SPI, I2C</li> <li>• 16 and 32-bit timers</li> <li>• SAI + audio PLL</li> <li>• SHA, TRNG</li> </ul>                                    | STM32L552<br>USB Device &<br>CAN-FD                       | 512 to 256 | 256        | SDIO<br>FSMC<br>Octo SPI | •        | •                              | •   | 2   | •      | •                               |   |
|   | <ul style="list-style-type: none"> <li>• 2x 12-bit DAC</li> <li>• Temperature sensor</li> <li>• Low voltage 1.71V to 3.6V</li> <li>• Vbat Mode</li> <li>• Unique ID</li> <li>• Capacitive Touch sensing</li> </ul> | STM32L562<br>USB Device &<br>CAN-FD & AES,<br>PKA, OTFDEC | 512        | 256        | SDIO<br>FSMC<br>Octo SPI | •        | •                              | •   | 2   | •      | •                               | • |

# STM32L5 - Main Markets targeted

- Wellness / Fitness / Lifestyle
  - Activity trackers, GPS, Smart watch, glasses
- Home automation
  - Thermostat, alarm detector, in-home display
- Metering
  - Gas, water, Electricity
- Industrial
  - Sensors, 4-20 mA loop
- Medical
  - Insulin pump, Glucosemeter
- Safety
  - Mobile POS



extra information



### Cortex-M4

|                     |
|---------------------|
| ETM                 |
| NVIC (max 240 IRQs) |
| MPU (PMSAv7)        |
| AHB Lite            |
| FPU                 |
| SIMD/ DSP           |
| WIC                 |
| Serial wire / JTAG  |
| ARMv7-M             |

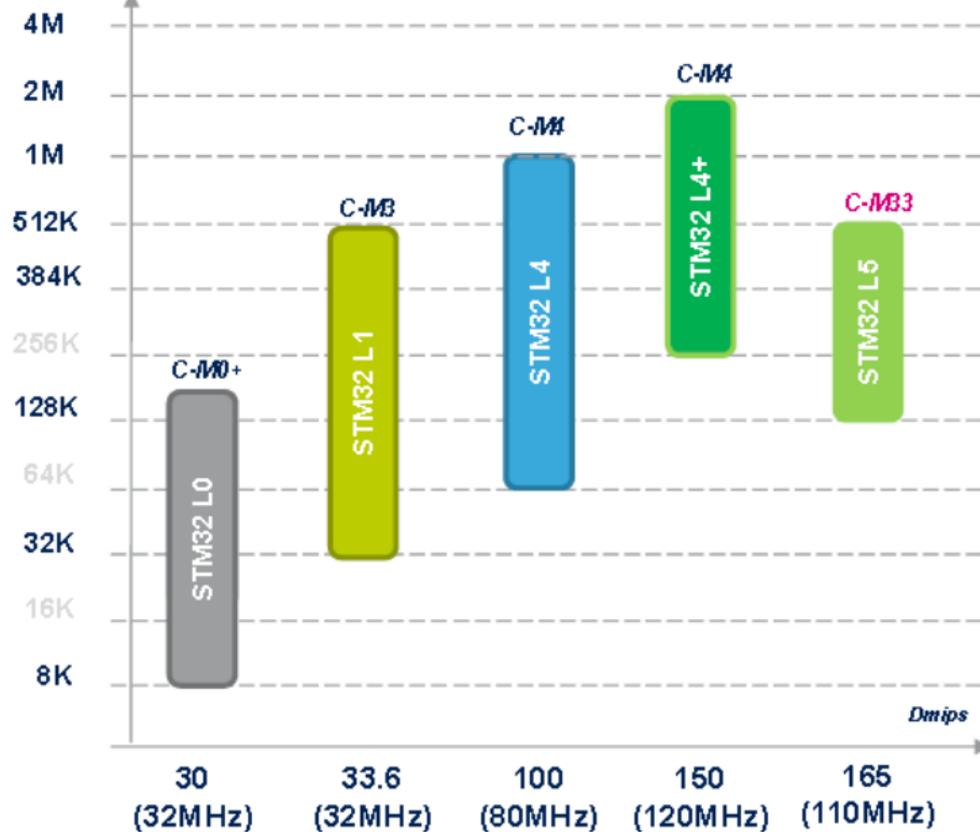
### Cortex-M33

|                        |
|------------------------|
| TrustZone              |
| Stack limit checking   |
| Co-processor interface |
| Enhanced debug         |
| MTB                    |
| ETM                    |
| NVIC (max 480 IRQs)    |
| MPU (PMSAv8)           |
| AHB5                   |
| FPU                    |
| SIMD/ DSP              |
| WIC                    |
| Serial wire / JTAG     |
| ARMv8-M mainline       |

■ New or updated



Memory size (Bytes)



# STM32L5

Click below to see a presentation on STM32L5



The video thumbnail features a man in a dark suit and light blue shirt on the left. To his right is a large green circle containing a white butterfly icon and the text "STM32 L5". In the top right corner of the video frame is the ST logo. Below the video frame, there is a pink magnifying glass icon, the text "Product overview" in blue, "STM32L5 MCU Series" in black, and a black box with "6:42" in white.

# STM32L5

From STM32 tool installation

to building your own IoT application

Getting Started  
STM32 step-by-step

# STM32L5



Simplified clock tree



STM32 Online Training  
In depth education

# STM32L5 – for more info...

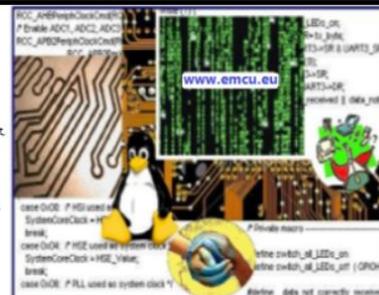
## EMCU

STMicroelectronics digital components  
(by E.Marinoni)



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**STM32** **STM32 Introduction** STM32L0xx – ultra-low-power EnergyLite™ MCU – Cortex M0+

Direct STM support only for key customers STM32 Peripheral Education

STM on GITHUB.COM STM32 Education

ATOLLIC Why use CORTEX M family instead of 8 and 16 bit MCU STM32L4xx – ultra-low-power EnergyLite™ MCU – Cortex M4

Oscillator design guide for STM8 and STM32 microcontrollers, AN2867 Change, from Arduino to STM32 STM32L4+ – ultra-low-power EnergyLite™ MCU – Cortex M4 at 120 Mhz

STM32 & STM8 product finder What should I use to develop on STM32 ? **STM32L5 – Excellence in ultra-low-power with more performance – Based on Cortex M33**

ST-LINK How to install the toolchain for develop on STM32

STM32 Cube Programmer

STM Studio How to program the STM32 STM32F0xx – Cortex M0

### ATTENTION

Use **FIREFOX** or **CHROME** for a clear view of the images present in this web site

### November 2018

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| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 |    |    |

« Or





Thank you!

