STM32L4+ MCU series
excellence
in ultra-low-power
with more performance
Smart peripherals

**Δ metering**

**Digital Filter for Sigma Delta Modulators**
- 8 x parallel inputs
- with up to 24-bit data output resolution

**V_{BAT} with RTC**
- for battery backup
- 300 nA in V_{BAT} mode for RTC and
- 32x 32-bit backup registers

**TRNG & AES**
- for Security
- 128-/256-bit AES
- key encryption hardware accelerator

**FSMC**
- External memory interface
  for static memories supporting SRAM, PSRAM, NOR and NAND

**STM32L4+**
- Electricity/Gas
  / Water
  Smart Meter

**LCD Display**
- SPI, Parallel or TFT Interface

**Anti Tamper pin**
- 3 x tamper pins
  for battery domain

**SPI / UART/ SDIO**
- for Wireless
  3x SPIs (4x SPIs with the Quad SPI)
  6x USARTs (ISO 7816, LIN, IrDA, modem)
  1 x SDIO

**I/Os**
- Up to 114 fast I/Os for buttons & relays

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**I/Os**
- Up to 114 fast I/Os for buttons & relays
Smart peripherals
fitness tracker - wristband

STM32L4+

- **Digital Filter for Sigma Delta Modulators**
  - with PDM (Pulse Density Modulation)
  - microphone input support

- **Batch Acquisition Mode (BAM)**

- **Sensors**
  - 3x I²C FM+(1 Mbit/s), SMBus/PMBus

- **SPI / UART**
  - 3x SPIs (4x SPIs with the Quad SPI)
  - 6x USARTs (ISO 7816, LIN, IrDA, modem)

- **ADC**
  - 2x 12-bit ADC 5 MSPS,
    up to 16-bit with hardware oversampling,
    200 μA/MSPS

- **DAC**
  - 2x 12-bit DAC,
    low-power sample and hold

- **OPAMP**
  - 2x op amp
    with built-in PGA

- **USB**
  - USB OTG 2.0
    full-speed,
    LPM and BCD

- **Zoom**
  - PC
  - Display
  - **FSMC**
    Parallel interface to TFT SPI
  - **MIPI DSI**
    Direct connection
  - **Chrom-ART**
    Graphic Acceleration
  - **Chrom-GRC**
    SRAM needs reduction

- **SAI**
  - 2x serial audio interfaces

- **FSMC**
  - Parallel interface to TFT SPI

- **USB**
  - USB OTG 2.0
    full-speed,
    LPM and BCD

- **SAI**
  - 2x serial audio interfaces
Motor Control:
2x 16-bit advanced motor-control timers
12-bit ADCs: 5 MSPS, with up to 16-bit with hardware oversampling, 200 μA/MSPS

CAN Bus
(2.0B Active)

TRNG & AES for Security
128/256-bit AES
key encryption hardware accelerator

FSMC
External memory interface for static memories supporting SRAM, PSRAM, NOR and NAND

STM32L4+
Electricity/Gas
/Water
Smart Meter

Display
TFT controller, or SPI or FSMC

High temperature
from -40°C
up to + 125°C

SPI / UART
3x SPIs (4x SPIs with the Octo SPI)
6x USARTs (ISO 7816, LIN, IrDA, modem)

I²C
3x I²C FM+(1 Mbit/s), SMBus/PMBus

I/Os
Up to 114 fast I/Os for buttons & relays
High integration with high memory size in small packages

<table>
<thead>
<tr>
<th>Connectivity</th>
<th>Timers</th>
<th>Analog</th>
<th>Parallel Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB OTG, 2 x SD/SDIO/MMC, 3 x SPI, 4 x FC, 1 x CAN, 2 x Octo SPI, 5 x USART, 1 x ULP UART</td>
<td>17 timers including: 2 x 16-bit advanced motor control timers, 2 x ULP timers, 7 x 16-bit-timers, 2 x 32-bit timers</td>
<td>2 x 12-bit ADC, 2 x DAC, 2 x Comparators, 2 x Op amps, 1 x Temperature sensor</td>
<td>FSMC 8-/16-bit (SRAM, NOR, NAND)</td>
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<td>Digital</td>
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<td>AES 256, SHA, PKA TRNG, 2 x SAI, DFSDM (4 channels)</td>
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<td>Display</td>
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<td>TFT-LCD Controller</td>
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<tr>
<td>I/Os</td>
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<tr>
<td>Up to 114 I/Os Touch-sensing controller</td>
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</tbody>
</table>

ARM® Cortex®-M4 120 MHz FPU MPU ETM

Package size down to 4.62 x 4.14 mm
Safety and security

Integrated safety and security features

- Brown-out Reset in all modes
- Clock Security System
- SRAM parity check
- Backup byte registers
- Supply monitoring
- Flash with ECC with status register (address)
- Dual watchdog

STM32L4+

- Anti-tamper detection
- Memory Protection Unit (MPU)
- Read and Write Protection
- Unique ID
- AES-256 / SHA-256 Encryption
- JTAG fuse
- True Random Number Generator
- Software IP Protection
- OTP Zone
## STM32 MCU Portfolio

### MPU
- STM32MP1
  - 4158 CoreMark
  - 650 MHz Cortex-M7

### High Perf MCUs
- STM32F0
  - 106 CoreMark
  - 48 MHz
- STM32F1
  - 177 CoreMark
  - 72 MHz
- STM32F2
  - 398 CoreMark
  - 120 MHz
- STM32F3
  - 245 CoreMark
  - 72 MHz
- STM32F4
  - 608 CoreMark
  - 180 MHz
- STM32F5
  - 932 CoreMark
  - 170 MHz
- STM32F7
  - 1082 CoreMark
  - 216 MHz

### Mainstream MCUs
- STM32L0
  - 75 CoreMark
  - 32 MHz
- STM32L1
  - 93 CoreMark
  - 32 MHz
- STM32L2
  - 245 CoreMark
  - 72 MHz
- STM32L3
  - 550 CoreMark
  - 170 MHz
- STM32L4
  - 409 CoreMark
  - 120 MHz

### Ultra-low Power MCUs
- STM32L0
  - 75 CoreMark
  - 32 MHz
- STM32L1
  - 93 CoreMark
  - 32 MHz
- STM32L5
  - 424 CoreMark
  - 110 MHz
- STM32L4
  - 273 CoreMark
  - 80 MHz
- STM32L4+
  - 409 CoreMark
  - 120 MHz

### Wireless MCUs
- STM32WL
  - 161 CoreMark
  - 48 MHz
- STM32WB
  - 216 CoreMark
  - 64 MHz

---

- **Arm® Cortex® core** - M0 / M0+ / M3 / M33 / M4 / M7 / dual -A7 & -M4
- **Optimized for mixed-signal applications**
- **Cortex-M0+ Radio co-processor**
## STM32L ULP portfolio

### STM32L0
- **Cost-smart ULP champion**
  - Cortex-M0+ at 32 MHz
  - 1.65 to 3.6V
  - 8-/16-bit applications
  - Wide range of pin-counts
  - 3 product lines,
    - Cost-effective,
    - Smaller packages,
    - USB, LCD, Analog
  - 8 to 192 Kbytes of Flash,
  - Up to 20 Kbytes of SRAM

### STM32L1
- **Broad-range foundation**
  - Cortex-M3 at 32 MHz
  - 1.65 to 3.6V
  - Wide choice of memory sizes
  - 3 product lines,
    - USB, LCD, AES,
    - Rich Analog
    - True EEPROM,
    - Dual-bank Flash memory (RWW),
  - 32 to 512 Kbytes of Flash,
  - Up to 80 Kbytes of SRAM

### STM32L4
- **ULP With performance**
  - Cortex-M4 w/ FPU at 80 MHz
  - 1.71 to 3.6V
  - High-performance, advanced analog circuits
  - 5 product lines,
    - 5-MSPS ADC,
    - PGA, Compar.,
    - DAC, Op Amp, USB OTG, LCD, AES
  - 64 Kbytes to 1 Mbyte
  - Up to 320 Kbytes of SRAM

### STM32L4+
- **ULP with more performance**
  - Cortex-M4 w/ FPU at 120 MHz
  - 1.71 to 3.6V
  - Wide choice of memory sizes
  - 3 product lines,
    - 5-MSPS ADC,
    - PGA, Compar.,
    - DAC, Op Amp, USB OTG, LCD, AES
  - 1 to 2 Mbytes of Flash,
  - Up to 640 Kbytes of SRAM

### STM32L5
- **Advanced security**
  - Cortex-M33 w/ FPU at 110 MHz
  - 1.71 to 3.6V
  - Wide choice of memory sizes
  - 1 product line,
    - 5-MSPS ADC,
    - PGA, Compar.,
    - DAC, Op Amp, USB Type C, AES
  - 256 to 512 Kbytes of Flash,
  - Up to 256 Kbytes of SRAM

### STM32L5 completes the ultra-low-power subclass
STM32L, a complete offer

STM32L4+ completes the ultra-low-power family

STM32L5
- 32-bit Arm® Cortex®-M33 + FPU at 110 MHz
- From 256 to 512 Kbytes of Flash memory
- Lowest power mode + RAM + RTC: 0.35 µA

STM32L4+
- 32-bit Arm® Cortex®-M4 + FPU at 120 MHz
- From 512 Kbytes to 2 Mbytes of Flash memory
- Lowest power mode + RAM + RTC: 1.63 nA

STM32L4
- 32-bit Arm® Cortex®-M4 + FPU at 80 MHz
- From 64 Kbytes to 1 Mbyte of Flash memory
- Lowest power mode + RAM + RTC: 0.34 µA

STM32L1
- 32-bit Arm® Cortex®-M0+ at 32 MHz
- From 32 to 512 Kbytes of Flash memory
- Lowest power mode + RAM + RTC: 1.2 µA

STM32L0
- 32-bit Arm® Cortex®-M0+ at 32 MHz
- From 8 to 192 Kbytes of Flash memory
- Lowest power mode + RAM + RTC: 0.67 µA

Additional information:
- STM32L supports longevity with a 10-year commitment.
- CoreMark scores:
  - STM32L5: 447
  - STM32L4+: 442
  - STM32L4: 409
  - STM32L1: 273
  - STM32L0: 93

Flash memory size (bytes): 14, 32, 64, 128, 256, 512, 1 M, 2 M
## STM32L4+ series

### STM32L4+ MCU Series

32-bit Arm® Cortex®-M4 (DSP + FPU) – 120 MHz

<table>
<thead>
<tr>
<th>Product line</th>
<th>Flash (KB)</th>
<th>RAM (KB)</th>
<th>Memory I/F</th>
<th>Op-Amp</th>
<th>Comp.</th>
<th>Sigma-Delta Mod.</th>
<th>12-bit ADC</th>
<th>5 Mbps 10-bit HW oversampling</th>
<th>USB2.0 OTG</th>
<th>TFT Display Interface</th>
<th>*Chrome-60™</th>
<th>MiPI-DSI</th>
<th>AES 128-/256-bit</th>
</tr>
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<tbody>
<tr>
<td>STM32L4P6</td>
<td>512 to 1024</td>
<td>320</td>
<td>SDIO FSMC</td>
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</table>
STM32L4+ portfolio

Legend:
- **STM32L4R9/S9**
- **STM32L4R5/S5**
- **STM32L4R7/S7**
- **STM32L4P5/Q5**
- With 128-/256-bit AES Hardware Encryption
STM32L4+ ecosystem

A large Ecosystem

SOFTWARE TOOLS

HARDWARE TOOLS

STM32CubeMX

IDEs

STM32CubeIAR
STM32CubeMonitor
STM32CubeMbed
STM32CubeMonitor
STM32CubeMbed

STM32CubeProlog
STM32CubeMonitor
STM32CubeMbed

STM32 Nucleo boards

Discovery kits

Evaluation boards

Configure and generate code

Compile and debug

Monitor & program

Flexible prototyping

Creative demos

Full-feature evaluation

Notes:
- STM32CubeMX will support multi-core debugging.
- STM32CubeIAR will support multi-core debugging in Q4 2019.
STM32L4/L4+ ecosystem

EMBEDDED SOFTWARE

- USB host and device library from ST
- STemWin graphical stack library from ST and Segger
- Open-source FAT file system (FatFs)
- Open-source real-time OS (FreeRTOS)
- Numerous examples

- STM32L4 Hardware Abstraction Layer (HAL) portable APIs
- High-performance, light-weight low-layer (LL) APIs
- High coverage for most STM32 peripherals
- Production-ready and fully qualified
- Dozens of usage examples
- Open-source BSD license
STM32 graphic ecosystem

3 Recommended Software Solutions

**FREE**

**STemWin**

**FREE**

**TouchGFX**

**FREE**

**Embedded Wizard**

Entry Solution

Advanced Solutions
# STM32 MCU “Ultra-low Power” series

<table>
<thead>
<tr>
<th>STM32F0</th>
<th>STM32F1</th>
<th>STM32F2</th>
<th>STM32F3</th>
<th>STM32F4</th>
<th>STM32F5</th>
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<tbody>
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**High Perf MCUs**
- STM32F2: 398 CoreMark, 120 MHz
- STM32F4: 608 CoreMark, 180 MHz
- STM32F7: 1082 CoreMark, 216 MHz

**Mainstream MCUs**
- STM32F0: 106 CoreMark, 48 MHz
- STM32G0: 142 CoreMark, 64 MHz
- STM32F1: 177 CoreMark, 72 MHz
- STM32F3: 245 CoreMark, 72 MHz
- STM32G4: 550 CoreMark, 170 MHz

**Ultra-low Power MCUs**
- STM32L0: 75 CoreMark, 32 MHz
- STM32L1: 93 CoreMark, 32 MHz
- STM32L5: 424 CoreMark, 110 MHz
- STM32L4: 273 CoreMark, 80 MHz
- STM32L4+: 409 CoreMark, 120 MHz

**Wireless MCUs**
- STM32WL: 161 CoreMark, 48 MHz
- STM32WB: 216 CoreMark, 64 MHz

**Arm® Cortex® core**
- -M0
- -M0+
- -M3
- -M33
- -M4
- -M7

- Optimized for mixed-signal applications
- Cortex-M0+ Radio co-processor

STM32L4+ and STM32L4+ are optimized for mixed-signal applications.
Summary
4 keys of STM32 L4 + series

- More performance and still ULP leader
- More Graphics and Innovation
- More Integration
- Great Investment
Releasing your creativity

/STM32
@ST_World
community.st.com
www.st.com/STM32L4-plus
Thank you