STM32L series
Ultra-low-power
32-bit MCUs
Releasing your creativity
3 STM32 and ultra-low-power
4 STM32ULP series
8 STM32L0 series
10 STM32L1 series
12 STM32L4 series
14 STM32L4+ series
16 STM32L5 series
18 STM32U5 series
20 STM32ULP ecosystem
STM32 and ultra-low-power

By choosing an STM32 microcontroller for your embedded application, you gain from our market-leading expertise in MCU architecture, technology, multi-source manufacturing and long-term supply.

17 PRODUCT SERIES – MORE THAN 70 PRODUCT LINES

The STM32 family of 32-bit microcontrollers based on the Arm® Cortex®-M processor is designed to offer new degrees of freedom to MCU users. It offers products combining very high performance, real-time capabilities, digital signal processing, low-power / low-voltage operation, and connectivity, while maintaining full integration and ease of development.

The unparalleled range of STM32 microcontrollers, based on an industry-standard core, comes with a vast choice of tools and software to support project development, making this family of products ideal for both small projects and end-to-end platforms.

STM32 MCUS - 32-BIT ARM® CORTEX®-M

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<th>High Perf MCUs</th>
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<th>Ultra low Power MCUs</th>
<th>Wireless MCUs</th>
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<tr>
<td>398 CoreMark</td>
<td>120 MHz Cortex-M3</td>
<td>108 CoreMark</td>
<td>162 CoreMark</td>
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<tr>
<td>608 CoreMark</td>
<td>180 MHz Cortex-M4</td>
<td>142 CoreMark</td>
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<td>1082 CoreMark</td>
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<td>72 MHz Cortex-M3</td>
<td>245 CoreMark</td>
<td>72 MHz Cortex-M3</td>
</tr>
<tr>
<td>Up to 3224 CoreMark</td>
<td>Up to 550 MHz Cortex-M7</td>
<td>569 CoreMark</td>
<td>170 MHz Cortex-M4</td>
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<td>STM32F4</td>
<td>STM32F1</td>
<td>STM32L1</td>
<td>STM322L4</td>
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<tr>
<td>250 MHz Cortex-M4</td>
<td>80 MHz Cortex-M4</td>
<td>273 CoreMark</td>
<td>409 CoreMark</td>
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<tr>
<td>355 CoreMark</td>
<td>170 MHz Cortex-M4</td>
<td>32 MHz Cortex-M0+</td>
<td>120 MHz Cortex-M4</td>
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<td>STM32F7</td>
<td>STM32F3</td>
<td>STM32L4</td>
<td>STM32L5</td>
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<tr>
<td>Up to 3224 CoreMark</td>
<td>Up to 550 MHz Cortex-M7</td>
<td>409 CoreMark</td>
<td>110 MHz Cortex-M33</td>
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<td>1200 MHz Cortex-M4</td>
<td>170 MHz Cortex-M4</td>
<td>443 CoreMark</td>
<td>160 MHz Cortex-M33</td>
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<td>STM32H7</td>
<td>STM32L4+</td>
<td>STM32L5</td>
<td>STM32U5</td>
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<td>STM32L4+</td>
<td>STM32L5</td>
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<tr>
<td>409 CoreMark</td>
<td>120 MHz Cortex-M4</td>
<td>110 MHz Cortex-M33</td>
<td>651 CoreMark</td>
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<td>443 CoreMark</td>
<td>160 MHz Cortex-M33</td>
<td>160 MHz Cortex-M33</td>
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</tbody>
</table>

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

ST MCU Finder
Free mobile and desktop application to find the right STM32 MCU
www.st.com/stmcufinder

ST Community
Ask, learn, share, discuss, become famous and engage with the community of STM32 enthusiasts on:
community.st.com

STM32 MCU wiki by STI
wiki.st.com/stm32mcu
STM32 ULP series

From cost smart up to advanced performance, there is an STM32Lx series to match all your memory, analog or peripheral needs.

STM32L: ULTRA-LOW-POWER 32-BIT MCU SERIES

ST's ultra-low-power MCU platform is based on a proprietary ultra-low-leakage technology and optimized design. STM32 ultra-low-power microcontrollers offer designers of energy-efficient embedded systems and applications a balance between performance, power, security and cost effectiveness. The portfolio includes the STM8L (8-bit proprietary core), the STM32L4 (Arm® Cortex®-M4), the STM32L0 (Arm® Cortex®-M0+) and the STM32L1 (Arm® Cortex®-M3). The STM32L5 MCU (Arm® Cortex®-M33) with its enhanced security features is the latest addition to this rich portfolio. Achieving the industry’s lowest current variation (25 to 125 °C), STM8L/STM32L/STM32U solutions guarantee outstanding low-current consumption at high temperatures.

- The new STM32U5 series combines the latest and most efficient Arm Cortex-M33 core with an innovative 40 nm platform that reduces energy consumption to the bone, while increasing performance. The series also adds the state-of-the-art features which are required in today’s applications, including advanced cyber security with hardware-based protection, and graphics accelerators for rich graphical user interfaces.
- The STM32L5 series enhanced security features leverage Arm® Cortex®-M33 and its TrustZone® for Armv8-M. Thanks to this new core and a new ST ART Accelerator™ (also supporting external memory), the STM32L5 reaches an 443 CoreMark.
- The STM32L4 series offers the excellence of ST’s ultra-low-power platform with an additional performance dimension by providing 100 DMIPS with DSP instructions and Floating-Point Unit (FPU), more memory (up to 1 Mbyte of Flash memory) and innovative features.
- The STM32L4+ series extends STM32L4 technology by offering higher performance (120 MHz/409 CoreMark executing from internal Flash memory), larger embedded memories (up to 2 Mbytes of Flash memory and 640 Kbytes of SRAM), and rendering advanced graphics without compromising ultra-low-power consumption.
- The STM32L0 series offers a genuine energy-saving solution for entry-level applications. Available in tiny packages down to 14 pins and with a wide range of Flash memory densities from 8 to 192 Kbytes, the STM32L0 features ultra-low power consumption in a competitive portfolio.

6 PRODUCT SERIES - 18 PRODUCT LINES

<table>
<thead>
<tr>
<th>STM32U5</th>
<th>STM32L5</th>
<th>STM32L4+</th>
<th>STM32L4</th>
<th>STM32L1</th>
<th>STM32L0</th>
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</thead>
<tbody>
<tr>
<td>32-bit Arm® Cortex®-M33 + FPU at 180 MHz</td>
<td>32-bit Arm® Cortex®-M33 + FPU at 110 MHz</td>
<td>32-bit Arm® Cortex®-M4 + FPU at 120 MHz</td>
<td>32-bit Arm® Cortex®-M4 + FPU at 80 MHz</td>
<td>32-bit Arm® Cortex®-M3 at 32 MHz</td>
<td>32-bit Arm® Cortex®-M0+ at 32 MHz</td>
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<tr>
<td>From 1 to 2 Mbytes of Flash memory</td>
<td>From 512 to 1 Mbytes of Flash memory</td>
<td>From 32 to 512 Kbytes of Flash memory</td>
<td>From 64 Kbytes to 1 Mbyte of Flash memory</td>
<td>From 32 to 512 Kbytes of Flash memory</td>
<td>From 8 to 192 Kbytes of Flash memory</td>
</tr>
<tr>
<td>Lowest power mode + RAM + RTC: 0.35 µA</td>
<td>Lowest power mode + RAM + RTC: 0.35 µA</td>
<td>Lowest power mode + RAM + RTC: 0.39 µA</td>
<td>Lowest power mode + RAM + RTC: 0.34 µA</td>
<td>Lowest power mode + RAM + RTC: 1.2 µA</td>
<td>Lowest power mode + RAM + RTC: 0.67 µA</td>
</tr>
</tbody>
</table>

CoreMark score 651

ULPBench score

Products

75 93 273 409 443
MORE MEMORY, PERFORMANCE, PERIPHERALS AND PACKAGE

- **STM32L0**
- **STM32L1**
- **STM32L4**
- **STM32L4+**
- **STM32L5**
- **STM32U5**

### Flash memory size (bytes)

- 2 M
- 1 M
- 512 K
- 384 K
- 256 K
- 192 K
- 128 K
- 64 K
- 32 K
- 16 K
- 8 K

### Pins

- 14
- 32
- 48
- 96
- 100
- 144
- 169

### Packages

- **WLCSP**
  - WLCSP25 (~2x2 mm)
  - WLCSP36 (~2x3 mm)
  - WLCSP49 (~3x3 mm)
  - WLCSP63 (~3x4 mm)
  - WLCSP64 (~4x5 mm)
  - WLCSP72 (~3x4 mm)
  - WLCSP81 (~3x4 mm)
  - WLCSP90 (~4x4 mm)
  - WLCSP100 (~4x4 mm)
  - WLCSP104 (~4x5 mm)
  - WLCSP144 (~5x5 mm)

- **QFN**
  - UFQFN20 (3x3 mm)
  - UFQFN28 (4x4 mm)
  - UFQFN32 (5x5 mm)
  - UFQFN48 (7x7 mm)

- **BGA**
  - UF3BG46 (5x5 mm)
  - UF3BA100 (7x7 mm)
  - UF3BA132 (7x7 mm)
  - UF3BA144 (10x10mm)
  - UF3BA169 (9x7 mm)

- **TSSOP**
  - TSSOP14 (4.4x1.1 mm)
  - TSSOP20 (4.4x6.6 mm)

- **LQFP**
  - LQFP32 (7x7 mm)
  - LQFP48 (7x7 mm)
  - LQFP64 (10x10 mm)
  - LQFP100 (14x14 mm)
  - LQFP144 (20x20 mm)
STM32 ULP MCUs ARE THE ANSWER, WHATEVER THE APPLICATION

Power tools

-40 to +125 °C temperature range
-1.65 to 3.6 V power supply range
-RTC with anti-tamper at 0.95 ppm
-Safety with ECC on Flash and SRAM, CRC
-Independent dual-bank Flash memory and EEPROM (RWW)
-Internal RC ± 1% accuracy over temperature and VDD
-Wide package offer from 14 to 169 pins
-Full Arm® Cortex®-M0+/M3/M4/M33 range offer

Gas/water meters

- Down to 450 nA mode with RTC, 16 Kbytes of SRAM
- LPBAM (Low Power Background Autonomous Mode), an innovative autonomous power mode
- LP-UART, Pulse counter, 16-bit LP-Timer
- 3.5 µs wakeup with 16 wakeup lines
- Dual-bank Flash memory (up to 2 Mbytes) for firmware upgrade
- Up to 16 Kbytes of true EEPROM for data login
- Built-in comparator and Op Amp with PGA
- TrustZone®, PCROP, ECC, CRC, JTAG fuse for security purposes
- Full Arm® Cortex®-M0+/M3/M4/M33 range offer

Sensor hub

Mobile phone/gaming

-1.4 µA Stop mode with 128 Kbytes of RAM+RTC
-4 µs wakeup time for fast system response
-USB 2.0 OTG for fast application processors
-Up to 786 Kbytes of SRAM
-Down to 1.65 V full speed
-I²C FM+, Fast SPI, Fast ADC for sensor acquisition
-Arm® Cortex®-M33 with FPU 240 DMIPS with ART Accelerator™
- Dynamic Efficiency 19 µA/MHz
- FSMC or Quad/Octo SPI for external memories
- LCD (4x52 or 8x48) for Display control
- TRNG and 256-bit AES for Security
- Digital filter for Sigma-Delta modulators or MDF
- VBAT with RTC for Battery backup domain

- 8 nA Shutdown mode to extend battery life
- Up to 2-Mbyte Flash memory to support advanced algorithms
- Dynamic Efficiency 19 µA/MHz
- I²C FM+ for sensors and HS communication
- 12-/16-bit ADC analog sensing and monitoring
- FS USB host for data transfer + device charging
- Full Arm® Cortex®-M0+/M3/M4/M33 range offer
- Up to 786 or ADF Kbytes of SRAM
- Graphic accelerator: Chrom-ART Accelerator™ and memory optimization Chrom-GRC™ round display
- MIPI-DSI, LCD-TFT and parallel interface for advanced graphics

- 28 nA Standby mode to extend battery life
- 4 to 14 µs wakeup time for a better user experience
- Digital filter for Sigma Delta for MEMS microphone
- 12-bit ADC at 200 µA / MSPS
- SAI / I2S for audio peripheral connections
- Arm® Cortex®-M33 up to 160 MHz with 240 DMIPS
- Quad or Octo-SPI Memory interface for data or execution in place

Electricity smart meters
Fitness/healthcare
Audio and voice recognition
# STM32L0 series

A tiny consumption budget for a wide application range

## STM32L0 MCU Series - 32-bit Arm® Cortex®-M0+

- Ultra low leakage process
- Dynamic voltage scaling
- 14 to 100-pin
- 5 clock sources
- Advanced RTC w/ calibration
- 12-bit ADC 1.14 Msps
- Multiple UART, SPI, I²C
- Multiple 16-bit timers
- LP UART1
- LP Timers1
- 2 watchdogs
- Reset circuitry POR/PDR
- Brown-out Reset
- DMA
- AES-128

<table>
<thead>
<tr>
<th>Product line</th>
<th>Flash (KB)</th>
<th>RAM (KB)</th>
<th>EE-PROM (Bytes)</th>
<th>Power supply</th>
<th>PVD</th>
<th>TEMP sensor</th>
<th>2x ULP COMP</th>
<th>2x 12-bit DAC</th>
<th>Touch sense</th>
<th>TRNG</th>
<th>USB 2.0</th>
<th>Segment LCD Driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>STM32L0x0 Value line</td>
<td>Up to 128</td>
<td>Up to 20</td>
<td>Up to 512</td>
<td>Down to 1.8V</td>
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<tr>
<td>STM32L0x1 Access</td>
<td>Up to 192</td>
<td>Up to 20</td>
<td>Up to 6K</td>
<td>Down to 1.65V</td>
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<tr>
<td>STM32L0x2 USB</td>
<td>Up to 192</td>
<td>Up to 20</td>
<td>Up to 6K</td>
<td>Down to 1.65V</td>
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</tr>
<tr>
<td>STM32L0x3 USB &amp; LCD</td>
<td>Up to 192</td>
<td>Up to 20</td>
<td>Up to 6K</td>
<td>Down to 1.65V</td>
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</tbody>
</table>

Note 1: Low-power peripherals available in ultra-low-power modes
Note 2: PVD = Programmable voltage detector

## STM32L0 ULTRA-LOW-POWER

- 33 DMIPS
- Dynamic run mode down to 49 μA/MHz (with external DC/DC) and 76 μA/MHz (with LDO)
- Stop mode with RAM + LTC (low-power time clock): 420 nA

Typical current at 125° C: 166 μA/MHz

Typ. current

Dynamic Run from Flash: 28 μA

Low-power Run at 32 kHz: 10 μA

Low-power Sleep at 32 kHz: 5.5 μA

Stop with RTC: 1.95 μA

Fast Wakeup time:
- Stop to Run from Flash: 5 μs (3.5 μs from RAM)
- Standby to Run: 50 μs

ULPMark-CP™ 244
ULPMark-PP™ 95

www.st.com/stm32l0
STM32L1 series

A MARKET-PROVEN SOLUTION
STM32L1 MCU Series - 32-bit Arm® Cortex®-M3

- Reset POR/PDR
- 2x watchdogs
- Hardware CRC
- Internal RC
- Crystal oscillators
- PLL
- RTC calendar
- 16- and 32-bit timers
- 1x12-bit ADC
- Temperature sensor
- Multiple-channel DMA
- Single-wire debug
- Unique ID
- USB 2.0 (with internal 48 MHz PLL)

<table>
<thead>
<tr>
<th>Product line</th>
<th>Flash (Kbytes)</th>
<th>RAM</th>
<th>EEPROM (Kbytes)</th>
<th>Memory I/F</th>
<th>Op-Amp</th>
<th>Comp</th>
<th>Temp Sensor</th>
<th>Capacitive Touch</th>
<th>Segment LCD Driver</th>
<th>AES 128-bit</th>
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<td>Up to 8 x 28</td>
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<tr>
<td>STM32L151 STM32L152</td>
<td>32 to 512</td>
<td>16 to 80</td>
<td>4 to 16</td>
<td>SDIO</td>
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<tr>
<td>STM32L162</td>
<td>256 to 512</td>
<td>32 to 80</td>
<td>8 to 16</td>
<td>SDIO</td>
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<td></td>
<td></td>
<td>Up to 8 x 28</td>
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</tbody>
</table>

STM32L1 ULTRA-LOW-POWER
- Arm® Cortex®-M3+ at 32 MHz, 33 DMIPS
- Dynamic run mode: down to 177 µA/MHz
- Stop with Full RAM retention 435 nA (1.3 µA with RTC)
- Standby mode + RTC: 900 nA with backup registers
- Standby mode: 280 nA with backup registers
- Dual-bank Flash memory and True embedded EEPROM
- Operates at up to 105 °C

ULPMark-CP™ 155
92.4

www.st.com/stm32l1
SUCCESSFULLY MEET ALL CHALLENGES

STM32L4 MCU Series - 32-bit Arm® Cortex®-M4 (DSP + FPU) - 80 MHz

<table>
<thead>
<tr>
<th>Product line</th>
<th>Flash (KB)</th>
<th>RAM (KB)</th>
<th>Memrory I/F</th>
<th>Op-Amp</th>
<th>CAN</th>
<th>Sigma Delta Interface</th>
<th>12-bit ADC</th>
<th>5 Mfps</th>
<th>16-bit HW oversampling</th>
<th>DAC</th>
<th>SAI</th>
<th>USB2.0 OTG</th>
<th>USB Device</th>
<th>Cortex-ART Accelerator™</th>
<th>Segment LCD driver</th>
<th>Product line Flash (KB)</th>
<th>RAM (KB)</th>
<th>MEM I/F</th>
<th>FSMS Op-A</th>
<th>CAN</th>
<th>16-bit HW oversampling</th>
<th>80 MHz</th>
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<tbody>
<tr>
<td>STM32L496**</td>
<td>512 to 1024</td>
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<td>2</td>
<td>2</td>
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<td>Up to 8x40</td>
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<td>STM32L4x6 - USB OTG + Segment LCD Lines</td>
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<td>STM32L476*</td>
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<td>2</td>
<td>1</td>
<td>8x ch</td>
<td>3</td>
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<td>STM32L4x5 - USB OTG lines</td>
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<td>8x ch</td>
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<td>STM32L4x3 - USB Device + Segment LCD lines</td>
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<td>STM32L433*</td>
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<td>12-bit ADC</td>
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<td>Up to 8x40</td>
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<td>STM32L4x2 - USB Device lines</td>
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<td>2</td>
<td>1</td>
<td>•</td>
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<td>STM32L412*</td>
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<td></td>
</tr>
<tr>
<td>STM32L431</td>
<td>128 to 256</td>
<td>64</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>12-bit ADC</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
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<td></td>
<td>STM32L4x1 - Access lines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: * HW crypto/hash functions are available on STM32L486, STM32L443, STM32L462, STM32L442 and STM32L422 - ** on STM32L4A6

STM32L4 ULTRA-LOW-POWER

- Up to 80 MHz/ 100 DMIPS with Chrom-ART Accelerator™
- Dynamic run mode at 28 µA/MHz
- Down to 450 nA with 32 kHz RTC + 16 Kbytes of RAM + I/Os
- Down to 200 nA with 32 kHz RTC or 8 nA without RTC
- Operates at up to 125 °C

STM32L4 Online training

www.st.com/stm32l4-online-training

www.st.com/stm32l4
A WIDE PORTFOLIO IN FULL PRODUCTION

### Flash memory size / RAM size (bytes)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>32-pin LQFP/QFN</td>
<td>-</td>
<td>-</td>
<td>LA62CE</td>
<td>LA52CE</td>
<td>LA51CE</td>
<td>L452CC</td>
<td>L451CC</td>
<td>L432KC</td>
<td>L431KB</td>
<td>L422KB</td>
</tr>
<tr>
<td>36-pin WLCSP</td>
<td>-</td>
<td>-</td>
<td>LA62RE</td>
<td>LA52RE</td>
<td>LA51RE</td>
<td>L452RC</td>
<td>L451RC</td>
<td>L432RC</td>
<td>L431RB</td>
<td>L422RC</td>
</tr>
<tr>
<td>48-pin LQFP/QFN</td>
<td>LA62CE</td>
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<td>LA62RE</td>
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<td>LA51CE</td>
<td>L452CC</td>
<td>L451CC</td>
<td>L432KC</td>
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<tr>
<td>49-pin WLCSP</td>
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<td>-</td>
<td>LA62RE</td>
<td>LA52RE</td>
<td>LA51RE</td>
<td>L452RC</td>
<td>L451RC</td>
<td>L432RC</td>
<td>L431RB</td>
<td>L422RC</td>
</tr>
<tr>
<td>64-pin LQFP/WLCSP UFBGA (0.5 mm pitch)</td>
<td>LA62CE</td>
<td>LA52CE</td>
<td>LA62RE</td>
<td>LA52RE</td>
<td>LA51CE</td>
<td>L452CC</td>
<td>L451CC</td>
<td>L432KC</td>
<td>L431KB</td>
<td>L422KB</td>
</tr>
<tr>
<td>72-pin LQFP/WLCSP UFBGA (0.6 mm pitch)</td>
<td>-</td>
<td>-</td>
<td>LA62RE</td>
<td>LA52RE</td>
<td>LA51RE</td>
<td>L452RC</td>
<td>L451RC</td>
<td>L432RC</td>
<td>L431RB</td>
<td>L422RC</td>
</tr>
<tr>
<td>81-pin LQFP/WLCSP UFBGA (0.6 mm pitch)</td>
<td>LA62CE</td>
<td>LA52CE</td>
<td>LA62RE</td>
<td>LA52RE</td>
<td>LA51CE</td>
<td>L452CC</td>
<td>L451CC</td>
<td>L432KC</td>
<td>L431KB</td>
<td>L422KB</td>
</tr>
<tr>
<td>100-pin LQFP/WLCSP UFBGA (0.6 mm pitch)</td>
<td>-</td>
<td>-</td>
<td>LA62RE</td>
<td>LA52RE</td>
<td>LA51RE</td>
<td>L452RC</td>
<td>L451RC</td>
<td>L432RC</td>
<td>L431RB</td>
<td>L422RC</td>
</tr>
<tr>
<td>132-pin LQFP/WLCSP UFBGA (0.5 mm pitch)</td>
<td>LA62CE</td>
<td>LA52CE</td>
<td>LA62RE</td>
<td>LA52RE</td>
<td>LA51CE</td>
<td>L452CC</td>
<td>L451CC</td>
<td>L432KC</td>
<td>L431KB</td>
<td>L422KB</td>
</tr>
<tr>
<td>144-pin LQFP/WLCSP UFBGA (0.8 mm pitch)</td>
<td>-</td>
<td>-</td>
<td>LA62RE</td>
<td>LA52RE</td>
<td>LA51RE</td>
<td>L452RC</td>
<td>L451RC</td>
<td>L432RC</td>
<td>L431RB</td>
<td>L422RC</td>
</tr>
<tr>
<td>169-pin UFBGA (0.5 mm pitch)</td>
<td>LA62CE</td>
<td>LA52CE</td>
<td>LA62RE</td>
<td>LA52RE</td>
<td>LA51CE</td>
<td>L452CC</td>
<td>L451CC</td>
<td>L432KC</td>
<td>L431KB</td>
<td>L422KB</td>
</tr>
<tr>
<td>132-pin UFBGA (0.5 mm pitch)</td>
<td>-</td>
<td>-</td>
<td>LA62RE</td>
<td>LA52RE</td>
<td>LA51RE</td>
<td>L452RC</td>
<td>L451RC</td>
<td>L432RC</td>
<td>L431RB</td>
<td>L422RC</td>
</tr>
<tr>
<td>100-pin UFBGA (0.6 mm pitch)</td>
<td>LA62CE</td>
<td>LA52CE</td>
<td>LA62RE</td>
<td>LA52RE</td>
<td>LA51CE</td>
<td>L452CC</td>
<td>L451CC</td>
<td>L432KC</td>
<td>L431KB</td>
<td>L422KB</td>
</tr>
<tr>
<td>64-pin LQFP/WLCSP UFBGA (0.5 mm pitch)</td>
<td>-</td>
<td>-</td>
<td>LA62RE</td>
<td>LA52RE</td>
<td>LA51RE</td>
<td>L452RC</td>
<td>L451RC</td>
<td>L432RC</td>
<td>L431RB</td>
<td>L422RC</td>
</tr>
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<td>351-pin UFBGA (0.6 mm pitch)</td>
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<td>LA52CE</td>
<td>LA62RE</td>
<td>LA52RE</td>
<td>LA51CE</td>
<td>L452CC</td>
<td>L451CC</td>
<td>L432KC</td>
<td>L431KB</td>
<td>L422KB</td>
</tr>
<tr>
<td>169-pin UFBGA</td>
<td>-</td>
<td>-</td>
<td>LA62RE</td>
<td>LA52RE</td>
<td>LA51RE</td>
<td>L452RC</td>
<td>L451RC</td>
<td>L432RC</td>
<td>L431RB</td>
<td>L422RC</td>
</tr>
<tr>
<td>132-pin UFBGA</td>
<td>LA62CE</td>
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<td>LA62RE</td>
<td>LA52RE</td>
<td>LA51CE</td>
<td>L452CC</td>
<td>L451CC</td>
<td>L432KC</td>
<td>L431KB</td>
<td>L422KB</td>
</tr>
</tbody>
</table>

**Legend**
- STM32L4x1 : Access lines
- STM32L4x2 : USB Device lines
- STM32L4x3 : USB Device + Segment LCD lines
- STM32L4x5 : USB OTG lines
- STM32L4x6 : USB OTG + Segment LCD lines
- With 128-/256-bit AES Hardware Encryption

---

**STM32L4 DEVICES OFFER THE LOWEST POWER CONSUMPTION VALUES ON THE MARKET (25 °C)**

![Dynamic Run from Flash memory](image1)

**V_{DD} range**

- **31 µA/MHz** Range 1
  - Up to 80 MHz
  - **28 µA/MHz** Range 2
  - Up to 26 MHz

![Wakeup to Run time](image2)

- **Dynamic Run**
  - from Flash memory
- **Stop-2**
  - with or w/out RTC
- **Standby + 16 Kbytes of RAM**
  - with or w/out RTC
- **Standby**
  - with or w/out RTC
- **Shutdown**
  - with or w/out RTC

### Power Consumption

- **Typical at 25° C**
  - **720 nA**
  - **950 nA**
  - **200 nA**
  - **450 nA**
  - **28 nA**
  - **280 nA**
  - **8 nA**
  - **200 nA**

**STM32L4**
LONGER BATTERY LIFE AND SUPERIOR USER EXPERIENCE

STM32L4+ MCU Series - 32-bit Arm® Cortex®-M4 (DSP + FPU) - 120 MHz

STM32L4+ ULTRA-LOW-POWER

- 233 ULPMark-CP score
- Chrom-GRC™ round display memory optimizer
- 20 nA in shutdown mode
- 2.5 μA in stop mode with full SRAM and peripheral states retention and with 4 μs wakeup time
- Down to 41 μA/MHz in active mode
- Superior graphic effects and fluid user interfaces thanks to ST’s Chrom-ART Accelerator™
- Zero wait state execution from internal Flash memory thanks to ST’s ART-Accelerator™
A BRAND NEW PORTFOLIO IN FULL PRODUCTION

STM32L4+ DEVICES POWER CONSUMPTION

V_{DD} range

Typical at 25° C

55 µA/MHz
Range 1
Up to 120 MHz

43 µA/MHz
Range 2
Up to 26 MHz

2.5 µA/
2.9 µA

242 nA/
390 nA

42 nA/
190 nA

22 nA/
180 nA

Dynamic Run
from Flash memory

Stop-2
with or w/out RTC

Standby +
4 Kbytes of RAM
with or w/out RTC

Standby
with or w/out RTC

Shutdown
with or w/out RTC

STM32L4+

Wakeup to Run time
• From Stop-2: 4 µs
• From Standby: 14 µs
• From Shutdown: 250 µs

Legend

■ STM32L4R9/S9 ■ STM32L4R5/S5 ■ STM32L4R7/S7 ■ STM32L4P5/Q5

With 128-/256-bit AES Hardware Encryption
STM32L5 series

Excellence in ultra-low power with more security

EXCELLENCE IN ULTRA-LOW-POWER WITH MORE SECURITY

STM32L5 MCU Series - 32-bit Arm® Cortex®-M33 (TrustZone®+ DSP + FPU) - 110 MHz

<table>
<thead>
<tr>
<th>Product line</th>
<th>FLASH (KB)</th>
<th>RAM (KB)</th>
<th>Memory I/F</th>
<th>2 x Op-Amp</th>
<th>4ch / 2x Sigma Delta Interface</th>
<th>12-bit ADC 5 Mbps 16 bit HW oversampling</th>
<th>USB2.0 Device</th>
<th>CAN-FD</th>
<th>AES, PKA, OTFDEC 128/256-bit</th>
</tr>
</thead>
<tbody>
<tr>
<td>STM32L552</td>
<td>512 to 256</td>
<td>256</td>
<td>SDIO FSMC Octo SPI</td>
<td>•</td>
<td>•</td>
<td>2</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>USB Device &amp; CAN-FD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>STM32L562</td>
<td>512</td>
<td>256</td>
<td>SDIO FSMC Octo SPI</td>
<td>•</td>
<td>•</td>
<td>2</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>USB Device &amp; CAN-FD &amp; AES</td>
<td></td>
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</table>

STM32L5 ULTRA-LOW-POWER

- New Arm Cortex-M33 at 110 MHz performance: +20% versus Cortex-M4
- New ST ART Accelerator: working both on internal and external Flash (8 Kbytes of instruction cache)
- Embedded SMPS step down converter (optional)
- Flexible hardware and software secure isolations with TrustZone®
- 17 nA in shutdown mode
- 3 μA in stop mode with full SRAM and peripheral states retention and with 5 μs wake-up time
- Down to 62 μA/MHz in active mode
- 165 DMIPS
STM32L5 PORTFOLIO

Flash memory size / RAM size (bytes)

<table>
<thead>
<tr>
<th>Pin count</th>
<th>Flash memory size / RAM size (bytes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>48-pin LQFP/QFN</td>
<td>512 K / 256 K</td>
</tr>
<tr>
<td>64-pin LQFP</td>
<td>512 K / 256 K</td>
</tr>
<tr>
<td>81-pin WLCSP</td>
<td>256 K / 256 K</td>
</tr>
<tr>
<td>100-pin LQFP</td>
<td>256 K / 256 K</td>
</tr>
<tr>
<td>132-pin UFBGA (0.5 mm pitch)</td>
<td>256 K / 256 K</td>
</tr>
<tr>
<td>144-pin LQFP</td>
<td>256 K / 256 K</td>
</tr>
</tbody>
</table>

Legend:
- without HW crypto
- with HW crypto

STM32L5 DEVICES’ POWER CONSUMPTION

Wakeup to Run time
- From Stop-2: 5 µs
- From Standby: 14 µs
- From Shutdown: 250 µs

<table>
<thead>
<tr>
<th>Mode</th>
<th>Current Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic Run from Flash memory</td>
<td>3.1 µA</td>
</tr>
<tr>
<td>Stop 3 with or w/out RTC</td>
<td>475 nA</td>
</tr>
<tr>
<td>Standby + 16 KBytes of RAM with or w/out RTC</td>
<td>300 nA</td>
</tr>
<tr>
<td>Standby with or w/out RTC</td>
<td>110 nA</td>
</tr>
<tr>
<td>Shutdown with or w/out RTC</td>
<td>44.7 µA/MHz Range 1 Up to 160 MHz</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>Typical at 25° C</td>
<td></td>
</tr>
</tbody>
</table>
# STM32U5 Series

The flagship of ultra-low power MCUs with advanced performance and security

## Excellence in Ultra-Low-Power with More Security

### STM32U5 MCU Series - 32-bit Arm® Cortex®-M33 (TrustZone®+ DSP + FPU) - 160 MHz

<table>
<thead>
<tr>
<th>Product line</th>
<th>FLASH (KB)</th>
<th>RAM (KB)</th>
<th>Memory I/F</th>
<th>2 x Op-Amp</th>
<th>2 x Comp</th>
<th>8ch / 4x MDF/ADF</th>
<th>1 x 14-bit ADC</th>
<th>USB-C FS Dual Role</th>
<th>CAN-FD</th>
<th>AES 128/256-bit</th>
<th>PKA</th>
<th>OTFDEC On the Fly Decryption</th>
</tr>
</thead>
<tbody>
<tr>
<td>STM32U575</td>
<td>2048 to 1024</td>
<td>786</td>
<td>SDIO FSMC 2x Octo SPI</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
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<td>•</td>
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</tr>
<tr>
<td>STM32U585</td>
<td>2048</td>
<td>786</td>
<td>SDIO FSMC 2x Octo SPI</td>
<td>•</td>
<td>•</td>
<td>•</td>
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<td>•</td>
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</tr>
</tbody>
</table>

### STM32U5 Ultra-Low-Power

- Arm Cortex-M33 running at 160 MHz
- New ST ART Accelerator: working both on internal and external Flash (8 Kbytes of instruction cache)
- Embedded SMPS step down converter (optional)
- Flexible hardware and software secure isolations with TrustZone®
- PSA Certified level 3 and SESIP (Security Evaluation Standard for IoT Platforms) level 3 certified
- 160 nA in shutdown mode
- Down to 19 µA/MHz in active mode
- 240 DMIPS

---

[STM32U5 Online Training](www.st.com/stm32u5-online-training)

www.st.com/stm32u5
STM32U5 PORTFOLIO

Flash memory size / RAM size (bytes)

<table>
<thead>
<tr>
<th></th>
<th>STM32U585CI</th>
<th>STM32U585RI</th>
<th>STM32U585OI</th>
<th>STM32U585VI</th>
<th>STM32U585QI</th>
<th>STM32U585ZI</th>
<th>STM32U585AI</th>
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</thead>
<tbody>
<tr>
<td>2 M</td>
<td>STM32U575CI</td>
<td>STM32U575RI</td>
<td>STM32U575OI</td>
<td>STM32U575VI</td>
<td>STM32U575QI</td>
<td>STM32U575ZI</td>
<td>STM32U575AI</td>
</tr>
<tr>
<td>1 M</td>
<td>STM32U575CG</td>
<td>STM32U575RG</td>
<td>STM32U575OG</td>
<td>STM32U575VG</td>
<td>STM32U575QG</td>
<td>STM32U575ZG</td>
<td>STM32U575AG</td>
</tr>
</tbody>
</table>

Legend: 
- without HW crypto
- with HW crypto

STM32U5 DEVICES’ POWER CONSUMPTION

- VDD range
  - Range 1: 44 µA/MHz
  - Range 4: 19.5 µA/MHz

Typical at 25°C

Wakeup to Run time
- From Stop-2: 5 µs
- From Standby: 14 µs
- From Shutdown: 250 µs

- Dynamic Run from Flash memory
- Stop-2 with full SRAM or with 16 Kbytes
- Stop-3 with full SRAM or with 16kB
- Standby with or w/out RTC
- Shutdown with or w/out RTC

8.95/4.0 µA
4.3 / 1.9 µA
440/210 nA
390/160 nA
STM32 HARDWARE TOOLS
www.st.com/stm32hardwaretools

Various types of development boards enable you to get started with STM32 products

- STM32 Nucleo boards provide an affordable and flexible way for anyone to try out new ideas and build prototypes with a wide choice of specialized expansion boards.
- The Discovery kits enable users to seamlessly explore key low-power features of STM32 ultra-low-power products, while the evaluation boards let you evaluate all MCU functions and peripherals.
- All these development boards include an integrated debugger/programmer as well as a comprehensive software library with examples that help developers take advantage of STM32 capabilities.

STM32 Nucleo boards
Discovery kits
Evaluation boards

Flexible prototyping
Creative demos
Full-feature evaluation

STM32 DISCOVERY KIT IOT NODE
The Discovery kits for IoT node allows users to develop power-efficient systems with direct connection to cloud servers.
This Discovery kit enables a wide diversity of applications by exploiting low-power communication (BLE, SubGHz, NFC) and WiFi, together with a complete collection of motion, gesture and environmental sensors.
The X-CUBE-CLD-GEN software package provides all the components needed to prototype end-to-end IoT solutions, including pre-integrated full application examples.

STM32 CELLULAR-TO-CLOUD DISCOVERY PACK
The P-L496G-CELL02 pack combines an STM32L496 Discovery board and a STMod+ Cellular add-on board, based on Quectel’s BG96 modem for LTE Cat M1/NB1 + 2G networks.
Software includes an embedded JavaScript engine running on STM32 for live coding, and an X-CUBE-CLD-GEN STM32Cube expansion package.
This Cellular-to-Cloud Discovery Pack also includes an ST eSIM with a complimentary trial plan from a telecom partner, while various partner Cloud services can be evaluated by mass-market developers.
STM32 NUCLEO

- Open platform with one MCU and integrated debugger/programmer
- Wide choice of connectors for unlimited extension capabilities:
  - Arduino Uno Rev3 connectors on Nucleo-64 and Nucleo-144, Arduino Nano on Nucleo-32
  - ST Zio connectors to access a wider range of peripherals on Nucleo-144
  - ST Morpho connectors for direct access to all MCU I/Os on Nucleo-64 and Nucleo-144
- Support for multiple IDEs and Arm® mbed™ online tools

STM32L WIRELESS CONNECTIVITY SOLUTIONS: LoRaWAN™
www.st.com/stm32-lrwan

As a strong player on LPWAN, ST offers up to 3 affordable and easy-to-use sets of hardware tools dedicated to the evaluation and development of LoRa® solutions which combined with the LoRaWAN software expansion package for STM32Cube (i-CUBELRWAN) is the quickest way to build a LoRaWAN end-node device. Check out the STM32 LoRa® Discovery kit (B-L072Z-LRWAN1), the STM32 expansion board (i-NUCLEO-LRWAN1) and the STM32 Nucleo packs (P-NUCLEO-LRWAN2/3).

STM32 Nucleo expansion boards

www.st.com/x-nucleo

STM32 Nucleo development boards can easily be expanded through a variety of addon boards. These expansion boards open the door to any type of application leveraging the appropriate mix of performance/peripherals/powers within the comprehensive STM32 family.

Each expansion board integrates the necessary components to implement specialized features of a chosen application, and comes with complementary STM32 software modules.

STM32 Nucleo expansion boards from ST and third parties
STM32 SOFTWARE DEVELOPMENT TOOLS
www.st.com/stm32softwaretools

STM32CubeMX

IDEs
STM32CubeProgrammer
STM32CubeMonitor

Free IDE

Configure and generate code
Compile and debug
Monitor & program

Specific focus on STM32L series
Build your own chip configuration, select the battery type or configure your own, define a sequence of steps representing your application, and use the STM32CubeMX Power Consumption Calculator wizard to determine power consumption and battery life results.
STM32 Power Shield: EEMBC-approved power-monitoring technology for energy-critical embedded development

To check the power consumption of embedded designs accurately, the STM32 Power shield (X-NUCLEO-LPM01A) provides developers an affordable tool with an ideal measurement range for ultra-low-power devices, such as IoT endpoints. This STM32 tool features voltage supply to the target down to 1.8V, measures dynamic current from 100nA to 50mA, and directly computes EEMBC ULPMark scores.

The STM32L562-DK discovery kit embeds an Energy Meter to monitor dynamic currents from 300nA to 150mA. Together with the STM32CubeMonitor-Power graphical application (STM32CubeMonPwr), users will be able to visualize the data captured to make better-informed decisions.
Specific offers for STM32L series

<table>
<thead>
<tr>
<th>Product</th>
<th>STM32L0</th>
<th>STM32L1</th>
<th>STM32L4</th>
<th>STM32L4+</th>
<th>STM32L5</th>
<th>STM32U5</th>
</tr>
</thead>
<tbody>
<tr>
<td>STM32Snippets</td>
<td>●</td>
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<tr>
<td>Standard Peripheral Library</td>
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<td>STM32Cube HAL</td>
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<td>●</td>
<td>●</td>
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<td>●</td>
<td>●</td>
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<tr>
<td>STM32Cube LL</td>
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User recommendations

STM32Cube HAL is the best answer when a high level of portability is required. STM32Cube LL APIs allow user control down to the register level, thus minimizing software overhead and allowing power consumption optimization. Both are available on all STM32L devices (part numbers: STM32CubeL0, STM32CubeL1, STM32CubeL4, STM32CubeL5, STM32CubeU5).

STM32L1 users:

- Standard Peripheral Library ensures a good portability level between all STM32L1 devices (part number: STSW-STM32077). STM32Cube is still highly recommended for new designs.

STM32L0 users:

- For STM32L0 users, STM32Snippets allow to control the hardware with minimal software overhead therefore optimizing power consumption (part number: STM32SnippetsL0). STM32Cube is still highly recommended for new designs.

CERTIFICATIONS
ST is fully committed at certifying its solutions by independent recognized authority.

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Based on PSA and SESIP certifications, STM32Trust helps designers meet the requirements of their pre-defined security assurance levels

www.st.com/stm32trust